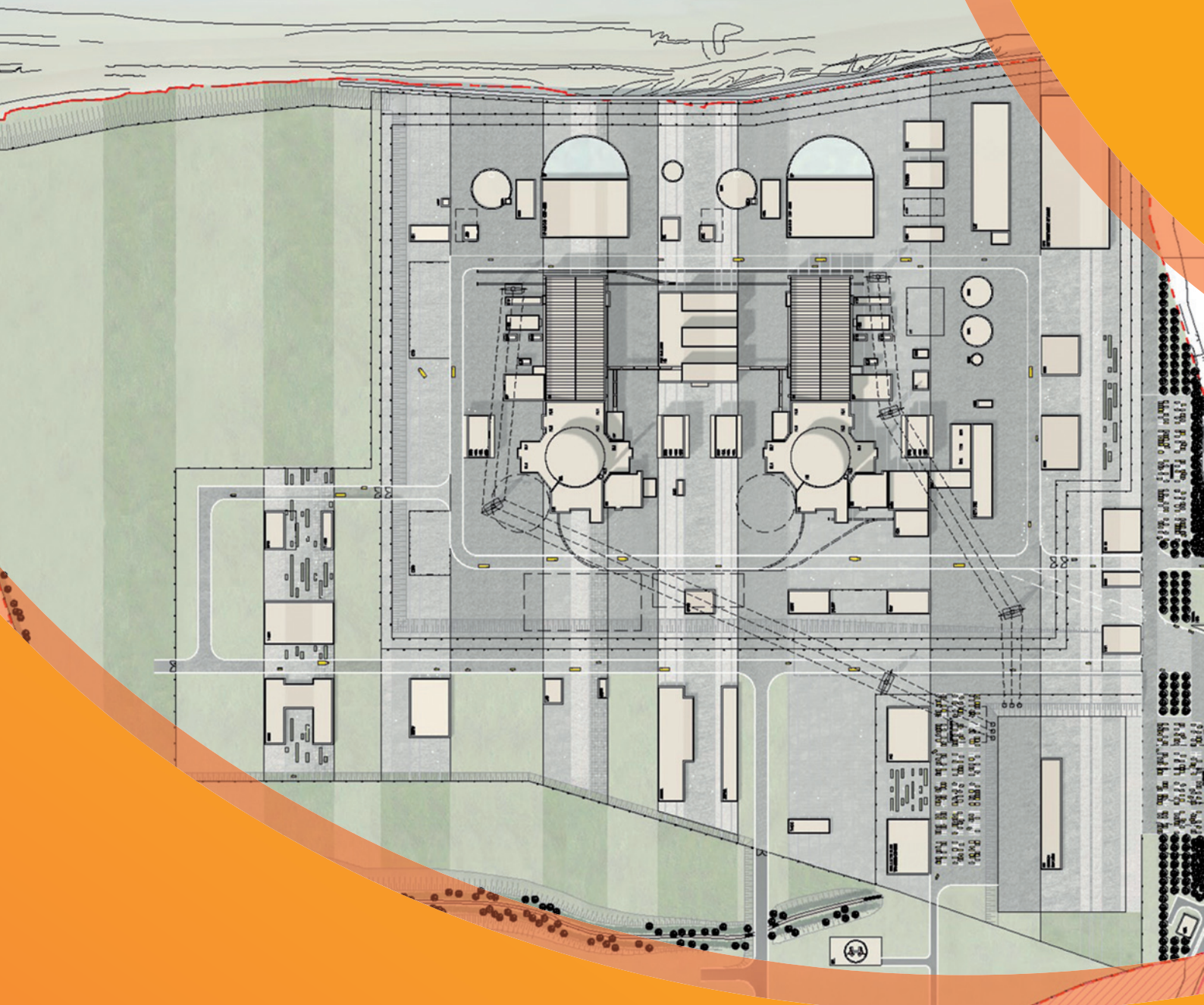


Hinkley Point C | Proposed Nuclear Development



ENVIRONMENTAL IMPACT ASSESSMENT
SCOPING REPORT
JANUARY 2010

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COMMON ABBREVIATIONS

AA	Appropriate Assessment
CPA	Coast Protection Act
DCLG	Department of Communities and Local Government
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
EDF	Electricité de France
EIA	Environmental Impact Assessment
ES	Environmental Statement
FEPA	Food & Environment Protection Act
IPC	Infrastructure Planning Commission
MFA	Marine & Fisheries Agency
MMO	Marine Management Organisation
SCC	Somerset County Council
SDC	Sedgemoor District Council
TCPA	Town & Country Planning Act
WSC	West Somerset Council

1 INTRODUCTION

1.1 Intention to Apply for Planning Consent at Hinkley Point

- 1.1.1 EDF Energy intends to submit an application for a Development Consent Order (DCO) to the Infrastructure Planning Commission (IPC) to develop a new nuclear power station at Hinkley Point, Somerset to be known as Hinkley Point C. In addition, the DCO will contain proposals, including options for associated development away from the power station site that is deemed necessary to construct and operate the plant. This category of development is defined as Off-site Associated Development (OAD). The application will comprise full details of all development proposals and will be accompanied by an Environmental Statement (ES) (conforming to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (SI 2009/2263)) and other documents including a statement on pre-application consultation.
- 1.1.2 This report sets out the proposed content, methodologies and key issues to be included in the Environmental Impact Assessment (EIA) and the resulting ES to be submitted with the application.

1.2 Site Location

- 1.1.3 Hinkley Point is located on the west Somerset coast, 25km to the east of Minehead and 12km to the north-west of Bridgwater. The indicative site upon which the nuclear power station is to be constructed (the Hinkley Point C site) is shown coloured red on **Figure 1**. The site is bounded to the north by Bridgwater Bay and to the west by land in agricultural production. The village of Shurton lies to the south. The permanent nuclear power station development will cover approximately 69 hectares (ha) and this is shown shaded pink. Locations of the Marine and Off-shore Works are shown in **Figure 2** and OAD in **Figure 3**.
- 1.1.4 Immediately to the east, the land is occupied by two nuclear power stations, Hinkley Point A and Hinkley Point B, which form the existing Hinkley Point Power Station Complex (as in **Figure 1**). Hinkley Point A operated between 1965 and 2000 and is currently undergoing decommissioning under the control of the Nuclear Decommissioning Authority (NDA). Hinkley Point B, owned by EDF Energy, has operated since 1976 and is scheduled to continue generating until at least 2016.

1.3 New Nuclear Development at Hinkley Point

a) The Need for New Nuclear Development

- 1.1.5 The Government's White Paper on Nuclear Power¹ and the UK Low Carbon Transition Plan² suggest a role for new nuclear generation as part of a low carbon energy mix,

¹ Department for Business Enterprise and Regulatory Reform (BERR) (January 2008) 'Meeting the Energy Challenge – A white paper on nuclear power'

tackling the challenges of energy security and climate change. Nuclear power is the most affordable, large-scale, low carbon generating technology currently available that can provide secure supplies of electricity for the UK. It is a technology that the UK has successfully exploited for more than 50 years for electricity generation and at its peak in 1998 accounted for 26% of UK generation. However, as the older nuclear power stations reach the end of their lives, this share has declined to below 15%.

- 1.1.6 The Government's draft Nuclear National Policy Statement (NPS)³ emphasises the need for the UK to take account of the ability to develop new nuclear power stations significantly earlier than 2025 so to displace CO₂, and achieve the Government's objective of achieving an electricity supply that is almost entirely 'decarbonised' by 2050.
- 1.1.7 The draft Nuclear NPS considers the need for and siting of new nuclear power stations at a strategic level, identifying those sites that are in principle suitable for new nuclear power stations. These sites, including Hinkley Point, were identified through the Government's Strategic Siting Assessment (SSA). Such sites are credible for deployment by 2025.
- 1.1.8 Unless action is taken now to invest in new nuclear power stations, carbon emissions from electricity generation are likely to rise and energy security will be at increased risk. It is on this fundamental basis that EDF Energy believes there is a pressing need for new nuclear development. The proposed nuclear power development at Hinkley Point C will provide more than 6% of the UK's electricity requirements. This will represent a significant contribution to the Government's energy policy aims in its own right.

b) Suitability of the Hinkley Point C Site

- 1.1.9 EDF Energy nominated the Hinkley Point C site into the Government's SSA process and believes the site is strategically suitable. Key attributes of the site include:
- Adjacent to an existing nuclear operation. There has been a nuclear power station at Hinkley Point since 1965 and the community is familiar with the technology and the employment opportunities it offers;
 - Planning precedent following a lengthy public enquiry. In 1990 planning consent was granted for a single reactor within the proposed site;
 - Technical and safety conditions. Hinkley Point is connected to the National Grid transmission network, although upgrades and reinforcement will be required. The provision of direct cooling using water from Bridgwater Bay is established and is the preferred option for new nuclear development; and
 - Ground conditions are considered suitable for development.

² HM Government (July 2009) 'The UK Low Carbon Transition Plan, National strategy for climate and energy'

³ Department for Energy and Climate Change (DECC) (November 2009) 'Draft National Policy Statement for Nuclear Power Generation (EN-6)'

1.1.10 EDF Energy also reviewed potential alternative sites against a range of criteria to assist its SSA nomination and found Hinkley Point is likely to be an appropriate location for development.

1.1.11 The nominated Hinkley Point site was assessed under the SSA to be potentially suitable for the deployment of new nuclear power stations by the end of 2025. This SSA process has informed the development of the draft Nuclear NPS, which as well as setting out the Government's policy on the national strategic issues, also reduces the need, as far as possible, for the IPC to consider alternative sites. The Nuclear NPS provides overall and site-specific guidance on nuclear specific impacts and siting issues intended to aid the IPC's assessment of specific potential impacts of new nuclear power stations.

c) Proposed Development

1.1.12 The proposed development at Hinkley Point C would comprise two UK European Pressurised Reactor (EPR) units. The expected electrical output of the nuclear power station will be approximately 1,630 megawatts (MW) per unit giving a total site capacity of 3,260MW. This will meet more than 6% of the UK's electricity needs, the equivalent of supplying approximately 5 million homes.

1.4 Development Objectives

1.4.1 EDF Energy has set the following objectives for its proposed development of a new nuclear power station at the Hinkley Point C site:

- To construct two UK EPR reactor units and associated facilities on the Hinkley Point C site to the highest standards of safety, quality and operational efficiency; to have the first reactor operational by the end of 2017 and the second by 2020;
- To manage the construction in a way that maximises efficiency and minimises disruption to the local community;
- To provide positive socio-economic benefits to the local community, e.g. through opportunities for training, employment and participation in the supply chain;
- To make a positive contribution to the locality, e.g. by taking forward development in line with regional and local priorities for regeneration;
- Where possible, to create infrastructure that has a long-term, sustainable legacy benefit for the local community;
- To minimise as far as reasonably practicable any negative environmental impacts and seek opportunities for environmental enhancement; and
- To be a 'good neighbour' and ensure the needs and views of the local community are fully taken into account.

1.5 Request for Scoping Opinion

1.5.1 This Scoping Report accompanies a written request to the IPC for a Scoping Opinion in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (SI 2009/2263). This request for a scoping opinion is accompanied by:

- A plan sufficient to identify the site (the Hinkley Point C site, and the OAD) which is the subject of the proposed development (see **Figure 1** to **Figure 3**); and
- A brief description of the nature and purpose of the proposed development (see **Section 3**) and its potential effects on the environment (see **Sections 5** and **6**).

a) The Scoping Report

1.5.2 This EIA Scoping Report builds upon an original Scoping Report submitted to the Department of Energy and Climate Change (DECC) in November 2008 and the subsequent opinion received in February 2009. The main purpose of requesting a further opinion is to ensure that the entirety of the development, both on and off-site has been included in the scoping process. It provides an outline description of the environmental baseline for the development areas, including all OAD, and summarises the work that has been undertaken, or that is planned to further inform this baseline. It also provides a preliminary view of the key issues associated with the proposals to help inform the scoping opinion.

b) Structure of the Scoping Report

1.5.3 This section (**Section 1**) introduces the EIA process, the proposed development site, and provides an overview of consultation carried out to date.

1.5.4 **Section 2** describes the consenting and regulatory regime determining the development.

1.5.5 **Section 3** provides more detailed information relating to the development proposals, outlining the sites and areas covered by this scoping report.

1.5.6 **Section 4** provides information on the EIA process, incorporating cumulative impact assessment, the Habitats Regulations Assessment, environmental management and the approach which will be taken towards the issue of sustainability.

1.5.7 **Sections 5** and **6** provide a summary of the baseline environmental studies and potential effects of the Hinkley Point C site and proposed OAD according to the following topics:

- Geology, soils and land use;
- Land contamination;
- Hydrogeology;
- Hydrology, drainage and flood defence;
- Fresh water quality;

- Marine water and sediment quality;
- Hydrodynamics and coastal geomorphology;
- Terrestrial flora and fauna, including ornithology;
- Marine and coastal flora and fauna;
- Transportation;
- Noise and vibration;
- Air quality;
- Radiological effects;
- Landscape and visual amenity;
- Archaeology and cultural heritage;
- Amenity and recreation; and
- Socio-economics.

1.5.8 For the Hinkley Point C site the baseline environment is summarised; studies undertaken to date to inform the impact assessment (e.g. surveys, reviews and consultation) are briefly discussed; and the proposed approach for continued assessment (e.g. further studies) is set out, where applicable.

1.5.9 For the OAD, the proposed elements have been grouped according to location, in order to facilitate more general description of the environmental baseline, the assessment approach, and an indication of likely issues.

1.5.10 **Section 7** provides a brief summary of the Scoping Report and the next steps towards the DCO application.

2 LEGISLATIVE AND REGULATORY REGIME

2.1 A New Planning Process for Major Infrastructure

- 2.1.1 The Planning Act 2008 (the Act) introduced a new planning regime for Nationally Significant Infrastructure Projects (NSIPs), including energy projects. The objective of the new regime is to improve the process for delivering major infrastructure projects, making the process faster and fairer. Under the Act the Infrastructure Planning Commission (IPC) has been established to consider applications for NSIPs from 1 March 2010.
- 2.1.2 The Act also provides for Government to produce National Policy Statements (NPSs) setting out the national need for strategically significant infrastructure and helping to set the strategic policy framework within which the IPC will consider individual applications. The draft Nuclear NPS⁴ sets out the Government's assessment of the need for new nuclear power. The Government's Strategic Siting Assessment (SSA) forms part of the draft Nuclear NPS.
- 2.1.3 A DCO authorising the project works will be subject to determination by the IPC following a detailed examination of the proposed development, including its local impacts. As part of this assessment, the IPC must have regard to the ES which EDF Energy will submit under The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 and any requirement to carry out an Appropriate Assessment under the Conservation (Natural Habitats, & c.) Regulations 1994.
- 2.1.4 The DCO may include consents required under a number of other licensing regimes, if the relevant licensing bodies agree. In particular, a DCO may include authorisations or permits normally issued by the Environment Agency, for instance under the Environmental Permitting (England and Wales) Regulations 2007, for activities such as standby combustion plant. A DCO may also grant deemed consent for works to be carried out at the Hinkley Point C site below Mean High Water Spring Tide (see **Section 3.3.3**). The DCO may also include powers of compulsory purchase.
- 2.1.5 Licensing of the proposed Hinkley Point C site under the Nuclear Installations Act 1965 will remain a separate process outside the control of the IPC. The Nuclear Installations Inspectorate (NII) is responsible for nuclear site licensing and will not grant this licence until it is satisfied that the design meets their standards and that organisational and safety issues are appropriately addressed. A process of Generic Design Assessment (GDA) is currently being carried out by the Health and Safety Executive (HSE) and the Environment Agency to assist the licensing process; the GDA is scheduled to be completed in June 2011. This process allows the generic safety, security and environmental implications of new nuclear reactor designs to be assessed before an application is made for a licence and permissions to build a

⁴ Department for Energy and Climate Change (DECC) (November 2009) 'Draft National Policy Statement for Nuclear Power Generation (EN-6)'

particular design of reactor on a particular site. The UK EPR developed by AREVA and EDF Energy is currently being assessed under the GDA.

- 2.1.6 EDF Energy must also have a Funded Decommissioning Programme (FDP) approved by Secretary of State (SoS) under the Energy Act 2008 before it can commence the installation of the nuclear reactors. The FDP will set out the technical basis for decommissioning the nuclear power station as well as the financial and legal arrangements to ensure that operators will meet the full costs of decommissioning and their full share of waste and spent fuel management costs in the future.

2.2 Alternative Solutions to Nuclear

- 2.2.1 Alternative solutions to nuclear power are assessed in the Government's draft Nuclear NPS against the core objectives of energy policy, which are to maintain security and affordable supplies and to help make the transformation to a low carbon economy.

- Renewables. The Government is committed to delivering 15% of final energy consumption from renewables by 2020, a demanding target which is dependent on financial incentives. Most renewables are intermittent in terms of electricity production, which limits the proportion of electricity generation that they can provide.
- Carbon Capture and Storage. Although it may prove feasible to capture and store the carbon dioxide produced from fossil fuel-powered energy generation this technology has not yet been proven for a full scale power station and cannot be regarded as a credible short-term alternative.
- Reduction in Demand. Demand for electricity is still expected to grow overall in the medium to long-term, driven by economic growth and an increased role for electricity in providing energy for heating and transport.

2.3 The Nuclear Regulatory Regime

- 2.3.1 Nuclear power stations are subject to a wide range of legislation and regulation, including safety, security and environmental aspects, by the UK's nuclear regulators. EDF Energy is developing applications for a Nuclear Site Licence, a Radioactive Substances Act 1993 (RSA) discharge authorisation and other environmental consents, which will be considered in parallel with the DCO application to the IPC. Site specific information will progressively build upon that provided to the UK's nuclear regulators as part of the GDA process, which has involved a rigorous and structured examination of detailed design information by all the nuclear regulators.
- 2.3.2 As part of the DCO determination, the IPC will consult with the key regulators, including the HSE and the Environment Agency. Before a decision is made the IPC will need to be satisfied, in principle, that the development can proceed safely and with due consideration given to the environment as set out below:

- **Safety.** The main element of the UK nuclear regulatory framework is the Nuclear Installations Act 1965, underpinned by the more general Health and Safety at Work Act 1974. The HSE through its Nuclear Installations Inspectorate (NII) scrutinises operators' nuclear activities.
- **Security.** The HSE through its Office for Civil Nuclear Security (OCNS) is the security regulator for the UK's civil nuclear industry under the authority of the Nuclear Industries Security Regulations (NISR) 2003 (as amended). Transporters of nuclear material to or from civil nuclear licensed sites must be approved by OCNS, and security vetting is also conducted by the OCNS.
- **Environment.** Under the RSA, the Environment Agency regulates all disposals of radioactive waste (in England and Wales). The Environment Agency also regulates: abstraction from and discharges to controlled waters; operation of specific 'conventional' plant; assessment and, where necessary, clean-up of contaminated land; disposal of conventional waste; and certain flood risk management matters.
- **Emergency preparedness.** Potential for an accidental release of radioactive material from nuclear power stations can never be completely ruled out. However the operator has a legal obligation to demonstrate risks are reduced to be as low as reasonably practicable. It is a condition of a Nuclear Site Licence that an operator has in place on-site emergency arrangements, and the Radiation Emergency Preparedness and Public Information Regulations 2001 require the relevant local authority to prepare adequate off-site emergency plans (working closely with the operator).
- **Transport.** The Department for Transport (DfT) Dangerous Goods Division is the Competent Authority for the transport of all radioactive material to and from the Hinkley Point C site.

2.4 Regulatory Justification of the UK EPR Reactor Unit Design

- 2.4.1 In parallel with the planning process the Justification of Practices Involving Ionising Radiation Regulations 2004 (Justification Regulations, in accordance with the EURATOM Treaty) require a demonstration that the benefits of a new practice outweigh any detriment to health. The Government has already consulted on the Nuclear Industry Association (NIA) application covering the UK EPR reactor unit and expects to consult on its draft decision. A positive decision by the Justifying Authority (DECC) would enable the UK EPR design, proposed for Hinkley Point C, to be used in the UK.

3 DESCRIPTION OF PROPOSED DEVELOPMENT

3.1 Development Proposals

3.1.1 Under the Planning Act 2008 (the Act), Nationally Significant Infrastructure Project (NSIP) development is divided into two categories.

- The NSIP itself, in this case a generating station (plant and buildings involved in the generation of electricity), referred to as Hinkley Point C Nuclear Power Station; and
- Associated development, such as offices, car parking and land required on a temporary basis for construction, both on and offsite. Under Section 115 of the Act this can be included as part of the overall development proposal if it can be reasonably demonstrated that it is needed to enable construction and operation.

3.1.2 The NSIP and on-site associated development are collectively referred to as the Hinkley Point C site. For the purposes of the EIA the Hinkley Point C site has been subdivided into the Built Development Area West, Built Development Area East and the Southern Construction Area (see **Figure 4**).

3.1.3 Development located away from the nuclear power station site, such as accommodation and transport infrastructure, is referred to as Off-site Associated Development (OAD) (as shown in **Figure 3**). These three elements of the development are introduced below.

3.2 Hinkley Point C Nuclear Power Station

a) Nuclear Reactors

3.2.1 The proposed Hinkley Point C nuclear power station design will comprise two UK EPR reactor units and shared facilities. The reactor unit is a development of existing technology, is designed for a lifetime of 60 years and makes more efficient use of fuel than current designs, thus reducing the quantities of spent fuel.

3.2.2 Generated steam powers a single large turbine, directly connected to a generator capable of producing around 1,630MW of electrical power. Electricity is exported by overhead lines to the National Grid transmission network. Seawater is used to condense the steam back to water before it is returned to the steam generators.

b) Safety Systems

3.2.3 Two simple principles are applied in delivering nuclear safety:

- ‘Protective barriers’ involves placing leak-tight physical barriers between radioactive materials and the environment; and
- ‘Defence-in-depth’ involves identifying threats to the integrity of the protective barriers providing successive lines of defence to protect them from failure.

3.2.4 Diverse systems are installed for safe reactor shutdown in the event of any faults, and essential buildings are designed to withstand identified human and natural hazards.

c) Fuel and Waste

3.2.5 Operational radioactive waste from a UK EPR reactor unit arises in solid, liquid and gaseous form. New and spent fuel is handled in the fuel building adjacent to the reactor building. Spent fuel is highly radioactive and is stored underwater in a fuel pond. The waste building will provide a shared service for both proposed reactors.

d) **Ancillary Buildings**

3.2.6 The nuclear auxiliary building houses reactor support functions such as water treatment plant and ventilation systems. A separate building houses offices and workshops for operations and maintenance staff for both reactor units.

3.3 Associated Development

a) **On-site Associated Development**

3.3.1 On-site Associated Development comprises:

- All infrastructure and facilities needed to support the operation of the nuclear power station including offices, workshops, storage buildings and transport infrastructure and car parks;
- A sea wall along the frontage of the site for coastal protection;
- Interim spent fuel storage facilities;
- Interim radioactive waste storage facilities;
- Cooling water tunnels (two intake and one outfall) and associated infrastructure;
- Construction areas and facilities including a Temporary Aggregates Jetty (the jetty) for bulk aggregate delivery;
- Temporary accommodation for construction workers;
- Spoil disposal/landscape integration; and
- Transmission infrastructure from the generating station to a proposed National Grid sub-station. Although both the new sub-station and overhead lines to the existing Hinkley connection will form part of a separate DCO submission from the National Grid, the transmission infrastructure will be considered in the assessment of cumulative impacts.

b) Off-site Associated Development

3.3.2 OAD considered necessary to construct and operate the nuclear power station include:

- A Cannington bypass around the village of Cannington;
- Accommodation facilities for construction workers (campuses);
- Park and ride facilities;
- Freight consolidation/storage facilities;
- Refurbishment of Combwich Wharf and a heavy loads berthing facility;
- Temporary laydown and storage facilities on land adjacent to Combwich Wharf;
- Road improvements; and
- Spoil disposal/landscape integration.

3.3.3 Fixed options and locations for OADs will be determined following optioneering and the outcomes of the first stage of the formal consultation exercise, in order to inform the second stage of the consultation and DCO application. The location of the OAD options under consideration are illustrated in **Figure 3**.

c) Preliminary Works

3.3.4 EDF Energy intends to seek separate consent to undertake 'Preliminary Works', including preparing the Hinkley Point C site for development along with the construction of a sea wall and the jetty, ahead of the main DCO application. These will be subject to separate scoping reports and one combined ES. These preliminary works will also be included within the proposed DCO application and assessed within the accompanying ES.

3.3.5 Development consents for the relevant components of the Preliminary Works will be sought from the Department of Transport (DfT) for a Harbour Empowerment order under the Harbours Act 1964 (as amended), from West Somerset Council (WSC) under the Town & Country Planning Act 1990 (TCPA) and from the future Marine Management Organisation (MMO) under the Food & Environment Protection Act 1985 (FEPA) and the Coast Protection Act 1949 (CPA). [Note: At present and before the MMO comes into effect in 2010, approvals under the FEPA and CPA are administered by the Marine and Fisheries Agency (MFA) and applications for orders under the Harbours Act are administered by the Department for Transport (DfT).]

3.3.6 Government has advised local authorities that permission can be granted on the basis that any preliminary works will be removed if the subsequent DCO application is turned down or if no application is made. Formal consultation will be undertaken by the local planning authority.

3.4 Construction Phase

3.4.1 This section outlines the main construction activities and phases together with land use requirements for the proposed new nuclear development.

a) Construction Activities

3.4.2 The two UK EPR reactor units would take approximately ten years to build, including preliminary works. The construction of these two units would be phased with the construction of the second unit commencing 18 months after the first. Workforce numbers are expected to peak at around 4,000. Construction work would fall into three phases as follows:

- Preliminary works including site preparation, construction of a new sea wall and the jetty to receive bulk aggregates.
- Construction of buildings. Material requirements during this period would be mainly sand, aggregate and cement, reinforcing steel and pipework.
- Installation of plant. Mechanical and electrical plant would begin to arrive on-site about a year after pouring of first structural concrete. Main plant erection will take place over approximately three years. During this period the construction site would be fully occupied.

b) Land Use Requirements for Construction

3.4.3 Significant areas of land will be required on a temporary basis. The way land is used necessitates careful assessment and planning, and the proposed location and use of land has been informed by a series of guiding principles. The majority of construction activity will take place in areas immediately adjacent to the permanent development site. South of the Green Lane, which approximately bisects the Hinkley Point C site east/west, land will be used generally for low level spoil storage, contractors' working areas and a workers' accommodation campus.

c) Reducing Impacts on Nearby Residential Properties

3.4.4 Careful consideration is being given to ensuring that those living relatively near to the Hinkley Point C site will be protected as far as possible from disturbance during construction. It is proposed that a substantial landscape buffer will be created along the southern perimeter of the construction site.

d) Workers' Accommodation Campus

3.4.5 **Section 6** provides information on proposals for worker accommodation off-site. EDF Energy is also proposing to erect a temporary workers' campus within the Hinkley Point C site, accommodating up to 700 workers for five years during the main phases of construction activity. EDF Energy's aim is to provide a good standard of accommodation for the workforce and include a range of services to minimise any potential adverse social impacts.

3.5 Operational Phase

3.5.1 The UK EPR reactor unit has an operational design life of 60 years. During normal operations the number of staff required on the Hinkley Point C site will be around

700. This includes those involved in support functions such as technical support, laboratory work, routine maintenance, training and procurement. Approximately 1,000 additional staff will be employed on each UK EPR reactor unit during planned refuelling and maintenance outages. A public information centre will also be opened on the site.

a) Waste Management Strategy

Radioactive and Non-radioactive Waste

3.5.2 Radioactive waste is produced by activities associated with the operation, maintenance and decommissioning of the nuclear power plant. In accordance with the Health and Safety Executive nuclear site licence conditions and the Nuclear Installations Act 1965, the nuclear reactor units will be designed to have suitable and sufficient safety systems. This includes the ‘defence-in-depth’ approach and ‘protective barriers’ to prevent the release of radioactive material; limit the severity of a release should it occur, and/or limit the consequence of the hazard should it occur and be severe.

3.5.3 The UK EPR reactor unit design applies the core principle of minimisation of the generation of radioactive and non-radioactive wastes, as far as is reasonably practicable, by application of the waste hierarchy. The waste hierarchy requires avoidance of waste in the first instance and reducing as far as possible the volume requiring disposal once the waste has been produced. The waste hierarchy gives an order of preference for waste management options to minimise the volume for disposal, including prevention (most favoured option), minimisation, reuse, recycling, energy recovery and disposal (least favoured option). Use of the waste hierarchy will be adhered to in the construction, operation and ultimate decommissioning periods of the nuclear power station.

Solid Radioactive Waste

3.5.4 Depending on the radioactivity level, solid radioactive waste will follow one of three routes for disposal in line with agreed practice. Very Low Level Waste (VLLW) will be disposed of at appropriately authorised sites and Low Level Waste (LLW) at the national Low Level Waste Repository (LLWR). These will be sent off-site promptly after they have been generated.

3.5.5 Intermediate Level Waste (ILW) will be kept on-site in a store designed to accommodate the nuclear power station’s lifetime arisings and capable of lasting for at least 100 years, pending despatch to a national geological disposal facility.

Liquid and Gaseous Radioactive Waste

3.5.6 Systems and plant will be operated to reduce radioactive discharges to a minimum through the use of Best Practice Means and in a manner so as to minimise the environmental impacts of discharges. All discharges will be monitored and recorded

to demonstrate this. Very low levels of gaseous radioactivity waste will be discharged to air via a stack (up to 80m) on the reactor building. Small amounts of radioactivity will also be discharged to sea via the cooling water system.

Spent Fuel

- 3.5.7 Spent Fuel assemblies will be discharged from the UK EPR reactor unit and placed into the spent fuel pool to cool and to allow levels of radioactivity to decay for about ten years. Spent fuel will then be moved to an on-site storage facility, designed to accommodate the nuclear power station's lifetime spent fuel arisings and capable of storing the fuel for at least 100 years. Consistent with the Government's long-term strategy for the management of spent fuel, it will ultimately be disposed of in a geological disposal facility.

Conventional Waste

- 3.5.8 Conventional wastes, including 'industrial', 'inert' and 'commercial' waste, are estimated at 1,200 tonnes per year, of which less than 20% will be classified as 'hazardous'. Using the waste hierarchy framework, the development will avoid waste in the first instance and reduce as far as possible the volume requiring disposal. The waste hierarchy will be adhered to in the construction, operation and ultimate decommissioning periods.

Impact Assessment

- 3.5.9 The Environmental Statement will provide information on the potential impacts of radioactive and conventional waste. The assessment of radioactive waste will give consideration to regulatory controls on radioactive waste management, identify potential sources of radioactive discharge to the environment and assess any potential radiological waste effects for the main site, including the potential effects of interim on-site storage and long-term geological disposal. The separate assessment of conventional waste will consider all non-radioactive waste both on-site and off-site.

3.6 Decommissioning

- 3.6.1 The EIA process for the full scheme including the Hinkley Point C site and OAD will focus on the potential impacts associated with the construction and operational phases of the development. The decommissioning period of Hinkley Point C, more than 60 years hence, will only be considered to the extent of assessing whether, in principle, there are likely to be any unacceptable environmental impacts arising from the decommissioning of the site. Decommissioning is subject to its own detailed EIA regulatory process, and there is a requirement for the operator to obtain consent from the HSE under the (Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999), which will include a period of public consultation. For the Hinkley Point C UK EPR reactor units this will take place

immediately prior to the end of operation. EDF Energy's decommissioning strategy will meet Government policy and regulatory requirements⁵.

3.6.2 The Energy Act 2008 further requires operators of new nuclear power stations to prepare a Funded Decommissioning Programme (FDP) for approval by the Secretary of State. This will set out the technical, financial and legal arrangements for decommissioning the nuclear power station and must be approved by the Secretary of State before construction.

a) Decommissioning Strategy and Activities

3.6.3 Modern PWRs incorporate design features which facilitate decommissioning. EDF Energy will be adopting a prompt decommissioning strategy. The principal elements of this are:

- Pre-closure preparatory work. Prior to the planned closure a programme of preparatory work will be initiated to ensure that the Hinkley Point C site is decommissioned as safely, efficiently and economically as possible;
- Defueling. Fuel will be removed from the core within a few weeks of the end of generation and will cool in ponds before transfer to the interim on-site storage;
- Decommissioning engineering preparatory work. Although some systems will continue to be required during decommissioning the remaining systems will be taken out of service and isolated, drained and purged or flushed and vented to make them safe; and
- Plant decommissioning. All equipment, facilities and buildings on the site, including both non-radioactive and radioactive parts and systems, will be removed. Radioactive and conventional waste materials will also be managed.

3.6.4 Decommissioning typically takes around 20-25 years. The final clearance and de-licensing of the whole of the Hinkley Point C site will only be carried out when the spent fuel is removed and the spent fuel store is fully decommissioned. Partial site clearance and de-licensing could be carried out to allow the re-use of most of the site in advance of this.

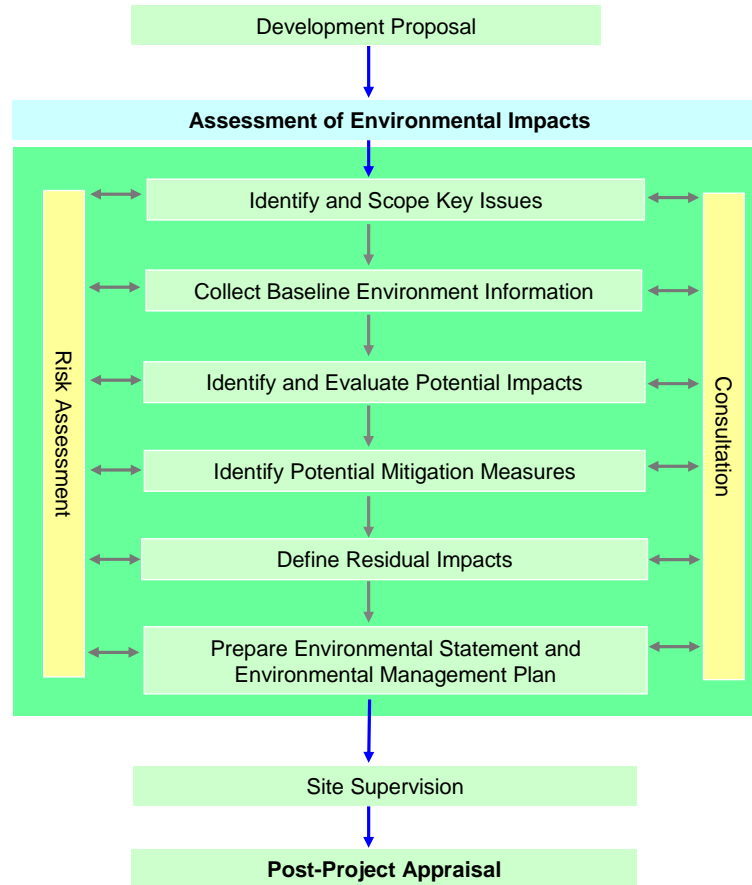
⁵ Government policy on decommissioning is set out in The Decommissioning of the UK Nuclear Industry's Facilities Statement (Department of Trade and Industry, September 2004)

4 APPROACH TO THE EIA AND ENVIRONMENTAL STATEMENT

4.1 The Environmental Impact Assessment

- 4.1.1 The EIA for the Hinkley Point C Development will conform to the requirements of the Planning Act 2008, including the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (SI 2009/2263). It will consider the potential implications of the proposals for the environment during construction and operation and, in outline, during the decommissioning phase of the development. The significance of any identified impacts will be determined against a scale from major adverse, through negligible/no impact, to major positive. For the purposes of the assessments 2008/9 is taken as a baseline year, 2015 is projected to be the peak construction year (in terms of the number of site-based employees) and both new reactors are projected to be operational by 2020.
- 4.1.2 The information presented within this document is intended to identify the way forward for the assessment of the potential environmental impacts associated with the new nuclear power station development at Hinkley. As the EIA is taken forward, the general steps in the process that will be followed are shown below in **Diagram 1**. The process of EIA is an iterative and evolutionary one that builds up layers of data as the assessment progresses. The approach it takes needs to be comprehensive and well-organised given the variety of technical specialisms involved, as well as the need to integrate many of the environmental and social issues potentially arising. Furthermore, the EIA needs to incorporate the comments and knowledge of a wide range of statutory and non-statutory stakeholders, as well as the input of the local community.
- 4.1.3 In order to address the expected data requirements of the future EIA, the further work described in **Sections 5 and 6** is either underway or in the process of being commissioned. In all cases where significant impacts are identified, appropriate mitigation measures will be developed and details provided in the ES. The residual impact will then be assessed and reported. The ES will report the outcomes of the process, and technical appendices will provide additional information on relevant topic areas. The ES will also be accompanied by a separate Non-Technical Summary (NTS).

Diagram 1 The EIA process



4.2 Form of the Environmental Statement

- 4.2.1 The findings of the EIA will be reported in the ES and accompanying technical appendices. It is anticipated that the first section of the ES would contain the introductory chapters relating to the project as a whole. These would include a description of the project, the planning policy context, the main alternatives considered during the evolution of the project, and the construction process and programme. Information relating to the consultation process together with the overall methodology adopted for the EIA would also be provided.
- 4.2.2 The next section of the ES would then comprise the individual topic chapters, which would each describe the baseline environment, identify and assess the significance of potential effects of the development, set out the proposals for avoidance and/or mitigation of any potential effects, and identify any residual effects. The topic chapters will include those presented within **Sections 5 and 6** of this Scoping Report and also the assessment of waste, both radioactive and conventional.
- 4.2.3 Cumulative assessment will form an important part of the EIA and will be undertaken in line with best practice. It will consider the potential implications of the

development in conjunction with recent and other foreseeable plans or projects. All such effects will be considered in detail as part of the EIA process.

4.3 The Study Area

- 4.3.1 Clear definition of the study area for the EIA is a key part of the process. The study area must encompass the area over which the impacts of the proposed scheme may be detected. Consequently, the study area for each of the environmental parameters included in the EIA may be different. For example the study area for the Landscape and Visual Impact Assessment is larger than that for the terrestrial ecology surveys.
- 4.3.2 For the purposes of EIA the Hinkley Point C site has been subdivided into the Built Development Area West and the Built Development Area East (collectively known as the Built Development Area), and the Southern Construction Area (see **Figure 4**). Built Development Area East comprises land formerly owned by British Energy and is currently used, in part, for car parking and training by the existing Hinkley Point Power Station Complex; the remainder of this area being used for cattle grazing. Built Development Area West and the Southern Construction Area comprise mostly agricultural land with isolated farm buildings and scattered waterbodies. In summary, the Built Development Areas East and West will accommodate the permanent power station development, and the Southern Construction Area is intended to support the construction phase works. Further details on each of the study areas are described in Section 5 below.
- 4.3.3 Study areas for the marine developments and the OAD are also shown in **Figures 2 and 3** respectively. A summary of the data collection work that has been undertaken, is ongoing or is planned for each of these areas, is provided in **Section 5**. Studies that have been completed, are ongoing or are planned with respect to OAD are summarised in **Section 6**.

4.4 Habitats Regulations Assessment (incorporating ‘Appropriate Assessment’)

- 4.4.1 Various sites of nature conservation interest designated at the European and International level surround Hinkley Point (Ramsar and Natura 2000 sites to the north, east and south). Plans or projects that are likely to have a significant effect on such internationally designated sites require assessment in accordance with Regulation 48(1) the Conservation (Natural Habitats &c) Regulations 1994 (the ‘Habitats Regulations’) implementing the requirements of Article 6(3) of the Habitats Directive. Natural England has advised that an Appropriate Assessment is required which will be undertaken by the IPC (as the ‘competent authority’). Information to help inform the Appropriate Assessment will be submitted with the DCO.
- 4.4.2 The assessment will consider the implications of the proposals in view of the conservation objectives of the designated sites to determine whether an ‘adverse effect on site integrity’ would arise. If this were to be the case, then the project could

only proceed if it can be demonstrated that no alternative solutions exist and that there are ‘imperative reasons of overriding public interest’. Compensatory habitat would have to be provided if these tests were met.

4.5 Environmental Management

4.5.1 An Environmental Management and Monitoring Plan (EMMP) is being prepared to accompany the DCO application to the IPC. Its purpose will be to monitor and confirm that effects or changes from construction and operation of the proposed development do not exceed stipulated environmental quality standards and the determined objectives for the project. Moreover it will ensure that any mitigation and monitoring proposals included within the ES are recorded and a timeframe and responsibilities are assigned. The EMMP is intended to provide a methodology by which significant changes to the environment can be avoided or, where change is inevitable, are controlled, measured and managed.

4.6 Approach to Sustainability

4.6.1 The Government’s White Paper ‘Meeting the Energy Challenge’ (January 2008⁶), concluded that nuclear had a role to play in the UK’s energy mix alongside other low carbon sources. The reasons for this were based on the environmental, social and economic characteristics of nuclear generation.

4.6.2 The Government undertook a high level assessment of the potential impacts on environmental, social and economic factors of construction, operation and decommissioning of new nuclear power stations (an Appraisal of Sustainability) as part of its draft Nuclear NPS. In addition to this, an Appraisal of Sustainability was also undertaken for the Hinkley Point Site, to inform the decision making for the SSA. This Appraisal draws on a range of information relevant to the Site, including the relevant policy context at the regional and local government level, which was used for the characterisation of baseline conditions and the appraisal of effects. The Appraisal of Sustainability for the Hinkley Point Site identifies potential significant effects arising from the construction of a new nuclear power station at Hinkley Point Site, and how adverse effects can potentially be mitigated. Whilst this appraisal considers the regional and local baseline, the Government acknowledges that the appraisals of Sustainability have been undertaken at a strategic level. The Government recognises that detailed assessment should take place at the development consent stage. EDF Energy’s Sustainability Statement for the proposed Hinkley Point C development, together with its Environmental Statement, will fulfil this need.

4.6.3 The Environmental statement will assess the significance of impacts at the site-specific level, and present mitigation where necessary. EDF Energy’s Sustainability Statement will draw on relevant sustainability objectives identified from the Hinkley

⁶ Department for Business, Enterprise and Regulatory Reform (BERR) (January 2008) ‘Meeting the Energy Challenge’: a White Paper on Nuclear Power

Point Site Specific Appraisal of Sustainability, and will demonstrate how the proposed development responds to these objectives based on the mitigation measures proposed, but also by examining additional measures considered by EDF Energy. The Sustainability Statement will therefore identify how the Sustainability Objectives for the project have been delivered; it is not the intention of this document to reassess the sustainability of nuclear energy, as this is established at a higher level through national level studies (i.e. the NPS).

4.7 Consultation

a) The Consultation Process

4.7.1 Under the Planning Act 2008, one of the key elements of the new regime for NSIPs, including nuclear power stations, is the legal requirement to undertake detailed pre-application consultation, in line with principles contained in the Department for Communities and Local Government's (DCLG's) Guidance on Pre-application Consultation⁷ and the IPC's Guidance Note 1 on Stages of Consultation Pre-application⁸. This pre-application consultation falls into two categories:

- Consultation with statutory consultees and other relevant stakeholders (other interested parties) under Section 42 of the Act; and
- Consultation with local communities living in the vicinity of the Hinkley Point C site under Section 47 of the Act.

4.7.2 In advance of making the DCO application, EDF Energy is consulting the local community, statutory stakeholders and other interested parties on its development proposals. This consultation process comprises two formal stages. Stage 1 undertaken between November 2009 and January 2010, sets out EDF Energy's initial proposals; and Stage 2 to be carried out in Spring 2010, will present more detailed proposals taking account of responses received at Stage 1 and results of ongoing studies.

4.7.3 Stage 1 consultation presented initial proposals and a number of options where elements could be subject to change as a result of ongoing studies and consultation feedback.

4.7.4 In addition to the formal stages of pre-application consultation, EDF Energy will continue to hold informal discussions with the key statutory consultees and other interested parties, as appropriate, up to the DCO application submission.

b) Consultation to Date

Statutory Consultees and Other Interested Parties

⁷ Department for Communities and Local Government (DCLG) (September 2009) Planning Act 2008 Guidance on Pre-Application Consultation

⁸ Infrastructure Planning Commission (December 2009) IPC Guidance Note 1 on Pre-application Stages (Chapter 2 of the Planning Act 2008)

- 4.7.5 Early consultation with statutory consultees and other interested parties commenced in Autumn/Winter 2008 in support of the initial EIA scoping process for DECC. Further consultation was undertaken prior to the acquisition of British Energy by EDF Energy in January 2009 to assist the Government's Strategic Siting Assessment (SSA) nomination process. This was undertaken by both companies.
- 4.7.6 During the formal announcement of intention to nominate Hinkley Point into the SSA process, EDF Energy widely publicised its intentions to nominate through national and local press releases, an advertising campaign and letters to stakeholders. The programme of consultation has continued.

Public Consultation

- 4.7.7 The existing Hinkley Point operators have strong links with the local community, including through the Hinkley Point Site Stakeholder Group. EDF Energy has undertaken a public consultation programme in order to engage people on its plans. A range of issues, raised during these stages, will be addressed through the EIA process.

c) Statement of Community Consultation (SOCC)

- 4.7.8 EDF Energy is committed to being open and transparent with the local community and key stakeholders. EDF Energy has prepared and published a Statement of Community Consultation (SOCC), as required by the Planning Act 2008. This sets out how we propose to formally consult people living in the vicinity of Hinkley Point in advance of submitting an application to the IPC. Further information is set out in the SOCC available online at www.edfconsultation.info.

5 ENVIRONMENTAL IMPACT ASSESSMENT – MAIN SITE AND ASSOCIATED ON-SITE DEVELOPMENT

5.1 Introduction

5.1.1 This section discusses the key potential environmental issues and impacts associated with the proposed development at the Hinkley Point C site. Each environmental parameter will be considered in the EIA. Where particular surveys or studies are required in order to describe the impact more fully or provide quantification of the magnitude of the impact, these are described.

5.2 Geology, Soils and Land Use

a) Baseline Environment

Geology

5.2.1 Hinkley Point lies on the southern margin of the Bristol Channel sedimentary basin (‘the Somerset Basin’). Mesozoic sediments, deposited in a synclinal trough, are floored by rocks of the Devonian and Carboniferous age, which are exposed in the Quantock Hills and in the South Wales Carboniferous massif. West of the Hinkley Point C site, Mesozoic (Jurassic and Triassic) rocks are exposed along the cliff towards Watchet; to the east the Lower Lias cliff line gives way to the flat low-lying ground of the River Parrett Estuary and the Somerset Levels which represent an extensive area of shallow marine and terrestrial Quaternary sediments.

5.2.2 The solid geology in the study area predominantly comprises:

- Lower Lias of the Lias Group (Lower Jurassic, Blue Lias);
- Triassic Penarth Groups (PNG) Lilstock Formation (subdivided into Langport Member and Cotham Member) and Westbury Formation; and
- Mercia Mudstone Groups (MMG). Blue Anchor Formation, and Undifferentiated.

5.2.3 The majority of the study area is shown not to be overlain by significant drift deposits (Quaternary and recent). Where they occur, these deposits consist of between 2m and 5m of gravelly-sandy silty clay. Hinkley Point B is underlain by up to 5m of made ground, and on the low land to the east of Hinkley Point B there is a superficial covering of up to 5m of estuarine organic clays overlying 2m to 5m of glacio-fluvial sands.

Special Designations

5.2.4 Approximately 300m of the western area of the cliff section adjacent to the western edge of the Hinkley Point C site lies within the ‘Blue Anchor to Lilstock’ Site of Special Scientific Interest (SSSI). The designated interest here comprises cliff and

foreshore exposures of Lower Jurassic age and the geomorphology of exposed foreshore rock pavement. The potential area identified for the jetty includes the most eastern section of the SSSI, although the final position of the jetty is yet to be determined. The sea wall and intake and outfall structures are outside the SSSI boundary.

Soils and Land Use

- 5.2.5 The Soil Survey for England and Wales provides information and description of the soils within the study area. Subsoils vary according to the underlying geology.
- 5.2.6 In terms of land use, a review of historical maps and plans has identified that the Built Development and Southern Construction Areas have been greenfield agricultural land since at least 1886. Some of the land in the Built Development Area East was used during construction of Hinkley Point B for workers' accommodation and other temporary uses.
- 5.2.7 Published mapping of agricultural land quality has identified the entire study area and most of the surrounding land as being of Grade 3 (according to the Agricultural Land Classification (ALC) system). However this does not differentiate between Grade 3a or 3b at this scale. There is a small area of Grade 4 land to the south and east of Hinkley Point B. Grade 3b, 4 and 5 agricultural land is considered to be of poorer quality. To confirm and map the ALC within the study area soils surveys are being undertaken to inform an assessment in accordance with relevant guidelines.
- 5.2.8 To date approximately 70% of the land is classified as Moderate Quality Agricultural Land (Subgrade 3b); while 24% of the agricultural land on site is Subgrade 3a, which falls within the category of 'Best and Most Versatile Land'. This band of Subgrade 3a, crosses the southern part of the Built Development Area West. The remaining 6% is Poor Quality Grade 4 land. Much of the land within the Built Development and Southern Construction Areas is the subject of agri-environment schemes.

b) Assessment Studies

- 5.2.9 The geological characteristics and interests of the Hinkley Point C site are being determined through a combination of desk-based review of available literature and mapped data. A site survey of the geological exposure provided by the low cliff fronting the Hinkley Point C site and the cliffs and foreshore to the west has been undertaken. This will provide information on the geological and geomorphological value of the cliff and foreshore which will be used to establish the importance of the area within the context of the wider, extensive exposures present within Lilstock and Watchet Bays.
- 5.2.10 Geological data for the Built Development Area West has also been obtained from geophysical investigations and intrusive works undertaken during 2008. Information on soils and soil conditions has been obtained via desk-based review and field survey.

5.2.11 No further studies to inform assessment of potential geological and soil-related interests are planned in the Built Development Areas, although a further ALC survey is planned for the Southern Construction Area.

5.2.12 The table below provides a summary of the surveys and studies undertaken to date or planned with respect to geology, soils and land use.

Built Development Area	
West	East
Completed studies: <ul style="list-style-type: none"> • Agricultural Land Classification (ALC) survey • Geological mapping of cliff exposures • Detailed geological and geotechnical intrusive investigation 	Completed studies: <ul style="list-style-type: none"> • Desk based studies • Geological mapping of cliff exposures
Studies in progress or planned: <ul style="list-style-type: none"> • None 	Studies in progress or planned: <ul style="list-style-type: none"> • ALC survey • Detailed geological and geotechnical intrusive investigation
Southern Construction Area	
Completed studies: <ul style="list-style-type: none"> • Desk based studies 	
Studies in progress or planned: <ul style="list-style-type: none"> • ALC survey • Geological and geotechnical intrusive investigation 	

c) Key Issues

5.2.13 Although some of the construction works would lead to disruption and the loss of geological material, these activities would be unlikely to have any significant impact on the intrinsic geological interest since the stratigraphic sequence subcrops extensively in the wider area. The intrinsic value of the geology of the Hinkley Point C site is, therefore, effectively confined to the visible outcrops forming the cliff and foreshore platform along the northern boundary.

5.2.14 Construction of the new 760m sea wall would obscure the exposure in the cliff section fronting the Hinkley Point C site and construction of both the sea wall and the jetty could impact on the exposed foreshore rock pavement. Given the potential value of the geological and geomorphological interests at this site (i.e. continuity of exposure with a designated geological SSSI to the west), consultation with Natural England has been undertaken and the scope of a geological mapping exercise was agreed.

5.2.15 The geological mapping confirmed that, to the west of Hinkley Point, the sequence of geological beds that would be lost due to construction of the sea wall are the same as the SSSI. Similarly, there are several examples of rock pavement exposed to the west of Hinkley Point that are similar to those present in front of the Hinkley Point C Development Site. They are also equally as accessible to the public.

- 5.2.16 In terms of the potential effects on land use and soils, preparation of the site for the main construction works will generate a number of possible adverse effects, largely linked to permanent and temporary land-take. This land-take for the main construction works will include changes to soils and land use over the lifetime of the facility, but these are confined to Grade 3b to 5 land, thus minimising the adverse effect.
- 5.2.17 Prior to construction of the plant and on-site associated development, it is intended that topsoil from the Built Development Areas will be stripped and stored in the Southern Construction Area for use in post-construction restoration work. Topsoil will also be stripped from land in the southern part of this area to enable excavated material from the Built Development Area to be stockpiled and infrastructure required for the construction phase (e.g. workers' accommodation campus) to be built. Stored soil will be used in the restoration of the areas subject to temporary construction works.

5.3 Land Contamination

a) Baseline Environment

- 5.3.1 Both the Built Development and Southern Construction Areas have been greenfield agricultural land since before 1886. The former Benhole Farm (north-western corner of the site) was demolished in around 1976 leaving a single remnant outbuilding.
- 5.3.2 Within the Southern Construction Area a number of historical ponds have been identified, however all but one have been infilled. In addition, a property has been identified as being on site from at least 1841 (Corner Farm), which by 1975 had become derelict and by 2002 had been completely removed. Ponds are also present in the Built Development Area West.
- 5.3.3 The Built Development Area East comprised greenfield, predominantly agricultural land until 1975, when a small sewage works was constructed. In addition, during the construction of Hinkley Point B, an accommodation campus and other temporary uses were developed in this area. At present, land near to the access road is used for car parking, training facilities and a small electrical substation. Surrounding the Hinkley Point C site, land use has remained predominantly agricultural with the exception of the existing Hinkley Point Power Station Complex.
- 5.3.4 Desk-based assessments have indicated the presence of a number of potential sources of contamination.
- Southern Construction Area and Built Development Area West – historical use as agricultural land, possible storage and maintenance of vehicles and chemicals within farm buildings and localised infilling of former pond areas. The Built Development Area West is not subject to any regulatory controls for radioactive substances and does not present a risk to human health.

- Built Development Area East – specific areas where waste management activities have taken place, former sewage works, former contractors’ accommodation/fabrication compound and associated electrical substations and a mound on site comprising excess spoil from the construction of the existing Hinkley Point Power Station Complex.

b) Assessment Studies

- 5.3.5 The Government’s guidance on land affected by contamination is set out in Annex 2 of Planning Policy Statement 23: Planning and Pollution Control (2004) (PPS23). The requirements follow the risk-based framework adopted in the Government guidance document: Model Procedures for the Management of Land Contamination (CLR 11). PPS23 requires that an assessment of risk is carried out by the applicant where development is proposed on land that is, or may be, affected by land contamination.
- 5.3.6 To date, intrusive soil investigations for non-radiological substances have been undertaken in two phases within the Built Development Area West to inform the risk assessment. Overall, the investigations of shallow and deeper soils identified the risk of non-radiological contamination to human health and ecological receptors to be very low.
- 5.3.7 Non-intrusive and intrusive soil investigations for radiological substances have also been undertaken within the Built Development Area West. The first phase in July 2008 comprised a non-intrusive ground survey using direct radiation measurements. In addition, 20 near-surface soil samples and 30 soil samples from trial trenches were collected and analysed concurrently with the non-radiological investigations in July and October 2008 respectively.
- 5.3.8 Radiation measurements taken during a walkover survey recorded environmental gamma dose rates representative of expected background values. Soil samples analysed for radiological parameters also indicated that levels of radioactivity in the near surface and deeper soils are similar to background levels and are mainly due to naturally occurring nuclides.
- 5.3.9 A desk-based assessment of the Built Development Area East and Southern Construction Area covering both non-radiological and radiological contamination issues is ongoing. The desk-based assessment will be followed by a radiological walkover survey and intrusive investigation to allow soil sampling and analysis.
- 5.3.10 The table below provides a summary of the surveys and studies undertaken to date or planned with respect to land contamination.

Key habitats	Description
Intertidal sand and mudflats	Annex I qualifying habitat types for the Severn Estuary SAC, and mudflats are also a UK BAP priority habitat type.
Atlantic salt meadow	Occurs east of Hinkley Point and forms a feature of the Severn Estuary SAC and SPA designation.
Sandbanks	Sandbank habitats forming part of the SAC designation and are located to the west of Hinkley Point.
Reef habitat supporting Sabellaria	Where <i>Sabellaria</i> occurs offshore in high densities (>1,000/m ²), forming a thick crust (>2cm) and covering an area generally exceeding 25m ² , it is defined as <i>Sabellaria</i> reef and forms one of the Severn SAC designated features. Both <i>Sabellaria alveolata</i> and <i>S. spinulosa</i> reefs are UKBAP Priority Habitats, and <i>Sabellaria alveolata</i> has a Species Action Plan in the West Somerset BAP.

Built Development Area	
West	East
<p>Completed studies:</p> <ul style="list-style-type: none"> Assessment of potential contamination sources and features Radiological walkover survey Ground gas monitoring (6 visits over 3 months) Phase 2 intrusive (shallow and deeper soils) radiological and non-radiological contamination investigation 	<p>Completed studies:</p> <ul style="list-style-type: none"> Assessment of potential contamination sources and features Design of Phase 2 intrusive investigation requirements
<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> Phase 1 desk study Phase 2 assessment (where necessary) 	<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> Radiological walkover survey Phase 2 intrusive investigation of soils (radiological and non-radiological) Ground gas monitoring (6 visits over 3 months) Phase 2 assessment (where necessary)
Southern Construction Area	
<ul style="list-style-type: none"> All as for Built Development Area East 	

c) Key Issues

5.3.11 Available data for the Built Development Area West indicates that land contamination is unlikely to be an issue for either construction or operation of the proposed nuclear power station.

5.3.12 Additional assessments for the Built Development Area East and Southern Construction Area are underway. The significance of any associated environmental issues will depend on both the presence of contaminated materials and the level of contamination. Dependant on the conclusions of the additional assessments, the following may also need to be considered:

- The management of topsoil stripped from the Built Development Areas and parts of the Southern Construction Area;

- The management of any contaminated materials contained within the spoil mounds created during construction of the existing Hinkley Point Power Station Complex;
- Any environmental, health and safety issues associated with the management of potentially contaminated materials;
- The potential contamination of groundwater and the drawdown and discharge (via dewatering) of this groundwater during construction; and
- The potential use of the jetty for discharges to sea.

5.4 Hydrogeology

a) Baseline Environment

5.4.1 The topography of the study area comprises undulating countryside, terminating at a natural cliff line which descends to a shingle beach. Across the Built Development Areas ground elevations range from approximately 10m Above Ordnance Datum (AOD) to 35m AOD; across the Southern Construction Area elevations range from approximately 5m AOD to 28m AOD.

5.4.2 The geology is described above. The Lower Lias comprises a Minor Aquifer. Rocks of the Penarth Group are considered to be generally impermeable although they may have minor transmissivity. The Mercia Mudstone Group (including the Blue Anchor Formation) are likely to be of insignificant permeability. The Environment Agency 1:100,000 Groundwater Vulnerability Map (Sheet 42, Somerset Coast) confirms the site as being situated on a Minor Aquifer (variably permeable).

5.4.3 Seventeen groundwater abstraction licences regulated by the Environment Agency are in place within 2km of the Hinkley Point C Development site. No surface water or potable water abstractions are recorded within a 1km search radius. Three of the 17 abstractions are located within 1km of the boundary of the Southern Construction Area. The closest are for farming and domestic use. The site is not within the catchment area or zone of any Source Protection Zone (SPZ).

5.4.4 Analysis of the available geological and groundwater information indicates that the Hinkley Point C site is likely to be largely self-contained as a groundwater system. Under natural conditions, groundwater is expected to flow northwards in general.

b) Assessment Studies

5.4.5 Groundwater level monitoring over a full calendar year for the Built Development Area West has been undertaken to allow both seasonal and potential tidal variations in behaviour to be assessed. Monitoring is also being undertaken within the Built Development Area East and the Southern Construction Area. On the basis of the geological and groundwater data a conceptual model of groundwater flow within the Hinkley Point C site is being developed. This will be used to ascertain potential effects of Hinkley Point C on groundwater flows and interdependent environmental parameters.

5.4.6 The table below provides a summary of the surveys undertaken to date, in progress or planned with respect to hydrogeology.

Built Development Area	
West	East
Completed studies: <ul style="list-style-type: none"> • None 	Completed studies: <ul style="list-style-type: none"> • None
Studies in progress or planned: <ul style="list-style-type: none"> • Development of Preliminary Conceptual Groundwater Model (PCGM) using site data from on-shore site investigation • Ongoing groundwater level monitoring 	Studies in progress or planned: <ul style="list-style-type: none"> • PCGM based on historic information • Intrusive site investigation • Groundwater level monitoring to commence once borehole installation is complete
Southern Construction Area	
Completed studies: <ul style="list-style-type: none"> • Assessment of groundwater conditions from historic information • PCGM inferred from maps and historic data 	
Studies in progress or planned: <ul style="list-style-type: none"> • Intrusive site investigation • Groundwater level monitoring to commence once borehole installation is complete 	

c) Key Issues

5.4.7 The main issue relating to groundwater conditions is the potential effect of drawdown of groundwater during construction in the vicinity of the deep excavation works for the two UK EPR reactor units and the management of the dewatering and associated discharge of this water. The following potential groundwater impacts relating to dewatering have been identified:

- The development of a cone(s) of depression creating new water gradients under buildings in adjacent areas; and
- The development of a cone(s) of depression creating reversal of the groundwater gradient and incursion of saline water to the Minor Aquifer.

5.4.8 The discharge of water from the dewatering abstraction would also be a consideration for the project. The details of the construction works are currently being developed, as is the dewatering strategy.

5.4.9 With respect to the potential impacts identified above, the assessment will consider:

- The likely volumes and rates over time of water needing to be removed from the aquifer for effective dewatering;
- The worst-case spatial extent of a dewatering cone(s) of depression;
- The range of worst-case spatial differential groundwater gradients and their implications; and
- Potential migration of contaminated water during dewatering.

- 5.4.10 The proposed dewatering strategy will be programmed and designed to minimise the risk of potential contamination issues.
- 5.4.11 The nearest licensed abstraction is situated 340m from the western boundary of the Southern Construction Area and is considered likely to be outside the dewatering zone of influence. All licensed abstraction sites are separated hydrogeologically by an area of upfaulted impermeable rocks (Mercia Mudstone) between the Built Development and Southern Construction Areas.
- 5.4.12 During the operational phase, several potential key effects on the groundwater regime have been identified, as listed below:
- Change in the groundwater flow regime due to either the placement of new building foundations, resulting in a rise in groundwater levels, or local permanent drainage systems around buildings, resulting in a decrease in groundwater levels;
 - Change in the distribution of any off-site contaminated groundwater due to the altered groundwater flow regime; and
 - Longer term increased incursion of sea water due to any alterations to the groundwater flow regime.
- 5.4.13 All of these issues will be assessed using the conceptual groundwater model developed on the basis of available geological and hydrogeological information and the scheduled second phase of geological site investigation and borehole data.

5.5 Hydrology, Drainage and Flood Risk

a) Baseline Environment

Surface Watercourses

- 5.5.1 A number of minor surface watercourses are present within the study area. Holford Stream runs west to east within the northern part of the Southern Construction Phase Area. This watercourse flows under Wick Moor Drove and drains into Wick Moor to the east. There are also a series of agricultural drainage ditches present on site, running along field boundaries. Two drainage ditches are present within the Built Development Area West, one running west to east along a field boundary in the northern part of this land parcel before turning northwards towards the coastline (as referred to above). The other, drains west to east at the base of the shallow valley forming the boundary between the Built Development Area West and Southern Construction Phase Area.

Flood Protection

- 5.5.2 The existing Hinkley Point Power Station Complex is protected from coastal flooding by the height of the land platform which, in turn, is protected from erosion by defences along the seaward frontage. The shoreline fronting the Hinkley Point C site

consists of a wide (500m) shore platform. This is important in dissipating wave energy and protecting the cliff platform on which the site lies at 10~16m Above Ordnance Datum (AOD).

- 5.5.3 According to sea level rise projections, it is likely that the flood defence embankment between Hinkley and Stolford Point will be overtopped during a 1 in 200 year tidal event. The Bridgwater Bay to Bideford Shoreline Management Plan (SMP) (1997) indicates that current management policies applicable to this area of coastline are ‘Do nothing’ and ‘Hold the line.’
- 5.5.4 Hinkley Point falls into the West Somerset Catchment Flood Management Plan (CFMP) prepared by the Environment Agency in 2007. There are no records of fluvial flooding affecting the immediate area of Hinkley Point (including the Holford Stream catchment). As a result, a policy of ‘no active intervention’ is recommended.
- 5.5.5 The Environment Agency has modelled potential flood zones in the area. The southern edge of the Southern Construction Area, within the catchments of the Bum and Bailey Brooks, is located within the Fluvial Flood Risk Map Zones 2 (land with a 0.1% or higher annual probability of being flooded from rivers and the sea) and 3 (1% or higher annual probability of being flooded by freshwater or a 0.5% or higher probability of being flooded from the sea).
- 5.5.6 No fluvial flooding is shown for the Holford Stream upstream (west) of Wick Moor Drove. The southern edge of the Built Development Area West and the northern part of the Southern Construction Area are within the catchment of Holford Stream which is located within Tidal Flood Risk Map Zones 2 and 3. Tidal flooding does not reach as far upstream as the divergence of West and East Brooks. The extent of the tidal flood zone is based on the assumption that no flood defences are present. However, a flood defence embankment is located between Hinkley Point and Stolford Point with an effective crest level of 8.22m AOD.

b) Assessment Studies

Hydrological Overview

- 5.5.7 A hydrological study for all the catchments of interest in the Hinkley Point C site study area has been carried out and considers the following:
- Evapotranspiration for the different land uses using the Meteorological Office Surface Exchange System (MOSES) database;
 - Annual average rainfall derived from a number of sources, including the Flood Estimation Handbook (FEH) CDROM, for the period 1960-1990 and applied to each of the catchments to obtain data for Design Rainfall Events;
 - Studies indicating that rainfall recharge provides the driving mechanism for groundwater flow. Groundwater intermittently springs out at outcrops of lower permeability strata and provides the baseflow to surface watercourses; and

- The West and East Built Development and Southern Construction Areas have been separated into zones of similar run-off characteristics and the greenfield run-off rates calculated following the Institute of Hydrology Report No 124.

Flood Protection

- 5.5.8 A Flood Risk Assessment (FRA), in accordance with PPS25, is being undertaken in order to fully assess any potential impacts associated with flood risk. The FRA utilises output from the above assessments and models the potential for breaching/overtopping of the flood defence embankment between Hinkley Point and Stolford Point under present and projected sea level scenarios.
- 5.5.9 The specification of a safe platform level for the Hinkley Point C site with respect to tidal flooding was informed by a study of extreme sea water levels that includes, for example, extreme wave modelling analysis and tsunami risk.
- 5.5.10 The level of flood risk to Wick Moor Drive, the main access/egress route for Hinkley Point C, where it crosses Holford Stream, Bum Brook and Stogursey Brook is being assessed to identify the likely duration over which the Hinkley Point C site would be isolated subsequent to a breach/overtopping event, if one occurs.
- 5.5.11 The table below provides a summary of the surveys and studies undertaken to date, in progress or planned with respect to hydrology, surface water drainage and flood defence.

Built Development and Southern Construction Area	
Completed Studies:	<ul style="list-style-type: none"> • Consultation with the Environment Agency and Internal Drainage Board to agree scope of Flood Risk Assessment • Assessment of existing surface water drainage characteristic • Topographic survey of watercourses, flood defences and Wick Moor Drove • Tidal breach and overtopping modelling
Studies in progress or planned:	<ul style="list-style-type: none"> • Tidal and Fluvial joint probability modelling • Assessment of drainage requirements for construction and development proposals • Flood Risk Assessment

c) Key Issues

Surface Water Drainage

- 5.5.12 A number of potential environmental impacts relate to the discharge of surface water derived from the Hinkley Point C site during the construction and operational phases. Surface water discharges to controlled waters would be managed in accordance with Planning Policy Statement 25: Development and Flood Risk (2006) (PPS25). Pollution control measures would be implemented and controlled through conditions of the discharge consents agreed with the Environment Agency on the control of discharges from the site.

- 5.5.13 Surface water drainage systems are being designed to intercept run-off. These will incorporate features which prevent or minimise both flooding of the Hinkley Point C site during construction and operation, and any adverse impact to the surrounding land or controlled waters to which they may discharge. A 'Water and Sediment Management Plan' will be developed to ensure that the drainage requirements are met during the construction phase.
- 5.5.14 The surface water drainage design will need to take account of potential changes to physical processes during the construction and operational phases that may be significant enough to impact receptors and require mitigation.

Flood Protection

- 5.5.15 The proposed platform level for the Built Development Area is approximately 14m and will provide adequate protection against tidal flooding from extreme sea water levels.
- 5.5.16 The FRA and associated modelling studies will inform the location and form of construction works that can be carried out within the Holford Stream and Bum Brook valleys without reducing the flood storage capacity and potentially increasing flood magnitude in the wider area. The FRA and modelling studies would also assess potential changes in the hydraulic regime in the Holford Stream as a result of culverting.

5.6 Fresh Water Quality

a) Baseline Environment

Surface Water

- 5.6.1 No historical water quality data is available for the surface watercourses draining the Hinkley Point C site. The most relevant surface water quality data available is Environment Agency data (2002-2007) for a 4.4km reach of the Stogursey Brook to the south of the Hinkley Point C site. It indicates moderate to good water quality with a high degree of nutrient enrichment.
- 5.6.2 During 2009, six surface water surveys were undertaken over the Built Development Areas, with five surveys reported on. For the surveys, a total of 11 sample locations were selected and a range of analyses were carried out on-site and in the laboratory.
- 5.6.3 The data from the first five surveys indicate that all tested parameters for monitoring sites within the Built Development Area are within the normal range for lowland freshwater systems and within the UK Drinking Water Standards (DWS) and freshwater Environmental Quality Standards (EQS) guidelines, with the exception of:
- Suspended solids with a maximum recorded value of 492mg/l (exceeds EQS value of 25mg/l);

- Biochemical Oxygen Demand (BOD) with a maximum recorded value of 16 mg/l (exceeds EQS value of 6mg/l); and
 - Ammonia with a maximum recorded value of 0.62mg/l (exceeds DWS value of 0.5 mg/l but below EQS of 1.3mg/l).
- 5.6.4 The results are not unexpected for shallow, agricultural drainage ditches which typically show wide variation in water quality and flow characteristics. Sections of the ditches become dry during long periods without rain.
- 5.6.5 Sampling associated with the Southern Construction Area indicate that the majority of water quality parameters are within the normal range for lowland freshwater systems.
- 5.6.6 The surface water quality survey also included an assessment of radiological parameters which indicated that, on average, results from all sampling locations do not exceed DWS criteria for gross alpha, gross beta and tritium. In addition, no anthropogenic radionuclides measurable by high-resolution gamma spectrometry were detected at any of the sampling locations.

Groundwater

- 5.6.7 Five groundwater surveys were undertaken over the Built Development Area West between December 2008 and June 2009. For the surveys, a total of 11 sample locations were selected, comprising:
- 8 boreholes with piezometers sampling shallow groundwater between 3.5m bgl and 18.5m bgl; and
 - 3 boreholes with piezometers sampling deep groundwater between 30m bgl and 54m bgl.
- 5.6.8 In terms of general groundwater quality in the shallow Lower Lias groundwaters, elevated concentrations of determinands related to sea water have been recorded from a couple of boreholes. Highly saline groundwaters have been recorded from deeper levels, particularly close to the shoreline or deeper in the Blue Anchor formations.
- 5.6.9 A Tier 1 groundwater risk assessment using the analytical results from the borehole monitoring has been undertaken. The results show that, generally, low concentrations of inorganic contaminants are present and are below the relevant screening values (i.e. the Drinking Water Standards (DWSs) and Environmental Quality Standard (EQSs)). Concentrations of organic contaminants (i.e. Petroleum Hydrocarbons (PHs), Polycyclic Aromatic Hydrocarbons (PAHs) and Volatile Organic Compounds (VOCs)) were below the limit of detection and below the relevant screening values across all deep and shallow groundwater locations, with the exception of an elevated Total Petroleum Hydrocarbon (TPH) concentration identified in one shallow piezometer during the first monitoring campaign.

5.6.10 The groundwater monitoring also included an assessment of radiometric and radiochemical parameters, as described with respect to the surface water monitoring. All of the shallow groundwaters met the UK drinking water screening criteria for gross alpha, gross beta and tritium. No anthropogenic radionuclides measurable by high-resolution gamma spectrometry were detected at any of the sampling locations throughout the survey.

b) Assessment Studies

5.6.11 Surface water quality monitoring has been undertaken across the development site in a series of six surveys during 2009. No further assessment studies are planned to establish baseline conditions.

5.6.12 Groundwater quality monitoring covering the Built Development Area West indicates no significant contamination. Further groundwater quality monitoring will be undertaken within the Built Development Area East and Southern Construction Area.

5.6.13 The table below provides a summary of the surveys and studies undertaken to date, in progress or planned with respect to fresh water quality.

Built Development Area	
West	East
<p>Completed studies:</p> <ul style="list-style-type: none"> • Consultation with the Environment Agency on requirements for surface water and groundwater quality monitoring and sampling • Five groundwater sampling campaigns from installed boreholes (December 2008 to June 2009) for radiological and non-radiological contaminants • Six terrestrial surface water monitoring and sampling campaigns for both radiological and non-radiological contaminants 	<p>Completed studies:</p> <ul style="list-style-type: none"> • None
<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> • Reporting of results 	<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> • Groundwater quality monitoring and sampling campaign (radiological and non-radiological)
Southern Construction Area	
<p>Completed studies:</p> <ul style="list-style-type: none"> • Surface water monitoring and sampling campaign 	
<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> • Groundwater quality monitoring and sampling campaign (radiological and non-radiological) 	

c) Key Issues

5.6.14 The following activities could lead to, or alter, discharges to terrestrial watercourses and in turn have the potential to result in changes to surface water quality during construction works:

- Surface drainage from drains, roads and stockpile areas, including hydrocarbon inputs from road drainage;
- Increased volume of surface discharges and associated sediment generation;

- Construction of haul road across Holford Stream; and
 - Erosion of riparian areas (potentially producing elevated suspended solids).
- 5.6.15 Best management practices will be implemented, including through the establishment of an EMMP, to minimise the risk of accidental spills/leaks affecting surface water and groundwater quality during construction and operational phases.
- 5.6.16 There will be a permanent surface drainage system constructed, which will collect most surface water and discharge it to marine waters rather than surface watercourses. There are no planned direct discharges to be made to the Holford Stream although there is the potential for surface water run-off to enter watercourses. The surface water drainage system will therefore incorporate catch-pits and oil interceptors. Sustainable Drainage System (SuDS) principles will be incorporated where possible.

5.7 Marine Water and Sediment Quality

a) Baseline Environment

- 5.7.1 Engineering works in the marine and estuarine environments will include the construction of cooling water intake and outfall tunnels below the intertidal shore and sea-bed and the installation of intake and outfall structures on the sea-bed itself. The works will also include construction of the Sea Wall, construction of the jetty and the upgrade to Combwich Wharf.
- 5.7.2 The sediment and water quality of Bridgwater Bay is affected by various historic and current activities including a number of major industrial activities. In addition, a number of nuclear power stations are situated around the Bristol Channel.
- 5.7.3 Marine water quality data for chemical and radiological parameters are available from a series of ongoing surveys. Samples have been collected from inshore and off-shore locations off Hinkley Point. Marine sediment quality data is not available for chemical contaminants but is available for radiological parameters (Radioactivity in Food and the Environment (RIFE) reports).

Chemical Parameters

- 5.7.4 Development specific data on marine sediment quality in the area off-shore of Hinkley Point has not been obtained, although a survey of the jetty's berthing pocket and proposed cooling water intake and outfall positions is planned. A study undertaken by Langston *et al.* in 2007⁹ indicates that:
- Arsenic, cadmium, chromium, copper, mercury and lead were present at concentrations at which biological effects could not be excluded; and

⁹ Langston, W.J., Chesman, B.S., Burt, G.R., Hawkins, S.J., Readman, J. and Worsfold, P. (2003) Site Characterisation of the South West European Marine Sites. Severn Estuary pSAC, SPA. Marine Biological Association Occasional Publication No.13.

- Zinc was present at concentrations at which biological effects might be expected.

5.7.5 In 2009, four water quality surveys were undertaken on different states of the tide and in different seasons and have recorded values for a range of non-radiological parameters. Results indicate relatively homogenous conditions within the sampling zones off Hinkley Point as would be expected given the large tidal range and high tidal velocities and associated mixing. Overall water quality conditions were within the normal range for coastal waters and generally comply with the relevant EQSs. However, an elevated concentration of dissolved copper was recorded at a number of locations and high suspended solids levels were also recorded (a noted feature of the Severn Estuary and Bristol Channel).

Radiological Parameters

5.7.6 Data on radionuclide presence in the marine environment is available through the annual RIFE reports. RIFE 13 (2007) includes data on radionuclide concentrations in sediment at various locations along the coast of Bridgwater Bay. The RIFE Reports suggest concentrations of man-made radionuclides in the aquatic environment of the Severn Estuary represent low total dose to critical groups (less than 5% of public dose limit).

5.7.7 In 2009, a further four water quality surveys were undertaken off-shore of Hinkley Point. The water collected was analysed for a range of radiochemical and radiometric parameters. The majority of results obtained were at levels below the analytical detection limit.

b) Assessment Studies

5.7.8 Impacts relating to discharge of thermal waters have been the subject of numerical modeling studies. Two models have been used to predict the impact of the development for four potential intake and discharge configurations.

5.7.9 The potential for impacts upon local sediment and water quality resulting from proposed dredging and other off-shore and cross-shore construction activities will be assessed in the context of both current and historical studies in the area. Where potential sensitivities are identified, mitigation will primarily be achieved through the selection of appropriate engineering design and construction methodologies and the application of best practice.

5.7.10 The table below provides a summary of the surveys and studies undertaken to date, in progress or planned with respect to marine water and sediment quality.

Marine Areas	
Completed Studies:	<ul style="list-style-type: none"> • Consultation with the Environment Agency on requirements for water quality monitoring and sampling • Four seasonal water quality monitoring and sampling campaigns (radiological and nonradiological) nearshore (cooling water outfall) and off-shore (cooling water intake) • High resolution temperature and turbidity surveys from fixed instrument platforms (intertidal, sea-bed and

buoyed).

Studies in progress or planned:

- Water quality modelling (considering discharge of a subset non-radiological contaminants into the marine environment)
- Sampling and analysis of sediments at specific locations where sediment management may be required

c) Key Issues

- 5.7.11 Potential marine water quality impacts include discharges of contaminated water into the marine environment, sediment disturbance and contaminant mobilisation associated with the construction works. A combination of environmentally sensitive design and best practice construction management measures will be implemented to avoid or minimise potential impacts.
- 5.7.12 Although there may be potential operational impacts as a result of the discharge of cooling water and possible use of various process chemicals, such as hydrazine. All discharges to the marine environment will be controlled through conditions of the discharge consents agreed with the Environment Agency.
- 5.7.13 During the operational phase of the development, it is proposed that a surface drainage system will collect all surface run-off from the Built Development Area and discharge this water via two outfall locations to the foreshore. Treatment measures will be incorporated into the drainage system. Best management practices would be implemented to minimise the risk of spills affecting water and sediment quality.

5.8 Hydrodynamics and Coastal Geomorphology

a) Baseline Environment

- 5.8.1 Hinkley Point is a headland and is a natural boundary between two distinct coastal process units, namely:
- Lilstock to Hinkley Point cliffs (a series of cliffs formed of Lower Lias limestones and mudstones); and
 - The outer Parrett Estuary (estuarine and marine Holocene deposits, characterised by reclaimed coastal marshes and mudflats).
- 5.8.2 Hydrodynamic survey work was undertaken at Hinkley Point in late summer 2008 over four spring-neap cycles and identified that:
- Tidal currents are parallel to the shore. Peak tidal current velocities in the nearshore subtidal zone range from 1.0m/s on neaps to 1.5m/s on springs relatively close to the site and 1.4m/s on neaps to 1.7m/s on springs further off-shore. Strong ebb to flood asymmetry was noted with stronger currents on the ebb. The magnitude of the asymmetry decreased as neap tides were approached. Current measurements across the sub-tidal zone described spring tide peak currents of approximately 1.4m/s. Tidal currents across the inter-tidal zone were variable with typical speeds of 1.0m/s on spring tides.

- The dominant direction of wave approach is from the west-northwest, with less frequent slightly smaller waves from the west. Significant wave heights of over 2m were recorded off-shore. The longest period waves (up to 20 seconds and likely to be swell waves) arrive from the west-northwest sector. Some shorter period waves arrive from the west sector.
- 5.8.3 This is a typical outer estuarine site that experiences a moderate variation in salinity regime throughout the tidal cycle. However, due to its extremely high tidal range, it is in most other senses atypical. Turbidity levels are extremely high, a distinctive feature of Bridgwater Bay, and the extreme turbidity and tidal regimes both have a significant influence on ecology and water quality. The freshwater plume from the nearby Parrett Estuary can also extend some distance off-shore.
- 5.8.4 Over the next 100 years, climate change is likely to impose a number of important modifications to the regime along the Somerset coast, including rising sea-levels and increases in the extreme water and storm surge levels. Climate change will act to accelerate existing trends within the Lilstock to Hinkley Point and outer Parrett Estuary process units. The evolution of these coastal/estuarine systems is being taken into account in predicting the potential implications of the development.
- 5.8.5 The geomorphology of the foreshore from St. Audrie's Bay to Hinkley Point comprises wave cut platforms of exposed rocks of the Upper Triassic and Lower Jurassic as well as shingle from an Ice Age source. The shingle originates to the west and is transported to the area by longshore drift.

b) Assessment Studies

- 5.8.6 An extensive suite of hydrodynamic survey work was undertaken at Hinkley Point in late summer 2008 over four spring-neap cycles using:
- A number of sub-tidal instrument moorings;
 - Inter-tidal instrument moorings;
 - Ship-borne instrument surveys;
 - An anchor station;
 - The deployment of drogues;
 - A long term Waverider buoy (still operating directly off-shore); and
 - A series of highly instrumented 'landers' on the sea-bed in shallower water.
- 5.8.7 New geophysical survey work was also undertaken to secure a detailed bathymetry sufficient for engineering design and hydraulic modelling. Swathe and sidescan sonar were used to develop habitat, bed morphology and (in combination with validation sampling) biotope maps. The output from these studies shows that most of the sea-bed and shore of the wider estuary is dominated by mud sometimes shallowly draped over the underlying solid geology with patches of coarser sediment. The sea-bed immediately in front of the Hinkley Point C site is dominated by bedrock exposures of interbedded limestone and mudstone.

5.8.8 On the basis of the collated data two separate numerical hydraulic models were developed to support, firstly, the engineering design studies and, secondly, the environmental assessment activity. Two potentially compatible needs have been considered in these simulations – avoiding recirculating the expelled cooling water back into the intake (with consequent efficiency losses on station operation) and limiting the potential environmental impact of the thermal plume from the cooling water outfall pipe.

5.8.9 The table below provides a summary of the studies undertaken to date, in progress or planned with respect to hydrodynamics and coastal geomorphology.

Marine Areas
<p>Completed Studies:</p> <ul style="list-style-type: none"> • Extensive single beam, sidescan and swathe high resolution surveys of the sea-bed • Mapping of nearshore and intertidal habitats and sea-bed morphology utilising sonar and Lidar surveys • Marine hydrographic surveys utilising ship-borne, sea-bed and buoyed instruments • Establishment of a long term wave monitoring facility (Waverider) and shallow water fixed instrument packages to ensure off-shore/on-shore wave field calibration • Development, calibration, validation and use of numerical hydraulic models in support of cooling water dispersion studies • Reviews and analyses of historical coastal geomorphological trends, current context and considerations of future change.

c) Key Issues

5.8.10 Studies to date on the hydrodynamics and coastal geomorphology have identified the following issues which will need to be taken into account:

- The engineering and access management approach for any cross-shore works. This will need to give careful consideration to local geomorphological interests. The main cooling water culverts will be tunnelled under the intertidal shore and sea-bed and thus will have no impact upon nearshore coastal geomorphological interests;
- The design and construction of the sea wall will be undertaken with appropriate care in order not to restrict the movement of sediments along the top of shore during storm sea conditions;
- The design and construction of other cross-shore structures, such as the proposed jetty, will be undertaken with appropriate care in order not to provide barriers to either waves or the existing hydraulic flows;
- Aside from the proposed sea wall itself the most significant structures to be introduced in the marine area will be the cooling water works. As described above any impact on the intertidal and near subtidal areas will be negated by tunnelling but the off-shore operations to introduce the intake and outfall structures themselves will inevitably cause some disturbance. The appropriate level of care in design and construction will be applied in order to control any localised impact on the hydrodynamic regime at these points; and
- Climate change predictions are suggesting higher water levels, including higher extreme water levels. The design of the sea wall will take these issues into account.

5.9 Terrestrial Flora and Fauna

a) Baseline Environment

- 5.9.1 The combined Built Development Area and Southern Construction Area comprises open, gently rolling mixed lowland farmland with hedgerows of variable quality, small scrubby woodlands and occasional standard trees. Much of the area is intensively managed and there is little semi-natural habitat present away from the cliff edge and the immediate vicinity of the built plant.
- 5.9.2 A relatively extensive area of land on the southern side and small areas of ground to the east and west of the existing Hinkley Point Power Station Complex have been subject to management according to an EDF Energy land management plan. The area is subject to the non-statutory conservation designation County Wildlife Site (CWS) (Hinkley CWS); approximately 60% of the designation is within the Built Development Area.
- 5.9.3 There are no substantial water-bodies within the combined Built Development and Southern Construction Areas, although two streams (Bum Brook and Holford Stream) run east-west across the area. These are connected to watercourses within the Bridgwater Bay SSSI and a minor unnamed stream which discharges to the intertidal zone. A more substantial drain (or rhyne) forms the boundary between the site and Wick Moor (North Moor). There is also limited standing water on-site.
- 5.9.4 The eastern boundary of the combined Built Development and Southern Construction Areas is formed (moving north to south) by the existing Hinkley Point Power Station Complex, the Bridgwater Bay SSSI and mixed farmland which has similar characteristics to that found within the site. The part of Bridgwater Bay SSSI immediately adjacent to the site consists of an area of flat, open improved grassland which is seasonally grazed. To the south and west of the Southern Construction Area there is further mixed farmland.
- 5.9.5 The northern boundary of the Built Development Area lies adjacent to Bridgwater Bay from which it is separated by a low cliff between five and ten metres in height. At low tide, the shore adjacent to and east of the site comprises a relatively narrow platform of rock (extending from approximately 200m to 500m from the cliff/upper shore). Further east, approximately 1km from the Hinkley Point C Development Site, the mosaic of intertidal habitats grades into an area of open mud and sand known as Steart Bay.
- 5.9.6 The Severn Estuary Special Protection Area (SPA) and Ramsar Site covers all intertidal and inshore marine habitat adjacent to the northern boundary of the Built Development Area and also extends inland and includes Wick and North Moor to the east.
- 5.9.7 The Severn Estuary was classified under the EU Birds Directive on the basis of its wintering and migratory bird interest. Qualifying features of the SPA are the wintering

numbers of (Russian) white-fronted goose, Bewick's swan, shelduck, gadwall, dunlin, redshank and the wintering waterfowl assemblage (over 20,000 birds). Additional species forming part of the key interest of the adjacent Bridgwater Bay SSSI (which shares a common boundary with the SPA locally) are whimbrel, grey plover, black-tailed godwit and teal.

Species Data

5.9.8 Sources of desk study data for terrestrial fauna including protected species are summarised below:

- **Birds:** Baseline data on the intertidal bird community included national Wetland Bird Survey (WeBS) counts and additional data collected for the West Hinkley Wind Farm Assessment (located on land within and to the east of the Built Development Area) which also supplemented annual breeding bird censuses undertaken by the EDF Energy Conservation Warden and historical work associated with previous applications.
- **Bats:** Considerable desk study data was available, predominantly as a result of the West Hinkley Wind Farm application, for which bat surveys were conducted between 2005 and 2007. Additional data and contextual information was received from Somerset Environmental Records Centre (SERC) and from the Somerset Bat Group
- **Water Vole:** Desk study data indicated that water vole occur to the east and south of the built plant at Hinkley Point, but that field signs had not been recorded within the site.
- **Otter:** There are very recent records of otter using rhynes to the east of the proposed development area from the EDF Energy Conservation Warden.
- **Dormouse:** Desk study indicated that there had been no previous dormouse survey, or records of dormouse within 3km, of the site. The nearest known record of the species is approximately 6.5km to the south-west.
- **Badger:** This species is abundant in West Somerset. Information from a number of sources was obtained through the desk study.
- **Great Crested Newts:** Information provided by SERC, the former site conservation warden and Somerset County Council indicated the historical occurrence of great crested newts in Pixies Pond and Branland Copse (to the east), but no recent records.
- **Reptiles:** Information from SERC and the site warden indicated that slow-worm and grass snake populations were likely to be present to the south of the existing Hinkley Point Power Station Complex and that common lizard was present on the coast outside the area of concern.
- **Invertebrates:** There were limited previous data available for the combined Built Development and Southern Construction Areas, with most available information relating to aquatic invertebrates on land to the east and to butterflies. This latter information was mainly available as a result of annual surveys undertaken by the EDF Energy Conservation Warden.

b) Assessment Studies

5.9.9 An extended Phase 1 habitat survey has been carried out in and around the Hinkley Point C site, the findings of which are illustrated in **Figure 5**. Further assessment surveys undertaken on the fauna in the study area are summarised below:

Birds

5.9.10 For estuarine habitats, the baseline numbers and distribution of breeding, feeding and roosting birds was established through two years of regular intertidal surveys. This resulted in no records of white-fronted goose, Bewick's swan and gadwall and very low numbers and/or infrequent occurrence of dunlin, grey plover and teal within 1km of the coastal fringe of the Built Development Area.

5.9.11 A survey of the breeding bird community of the Built Development and Southern Construction Areas and a substantial perimeter area was completed in 2007. The breeding bird community of the mixed farmland habitats within the combined Built Development and Southern Construction Areas is characterised by a range of common and relatively ubiquitous bird species. Skylark is present in the larger arable fields, with lesser whitethroat being the only locally notable farmland species (towards the western edge of its range). The area of the Hinkley CWS to the south of the existing Hinkley Point Power Station Complex supports several pairs of the regionally scarce nightingale and lesser whitethroat and also Cetti's warbler, which is specially protected.

Bats

5.9.12 Surveys were mainly undertaken in 2007 and 2009 and included walked transects, deployment of static detectors and emergence and re-entry surveys. These found that at least 12 species of bat used the combined Built Development and Southern Construction Areas, with the east-west green lane being of particular local importance as a commuting route. Several species featuring in Annex II of the Habitats Directive were recorded (barbastelle, greater horseshoe and lesser horseshoe bats).

Water Voles

5.9.13 Surveys were conducted during 2007, 2008 and 2009, with the most complete survey (taking in all running and still water-bodies) within the Built Development and Southern Construction Areas conducted in 2009. No field signs of water vole were recorded.

Otter

5.9.14 Survey of all watercourses within and close to the combined Built Development and Southern Construction Areas in 2009 recorded a few field signs in areas of adjacent

land along the Bum Brook and a rhyne on Wick Moor. There were no signs from within the Hinkley Point C site.

Dormouse

- 5.9.15 Surveys were conducted between 2007 and 2009 targetting the most suitable habitat. Over 350 dormouse ‘tubes’ were deployed, with no recordings.

Badger

- 5.9.16 A detailed survey followed by a bait marking study were completed in winter 2008/09 (when animals are most active). 28 setts (belonging to eight social groups) were located within the combined Built Development and Southern Construction Areas boundary. Bait marking work established that 12 social groups were present within the wider survey area (which extended well outside the Hinkley Point C area).

Great Crested Newt

- 5.9.17 In 2009, fifteen ponds within 500m of the Hinkley Point C site were screened with regard to suitability for great crested newts. Eight were then subject to detailed survey work in 2009. No great crested newts were recorded.

Reptiles

- 5.9.18 Surveys conducted within the combined Built Development and Southern Construction Areas (and adjacent land) over three consecutive years (2007-2009) concluded that there was a low population of grass snake and a good population of slow-worm to the south of the existing plant, but that reptiles were largely absent from the Hinkley Point C Development Site.

Invertebrates

- 5.9.19 Freshwater and terrestrial surveys recorded a small number of rare species, most of which were associated with the more extensive semi-natural habitats (including the less seasonal watercourses) outside the Built Development and Southern Construction Areas boundary.
- 5.9.20 Consultation with key stakeholders with respect to terrestrial ecology, including Natural England, the Environment Agency, Somerset Wildlife Trust and the RSPB, is ongoing and will continue throughout the assessment process.
- 5.9.21 The table below provides a summary of the terrestrial ecology surveys undertaken to date and planned.

Built Development Area and Southern Construction Area

Completed studies:

- Extended Phase 1 Habitat Survey
- Hedgerow Assessment

- River Corridor Survey
- National Vegetation Survey of Seminal grassland areas
- Woodland Condition Assessment
- Intertidal Bird Survey (72 visits)
- Nocturnal Bird Survey (26 visits)
- Bird usage of farmland around Hinkley
- Breeding Bird Survey
- Badger Surveys (including bait marking)
- Bat Surveys
- Dormouse Surveys
- Otter Surveys
- Water Vole Surveys
- Reptile Surveys
- Great Crested Newt Surveys
- Freshwater Invertebrate Survey

Studies in progress or planned:

- None

c) Key Issues

5.9.22 The principal ecological issues will be the loss of semi-natural habitats and habitat corridors within the Built Development and Southern Construction Areas and potential disturbance leading to displacement of bird populations within the Severn Estuary SPA and Ramsar Site and the Bridgwater Bay SSSI. The Built Development will also result in the loss of approximately 60% of the Hinkley CWS.

5.9.23 As a result of the soil stripping process, one small block and one linear strip of species rich semi-natural coastal grassland and seven small (generally) species poor woodland compartments will be lost. The majority of the 60 hedgerows within and adjacent to the Built Development and Southern Construction Areas, one pond and two flowing water-bodies will also potentially be removed or radically altered as a result of development. 37 of the hedgerows are considered important under the Hedgerow Regulations; this is due in almost all cases to their having seven or more woody species in a 30m sample area. The pond and most of the sections of watercourses have an aquatic and marginal flora that is of limited conservation interest.

5.9.24 Potential issues identified through the surveys to date relating to terrestrial fauna, including protected *species* are summarised below:

Birds

5.9.25 Waterfowl species most likely to be affected by disturbance resulting from the construction *works* (e.g. noise) will include moulting and wintering shelduck, wintering curlew and passage ringed plover.

5.9.26 Breeding bird habitat in the form of hedgerow, woodland and arable fields (very few *birds* breed in the pasture on site) will be lost in both the Built Development and Southern Construction Areas.

Bats

- 5.9.27 Loss of commuting routes and the three small on-site barns, two of which are used in summer by *small* numbers of roosting pipistrelles.

Otter

- 5.9.28 There is unlikely to *be* any significant effects on otter populations.

Badgers

- 5.9.29 There is the potential for badgers to be affected by the proposed development, particularly as a result of elements such as soil stripping and the removal of *woodland*. Given the confidential status that the locations of badger setts are afforded and the specific legislation relating to the species, a separate consenting process involving Natural England is being conducted.

Reptiles

- 5.9.30 Populations *present* are not likely to be affected by the development.

Invertebrates

- 5.9.31 Effects on invertebrate communities, which reflect habitat quality, will be limited.

Other Protected Species

- 5.9.32 Great crested newt, dormouse *and* water vole are considered unlikely to be affected by the proposal.

- 5.9.33 It should be noted that the most *ecologically* diverse area of the Hinkley CWS (approximately 40% of the total area) has been avoided through development design. This allows the retention of the most extensive areas of species-rich semi-natural grassland, the still water-bodies of most ecological merit and much of the local scrub.

- 5.9.34 Where required, a range of options will be considered to achieve the mitigation and conservation gain required of the development. The scope of the environmental measures will be agreed with nature conservation consultees.

5.10 Marine and Coastal Flora and Fauna

a) Baseline Environment

Marine Communities

- 5.10.1 The Severn Estuary SAC is recognised for its dynamic estuarine habitats, including immersed sandbanks, extensive mudflats and Atlantic salt meadows.
- 5.10.2 **Phytoplankton:** Throughout the Bristol Channel and Severn Estuary (including off Hinkley Point) low light levels restrict phytoplankton growth in open waters.
- 5.10.3 **Zooplankton:** The limitation of primary production is also considered to reduce growth of zooplankton.
- 5.10.4 **Sea-bed Fauna:** The sea-bed faunal assemblages of the Severn Estuary are generally regarded as being relatively impoverished.
- 5.10.5 **Intertidal Fauna and Flora:** The foreshore both fronting and adjacent to the proposed Hinkley Point C site comprises cobbles and shingle on the upper shore and outcrops of beds of limestone and shale mixed with areas of mud across the rest of the shore. The middle shore has a partial covering of brown algae but is otherwise relatively devoid of species. The lower shore immediately to the west of the existing Hinkley Point B cross-shore cooling water outfall is heavily colonized by the tube dwelling worm *Sabellaria*. Further areas colonised by *Sabellaria* exist both to the east of the existing outfall area and to the west of the proposed development area. Although individuals of these species are not themselves protected under UK legislation, they can form extensive biogenic reefs. Within the Severn Estuary, some of the subtidal *Sabellaria* agglomerations are of sufficient size and development to be considered as biogenic reef habitat and as such are designated as Annex I habitat under the EC Habitats Directive, as well as being listed within the UK Biodiversity Action Plan.
- 5.10.6 Another feature of interest on this part of the shore is the presence of areas of *Corallina* sward associated with the outer faces of the dipping limestone beds. These provide a habitat for a wide variety of species not otherwise found locally. Some of these features are present along the wave-cut rocky platform fronting the Hinkley Point C site and in the area where the jetty is proposed.

Fish and Fisheries

- 5.10.7 The fish assemblage common to the area around Hinkley Point is well known through continuing long-term study at the existing Hinkley Point B site. This assemblage is highly diverse due to the coast's southern and western location and includes many species of potential commercial and conservation significance.
- 5.10.8 **Protected Fish Species:** Several species of fish, protected under various pieces of legislation, occur within the immediate area of the proposed Hinkley Point C site and, on a wider scale, within the Severn Estuary and Bristol Channel. The seven migratory species found within the estuary together form a qualifying feature of the Severn Estuary Ramsar site.

- 5.10.9 Only twaite shad *Alosa fallax*, river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* are qualifying features of the Severn Estuary SAC, although these species have been rarely observed at Hinkley Point despite many years of routine survey effort. In addition to the migratory species, ten marine species found within the estuary are also UK BAP species, and the entire estuarine fish assemblage of the Severn Estuary is designated under Ramsar Criterion 8 as ‘one of the most diverse in Britain’.
- 5.10.10 The level of commercial fishing activity in the Severn Estuary and inner Bristol Channel is generally much lower than on grounds to the west and is thought to be decreasing. The estuary as a whole is thought to act as an important nursery ground for many commercially important species, including sole and sea bass. The nearest harbour to the site is Watchet which berths no commercial fishing vessels.

Marine Mammals

- 5.10.11 The diversity and abundance of marine mammals decreases within increased proximity to the Severn Estuary (SWF, 2009a). Sparse data is available for marine mammals in the Severn Estuary and it is likely that marine mammals are largely absent from this area.

b) Assessment Studies

Marine Communities

- 5.10.12 **Phytoplankton:** Routine seasonal phytoplankton surveys have been carried out off-shore over the course of a year.
- 5.10.13 **Zooplankton:** Routine zooplankton surveys have been carried out over an extensive area with a particular interest in the planktonic larvae and eggs of fish.
- 5.10.14 **Sea-bed Fauna:** Extensive surveys of the sea-bed fauna have been carried out routinely from early in 2008.
- 5.10.15 **Intertidal Fauna and Flora:** Extensive studies of the intertidal rocky shore and soft shore habitats fronting and flanking the proposed development site for several kilometers to the east and west have been carried out and, in combination with a detailed examination of remote sensing data, habitat and biotope maps have been produced. The only species recorded within the intertidal zone of potential conservation interest were *Sabellaria* and *Corallina*.

Fish and Fisheries

- 5.10.16 As well as surveys associated with this particular development numerous studies have been conducted on fish assemblages within the Severn Estuary and the Bristol

Channel. As a result, much information is available regarding species identity, richness and their population dynamics within the Severn Estuary and Bristol Channel. A number of studies have investigated the life history and migratory movement of particular species.

5.10.17 A comprehensive source of information on the abundance and species richness of fish in the locality is provided by the entrainment and impingement data collected at Hinkley Point B using the station’s cooling water drum screens – this effort was instigated in 1981.

5.10.18 To add to this data further quantitative studies have been established at the site to aid in refining predictions of cooling water impingement by the proposed Hinkley Point C Nuclear Power Station. Amongst these, an extensive series of surveys began early in 2008, involving trawls both in open water and over the sea-bed. The total number of species recorded in the trawls carried out in the vicinity of the proposed off-shore cooling water intake and outfall locations was low (15) and the catch per unit effort was also generally low.

Marine Mammals

5.10.19 A desk-based review indicated that although there have been sightings of harbour porpoise, dolphin species (mainly common dolphin) and grey seal in the outer Bristol Channel, the diversity and abundance of marine mammals decreases within proximity to the Severn Estuary.

5.10.20 The table below provides a summary of the surveys and studies undertaken to date, in progress or planned with respect to marine flora and fauna.

Marine Areas
<p>Completed Studies:</p> <ul style="list-style-type: none"> • Construction areas: first and second phase marine ecology baseline surveys • Wider subtidal areas: study of near-shore subtidal resources • Wider intertidal areas: study of intertidal resources • Characterisation (habitat and biotope mapping) of subtidal and intertidal areas • Review of commercial fisheries activity • Reviews of historic intertidal and power station fish impingement studies • Initial predictions of fish impingement and entrainment on cooling water screens • Campaigns from February 2008 to July 2009, including investigations of: <ul style="list-style-type: none"> ○ Fish, using pelagic, otter and beam trawls ○ Zooplankton (including dedicated ichthyoplankton surveys) and phytoplankton ○ Fish caught on power station screens and entrained plankton ○ Intertidal infauna, epifauna and flora ○ Subtidal infauna and epifauna ○ Subtidal and intertidal habitat and biotope mapping using remote sensing and field validation ○ Intertidal fish and mobile invertebrates • Desk-based assessment of marine mammals
<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> • Construction areas: final baseline marine ecology surveys • Continuing intertidal fish surveys • Continuing power station fish-on-screen surveys, in support of impingement and entrainment predictions and assessments • Continuing near-shore fish, ichthyoplankton, benthic intertidal and subtidal surveys.

c) Key Issues

Construction

- 5.10.21 The construction methods for installing cooling water infrastructure (horizontal tunnels and vertical wells) will result in the loss of limited areas of subtidal habitat immediately around the sea-bed structures themselves. It is likely that the area of disturbance will be greatest during the construction phase when there is a risk of greater upstream/downstream impacts on the sea-bed due to scour. However, the area of habitat loss is not expected to be significant.
- 5.10.22 The movement of construction vehicles during the construction of the sea wall and jetty has the potential to impact the foreshore and intertidal area supporting *Corallina* and *Saballeria*. Careful controls governing access during construction will be implemented in order to minimise potential effects as far as possible.
- 5.10.23 The construction of the sea wall and jetty may have an impact on the intertidal and subtidal areas although with careful positioning and appropriate mitigation the impacts on the shore are unlikely to be significant.
- 5.10.24 Any piling noise associated with the jetty could also affect certain fish species in close proximity to the works. Further studies are being undertaken to determine the potential effects.
- 5.10.25 Construction-related discharges from the land-based works, or through accidents and incidents, into the marine environment have the potential to erate impact the foreshore and associated *Corallina* community.

Operation

- 5.10.26 The operation of the Hinkley Point C Nuclear Power Station will result in the impingement of fish and crustacea on the cooling water intake screens and entrainment through the cooling water system and subsequent discharge of fish eggs and larvae. The primary means of mitigating such impacts is through the appropriate location and design of the cooling water intake structures and, in this instance, the proposal is that the intakes be positioned a significant distance off-shore in deeper water. In addition, designs that reduce the intake velocity sufficiently to allow fish avoidance to occur, even under conditions of high tidal flow, are being considered. The introduction and maintenance of more active (e.g. acoustic) fish protection measures at such a remote off-shore location are unlikely to prove practicable.
- 5.10.27 The tidally oscillating and generally buoyant thermal plume that will result from the cooling water discharge will impinge upon areas of sea-bed and this plume at its furthest extent may reach as far as the shore flanking Bridgwater Bay and the mouth of the Parrett Estuary. Given the highly opportunistic nature of the infaunal

populations in this area and the limited temperature rise involved, this plume is unlikely to have any significant impact, despite its scale.

5.10.28 The release of hydrazine and the any residues of biological fouling control agents during routine operations may have a negative impact on the marine environment. However, any such operational discharges will be controlled to within acceptable levels.

5.10.29 The *Corallina* community present on the shore fronting the site may be negatively impacted by discharges from the adjacent land onto the foreshore. Appropriate design and the operational management arrangements on-site will mitigate this.

European and nationally designated sites

5.10.30 The key potential ecological effects associated with the development are those that could affect European and nationally designated sites. Consequently, any such potential effects are being considered in detail. The effects of the project on marine species and habitats that form part of the designated interest features of the Severn Estuary SAC, SPA and Ramsar site will be considered in light of the Habitats Regulations.

5.11 Transportation

a) Baseline Environment

5.11.1 EDF Energy's baseline assessment of transportation in the vicinity of the Hinkley Point C site has considered the full range of potential options for accessing the site – by road, walking, cycling, bus, rail and sea.

5.11.2 The main access road serving Hinkley Point is the C182, which runs from Hinkley Point through the village of Cannington and then joins the A39 to the south of the village. It is an unlit, single carriageway rural road, generally subject to the national speed limit.

5.11.3 From the M5, the A38 links the motorway north and south of Bridgwater at Junctions 23 and 24 respectively. At Bridgwater the A38 joins the A39. Despite the A39 bypass traffic associated with the Hinkley Point Power Station Complex still has to travel through the centre of Cannington to reach the C182.

5.11.4 There are very few footpaths on the C182 leading to the site and little use is made of the unlit local roads for walking and cycling. Some bus services run between local villages and into Bridgwater, but services are extremely limited. The nearest railhead is at Bridgwater approximately 12km from the Hinkley Point C site. A privately operated line runs 12km to the west of the Hinkley Point C site.

5.11.5 EDF Energy owns a roll-on roll-off (RoRo) facility at Combwich Wharf on the River Parrett. This is used periodically to receive delivery of very heavy or large plant. Combwich is a very small village with narrow streets which are not suitable for the

passage of large vehicles. Deliveries arriving at Combwich are transported to Hinkley Point along a private access road, which connects to the C182.

- 5.11.6 Navigation at Hinkley Point and into the River Parrett is managed by the Port of Bridgwater. As well as the RoRo berth owned by EDF Energy at Combwich, Hanson Aggregates manage the sand wharf at Dunball. Shipping operations are due to commence shortly at the cargo berth at Dunball Wharf which has recently been taken over by River Bulk Shipping. Vessel usage within the area managed by the Port of Bridgwater is on a fairly small scale with 59 coastal vessels recorded in 2006.

b) Assessment Studies

- 5.11.7 A Strategic Transport Masterplan for the Hinkley Point C project was developed in 2008 in consultation with key statutory consultees. The strategy examined the key issues for transportation, including scope, aspirations and impacts of the development scenarios. A transport baseline report was produced in late 2008, covering the existing road, rail and bus network in the vicinity of the Hinkley Point site. Further transport assessment studies followed in 2009 and this assessment work is still ongoing.

Roads

- 5.11.8 The baseline report established a traffic scenario of existing (2008) demand conditions on the Somerset road network within an agreed survey area; this includes the M5 motorway (and specifically Junctions 23 and 24), the A38, the A39 and the C182 through Dunball, Bridgwater, Cannington and Combwich. The geographic extent was increased for later surveys to capture demand on highway links and junctions that may accommodate both existing and future operational traffic. This entailed extending the assessment area further to the west of Hinkley Point. The Highways Agency has also sought confirmation of the development's potential implications for the performance of the strategic road network at motorway junctions more remote than Junctions 23 and 24. Further work will be carried out to investigate this.
- 5.11.9 The baseline report included a significant data collection exercise to obtain traffic flow and queue length data for key links and junctions on the highway network. Further traffic volumetric data has been secured in 2009. The data has been collected using automatic traffic counters (ATC) that identify the mix of light vehicles and heavy vehicles on a daily basis. At junctions on the network, vehicle turning movements have been counted, along with the length of traffic queues during the network peak hours.
- 5.11.10 Once the base data has been collected, appropriate growth factors (as agreed with the Highway Authorities) will be included in order to represent the baseline background traffic growth on the network, before any additional construction or operational traffic is added on. Future year assessments of highway network performance are to be undertaken for 2015, the projected peak construction year in

terms of the number of site-based employees, and for 2020 when both new reactors are projected to be operational. This is also in line with the Highways Agency ‘review period’. The baseline assessment will be used to determine whether any highway improvements will be required.

- 5.11.11 Data has also been collected on personal injury accidents on the Somerset road network within the chosen survey area, including the M5 motorway and the slip-roads serving Junctions 23 and 24. Further accident analysis is ongoing.
- 5.11.12 In addition to its baseline assessment, EDF Energy is assessing the potential impact of Hinkley Point C traffic on the local road network with its proposed Transport Strategy in place using the PARAMICS micro-simulation model and the more strategic SATURN model (developed from the Taunton and Surrounding Area Strategic Traffic Model (TSTRT2)). Both models are being used to assess the need for bypasses around Cannington and Bridgwater.
- 5.11.13 In addition to traffic flow modelling, further detailed analysis of accident statistics will be undertaken and a review of whether there are any intrinsic safety issues.
- 5.11.14 EDF Energy’s Transport Strategy has as a key objective the promotion of sustainable modes of transport. All possible public transport options have, therefore, been identified and their viability assessed.
- 5.11.15 Data on vessel operations off the coast of Hinkley Point and within the River Parrett is being sought from the Port of Bridgwater, together with information regarding key navigation routes around the UK obtained from the Marine and Coastguard Agency.
- 5.11.16 All of the marine construction works will have navigational requirements, which may require a navigation risk assessment to be undertaken. This would be based on the baseline data collected and the construction activities planned (i.e. the number and timing of vessels and other structures). The influence of the tidal range and current speeds will also be taken into account to inform the design of the proposed jetty.
- 5.11.17 The table below provides a summary of the surveys and studies undertaken to date, as well as those in progress or planned.

Transport Assessment
<p>Completed Studies:</p> <ul style="list-style-type: none"> Desk-based data review Traffic flow and queue surveys Roadside survey interviews to secure origin and destination data at five locations Public Transport Network and Service assessments Preliminary Personal Injury Accident analysis Preliminary traffic modelling of highway network performance using both SATURN and PARAMICS modelling software Preliminary highway design route assessment study for Cannington bypass
<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> Further traffic surveys (volumetric and queues) Detailed traffic modelling for each respective phase of development Detailed analysis of accident data

c) Key Issues

- 5.11.18 The construction of Hinkley Point C will require significant movement of people and materials to and from the site, which could have an adverse impact on local transport if not properly managed. During construction, the workforce on the site is predicted to peak at around 4,000 plus a 20% contingency (see **Section 5.18.1** Socio-economics) in 2015 and most of these workers will have to be transported to and from the site on a daily basis. In addition, significant volumes of construction materials will have to be transported to the site, including large and abnormal loads. Once the site is operational, it will have a permanent workforce of around 700 and an additional temporary workforce of around 1,000 for periodic outages. These workers will also have to travel to and from the site on a daily basis.
- 5.11.19 Socio-economic work has assessed the probable geographic origins of the construction workforce and enabled likely travel routes and predicted demand to be identified.
- 5.11.20 There is inevitably some uncertainty about the origins of construction material given that EDF Energy has not yet placed contracts for their supply. However, a “first principles” approach has been adopted to assess likely vehicle movements. An assessment has also been undertaken of likely vehicle movements once the plant is operational.
- 5.11.21 The overall road transport assessment for both the construction and operational phases will enable EDF Energy to determine the overall impact of its proposals on the road network and whether any additional mitigation measures are required.
- 5.11.22 Two key locations that need to be assessed from a road transport perspective are Cannington and Bridgwater. Preliminary analysis has shown that a bypass around Cannington is likely to be necessary but does not indicate a need for a bypass around Bridgwater. Further investigations are being conducted at both locations.
- 5.11.23 Although preliminary analysis has shown that it is not likely to be practical for workers to walk or cycle to the site or use local bus services, in line with EDF Energy’s commitment to maximise the use of sustainable modes of transport, plans have been put in place for workers to use park and ride facilities. The key issue of how to encourage workers to use alternative modes of transport is being included in the Transport Assessment.
- 5.11.24 The use of rail services is likely to be impractical for the bulk transfer of materials to the site, since goods would have to be transported from the railhead to the site by road via Bridgwater. There may be some scope for transporting workers to the area by rail if services can be improved. EDF Energy is discussing this with First Great Western.
- 5.11.25 Tidal navigation in the vicinity of the jetty will be constrained by the large tidal ranges experienced in the Severn Estuary (up to 12 metres on spring tides). Navigation will

also be influenced by the construction and eventual presence of the off-shore cooling water infrastructure. Hence measures will need to be taken during the construction phase to avoid congestion and ensure safe navigation in the long-term.

5.11.26 In light of the above issues, EDF Energy is therefore developing a suite of measures to deal with transport related impacts, including:

- The refurbishment of Combrich Wharf to maximise water-borne transport of bulky and abnormal loads;
- Provision of a temporary jetty at Hinkley Point C for bulky aggregate delivery;
- shift patterns for construction workers so that they can be moved to and from the site outside peak traffic hours;
- Strategic locations for construction worker accommodation;
- Car sharing;
- Park and ride facilities;
- Parking restraint measures;
- Freight consolidation facilities;
- A bypass around Cannington; and
- Minor road improvements.

5.12 Noise and Vibration

a) Baseline Environment

5.12.1 Noise sensitive receptor locations relative to the Built Development Area and Southern Construction Areas have been identified. The sensitive receptors to be used in the assessment are those located closest to potential sources of noise or vibration (during construction and/or operation) or the most representative, where numerous receptors exist close together. The presumption is that achieving suitable noise or vibration levels for these receptors will, in the majority of situations, afford sufficient protection to more distant receptors.

5.12.2 The area around the Built Development Area is primarily arable farmland, punctuated by scattered residences, farmhouses and a number of small hamlets. Three noise sensitive receptors have been selected from these, each at a distance greater than 1km from the nearest proposed UK EPR reactor unit. However, some activities within the Southern Construction Area may be at a closer distance (within 50m to the nearest residential dwelling). One of the selected assessment locations is the closest potentially affected receptors to these operations.

5.12.3 Noise measurement survey work was undertaken in April and May 2009. The methodology for the survey was agreed in advance with the relevant local authority Environmental Health Departments and was carried out in accordance with current best practice and the requirements of British Standard 7445 'Description and measurement of environmental noise'.

5.12.4 The noise measurements recorded during the various surveys generally show levels typical of those expected in a rural community, with dominant noise sources including local road traffic, birdsong and surf movement (at the coastal monitoring location), dropping to very low levels during the night-time with wind noise providing an observable contribution to the noise levels.

5.12.5 No background vibration measurements have been conducted and it was agreed with the local authority Environmental Health Officers that none were necessary given the distance separation between likely sources and potential receptors.

b) Assessment Studies

5.12.6 Preliminary construction and operational noise assessments have been conducted, including assessment of noise associated with the jetty. Impacts have been assessed with regard to human receptors.

5.12.7 The construction noise assessment indicated that the majority of the construction operations associated with the Hinkley Point C Development Site, including commissioning activities, would have a negligible noise impact on the nearest potentially sensitive receptors, based on permissible noise limits agreed with the local authority. The assessment found, however, that a potentially major adverse day-time noise impact may arise as a result of earthworks and stockpiling at the southern-most extent of the site. The creation of a landscape buffer from topsoil to potentially reduce noise levels to a moderate adverse impact level is being evaluated.

5.12.8 EDF Energy is currently consulting on proposals to build a workers' accommodation campus near to Doggetts Farm and Wick Moor Drove. The construction and occupation of this building will be examined further within the ES, with noise impacts assessed and suitable mitigation proposed where necessary.

5.12.9 An assessment of noise emissions from the proposed operational Hinkley Point C Nuclear Power Station has been undertaken using a 3-dimensional noise propagation model to predict noise levels at the nearest sensitive receptors. In light of the low existing ambient noise levels measured at these receptors and the low predicted power station noise at each a permissible night-time noise level of 43dB LAeq for the combined noise emissions from the power station was derived from published threshold values with the aim to protect amenity and prevent sleep disturbance. If required, it is proposed that suitable attenuation measures would be applied to the most significant noise sources on the site with a view to minimising any further adverse impact and these will be further detailed in the ES.

5.12.10 Assessment of traffic-related noise will be conducted in accordance with the guidance contained in the Highways Agency document 'Design manual for roads and bridges' (Volume 11, Section 3, Part 7 - 2008) and the Department of Transport guidance 'Calculation of road traffic noise' (1988).

5.12.11 Control of construction noise will be achieved through an application by the contractor for a ‘prior consent’ in accordance with the guidance at Section 61 of the Control of Pollution Act 1974. This will enable the principal contractor and local authority to agree suitable measures intended to minimise the potential for disturbance due to construction activities, including such things as permissible noise levels and working hours, at a time when the proposed construction methodology and timescales are better defined.

5.12.12 The table below provides a summary of the studies undertaken to date, planned or in progress with respect to noise and vibration.

Built Development Area	
West	East
Completed studies: <ul style="list-style-type: none"> • Baseline noise monitoring 	Completed studies: <ul style="list-style-type: none"> • Baseline noise monitoring
Studies in progress or planned: <ul style="list-style-type: none"> • Modelling of noise sources during the operational phase 	Studies in progress or planned: <ul style="list-style-type: none"> • Modelling of noise sources during the operational phase
Southern Construction Area	
Completed studies: <ul style="list-style-type: none"> • Baseline noise monitoring 	
Studies in progress or planned: <ul style="list-style-type: none"> • Construction and Operational noise and vibration impact assessment of potential campus development 	

c) Key Issues

5.12.13 The primary noise and vibration sources during the construction phase would be those typical of an industrial construction site. Potential impacts would vary through the following major stages of the development, but the potentially significant activities would include:

- Mobilisation;
- Earthworks and site platform construction;
- Building construction, including percussive piling and any blasting;
- Construction of the jetty and refurbishment works to Comwich Wharf; and
- UK EPR commissioning.

5.12.14 The preliminary assessments have indicated that, in most cases, there is likely to be a significant separation distance between the construction areas and potentially affected receptors and, therefore, a negligible noise impact. Potentially greater impacts may be anticipated where activities occur much closer to residential properties, such as the stockpiling operations in the Southern Construction Area. However, it is intended that the construction of a landscape buffer in this location will serve to reduce construction noise to an acceptable level, although the creation of the buffer will, itself, be a source of potential noise in the short-term.

5.12.15 Throughout the construction period, the volume of construction traffic on local roads will vary, but is generally expected to increase significantly, with the potential for noise and vibration impacts on receptors along affected routes. The local roads most likely to be affected during this period are:

- A39 Bridgwater to Minehead Road;
- Cannington High Street;
- Rodway; and
- Withycombe Hill.

5.12.16 The assessment of off-site impacts (beyond the construction site) will be based upon the detailed Transport Assessment, which will address mitigation of local effects.

5.13 Air Quality

a) Baseline Environment

5.13.1 The proposed development at Hinkley Point C is located in a predominantly rural setting on the coastline of Bridgwater Bay. The study area constitutes the residential and ecological receptor locations in closest proximity to the Built Development Area and Southern Construction Area and to the off-site construction phase roads.

5.13.2 Information relating to existing ambient air quality is available from a series of reports prepared by West Somerset Council and Sedgemoor District Council under the Local Air Quality Management regime. In addition a 6-month background monitoring survey of nitrogen dioxide (NO₂), sulphur dioxide (SO₂) and fine particulate matter (PM₁₀) was undertaken between February and September 2009. Measurements were taken at representative properties of the nearest residential locations to the proposed development, in the villages of Burton, Shurton and Wick to the south and Stolford to the east and on-site at the Hinkley Point B Nuclear Power Station Training Centre.

5.13.3 Further background air pollutant concentration data is available on the DEFRA UK Air Quality Archive (UKAQA) over a 1km² grid. The monitoring survey data better reflects local air quality, which can generally be regarded as good. Values are well within the respective health-based Air Quality Objectives prescribed in the Air Quality Regulations (DEFRA, 2002). No statutory Air Quality Management Areas (AQMAs) have been designated by either West Somerset or Sedgemoor District Councils.

5.13.4 In respect of potential air quality effects on vegetation and ecosystems, the AQS also defines objectives for concentrations of nitrogen oxides (NO_x), sulphur dioxide (SO₂) and ozone (O₃). Critical Loads for pollutant deposition and Critical Levels of gaseous pollutant concentrations are available from the UK Air Pollution Information System.

b) Assessment Studies

5.13.5 A qualitative assessment of potential air quality impacts from the construction phase of the development has been undertaken, comprising consideration of fugitive construction dust releases from assumed activities. The assessment is based on analysis of local meteorological data and the consideration of 31 receptor locations (18 of which are located more than 1km from the development and all of which are

more than 200m from the site activities, with one exception, Doggetts Farm, which is approximately 50m from the construction site boundary). The approach is conservative and the assessment concludes that, even at Doggetts Farm, appropriate dust control and management as will be described in the EMMP, would ensure that any impact would be minor.

5.13.6 Once a detailed construction programme, including transportation and shipping, has been defined, the effects of exhaust emissions from on-site plant and equipment will be considered.

5.13.7 Emissions to air from (non-transportation) operational processes have been assessed using a two-stage approach. A screening assessment was undertaken using Environment Agency guidance for the purposes of regulated industry permitting. Detailed dispersion modelling of emissions was undertaken, including releases from the following activities:

- Periodic testing of diesel backup generators (NO₂ and SO₂);
- Thermal decomposition of insulation material (formaldehyde, HCHO and carbon monoxide, CO);
- Releases from temperature increases in the steam generators after wet lay-up (ammonia, NH₃); and
- Exhaust releases from auxiliary boilers, domestic heating and fire fighting and hydrant diesel pumps (NO₂ and SO₂), albeit limited.

5.13.8 Based on the screening approach described above, a detailed modelling study was carried out for emissions from the diesel backup generator testing activity. The estimated process emissions from the other activities were all determined to be insignificant, with regard to both human health and ecological receptors. Thus, detailed modelling was only undertaken for short-term emissions of NO₂ and SO₂. ADMS 4 dispersion modelling software was used with 5 years of local meteorological data in order to predict concentrations at sensitive human health receptor locations based on scenarios in 2017 (first reactor operational) and 2020 (both reactors operational). The approach was very conservative; worst-case dispersion conditions (2005 meteorological data) were used and releases were assumed for each hour of the year, whereas in reality this generator testing is scheduled to occur for only 88 hours per year. Predicted short-term NO₂ and SO₂ concentrations did not exceed the relevant Air Quality Objectives at any of the receptor locations.

5.13.9 To date, no assessment of the local air quality impacts of exhaust emissions from operational traffic has been undertaken. Once the traffic data becomes available, detailed modelling of road traffic emissions will be carried out using ADMS Roads software, considering a worstcase construction period and operational scenario.

5.13.10 The table below provides a summary of the surveys and studies undertaken to date, in progress or planned with respect to air quality.

Built Development Area and Southern Construction Area
<p>Completed studies:</p> <ul style="list-style-type: none"> • Air quality baseline monitoring to determine background pollutant concentrations • Air quality modelling of operational emissions to air
<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> • Dispersion modelling and impact assessment of vehicular emissions to air (construction and operational phases)

c) Key Issues

- 5.13.11 The separation distance between the construction areas and potentially affected off-site receptors should ensure that there is no significant impact from construction dust. Although one receptor is within relatively close proximity to activities on the southern boundary, the creation of a landscape buffer and control and management of fugitive dust emissions during the construction activities will ensure that impacts at this location are not significant.
- 5.13.12 The construction programme will identify the extent of proposed rail and marine transportation routes and at that stage the scope of any assessment of the air quality impact of emissions associated with these routes will be determined. Emissions from construction and operational traffic will be considered in the forthcoming vehicular dispersion modelling study. Operational impacts (non-vehicular) have already been assessed and process emissions from all activities will not contribute significantly to existing pollutant background concentrations.
- 5.13.13 Operational impacts (non-vehicular) have been assessed and process emissions from all activities are not likely to contribute significantly to existing pollutant background concentrations.
- 5.13.14 Releases from periodic testing of the diesel backup generators were modelled and this indicated that the relevant short-term Air Quality Objectives will not be exceeded. Emissions from construction and operational traffic will be considered in the proposed vehicular dispersion modelling study.

5.14 Radiological Effects

a) Baseline Environment

- 5.14.1 All individuals in the UK are exposed to ionising radiation to a varying degree from natural and man-made sources. Natural contributions (from radon gas, cosmic rays etc.) vary according to location, whilst exposure to man-made sources varies according to occupation, lifestyle and location. Natural sources contribute on average 84% of the total annual dose to members of the public. Discharges of radioactivity into the environment from industry contribute less than 0.04% a year of the total dose received.

5.14.2 The historical, current and future discharges from the Hinkley Point A and Hinkley Point B Nuclear Power Stations provide a contribution to the historic and potential future baseline for the discharges of artificial radionuclides around Hinkley Point. The Environment Agency and the Foods Standards Agency produce an annual ‘Radioactivity In Food and the Environment’ (RIFE) report on the results of radiological monitoring of food and environmental sampling programmes in the UK, especially near nuclear licensed sites. The most recent RIFE reports have been reviewed and the following relevant data have been extracted:

- Drinking water, freshwater and seawater for locations close to Hinkley Point; and
- Mud sampled 1.6km from the discharge pipeline from the existing Hinkley Point Power Station Complex, mud from Watchet and sediment from Stolford.

5.14.3 In addition to this published data specific sampling campaigns are being carried out by EDF Energy in order to obtain a comprehensive understanding of background levels of radioactivity around Hinkley Point. The results of these sampling campaigns have been assessed against a range of relevant regulatory guidelines and the results of these assessments are provided in the relevant sections dealing with land quality (**Section 5.3**), fresh water quality (**Section 5.6**) and marine water quality (**Section 5.7**).

5.14.4 Further walkover surveys will be undertaken within the Built Development Area East and Southern Construction Area and these will be followed by soil and groundwater sampling and analysis to complete the baseline characterisation.

b) Assessment Studies

5.14.5 For the construction phase of Hinkley Point C, if the results of the soil and groundwater investigations described above show any significant contamination to be present, then radiological impacts on workers involved in the construction of the proposed power station will be assessed.

5.14.6 For the operational phase, the assessments include the evaluation of radiological impacts on both human and non-human species. These assessments have taken into account the particular characteristics of the human population and the natural environment in the locality of Hinkley Point. The assessments follow up the work which has already been done during the Generic Design Assessment (GDA) process. The GDA has determined the potential doses to members of the public and a range of non-human species from the operation of an UK EPR reactor unit for a ‘generic’ new build nuclear power station site in the UK. The purpose of all of this work is to demonstrate to the regulatory authorities that doses to members of the public due to discharges of radioactivity from the UK EPR reactor design will be within relevant regulatory limits.

5.14.7 The table below provides a summary of the studies undertaken to date, in progress or planned with respect to human and non-human radiological effects.

Built Development Area and Southern Construction Area
Completed studies: <ul style="list-style-type: none">• Assessment of the radiological impact of the transport of radioactive materials• Assessment of human radiological impacts from discharges• Assessment of non-human radiological impacts from discharges
Studies in progress or planned: <ul style="list-style-type: none">• Assessment of radiological impacts on workers during the construction phase, should contamination be identified following intrusive investigations on the Built Development Area East.

5.14.8 Site-specific assessments have been carried out with respect to the human population in order to determine the following radiological impacts:

- Doses to the selected critical groups from routine, continuous releases of liquid and atmospheric discharges. The critical groups represent those individual members of the public in the area around Hinkley Point who, because of their location and day-to-day activities are expected to receive the highest doses. Within each critical group, doses to adults, children and infants have been calculated.
- Annual doses to the most exposed members of the public from direct radiation exposure to the proposed radioactive waste stores.
- Collective doses to the UK, European and World populations from routine releases of liquid and atmospheric discharges and representative ‘per caput’ doses (the latter refers essentially to the average dose to individuals within each of these large populations).
- Potential doses to hypothetical members of a critical group as a result of short-term operational atmospheric discharges.
- Doses due to potential build-up of radionuclides in the environment as a result of discharges during the whole of the proposed 60 year operational phase of Hinkley Point C.
- The radiological impact of the transport of radioactive materials to and from Hinkley Point C and required in support of its normal operational activities.

5.14.9 Radiological impacts on non-human species as a result of liquid and atmospheric discharges from Hinkley Point C have been assessed with respect to four habitats that are representative of the range of habitats in the locality of Hinkley Point (i.e. marine, freshwater, terrestrial and coastal). The locations of the habitats were selected to include ecologically designated sites or those where radionuclide concentrations would be highest.

5.14.10 Generic species which are appropriate for each of the selected habitats together with certain additional terrestrial species (badgers and bats) that are known to be present in the locality of Hinkley Point, were modelled to determine representative doses.

c) Key Issues

- 5.14.11 For the assessment of radiological impact on humans, the calculated doses have been compared using significance criteria derived from guidance values as set by the regulatory authorities.
- 5.14.12 Assessments to date show that doses to members of the public from the liquid and gaseous discharges from Hinkley Point C can be considered as negligible (less than 20 $\mu\text{Sv}/\text{y}$). When taken together with the existing authorised discharges from the Hinkley Point A and Hinkley Point B sites total doses to the critical group members of the public will also be negligible (less than 20 $\mu\text{Sv}/\text{y}$), and will be dominated by the assumed discharges from the existing Hinkley Point A and Hinkley Point B stations. A worst-case assumption has been made that both the existing Hinkley Point A and B sites continue to discharge wastes at the current authorised limits. In reality this will not be the case and, in the medium and long-term, only discharges (and the associated negligible impacts) from Hinkley Point C need to be considered.
- 5.14.13 The doses estimated for the non-human species assessment were also considered in light of relevant regulatory guidance. The most stringent limit is a dose rate of 10 $\mu\text{Gy}/\text{hr}$, below which evidence shows that there would be no measureable harm to any non-human species. This was therefore also taken as constituting a ‘negligible’ radiological impact with respect to non-human species around the site. The assessments indicate that the doses in the selected habitats (and for generic species) from Hinkley Point C and the cumulative Hinkley Point Nuclear Power Station Complex discharges will be well below this criterion of 10 $\mu\text{Gy}/\text{hr}$ and can, therefore, also be considered as negligible.

5.15 Landscape and Visual Amenity

a) Baseline Environment

- 5.15.1 Hinkley Point is situated in a clearly defined geographical region of North Somerset, bounded by the Bridgwater Bay to the north, the Quantock Hills to the south and west and the Polden Hills to the east.
- 5.15.2 The Hinkley Point Nuclear Power Station Complex lies within national Landscape Character ‘Area 142 – Somerset Levels and Moors’ (as amended within the West Somerset District Local Plan), which is a broad area of low-lying farmland and wetland surrounded and divided up by low hills and ridges. At a more local level Hinkley Point C falls within the Quantock Vale Landscape Character Area, which extends approximately 5km from the site. This area is characterised as a lowland landscape of wider valleys and gentle hills, rarely above 60m AOD. Within the hinterland of Hinkley Point are a number of small villages and hamlets widely dispersed around a network of minor roads. Within this context, the Hinkley Nuclear Point Power Station Complex is a dominant landscape feature.

- 5.15.3 Several national and international designations within the wider study area have informed the landscape and visual assessment. They include the Exmoor National Park, Quantock Hills and Mendip Hills Areas of Outstanding Natural Beauty (AONB), the Severn Estuary Ramsar site, SPA and SAC and Bridgwater Bay SSSI and National Nature Reserve. There are no local landscape designations within the site, however, a Historic Landscape, Green Wedge, Historic Parks and Gardens and a Conservation Area are present within the wider study area.
- 5.15.4 The potential visibility or Theoretical Zone of Visual Influence (TZVI) of the development has been mapped using modelling software. Consultation with key stakeholders was undertaken from December 2008 to July 2009 has identified all relevant landscape designations and landscape character assessments to be considered, and provided advice on areas of potential visual sensitivity.
- 5.15.5 Principal and secondary viewpoints have been identified for the visual assessment. Principal viewpoints were selected as points which provide the clearest views of the site and are also the most accessible to the public. Secondary viewpoints represent views from areas which are not commonly used by the public, would provide less clear views of the Hinkley Point C Development Site, or may be perceived to be sensitive but in reality have restricted views of the site due to the distance.
- 5.15.6 From 57 viewpoints initially recorded, principal (23) and secondary (12) viewpoints were selected following consultation with key stakeholders (including Natural England, West Somerset Council, Somerset County Council, Sedgemoor District Council and Exmoor National Park Authority). The sensitivity of the selected viewpoints has been assessed using standard, and accepted methods. In broad terms, sensitivity depends on the distance from the site, the number of potential viewers, nature of the viewpoint, movement of viewers and cultural significance of the viewpoint.
- 5.15.7 Seascape has been considered alongside landscape and takes account of the open water beyond the mainland and includes views from the land to sea, from sea to land and along the coastline.

b) Assessment Studies

- 5.15.8 The initial impact assessment of the scheme has been carried out and mitigation measures have been proposed. Local landscape components have influenced the development of the concept design for the site. The residual landscape effects have been assessed for all landscape elements identified in the baseline study and include impacts on grassland, hedgerows, woodland and trees, water features, topography, aesthetic and perceptual factors, accessibility, agricultural land, field patterns and cultural and social factors.
- 5.15.9 Visual impact assessments identify key potential impacts of development, both beneficial and adverse. For the full assessment, the impact upon the baseline landscape and receptor groups' views of the landscape has been identified and

assessed for the construction phase and on completion of the Hinkley Point C Nuclear Power Station Development.

5.15.10 The assessment of the significance of residual landscape and visual effects has been determined using the ‘Guidelines for Landscape and Visual Impact Assessment’ produced by the Landscape Institute and the Institute of Environmental Management and Assessment (2002). It defines impact significance as a combination of the sensitivity of landscape and visual setting analysed in the baseline study and the magnitude of impact following mitigation.

5.15.11 The table below provides a summary of the surveys undertaken to date, in progress or planned with respect to landscape and visual amenity.

Built Development Area
Completed studies: <ul style="list-style-type: none"> • Landscape baseline • Visual baseline
Studies in progress or planned: <ul style="list-style-type: none"> • Landscape and visual assessment, including a visual impact assessment model and photomontages • Seascape assessment (landscape and visual) of the jetty and the seawall • Offsite mitigation proposals
Southern Construction Area
Completed studies: <ul style="list-style-type: none"> • Landscape baseline
Studies in progress or planned: <ul style="list-style-type: none"> • Landscape and visual assessment (including site preparation) • Restoration/mitigation proposals • Photomontages

c) Key Issues

5.15.12 The proposed development has the potential to change the character and appearance of the coastline and cliff top, i.e. cause landscape and visual effects, defined by the Landscape Institute and Institute of Environmental Assessment (2002) as:

- **Landscape Effects:** Changes *‘in the elements, characteristics, character and qualities of the landscape as a result of development’*; and
- **Visual Effects:** Changes *‘in the appearance of the landscape as a result of development.’*

5.15.13 Either can be positive or negative. The main landscape impacts associated with the construction would be the loss of landscape features, including:

- Grassland areas, including calcareous grassland;
- Hedgerows;
- Predominantly deciduous woodland; and
- Watercourses and ponds within the site.

5.15.14 Further landscape impacts during construction would include:

- Changes to topography due to stockpiling of excavated materials and longer-term new build elements for the purpose of screening;
- Change in landscape character due to the presence of construction machinery;
- Adverse landscape impacts on aesthetic and perceptual attributes of the surrounding landscape character areas;
- Impacts on accessibility;
- Impacts from the visibility of lighting associated with construction; and
- Loss of agricultural land with an ancient, distinctive field pattern.

5.15.15 The visual effects during the construction phase include adverse visual impacts from:

- The majority of principal viewpoints and some secondary viewpoints due to construction machinery, materials, stripped soils and partially completed buildings;
- Increased traffic to and from the development;
- The visibility of lighting associated with construction at viewpoints; and
- Loss of landscape elements providing screening to the existing development.

5.15.16 During operation, the main landscape and visual impacts associated with the development would be the main power station buildings. There would be lighting associated with the elements of the scheme that would be visible. Changes to the existing lighting regime will need to be carefully considered. Where appropriate, shielding will be used to reduce this impact as much as possible.

5.15.17 The majority of landscape elements to be lost during construction will be recreated on completion of the scheme. A net gain in some landscape elements such as woodland areas is one of the aims of the design concept.

5.15.18 The residual visual impacts will be analysed on a viewpoint-by-viewpoint basis. The need for screening the proposed development from sensitive locations will be addressed in the mitigation strategy.

5.16 Archaeology and Cultural Heritage

a) Baseline Environment

5.16.1 Within the Hinkley Point C site there are no Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Parks and Gardens or Registered Battlefields. However, there are a number of hedgerows that meet the archaeological and historical criteria of Important Hedgerows as defined in the Hedgerow Regulations 1997.

5.16.2 A Scheduled Monument, Wick Barrow (also known as Pixies Mound) is located 50m outside the site boundary to the east of Wick Moor Drove. It dates from the Neolithic and Bronze Age periods and was partially excavated in 1907. There are eight Listed Buildings situated to the south of the site boundary in the nearby village of Shurton.

5.16.3 Ten sites, identified from previous studies, are recorded in the Somerset Historic Environment Record (HER) and National Monuments Record (NMR), including:

- Scatters of Mesolithic flints found during previous field walking surveys;
- St Sidwell's Well, located just within the eastern site boundary to the west of Wick Barrow, which may have its origins in the Iron Age;
- A 3rd - 4th century Romano-British settlement identified during previous archaeological investigations in the northern part of the site;
- The postulated site of a late Saxon-medieval settlement, Sedtammtone, recorded in the Domesday Book but never convincingly located;
- The sites of Benhole Farm and of Corner Farm;
- Water meadow systems and associated drainage features;
- The remains of a possible limekiln; and
- An undated enclosure, visible as cropmarks on aerial photographs in the south of the site.

5.16.4 There are three historic buildings surviving within the site. Benhole Barn, the only surviving structure at the site of Benhole Farm which burnt down in 1952, has been substantially altered. Langborough Barn and lincay complex is located to the east of Benhole Barn. Part of its roof and a substantial lean-to building along the south face of the building has collapsed. Sidwell Barn, the smallest but most complete of the three buildings, is located in the east of the site, adjacent to Wick Moor Drove. None of these buildings are designated and no previous studies had been undertaken to establish their importance.

5.16.5 The Severn Estuary is of known importance for its marine archaeological interest. At Stolford, immediately to the east of Hinkley Point, the geology of the off-shore area is characterised by banded layers of alluvium and peat. Exposed timbers of Mesolithic and Neolithic date have been eroded and exposed from these deposits, observable on the foreshore. This area is known as the Stolford Submarine Forest. Medieval and Post-medieval fish weirs and Post-medieval groynes are also recorded in the foreshore area.

b) Assessment Studies

5.16.6 A 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 2008'. In accordance with standard practice, a study area, extending 500m beyond the boundary of Hinkley Point C, was defined in order to establish the archaeological and historical context of the site.

5.16.7 This assessment has identified 42 known or suspected cultural heritage assets within the study area through a combination of desk study, site walkover surveys, watching briefs during geotechnical site investigation and a geophysical survey. These include 39 archaeological sites and three standing buildings.

5.16.8 Cultural heritage assets were identified through:

- A search of the records held at the National Monuments Record and the Somerset Historic Environment Record;
- Analysis of the Historic Landscape Characterisation (HLC) data;
- A search of maps and documentation at the Somerset Record Office;
- Data from field surveys carried out for the 1990 Hinkley Point C proposal;
- Other data sources, including the National Mapping Programme,
- Portable Antiquities Scheme and the South West Archaeological Research Framework (Webster 2008); and
- Consultation with appropriate statutory bodies.

5.16.9 Consultation has been undertaken with Somerset County Council Historic Environment Services (HES), regarding the assessment methodology and mitigation of potential impacts. English Heritage has also been kept informed of the progress of the assessment. Further consultation is planned.

5.16.10 Following a site walkover with the County Archaeologist, the Development Control Archaeologist and the Senior Conservation Officer it was agreed that specialist assessments would be required to determine the importance of the surviving historic buildings and inform a suitable strategy for mitigating potential impacts on extant historic buildings and historic landscape features on the Built Development Area.

5.16.11 Non-intrusive field surveys have also been carried out in order to identify previously unknown features as part of the ongoing assessment, including:

- Field reconnaissance surveys;
- A watching brief during construction adjacent to Wick Moor Drove;
- A watching brief during excavation of geotechnical test pits; and
- Geophysical surveys.

5.16.12 Geophysical surveys, comprising a detailed magnetometer survey and limited resistivity survey, have been undertaken across the whole site. As well as enhancing the known data for the Romano-British settlement in the northern part of the site, the surveys also confirmed the presence and location of the undated cropmark enclosure in the south of the site.

5.16.13 The magnetometer survey also identified a number of potential archaeological sites that were previously unknown, including:

- A possible doubled-ditched, sub-circular enclosure, approximately 75m in diameter, located to the north of the Romano-British settlement;
- Possible enclosures and field systems to the south-west of the Romano-British settlement;
- Linear and curvilinear features and a possible enclosure to the east of Langborough Barn;

- Possible enclosures or field systems with a drive way leading to Wick Moor Drove, recorded to the north of Sidwell Barn; and
 - A series of enclosures and linear features, extending east-west across the site and straddling the boundary between the Built Development Area and the Southern Construction Area.
- 5.16.14 An archaeological watching brief during construction of the site compound adjacent to Wick Moor Drove recorded an undated pit and ditch, which may relate to Romano-British settlement features recorded beyond the site boundary to the east.
- 5.16.15 Desk studies identified the site of a building ‘the Old Barn’, to the south of Langborough Barn, recorded on an estate map dating from 1614.
- 5.16.16 In addition, 21 possible sites were identified as a result of the site walkover surveys. The majority of these sites comprise earthwork remains of former landscape features such as field boundaries, watercourses or ponds.
- 5.16.17 Surviving field boundaries within the site boundary are usually formed of a hedge on a bank commonly with a drainage ditch. Many of these boundaries are recorded on the 1614 and 1794 maps and would be considered Important under the archaeological and historical criteria included in the Hedgerow Regulations.
- 5.16.18 The most prominent historic landscape feature is an east-west track way, following the well defined ridge which runs through the central section of the Hinkley Point C site. This track way is depicted on all historic maps of the site dating back to 1614. A substantial hedge survives along most of the southern side of the track and there is a shorter stretch of hedge along its northern edge that continues for approximately 200m.
- 5.16.19 An assessment of the surviving historic buildings on the site has been undertaken. The assessment reviewed previous desk-based studies and the geophysical survey of the off-shore area undertaken by EMU, also in 2009. The document was commissioned to assess the proposed locations of 19 boreholes in the off-shore area, and concluded that *“There are no direct conflicts at any of the nineteen proposed borehole locations with known archaeological targets, or features/zones of high archaeological potential as determined from an assessment of the extant interpretations of the geophysical data.”*
- 5.16.20 The table below provides a summary of the studies and surveys undertaken to date, in progress or planned with respect to archaeology and cultural heritage.

Built Development Area	
West	East
<p>Completed studies:</p> <ul style="list-style-type: none"> • Cultural heritage desk-based assessment (DBA) • Detailed walkover survey • Historic Buildings Assessment • Watching brief during geotechnical site investigation • Geophysical survey to identify features of potential archaeological interest 	<p>Completed studies:</p> <ul style="list-style-type: none"> • Cultural heritage DBA • Detailed walkover survey • Geophysical survey
<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> • Trial trenching to confirm findings of geophysical survey 	<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> • None
Southern Construction Area	
<p>Completed studies:</p> <ul style="list-style-type: none"> • Cultural heritage DBA • Detailed walkover survey • Geophysical survey 	
<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> • Additional geophysical survey at Shurton • Trial trenching to confirm findings of geophysical survey 	

c) Key Issues

- 5.16.21 Geophysical anomalies of possible archaeological origin were recorded across large areas of the site. At least five potential sites were identified, but at present the date and function of these possible sites remains unknown. Therefore the importance of these sites cannot be assessed.
- 5.16.22 Trial trenching across the Hinkley Point C site is currently being undertaken; a total of 130 trial trenches will be excavated. The trial trenching will target potential features identified by desk-based studies, walkover surveys and the geophysical surveys. The number and locations of the trenches has been agreed with Somerset County Council HES. Trial trenching will adhere to the Institute for Archaeologists' Standards and Guidance for Archaeological Field Evaluation, 2008.
- 5.16.23 Prior to the main construction works, topsoil stripping and land-levelling will take place across all areas where site works are planned, including temporary work areas and sites used for the storage of spoil. Groundworks will result in the destruction of all archaeological remains below ground. The existing buildings on the site will be demolished.
- 5.16.24 A section of the historic track way and hedge banks will be retained within the proposed development but the majority of the historic landscape features above

ground will be lost. Somerset County Council HES has agreed that preservation by record, in accordance with the guidance contained in Planning Policy Guidance Note 16: Archaeology and Planning (1990) (PPG16), would be appropriate mitigation.

- 5.16.25 Archaeological excavation and recording would be followed by an appropriate programme of post-excavation works, comprising assessment, analysis, publication and archiving.
- 5.16.26 Historic building recording, equivalent to Royal Commission for Historic Monuments of England (RCHME) Level II standard, will be completed prior to demolition of the historic barns.
- 5.16.27 The setting of the Scheduled Monument, Wick Barrow, would be slightly altered by the development, both during construction and operation. However, since part of the setting is already occupied by the existing Hinkley Point Nuclear Power Station Complex and that it is intended that much of the land to the south would be reinstated, this slight alteration to the setting of the Scheduled Monument is likely to be of minor significance. Adequate mitigation, including the preparation of an updated Monument Management Plan, will be discussed with English Heritage and Somerset County Council HES.
- 5.16.28 The development would have no impact on the Listed Buildings in Shurton Village, or their settings.
- 5.16.29 Although the off-shore work established that there are no direct conflicts at any of the borehole locations with known features or zones of high archaeological potential, boreholes may still encounter deposits of palaeo-environmental and archaeological significance. Further consultation will be undertaken with the English Heritage Regional Scientific Advisor to determine suitable mitigation of potential impacts on marine archaeology.

5.17 Amenity and Recreation

a) Baseline Environment

- 5.17.1 The Hinkley Point C site is well served by a network of public footpaths and bridleways (Public Rights of Way - PRoW). Within 3km of Hinkley Point, there are 50km of PRoW that are connected to the Hinkley Point area by road or by other footpaths. A coastal path runs along the low cliff edge to the west and along the coastal frontage of the proposed Hinkley Point C site. A number of the north-south coastal access paths, as well as east-west connecting PRoW, fall within the Hinkley Point C Development Site. The PRoW network which runs across and in the vicinity of the site provides access to a blend of coastal and inland environments.
- 5.17.2 Aside from use of the footpath network, fishing, horse-riding and occasional wildfowling are the only formal recreational activities undertaken on or near to the

Hinkley Point C Development site, in relatively restricted areas, as well as in low numbers.

5.17.3 Within the Severn Estuary and Bristol Channel there are a large number of sailing, cruising, boating and yacht clubs. However, no specific or formal boating/sailing activities or events are known to occur off Hinkley Point.

b) Assessment Studies

5.17.4 Following consultation with Somerset County Council’s Rights of Way Team, a Recreational Access Survey was undertaken for the PRoW across and in the vicinity of the site. The survey entailed counts of users of the PRoW and a questionnaire for PRoW users, as well as a survey of footpath condition and access.

5.17.5 Counts of footpath users did not indicate a high density use of the PRoW network, including along the coastal path. During 1 hour counts at various locations across the footpath network, over a 12 hour period on each of 4 days, 26 individuals were recorded. Based on the Somerset County Council Rights of Way Improvement Plan (RoWIP) Appendix F criteria, the use was low for all PRoW counted.

5.17.6 The majority of users appear to be local residents (70% of those surveyed lived within less than 1km), though on occasion visitors who reside significant distances from the area (e.g. in excess of 10km) use the PRoW. The PRoW network is predominantly favoured for dog walking (85% of users counted).

5.17.7 The counts did not reveal significant differences in visitor/user numbers between weekdays and weekends. Use of the PRoW network is therefore seen to be low intensity but high frequency (repetitive use of the network by local users).

5.17.8 The table below summarises the surveys undertaken to date, in progress or planned with respect to amenity and recreation.

Built Development Area
Completed studies:
<ul style="list-style-type: none"> Recreational Access Survey
Studies in progress or planned:
<ul style="list-style-type: none"> Consultation with amenity groups, and with angling groups over use of the foreshore Consultation with Natural England, Ramblers Association and Open Space Society Consultation with local residents Consultation with SCC PRoW Officer over closures/diversions/enhancements.
Southern Construction Area
Completed studies:
<ul style="list-style-type: none"> Recreational Access Survey
Studies in progress or planned:
<ul style="list-style-type: none"> Consultation with SCC PRoW Officer over closures/diversions/enhancements.

c) Key Issues

5.17.9 The PRoW network will be impacted during the construction and operational phases of the Hinkley Point C development with some permanent rationalisation and diversion of PRoW. The survey described above will help to inform the evaluation of

significance of potential impact from closure and likely redirection of routes, as well as providing supporting information for the focus of mitigation measures and possible enhancements. These will be undertaken based on the priorities identified in the Somerset County Council RoWIP.

5.17.10 Plans for the PRoW are yet to be finalised. Consultation will take place with Somerset County Council ahead of any application to rationalise or divert PRoW and, in due course, there will be engagement with the Ramblers Association and the Open Spaces Society. In addition, Natural England will be a key consultee for any works impacting on the coastal footpath due to their remit under the Marine and Coastal Access Act (2009). Further feedback will also be sought from users of the PRoW network.

5.17.11 The following is currently being considered:

- During the construction phase, it is proposed that all PRoW are temporarily diverted around the outside of the site for safety reasons;
- A temporary diversion to the coastal path for a maximum of 18 months will be necessary for the construction of the jetty and Sea Wall. The Coastal Path will remain open to the public thereafter;
- Following construction, PRoW within the development site will not be re-opened, but alternative routes outside the permanent development area boundary will be provided; and
- Opportunities will be explored with consultees for proposals to up-grade and enhance the quality of the permanent PRoW.

5.17.12 Any potential effects of the proposals on horse riding, wildfowling, fishing, sailing and boating will also need to be considered.

5.18 Socio-economics

a) Baseline Environment

5.18.1 Socio-economic impact assessment involves a systematic appraisal of the impacts on day-to-day quality of life of people and communities. Sensitivities can be defined in terms of the various groups and agencies likely to be affected by the proposed development.

5.18.2 Construction stage employment is estimated to peak at 4,000, plus a 20% contingency, based on current estimates and actual monitoring information on the workforce profile for Sizewell B Nuclear Power Station which provides some valuable comparative information. Operational workforce numbers are expected to build up from about the middle of the construction programme and well before the reactors are commissioned. The fully operational station (from 2020 onwards) will provide approximately 700 permanent jobs, comprising various categories. In addition, approximately 1,000 other workers will be employed at the site during refuelling and maintenance outages.

- 5.18.3 Socio-economic impacts must be seen in the context of the local baseline, including local demographics, economy and employment, accommodation, education, health and other services, plus community perceptions of impacts. They must also be seen in various spatial contexts.
- 5.18.4 The combined population in the three immediate districts of Sedgemoor, Taunton Deane and West Somerset is almost 256,000 (Office of National Statistics (ONS), mid-2007 population estimates). The Office of National Statistics forecast population growth between 2006 and 2026 in these districts, divided by broad age group, shows small growth percentages forecast in numbers of children (15%) and those of working age (9%) compared with major growth in those over retirement age (59%). West Somerset has an increasing and very high percentage of population over retirement age. Also of significance for the retention of a young and future working age population is the net outward migration of people in the 16-24 age group from all three districts.
- 5.18.5 The employment rate in Sedgemoor, Taunton Deane and West Somerset is similar to the national average, but slightly below the south-west regional average. Important employment sectors include manufacturing in Sedgemoor; public services in Taunton Deane and tourism-related employment in all districts, particularly in West Somerset. Overall the number of residents in skilled manual trades (c14% for the three districts), including construction and building trades, is above average.
- 5.18.6 Claimant unemployment rates have been low and below the English average, but rose substantially in 2008/2009 in the face of the global recession, with a more than doubling of rates over the year. An occupational breakdown for May 2009 shows over 800 unemployed claimants in the three districts with relevant engineering and construction skills and over 7,000 in a 90 minute daily commuting zone.
- 5.18.7 The districts do display some important socio-economic issues and on the overall Index of Multiple Deprivation (2007), West Somerset is ranked 106th out of the 354 local authority districts in England (where a rank of 1 indicates the most deprived district nationally). Average levels of deprivation are lower in Sedgemoor (ranked 169th) and Taunton Deane (ranked 204th).

b) Assessment Studies

- 5.18.8 Socio-economic effects are partly determined by the nature of the development; the nature of the locality; and policy decisions taken by key stakeholders (e.g. the developer's policy on accommodation/local recruitment/training etc; and the policy positions and socio-economic objectives of local and regional authorities and agencies). These determinands need to be investigated thoroughly to clarify the likely set of key impacts. An important distinction is made between the construction and the operational stages of the development, as previous experience has shown that there are marked differences in their socio-economic impacts. The assessment study methodology included:

- Initial assembly of baseline data for the local area;
- Socio-economic Topic Group Workshops with local stakeholders;
- Development of framework and key elements to provide a comprehensive local area socio-economic baseline ;
- Work on the power station baseline, including detailing existing power station socioeconomic characteristics; and
- Clarification of potential socio-economic impacts for the construction and operational stages of the projects consultation on possible mitigation and enhancement.

5.18.9 The spatial/geographic scope of the socio-economic baseline studies varies by impact category. The local labour market for the operational phase is defined as the immediate districts of West Somerset, Sedgemoor and Taunton Deane.

5.18.10 The studies draw on extensive work on the socio-economic impacts of many of the UK nuclear power stations, including an eight year longitudinal study monitoring the socio-economic impacts of building Sizewell B, socio-economic studies for the proposed Hinkley Point C Nuclear Power Station in the late 1980s, and studies on the decommissioning of Hinkley Point A. Studies of the local socio-economic impacts of the early years of the construction stage of the EDF EPR project at Flamanville 3 in Normandy provide some current comparative experience.

5.18.11 The methodology has drawn on published/semi-published information and consultation with local area stakeholders and power station staff. The table below provides a summary of the socio-economic studies that have been undertaken or are planned.

Main Development
<p>Completed studies:</p> <ul style="list-style-type: none"> • Initial socio-economic scoping • Stage 2 baseline studies (local area, generic power station development, likely impacts and mitigation) • Comparative studies • Hinkley Point C Construction workforce – journey origins and routes study • Socio-economic stakeholder workshops (2008-9) • Work on mitigation, enhancement and legacy possibilities
<p>Studies in progress or planned:</p> <ul style="list-style-type: none"> • Work on local/regional area assessment indicators, wider effects and more detailed mitigation and enhancement • Latent accommodation study.

c) Key Issues

5.18.12 The construction of the proposed Hinkley Point C Nuclear Power Station is expected to take in the region of ten years with a peak workforce estimate of 4,000 plus a 20% contingency. There is a further assumption of an 18 month stagger between construction of the two units, which has the advantage of facilitating the continuity of some skills/workers needed.

5.18.13 Development changes in the locality have the potential to generate a range of socio-economic impacts with, as appropriate, mitigation/enhancement measures, including:

Construction

- **Employment:** the employment profile is based on a peak workforce estimate of 4,000 plus a 20% contingency, giving a planning peak of 4,800. The potential for local recruitment is considerable, but varies across workforce categories. With a set of strong support policies and practices it is anticipated that over 2,000 peak construction jobs could be taken up by people from the local commute zone and especially the immediate districts. The development could provide a major opportunity for local employment which could help to keep (primarily young) employees in the districts and contribute to an enhancement of employee skills in the engineering and construction industries which could be used on other local projects.
- **Accommodation:** at peak construction there might be approximately 2,400 non-local workers seeking a range of largely temporary accommodation provision in the locality. It is estimated that about one quarter of the non-local workforce could make use of local B&Bs/guest houses/caravans etc, without putting an undue strain on the important local tourism accommodation market. Other accommodation would be provided by the owner-occupied and rental sectors, but it is estimated that there will be a need for the supply of purpose built accommodation for at least one third of the non-local workforce.
- **Other Key Services:** these include for example, impacts on education and schools, health and local medical services and crime and policing. Impacts on schools are influenced particularly by the number of non-local workers accompanied by families. From comparative experience this is estimated to be quite low. Measures would include the provision of an on-site medical centre, worker behaviour policies and the provision of high quality campuses and worker transport.
- **Wider Economic Impacts:** In addition to the direct local employment effects discussed above, power station developments have a range of secondary or indirect effects. The construction work on site is likely to create demands for goods and services from local firms creating additional employment. The scale of these wider economic impacts is substantial and provisionally estimated at around £100 million per annum over the construction period. On the other hand there can be concern that some existing local firms may suffer, by losing labour to the power station project.
- **Less Tangible Impacts/Disturbance:** the aim of mitigation is to avoid/minimise any negative impacts associated with the development of the project, as discussed above. Opportunities for the enhancement of positive impacts would also be taken. However such a large project is likely to cause some indirect disturbance effects which are less easy to address directly. In such cases there can be benefit in supporting a package of facilities which the local community can enjoy, with a focus perhaps on locally identified key priority areas.

Operation

- **Employment:** the operational workforce is expected to build up from about the middle of the construction programme and well before the reactors are commissioned. The fully operational station will provide around 700 permanent jobs, again comprising various categories: managerial, clerical and administrative, plus the major industrial workforce category. In addition, approximately 1,000 other workers will be employed at the site over a period of one month every one to two years, for refuelling and maintenance outage for each reactor. Drawing on experiences from other nuclear stations, and policies of strong support for local recruitment, it is estimated that at least 50% of the operational workforce could be recruited from the immediate districts. The operational project should provide a continuation for a substantial quota of skilled and secure jobs for local people, partly off-setting the closure and decommissioning of Hinkley Point A and the eventual closure of Hinkley Point B.
- **Accommodation:** it is estimated that the non-local permanent operational workforce will primarily be owner occupiers (almost 80%), with the remainder renting property. Hinkley Point B provides a useful guide to the future pattern of residential location, with 95% of the operational workforce living within the three immediate districts, including 70% living in Sedgemoor.
- **Other Key Services:** data from previous studies suggest a school age child yield of about one per non-local employee. The age profile is likely to be more balanced between primary and secondary school age children for the operational phase compared to the primary school focus for the construction stage. The distribution of children is likely to be across many schools within the three immediate districts but, reflecting the distribution of nonlocal families, is likely to be concentrated in Sedgemoor. Registration with local GP surgeries is also likely to be primarily in Sedgemoor, with smaller numbers in West Somerset.
- **Wider Economic Impacts:** at full operation the indirect employment effects and the increase in the level of income in the local economy will be of a more permanent nature. Estimates of the annual addition suggest this may be in the range of £30-40m per annum (2010 prices). Previous studies also suggest the additional local indirect employment will be about 60% of direct employment.
- **Perceptions of impacts/disturbance:** there is likely to be little in terms of significance in terms of community disturbance and most impacts are likely to be positive.

5.18.14 Detailed impact studies have been undertaken for all the issues summarised above and these have been discussed with local stakeholders. The socio-economic work will continue to be refined to take account of the latest data, local and regional objectives and policies and continuing discussions on mitigation and enhancement.

6 ENVIRONMENTAL IMPACT ASSESSMENT – OFF-SITE ASSOCIATED DEVELOPMENT

6.1 Introduction

6.1.1 There are a number of options proposed for the Off-site Associated Development in terms of location and scale. These have been informed by EDF Energy’s transport and accommodation strategies. The environmental assessment work undertaken for the Off-site Associated Development is in its early stages, but all surveys and assessments required for a robust EIA will be completed prior to the DCO application. The table below sets out the current proposals and options for the Off-site Associated Development considered necessary to construct and operate the Hinkley Point C Development.

Locations	Potential developments
Cannington	<ul style="list-style-type: none"> • Bypass to the east or the west • Accommodation with up to 320 beds (including Cannington College) • Park and Ride facility with up to 900 spaces • Consolidation/storage facility for road and water-borne freight • Spoil disposal
Bridgwater	<ul style="list-style-type: none"> • Park and Ride facility with up to 750 spaces at Junction 23 • Park and Ride facility with up to 350 spaces at Junction 24 • Freight consolidation facility at either Junction 23 or 24 • Accommodation with up to 500 beds
Williton	<ul style="list-style-type: none"> • Accommodation with up to 200 beds • Park and Ride facility with up to 350 spaces
Combwich Wharf	<ul style="list-style-type: none"> • Wharf refurbishment, and provision of a freight consolidation/storage facility for water-borne freight

6.1.2 In this section a short description is provided of the assessment studies either undertaken or proposed for each of these locations and potential developments, along with an initial indication of the potential impact issues. Socio-economics is considered in general terms for all of the Off-site Associated Development in **Section 6.2**.

6.2 Socio-economics

6.2.1 EDF Energy’s strategy for Off-site Associated Development, in terms of location and scale, has been assisted by the baseline assessment of the local population, local employment, accommodation provision and the likely origins of workers expected to be employed to construct the Hinkley Point C Development. The assessment of the socio-economic impacts of the proposed Off-site Associated Development is still in its initial stages. Further information is being collected, for example on the likely numbers of workers and the amount of materials required for construction.

Key Issues

- 6.2.2 The construction of the proposed Off-site Associated Development is expected to take in the region of one to two years. There is expected to be a distinction between the socio-economic impacts arising during the construction, operation and (where appropriate) decommissioning or legacy phases. For example, once Hinkley Point C is constructed, the Cannington bypass would be used less, but other projects may have ongoing legacy uses that give rise to employment opportunities.
- 6.2.3 It is estimated that the construction employment impacts will be far less for the Off-site Associated Development compared with the Hinkley Point C Development. However, it is possible that there could be a proportionally higher percentage of local employment, especially given the recruitment and training practices proposed to be adopted by EDF Energy. Construction of the Off-site Associated Development will be in advance of the peak periods for Hinkley Point C and there may be opportunities for some continuity of employment on power station construction.
- 6.2.4 Other socio-economic impacts will flow from the employment impacts. For example, if the workforce is largely locally based, there will be less requirement for additional accommodation, or additional impact on local services.

6.3 Cannington Bypass

- 6.3.1 Two potential route options have been identified for the proposed bypass – to the east and west of the village.

Geology, land-use and soils

- 6.3.2 A desk-based assessment and site visit has been undertaken for both route options to ascertain the Agricultural Land Quality, geology and existing land uses. The pattern of soils across both route option is similar. Land use within both corridors is agricultural, covering Agricultural Land Classification (ALC) Grades 1, 2 and 3. EDF Energy will be undertaking further ALC field surveys and assessment of the stewardship schemes in operation. These will be supported by further site visits and consultation with landowners. There are unlikely to be any issues relating to geology, except where it potentially affects design, and no further assessment is considered to be required.

- 6.3.3 Key issues relating to soils and land use are:

Construction

- Loss of agricultural land and impacts on biodiversity;
- Temporary and permanent loss of land uses, including agricultural land, for both routes. Any temporary loss can be mitigated by good soils management practices and high quality restorations of the site post construction.

Operation

- There are unlikely to be any significant issues for soils and land use during the operational phase, but the shorter western route option is likely to have lower impact as it has a smaller footprint than the eastern option and would affect smaller areas of agri-environment schemes.

Land contamination

- 6.3.4 Consultation has been undertaken with the Environmental Health Officer from Sedgemoor District Council and the potential for contamination discussed. It was agreed that as a desk study had shown no significant potential for contamination no further assessment would be required. However, as part of the construction management plan the Contractor will put in place a contingency plan to deal with any contamination should an unexpected site be encountered. There are no significant issues in relation to contamination and waste for either of the route options.

Hydrogeology

- 6.3.5 Initial desk-based assessment and site survey have been carried out. The majority of both routes cross areas designated as Non-Aquifers. Of the remaining sections, the route crosses a Minor Aquifer associated with terrace gravels and a small section of a Major Aquifer within sandstone. These aquifers are classified as being of high and intermediate permeability and so are vulnerable to any surface pollution. There are no Source Protection Zones located within a 5km radius of the study area, and there are a number of current records of abstraction licences for general farming or dairy use and/or spray irrigation, and domestic use.
- 6.3.6 Further Studies to be undertaken include groundwater level survey information (obtained either through consultation with the Environment Agency or by site investigation), groundwater quality assessments and an assessment of the appropriateness of the mitigation package.

Hydrology, drainage and flood defence

- 6.3.7 In order to determine the impact on hydrology and related aspects, the issues of flooding and drainage are key themes and factors that will influence the design of any bypass. Cannington is covered by the Parrett Catchment Flood Management Plan (CFMP). Steepness of local watercourses, combined with the impermeability of the local geology, generates high run-off from the land causing rivers to respond rapidly to rainfall. Modelling has been carried out for the area to estimate the potential flood zones, which are presented in the Sedgemoor Strategic FRA Level 1 report. The majority of the village and surrounding area is in Flood Zone 1 and therefore not at major risk of flooding. The main sources of recorded flood incidences within Cannington are associated with surface water.
- 6.3.8 The key issues for the western route are the potential for the bypass to result in the exacerbation of peak fluvial flows in Cannington Brook, whilst the key issues for the eastern route arise from its presence within the floodplain. Although mitigation measures can be incorporated for both bypass options to minimise impacts on

drainage and flood risk, the scale and influence on the eastern route results in much greater disturbance than the western route. Furthermore, in terms of the sequential testing under PPS25, it is likely that the eastern bypass would not be the favoured route.

- 6.3.9 Further studies will include an assessment of any direct effects on watercourses and drains (including assessment against the Water Framework Directive criteria which will be relevant for the Cannington Brook (eastern route option)). Somerset Consortium of Drainage Boards will also be consulted in respect of an eastern route option to ensure that drainage management and control across the area is unimpeded. The approach to be employed for a Flood Risk Assessment will be agreed with the Environment Agency in advance of undertaking the assessment.

Freshwater quality

- 6.3.10 An initial desk-based assessment has been undertaken. The proposed western route is on higher, more freely draining ground and does not contain any significant surface water channels. Cannington Brook, although small, is the major surface water feature in Cannington but is 140m from the western route option at its nearest point. One small tributary stream of the Cannington Brook is present and this is crossed by the western route option. Cannington Brook is separated by a weir into two separate channels on the eastern side of the village, and the eastern bypass route crosses both of the separate channels. The remainder of the eastern route crosses a further eight channels. Ongoing monitoring by the Environment Agency of Cannington Brook at the Cannington Weir indicates water quality at Chemical Grade A (very good), i.e. containing a natural ecosystem, suitable for salmonid and cyprinid fisheries.
- 6.3.11 In order to determine the impact on water quality the assessments of effects on watercourses and drains, including geotechnical investigation will be carried out, assessing against the Water Framework Directive criteria (relevant for the eastern route option). The Somerset Consortium of Drainage Boards will continue to be consulted.

Terrestrial flora and fauna

- 6.3.12 Most of the habitats along both routes are of limited biodiversity value. The exceptions to this are areas of marshy grassland, hedgerows, watercourses and mature trees. Hedgerows along both route are considered to be ecologically 'important' under the Hedgerow Regulations 1997, primarily for the number of woody species they support.
- 6.3.13 The western route does not cross any designated sites. Two County Wildlife Sites, Cannington Brook and Cannington Park are located within 250m of the route. The eastern route crosses the Cannington Brook County Wildlife Site. The Severn Ramsar, Severn Estuary SPA and SAC and Bridgwater Bay SSSI all lie approximately 1km to the north-west of the route.

6.3.14 Desk study information has been obtained (primarily from the Somerset Environmental Records Centre (SERC)) regarding protected species records within 3km of both route options and is summarised below.

- Bats. Most of the desk study information related to records of individual bats. A small number of roost sites were highlighted but none are located on the route. Within 10km a range of species have been recorded;
- Water vole. This species has previously been recorded on the Cannington Brook, which is crossed by the eastern route;
- Otter. There are numerous records of otter were provided, relating primarily to the Cannington Brook and its tributaries;
- Dormouse. There are no records of dormouse within 3km of either option;
- Badger. Records of badger were noted from various locations;
- Great crested newt. A single record was provided from 1992 when this species was recorded to the west of the western route; and
- Reptiles. Records of both slow-worm and grass snake were provided. These species are both relatively widespread in the area.

6.3.15 Faunal surveys commenced in May 2009 and will continue until summer 2010. Surveys completed to date include:

- Breeding bird characterisation survey (footpaths and roads only, completed between May and July 2009). Seven species that feature on both the Red List of Birds of Conservation Concern and the UK BAP (Biodiversity Action Plan) Priority list, three species which are Amber-listed and also UK BAP Priority species and nine additional Amber-listed species were recorded breeding within the survey area. Farmland bird numbers were generally low. Three Schedule 1 species (afforded special protection under the Wildlife and Countryside Act 1981,) were recorded within the survey area: kingfisher (2 territories), peregrine and hobby. Winter surveys of the fields within 1km of each route option are being undertaken;
- Due to the size of the survey area three bat transect routes, sampling bat activity and species, were completed per month between June and September 2009. This was augmented by a monthly driven transect. A minimum of ten bat species have been recorded to date, including the Annex II (of the Habitats Directive) listed species barbastelle, lesser horseshoe and greater horseshoe bat. A preliminary appraisal of the buildings and trees near to the route options has identified a number of locations with high potential to support bat roosts;
- A water vole survey of all watercourses within 250m of each route option was completed in August 2009. This found evidence of water vole on nine sections of watercourse, all associated with the eastern route. Further watercourses provide suitable habitat for water vole and there is potential for them to be more wide spread throughout the site;
- An otter survey of all watercourses within 250m of each route option was completed in August 2009. This found evidence of otter on two sections of watercourse, both associated with the eastern route. Further evidence of otter

was found along the River Parrett and the Perrymoor Brook. All the watercourses within the survey area provide suitable habitat for otter and are likely to be used, at least, infrequently;

- A dormouse survey began in August 2009, and monthly checks will be completed between September and November 2009 and between April and May 2010. A dormouse nest was found within a tube located near to the eastern route in August 2009;
- A badger survey was completed in August 2009 of both route options. It recorded four setts within 250m of the route options and a moderate amount of activity within the fields crossed by the routes.;
- All the ponds within 500m of both route options were screened in August 2009 for Great Crested Newt. Of the 15 ponds identified, 12 were considered to provide potentially suitable habitat. Presence/absence surveys will be completed in spring 2010; and
- A reptile survey of both routes was begun in August 2009. Approximately 200 reptile mats covering both route options have been checked on 11 occasions between August and September 2009. A further nine survey visits are planned for April and May 2010 to determine an approximate population size class estimate. The surveys to date have recorded slow-worm along the western route and grass snake along the eastern route, although the habitats in both locations have the potential to support both these species and common lizard.

6.3.16 On the basis of results from the desk study and field surveys undertaken to date, the western route is the preferred route option from an ecological perspective. It does not cross any non-statutory designated sites and is considerably further away from Natura 2000 sites than the eastern route. Protected species surveys are at a relatively early stage, but emerging results suggest the western route is also the preferred route option.

Transportation

6.3.17 Much of the work being carried out in relation to the Strategic Transport Assessment will inform the assessment of the Off-site Associated Development, including the Cannington bypass. As detailed earlier, the extent of the highway network to be included in the assessment has been identified through consultation with the Highway Authorities (Somerset County Council and the Highways Agency).

6.3.18 Traffic data has been collected using automatic traffic counters (ATC) and this data identifies the existing mix of light vehicles and heavy vehicles, vehicle turning movement counts for the various junctions, along with the length of traffic queues that were observed at those junctions during the surveys. The survey data was collected in neutral periods in 2008 and has informed the traffic modelling of future highway network operation.

6.3.19 Using the baseline traffic flow data, an audit of the local highway network will be completed to assess the operational capacity of the roads and, critically, the junctions. This will determine whether highway improvements will be required during

the construction and operational phases, and the extent of those works. This analysis will include analysis of the accident statistics.

- 6.3.20 An assessment of existing public transport provision will be assessed, to include any planned changes to provision. Traffic modelling will be undertaken to ascertain the effects of the proposed development on the highway network during the construction and operational phases. The results of the traffic modelling will be used to inform the air quality and noise assessment work.
- 6.3.21 Both the SATURN and PARAMICS traffic models will be further utilised to assess the effects of a Cannington bypass on traffic flows through the village. ‘Do minimum’ traffic modelling scenarios will also be tested.

Noise and vibration

- 6.3.22 Background noise monitoring has been undertaken within the vicinity of Cannington, as part of the main site works. Existing road traffic noise levels were determined in accordance with the Calculation of Road Traffic Noise Shortened Measurement Procedure. Attended measurement was carried out over three consecutive daytime hours.
- 6.3.23 The noise monitoring location for the western route was at Chad’s Hill. The monitoring location was 3m east of the carriageway edge and 40m north of its junction with Park Lane and Sandy Lane. This location was representative of residential dwellings on Park Lane, Sandy Lane and Chad’s Hill. Two monitoring locations allowed assessment of the baseline noise levels at residential properties closest to the eastern route. These were at Rodway on the north edge of the village and at Northbrook Road on the southern eastern section of the village. At the Chad’s Hill location significant noise from Castle Hill Quarry was observed. Notable sources included an aggregate crusher plant (repetitive clunks) and quarry vehicle reversing beepers. The surveys otherwise showed noise levels typical of a semi rural situation.
- 6.3.24 As part of this initial review an assessment has also been made of the number of noise sensitive properties (NSPs) that are within 600m of the proposed routes.
- Western route. 202 properties, with 6 of these within 100m. Non-residential noise sensitive properties include Brymore School, the cemetery, a church and Cannington College. The precise distance between the nearest properties and the road will be established during the detailed assessment.
 - Eastern route. 388 properties, with 22 within 100m. The only other potentially noise sensitive property within the 600m range is the Cannington Primary School (at between 500m to 600m).
- 6.3.25 The lack of heavy industry or railways in the area leads to the conclusion that existing ground-borne vibration is unlikely to be an issue in the area for either route. Existing blasting activities from Castle Hill Quarry may cause localised and short-lived vibration in properties in the area immediately surrounding the quarry. Ground-borne

vibration from passing traffic may be apparent for some properties located very close to roads. Existing ground-borne vibration levels are, therefore, likely to be extremely low or negligible.

6.3.26 Detailed assessment of potential noise and vibration impacts will be conducted with reference to relevant national and local legislation and guidance. Consultation has been held with the local Environmental Health Officer to agree the assessment scope and methodology proposed. The following assessments will therefore be undertaken:

- Baseline Noise Survey. Once final details of the selected route and design are established the current noise survey will be reviewed to ensure it is adequate for the assessment. If additional monitoring is required then this will be undertaken in accordance with national guidance;
- Infrastructure Construction Noise. Assessment of potential noise impacts during the bypass construction will be conducted using the methodology contained in BS 5228-1:2009;
- Road Traffic Noise. The Department for Transport 'Calculation of Road Traffic Noise' (1988) methodology will be used for the prediction of road traffic noise levels; and
- Vibration. It is not considered that vibration will be a specific issue for either the construction or operation of either bypass route. As such no detailed vibration assessment is proposed. This will however be reviewed once scheme details are finalised.

Air quality

6.3.27 The Cannington area is not located within or near to an Air Quality Management Area (AQMA), nor are there any AQMAs designated within the Sedgemoor District Council boundary. The main sources of air pollution within Cannington and the surrounding area are considered to be road traffic emissions and, to a lesser extent, agricultural processes.

6.3.28 Consultation with West Somerset Council and Sedgemoor District Council has been undertaken and data currently held by them collected. Both authorities currently only carry out NO₂ monitoring, with the majority of monitoring performed within the key urban areas (Bridgwater and Williton).

6.3.29 The UK Air Quality Archive will be accessed to obtain further background air pollutant concentrations, particularly annual mean NO₂ and PM₁₀ concentrations. Furthermore, existing traffic flow data on the local road network within the study area would be used in the dispersion modelling study to estimate existing air pollutant concentrations at sensitive receptors.

6.3.30 Detailed assessments of possible impacts through the construction and operation phases will be undertaken using an appropriate atmospheric dispersion model

suitable for road traffic (e.g. ADMS Roads). The scope of the assessment, would be agreed with the local Environmental Health Officer.

Landscape and visual amenity

- 6.3.31 A number of viewpoints have been initially recorded to show the potential visibility of both bypass options in the surrounding landscape. Those viewpoints will be refined during the consultation process and a final list of principal and secondary viewpoints will be established to assess the visual impact from a variety of locations.
- 6.3.32 The initial visual survey study revealed limited visibility of the proposed bypass options in the surrounding landscape due to the rolling topography and vegetation (western route) and flat topography (eastern route) with a number of hedgerows providing good screening of low development views. The visual envelope of the proposed options and the final list of principal and secondary viewpoints will be mapped using contour plans and aerial photographs, following consultation and further site visits.
- 6.3.33 Along with desk-based research, further surveys will include detailed information on designated areas, a detailed description of landscape character and the identification of areas of particular sensitivity, including settlements and dwellings which may be adversely affected. Consideration will also be given to any mitigation requirements. These elements will also be supported by mapping of the landscape character and sensitivities. Information including existing levels of light pollution, and quality of the study area will be collated and described.

Archaeology and cultural heritage

- 6.3.34 There are two Scheduled Monuments located to the north-west of Cannington: an Iron Age/Romano-British settlement and an Iron Age hillfort (Cynwit Castle, also known as Cannington Camp). The centre of Cannington is a Conservation Area. There are 33 Listed Buildings within the study area (see below), of which four are Grade I, one is Grade II* and 28 are Grade II. 13 of these buildings are located within the Conservation Area.
- 6.3.35 Numerous archaeological sites and find spots, ranging from the prehistoric to the post-medieval period, are recorded in the vicinity of Cannington.
- 6.3.36 A Cultural Heritage Desk Based Assessment (DBA) has been undertaken, together with searches of the National Monuments Record (NMR) and Somerset Historic Environment Record (HER).
- 6.3.37 Surviving archaeological remains located within the footprint of either bypass route would be wholly, or partially, removed by any groundworks associated with the

construction phase. The settings of Scheduled Monuments and Listed Buildings could be adversely affected by the bypass.

- 6.3.38 A detailed DBA will be carried out for the preferred route option and the chosen locations of the additional infrastructure, if appropriate. Preliminary discussions have been undertaken with Somerset County Council Historic Environment Service (HES), archaeological advisors to Sedgemoor District Council. A staged approach, comprising walkover surveys and geophysical surveys in the first instance, has been agreed. The results of nonintrusive surveys would inform later excavation, as appropriate, once the final route option has been determined. The combined assessment will inform the design of appropriate mitigation. These studies will be undertaken in consultation with Somerset County Council Historic Environment Service and English Heritage.

Amenity and recreation

- 6.3.39 The Cannington area is well served by a network of public footpaths and bridleways (Public Rights of Way, (PRoW)), as well as permissive paths. Recreation is generally informal, although there is a recreational playing field on the northern outskirts of Cannington and Bridgwater College Cannington Campus has a golf course and horse riding facilities which are open to the public. Details of the construction and operational activities and footprints of the bypass options have been examined against the recreational assets and activities in the surrounding area.
- 6.3.40 When further details of bypass construction and operation are available, any construction or operational phase closure or diversion to PRoW, or impacts on safety, would be identified. Construction or operational disturbance to recreational activities would also be assessed. Additional data on users will be collated to quantify impacts. Sedgemoor District Council and Somerset County Council will need to be fully consulted on any proposals to alter PRoW, which should also take account of the County Council Rights of Way Improvement Plan (RoWIP) scorecard.

6.4 Cannington

- 6.4.1 Cannington South. Land to the south of Cannington has been identified as a potentially suitable to accommodate some or all of the following land uses:
- A campus to accommodate up to 200 construction workers;
 - A park and ride facility; and
 - A freight consolidation facility for road-borne freight.
- 6.4.2 Cannington North-west. Land to the north-west of Cannington (which includes Cannington Quarry) has been identified as a potentially suitable for the following land uses:
- A park and ride facility;
 - A freight consolidation facility for road-borne and/or water borne freight; and

- A spoil disposal site.
- 6.4.3 Cannington Central - Land in the centre of Cannington has been identified as a potentially suitable location to accommodate a campus for up to 120 beds with a legacy use for Cannington College. Assessment work has recently commenced and when available the conclusions will inform the selection of a preferred site.
- 6.4.4 Assessment studies either undertaken or proposed these locations are considered below.

Geology, land use and soils

- 6.4.5 An initial desk-based assessment has been completed in respect of the Cannington South search area. A similar assessment is being undertaken in respect of the Cannington North-west search area. Both search areas are in agricultural use, as arable/grassland and grazing land respectively.
- 6.4.6 Further assessment will be undertaken to define the potential mineral reserves that may be affected by any proposed development. This will include assessment of reserves within Cannington Quarry and the extent of potential un-worked reserves in the wider area.
- 6.4.7 In terms of soils and land use, agricultural soil surveys will be undertaken to confirm the ALC grading of the land and allow specification of soils management practices.

Land contamination

- 6.4.8 A desk-based review of available information has been completed. No key issues have been identified with respect to contamination or waste at this stage. However, land raising and the presence of a former oil depot to the north of the search area indicate a potential but low risk.
- 6.4.9 A full Phase 1 contaminated land desk study of the search areas will be undertaken to identify any potential sources of contamination. Subject to the findings of this study, further investigation may be required. To confirm that no contamination has occurred from the former oil depot or from the land raising, further consultation and possible on-site assessment will be undertaken.

Hydrogeology

- 6.4.10 A desk-based review of available information has been undertaken. For the Cannington North-west area the groundwater vulnerability map indicates that the majority of the search area overlies a Minor Aquifer, with soils of intermediate permeability, whilst the remainder overlies either a Non Aquifer or a Major Aquifer. Currently no information has been collated in relation to groundwater levels, flow or chemistry, although groundwater is present within the currently dormant Cannington Quarry.

- 6.4.11 One option is to backfill the Cannington Quarry with excess spoil. As the quarry lies within a major aquifer and any filling would be below the groundwater table a key issue will be the potential for any imported fill to contaminate this groundwater resource. Should this option be pursued then a detailed assessment of the groundwater regime at the site will be undertaken.
- 6.4.12 The southern search area is on the Mercia Mudstones which are classified by the Environment Agency as non-aquifer. No issues have been identified at this stage relating to hydrogeology or groundwater in the Cannington South area and no further assessments have been identified.

Hydrology, drainage and flood defence

- 6.4.13 An initial desk-based assessment has been undertaken, which shows that the North-west search area is in Flood Zone 1 and, therefore, is not at major risk of flooding.
- 6.4.14 The Cannington South area is covered by the Parrett CFMP. Flood Zone 3b (Functional Floodplain), following the line of the Cannington Brook close to the centre of the village which runs through the search area. The majority of the village and surrounding area is, however, in Flood Zone 1 and therefore not at major risk of flooding. Development within the Southern area could result in the loss of functional floodplain, depending on final development locations, and localised drainage impacts could therefore occur although this will be avoided through sensible design and mitigation. A Flood Risk Assessment will be completed, in accordance with accepted methodology.

Freshwater quality

- 6.4.15 The North-west area is on raised ground within generally permeable geologies. As such there are no identified surface water channels, although there is a partially flooded quarry.
- 6.4.16 The main watercourse in the Cannington South search area is Cannington Brook, which flows through the centre of the area as a single channel. The area is also crossed by a number of minor ditches and watercourses that drain the adjacent fields into the Cannington Brook. Cannington Brook is considered as a sensitive receptor.
- 6.4.17 No assessments have been undertaken to date but a desk study review of the potential surface water bodies, quality standards and objectives will be undertaken.

Terrestrial flora and fauna

- 6.4.18 Cannington Quarry (North-west area) is approximately 180m by 160m in size and bounded on three sides by a tall (~80m) exposed rock face. The bowl of the quarry is

filled with water of an unknown depth and relatively dense broad-leaved scrub/woodland occurs around the edge.

- 6.4.19 A preliminary assessment has been completed of the Cannington South search area. It is characterised by agricultural fields, most of which are used for stock grazing. Boundaries are formed by hedgerows, fences and watercourses. There is potential for a proportion of the hedgerows to be ecologically important. Cannington Brook is lined by mature broad-leaved trees and is designated as a County Wildlife Site (CWS) for the protected species it supports. It passes through the western part of the area.
- 6.4.20 A Phase 1 Habitat Survey and species specific surveys (as necessary) will be completed in accordance with accepted methodology. Appropriate environmental measures will be implemented during the construction and operation of the site to ensure potentially negative effects on habitats and species are minimised.

Transportation

- 6.4.21 The effects of the use of the Cannington Quarry (North-west area) are envisaged to be low in terms of significance to the receptors in the village although HGV traffic may route to and from the site through the village at the beginning and end of the working day. The timing of the construction and opening of the Cannington bypass in this respect will be important.
- 6.4.22 Impacts of a park and ride and freight consolidation facilities at Cannington are intrinsically linked with the proposed provision of the Cannington bypass. It is for this reason that both 'with' and 'without' Cannington bypass assessments will be undertaken to establish environmental effects of both scenarios. Assessment work has already established that there are capacity constraints on the highway network through the village. A Transport Assessment will be completed, in accordance with accepted methodology.

Noise and vibration

- 6.4.23 In the North-west search area the dominant noise sources include quarry activities at Castle Hill Quarry, local road traffic, as well as intermittent noise sources including agricultural activities. In terms of potential receptors the search area is generally in a rural location with few domestic properties; local farms and isolated properties to the north of Cannington will be key receptors.
- 6.4.24 The quarry means that there is potential for an existing vibration impact. However there are few receptors close to the quarry that may be affected and it is unlikely to have any significant bearing on potential receptors for the proposed development.
- 6.4.25 In the Cannington South area dominant noise sources include local road traffic on the A39 southern Cannington bypass and on Cannington High Street to the north. Other intermittent sources include general residential and agricultural activities. Noise sensitive receptors, primarily residential dwellings may potentially be exposed

to significant noise impacts, dependent upon the final use and site layout design. In addition, once the accommodation is built, potential receptors would also be present within the development itself.

- 6.4.26 The lack of heavy industry or railways in the area leads to the conclusion that existing ground-borne vibration levels are likely to be extremely low or negligible. No further assessment of this issue is therefore proposed.
- 6.4.27 A desk-based assessment has been undertaken to date. Once the nature of the proposed development is defined baseline noise surveys will be conducted in accordance with national guidelines at representative sensitive locations, agreed with the relevant authorities. Assessment of potential noise impacts during construction and operation will then be conducted using the methodology contained in BS 5228-1:2009.

Air quality

- 6.4.28 A desk-based assessment has been undertaken to date. The Cannington North-west area is generally rural location with few domestic properties (key potential receptors will be the local farms). Whether impacts arise is dependent upon the final use and site layout design.
- 6.4.29 Receptors for air quality impacts within the Cannington South area are the private residential and farming premises on the southern perimeter of the village. Impacts will be minimised on these receptors through the masterplanning of the development.
- 6.4.30 Air quality impacts from plant and traffic will be assessed in terms of vehicle emissions of NO₂ and PM₁₀. Traffic data from the transport study and main site design will be used to provide 'with and without' development traffic flows and lorry numbers for any quarry filling. The assessment will be undertaken using accepted methodology.
- 6.4.31 The final site design options, particularly the location of the works within the current search area, will be assessed with respect to potential dust impacts and in order to minimise any impacts. This will allow identification of sensitive receptors in proximity to the proposed development site.

Landscape and visual amenity

- 6.4.32 An initial desk-based assessment and visual survey (from public rights of way) has been undertaken. The visual envelope of the proposed options and the final list of principal and secondary viewpoints will be mapped using contour plans and aerial photographs, following consultation and further site visits.

- 6.4.33 The area is located within national landscape character Area '146 Vale of Taunton and Quantock Fringes' and the 'Quantock Foothills' local characterisation. The Area of Outstanding Natural Beauty (AONB) is 10km away
- 6.4.34 The majority of the Cannington North-west search area is a quarry and many of the original landscape elements have been lost. The initial visual survey study revealed medium visibility of the site, predominantly from nearby public rights of way and local roads. Limited views are available from local dwellings.
- 6.4.35 The initial visual survey study revealed limited visibility of the Cannington South search area due to the dense belt of boundary vegetation, topography and the surrounding built environment. Walkers and drivers on the High Street and residents of adjacent dwellings will experience the majority of views. Medium and long distance views into the area are very limited.
- 6.4.36 The main landscape impacts associated with any development would be the potential loss of landscape features within the peripheries of the site, which could be partially mitigated. Along with desk-based research, further surveys will be supported by mapping of the landscape character and sensitivities. Information including existing levels of light pollution and quality of the study area will be collated and described.

Archaeology and cultural heritage

- 6.4.37 An initial desk-based assessment has been undertaken. There is only one recorded site within the Cannington North-west search area and two Scheduled Monuments and an early Christian cemetery are located to the west. These suggest that the location is an area of high archaeological potential although the majority of the cemetery has probably been destroyed by quarrying. There are 33 Listed Buildings within the search area. The centre of Cannington, about 1km to the south, is a Conservation Area.
- 6.4.38 There are no recorded sites or find spots within the Cannington South search area, although numerous archaeological sites and find spots are recorded in the vicinity. Cannington Conservation Area abuts the north-east boundary. Undated boundary ditches are recorded immediately to the south and west of the search area and previous construction identified prehistoric remains to the south. Bymore School to the west is set within a post-medieval landscaped park.
- 6.4.39 There is a relatively high potential for unrecorded archaeological remains to survive within the North-west area, and the settings of the Scheduled Monuments (North-west area) and the Conservation Area and Listed Buildings would potentially be affected. The scope of further detailed studies will be developed in consultation with Somerset County Council Historic Environmental Services and English Heritage. It is envisaged that desk-based assessment and walk over surveys and/or trial trenching will be carried out as appropriate.

Amenity and recreation

- 6.4.40 An initial desk-based assessment has been undertaken. The Cannington area is well served by a network of footpaths, bridleways and permissive paths. Recreation is generally informal and predominantly consists of cycling, walking, horse riding, and bird watching. However, there are no footpaths directly within the area proposed for freight consolidation and spoil disposal.
- 6.4.41 A recreational playing field, golf course and horse riding facilities are within 300m of the south-eastern extent of the North-west search area, and there are no formal facilities within 250m of the Cannington South boundary.
- 6.4.42 Further assessment will consider construction and operational effects, including disturbance, to PRoW and to recreational assets. In order to support the quantification of potential impacts in the above assessment, additional data will be collected on the number of recreational and footpath users in the area.

6.5 M5 Junction 23

- 6.5.1 Junction 23 of the M5 has been identified as a potentially suitable area for the following landuses:
- A park and ride facility to accommodate up to 750 cars; and
 - A freight consolidation facility for road-borne freight.
- 6.5.2 Two search areas for land around Junction 23 have been identified (J23-A and J23-B). Assessment studies undertaken or proposed are considered below.

Geology, land use and soils

- 6.5.3 A desk-based assessment has shown that both search areas are underlain by drift deposits (Estuarine Alluvium), which are themselves underlain by the Blue Lias Formation. The land uses of the search area are not known in detail at this stage. The western areas are, however, currently thought to be either permanent grassland, conservation grassland (hay or silage) or arable uses. The eastern section of the search area adjacent to the A38 is split between the car park for the vehicle auction site (north section) and an area of partial land raising (approximately 1.5m of imported fill) and is currently unused.
- 6.5.4 Soils in the J23-A search area are impermeable and artificial drainage is required for cultivation. Groundwater levels in the fields close to the River Parrett are controlled by ditches and pumps. The indicative ALC for the search area is Grade 3 (undifferentiated). None of the search area is part of any agri-environment scheme. The nature of the soil of the J23-B search area is unknown at this stage.
- 6.5.5 Soil and Agricultural Land Classification field surveys will be undertaken, as key issues are likely to relate to loss of agricultural land and damage to soils.

reduce the exacerbation of flood risk are straightforward and would be incorporated as part of any development, including use of Sustainable Drainage Systems (SuDS).

Freshwater quality

- 6.5.13 An initial desk-based assessment has been undertaken of the J23-A search area. The river floodplain immediately to the west of the J23-A search area is drained by a network of land drainage channels which discharge to the tidal sections of the River Parrett. One of these crosses the search area. There are no surface water gauging stations in the tidal section of the River Parrett, and the local surface water drainage channels are not monitored, but published Environment Agency data indicates a moderate ecological status for the tidal River Parrett. There are ten records of consent to discharge to controlled waters within a 500m radius of the search area, the majority of which are for treated sewage effluents, except for two trade effluent discharges. There are no surface water abstractions within 500m. Similar baseline data for the J23-B search area will be obtained.
- 6.5.14 Full desk-based environmental studies will be undertaken in respect of both search areas, although on the basis of adoption of best practice design standards, no key issues are likely to arise in relation to surface water during construction or operation.

Terrestrial Flora and Fauna

- 6.5.15 A preliminary desk-based assessment including aerial photographs has been undertaken in respect of the J23-A search area. Similar assessment will also be undertaken in respect of the J23-B search area.
- 6.5.16 Whilst most of the habitats within the search area appear likely to be of limited biodiversity value, the development could result in permanent land take of habitats. A Phase 1 Habitat Survey and species specific surveys (as necessary) will be undertaken in accordance with accepted methodology and appropriate mitigation will be implemented.

Transportation

- 6.5.17 Consultation with the Highways Agency has identified that there are no planned improvement works, preliminary traffic modelling has been undertaken using the SATURN model and accident data has also been collected.
- 6.5.18 Preliminary modelling has identified potential implications of development traffic on the performance of the roundabout at Junction 23 and the Dunball Roundabout on the A38. A full Transport Assessment will be undertaken in line with established methodologies.

Noise and vibration

- 6.5.19 No assessments have been carried out to date, although following development of the design of the facilities, any sensitive receptors will be identified and background monitoring and prediction of potential noise impacts will be conducted. Data on traffic movement will be assessed against existing baseline traffic flows on the network. Where increases indicate potential noise impacts, assessment will be conducted in line with standard guidance.

Air quality

- 6.5.20 A desk-based assessment has been undertaken in respect of the J23-A search area, although no air quality data is held for either of the search areas. There are a significant number of operations including the highway infrastructure and commercial uses, in the area that will affect baseline air quality.
- 6.5.21 The principal air quality issue during the construction phase is likely to be the generation and dispersion of dust. This matter will be assessed once the preferred site and nature of development in that location is selected. Air quality impacts in terms of vehicle emissions will be assessed using accepted methodology, informed by the Transport Assessment.

Landscape and visual amenity

- 6.5.22 The landscape around Junction 23 (Area 142 Somerset Levels and Moors) is broadly characterised by low-lying farmland and wetland surrounded and divided by low hills and ridges. At the local level, the landscape character is defined by Sedgemoor District Council as 'Levels and Moors'. A number of viewpoints have been recorded to show the potential visibility of the search areas. These will be refined through consultation and a final list of principal and secondary viewpoints will be established to assess visual impact from a variety of locations.
- 6.5.23 The initial visual survey study revealed limited visibility of the search areas due to the relatively flat topography combined with vegetation including hedgerows and small woodland copses providing good screening.
- 6.5.24 The main impacts associated with development within the search areas would be the loss of valuable landscape features and vegetation, including hedgerows, trees, areas of grassland and farmland. The impact on the landscape character would be low due to the existing built development and the A38 corridor. Potential also exists for effective landscape mitigation.
- 6.5.25 Along with desk-based research, further surveys will provide detailed information on designated areas and a detailed description and mapping of landscape character. They will also identify areas of particular sensitivity opportunities for mitigation and settlements and dwellings which may be adversely affected.

Archaeology and cultural heritage

- 6.5.26 Preliminary consultation with Somerset County Council Historic Environment Services has been undertaken in respect of the J23-A search area and will be undertaken for J23-B. No key issues with respect to the historic environment have been identified within the J23-A search area; there is one Scheduled Monument in the vicinity of the J23-A search area but an archaeological evaluation, comprising trial trenching, confirmed that there is no archaeological potential over a large part of the area. No further assessment work is anticipated, following discussions with Somerset County Council Historic Environment Services.

Amenity and recreation

- 6.5.27 An initial desk-based assessment of the J23-A search area indicates that a coastal path runs along the embankment to the south and west (and outside) of the search area. An alteration is recorded by Somerset County Council within the search area, which follows the line of Dunball Drove and indicates that this may now be a PRow. No formal recreational activities occur adjacent to the J23-A search area.
- 6.5.28 Details of the construction and operational activities and footprint of the park and ride and freight consolidation facilities will be assessed against the recreational assets and activities in the surrounding area. Additional data will be collected on the number of users utilising any identified paths. Unless physical obstruction occurs to the footpath network, it is unlikely that significant recreation or amenities issues will arise as a result of development within either search areas.

6.6 M5 Junction 24

- 6.6.1 Junction 24 of the M5 has been identified as a potentially suitable location for a park and ride facility to accommodate up to 350 cars. It is also considered potentially suitable for a freight consolidation facility for road-borne freight. Assessment studies either undertaken or proposed for three sites (A, B and C) are considered below.

Geology, land use and soils

- 6.6.2 A desk-based assessment has been undertaken and ALC field surveys will be completed. None of the identified areas lie within a Mineral Consultation Area or are impacted by any approved Area of Permission for mineral workings.
- 6.6.3 In terms of land use J24-A is described as ‘versatile’ and the indicative Agricultural Land Classification (ALC) for this study area is 50% Grade 1 (to the north) and 50% Grade 2 (to the south). This area is thus classified as ‘best and most versatile land’ (BMVL). None of this search area is part of an agri-environment scheme. J24-B and J24-C is also described as ‘versatile’ and the indicative ALC is Grade 2.

- 6.6.4 The key issues relate to development within the search area (J24 A, B and C) are: the loss of agricultural land and damage to soils. There are no issues in relation to geology.

Land contamination

- 6.6.5 Assessments undertaken to date include historic map search, a review of information held by the Environment Agency, an Envirocheck report and a site walk over.
- 6.6.6 A waste transfer site was formerly located approximately 750m to the north of the search area (Huntsworth M5 Depot, licensed to transfer waste in very small quantities (less than 10,000 tonnes per year) but the licence has since been surrendered. Documented sources of information will be obtained for the B and C search areas.
- 6.6.7 A Phase 1 desk-based contamination assessment will be completed but there are unlikely to be any significant issues relating to land contamination.

Hydrogeology

- 6.6.8 An initial desk-based environmental baseline assessment has identified that the J24-A and J24-B areas overlay a Non-Aquifer. The groundwater vulnerability map indicates that approximately 60% of the J24-C site overlies a Minor Aquifer. The remainder is shown as a Non Aquifer. Standard control measures will be developed and incorporated into the design proposals.

Hydrology, Drainage and Flood defence

- 6.6.9 An initial desk-based assessment indicates that surface water drainage within this area is limited to minor drains along field boundaries that eventually lead into the River Parrett. The entirety of the search area falls within Flood Zone 1 indicating no risk of flooding.
- 6.6.10 Assessment of any direct effects on watercourses and drains, will be undertaken in consultation with the Somerset Consortium of Drainage Boards, to ensure that appropriate design measures are incorporated. A Flood Risk Assessment will also be completed, in accordance with PPS25.

Freshwater quality

- 6.6.11 The search areas will be assessed in terms of their status with respect to surface water quality. A desk-based assessment and walk over of the search areas will be conducted to establish their status.

Terrestrial Flora and Fauna

- 6.6.12 Preliminary assessments of aerial photographs and desk study information have been undertaken.
- 6.6.13 The J24-B and J24-C search areas both comprise two arable fields bordered by a mixture of hedgerows and fencing. The M5 embankment, which incorporates a narrow band of scrub/woodland, also borders both sites.
- 6.6.14 There are a considerable number of waterbodies within 500m of the J24-C area and the surrounding area supports a network of drains, some of which connect the ponds.
- 6.6.15 Records relating to Stockmoor County Wildlife Site (within 500m of the J24-A search area) includes records of various protected species. In the wider area, further records are present within approximately 1km; there are also a considerable number of records of otter within 2km of the search areas, and the desk study data identifies that water vole has occurred at a number of different locations to the north. A range of bird species, such as kingfisher and bittern, have been recorded within 2km of the area. Many of these records relate to the County Wildlife Sites to the north of the area such as Dunwear Brick Pits, Screech Owl Local Nature Reserve (LNR) and the Bridgwater and Taunton Canal.
- 6.6.16 Whilst most of the habitats within the search area appear likely to be of limited biodiversity value, development could result in permanent land take of habitats that are listed as being a priority under the UK Biodiversity Action Plan (e.g. hedgerows) and which are used by protected species. Appropriate environmental measures will be implemented during the construction and operation of the development to ensure potentially negative effects are minimised.
- 6.6.17 A Phase 1 Habitat Survey and species specific surveys (as necessary) will be completed in accordance with accepted methodology.

Transportation

- 6.6.18 Traffic modelling using the SATURN model and analysis of accident data in the vicinity of Junction 24 is being undertaken. The traffic impact analysis has been informed by the socio-economic work undertaken by Oxford Brookes University in respect of traffic distribution assumptions.
- 6.6.19 The key issue of the proposed development on the performance of the roundabout junction at J24 and the roundabout on the Taunton Road (A38) to the west of the M5. These are key 'gateway' junctions to Bridgwater. There is also a significant amount of committed development in the area, some of which is under construction. The Highways Agency has indicated that sites J24-C and J24-B will need particular consideration.
- 6.6.20 A full Transport Assessment will be completed, in accordance with accepted methodology.

Noise and vibration

- 6.6.21 No assessments have been undertaken to date, although the acoustic climate at these search areas is dominated by road traffic noise. Other intermittent noise sources include agricultural activities in neighbouring fields to the north, east and south. Residential properties, including the new housing development at Dawes Farm, represent likely sensitive receptors.
- 6.6.22 Once the nature of the proposed development is defined, baseline noise surveys will be identified and assessment of potential noise impacts during construction and operation will be undertaken. The key issue will be potential noise impacts on residential properties

Air quality

- 6.6.23 No air quality data for the Junction 24 area is currently held but a desk-based assessment has been undertaken. There is a significant area of industrial/commercial development in the vicinity of the search areas, and the M5 motorway is close to all search areas bordering both J24-B and J24-C. The A38 forms the eastern boundary of the J24-B search area. There are, therefore, a significant number of operations in the area that will affect the baseline air quality.
- 6.6.24 In terms of potential receptors, the J24-A search area is generally in a rural area surrounded by agricultural fields to the west. Potentially sensitive receptors include the new housing at Dawes Farm and other residential properties adjacent to the south-west boundary. The J24-B search area has a series of residential properties on its south-east boundary, and the J24-C search area, has properties to its north-eastern end and immediately adjacent.
- 6.6.25 The principal air quality issue during construction is likely to be the generation and dispersion of dust. The final site design option, particularly the location of the works within the current search area, will therefore be assessed with respect to the potential dust impacts. Air quality impacts in terms of vehicle emissions will be assessed using accepted methodology, and informed by the Transport Assessment.

Landscape and visual amenity

- 6.6.26 An initial desk-based assessment and survey work has been undertaken. Junction 24 lies approximately 1km to the south of Bridgwater urban area and 1km to the north-east of North Petherton. The M5 and A38 are located in the immediate vicinity of the proposed sites as do a number of commercial and industrial uses. The Quantock Hills are the nearest designated Area of Outstanding Natural Beauty (AONB), approximately 8km to the west. No other international and local designations exist in the surrounding area.

- 6.6.27 Relevant local designations include a Green Wedge, Country Park and County Wildlife Sites. The search areas at Junction 24 are located within two national character areas (146: Vale of Taunton and Quantock Fringes; and 142 Somerset Levels and Moors). Two local landscape character areas have been defined by Sedgemoor District Council ('Quantock Foothills' and 'Levels and Moors'). 'Quantock Foothills' covers the majority of the search areas.
- 6.6.28 Several viewpoints have been initially defined to show the potential visibility of the search area, and these will be refined during the consultation process. The initial visual survey revealed short distance visibility of the search areas due to the rolling topography, intervening vegetation and built form. Along with desk-based research, further surveys and mapping will provide detailed information.

Archaeology and cultural heritage

- 6.6.29 Preliminary consultation with Somerset County Council Historic Environment Services has been undertaken and baseline information is being obtained.
- 6.6.30 Surviving archaeological remains within the footprint of any of the sites would be wholly, or partially, destroyed by any groundworks. The settings of Listed Buildings could also be adversely affected. A Cultural Heritage desk-based assessment will be undertaken following standard methodology, and will inform the design of appropriate mitigation. If necessary archaeological excavation and recording will be followed by an appropriate programme of post-excavation works, in accordance with English Heritage guidance.

Amenity and recreation

- 6.6.31 An initial desk-based assessment shows that there are no PRow within or in the vicinity of the J24-A or J24-B search areas. A PRow runs immediately outside the northern boundary of the J24-C area, connecting Huntworth to south Bridgwater.
- 6.6.32 Details of the construction and operational activities will be assessed against recreational assets and activities, but unless physical obstruction occurs to the footpath network, it is unlikely that significant issues will arise as a result of development.

6.7 Bridgwater

- 6.7.1 In addition to the development proposed at Junctions 23 and 24 of the M5, Bridgwater has also been identified as a potentially suitable location for accommodation for up to 500 construction workers, with associated living and recreational facilities, in one or several campuses. A number of search areas are being considered and the baseline environment has yet to be assessed.

6.8 Combwich Wharf

- 6.8.1 EDF Energy proposes to refurbish the existing wharf facility at Comwich to enable the transport of bulky freight. It is also proposed to use 7-10 hectares of adjacent land for freight consolidation/storage. Assessment studies either undertaken or proposed are considered below.

Geology, land use and soils

- 6.8.2 Initial desk-based assessment shows the entire search area to be formed of quaternary (alluvial) deposits with typical soils. The provisional (ALC) maps indicate that the land is Grade 3 (undistinguished). Key issues relating to the proposed development are likely to be the loss of agricultural land and damage to soils. Further desk-based assessment relating to geology and soil, and an ALC field survey will be undertaken.

Land contamination

- 6.8.3 The search area appears (from a site walk-over) to be natural ground in agricultural use. There is no evidence of activity that may cause contamination. A Phase 1 desk-based Contamination Assessment will be undertaken, although there are unlikely to be any significant issues relating to land contamination.

Hydrogeology

- 6.8.4 The south-west section of the search area is classified as Non Aquifer; the remainder of the area is shown as being a Minor Aquifer with potential for surface contamination to migrate to groundwater. A desk-based assessment and site survey will be undertaken, and standard control measures will be incorporated into any design

Hydrology, drainage and flood defence

- 6.8.5 The Comwich area is covered by the Parrett Catchment Flood Management Plan (CFMP). The proposed search area lies within Flood Zone 3a, and drainage is maintained and administered by the Somerset Consortium of Drainage Boards. All the drains to the south of Comwich are artificial, constructed to drain agricultural land.

- 6.8.6 A Flood Risk Assessment will be completed, in accordance with the methodology set out in PPS25. Assessments of any direct effects on watercourses and drains will be undertaken in, consultation with the Somerset Consortium of Drainage Boards to ensure that appropriate design measures are incorporated and that drainage management and control across the area is unimpeded.

Freshwater quality

- 6.8.7 Initial assessment indicates that the proposed freight consolidation/storage facility would be located on the flood plain of the River Parrett. There are a number of adjacent surface water features but no surface water quality data is available for the search area.
- 6.8.8 There are two records of consent to discharge to controlled waters within a 500m radius of the search, relating to discharge from Wessex Water Facilities of either treated sewage effluents or storm water overflow discharges. There are no surface water abstractions within 500m of the search area.
- 6.8.9 During construction and operation, accidents causing spillage of contaminative materials which may subsequently discharge to stream is the key issue, and standard control measures will be incorporated into the design.

Marine water and sediment quality

- 6.8.10 A desk-based assessment/information review has been undertaken. No data is held with respect to marine water quality and sediment quality in the River Parrett with the exception of data for radiological parameters in marine sediments which is available from the RIFE reports.
- 6.8.11 There may be potential for direct contamination effects on the River Parrett's marine water and sediment quality during construction and operation of this development. A desk-based assessment of marine water and sediment quality data will be completed in order to establish baseline environmental conditions. Depending on the data available, this assessment may be supplemented with surveys for contaminants.
- 6.8.12 An assessment will be completed of any direct contamination effects on the River Parrett's marine water and sediment quality during construction and operation of Comwich Wharf (including assessment against the Water Framework Directive criteria).

Hydrodynamics and coastal geomorphology

- 6.8.13 An initial desk-based assessment shows that the tidal range varies from approximately 6m at Dunball to approximately 12m at Burnham-on-Sea. The marine sediments of the River Parrett estuary comprise estuarine and marine Holocene deposits, some of which have been reclaimed into coastal marshes and mudflats. Longshore drift is consistently west to east between Hinkley Point and Steart Island.
- 6.8.14 An assessment of sediment transport patterns will be completed. As the development could result in localised changes in patterns of sediment erosion and

accretion in the River Parrett's estuary it will be designed to minimise any potential impacts.

Terrestrial Flora and Fauna

- 6.8.15 An extended Phase 1 Habitat Survey has been undertaken. The area in the immediate vicinity of the search area comprises hardstanding and the approach road to the Wharf, a single storey brick building used as a laboratory by EDF Energy, two small sheds and a sewage treatment works (owned by Wessex Water). There are four small compartments of seminatural grassland. A small compartment of dense scrub is also present. A further area of grassland lies between Comwich Wharf and the intertidal mud of the Comwich Pill, grading into a small fringing area of saltmarsh.
- 6.8.16 At low tide, the intertidal area adjacent to the Wharf comprises relatively steeply sloping banks of mud that have the potential to provide habitats for estuarine birds. Far more extensive areas of open mud and sand are present further downstream. At high tide the entire extent of mud and sand at Comwich is generally covered. To the west of the search area are thin strips of pasture land and an extensive former gravel pit (now a commercial angling facility), which has CWS status.
- 6.8.17 The Severn Estuary Special Protection Area (SPA) and Ramsar Site takes in all intertidal and inshore marine habitat adjacent to the Wharf (other than the mouth of Comwich Pill).
- 6.8.18 Available baseline data on the intertidal bird community includes national Wetland Bird Survey (WeBS) counts and counts undertaken by the British Energy Conservation Warden at The Island (a promontory of land at the mouth of the Huntspill).
- 6.8.19 The principal ecological issue would be disturbance during construction and operation leading to displacement of birds using the intertidal area adjacent to the wharf. Loss of habitat corridors within the search area is a further potential ecological issue, as these are used by a range of protected species. Further targeted surveys, including intertidal bird counts (following consultation with stakeholders) will be completed. A range of options will be considered to mitigate potential effects and achieve local conservation gain.

Marine and Coastal Flora and Fauna

- 6.8.20 To date a desk-based study has been undertaken. Comwich Wharf is located on the River Parrett and the search area is dominated by inter-tidal mudflat and saltmarsh habitats covered by several levels of national and international conservation designations. The River Parrett's mudflats exhibit a mid to high shore mudflat fauna that also acts as a food source for overwintering bird populations. *Spartina* is particularly common in the large fringes of saltmarsh and the river is an important migration route for eel and elver. There is also a small but significant run of salmon in the River Parrett.

- 6.8.21 Piling and other works may disturb fish migration in the River Parrett and the refurbished Combwich Wharf could cause the loss of habitats directly and/or indirectly. Consultation will be undertaken with Natural England to determine specific survey requirements for the intertidal mudflats and quantitative fishery data will be sought from the Environment Agency to provide contextual data.

Transportation

- 6.8.22 Baseline traffic study has been carried out as part of work undertaken for the main site. Traffic from the C182 to Combwich is confined to local residents and visitors, with no through route. Flows on the C182 have been observed and analysed as part of the wider transport baseline study completed in 2008. There is also a level of use established with Combwich Wharf that has historically generated heavy goods vehicle movements to and from Hinkley Point
- 6.8.23 A Traffic Assessment will be completed to examine the potential impact of using Combwich Wharf on the local road network. A structural survey of the C182 is being undertaken to ascertain the likelihood of damage to the road and culvert infrastructure as a result of heavy loads. An assessment is also being undertaken of the junction of the haul route that provides access to the C182 to and from Combwich Wharf in order to identify whether any works are required to enable the movement of Abnormal Indivisible Loads (AILs). Due to the scale of traffic and nature of the site works and operational use, however, no traffic issues are expected.

Noise and vibration

- 6.8.24 A baseline noise survey has been carried out and the acoustic climate at this site is typical of a quiet rural location, i.e. low daytime ambient levels. The nearest noise sensitive receptors include nearby residential dwellings.
- 6.8.25 The refurbishment and use of the Wharf and construction/operation of a consolidation/storage area have the potential to cause noise disturbance. Once the nature and exact location of the proposed development is defined, the need for additional baseline noise surveys will be established and assessment of potential noise impacts undertaken.

Air quality

- 6.8.26 A desk-based assessment has identified that receptors for air quality within this area are the private residential properties on the southern edge of Combwich and at Putnell Farm. Once the location of the works within the current search area is defined, the potential dust impacts on sensitive receptors will be assessed in line with accepted methodology. Operational impacts will be considered through the design of the development, with vehicular routes and working areas located as far as possible from sensitive receptors.

Landscape and visual amenity

- 6.8.27 An initial desk-based assessment and visual survey work has been undertaken. Combwich Wharf lies on the floodplain of the River Parrett adjacent to the built-up area of Combwich. Combwich Wharf lies within the 'Levels-Estuarine' sub-area of the 'Levels and Moors' local landscape character and within national landscape character area 142 'Somerset Levels and Moors'. The Quantock Hills are the nearest designated Area of Outstanding Natural Beauty (AONB), 10km to the south-west.
- 6.8.28 Several important national and international conservation designations are adjacent to the search area, and local designations close to the search area include a CWS (adjacent to the search area), ancient woodlands and a Green Wedge.
- 6.8.29 The initial visual survey study revealed high visibility of the search area within short distance. The main landscape impacts associated with the development of Combwich Wharf would be the potential loss of valuable landscape features within the periphery of the search area, although these features would be protected, where possible, through appropriate site layout design and an effective landscape strategy. The opportunity exists to create new landscape elements and to screen the development. With respect to the adjacent international and national designations, it will be important to establish appropriate buffer zones on site boundaries to protect these valuable resources from visual intrusion. Along with desk-based research, further surveys will provide detailed information and identify opportunities for any required mitigation

Archaeology and cultural heritage

- 6.8.30 A Cultural Heritage DBA indicates that there are no Scheduled Monuments, Conservation Areas, Registered Parks and Gardens or Registered Battlefields within the search area. There are four Grade II Listed Buildings located in Combwich village and evidence of a settlement dating from the Iron Age and Romano-British periods has been recovered to the south. The area is now designated as a site of county importance by Somerset County Council Historic Environment Services.
- 6.8.31 The presence of a Roman port at Combwich Pill has also been suggested. The place-name Combwich indicates Saxon settlement, although no Saxon remains are recorded in the town. Combwich was also an established medieval port. Medieval ridge and furrow earthworks are recorded to the east.
- 6.8.32 Although Combwich is an archaeologically rich area, with an area to the south designated as a site of county importance, geotechnical data suggests that deep (up to 3m) alluvial deposits may overlie any surviving archaeological remains. The extent to which potential development would impact on any surviving archaeological remains is yet to be established.
- 6.8.33 Desk-studies and deposit modelling, followed by geophysical survey and trial trenching, if Appropriate, will be carried out. Should it be required, archaeological

excavation and recording will be followed by an appropriate programme of post-excavation works, in accordance with English Heritage guidance.

Amenity and recreation

- 6.8.34 Desk-based study indicates that the River Parrett is navigable to Bridgwater. Combwich Motor Boat and Sailing Club have mooring facilities and slipways at Combwich Quay and facilities that it leases from EDF Energy to the east. Laboratory access to the river is gained by a public slipway within the Pill and two slipways accessed from land leased by the club.
- 6.8.35 Informal recreational activities take place along the Public Rights of Way (PRoW) that are present within the search area. The Parrett Trail footpath crosses the access (diversion) road into Combwich Quay that is used by Abnormal Indivisible Loads (AILs).
- 6.8.36 Although considered unlikely, the layout and area of the upgraded facilities at Combwich could affect either the facilities or activities of the Combwich Motor Boat and Sailing Club. Disturbance will be avoided wherever possible and if necessary mitigation measures will be implemented. Potential disturbance or obstruction could arise to the PRoW during construction or operation, and where this is possible mitigation measures will be discussed with the Local Authority Rights of Way Officer.
- 6.8.37 Further studies will identify any construction or operational phase closure or diversion to PRoW and assess construction or operational disturbance to any recreational facilities or amenities.

6.9 Williton

- 6.9.1 Williton has been identified as being a potentially suitable location to accommodate the following land uses:
- A campus to accommodate up to 200 people; and
 - A park and ride facility to accommodate up to 350 cars.
- 6.9.2 As surveys and assessments related to this location have not been as detailed to date as for other locations, the studies either undertaken or proposed are only summarised in the table below.

Geology, land use and soils

- 6.9.3 A review of available mapping indicates that both search areas (WIL-A and WIL-B) are in agricultural use. Potential issues are likely to relate to loss of agricultural land and to damage to soils. It is unlikely that any issues relating to geology will arise. Soil and ALC field surveys will be completed.

Land contamination

- 6.9.4 A desk-based review of mapping indicates both search areas are both in agricultural use, and no potentially contaminative sites are on or near the areas. A Phase 1 contamination desk study will be carried out for both sites although it is unlikely that issues relating to land contamination and waste will arise.

Hydrogeology

- 6.9.5 No studies have been carried out to date. A desk-based assessment will be performed, from which the risk to the groundwater environment and need for further studies will be established.

Hydrology, drainage and flood defence

- 6.9.6 Desk-based assessments show that the Williton area is covered by the West Somerset Catchment Flood Management Plan (CFMP). Both search areas are located within Flood Zone 3a. Development over any of the drains within the WIL-B search could result in localised drainage impacts, hardstanding from the park and ride and campus developments could result in increased peak fluvial flows to nearby streams, with the potential to result in more frequent or more extensive flooding within Williton. However measures including SUDS would be incorporated in the design of the development. Assessment will be undertaken of any direct effects on watercourses and drains, and Flood Risk Assessment will also be carried out, using the methodology set out in PPS25.

Freshwater quality

- 6.9.7 An initial desk-based assessment has been completed and a desk-based water quality assessment will be carried out.

Terrestrial flora and fauna

- 6.9.8 The two search areas have been subject to a preliminary assessment, using aerial photographs and desk study information. Whilst most of the habitats within the search areas appear likely to be of limited biodiversity value, the development could result in permanent landtake of habitats that are listed as being a priority under the UK Biodiversity Action Plan (UKBAP), are used by protected species, or could sever habitat corridors. Construction also has the potential to harm and disturb species. Phase 1 Habitat Survey and species specific surveys (as necessary) will be undertaken, in accordance with accepted methodology.

Transportation

- 6.9.9 A full transportation study will be completed.

Noise and vibration

- 6.9.10 An initial desk-based assessment indicates that main noise sources are broadly similar between the two sites, as is the nature of potential receptors. Sensitive

receptors will be identified and background monitoring will be conducted as appropriate. Prediction of potential noise impacts, in accordance with standard guidance, would then be conducted.

Air quality

- 6.9.11 An initial desk-based assessment shows that the search areas are generally rural in location, with no major sources of air pollution identified. Potential receptors are in effect the same as for noise - the residential properties that border both search areas. Both search areas have similar sensitivities. The impact of dust will be assessed and sensitive receptors identified. Air quality impacts in terms of vehicle emissions will also be assessed using accepted methodology and informed by the Transport Assessment.

Landscape and visual amenity

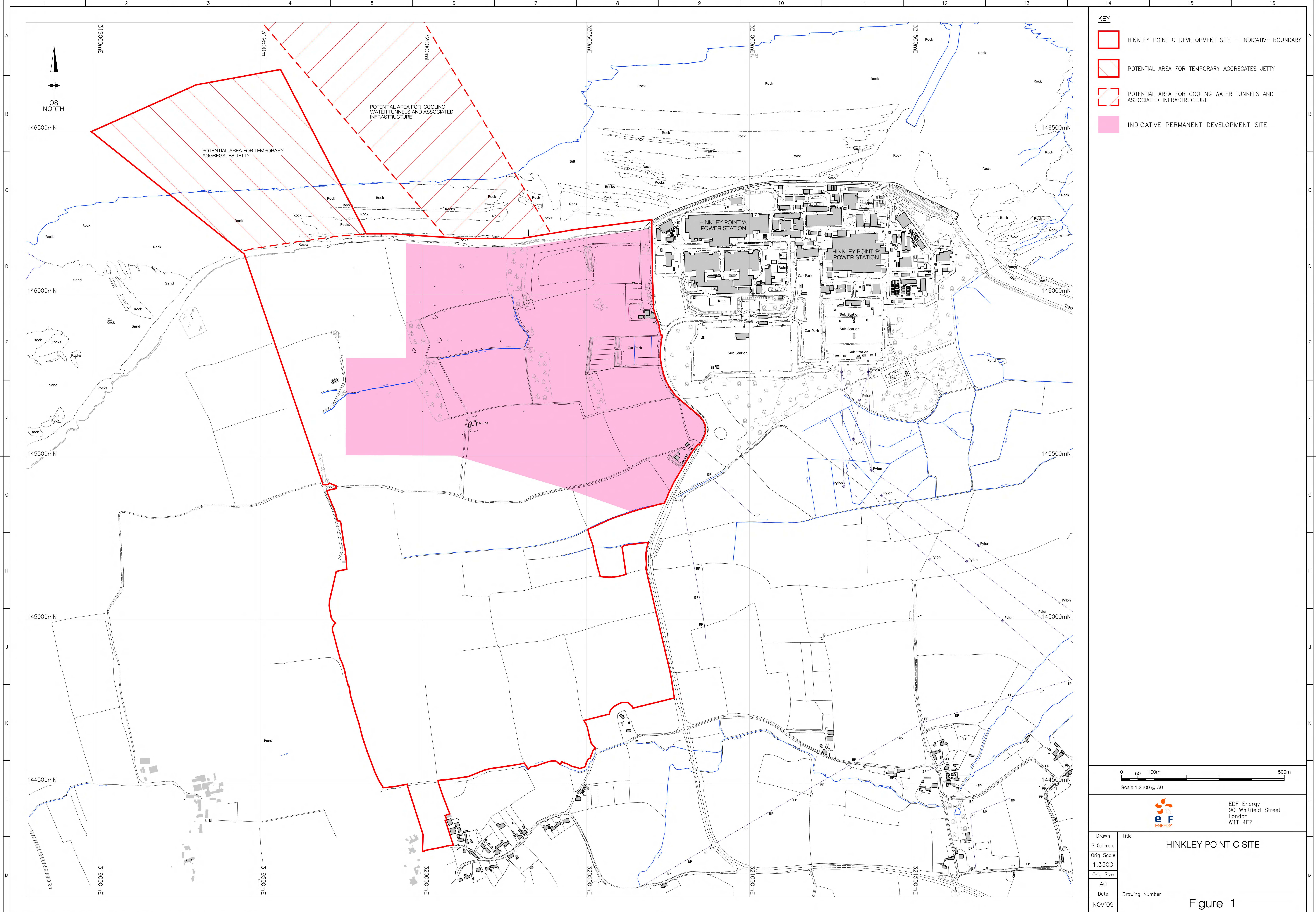
- 6.9.12 Whilst the proposed development has the potential to change the character and appearance of the local landscape, desk-based research and surveys will provide detailed information in order to assess the impact and identify opportunities for mitigation.

Archaeology and cultural heritage

- 6.9.13 A Cultural Heritage Desk Based Assessment (DBA) in accordance with the published guidelines, will be undertaken and will include a field reconnaissance walkover survey. The results will be discussed with Somerset County Council Historic Environment Services and any need for further assessment agreed.

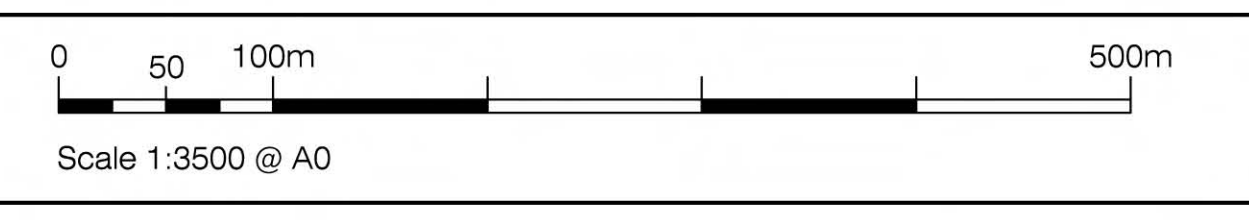
Amenity and recreation

- 6.9.14 A desk-based assessment has been completed and a number of PRoW identified within both search areas. A PRoW within the WIL-B search area provides an off-road connection between Williton and Sampford Brett as well as amenity use. A tennis court, presumably part of the Mamsey House nursing home, is located within the WIL-A search area.
- 6.9.15 Potential disturbance or obstruction to PRoW could arise Where potential obstruction could occur, mitigation measures will be agreed with the Rights of Way Officer. Details of the construction and operational activities and footprint of the campus and park and ride facility will be assessed against the recreational assets and activities. In order to support the quantification of potential impacts additional data will be collected on the number of users of the PRoW.



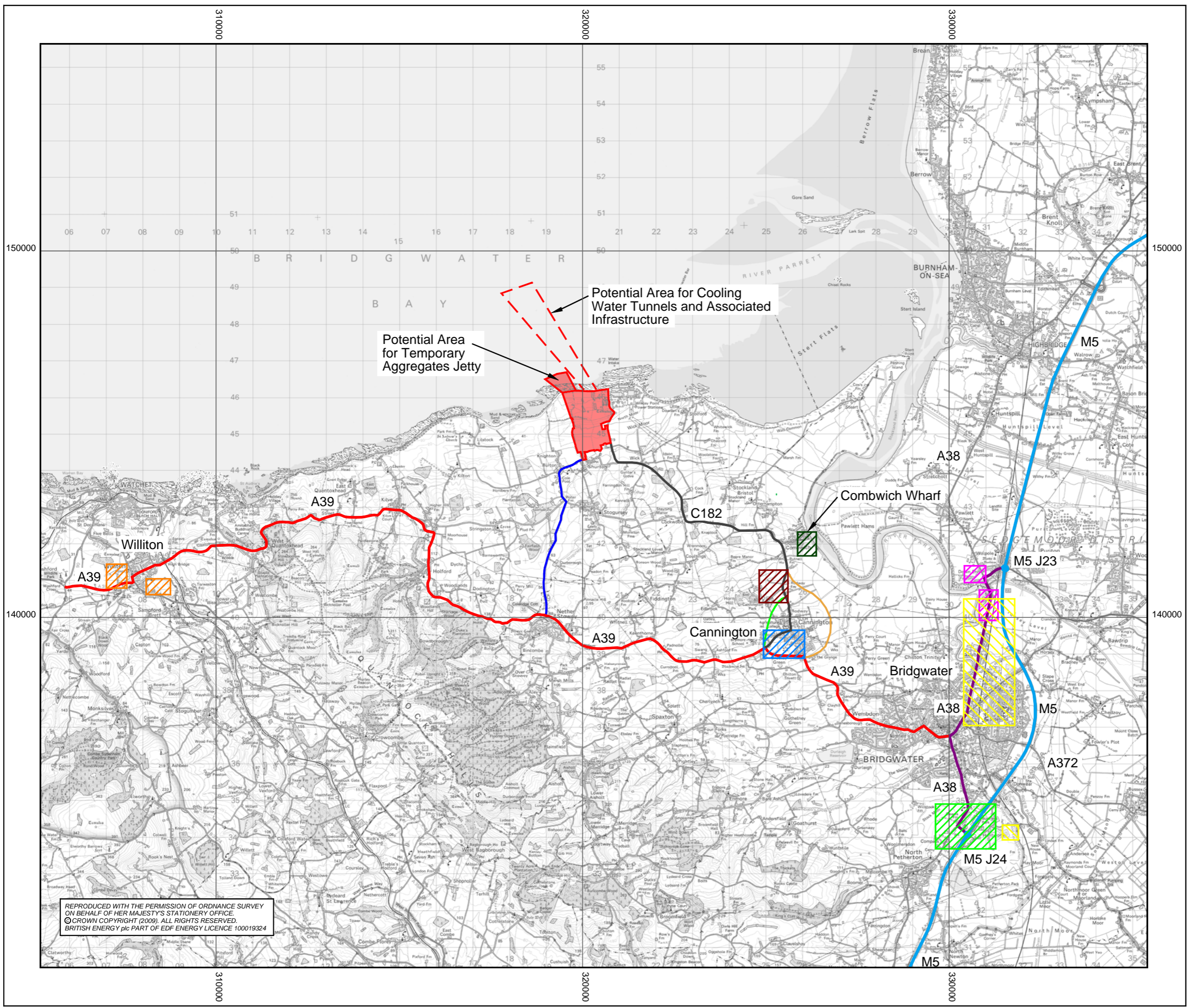
KEY

- HINKLEY POINT C DEVELOPMENT SITE - INDICATIVE BOUNDARY
- POTENTIAL AREA FOR TEMPORARY AGGREGATES JETTY
- POTENTIAL AREA FOR COOLING WATER TUNNELS AND ASSOCIATED INFRASTRUCTURE
- INDICATIVE PERMANENT DEVELOPMENT SITE

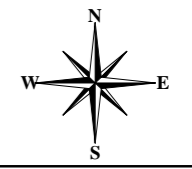


EDF ENERGY
EDF Energy
90 Whitfield Street
London
W1T 4EZ

Drawn	Title
S Gallimore	HINKLEY POINT C SITE
Orig Scale	
1:3500	
Orig Size	
A0	
Date	Drawing Number
NOV'09	Figure 1



- KEY**
- M5 MOTORWAY
 - A39
 - A38
 - C182
 - ALTERNATIVE EMERGENCY ACCESS ROUTE ON PUBLIC HIGHWAY
- KEY PROPOSALS**
- HINKLEY POINT C DEVELOPMENT SITE - INDICATIVE BOUNDARY
 - POTENTIAL AREA FOR COOLING WATER TUNNELS AND ASSOCIATED INFRASTRUCTURE
 - CANNINGTON BYPASS OPTIONS EASTERN AND WESTERN - SEE FIGURE 6
 - ▨ CANNINGTON NORTH-WEST SEARCH AREA - SEE FIGURE 7
 - ▨ CANNINGTON SOUTH AND CANNINGTON CENTRAL SEARCH AREAS - SEE FIGURE 7
 - ▨ JUNCTION 23 SEARCH AREAS - SEE FIGURE 8
 - ▨ JUNCTION 24 SEARCH AREAS - SEE FIGURE 9
 - ▨ BRIDGWATER SEARCH AREAS - SEE FIGURE 10
 - ▨ WILLITON SEARCH AREAS - SEE FIGURE 11
 - ▨ COMBWICH WHARF SEARCH AREA - SEE FIGURE 12
- ROAD IMPROVEMENTS - SEE FIGURE 13



Scale 1:100,000 @ A3
 0 1,000m 5,000m

Drawn : S Gallimore Date : Jan 10



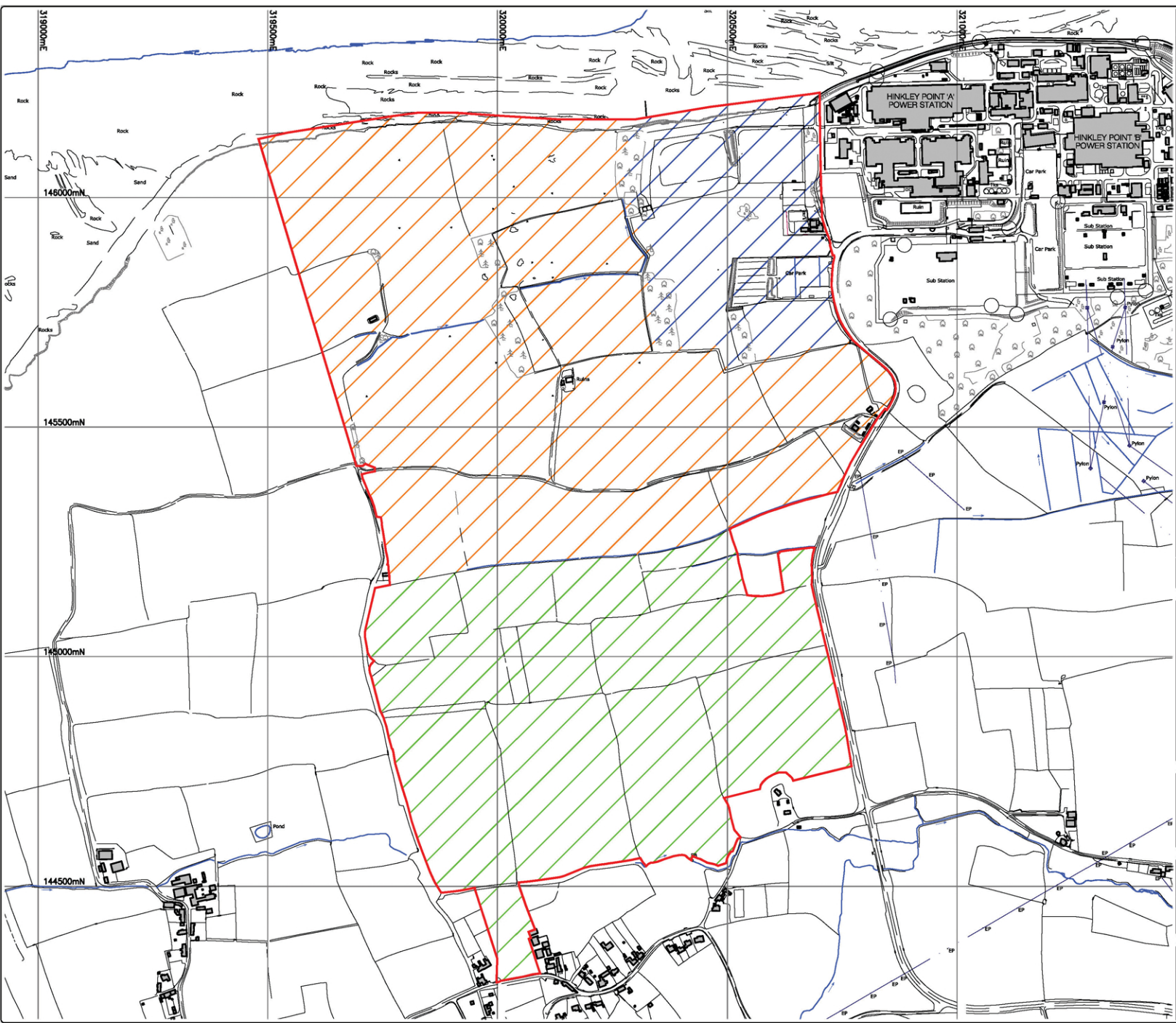
Hinkley Point C
 Proposed Nuclear Power Station
 and Off-Site Development

Proposed Power Station Site and
 Indicative Off-site Development

Figure 3

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Only figured dimensions are to be worked from
Draw to microtopography standards



KEY

FOR DISCUSSION

Legend

- Hinkley Point C Development Site - Indicative Boundary
- Built Development Area West
- Built Development Area East
- Southern Construction Phase Area

D2	23.10.09	Change of Layout	KB
D1	22.10.09	First Issue	SG
Rev	Date	Description	By / Des

Overview

Client	EDF CIDEN				
Project	Hinkley EPR EDF Access				
Title	Main Development and Construction Area (the boundary which stops at the coast) [Antony]				
Drawn	KB	Checked	HK	Approved	JB
Date	23 October 2009		Sheet size	A3	
Drawing Number	HinkleyDevArea	Rev	D2	Scale	see scale bar

EDF Energy
90 Whitehall Street
London
W1T 4EZ

Drawn	Title	HINKLEY POINT C MAIN DEVELOPMENT AND CONSTRUCTION AREA
Only Scale	NTS	
Only Size	A3	
Date	NOV'09	Drawing Number

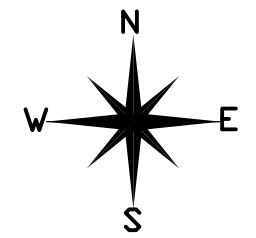
Figure 4




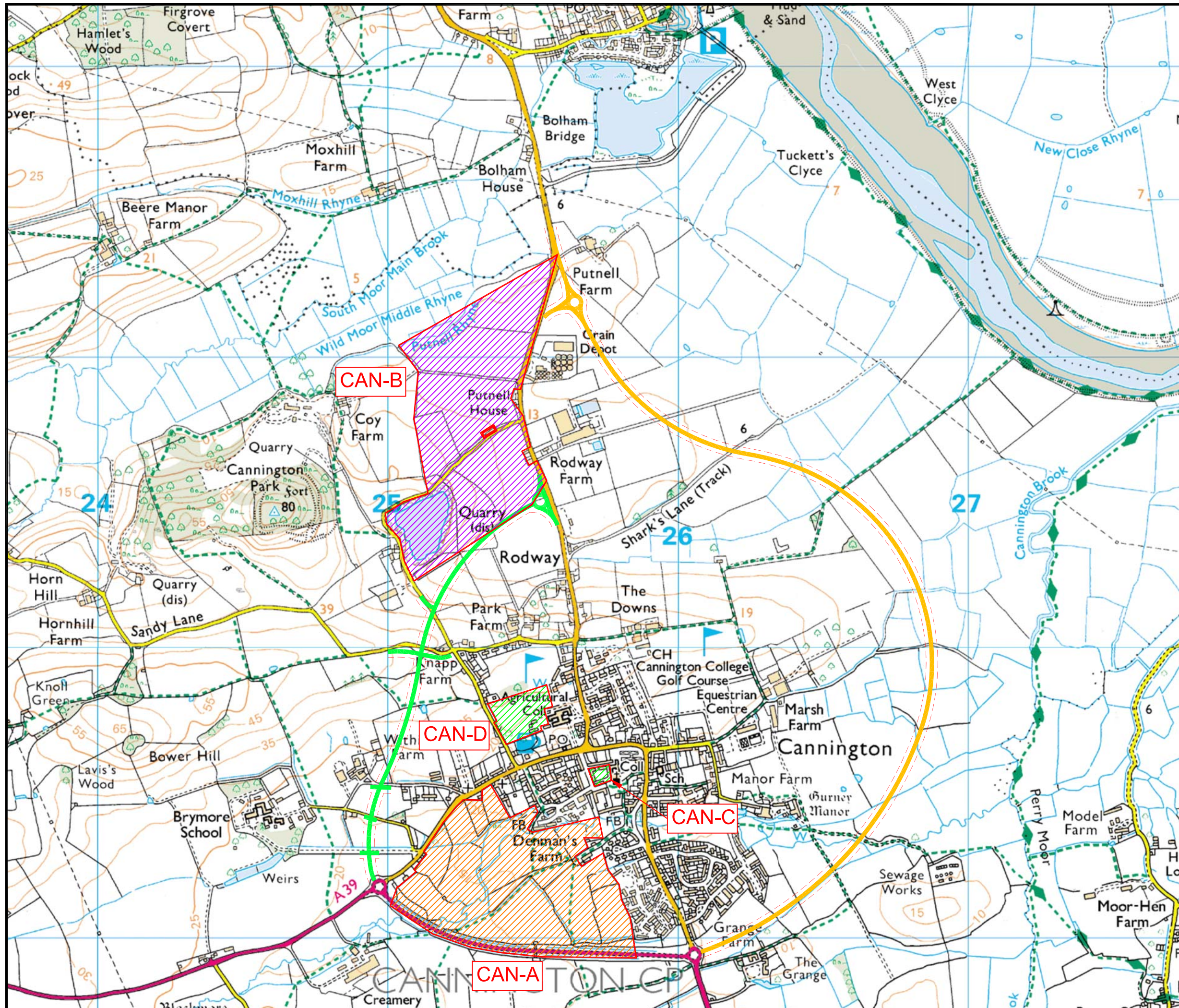
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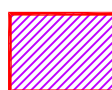



SEARCH AREAS:

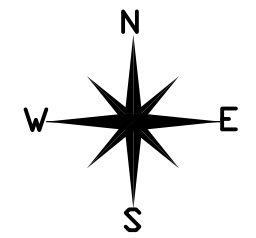
- EASTERN BYPASS ROUTE OPTION
- WESTERN BYPASS ROUTE OPTION




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JOG	JAN 10
	
HINKLEY POINT C PROPOSED OFF SITE ASSOCIATED DEVELOPMENT	
CANNINGTON BYPASS ROUTE OPTIONS	
9S4862	FIGURE 6



- KEY**
- SEARCH AREAS:**
-  CAMPUS AND/OR PARK AND RIDE AND/OR FREIGHT CONSOLIDATION (ROAD-BORNE FREIGHT)
 -  PARK AND RIDE AND/OR FREIGHT CONSOLIDATION/STORAGE (ROAD AND WATER-BORNE FREIGHT) AND/OR SPOIL DISPOSAL
 -  CAMPUS
 -  EASTERN BYPASS ROUTE OPTION
 -  WESTERN BYPASS ROUTE OPTION

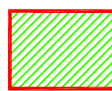


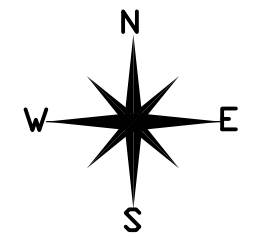
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HINKLEY POINT C PROPOSED OFF SITE ASSOCIATED DEVELOPMENT	
CANNINGTON SEARCH AREAS	
9S4862	FIGURE 7



KEY

SEARCH AREAS:

 PARK AND RIDE AND FREIGHT CONSOLIDATION (ROAD-BORNE FREIGHT)



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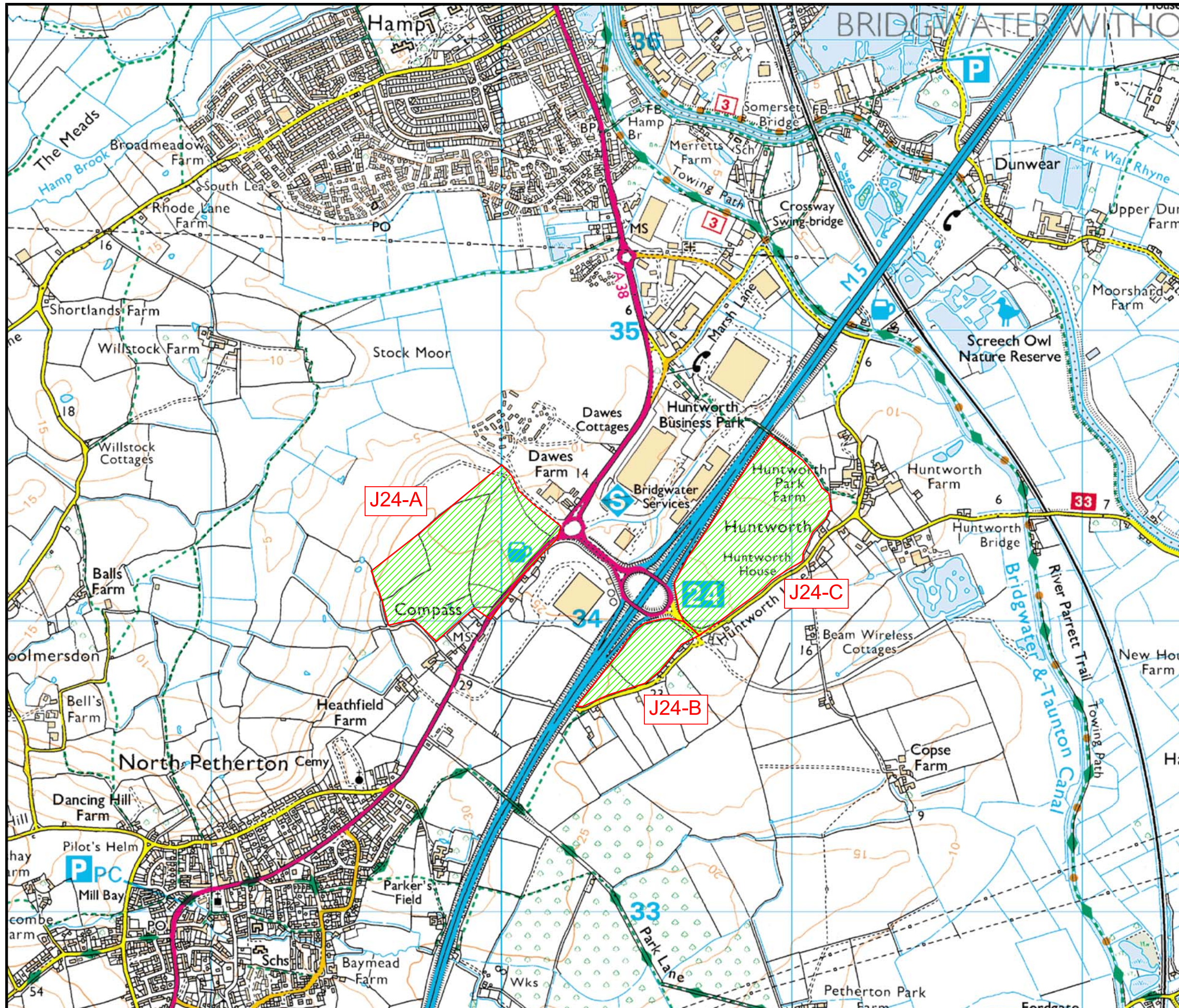
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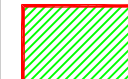


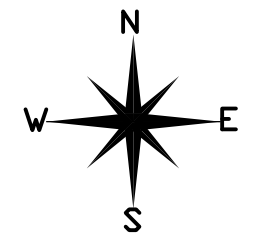
HINKLEY POINT C
PROPOSED OFF SITE
ASSOCIATED DEVELOPMENT


M5 JUNCTION 23
SEARCH AREAS

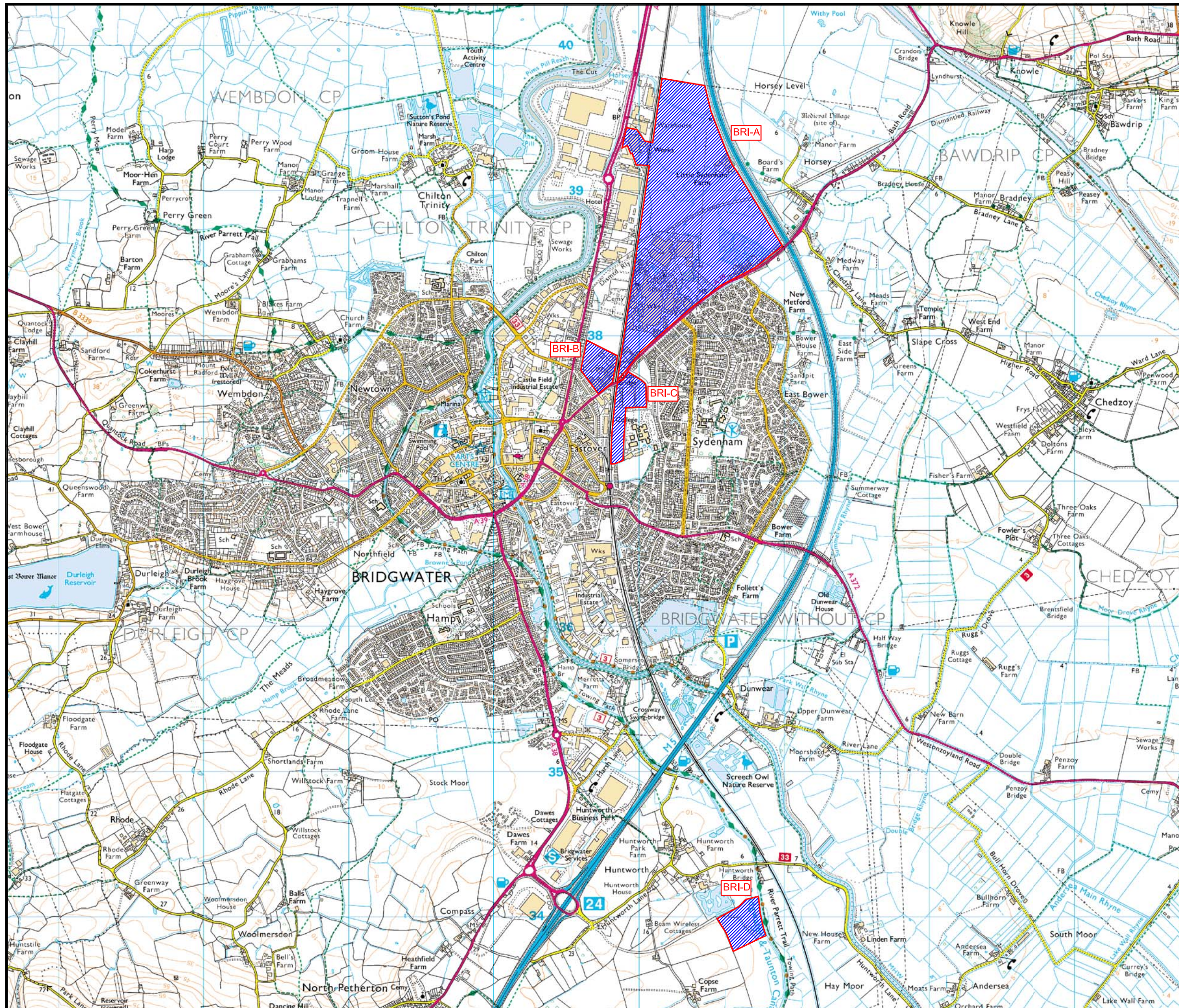
9S4862 FIGURE 8



KEY
 SEARCH AREAS:
 PARK AND RIDE AND FREIGHT CONSOLIDATION (ROAD-BORNE FREIGHT)




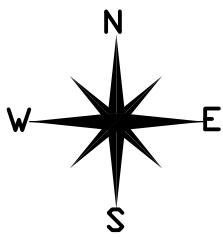
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HINKLEY POINT C PROPOSED OFF SITE ASSOCIATED DEVELOPMENT	
M5 JUNCTION 24 SEARCH AREAS	
9S4862	FIGURE 9




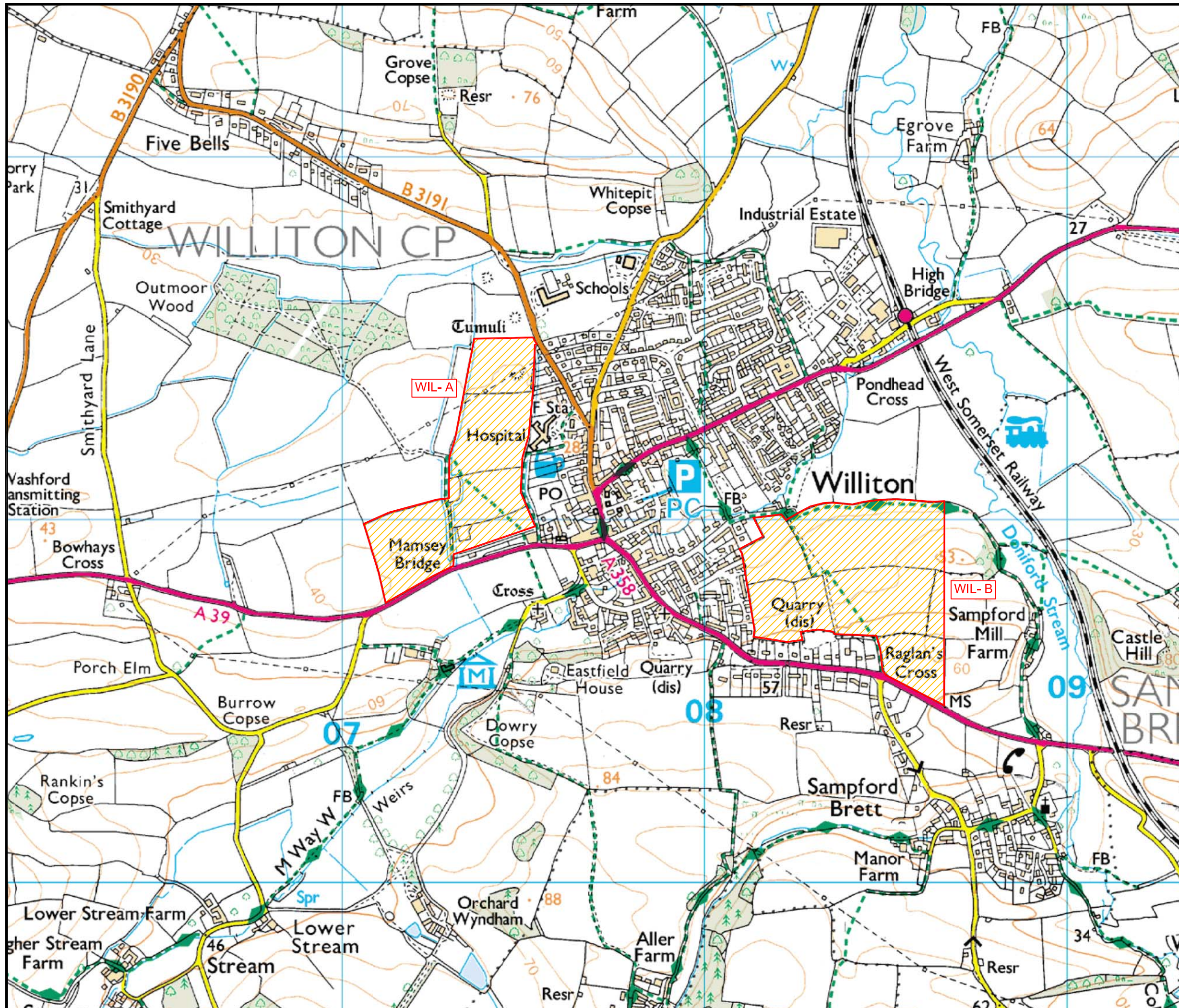
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SEARCH AREAS:

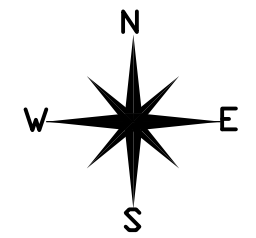
 CAMPUS




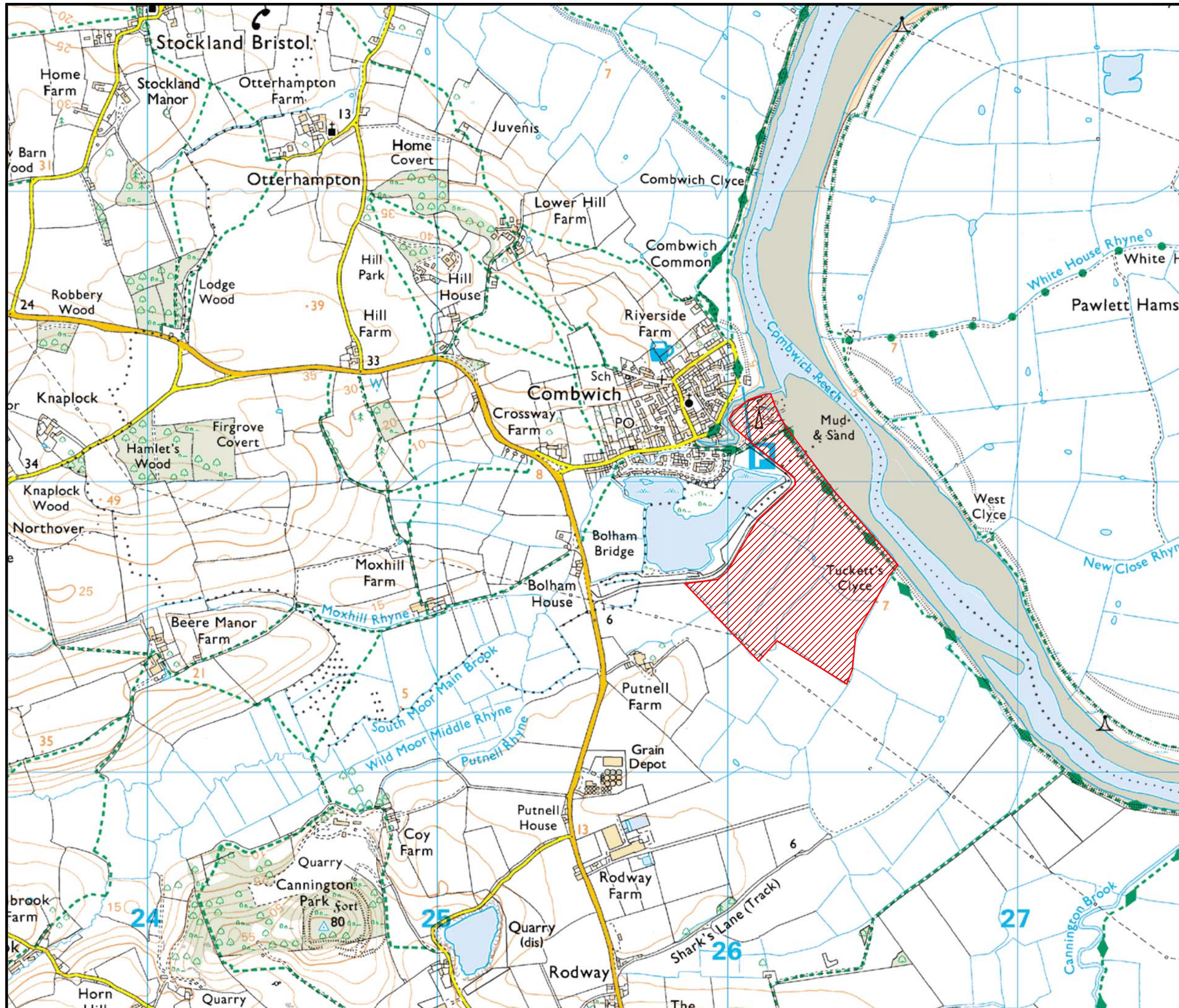
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HINKLEY POINT C PROPOSED OFF SITE ASSOCIATED DEVELOPMENT	
BRIDGWATER ACCOMMODATION SEARCH AREAS	
9S4862	FIGURE 10



KEY
 SEARCH AREAS:
 PARK AND RIDE AND CAMPUS




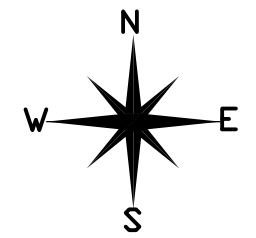
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HINKLEY POINT C PROPOSED OFF SITE ASSOCIATED DEVELOPMENT	
WILLITON SEARCH AREAS	
9S4862	FIGURE 11



KEY

SEARCH AREAS:

 REFURBISHMENT OF WHARF AND FREIGHT CONSOLIDATION/STORAGE (WATER-BORNE FREIGHT)



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JOG JAN 10



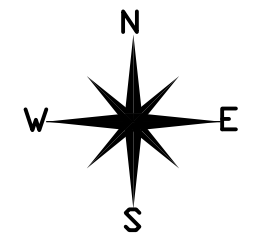
HINKLEY POINT C
PROPOSED OFF SITE
ASSOCIATED DEVELOPMENT

COMBWICH WHARF
SEARCH AREA

9S4862 FIGURE 12

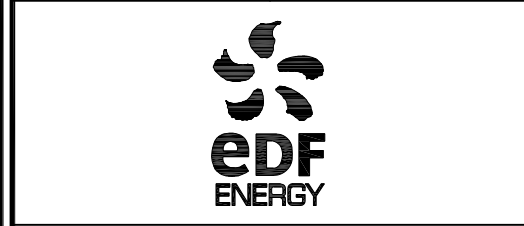


KEY
 SEARCH AREAS:
 POTENTIAL ROAD IMPROVEMENTS



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JOG JAN 10



HINKLEY POINT C
 PROPOSED OFF SITE
 ASSOCIATED DEVELOPMENT

ROAD IMPROVEMENTS

9S4862 FIGURE 13



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