BRADWELL B

Stage One - Consultation Document

BRB CGN EDF ENERGY

Contents

	FOREWORD	2
1	INTRODUCTION	
1.1	Overview	4
1.2	Navigating the Document	8
2	PROJECT AIMS AND OVERVIEW	
2.1	Introduction	12
2.2	Safety, Security and Regulation	13
2.3	Planning and Public Consultation	16
2.4	Other Planning and Related Consents	17
2.5	Environmental Impact Assessment	17
2.6	The Bradwell B Project	18
2.7	Project Stages	21
3	MAIN DEVELOPMENT SITE	
3.1	Introduction	24
3.2	Site Description and Context	26
3.3	Permanent Development Proposals	44
3.4	Other Environmental Considerations Affecting Permanent Development	62
3.5	Landscape Strategy	68
3.6	Proposed Design Principles for Bradwell B	72
3.7	Construction Phase Proposals	77
3.8	Earthworks Strategy	82
3.9	Marine Transport Options	84
3.10	Summary and Next Steps	89
4	TRANSPORT	
4.1	Introduction	92
4.2	Existing Transport Context	92
4.3	Policy Context and Transport Objectives	96
4.4	Transport Strategy Objectives	98
4.5	Movement of Construction Workforce	98
4.6	Movement of Freight	104
4.7	Potential Highway Improvements	108
4.8	Summary and Next Steps	123
5	JOBS AND PEOPLE	
5.1	Introduction	126
5.2	National policy	126
5.3	Size and Distribution of the Workforce	126
5.4	Approach to Managing Effects	127
5.5	Understanding the Project's Possible Effects	128
5.6	Our proposed Jobs, Skills and Supply Chain Strategy	129
5.7	Accommodation Strategy	131
5.8	Summary and Next Steps	138
6	NEXT STEPS	
6.1	How to Respond to this Consultation	140
6.2	Project Evolution	140
6.3	How we will Respond to Feedback	141

FOREWORD

The United Kingdom has a long history in nuclear generation. It is more than 60 years since our first commercial nuclear power station opened and today nuclear power plays an important role in moving towards a carbon-free electricity system. Bradwell B would make a vital contribution to meeting the UK's future need for low carbon, secure and affordable energy and achieving the UK's legally binding target of net zero carbon by 2050. A valuable - and necessary - part of our electricity mix, nuclear power ensures there is reliable and affordable electricity, including when limited wind and solar power is produced.

With 2020 marking 57 years since the opening of the original Bradwell nuclear power station, I am pleased to introduce our proposals for a new nuclear power station at Bradwell-on-Sea.

Bradwell B would build on the long-established history of nuclear power in the area, creating long-term employment opportunities and thousands of construction jobs, along with significant business and training opportunities. It would inject millions of pounds of investment into the local and regional economies and generate enough electricity to power more than four million homes, making an important contribution to the UK's future low carbon energy needs.

Consulting with local people, businesses and stakeholders is important to the way we develop and refine our plans for Bradwell B. At this early stage we would like to tell you about our work to date and seek your views on our initial proposals and options. We are also committed to working with you to understand the potential impacts of Bradwell B and consider ways in which we can manage impacts and maximise benefits for the community.

Do please contribute to this, our first stage of consultation. We will continue to update you and take account of your views through informal engagement and later stages of consultation as our proposals progress.

This document includes information about how to respond to this consultation. In addition, the Bradwell B team will be available at our consultation events to help explain the proposals and answer your questions.

I look forward to hearing your views.

Alan Raymant
CEO, Bradwell B

INTRODUCTION

1.1 Overview

1.2 Navigating the document

1.1. Overview

1.1.1 It is government policy that new nuclear power stations should play a significant role in the future generation of electricity in the UK.

1.1.2 The National Policy Statement for Nuclear Power Generation (NPS EN-6) (2011) explains that there is an urgent need for new nuclear power stations and identifies Bradwell as a potentially suitable site for a new nuclear power station. The site is next to the existing Bradwell power station at Bradwell-on-Sea in the district of Maldon, Essex.

1.1.3 The Government is in the process of preparing a new NPS for nuclear power. In the meantime, it has confirmed that it continues to support proposals for sites identified in NPS EN-6.

1.1.4 China Generation Nuclear Power Corporation (CGN) and EDF Energy are partnering together to develop proposals for the Bradwell B nuclear power station. Once operational, the power station would generate approximately 2.2GW of electricity, providing power for around 4 million homes for decades to come.

1.1.5 Once our consultation stages are complete, we intend to submit an application to the Secretary of State for Business, Energy and Industrial Strategy (BEIS) for a Development Consent Order (DCO). This is required in order to construct and operate Bradwell B power station together with the associated development needed for its construction and operation, such as new roads, park and ride and freight facilities (the "Bradwell B Project").

Purpose of this document

1.1.6 This document launches the pre-application consultation process on the Bradwell B Project.

1.1.7 This Stage One consultation is non-statutory and presents our vision and emerging proposals for the Bradwell B Project to enable you to provide your feedback so that we can take it into account as our proposals develop. This builds on Bradwell B's engagement activities to date and supports an open and ongoing dialogue with stakeholders and local communities.

1.1.8 This document contains information on the proposed nuclear power station, together with details and options for facilities off-site, and an outline of the key effects that the Project is likely to have on the local area. It includes information on our initial proposals and options at this stage providing the opportunity for you to let us know your views on them.

> We welcome your feedback. You will find prompts throughout this document to guide you to those areas where you may wish to focus your feedback on. They are shown in a box like this.

1.1.9 A summary document, called the Consultation Summary Document is also provided as part of this consultation, together with a Consultation Questionnaire to provide your feedback.

Scope of consultation

1.1.10 We welcome comments from all those with an interest in the Bradwell B Project. Your feedback is important and will enable us to take account of your views whilst the proposals are still at an early stage of development.

1.1.11 We have chosen to carry out an early stage of consultation following advice from the Government in the document "Planning Act 2008: guidance on the pre-application process for major infrastructure projects" (March 2015). We will also be consulting at a later stage of project development, when we will know more about our preferred proposals. Our statutory Stage Two consultation will also include engagement with landowners whose land might be affected by, or may be required to deliver, the Bradwell B Project.

1.1.12 At Stage One we are seeking views on our project aims and overall proposals for the Bradwell B Project and we encourage you to comment and share your views with us.

1.1.13 Whilst we welcome views on any aspect of our proposals, at this stage they fall into two broad groups. Parts of our proposals are not likely to be influenced by consultation because they are driven by important technical considerations such as safety and efficiency. However, there are many parts of our proposals which will be influenced as a result of responses to our consultation or further technical and environmental studies. More information is shown in Figure 1.1.

Figure 1.1 - Scope for influencing the Bradwell B Project

Parts of the Project which are not likely to be influenced by the consultation

The principle of building a new nuclear power station on land adjacent to the existing Bradwell power station (as a matter of Government policy)

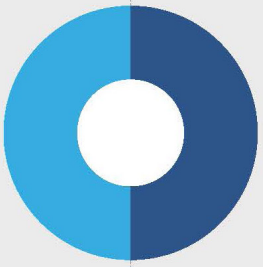
The approximate siting of the new power station, as shown in the indicative masterplan for the Bradwell B permanent development

Technical details including:

- The use of UK HPR1000 nuclear technology
- The proposed deployment of two reactors
- The adoption of indirect cooling

The principle of the type of 'associated development' needed to support the construction of the Bradwell B power station including:

- Accommodation for construction workers close to site
- Local highways improvements
- Marine transport facilities
- Temporary park and ride and freight management facilities



Parts of the Project which are likely to be influenced by the consultation

The 'design principles' that will guide future design development of the Bradwell B power station

The location of certain elements of the Bradwell B power station that do not fulfil important safety or functional requirements, such as administration and ancillary buildings

Our approach to:

- Managing the transport effects of the Project including the use of roads, sea and rail
- Reducing the environmental effects of the Project through design and mitigation
- Design of the Project, associated development or mitigation works that could also provide community and legacy benefits

Options and areas of search for associated development including:

- Accommodation for construction workers
- Local highway improvements
- Marine transport facilities
- Temporary park and ride and freight management facilities
- How we maximise the economic benefits to local communities and businesses

1.1.14 The principle of the need for new nuclear power stations and the choice of Bradwell as a potentially suitable site is a matter for Government policy and outside the scope of this consultation. Further details of the Government's policy on nationally significant infrastructure projects (NSIPs) and specifically nuclear power, is provided in Section 2 of this document.

1.1.15 Whilst some details of the Bradwell B power station design are still to be decided, the power station layout is largely fixed – being driven by technical and safety considerations. The type of nuclear reactor technology proposed (called the 'UK HPR1000' design) is going through a rigorous safety assessment (see Section 2.4 - Generic Design Assessment). This is also outside the scope of this consultation. We do, however, welcome your views on the 'design principles' that will guide future design development of the Bradwell B Project that are not subject to other processes and approvals.

1.1.16 We are proposing alternative sites or search areas for the location of some of the associated development required to facilitate the construction of the Bradwell B Project. We encourage you to comment and share your views on these.

1.1.17 We also encourage you to comment and share your views on:

- Our vision and emerging proposals for the Bradwell B Project;
- Options for the associated development needed to support the construction and/or operation of the power station, including highway works, park and ride and freight management facilities; and
- The potential effects on the local community, both positive and negative, and how we can maximise the benefits and mitigate the negatives.

1.1.18 It should be noted that a new connection will be required to export the electricity generated by the new power station to the National Grid. This will be subject to a separate application and consultation by National Grid Electricity Transmission and is therefore outside the scope of this consultation.

1.1.19 The first stage of consultation will run for 12 weeks from 4th March to 27th May 2020.

1.1.20 Following this Stage One consultation, we will consider all responses and feedback we have received and use it to inform the development of our plans. We will then publish our preferred options in a Stage Two consultation which will identify the land likely to be affected by our proposals. Stages One and Two may be supplemented by limited, focused stages of further consultation where necessary.

What is included in this consultation and what we will consult on later

1.1.21 We have included information in this consultation based on our current understanding of the main power station site and local area and our experience from other similar projects, such as Hinkley Point C in Somerset which is currently being constructed by CGN and EDF. We would like to know more about local priorities and your views on what we have presented to help develop our proposals.

1.1.22 As we develop our proposals and their likely effects on the environment and local communities, we will prepare more detailed strategies to address these effects. Where we can, we will provide further details on these strategies at later stages of our consultation process however, for some more complex areas, the full detail may not be available until our DCO application (where anyone who is interested in the Project will have the opportunity to register with the Planning Inspectorate to take part in the Examination of the application)

1.1.23 Figure 1.2 provides our current view on what type of information is likely to be available and when.

Figure 1.2 - Route Map to DCO Application

STAGES OF CONSULTATION	STAGE ONE CONSULTATION	STAGE TWO CONSULTATION	DCO APPLICATION

KEY INFORMATION AVAILABLE	• Our Vision for Bradwell B including the potential approach for maximising benefits for the local area
	• Indicative permanent and construction masterplans for the Power Station
	• Design principles and landscape approach for the Power Station
	• Preferred site and possible extension areas for temporary worker accommodation
	• Options for potential marine transport of freight
	• Areas of search for park and ride and freight management facilities
	• Options for potential highway improvements
		• Updated indicative masterplans for the Power Station
		• Indicative landscape and ecological strategy for Main Power Station Site
		• Preferred sites and indicative layouts for accommodation campus, park and ride and freight management facilities and off-site power station facilities
		• Preferred option for marine transport of freight
		• Preliminary Environmental Information
		• Preferred highway works proposals
		• Preferred accommodation strategy
		• Preferred jobs and skills strategy
		• Preferred HGV and bus routes during construction
			• Detailed proposals for all aspects of the Bradwell B Project
			• Plans identifying the land required to deliver the Bradwell B Project and the rights sought over it
			• Design and Access Statements
			• Other supporting information including:
			  • Environmental Statement
			  • Shadow Habitat Regulations Assessment
			  • Jobs and Skills Strategy
			  • Accommodation Strategy
			  • Control documents including Code of Construction Practice
			  • Consultation Report
			  • Draft of the Development Consent Order

Stakeholder Engagement

How to respond to this consultation

1.1.24 We are inviting comments from everyone, and especially all those living and working in and around the Bradwell B main development site.

1.1.25 Comments must be received by midnight on 27th May 2020 and can be submitted in any of the following ways:

- A public questionnaire can be found online at: www.bradwellb.co.uk
- You can email your comments on our proposals to: info@bradwellb.co.uk
- Written responses can be posted to Freepost Bradwell B Consultation.
- You can also submit your comments via the Bradwell B Freephone hotline 01621 451 451 during normal office hours.

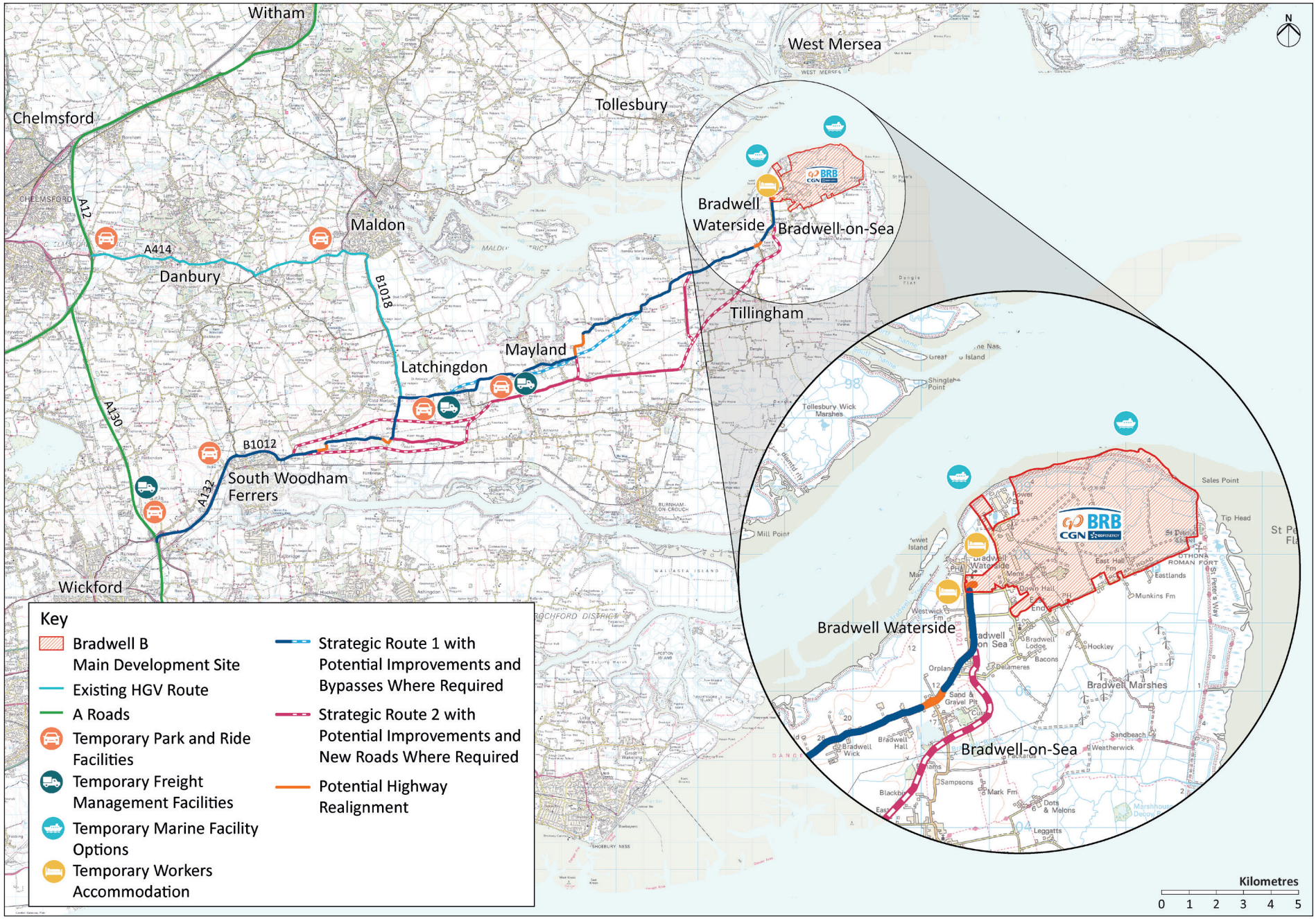
1.1.26 Your views are important to us and we look forward to hearing them so we can take them into account as our Project progresses.

1.2. Navigating the Document

1.2.1 The general content of this Document is as follows:

- **Section 1:** Introduction provides a brief introduction to the Bradwell B Project and the scope of this Stage One consultation;
- **Section 2:** Project Aims and Overview explains our aims and contains an overview of the key components of the Bradwell B Project, including a brief description of the wider area in which it is located;
- **Section 3:** Main Development Site describes the land which would be occupied by the power station as well as the land required temporarily in the vicinity to construct the power station (referred to as the "main development site") as shown Figure 1.3. This section provides an introduction to the principal parts of the main power station and how we have arrived at our current proposals;
- **Section 4**: Transport and Proposed Works explains our proposed transport strategy, the strategic options under consideration and our proposed approach to transport requirements for the Bradwell B Project, including our approach to identifying sites for park and ride and freight management facilities;
- **Section 5:** Jobs and People outlines the anticipated workforce requirements of the Bradwell B Project and our latest thinking on how this can be accommodated, including our proposed approach to project-provided accommodation, together with an outline of our skills strategies for enabling local people to access the opportunities available;
- **Section 6:** Next Steps sets out how consultation responses will be considered in developing the Bradwell B Project and the next steps for our consultation.

Figure 1.3 - Project Location Map



PROJECT AIMS AND OVERVIEW

2.1 Introduction

2.2 Safety, Security and Regulation

2.3 Planning and Public Consultation

2.4 Other Planning and Related Consents

2.5 Environmental Impact Assessment

2.6 The Bradwell B Project

2.7 Project Stages

2.1. Introduction

2.1.1 The Bradwell B Project requires the development of infrastructure which will ultimately enable electricity generated at the power station to be exported to the national grid electricity transmission network. It involves the construction and operation of two UK HPR1000 nuclear reactors, together with associated buildings, structures and components. The surrounding land and marine areas will have an important role, supporting essential construction facilities, temporary and permanent infrastructure and enabling the creation of an appropriately landscaped setting for the power station.

2.1.2 In order to build and operate the Bradwell B Project, other off-site development would be required (known as "associated development"). For example, we would need to develop temporary accommodation for construction workers as well as associated traffic management measures, including temporary park and ride and freight management facilities and road and junction improvements. Some of this would be temporary and removed following construction.

2.1.3 The Bradwell B Project would build on the long history of nuclear power generation at Bradwell-on-Sea, with 2020 marking 57 years since the opening of the original Bradwell nuclear power station. The proposed development will create considerable medium and long term employment in Essex with a workforce that will inject millions of pounds per year into the local economy.

2.1.4 The Bradwell B Project is expected to create approximately 900 permanent jobs, with an additional 1,000 jobs during periods of outage for maintenance and refuelling, presenting opportunities to draw on and improve the local skills base.

2.1.5 During construction several thousand workers would be required. Numbers could reach between 9,100 and 10,600 workers during peak periods.

2.1.6 There will also be considerable additional opportunities (sometimes referred to as the 'multiplier effect') generated for supporting businesses, such as catering, facilities management and logistics, during both construction and operation.

Bradwell Power Generation Company Limited

2.1.7 Bradwell Power Generation Company Limited ("Bradwell B") is the promoter of the Bradwell B Project and forms a partnership between China Generation Nuclear Power Corporation (CGN) and EDF Energy. The company was established in 2016 to develop proposals for and deliver the Bradwell B Project.

2.1.8 Bradwell Power Generation Company Limited ("Bradwell B") is the promoter of the Bradwell B Project and forms a partnership between CGN and EDF. The company was established in 2016 to develop proposals for and deliver the Bradwell B Project.

2.1.9 CGN and EDF have a long-standing partnership spanning 30 years. Together, they are developing plans for a nuclear power station in Suffolk (Sizewell C) and are currently building the UK's first new nuclear power station in over 20 years in Somerset (Hinkley Point C).

2.1.10 CGN is a major generator of low carbon energy in China and around the world and is the biggest builder of new nuclear power stations globally. CGN has more than 30 years' experience of safely delivering nuclear power projects.

2.1.11 EDF's UK subsidiary is the UK's largest producer of low-carbon electricity, meeting around one-fifth of the country's demand. It currently operates the UK civil nuclear fleet consisting of eight power stations.

Project aims

2.1.12 The Bradwell B Project will make a substantial contribution to the nation's energy needs in a reliable and sustainable way. This will help the UK to meet its climate change targets by supporting the transition to a low carbon economy.

2.1.13 Our aims in the development of the Bradwell B Project are to:

- Apply the highest standards of safety, reliability and sustainability over the whole life of the Bradwell B Project, as well as regulatory confidence in our technology and organisation.
- Build positive and trusted relationships with stakeholders, including the local planning authorities, statutory consultees, local communities and the wider public.
- Avoid significant adverse environmental effects from the Bradwell B Project where practicable, and where these are unavoidable, work to mitigate or compensate them. We are also looking for opportunities to provide enhancement where possible.
- Maximise the social and economic benefits of the Project for the local and regional community through, for example, training, employment and the supply chain, where practicable.

2.2. Safety, Security and Regulation

Safety and security

2.2.1 Nuclear power is one of the most strictly regulated industries in the UK. Specific laws govern the handling, transport and use of nuclear materials, information security, and operations.

2.2.2 The Office for Nuclear Regulation (the ONR) and the Environment Agency are the regulators for nuclear safety, security, transport and environmental issues at nuclear licensed sites in England. Together they issue and monitor compliance with the licences and permits that are necessary for the construction and operation of nuclear facilities.

2.2.3 Operators of licenced nuclear sites must have site security plans approved by the ONR. These confidential plans detail the security arrangements for the protection of nuclear sites, including nuclear and other radioactive material and sensitive nuclear information on such sites.

Generic Design Assessment

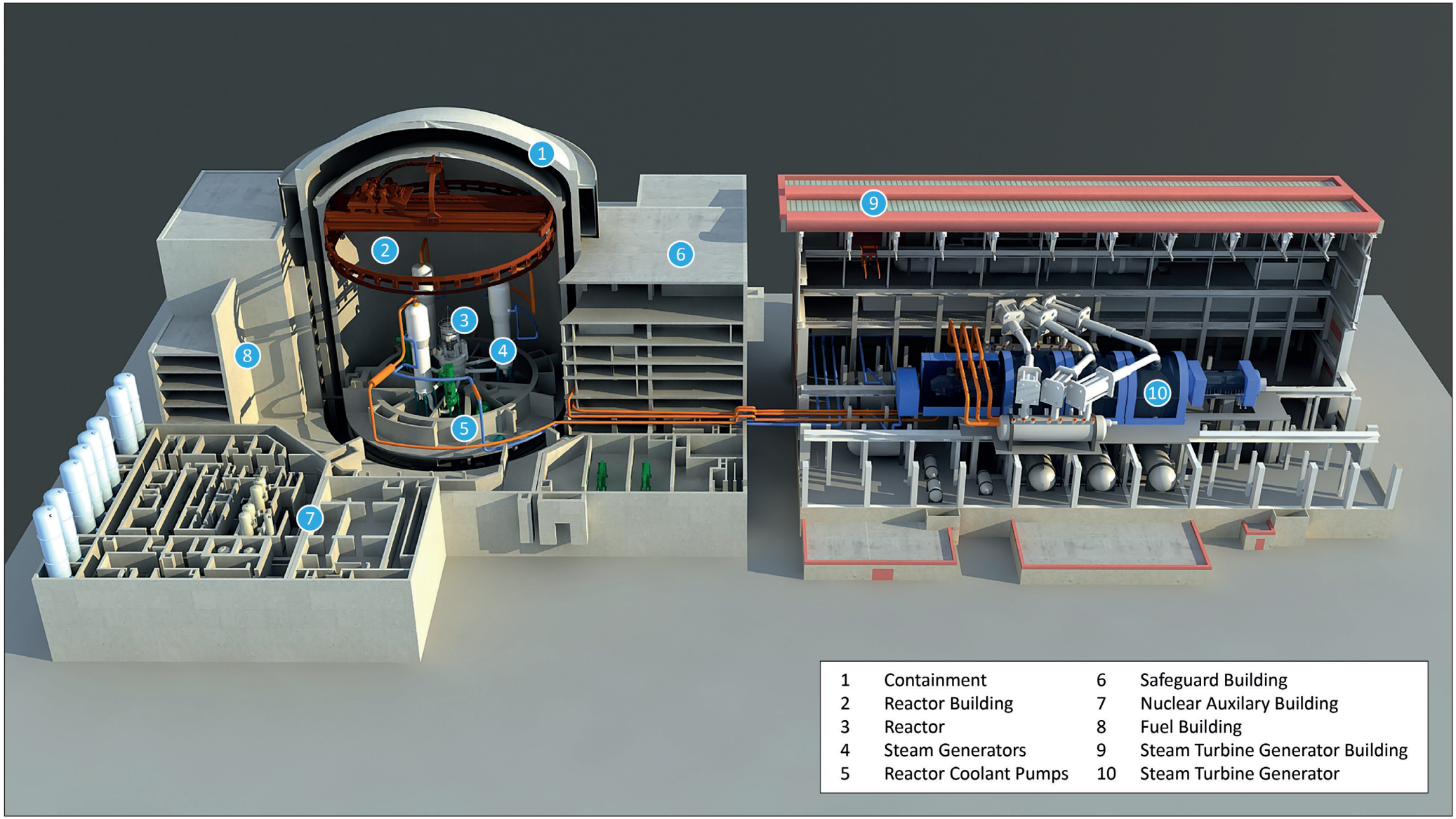
2.2.4 There are a number of different nuclear reactor designs used around the world to generate electricity. All reactor technology deployed in the UK must comply with the UK's robust nuclear regulatory requirements. We are proposing that the Bradwell B power station will use a third-generation pressurised water reactor called UK HPR1000.

2.2.5 The UK HPR1000 is currently undergoing assessment as part of the Generic Design Assessment process (GDA). This process is independently controlled by the ONR and the Environment Agency. It ensures that the design of new nuclear power stations proposed to be built in the UK meets high standards of safety, security, environmental protection and waste management.

2.2.6 The GDA process is a lengthy process, taking approximately 4-5 years to complete. Bradwell B began the GDA process for the UK HPR1000 nuclear reactor in January 2017 and we are currently in Step 4 of the four stage process.

2.2.7 Progress with the GDA process is reported online by the Office for Nuclear Regulation (www.onr.org.uk) and on the UK HPR1000 websites (www.ukhpr1000.co.uk).

Figure 2.1 - Illustrative UK HPR1000 reactor unit layout



Nuclear Site Licence

2.2.8 A nuclear site licence must be granted before a new reactor can be built and operated on a specific site. It is a legal document unique to each nuclear site and includes conditions on the handling, treatment and disposal of nuclear matter. The licence and licence conditions apply at all times throughout the life of the site and therefore cover design, construction, commissioning, operation, maintenance, modifications and eventual decommissioning. A licence is provided through a system of regulatory control under the Nuclear Installations Act 1965 (as amended).

2.2.9 The ONR regulates the nuclear power industry, including the design, construction, operation and decommissioning of any nuclear installation. The ONR sets out a series of licence conditions and assesses licensees against them. More information on the Office for Nuclear Regulation can be found at: www.onr.org.uk

Spent fuel and radioactive waste

2.2.10 The spent fuel and radioactive waste produced by the Bradwell B power station would be managed in a manner that protects people and the environment and is in accordance with all relevant UK policy and legislation.

2.2.11 Spent fuel removed from the reactor would initially be stored in the reactor fuel pool, for pre-cooling, this is commonly referred to as short term storage. Following this initial storage period, the spent fuel would be transferred into a transportation canister and moved to the separate on-site interim spent fuel store where it would be safely stored until a UK Geological Disposal Facility is available and the spent fuel is ready for -final disposal.

2.2.12 The interim spent fuel store would be designed for a life of at least 100 years, which could be extended if necessary. The interim spent fuel store would be designed to be capable of operating independently of other parts of the power station in recognition that its lifetime would, under current assumptions, extend beyond the operational life and decommissioning of the other facilities on-site.

2.2.13 Radioactive waste generated at Bradwell B would fall into two categories – Low Level Waste (LLW) or Intermediate Level Waste (ILW). LLW would be disposed of as soon as reasonably practicable, following treatment to limit its volume and appropriate conditioning or packaging to allow its safe transport and disposal. ILW would be conditioned and packaged on-site throughout the operational phase. As with other licenced sites, the packages would be safely stored in the ILW interim storage facility until a UK Geological Disposal Facility is available to accept waste from Bradwell B for disposal. As with the interim spent fuel store, it would be possible to extend the life of the ILW interim storage facility.

Emergency preparedness

2.2.14 Both CGN and EDF Energy place safety as the overriding priority of their nuclear businesses. Each operating power station has well-developed plans to deal with emergencies, including contingency emergency plans in the extremely unlikely event of an unplanned release of radioactive material off-site. These plans are underpinned by legal obligations to demonstrate and ensure that the risks are as low as is reasonably practicable.

2.2.15 Similarly we would work with the local authorities to ensure there would be appropriate off-site emergency plans to cover the Bradwell B Project (including our workers during the construction phase), in order to comply with the relevant provisions of The Radiation (Emergency Preparedness and Public Information) Regulations 2019. These emergency arrangements would be regularly reviewed, practised and updated, and assessed by the regulator, the ONR, as a legal obligation on Bradwell B.

2.3. Planning and Public Consultation

Planning policy context

2.3.1 A nuclear power station is defined as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. The construction and operation of a new nuclear power station must therefore be authorised by a DCO granted by the Secretary of State for BEIS.

2.3.2 The Planning Inspectorate will manage the application acceptance process on the Secretary of State's behalf, and will also carry out an independent examination of the application before making a recommendation to the Secretary of State, who will then make the final decision on whether to grant development consent.

2.3.3 The Government has set out its policies in relation to NSIPs in a series of National Policy Statements (NPS). The following statements are relevant to the Bradwell B Project:

- Overarching National Policy Statement for Energy (NPS EN-1); and,
- National Policy Statement for Nuclear Energy Generation (NPS EN-6).

2.3.4 Collectively, these NPSs establish that there is an urgent need for new electricity generating capacity, including nuclear. NPS EN-6 makes clear that an application for development consent for a new nuclear power station should be assessed on the basis that 'the need for such infrastructure has been demonstrated' and goes on to identify Bradwell as one of the eight sites potentially suitable for deployment for a new nuclear power station before the end of 2025.

2.3.5 Each site listed in NPS EN-6 was assessed by the Government by way of a Strategic Siting Assessment (SSA) and an Appraisal of Sustainability (AoS). Annex C of NPS EN-6 includes site boundaries for each identified site based on the site originally promoted by the nominator (the "NPS site boundary"). The NPS site boundary for Bradwell comprises land to the south and east of the existing Bradwell power station. The relationship between the NPS site boundary and the Bradwell B Project "main development site" is explained in Section 3 of this document.

2.3.6 A subsequent Written Ministerial Statement (07 December 2017) makes clear that the Government continues to give strong in-principle support to proposals for those sites listed in NPS EN-6 yet to apply for development consent and due for deployment beyond 2025, which includes Bradwell.

2.3.7 In December 2017, the Government started consultation on the site selection process for new nuclear power stations capable of deployment beyond 2025 to inform a revised draft of NPS EN-6. The Government's response to the consultation was published in July 2018. This included a request for the promoters of new nuclear power stations, including Bradwell B, to send the Government information on how the sites met the siting requirements (Annex II, paragraph II.8). Bradwell B subsequently provided this information and will continue to engage with the Government on any revised NPS.

2.3.8 Given the need for nuclear power and the choice of Bradwell as a location for a new nuclear power station is a matter for national policy we are not consulting on the principle of nuclear power, the role of national policy or the suitability of Bradwell for a new nuclear power station. Instead, this consultation focuses on our proposals for the new nuclear power station site and explains our current thinking around options and search areas for associated development needed to construct and operate the power station.

2.3.9 Maldon District Council (MDC) are the relevant local planning authority for the area in which the main development site are located. Policy D4 of MDC's Approved Local Development Plan 2014-2029 states that "the Council will strongly support the principle of the development of a new nuclear power station at Bradwell-on-Sea".

2.3.10 Essex County Council (ECC) is the relevant County Council responsible for strategic planning and certain other functions such as transport and waste. ECC recognise the Bradwell B Project as a large infrastructure project in the area and identify its role as being to influence the Project and represent the interests of Essex.

2.3.11 Some of our search areas for the associated development sites fall within the Chelmsford City Council administrative area. Guidance published by the Government explains the role of local authorities in the development consent process.

The consultation process

2.3.12 Pre-application consultation is a legal requirement before the promoter of an NSIP can make an application for development consent. There are two types of pre-application consultation, often called statutory and non-statutory. This Stage One consultation is non-statutory. A further, statutory, Stage Two consultation will be carried out at a later date and will include prescribed information and publicity methods, and consultation with the bodies and people prescribed by the Planning Act 2008, which broadly comprise:

- Statutory consultees, which includes the relevant local authorities and other prescribed consultees and persons with an interest in the land affected by the proposal under section 42 of the Planning Act 2008; and
- The local community living in the vicinity of the proposed development under section 47 of the Planning Act 2008. Bradwell B's approach to consultation with the local community is set out in the Statement of Community Consultation for this Project.

2.3.13 Consultation is an important stage in the development consent process. It will allow us to understand consultees' views and seek to identify ways of refining our proposals and mitigating the potential impacts of the development before the application is submitted.

2.3.14 Guidance published by the Government supports consulting at an early stage in the Project, when it is still evolving, as well as at a later stage when the Project is sufficiently defined to identify landowners and those likely to be affected.

2.3.15 This consultation therefore aims to explain our Project aims and current thinking on the Project and the options we have identified.

2.3.16 Following Stage One consultation, the responses and feedback received will inform the development of the proposals ahead of Stage Two consultation.

2.3.17 Stage Two will focus on our 'Preferred Proposals' for the Bradwell B Project which will include more detailed proposals and environmental information, focusing on specific sites for development. This will take place ahead of the submission of an application for development consent, allowing time for regard to be given to any feedback received.

2.3.18 This may be supplemented by further stages of limited, focused consultation if considered necessary.

2.3.19 We will consider feedback from the second stage and any further limited stages of consultation prior to submitting our application for development consent.

2.4. Other Planning and Related Consents

2.4.1 In addition to the DCO, we will also require other permissions for parts of the construction activities and for subsequent operation and decommissioning of the power station. It is possible for any marine licence to be included within our DCO application. Other consents, for example environmental permits will be applied for at different times and will be consulted on as appropriate by the relevant authority.

2.4.2 In addition we are also considering making separate planning applications for enabling works, for example site clearance and highway improvements.

2.5. Environmental Impact Assessment

2.5.1 The size and nature of the power station is such that it is classified as Environmental Impact Assessment (EIA) development under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the Infrastructure EIA Regulations').

2.5.2 EIA is a process carried out to enable decision makers to understand the likely significant effects of an NSIP. The associated development will similarly be subject to EIA. The output of the EIA will be reported in a document known as an Environmental Statement which will accompany the application for development consent.

2.5.3 The Infrastructure EIA Regulations also require an applicant for EIA development to consult on preliminary environmental information. This is, in broad terms, the environmental information that is available on the project at the time of pre-application consultation. Our Stage Two statutory consultation will contain our preliminary environmental information including an indication of likely impacts that could arise from our preferred proposals and our proposed mitigation. This Stage One Consultation Document incorporates an outline of the key effects that the Bradwell B Project is likely to have on the local area. It provides a description of the existing baseline environmental conditions of the main development site

and potential associated development sites and search areas, where these are identified.

2.5.4 A Habitat Regulations Assessment will also be undertaken in parallel with the EIA processes to assess the potential for adverse effects on the conservation objectives of existing or proposed European Protected Sites resulting from the Bradwell B Project.

2.6. The Bradwell B Project

2.6.1 The Bradwell B Project includes:

- **The Power Station Permanent Development** - the proposed new nuclear power station on land within the main development site (adjacent to the existing Bradwell station) which will be developed with two UK HPR1000 nuclear reactors, together with associated plant and ancillary structures and features of the power station.
- **The Power Station Permanent Development** - the proposed new nuclear power station on land within the main development site (adjacent to the existing Bradwell station) which will be developed with two UK HPR1000 nuclear reactors, together with associated plant and ancillary structures and features of the power station.
- **Temporary Construction Facilities** - these are temporary facilities required for construction on the main development site and for the duration of the construction period.
- **Off-site Power Station Facilities** - these are permanent facilities away from the main development site, which are essential for the safe operation of the power station.
- **Associated Development** - development on and off-site to support the construction and/or operation of the power station, for example park and ride facilities for construction workers, freight management facilities, temporary worker accommodation and road and junction improvements.

The site and surroundings

2.6.2 The indicative area that we have identified for the main components of the power station lies within the NPS site boundary. NPS EN-6 recognises that the site boundary proposed in the application for development consent may vary from the NPS site boundary, as specific proposals are developed. Paragraphs 2.3.3 to 2.3.4 explain that the SSA was undertaken on the basis that applications for development consent may also include additional land for other elements of the power station including car parks, access roads and marine landing facilities.

2.6.3 The main development site (which refers to the land that would be occupied by the permanent power station and land required for construction) covers approximately 230 hectares and lies immediately to the south and east of the existing Bradwell power station. The site is next to the Blackwater Estuary on the Dengie Peninsula, approximately 15km east of the town of Maldon and 1km north-east of the village of Bradwell-on-Sea. Figure 2.2 shows the main development site relative to the nearest towns, villages and other local points of interest.

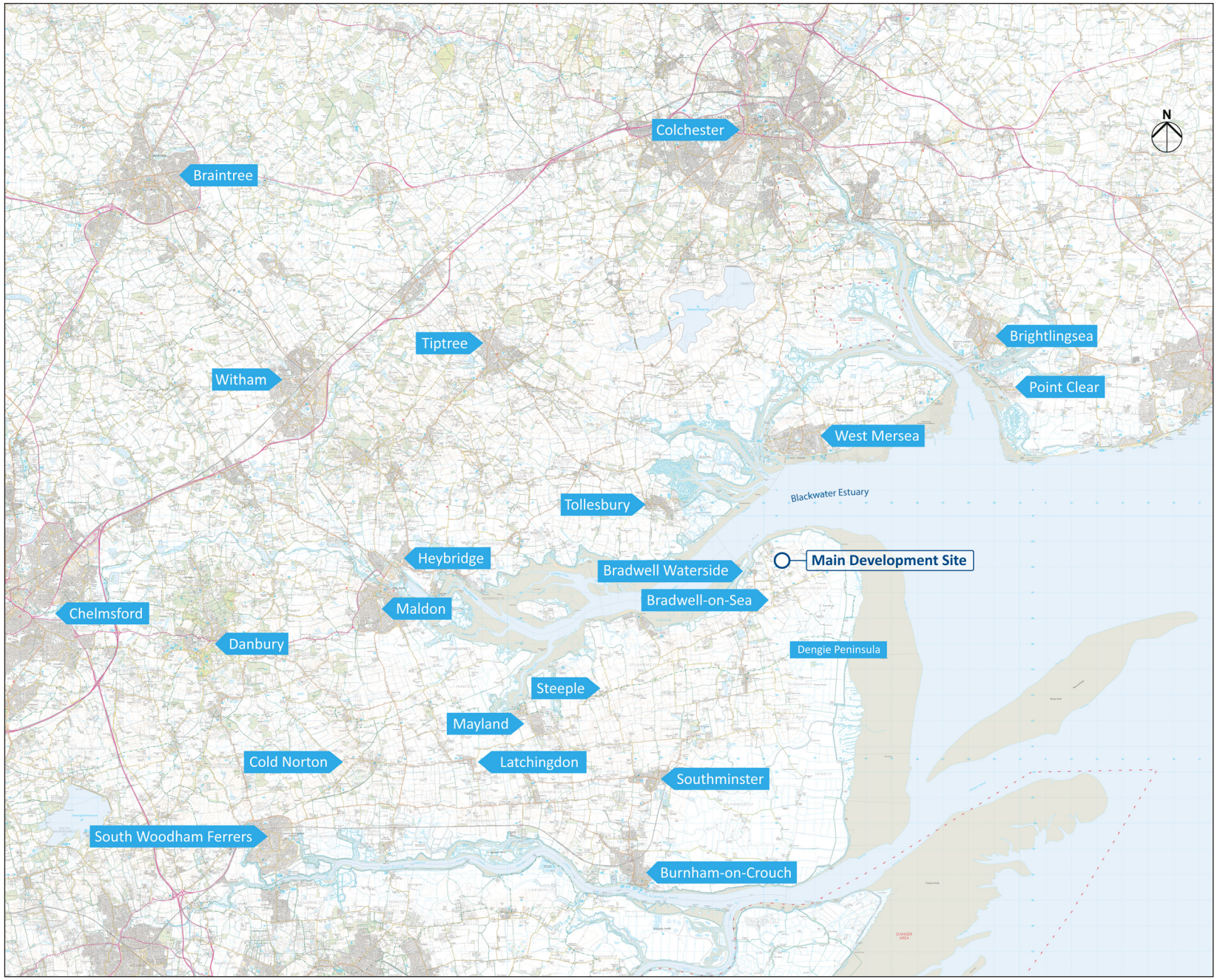
2.6.4 The existing Bradwell power station closed in 2002 and is being decommissioned by the Nuclear Decommissioning Authority (NDA). The facility has been in 'Care and Maintenance' since 2018.

2.6.5 The Dengie Peninsula is formed by the River Blackwater Estuary to the north and River Crouch to the south. The entire coastal fringes, as well as large parts of the low-lying Dengie Peninsula, are covered by international nature designations, including the Essex Estuaries Special Area of Conservation (SAC), the Dengie (Mid-Essex Coast Phase 1) Special Protection Area (SPA), and Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar site. Parts of the Estuary are designated as Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR) and most recently, a Marine Conservation Zone.

2.6.6 The Dengie Peninsula sits within a major estuarine embayment, as a partially enclosed waterbody that opens out to the Blackwater Estuary. The Estuary is popular for sailing, with numerous marinas and sailing clubs along its coast, including at Bradwell Waterside immediately to the west of the main site. The Peninsula also hosts a number of holiday parks and caravan sites.

2.6.7 On the opposite side of the estuary from the main development site lies Mersea Island and the town of West Mersea. Further to the west is Tollesbury, other settlements to the east include East Mersea and, further afield, Brightlingsea and Point Clear.

Figure 2.2 - Location of the main development site



2.6.8 There are a number of designated heritage assets within the surrounding area of the Site, most notably the Grade I listed Chapel of St Peter on the Wall and the scheduled Saxon Shore Fort. The nearby Bradwell-on-Sea Conservation Area also contains the Grade II* listed Church of St Thomas.

2.6.9 Section 3: Main Development Site contains a description of the site conditions and key environmental constraints of the main development site and explains how these have informed the design process to develop indicative masterplans for the permanent and temporary development needed for the Bradwell B Project.

Power station permanent development

2.6.10 The power station permanent development within the main development site would comprise the two UK HPR1000 nuclear reactors, comprising the reactor buildings and associated buildings (the 'Nuclear Island'), and turbine halls and electrical buildings (the 'Conventional Island'), located alongside plant facilities for operational maintenance (the 'Balance of Plant').

2.6.11 The permanent development would also include cooling water infrastructure, fuel and waste storage facilities, a beach landing facility, highway infrastructure (including access roads, internal roads and car parking), security fencing and lighting, and environmental enhancement and mitigation informed by environmental studies. The power station would also be supported by the necessary office provisions, welfare facilities, and security and emergency response facilities (some of which may be located off-site).

2.6.12 Section 3: Main Development Site describes the permanent components of the power station in further detail, together with an explanation of the design evolution of the various components and an outline of the key effects on the local area that will be taken into account as the development of the design progresses.

2.6.13 Some limited, but important, permanent facilities will also be required off-site for the safe operation of the power station, for example, some security and emergency response facilities. We have included information on the locational requirements for these elements in Section 3: Main Development Site.

Temporary construction facilities

2.6.14 Temporary land use and development on the main development site is required for construction purposes and will remain for around the length of the construction period. These temporary provisions would include site access facilities, stockpiling structures, beach landing facilities, contractor working areas, storage areas, wastewater facilities, marine works area, together with utilities, roads, fencing, lighting and security measures. Landscape planting and environmental mitigation would also be provided in relation to the temporary construction works.

2.6.15 Section 3: Main Development Site provides a more detailed description of the temporary construction facilities associated with the power station and explains the approach to construction and phasing, including a description of construction activities and facilities accompanied by our proposed indicative construction masterplan.

Associated development

2.6.16 To support the construction of the power station, we will require some additional facilities both on and off site called 'associated development'. This would include temporary worker accommodation, park and ride facilities, freight management facilities and road and junction improvements. The need for associated development and the available options, subject to this consultation, are contained in Section 4: Traffic and Transport and Section 5: Jobs and People.

2.6.17 At this stage in the development of the Project, we have been working hard to understand the existing road network in order to define broad locations, size and number of park and ride and logistics facilities. Section 4: Traffic and Transport explains the areas of search that we currently anticipate such facilities would be located in and the criteria that we intend to apply in defining them further.

2.6.18 We are also working to define the precise extent of road improvements necessary and will be considering a range of interventions from minor road widening to by-passes. Section 4: Traffic and Transport explains which areas of the road network where we are considering improvements to and the range of options currently being considered.

2.6.19 We are considering options for temporary worker accommodation on sites close to the main development site. Further information on these options and rationale for their location is provided in Section 5: Jobs and People.

2.7. Project Stages

2.7.1 There are four main stages in the lifetime of our Power Station. These are:

1: Enabling Works: The series of works that are needed to prepare the main development site for the construction of the power station. It includes:

- Various site clearance works, site excavation, site preparation and site levelling works.
- Construction compounds would be required to support these activities, with the remainder of the construction compounds needed during the Main Construction stage (below).
- Highway works, beach landing works and environmental site preparation activities.

2: Main Construction: The main construction activities would include:

- Final levelling and deep excavations to form working platforms for construction of the main foundations of the power station;
- Main civil construction activities (including concrete foundations, building sub-structure and super-structure, internal roads, mechanical and electrical installation) and construction and non-active commissioning of each generating unit;
- Complete construction and active commissioning of each generating unit and site finishing works, and later reinstatement of temporary construction areas;
- Construction and operation of the associated developments required temporarily to support the Main Construction.

3: Operation: The operation of the power station plant and systems for the generation of electricity, including the cyclical abstraction and discharge of water; and

4: Decommissioning: At the end of electricity generation at Bradwell B power station, the site would be decommissioned. The process of decommissioning would be divided into a number of activities leading to the clearance and delicensed state and ultimately its release for re-use. This will be subject to a separate consent at the relevant time.

2.7.2 At this early stage of the development and consultation process, it is not possible to say with certainty when generation of electricity would start. Should we receive the necessary consents, following site preparation we expect that construction of the Power Station will take around 9-12 years (including restoration of those parts of the main development site not required for the operational phase). This can vary as a result of reactor design and specific site features - every nuclear power station project is different.

2.7.3 We will keep stakeholders and local residents informed of the progress of the Bradwell B Project and its timeline as we move forward.

MAIN DEVELOPMENT SITE

3.1 Introduction

3.2 Site Description and Context

3.3 Permanent Development Proposals

3.4 Other Environmental Considerations Affecting Permanent Development

3.5 Landscape Strategy

3.6 Proposed Design Principles for Bradwell B

3.7 Construction Phase Proposals

3.8 Earthworks Strategy

3.9 Marine Transport Options

3.10 Summary and Next Steps

3.1. Introduction

3.1.1 This Section describes our initial proposals and options for the Bradwell B power station.

3.1.2 Figure 3.1 shows the main development site which comprises land next to the existing Bradwell power station which would be occupied by the Bradwell B power station (permanent development), as well as the land required temporarily in the vicinity to construct the power station (temporary construction area) which would be restored afterwards. This area does not include the temporary workers' accommodation or other facilities located away from the main development site area, such as road improvements and park and ride facilities. Figure 3.1 also shows an indicative marine zone within which marine infrastructure will be located.

Power Station Permanent Development: this is contained within the main development site and consists of the elements that would make up the operational power station, including the reactors, turbine halls, substation connection, site access, office and welfare facilities and sea defences.

Temporary construction area: this is the additional land, within the main development site, that would be required temporarily to construct the Bradwell B power station. As it would not be required on a permanent basis, this land would be restored once the power station has been built.

Indicative marine construction area: a zone extending into the Blackwater Estuary within which marine infrastructure such as cooling water infrastructure would be constructed. The marine infrastructure would only occupy a small part of this area.

3.1.3 The relationship of the main development site with the NPS site boundary (as introduced in Section 2) is shown on Figure 3.1.

3.1.4 This Section starts with a summary of the environmental context of the main development site and its surroundings, highlighting the key environmental considerations to take into account in our design development work. We would like to know if you agree with our description of the site context, or if there are additional environmental considerations or information that you think we should be taking into account.

3.1.5 We then provide a brief description of some of the design processes that we have followed in developing our initial proposals for the permanent development. These have been related to our strategy for cooling the steam leaving the turbines and initial master planning of Bradwell B (set out later in this Section at Figure 3.21). We have given particular consideration to our cooling strategy in view of the local sensitivities around the marine environment.

3.1.6 The masterplan shows where the power station would be located within the main development site, and the indicative layout of some of its significant buildings and structures, such as the reactors, turbine halls and cooling infrastructure.

3.1.7 The construction of the Bradwell B power station would be a significant undertaking over a number of years. Our indicative construction masterplan (shown later in this Section at Figure 3.31) is presented which shows the extent of the temporary construction area and indicates how different parts of the site would be used. Not all of the land required for construction would be needed once the power station has been built. This surplus land would be restored, and we invite feedback on our proposed approach, set out at section 3.4 of this Section.

3.1.8 We then provide a brief description of some of the design processes that we have followed in developing our initial proposals for the permanent development. These have been related to our strategy for cooling the steam leaving the turbines and initial master planning of Bradwell B (set out later in this Section at Figure 3.21). We have given particular consideration to our cooling strategy in view of the local sensitivities around the marine environment.

3.1.9 The masterplan shows where the power station would be located within the main development site, and the indicative layout of some of its significant buildings and structures, such as the reactors, turbine halls and cooling infrastructure.

Figure 3.1 - Indicative Bradwell B main development site

3.1.10 The construction of the Bradwell B power station would be a significant undertaking over a number of years. Our indicative construction masterplan (shown later in this Section at Figure 3.31) is presented which shows the extent of the temporary construction area and indicates how different parts of the site would be used. Not all of the land required for construction would be needed once the power station has been built. This surplus land would be restored, and we invite feedback on our proposed approach, set out at section 3.4.

3.1.11 We will need to transport significant quantities of construction materials to site to construct the power station. We are committed to use of sustainable transport modes as far as practicable to help reduce HGV traffic on local roads. In addition, some large items called Abnormal Indivisible Loads (AILs) must be transported by sea because they are too large or heavy to transport by road. We believe that sea transport has the potential to play a major role in our freight strategy and we have identified a number of options and presented information on each. We would welcome your feedback on these options. Further information on our transport strategy is provided in Section 4 of this document.

3.2. Site Description and Context

3.2.1 This section describes the site location and its geographical and environmental context including reference to the following aspects:

- Site Location and Boundaries;
- Landscape and Seascape;
- Public Access and Recreation;
- Heritage and Archaeology;
- Ground Conditions and Flood Risk; and
- Terrestrial, Coastal and Marine Ecology.

Site location and boundaries

3.2.2 Figure 3.1 shows the indicative main development site boundary and the indicative zone for marine infrastructure.

3.2.3 Also shown on Figure 3.1 is the NPS site boundary for Bradwell as set out in the NPS EN-6 (see Section 2). The NPS site boundary represents the land within which the nuclear and conventional islands, safety critical systems and associated nuclear waste facilities - including the spent fuel interim store - should be located unless flexibility can be justified.

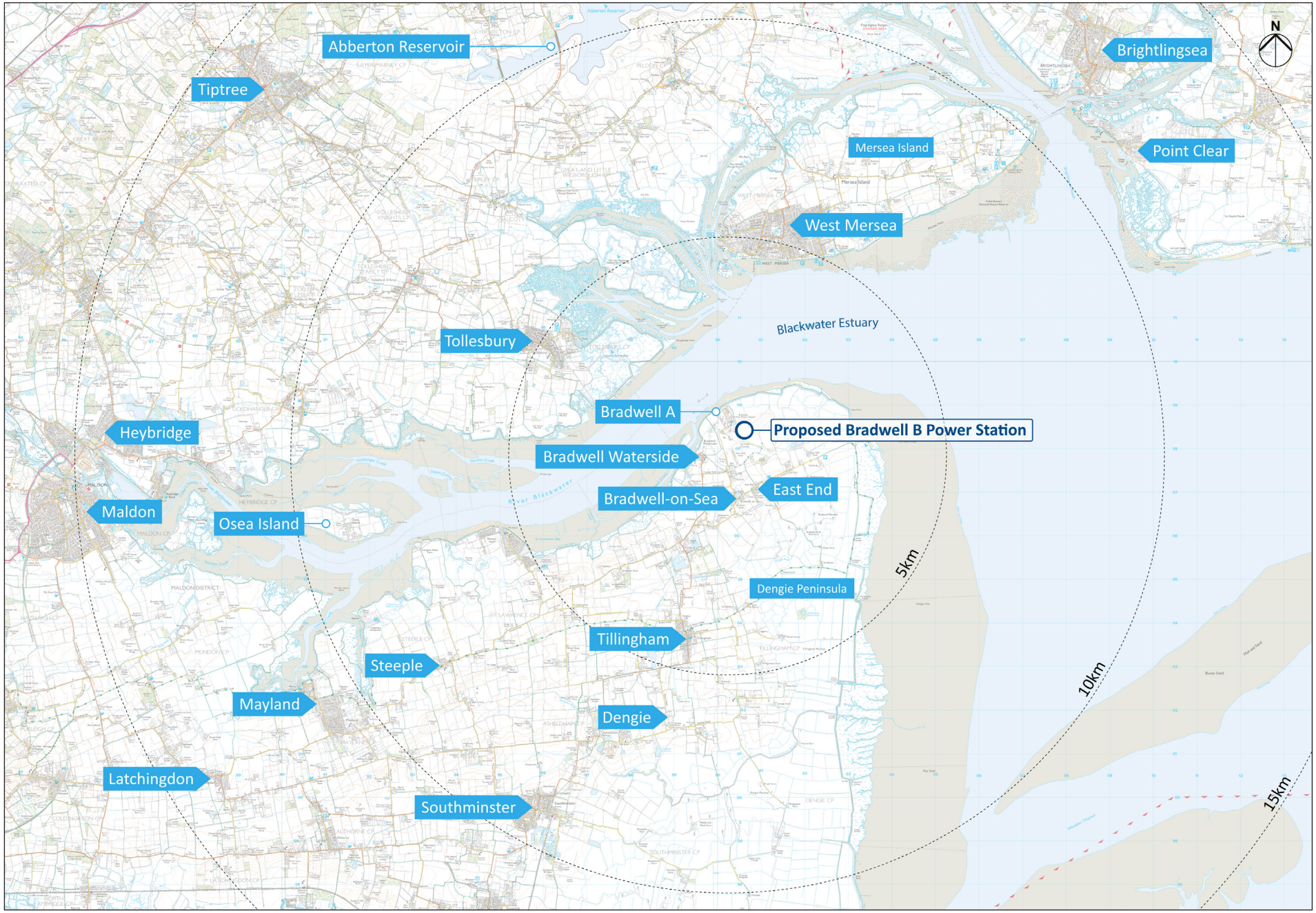
3.2.4 A small number of residential properties and a farmstead (East Hall Farm) are located within the main development site boundary. This includes the former RAF Bradwell Bay control tower which has been converted into residential use. At this stage, we anticipate that East Hall Farm would be retained during the development of the Bradwell B Project, but all other residential properties, the majority of which are in our ownership, would need to be vacated and demolished.

3.2.5 The Christian community of Othona, Essex is located to the east of the main development site. Vehicular access to the community is by means of a private road off East Hall Road via East Hall Farm. This access route would be maintained throughout construction of the power station, subject to potential minor realignment. See Section 3.4 for further details.

3.2.6 There is a residential care home adjacent to the site's south-western boundary and a number of residential properties abut the site along East End Road. Some of these look across the site with little or no screening. Further to the east, along East End Road, is a public house (The Cricketer's) and a caravan park which are located adjacent to the main development site boundary.

3.2.7 Information on our approach to protecting residential amenity as part of our landscape strategy is provided in Section 4 of this document.

Figure 3.2 - Main development site location



Landscape and seascape

3.2.8 The site is located within the 'Greater Thames Estuary' National Character Area. This is a predominantly flat, low-lying coastal landscape where extensive open spaces are dominated by the sky.

3.2.9 The landscape characteristics include large open and mostly arable fields. Where present, hedgerows tend to be small and non-continuous, and provide little screening. A general absence of trees further contributes to the sense of openness, affording panoramic views across the marsh and out to sea.

3.2.10 Within the Dengie Peninsula there are three landscape character types, as illustrated in Figure 3.4. The landscape/seascape boundary of the 'Estuarine Marsh and Mudflats' have a strong influence on the local character. Landward of the flood embankment this grades into 'Drained Estuarine Marsh' which comprises low lying arable fields, intersected by linear dykes which reflect older natural drainage patterns and define the field boundaries.

3.2.11 Figure 3.3 shows examples from within the main development site of the graded coastal landscape from Estuarine Marsh to Coastal Farmland.

Figure 3.3 - Grand Coastal Landscape from Estuarine Marsh to Coastal Farmland

Figure 3.4 - Landscape Character Areas

3.2.12 The surrounding seascape lies within the Essex and South Suffolk Estuaries and Coastal Waters Marine Character Area. This is characterised by an intricate pattern of estuaries, rivers, branching tributaries, shallow creeks, extensive mudflats, low-lying islands, tidal salt marshes, and open water as illustrated by Figure 3.5 below. This is an aerial view across the Blackwater Estuary from Maldon that is situated at the landward extent of the estuary.

Figure 3.5 - Maldon and the Blackwater Estuary

3.2.13 Our vision is for the design of Bradwell B to take account of its distinctive local landscape and seascape setting as far as possible, whilst also recognising that existing energy infrastructure dominates the skyline from a number of views. This infrastructure includes the Bradwell A power station and its associated overhead transmission lines, as well more recent wind farm development, the nearest one being Bradwell on-shore wind farm approximately 900m south of East End Road. Figure 3.6 is a view of this wind farm from the Chapel of St Peter on the Wall to the east of the site.

Figure 3.6 - View of Bradwell on-shore wind farm

Public access and recreation

3.2.14 Figure 3.7 shows public rights of way (PRoW), permitted routes and other key recreational resources in the vicinity of the main development site.

3.2.15 There is a footpath (PRoW 241-15) along the top of the flood embankment that wraps around the main development site; this footpath is part the local Saltmarsh Coast Trail as well as the Burnham-on-Crouch to Maldon section of the proposed England Coast Path National Trail (ECP). We recognise that this is a key constraint and intend to keep it open to the public as much as possible while Bradwell B is being built. However, it may need to be temporarily closed and diverted during some construction activities for safety reasons. We would work with stakeholders to develop a diversion route.

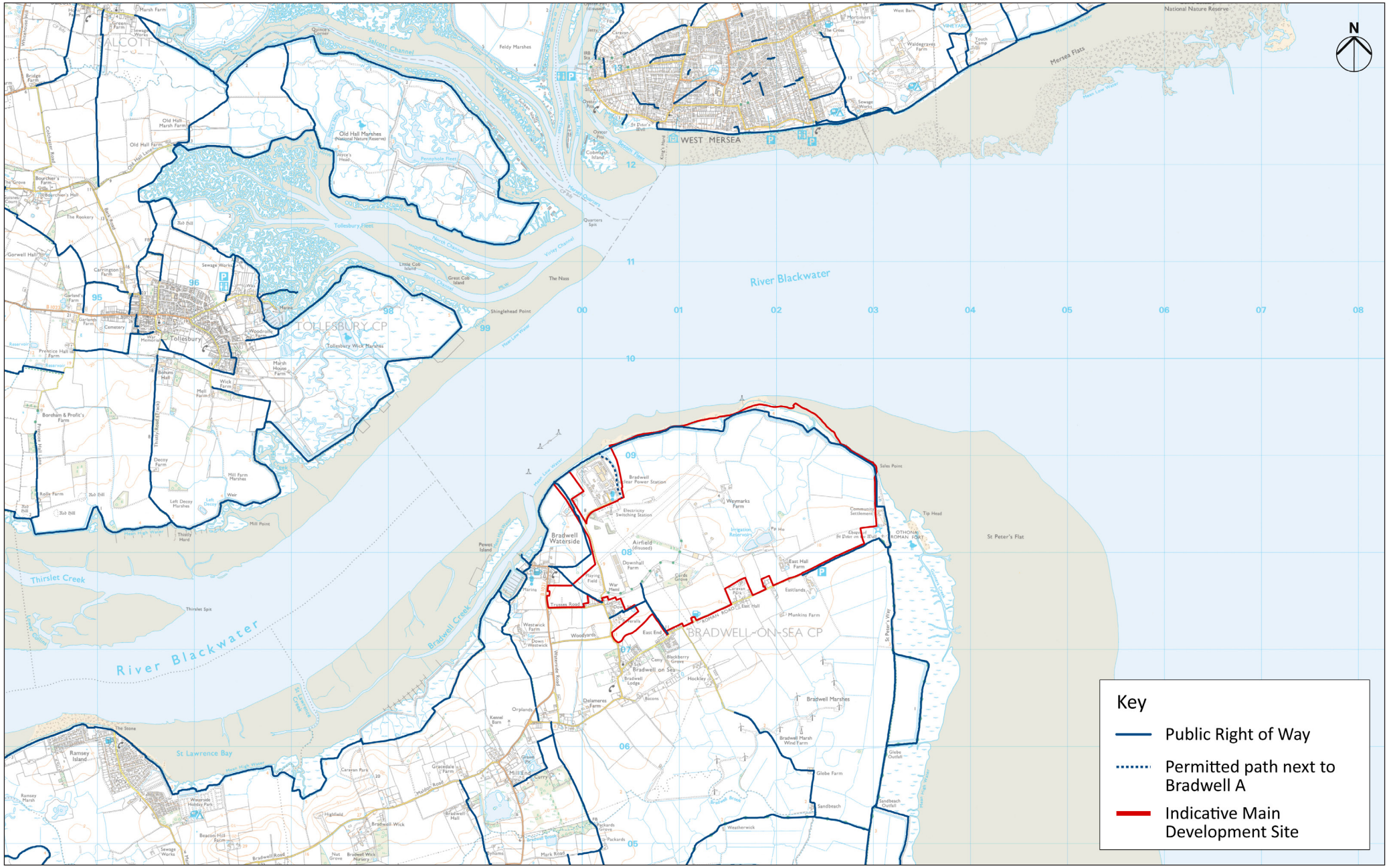
3.2.16 The figure also shows a number of other public rights of way within the main development site and its vicinity. All existing public rights of way that exist within the main development site apart from PRoW 241-15 as noted above would need to be temporarily stopped up and diverted or extinguished. We may also need to divert or extinguish footpaths to the immediate west of the main development site, depending upon the design of the site access and temporary workers accommodation that would be located in this area. Again, we would work with stakeholders to develop appropriate footpath diversions.

3.2.17 There is a permitted path from Bradwell A car park to the Sea Wall at Bradwell Beach (also known as Bradwell Nature Trail). We do not envisage any need to affect public access or use of this path, which we understand is well used.

3.2.18 There is open access to a number of small beaches seaward of the main development site via the flood embankment footpath (PRoW 241-15). However, the nearest designated bathing waters are located across the estuary from the proposed main development site, at West Mersea.

3.2.19 The Blackwater Estuary is very popular for watersports, especially sailing. There are marinas at Bradwell Waterside to the west of the main development site, and at West Mersea and Tollesbury across the estuary. Our proposals would need to minimise impact on the navigation use of Bradwell marina as well as protecting the amenity of recreational users of the Blackwater Estuary as far as practicable.

Figure 3.7 - Public Rights of Way



Historic environment

3.2.20 There are a large number of designated heritage assets near the site (see Figure 3.8 and 3.9), as well as further afield within the surrounding landscape. This reflects the high historical interest associated with the Dengie Peninsula.

3.2.21 Perhaps the most significant in the context of the main development site are the Saxon Chapel of St. Peter-on-the-Wall that was reputedly built by St. Cedd in AD 654 on the western wall of the former late Roman Shore Fort of Othona. The Chapel of St Peter-on-the-Wall is a Grade I listed building and the fort is a Scheduled Monument. We recognise the importance of these assets, and the need to ensure that impacts on their setting are minimised.

3.2.22 Situated within the main development site are four Grade II listed buildings at East Hall Farm, comprising the farmhouse and the associated stable ranges, byres and barns to the west. These designated assets would be retained during the development. We would also aim to protect and enhance their setting following construction.

3.2.23 To the south-west of the main development site is the Bradwell-on-Sea Conservation Area, which is centred on the historic core of the village around the Grade II* listed Church of St Thomas. In addition to the parish church, the conservation area contains numerous Grade II listed buildings. Views out of the conservation area towards the main development site are constrained by planting and more modern development outwith the conservation area along East End Road, although some views are possible, particularly along High Street.

3.2.24 There are further Grade II listed buildings to the west at Bradwell Waterside, Trusses Road and Down Westwick. Views to the main development site from these buildings are screened to varying degrees by planting. There are further Grade II listed buildings along East End Road, including Cricketer's Cottage, three listed buildings at Munkin's Farm and Linnet's Cottage.

3.2.25 The West Mersea Conservation Area is located on the opposite side of the Blackwater Estuary, approximately 3km north of the site. This conservation area is focused on the marina and moorings along the mudflats on the north side of the estuary and there are clear views southwards across the estuary. We will take account of views from here in Bradwell B's design development.

3.2.26 Given its setting, the main development site has the potential to contain unrecorded archaeology. The more elevated land may have provided favourable conditions for permanent settlement. There are several cropmarks suggestive of pits, ditches and possible enclosures recorded by the National Mapping Programme within the site, although it is difficult to identify coherent archaeological features based on this existing information.

3.2.27 We do not consider that archaeology, if present, would affect the siting or design of Bradwell B, although detailed archaeological investigations will need to be undertaken to establish occurrence and develop appropriate mitigation in consultation with stakeholders, such as preservation by record.

Figure 3.8 - Designated Heritage Assets - Wider context

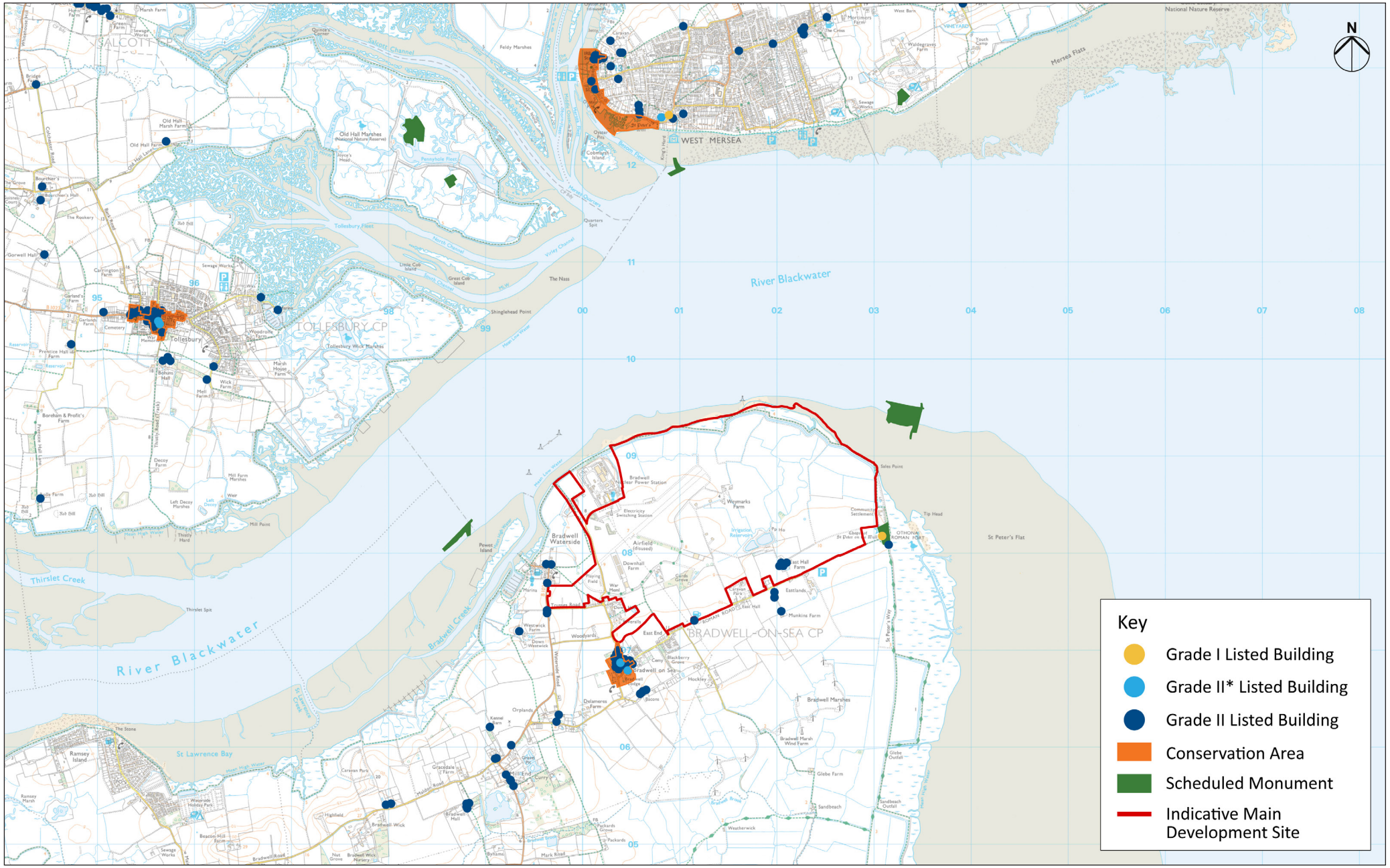
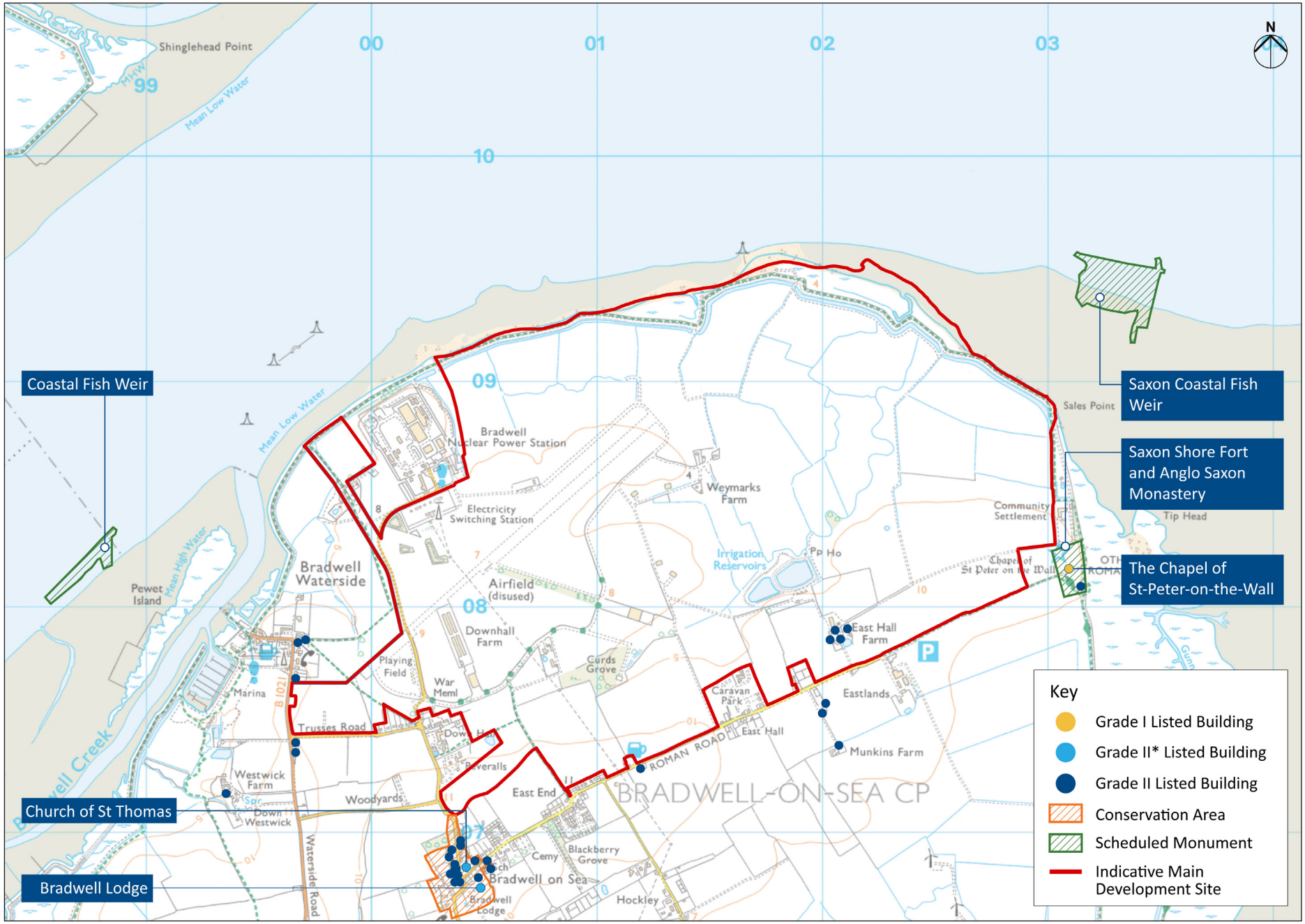


Figure 3.9 - Designated Heritage Assets - Main development site



3.2.28 During World War II part of the main development site was used as an airfield, known as RAF Bradwell Bay. Some of the former runways and buildings are still present, including the former watch office (control tower) and attached squadron headquarters, blister hangars and several pillboxes. Figure 3.10 is an aerial view of one of the runways which is clearly visible. The significance of these assets will need to be assessed and impacts would mitigated as appropriate. Of particular note is the RAF Bradwell B War Memorial which would be retained. We will carefully consider how we could enhance the setting of the memorial in consultation with stakeholders.

Figure 3.10 - Bradwell Bay former runways

Ground conditions and flood risk

3.2.29 The main development site is covered by a very thick layer of London Clay. This is underlain by sands and clays which in turn, are underlain by Chalk. On the more elevated land the London Clay is overlain by River Terrace Deposits (sand and gravel), which grade into clay and silt on lower ground.

3.2.30 The London Clay is classified as a non-aquifer so contains little or no groundwater. The River Terrace Deposits are 'secondary undifferentiated aquifers', which therefore have the potential to contain some groundwater.

3.2.31 Ground investigations that we commissioned across the site in 2018 showed no evidence of any contamination of the ground or groundwater within the main development site. The ground and groundwater conditions are such that there is limited, if any, potential for contaminant migration onto the site from adjacent land.

3.2.32 Figure 3.11 is an extract of the Environment Agency's published 'Flood Map for Planning', centred on the main development site, with the line of the existing sea defences, and the existing reservoirs, added for illustration. This shows the extent of Flood Zones 2 and 3, which represent the areas most at risk from tidal flooding, noting that the site benefits from flood defences.

3.2.33 Although the main development site benefits from the existing flood embankment, this would not be sufficient to protect the Bradwell B power station from flooding over the full lifetime of the plant, taking account of climate change. Therefore the site would need to be raised and new, larger sea defences constructed. Further information on our proposed approach are provided in Section 3.3.

3.2.34 Weymark's River, which is classified by the Environment Agency as a 'Main River', is the primary drainage route through the site, connecting a network of land drains to the borrow dyke. The borrow dyke drains to the foreshore in from of the main development site via a buried culvert at Weymark's Sluice.

3.2.35 Our proposals would retain Weymark's River as the primary drainage feature within the site, although a section of the river would need to be culverted on a temporary basis to provide access for construction vehicles while Bradwell B is being built. All of the other land drains within the main development site, which are classified as 'Ordinary Watercourses', would be backfilled. See Section 3.7 for further information on our proposed construction masterplan.

3.2.36 In terms of water resources, we have been in discussions with the local water utility company, Essex and Suffolk Water, which has confirmed that there are sufficient planned water resources available to meet the Bradwell B Project's peak requirements for mains water during construction and operation. We will continue to engage with Essex and Suffolk Water as our proposals develop.

Figure 3.11 - Flood zone map for planning

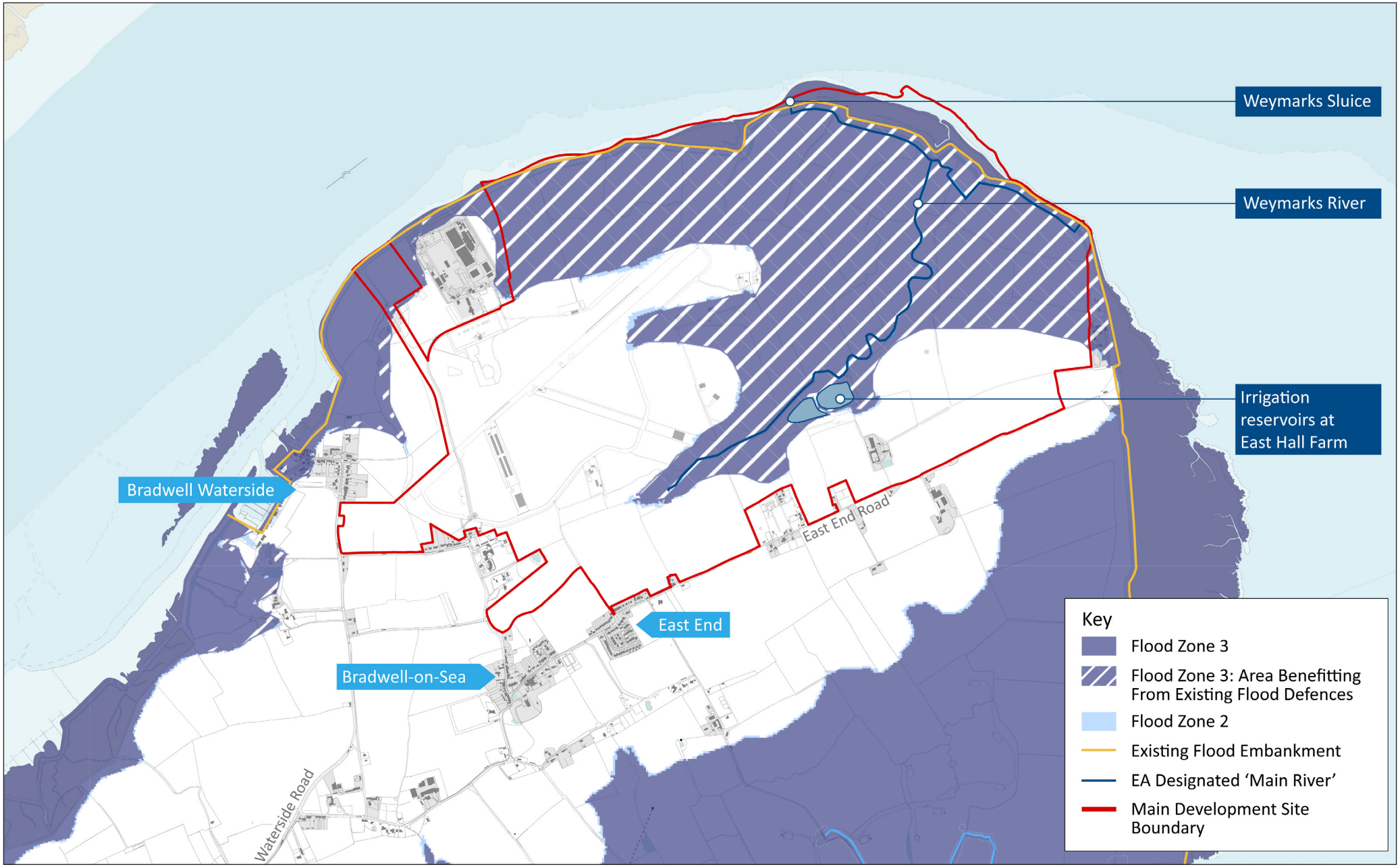


Figure 3.12 - Existing flood embankment and associated borrow dyke

Terrestrial ecology

3.2.37 Perhaps the main terrestrial interest associated with the main development site is that some of the fields provide foraging habitat for wintering dark-bellied brent geese, which have historically been recorded there in large numbers. The fields may also support other wintering waders and wildfowl. Surveys are underway to establish presence, abundance and distribution within the main development site and on surrounding land. We will use this information to assess the potential loss of available foraging resource during the construction and operation of the Bradwell B power station and will engage with stakeholders as we assess impacts and develop our mitigation proposals.

3.2.38 The arable fields may also support farmland bird species of conservation importance, such as turtle dove, grey partridge and skylark. As above, this will be confirmed in surveys and appropriate mitigation would be provided.

3.2.39 The borrow dyke is designated as a Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site. We therefore intend to retain and protect this feature.

3.2.40 The borrow dyke and other ditches within the main development site may support water voles, which are a protected species. Surveys will be undertaken to establish their distribution and appropriate mitigation will be provided. This is likely to involve translocation to replacement ditch habitat.

3.2.41 Although the main development site is in large part intensively farmed, the field margins and areas of more established planting may also support other protected species including bats, badger, amphibians and reptiles. Comprehensive surveys will be undertaken to identify all habitats and species of ecological interest within the main development site and on surrounding land, which we will take account of in future design development.

Coastal and marine ecology

3.2.42 We are aware that the Blackwater Estuary, as well as the Colne Estuary to the north and the Crouch and Roach Estuaries to the south, are of very high ecological importance, and also support important commercial fisheries. Collectively, the estuaries are protected by a combination of nature conservation designations at a national, European and international level. The designations applying to the estuaries complex are shown in Figure 3.13.

3.2.43 Our vision is to design, build and operate Bradwell B in a manner that minimises impacts on the marine environment. This is reflected in our proposed approach to cooling water strategy explained in Section 3.3, as well as in our preferred options for marine transport outlined in Section 3.9.

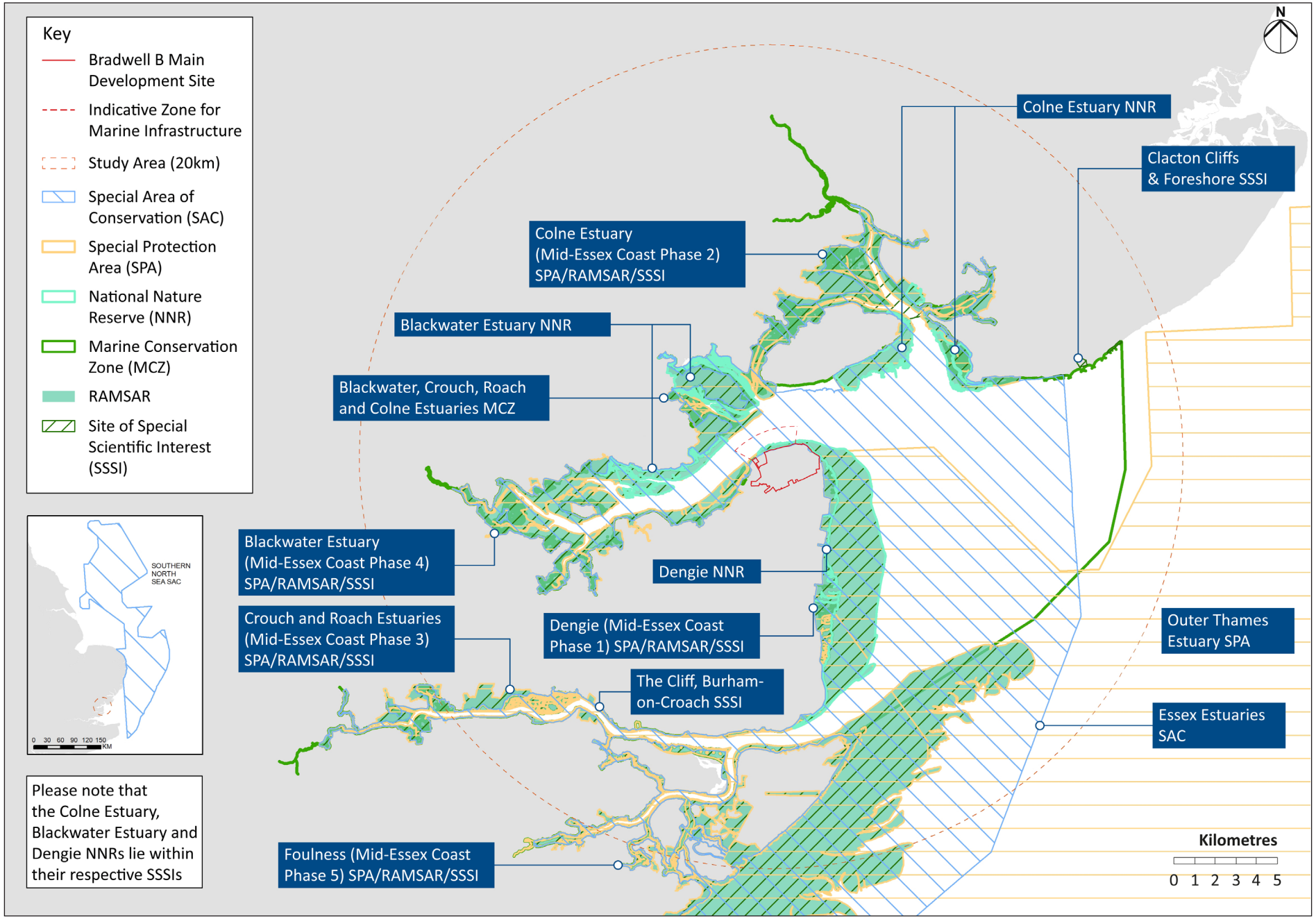
3.2.44 We invite feedback on our interpretation of the key ecological constraints associated with the coastal and marine environment as summarised below. These are the aspects that we intend to focus on in developing our proposals.

3.2.45 The extensive mudflats and saltmarsh of the estuary provide rich foraging for tens of thousands of wintering waterbirds as well as important breeding habitat. The Blackwater Estuary Special Protection Area (SPA), Ramsar, Site of Special Scientific Interest (SSSI) and National Nature Reserve (NNR) are designated for breeding little terns, ringed plover and pochard. The important wintering species include dark-bellied brent geese, grey plover, dunlin and black-tailed godwit. The Dengie SPA, Ramsar, SSSI and NNR are designated for their wintering populations of dark-bellied brent geese, grey plover and knot, and for their nationally important populations of dunlin, black-tailed godwit, bar-tailed godwit and hen harrier. The Outer Thames Estuary SPA is designated to protect the largest population of wintering red throated diver in the UK, together with breeding common and little tern.

Environmental designations within and close to the main development site include:

- Blackwater Estuary SSSI;
- Dengie SSSI;
- Dengie NNR;
- Blackwater, Crouch, Roach and Colne Estuaries (MCZ);
- Blackwater Estuary (Mid Essex Coast Phase 4) Ramsar;
- Dengie (Mid-Essex Coast Phase 1) Ramsar;
- Essex Estuaries SAC;
- Mid-Essex Coast SPA complex;
- Outer Thames Estuary SPA; and
- Southern North Sea SAC.

Figure 3.13 - Key conservation designations within 20km



3.2.46 Detailed studies will be required to ensure that our proposals will minimise disturbance to these bird species, especially during construction activities. During the operational phase of the development, we will need to demonstrate that our proposals do not affect birds indirectly, for example by affecting the abundance, distribution or availability of their prey species.

3.2.47 The shoreline within and adjacent to the main development site contains potentially suitable habitat for some of the breeding bird species that are qualifying features of the Blackwater Estuary (Mid-Essex Coast Phase 4) SPA/Ramsar. We are aware of efforts being made to encourage Little Tern to breed on the shingle at Essex Wildlife Trust's Cockle Spit nature reserve to the east of the main development site, as well as at other reserves on the opposite side of the estuary. Recreational disturbance at these reserves is already an issue and it will be important for us to consider what additional impact our development could have alongside other relevant plans such as the proposed England coast path. We will work with stakeholders to assess potential impacts from Bradwell B and develop appropriate mitigation measures.

3.2.48 The Blackwater, Crouch, Roach and Colne Estuaries Marine Conservation Zone was designated to recover native oysters and native oyster beds. Oyster beds also provide important habitat for other marine wildlife as well as delivering important ecosystem services. We have been working closely with stakeholders including Environment Agency, MMO and Natural England to understand the current distribution of native oysters within the estuaries and are familiar with the current work being carried out by the Essex Native Oyster Restoration Initiative (ENORI) to develop a self-sustaining population of native oysters within the estuaries' complex. Native oysters are a key consideration in design of our cooling water system.

3.2.49 In addition, the estuary and nearby waters further offshore support a diversity of finfish. Blackwater Herring, which is a key specie,spawn at Eagle bank at the mouth of the estuary, and the estuary's shallow, turbid waters provide nursery habitat for a variety of juvenile fish.

3.2.50 Key migratory fish species of conservation importance include European eel and cucumber smelt. River lamprey may also be present, although there is no evidence that the estuary supports a breeding population of this species.

3.2.51 Impacts on fisheries, including migratory fish, are also key considerations in the design of cooling infrastructure and will require detailed investigation.

3.2.52 We are in the process of developing an 'Evidence Plan' with stakeholders for the shadow Habitats Regulations Assessment (HRA) to agree all 'impact pathways' that have the potential to affect European and internationally designated ecological features. As part of this process, we will also be considering additional sites located outside 20km such as the Southern North Sea SAC. In addition, we will work with stakeholders to identify all 'functionally linked habitat' to ensure that all potential impact pathways are fully assessed.

We believe that these are the key environmental considerations that should be taken into account as we develop our proposals for the Bradwell B Project but we would like to know if you agree with this interpretation and if there are any other matters we should consider.

3.3. Permanent Development Proposals

3.3.1 This section outlines what the power station would consist of and provides information on the design process we have followed so far to develop our initial proposals.

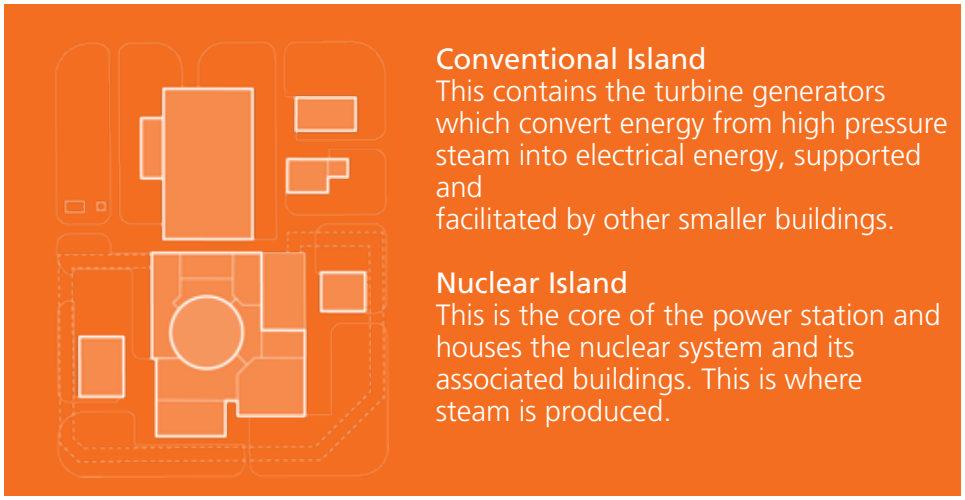
Main components of Bradwell B

3.3.2 The Bradwell B power station would comprise a number of elements that would form the 'permanent development'. The main elements would be as follows:

- Two UK HPR1000 reactor units each comprising a reactor containment building with its associated buildings (the 'nuclear island'), a turbine hall with electrical buildings (the 'conventional island') and associated balance of plant. These units are often referred to as the 'main power blocks';
- Additional 'Balance of Plant' facilities and equipment that facilitate the operation of the power station. Many of these buildings and structures are similar to those that would be found on a gas or coal fired power station;
- Cooling water infrastructure including forebay, pump houses, water treatment and cooling plant, plus cooling water tunnels extending out from the power station into the sea to abstract and discharge cooling water;
- Power transmission infrastructure including a connection to a new 400kV substation to be provided by National Grid;
- Fuel and waste storage facilities, including interim storage for nuclear waste and spent fuel;
- Offices, welfare facilities, security and emergency response facilities (some of the latter may also be located off-site); and
- Security facilities including fencing and security checkpoints to control access to different areas of the site, as well as security lighting.

3.3.3 The UK 1000 reactor units are formed of two parts, illustrated below.

Figure 3.14 – Conventional and Nuclear islands



3.3.4 In addition to the permanent development works that form the functional power station, there would be associated permanent infrastructure supporting the operation and maintenance of the power station. This would include:

- Primary and secondary access roads, car parking (including contractor car parking for use during maintenance periods) and internal roads;
- Sea defences surrounding a raised platform to protect the power station from extreme flood events (taking into account future climate change);
- A marine transport facility for occasional use (once every 5 years or less on average) to bring large components to site by sea; and
- A restored landscape extending across all areas impacted by construction, incorporating elements which would contribute to environmental mitigation, compensation and enhancement.

3.3.5 There may also be a need to locate some additional power station facilities such as emergency response units off-site. These potential requirements are in the very early stages of consideration and we will therefore publish proposals for any such facilities in our Stage Two consultation in due course.

Reference design

3.3.6 The Bradwell B power station would use the same nuclear technology as another power station that is currently being built in China, known as 'Fangchenggang 3'. This power station is being used as the 'reference design' for Bradwell B and is currently undergoing assessment as part of the GDA process (see Section 2). Therefore, the design of these parts of our proposals is not within the scope of this consultation.

3.3.7 There is some flexibility in other aspects of the power station's design, which are applied at a site level, such as the cooling water infrastructure. There is also some flexibility in relation to the orientation of the nuclear and conventional islands and their location within the main development site, and the arrangement of other building groups such as balance of plant. These more flexible elements have formed the basis for our early design work.

Cooling water infrastructure

Direct versus indirect cooling

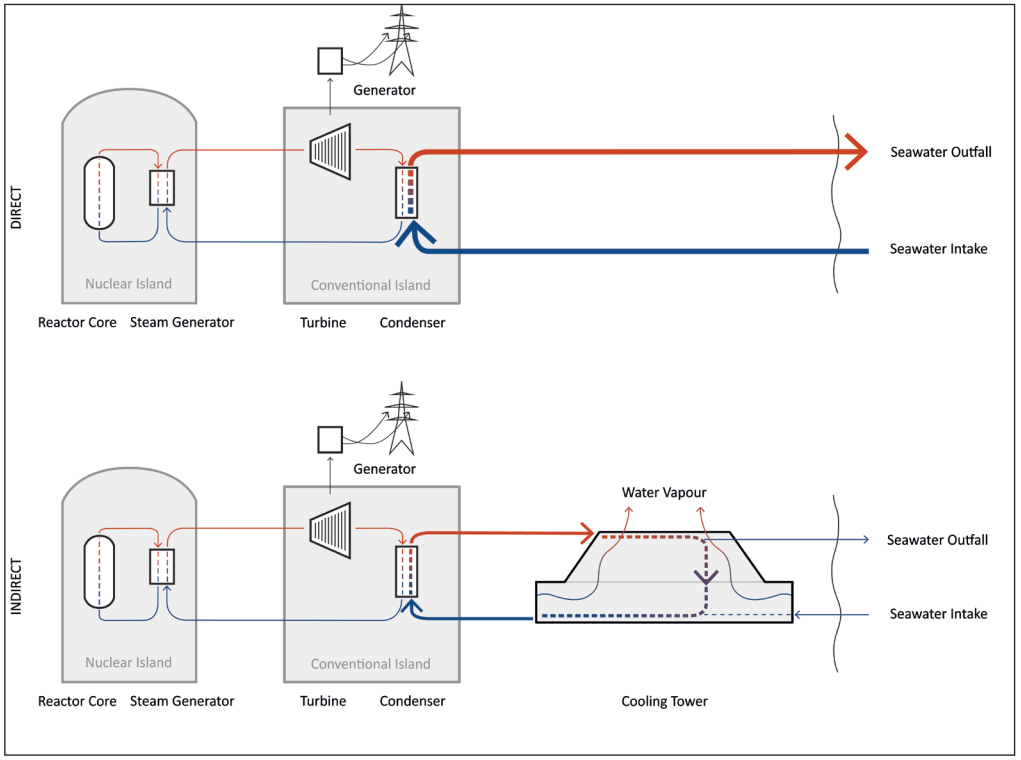
3.3.8 The heat energy from the reactors at the Bradwell B power station would be used to create steam, driving turbines to generate electrical power. This process requires a cooling system to condense the exhaust steam from the turbines.

3.3.9 The reference design (in common with most UK nuclear power stations) has a 'direct' cooling system in which water is abstracted from the sea, passed through the condensers and discharged straight back to sea. Significant volumes of sea water are abstracted and discharged as a result. The water returned to the sea is warmer, and contains low concentrations of chemicals that are added to prevent biofouling or to condition the water to make it suitable for use in the power station.

3.3.10 Where power stations have access to sufficiently deep water relatively close to the shore, such direct cooling water systems can usually be designed with minimal environmental impact. However in estuaries, the cooling capacity of the shallower water is more constrained. The alternative is to use 'indirect' cooling methods. In these methods, cooling water is re-circulated around the plant, losing heat to the atmosphere via evaporation in 'cooling towers'. In such indirect cooling systems, a much smaller volume of seawater abstraction is required. This is needed to replace evaporation losses from the cooling towers, and also to make up for a relatively small discharge from the system called a 'purge' that's carried out to prevent the build-up of salt.

3.3.11 Figure 3.15 below illustrates how direct and indirect cooling systems work.

Figure 3.15 - Direct (top) versus indirect (below) cooling water systems



3.3.12 Much smaller volumes of seawater need to be abstracted and discharged in an indirectly cooled system compared to a directly cooled system. We have estimated that direct cooling at Bradwell B would require a seawater abstraction of approximately 130 cubic metres per second (m3/s) with the same volume of discharge. Indirect cooling would require significantly less abstraction: approximately 9m3/s, with an even smaller discharge of approximately 7m3/s (the difference being accounted for by evaporation in the cooling towers). For context, an indirectly cooled discharge from Bradwell B would be less than a third of the former Bradwell power station's direct-cooled discharge.

3.3.13 Cooling water would be taken from and returned to the estuary though seabed structures known as intakes and outfalls. Cooling water intakes are designed to reduce the number of fish drawn in, but some would still enter the intakes. Many of these fish would be returned to the sea although not all would survive. Very small organisms such as fish eggs, fish larvae and shellfish larvae may pass through the cooling water system before being returned to the sea through the outfalls. Fish eggs, fish larvae, shellfish larvae and many fish species naturally experience high mortality rates, but additional losses caused by entering the cooling water intakes can be significant in some species and requires investigation. It is unlikely that oyster larvae drawn into the cooling intake would survive circulating through the system and therefore it is important that the cooling water intakes are positioned to minimise the amount of oyster larvae that could be drawn in. This is an example of how mitigation can be embedded in the design.

3.3.14 In view of the environmental sensitivity of the local marine environment, especially on account of the protected native oyster, we have assessed the environmental impact of a full range of cooling options. This included fully direct cooling (in which both reactors were assumed to be directly cooled), fully indirect cooling, and a combination of cooling options (in which one reactor was assumed to be directly cooled and the other indirectly cooled). Different cooling water intake and outfall locations were also considered.

3.3.15 The study benefitted from a series of technical discussions (workshops) with stakeholders such as the Environment Agency, Natural England, the Marine Management Organisation (MMO), Essex Wildlife Trust and representatives from the Essex Native Oyster Restoration Initiative (ENORI).

3.3.16 The study involved development of preliminary computer models to predict the dispersion of discharges from the outfall and the effects of abstraction.

3.3.17 Figure 3.16 shows the predicted extent of 'excess' sea water temperature (i.e. warming due to the cooling water discharge) at the sea bed that would be exceeded no more that 2% of the time over a year (approximately 1 week) for a directly cooled scenario with a 5km outfall (top) compared to indirect cooling (bottom). The zone of potential impact corresponds approximately with the 2oC contour. It can be seen that in the case of the directly cooled scenario (top), the 2oC contour extends across a considerable part of the estuary, whereas in the indirectly cooled scenario (bottom) it is confined to a very small area around the discharge point. This is a good indication of the lower potential impact of indirect cooling methods.

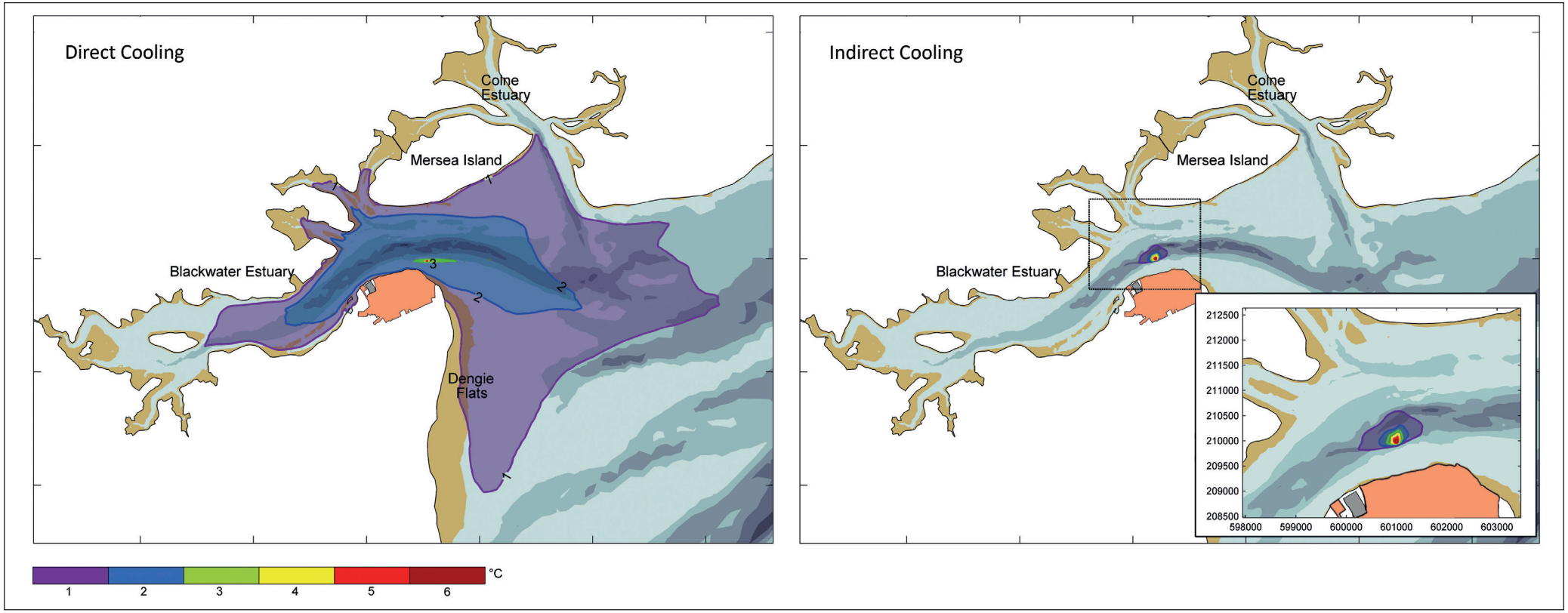
3.3.18 Our preliminary work indicates that direct cooling would likely require a long outfall tunnel (at least 5km in length) in order to reduce thermal impacts on native oysters and fish, including migratory fish, to acceptable levels. In addition, our work indicated that direct cooling would require two very long intake tunnels (at least 11.5km in length) to minimise impacts on oyster larvae. Indirect cooling would minimise both impacts because the volume of seawater that would be abstracted and discharged would be relatively small.

3.3.19 Consequently shorter intake and outfall tunnels would be required for indirect cooling; studies suggest tunnels up to 1km in length would be appropriate.

3.3.20 Taking account of the initial environmental analysis, we have decided not to proceed with direct cooling but to cool Bradwell B's condensers indirectly using cooling towers. This will minimise the marine environmental impact of operating Bradwell B compared to direct cooling.

3.3.21 As it is our duty to demonstrate the likelihood of any effects of our cooling proposals for Bradwell B on native oysters (or other wildlife), we are pleased to have funded an independent two-year post-doctorate research programme at the University of Essex to help build a scientific evidence base for use in detailed impact assessments.

Figure 3.16 - Thermal plume from direct cooling (top) versus indirect cooling (bottom) – 98%ile Excess temp, bed full year simulation



Type of cooling towers

3.3.22 We have considered a number of different types of cooling towers. We have discounted 'natural draft' cooling towers often associated with coal-fired power stations. This is because their massive scale and height (up to 180m) and highly visible plume of water vapour would give rise to unacceptable levels of visual impact. Traditional wet mechanical draft towers have also been discounted, because although smaller in scale than natural draft towers, they also have highly visible plumes. We are instead proposing to use modern, low-plume 'hybrid' cooling towers, of which there are two basic types: rectangular and circular.

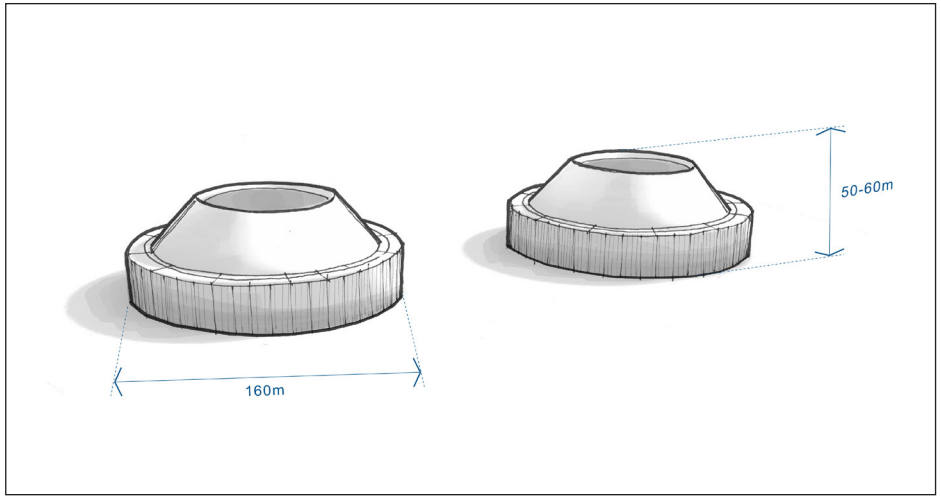
3.3.23 As shown on Figure 3.17, we would need six rectangular towers or two circular ones. The circular towers would each measure approximately 120-165m in diameter at the base and would stand 50-60m high. The rectangular towers would each be approximately 40m wide and 170m in length and would be 25-30m in height.

3.3.24 In comparison, the reactor buildings within the nuclear island would stand approximately 63m in height and the turbine halls in the conventional island would be approximately 50m high.

3.3.25 For technical reasons, the rectangular towers would need to be orientated parallel to the prevailing wind and set apart from each other. This would result in a greater spread of cooling infrastructure across the main development site in comparison with circular towers, which do not have the same technical requirements and whose layout could therefore be more compact. We think this is a significant difference, because it would mean that we would have more design control with circular towers in future masterplanning, which is likely to be important in helping to mitigate the visual impacts of the Bradwell B power station.

3.3.26 Figure 3.18 illustrates the greater horizontal spread of cooling infrastructure with rectangular towers compared to circular towers.

Figure 3.17 - Comparison of two circular and six rectangular towers



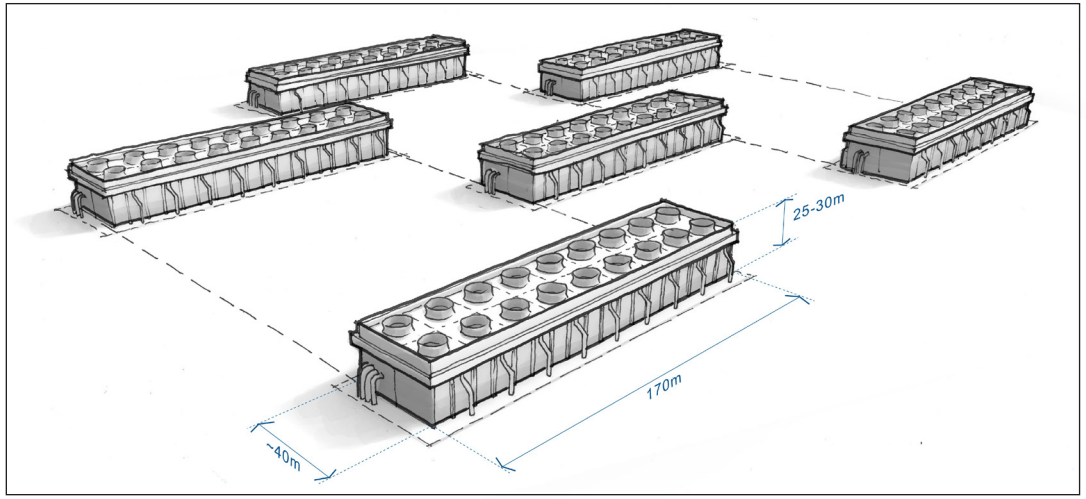


Figure 3.18 - Reduced horizontal spread of two circular cooling towers

3.3.27 Hybrid cooling towers are designed to reduce the frequency and extent of visible plumes over a wide range of meteorological conditions in comparison with traditional natural draft and wet mechanical cooling towers. We have carried out a preliminary analysis of local meteorological data to give an indication of how often the plume may be visible assuming the above specification is adopted. This showed that the plume would only be visible for 5% of the time as an annual average and would be visible for 10% of the time during the winter (Nov-Mar).

3.3.28 Whilst both types of hybrid cooling tower would be designed to minimise plume visibility, circular towers are likely to be more effective than rectangular towers, because their operation is not affected by changing wind direction.

3.3.29 This preliminary estimate of plume visibility is likely to represent the worst-case, because some of the time, especially during the winter, visibility will naturally be poor. Under poor weather conditions, any plume from the cooling towers would be unlikely to be visible, other than perhaps from in the immediate vicinity. We recognise that plume visibility will be of significant interest to the public and stakeholders and it will therefore be a key area for us to investigate in detail in future studies following Stage One consultation.

3.3.30 Both types of hybrid cooling towers would be potential sources of noise from use of the mechanical fans and from water falling through the towers. Modern fans are aerodynamically designed and use optimised blade profiles to reduce noise to very low levels; attenuating louvres can also be fitted around the towers, if required. 'Salt drift' can be an issue with cooling towers supplied by seawater as small salt deposits left by evaporating water can sometimes get suspended in the air and carried out with the plume. Drift eliminators would be used to minimise the risk of this happening. Both types of towers could be designed and operated to ensure that noise and salt drift do not cause nuisance to local residents, although these issues could be managed most effectively with circular towers.

3.3.31 There would be no differences in the quantity or quality of water discharges into the marine environment from the two types of cooling towers. Detailed studies will however be undertaken to assess marine impacts.

3.3.32 Table 3.1 provides a high-level summary of the above technical information.

Table 3.1: Comparison of rectangular and circular cooling towers

	Rectangular type	Circular type
Relative performance of cooling towers under variable wind directions	High	Very High
Level of design control in siting and appearance of cooling towers to help mitigate the visual impact of Bradwell B	Low	Moderate
Plume visibility risk	Low	Very Low
Risk of nuisance from noise	Low	Very Low
Risk of nuisance from salt drift	Low	Very Low

3.3.33 Based on our work to date, our preference is to use circular cooling towers. Whilst rectangular towers have not been discounted at this early stage in the Project, on balance we think they are less favourable.

We have provided a high level comparison of rectangular and circular towers in Table 3.1, and based on our initial analysis our strong preference is for circular towers. We will confirm our preferred proposals for cooling towers in our Stage Two consultation.

Evolution of the proposed indicative masterplan for Bradwell B

Good design

3.3.34 NPS EN-1 and EN-6 confirm the importance of good design and set out a number of policies by which this should be achieved for energy NSIPs.

3.3.35 Section 4.5 of NPS EN-1 (also referenced in Section 2.8 of NPS EN-6) states:

> *"Applying "good design" to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible."*

3.3.36 The planning policies related to good design acknowledge that the nature of energy infrastructure projects can limit the potential for controlling the visual appearance of buildings, and as such recognise that good design goes beyond visual aesthetics.

3.3.37 We are committed to applying 'good design' in our design processes and bring experience gained on Hinkley Point C and Sizewell C. Our aim is to deliver an efficient power station that relates to its setting on the Blackwater Estuary and that can be built and operated in a safe and sustainable way; applying principles of good design will be central to achieving these aims.

3.3.38 The following pages summarise the design process we have carried out so far to develop our indicative masterplan for the Bradwell B power station. This will form the basis of future design work for the power station taking account of technical studies and the 'design principles' that we propose to adopt. See Section 3.4 for further details.

Safety, efficiency and other technical considerations will inform the preferred proposal for key elements of the main development site masterplan and therefore there is limited ability for these choices to be influenced by consultation.

However we are interested in your views on our initial design process and the emerging design principles that we will use to determine the location and design of these components.

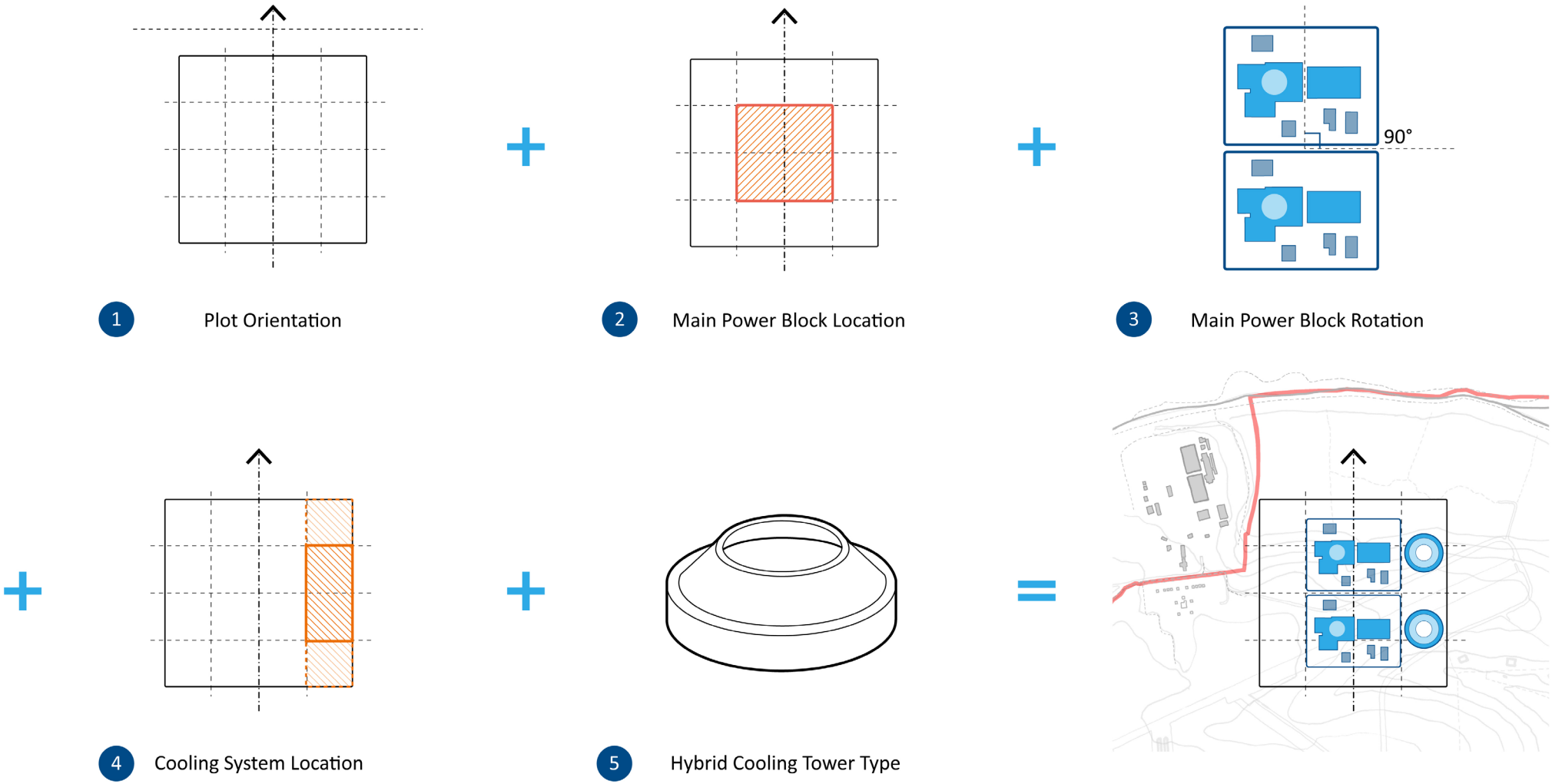
Initial design process

3.3.39 We have established a structured design process to explore a full range of potential indicative layouts for the power station. We considered that this was important to provide an evidence based approach for making decisions.

3.3.40 In order to generate a broad initial 'long-list' of potential layout options, early design exploration identified the following five key variables (see Figure 3.19):

- Orientation of the overall power station platform (i.e. rotation from north);
- Location of the nuclear and conventional islands within the plot;
- Rotation and arrangement of the nuclear and conventional islands relative to the primary orientation of the power station platform;
- Location of the cooling infrastructure relative to the nuclear and conventional islands; and
- Type of low plume hybrid cooling towers: rectangular or circular (noting that, when the optioneering process was carried out, both types were still under consideration).

Figure 3.19 - Five Variable Elements



3.3.41 Each of these elements was combined in a series of design steps to develop the long list of layout options to take through the optioneering process. Over 50 potential permanent development layouts were established in this way.

3.3.42 The long list options were subsequently evaluated in a series of project team workshops, which brought together technical specialists drawn from across the business, supported as necessary by our UK supply chain. This comprised representatives from Safety; Security; Engineering (Building Configuration and Functionality); Engineering (Construction Planning); Environment; and Cost Estimation. Each of these specialist teams was responsible for developing technical criteria to be used in the evaluation.

3.3.43 Evaluation criteria were developed for each of the following areas:

- Safety;
- Security;
- Functionality;
- Constructability;
- Environment; and
- Cost/schedule.

3.3.44 Using a traffic light (red, amber, green) approach, each layout option was assessed against these criteria using expert judgement, recording the most preferred plans, plans with areas that could be improved upon with further work, and plans that had elements that caused significant concern. Any layout arrangements with inherent safety issues were excluded from further consideration. Through this process, the long list was refined to a short list of ten plans that were developed in more detail in readiness for the next stage. Figure 3.20 illustrates an example of how this was recorded for each option. Scores were recorded alongside more detailed pros and cons, with a sketch plan and diagrammatic photomontages showing the option in the site context.

Figure 3.20 - Option record analysis

3.3.45 The shortlisted options were assessed in a greater level of detail; the assessment criteria being expanded with multiple sub-criteria. By way of example, environmental sub-criteria were developed to capture differences between the options in terms of potential impact on landscape and visual amenity; ecology; historic environment; flood risk; and residential amenity.

3.3.46 The shortlisted options were assessed against the detailed sub-criteria and again scored with a traffic light system. Options were selected that performed well across multiple criteria. Specific areas for improvement or development were noted in options that were otherwise viewed favourably. In this way the ten short listed options were systematically reduced until arrival at the proposed indicative masterplan that is the basis of this public consultation.

Key influences

3.3.47 A number of 'key influences' on the proposed layout emerged from the design process for the permanent masterplan, as outlined in the box below.

3.3.48 These influences have collectively driven our decision to locate the power station on the higher ground to the south and west of the existing Bradwell power station. This arrangement would have a number of environmental benefits including:

- Reducing the amount of engineering fill required to raise the platform which would help minimise HGV traffic on local roads. More detail on our transport strategy is set out in Section 4;
- Retention of the existing flood embankment and borrow dyke;
- Concentrating development on areas of lowest flood risk within the site;
- Reducing potential impacts on the Chapel of St Peter-on-the-Wall and Roman Shore Fort of Othona which are located to the east of the site;
- Reducing potential disturbance of wintering birds using the coastal mudflats which are centred on Dengie Flats to the east of the site;
- Maximising the availability of low-lying land next to the coast for potential ecological enhancement after the power station has been built; and
- Pulling the development back from the coastal footpath that runs on top of the flood embankment and is also the proposed England Coast Path.

3.3.49 Locating the development away from the coast, however, would bring the permanent development closer to Bradwell-on-Sea and Bradwell Waterside. Measures to reduce the impact of this, during construction and operation, are a key focus of the indicative permanent and construction masterplans, particularly within the landscape strategy. See Section 3.5 for further details.

Founding geology: The nuclear and conventional islands should ideally be located on the higher ground in the south-west part of main development site where the most competent founding geology (un-weathered London Clay) is at its optimal level. This would minimise the need for imported fill to support the safety critical buildings for Bradwell B and would help reduce HGV traffic on local roads.

Construction access: Access around the permanent development throughout the construction phase should be unconstrained, especially east of unit two. This is important for efficient construction in accordance with the project schedule.

Platform height: Bradwell B would need to be constructed on a raised platform to protect it from extreme flooding events. The indicative optimal platform level would be around 7.4m AOD, which would protect the site from a 1 in 10,000 year extreme sea level (as informed by the Environment Agency's published data and ONR and Environment Agency guidance), taking account of potential climate change. This favoured development on the higher ground to the south and west of the existing Bradwell power station.

Sea defences: Setting the power station back from the coast would avoid interference with the existing flood embankment and reduce the required scale of the new defences. Enough space should be allocated for their construction around the permanent development, with an allowance for adaptation as appropriate, especially at more constrained points close to Bradwell A.

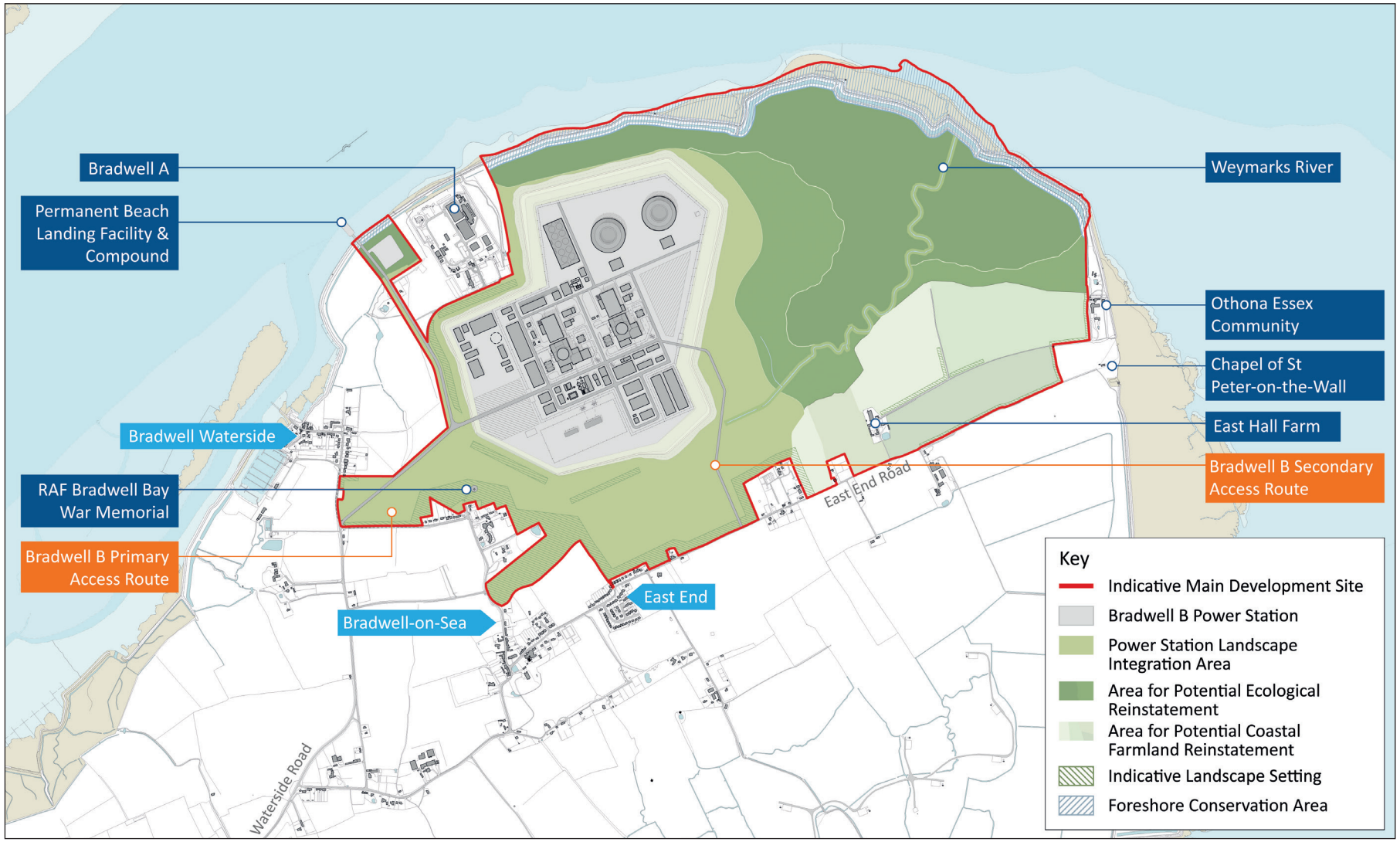
Building Configuration: There should be efficient connections between core buildings and functions, especially co-location of the turbine hall condensers with cooling infrastructure. The need to minimise the length and complexity of the recirculating cooling water system is a key requirement to maximise efficiency.

Environment: The power station should be pulled back from the coast to help reduce impacts on the coastal and marine environment and on the proposed England Coast Path route, and also to concentrate development on areas of lowest flood risk within the main development site in line with planning policy.

Indicative permanent masterplan

3.3.50 Figure 3.21 illustrates our indicative permanent masterplan for the Bradwell B power station, resulting from the optioneering process and design development outlined in the previous section. The Bradwell B power station would be a much larger development than the existing Bradwell power station, because its electrical output would be much greater (around 10 times more). In addition, the Bradwell B power station would require land for cooling towers.

Figure 3.21 - Indicative permanent master plan



3.3.51 Some elements of the power station layout are based on preliminary design information. Whilst this has enabled us to explore options at a masterplan scale, it carries a degree of uncertainty at a more detailed level. As we continue to develop the design in more detail, the layout of the power station will be optimised, working with stakeholders to help direct the focus of this work. Currently the power station layout assumes two units' side by side with few shared facilities. It may be possible for the two main power blocks to share additional facilities, which will be explored. The footprint of the development could therefore reduce slightly as we develop the design.

3.3.52 As described above, the main power blocks would be set back from the coast on the higher ground behind existing Bradwell power station, with the turbine halls facing out towards the estuary. The precise orientation of the main power blocks are not fixed and will continue to be explored as further technical and environmental information becomes available, such as the results of further ground investigations and landscape and visual impact assessment.

3.3.53 A direct route to the cooling towers for high-pressure cooling water from the turbine halls' condensers is important for efficient operation of the power station. The cooling system would therefore be best sited between the turbine halls and the coast, arranged to enable the northern extent of the permanent development to be pulled back as far as possible from the coast.

3.3.54 Locating the cooling system between the turbine halls and estuary will have a significant effect on how the power station appears from the north, as the open landscape of the Dengie Peninsula allows long views of the site across the Blackwater Estuary. The large size of the circular cooling towers would mean they would be the dominant features when viewed from the estuary, although the limited number of towers would potentially give clarity to the design. The landscape and visual impact is explored further in Section 3.4.

Power station buildings and facilities

3.3.55 To support the energy-generating components of the permanent development, a number of supporting buildings and facilities are required as outlined below, which would together form the permanent development.

National grid 400kV sub station

3.3.56 A new 400kV substation is required to transmit the electricity generated by Bradwell B to the National Grid, and the permanent development plan indicates a proposed position away from the estuary and to the south of the main power blocks. Within the permanent development, we would be responsible for Bradwell B's connection to this new 400kV sub station, but National Grid would be responsible for building the substation and connecting it to the National Grid. This could be included in Bradwell B's DCO application or a separate DCO by National Grid, to be subject to a later decision.

Balance of plant

3.3.57 The plant facilities required for maintaining operation of the main power blocks, known as the 'Balance of plant' would be located directly alongside the nuclear and conventional islands to provide efficient connections and processes. These are shown consolidated into areas immediately adjacent to the nuclear islands and would include maintenance workshops and storage for gases and liquids.

Interim spent fuel and waste storage

3.3.58 Interim spent fuel and waste storage would be sited to the south of the main power blocks, away from the residential properties located mainly to the south-west. These facilities would store interim spent fuel and waste safely and securely. Their location responds to the need to locate them close to the main power blocks for efficient and direct transport of waste within the site.

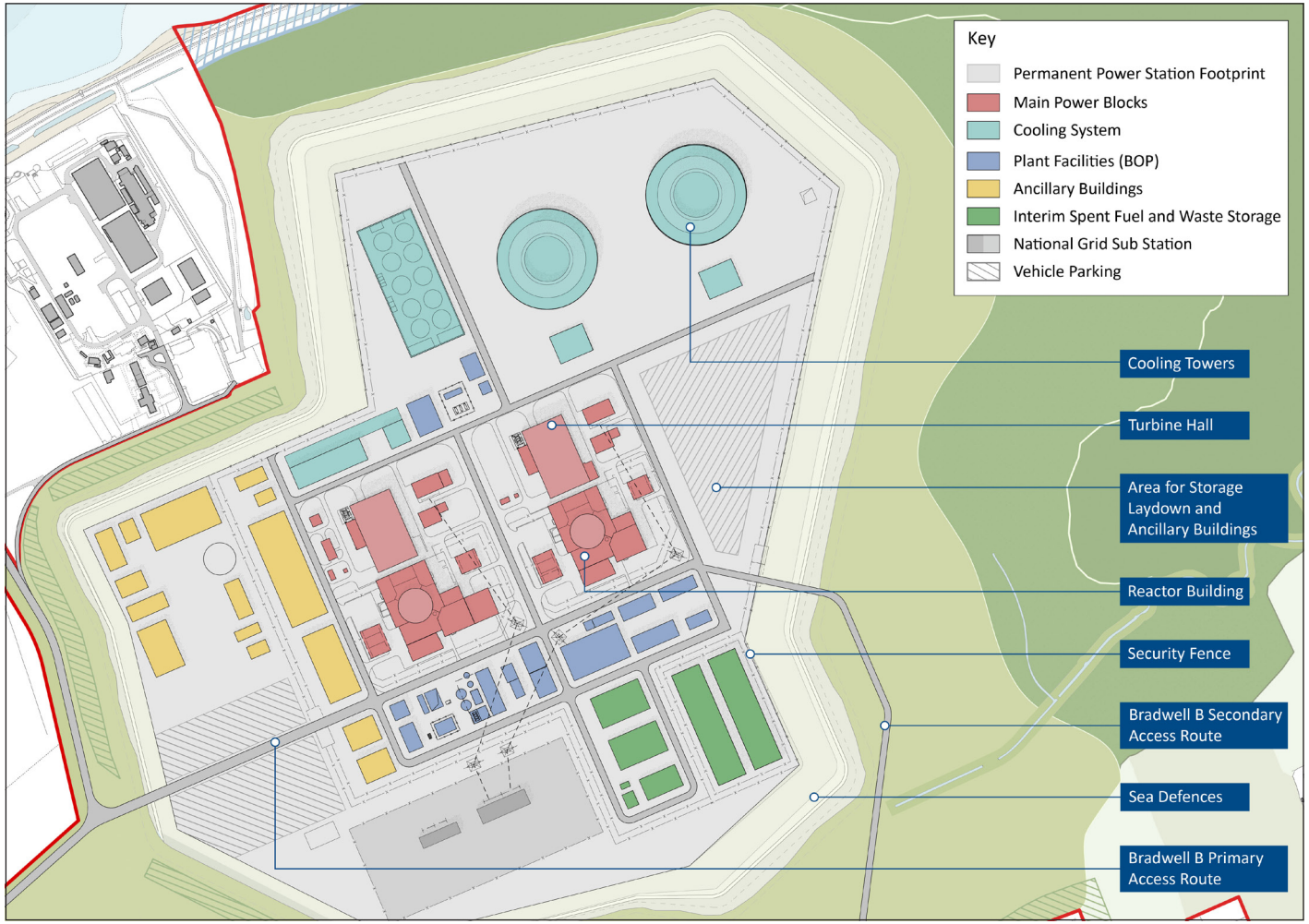
Ancillary buildings

3.3.59 The ancillary buildings are those used by staff in the daily operation of the power station, including offices, warehouses, and workshops. We envisage that they would be located to the west of the main power blocks, close to the primary site access and associated car parking to provide easy access for our site staff. Most of these buildings would be inside the security fence, but some may be located outside, depending upon their specific requirements.

3.3.60 Figure 3.22 illustrates the proposed arrangement of all of the principal building groups described above within the indicative masterplan. The power station would be contained within a series of secure fences in accordance with ONR guidance, with controlled access via security gates and inspection facilities.

3.3.61 In the proposed layout, the circular cooling towers are arranged as a pair, offset from the turbine halls. Figure 3.26 (VP-03) illustrates this arrangement when viewed from across the estuary, close to the boardwalk in West Mersea. As the design continues to develop, the project team will explore this configuration in further detail, looking in particular at the relationship between the main power blocks and the cooling system. This will consider alignment, visibility of significant buildings and structures, and compactness, working in close association with detailed landscape and visual impact assessment studies in consultation with stakeholders.

Figure 3.22 - Power Station building group arrangement



Other design components

3.3.62 Outside the security fence, other elements would be required to protect and operate the power station, including permanent and secondary (emergency) road access, permanent marine-based infrastructure, and landscape and environmental design and mitigation. Outline proposals are as follows.

Site access

3.3.63 Nuclear power stations require two separate access routes for safety reasons. We propose a primary access route for general operational use, and a secondary access for use in emergencies. Figure 3.23 shows the indicative location and alignment of the proposed new access routes.

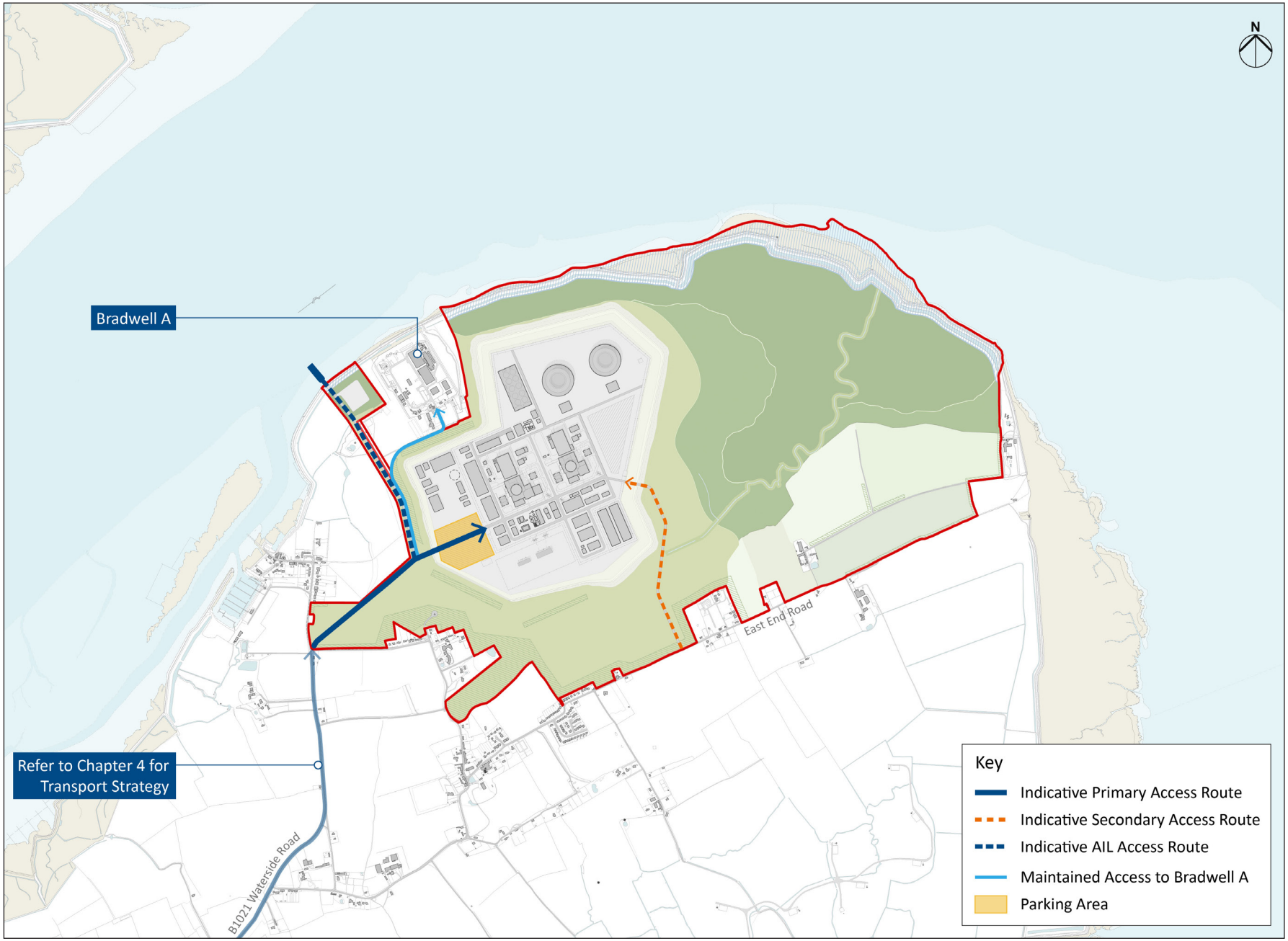
3.3.64 The proposed primary access route, in part following the alignment of the disused main airstrip at RAF Bradwell, would provide access to the power station for the operational phase, and would also serve the construction phase (see Section 3.7 for further details). It is anticipated that this road would connect to the existing B1021 (Waterside Road) just north of the junction with Trusses Road, avoiding traffic passing through Bradwell village. The smaller secondary site access route would connect to East End Road, west of the Eastland Meadows Country Park and close to the line of an existing farm track. This would be used only occasionally during emergencies, if required. As advised in Government policy within NPS EN-6, both routes would be designed to provide safe routes for emergency access and egress in times of flood. Access to the existing Bradwell power station would be maintained.

3.3.65 A new car park is proposed at the main entrance to the power station, providing a compact arrangement that gives easy and direct pedestrian access into the power station. The area currently shown could accommodate approximately 1,500 spaces, providing parking for permanent operational staff and also additional spaces for use by contractors in planned maintenance 'outages'.

Beach landing facility

3.3.66 There would be a requirement for a permanent Beach Landing Facility (BLF) to transport very wide or heavy components (AILs) to the power station during maintenance shutdowns. This would also be a requirement during construction of the power station for importation of construction materials - see Section 3.7 for further details. Once the Bradwell B power station has been built we would therefore retain the BLF for operational use. We anticipate it would only need to be used occasionally (approximately once every 5 years or less).

Figure 3.23 – Proposed access routes to Bradwell B



Marine based cooling infrastructure

3.3.67 The development of the Bradwell B power station would require sea water intake and outfall tunnels and associated infrastructure for cooling as described earlier in this Section. These would be located within the offshore zones shown on the Indicative permanent masterplan (Figure 3.21). Work to determine their exact location and design is underway and will be subject to ongoing survey and assessment (including modelling) to minimise environmental impacts. We anticipate that the cooling tunnels would be up to 1km in length.

3.3.68 The cooling discharge would be more saline (saltier) than seawater, therefore there is potential for it to sink. This may require use of a diffuser at the outfall to improve mixing with the seawater, depending on the outcome of ongoing environmental studies.

3.3.69 In addition, we will investigate the potential need (and effectiveness) of mitigation measures at the cooling water intakes to reduce impacts on fish. This would include the potential use of a 'fish recovery and return system' (FRR) in which fish that are drawn into the intakes with seawater and survivors are intercepted and returned to sea via a dedicated pipeline.

3.3.70 Due to the low abstraction and discharge rates of indirect cooling in comparison to direct cooling, the intake and outfall heads (where seawater would be drawn in or discharged to sea) would be relatively small. The effect on waves and flows would be local to the structures, with potential for some local scouring of the seabed as a result. The intake and outfall heads would be connected to the plant via tunnels constructed beneath the sea bed.

3.3.71 The intakes would draw in suspended sediment which would be settled out on arrival at the power station before the seawater is used in the cooling system. Sediment that is collected would either be returned to sea by the cooling outfall or taken off-site for re-use or disposal as shown in Figure 3.25.

Sea defences

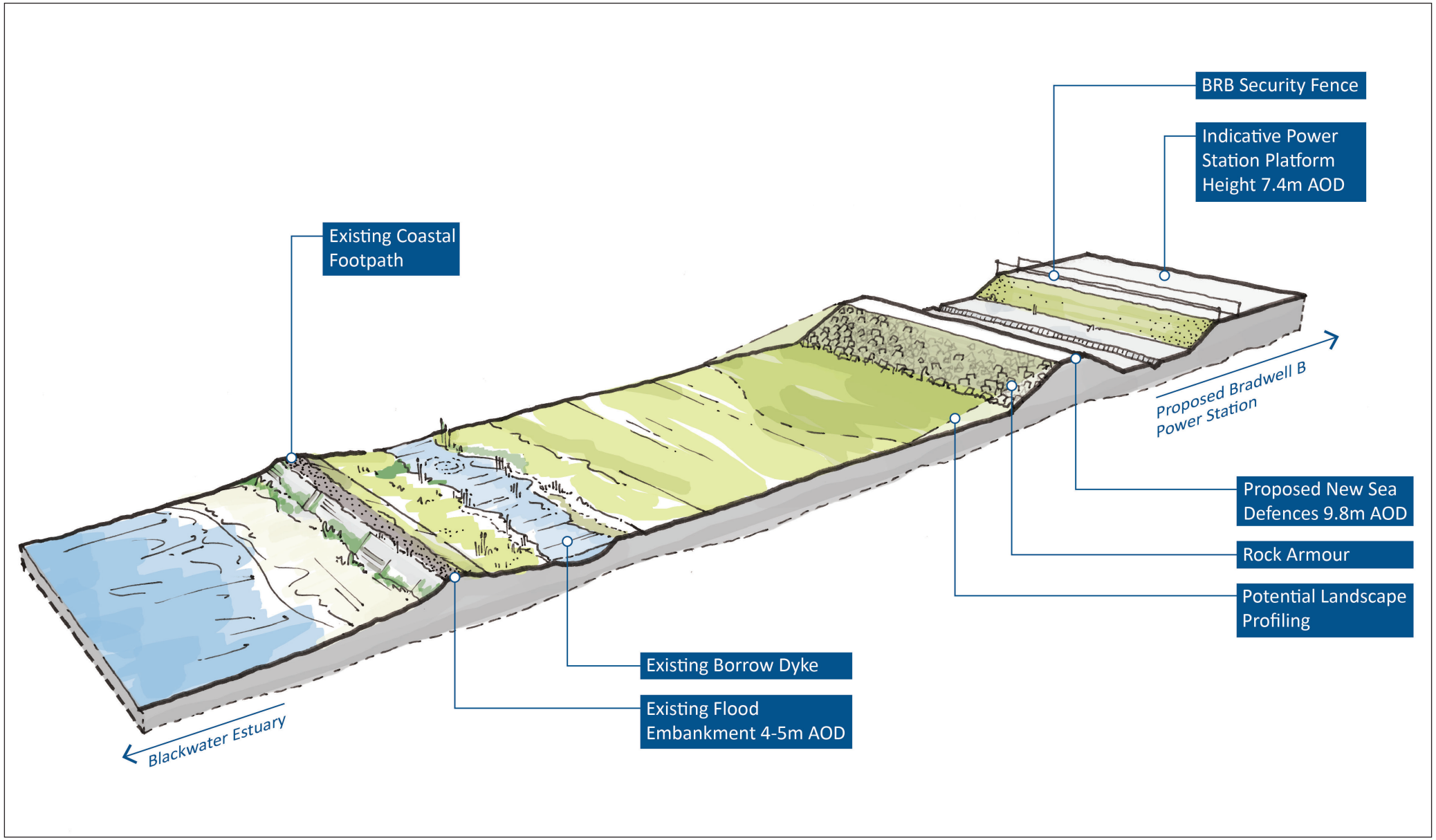
3.3.72 As noted in the above sections, the new power station would need to sit on a raised platform at approximately 7.4m AOD. This is an indicative level; further more detailed studies are required to confirm the actual platform level.

3.3.73 In the event of an extreme flood event, it would also be necessary to protect the power station from wave run-up and overtopping, which would require new flood defences. Based on preliminary design work, we envisage that the new sea defences would need to have a crest level (top) up to 9.8m AOD.

3.3.74 The new sea defence could be constructed with material sourced on site (e.g. London Clay), or with imported material. The seaward facing sections would need to be armoured with rock, especially at the most exposed north-east corner. Where appropriate and practicable, the sea defences could be top dressed with soil and vegetated to give them a more natural appearance.

3.3.75 Bradwell B's new sea defences would incorporate a drainage ditch on the landward side that would discharge via a buried culvert to the seaward side. Figure 3.24 illustrates an indicative cross section extending from the proposed raised platform for Bradwell B on the right-hand side, through the proposed drainage ditch and over the proposed new sea defences. This profile is illustrative of the northern side of the development. The "toe" of the flood defences (on the left-hand side of the new sea defences) would tie in with the existing ground levels adjacent. Towards the south-west of the site, where existing ground levels are higher and where the site is also more sheltered from extreme North Sea storms, the sea defences would not need to be as high.

Figure 3.24 - Flood defences / levels section



3.4. Other Environmental Considerations Affecting Permanent Development

3.4.1 In Section 3.2 we explained how consideration of the sensitive marine environment of the estuary has informed our design so far. This section provides further information on other key environmental considerations that were taken into account in early design development.

Visual amenity

3.4.2 A key consideration has been to limit the impact of the power station on visual amenity from key viewpoints around the site, as far as practicable. Our initial assessment has included consideration of viewpoints from West Mersea to the north, Bradwell-on-Sea to the south-west and views from around the coastline such as Bradwell Waterside, the Chapel of St Peter-on-the-Wall, Tollesbury Marina, Sales Point, and Point Clear, as well as users of the key local public rights of way including the proposed England Coast Path.

3.4.3 Throughout the development of the masterplan, a selection of initial landscape and visual impact assessment viewpoints were used to inform the preliminary visual impact assessment of design options.

3.4.4 The viewpoints used in this early assessment are illustrated in Figure 3.25. They aim to give a good understanding of the scheme's impact from a variety of locations, at a range of distances from the site. These will be expanded upon and refined in discussion with stakeholders as the project proceeds.

3.4.5 From our understanding of the site and its surrounding landscape, the horizontal spread of the development across the peninsula is an important consideration. Siting the permanent development as far to the south and west as possible - close to the existing Bradwell power station buildings - helps to reduce this impact.

3.4.6 Views of the Bradwell B site from across the estuary are open and unobstructed and would be experienced by a relatively large number of people. Combined with the lack of opportunity to use the landscape for screening, these views have therefore been an important consideration in understanding the visual impact of the proposed development. Figure 3.26 illustrates the proposed indicative permanent development from selected viewpoints around the main development site including Point Clear (VP-15) and West Mersea (VP-03) on the opposite side of the estuary; and from East End Road (VP-07) and the RAF Bradwell Bay War Memorial (VP-10) located to the immediate south and south-west of the main development site, respectively.

Figure 3.25 - Landscape and visual impact assessment viewpoints

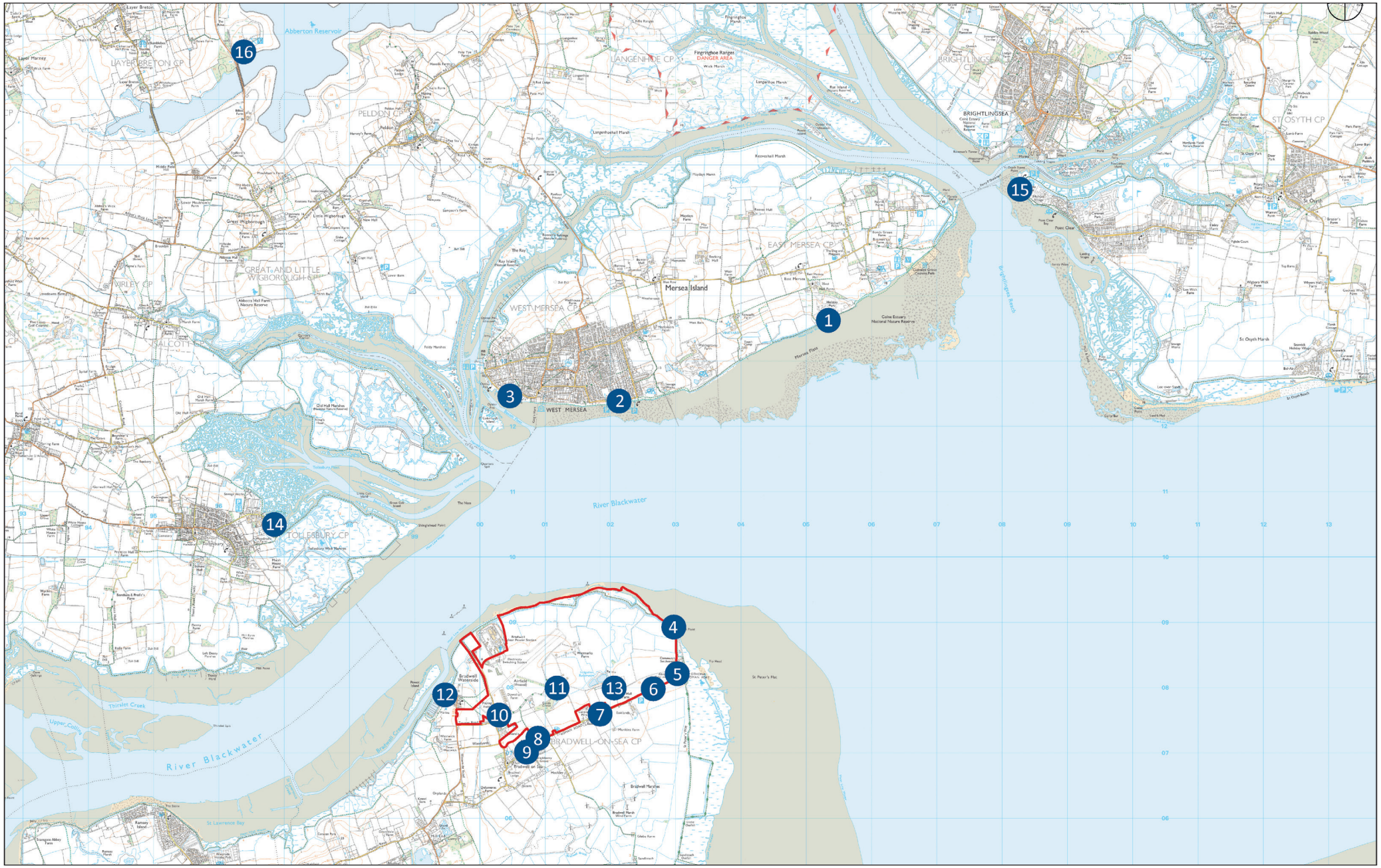
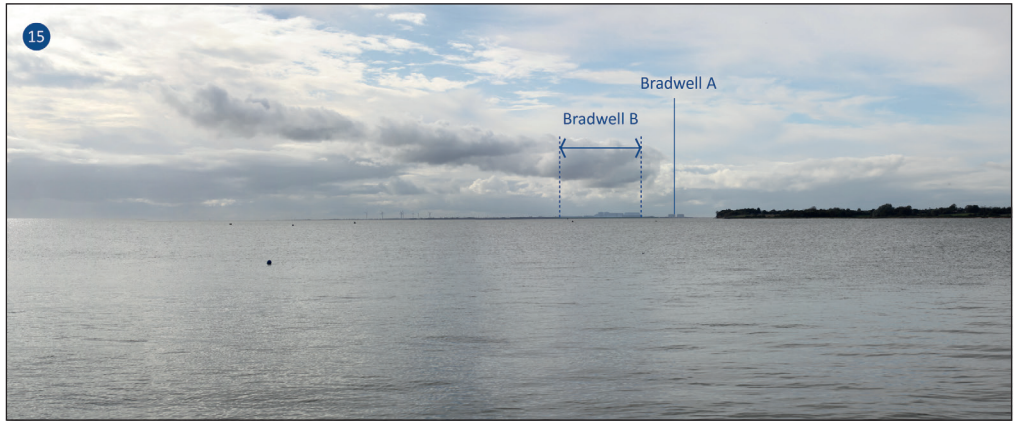
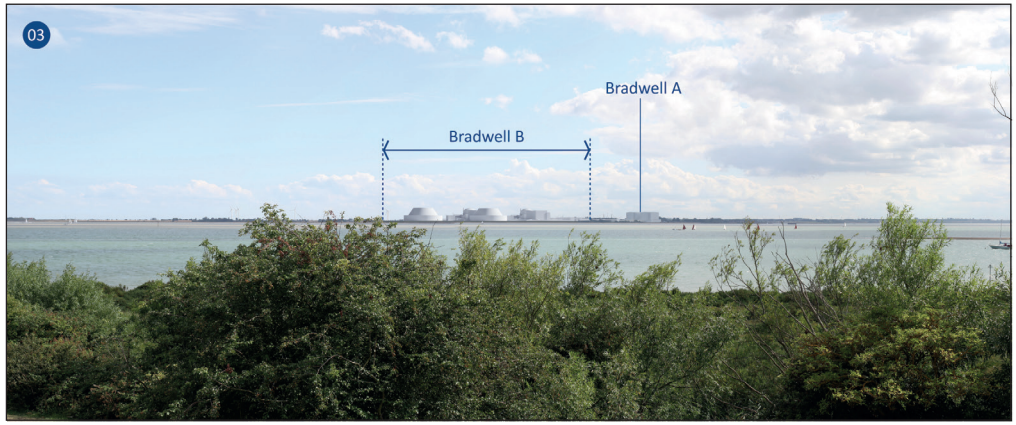
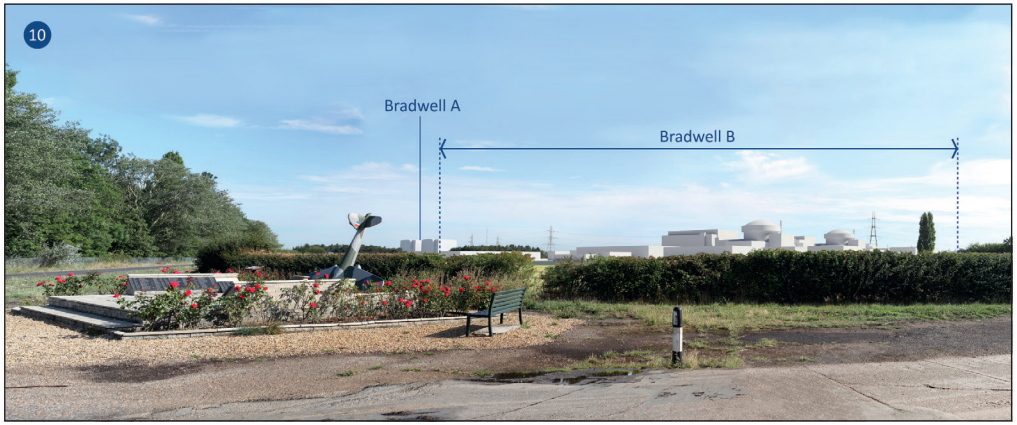


Figure 3.26 - Initial indicative photomontages of the permanent development from Point Clear (VP-15), West Mersea boardwalk (VP-03), East End Rd (VP-07), and RAF Bradwell Bay War Memorial (VP-10)







3.4.7 From across the estuary, an architectural composition in which the significant buildings and structures are clear and visible is considered important, avoiding a 'cluttered' appearance where possible. Careful thought will be given to how we can continue to refine this in the future. This will take account of the architectural characteristics of the dominant elements within the permanent development - particularly the circular cooling towers - with consideration of how they relate to the existing Bradwell power station. It is envisaged that the sea defences would help screen the low level activity.

3.4.8 For viewpoints from the south, such as from Bradwell-on-Sea and surrounding areas to the south-west of the site, there is an opportunity to reduce impacts on visual amenity by replicating and extending the increased tree cover which prevails in this area. As illustrated from viewpoint 10, Figure 3.26, the view from the RAF Bradwell Bay War Memorial is dominated by the reactor buildings and turbine halls; the circular cooling towers are not visible from this location because they are screened by intervening buildings.

3.4.9 Figure 3.26 also illustrates the permanent development when viewed from East End road (VP-07), where landscaping including both new landform and planting (see Section 3.5) could be used to help mitigate adverse effects.

3.4.10 We recognise that the coastal setting means that landscape screening is not appropriate for many views of the permanent development. As the design develops in more detail, and working closely with stakeholders, we will explore ways to better manage the visual effects of the development on the peninsula where practicable. This could include the use of different colours or types of material on some of the buildings, where it is possible for us to do so.

3.4.11 Consideration of the potential landscape and visual impacts of the proposals will continue to be an important part of design development. The Landscape and Visual Impact Assessment (LVIA) that will form part of the EIA for the Project will be discussed in draft form with key technical stakeholders.

We are interested in your views on the information that has informed our understanding of the main development site and the local area, which is shaping our current thinking.

Recreation and amenity

3.4.12 Bradwell B would be set back from the existing flood embankment and consequently would not affect use of the proposed England Coast Path during the operational phase. However, the visual amenity of users of the path is likely to be adversely affected; opportunities to screen the development would be very limited. Likewise, there would be no direct impacts on recreational (or other) users of the Blackwater Estuary, although their visual amenity would be similarly affected. We will seek to reduce impact upon amenity through 'good design' where practicable.

3.4.13 The other local footpaths located within the site, described earlier, would be returned to current use after construction if practicable. The need for any permanent diversions will be considered, and routing proposals will be discussed and agreed with stakeholders. We envisage that new routes will be created to enhance access to landscape amenity within the local area.

Ecology

3.4.14 Setting the power station back from the coast would mean that the borrow dyke and all other designated habitat on its seaward side would be retained. It would also help reduce disturbance of birds using the marine environment, especially the extensive mudflats at Dengie Flats to the east of the site. This approach would also reduce permanent use of low-lying parts of the site, meaning that these areas would potentially be available for ecological restoration and enhancement following construction of Bradwell B.

3.4.15 Detailed ecological studies will be carried out to inform the development of an ecological mitigation strategy, which will include developing proposals for habitat creation. This strategy will be developed in conjunction with the landscape strategy described in Section 3.5 to develop an integrated plan.

Historic environment

3.4.16 The proposed development would be concentrated in the far western part of the main development site, which would help to protect the setting of The Chapel of St Peter-on-the-Wall and Roman Shore Fort of Othona. If appropriate, it should be possible to screen views from the Chapel to minimise visual effects, as illustrated in Figure 3.27 This will be explored further in the landscape strategy.

3.4.17 Design measures aimed at minimising effects arising from visual change to residential and community receptors at West Mersea, Bradwell-on-Sea and Bradwell Waterside (see Section 4.3) would also serve to limit adverse change in the setting of designated heritage assets in these areas. We consider that effects on the setting of these heritage assets could be wholly or partially reduced through the landscape strategy.

Figure 3.27 - Proposed development from The Chapel of St Peter-on-the-Wall (VP-5)

Hydrology and flood risk

3.4.18 Our proposals to locate the power station back from the coastline and on higher ground would help reduce flood risk elsewhere and result in reduced interaction with the existing surface water and drainage features.

3.4.19 This follows relevant policy in NPS EN-6 para 3.6.8 which states that safety and operational critical installations should be sited in the areas of the site at least risk of flooding following application of the sequential test applied at the site level. In addition, as part of considering 'good design' we have allocated sufficient space in the masterplan to be able to adapt the proposed new flood defences, if required, without major redesign work or physical disruption.

3.4.20 It was also considered preferable to retain the borrow dyke and Weymark's river as these are the two principal drainage features within the site.

3.4.21 Consideration of flood risk and the potential impacts upon surface water, drainage and third parties will continue to inform our design process.

Residential amenity

3.4.22 Our proposed indicative masterplan would bring the power station relatively close to the villages of Bradwell-on-Sea and Bradwell Waterside. There are several residential properties on or close to the site boundary in Bradwell-on-Sea and East End; some of these are well screened from the site by existing buildings and vegetation, others less so.

3.4.23 Measures to protect the amenity of our neighbours and local communities has been, and will continue to be, an important consideration in developing our designs. This applies both to the layout and design of the buildings and facilities within the power station, aiming to minimise the potential for noise disturbance for example, and also to the development of our proposed landscape strategy for the site, outlined below. The permanent boundary treatment, for example, will play an important role in managing the impacts of the development on local residents. We will work closely with stakeholders to ensure that adverse impacts on residential amenity are kept as low as possible through both design decisions and mitigation strategies.

3.5. Landscape Strategy

3.5.1 Our proposed indicative permanent masterplan has been informed by our understanding of the site context described in Section 3.2. High-level environmental assessment of key environmental constraints, features, and opportunities for enhancement have, and will continue to inform design development in order to ensure that our proposals are sustainable.

3.5.2 We have started to think about our approach to landscape design and site restoration (following the construction of Bradwell B) at this early stage of the Project to inform our masterplans for both the permanent development and construction phase, which are closely linked (see Section 3.7 for details of our proposed construction phase masterplan). We think this approach will help ensure that we develop an integrated approach with the best possible outcomes for our neighbours, landscape and for the environment in general.

3.5.3 Our proposals retain the most important qualities and characteristics of the site, including the designated habitat from the borrow dyke seaward, and aim to create a development that relates to the setting of the Dengie Peninsula. To help redistribute earth excavated during construction and reduce HGV traffic, we plan to re-use soil and spoil that is unsuitable for construction to create new permanent landform and ecological habitat.

3.5.4 We would aim to retain existing vegetation within the site as far as possible, but the majority of existing planting within the main development site would likely be lost to make way for construction. As we develop our proposals, we will continue to give careful consideration to the landscape features that can be retained. Detailed plans will be prepared showing where existing vegetation would be retained (or lost) and where new landscape is proposed. Our construction phase and permanent masterplans will incorporate areas of new landscape (both landform and planting) to help protect the amenity of our neighbours and local communities.

3.5.5 Figure 3.28 identifies different areas within the main development site, within which we would take a different approach to landscaping, following construction of the power station:

- Permanent development integration area - immediately adjacent to the permanent power station, would include the establishment of block planting to screen views from adjoining settlement to the south-west and provide offset from these communities to the power station;
- Landscape restoration - on the higher ground between East Hall Farm and the Chapel of St Peter-on-the-Wall to re-establish coastal farmland. This land is currently in arable use but could be converted to grassland;
- Estuarine marsh restoration - of existing mainly arable land in the lower lying areas of the site to estuarine marsh, or other appropriate habitat. We would need to carry out detailed investigations and work closely with stakeholders to confirm the ecological restoration proposals, but we favour an ecological end-use in this area rather than an agricultural restoration; and
- SSSI conservation zone - within which the existing habitats and species associated with the borrow dyke and coastal strip would be protected.

Figure 3.28 – Indicative Landscape Areas

3.5.6 We have developed some initial approaches to landscape design and restoration that take into account the local context, which we intend to use as the basis for the detailed development of our landscape proposals for Bradwell B. These broad approaches include:

- Retaining areas of established vegetation that have an important function in containing views towards the permanent development site (e.g. hedgerows and tree belts) as far as is practicable;
- Establishing new planting at the earliest opportunity to strengthen/ enhance existing boundary vegetation and allow areas of new planting associated with the operational phase landscape masterplan to become established as soon as possible;
- Creation of new ecological habitat with the potential to provide suitable conditions for key species of conservation importance including water vole, dark-bellied brent geese and other wintering wildfowl species.

3.5.7 Establishing new landscape around the edges of the main development site, including both planting and raised landform, to provide visual containment of lower level construction activity and vehicle movement.

3.5.8 The area between East Hall Farm and the Chapel of St Peter-on-the-Wall would be subject to ground remodelling to beneficially re-use surplus spoil that would be excavated within the site during early construction . This remodelling would seek to reflect existing ground contours, and ensure the land would not be over steepened, giving careful consideration to the setting of The Chapel of St Peter-on-the-Wall. An acceptable threshold level would be established as part of the heritage impact assessment in consultation with stakeholders, and land would not be raised above this threshold.

3.5.9 Access to the Othona Essex Community, which currently passes through this area of the main development site would be retained, potentially with some minor realignment of the existing access track to accommodate the uplift of land levels. We will consult with the Othona Essex Community as we develop our proposals in this respect.

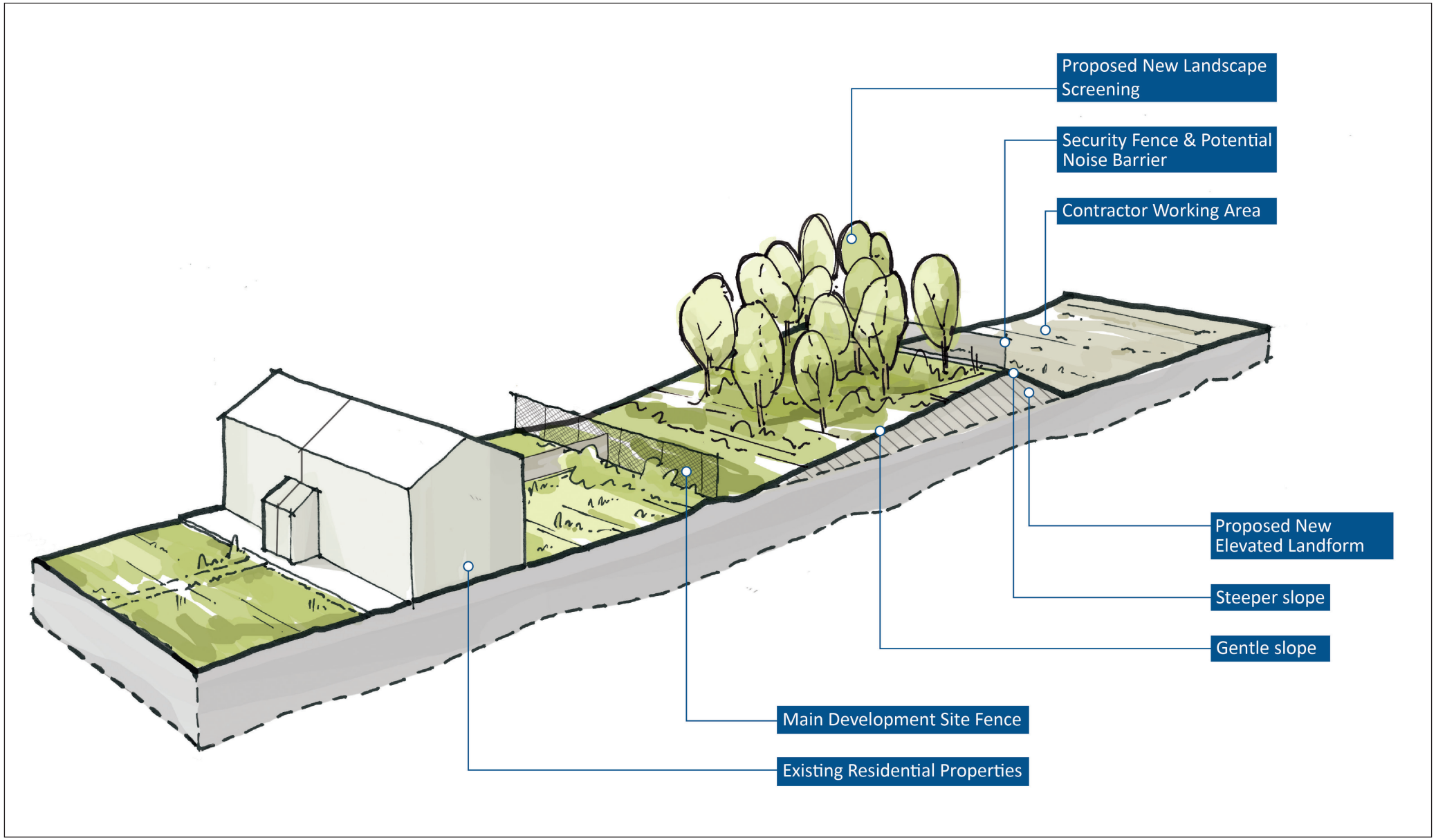
3.5.10 Where more substantial vegetation is appropriate to the landscape character, planting would be used in combination with earthworks to provide boundary screening and landscape buffers, particularly around the south-west perimeter of the main development site close to Bradwell-on-Sea.

3.5.11 Blocks of planting would be installed to screen views from adjoining settlements to the south-west and along East End Road, while providing a suitable offset distance from construction activity. Careful consideration will be given to this planting to ensure that it clearly responds to the existing landscape character and the pattern of existing tree cover.

3.5.12 Around properties, ground reprofiling would also form an important part of the landscape approach and would be used to aid visual screening and noise attenuation of construction activities for residential areas. Permanent landform that is sensitive to the context could be created in the early stages of the project. The slopes of new permanent landforms that face toward properties would be gentle, with steeper slope profiles facing toward construction works to maximise the available working area. Figure 3.29 below illustrates this approach.

3.5.13 As the strategy would involve the creation of new landform using material sourced on site, it may be possible to deliver elements of the permanent strategy during the construction phase, rather than waiting until after the Bradwell B power station has been built. Early implementation of parts of the strategy would maximise the contribution it could make to maximise impacts. We will explore the phasing of landscaping restoration in design development and will present more detailed proposals at the Stage Two consultation.

Figure 3.29 - Boundary sketch section



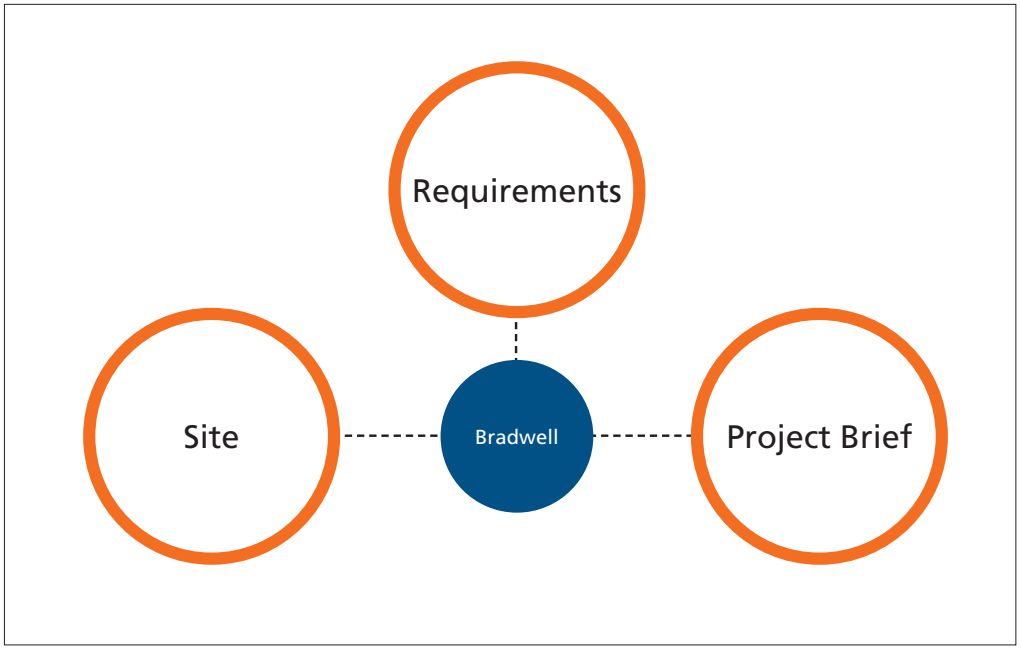
3.6. Proposed Design Principles for Bradwell B

3.6.1 The National Infrastructure Commission gives guidance on developing and using design principles for national infrastructure projects, setting out their importance to ensure that project teams have a common understanding of issues to be addressed and making sure that design decisions consider the influences acting on the 'big picture' of the Project. These influences, and their translation into a series of design principles, are described below.

National infrastructure influences

3.6.2 There are a number of key influences that affect the development of any nuclear power station: the over-arching project brief, the legislative and regulatory context (requirements), and the site location (illustrated in Figure 3.30). These high-level influences act upon the development of Bradwell B from the Project's inception through to decommissioning.

Figure 3.30 – Key influences for development



3.6.3 The project brief, focussed on delivery of the project, sets out the technical and functional requirements, the project budget, the timetable, and relevant quality standards.

The Project Brief

UK HPR1000 Nuclear Technology The specification of the technology used at Bradwell B is the starting point for the Project.

Functionality The design must respect key functional relationships between significant buildings and structures to maximise electricity generation and site working efficiencies in terms of personnel and cargo flows; and

Delivery The Bradwell B Project must be economic and competitive and deliver value for our shareholders, investors and customers.

3.6.4 Delivery of the project also relies on complying with a series of requirements in the form of regulation and legislation at many levels, from nuclear safety legislation under the ONR, to environmental legislation and planning policy.

The Key Requirements

Safety Safety is our overriding priority; we must demonstrate to the nuclear regulators that safety risks are designed to be 'as low as reasonably practicable' in accordance with nuclear safety legislation, ONR and EA requirements and CGN/EDF standards;

Security We must demonstrate that proposals for Bradwell B incorporate appropriate and proportionate nuclear security arrangements in accordance with nuclear security legislation, ONR requirements and CGN/EDF standards; and

Legislation The Project must meet requirements set out in relevant policy and legislation, including that related to nuclear regulation and safety, planning and environment.

3.6.5 Above all else, the design of the Bradwell B power station must meet these requirements and the project brief to deliver a project that is safe, secure, efficient and cost-competitive. These are the core requirements of the project, and our design responses must contribute to achieving them.

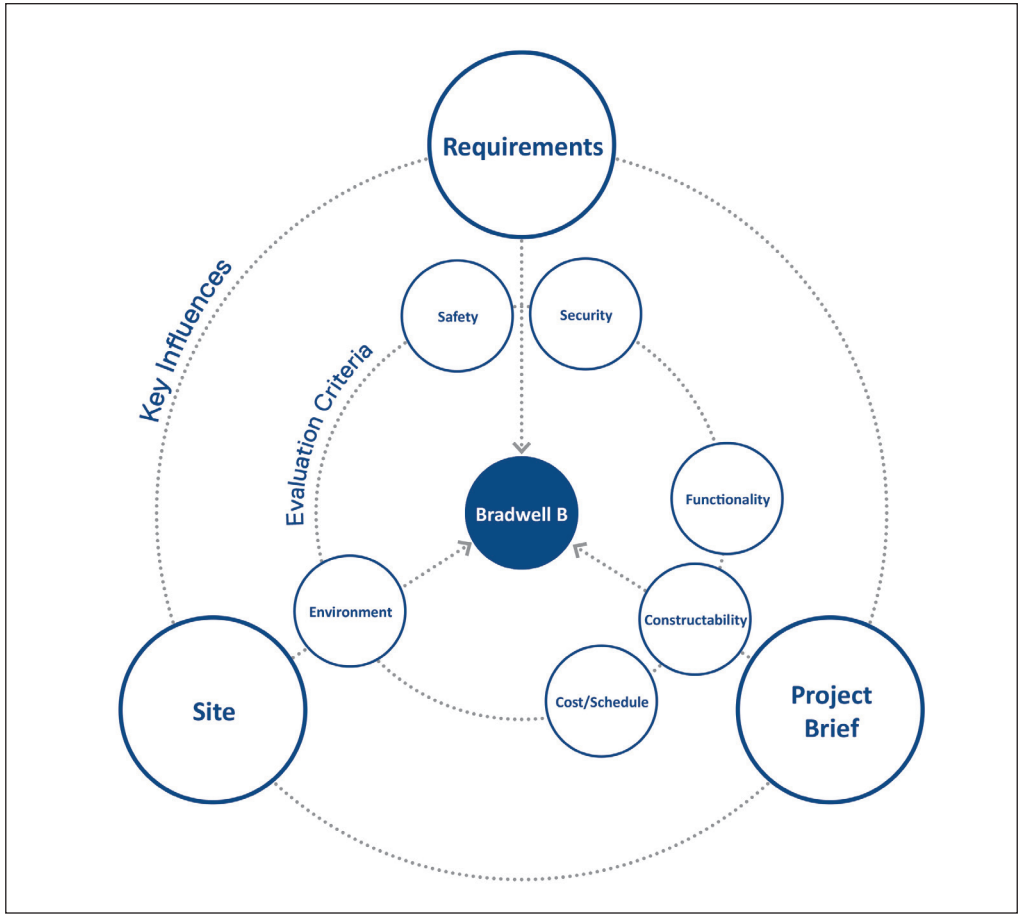
3.6.6 The specific site location, however, significantly influences how the project is designed in order to meet the relevant legislation, achieve the requirements of the brief and, ultimately, deliver the project. This includes, but is not limited to: the regional context, in this case Maldon and the Blackwater Estuary; existing transport networks; the proximity of local communities and their relationship with the site; ground conditions within the site; local ecology and biodiversity; and local heritage assets, among many other influences.

The Site Context, including:

- The Blackwater Estuary
- Regional/Local Transport Networks
- Local Communities
- Ground Conditions
- Ecology and Biodiversity
- Local Heritage Assets

3.6.7 These three groups of influences have been central to design development so far, and were distilled to form the basis of the evaluation criteria (safety, security, functionality, constructability, cost and schedule, and environment) that were used to assess early design decisions for the permanent development (set out in Section 3.3 and illustrated in Figure 3.31).

Figure 3.31 – Evaluation criteria in relation to the key project influences



3.6.8 The proposals described in this consultation outline our initial responses to these groups of diverse influences. At this stage these responses are high-level, and will be developed in detail as the project continues.

Emerging design principles

3.6.9 By responding to each of the influences described above, and throughout the development of the indicative permanent masterplan, a number of design principles have emerged that we consider to be important for the Bradwell B Project. Considering these principles whilst achieving the strategic requirements of the Project will help us to deliver a high quality development and 'good design' as set out in Section 2.3, and they will be developed to give structure to future design development. We welcome your views on them.

Safe by design

Safety is our overriding priority and is embedded throughout our design decisions and processes. This includes, for example, siting the development on the higher and most competent ground.

Design for efficiency

Our designs for the Bradwell B power station should have efficiency at their centre, from design and construction through to decommissioning. This includes, for example, minimising the amount of land used, whilst ensuring sufficient space and access for efficient construction and operation; ensuring related construction processes are well connected and streamlined; and designing for efficient operation and maintenance of the power station, including staff access and movement, and building configuration.

Respect the outstanding marine biodiversity of the Blackwater Estuary

The marine environment of the Blackwater Estuary is of national and international importance for nature conservation, and our proposals therefore give special attention to the local marine sensitivities. This includes, for example, designing the cooling system to minimise harm to native oyster populations; minimising disturbance to protected species and habitats; and seeking to minimise effects on coastal processes.

Protect the rich biodiversity and ecology of the Dengie Peninsula

The biodiversity of the Dengie Peninsula is closely linked with the surrounding marine environment and should be given similar consideration. This includes, for example, retaining existing habitats where possible, including the borrow dyke landward of the existing flood embankment; minimising disturbance to protected species and habitats; and incorporating the 'enhance – avoid – mitigate – compensate' hierarchy in relation to key environmental aspects as an integral part of the design process.

Protect the amenity of our neighbours and local communities

This includes, for example, implementing new landscape screening, landform, and acoustic barriers where appropriate; aiming to locate the most potentially disruptive activities away from sensitive site boundaries; delivering construction materials to site by sea as far as practicable, to reduce lorry movements on local roads; and concentrating use of the areas of lowest flood risk within the site to minimise flooding off-site.

Be sensitive to the distinctive visual setting of the Blackwater Estuary

The development of the Bradwell B power station will be visible from points throughout the wider setting of the Blackwater Estuary. Our proposals will seek to minimise this impact by, for example, considering long distance views from Maldon, Brightlingsea and further afield; minimising the spread of permanent development across the peninsula; giving careful consideration to the composition of larger elements, including the relationship of the new development with the existing Bradwell power station; and integrating design work with early landscape and visual impact assessment.

Respond to the distinctive landscape character of the Dengie Peninsula

The permanent development should use sensitive planting and landform to better integrate the development into the local landscape. This includes, for example, ensuring that where new landform and planting is created it responds to, and is integrated with, the specific local character.

Respect the history and setting of local heritage assets

Our proposals respect the unique history of the Chapel of St-Peter-on-the-Wall and would seek to minimise impacts on the setting of the chapel and other designated heritage assets as far as is practicable.

Protect recreational use of the Estuary and Peninsula

This includes, for example, minimising effects on the proposed England Coast Path and other recreational routes, and ensuring rights of way that require temporary diversion during construction works are as direct as possible, and of a similar or better standard to the original right of way.

Deliver high quality infrastructure design

As we develop our proposals in further detail, we will work to deliver an infrastructure development of high quality, from the scale of the permanent development layout to the architecture of some of the more significant buildings and structures, where practicable. This would be achieved by, for example, delivering a planned composition that is coherent, clear, and uncluttered; developing a coordinated architectural language for each of the key building groups; and designing to be durable and robust, especially considering the coastal environment.

Provide a high quality place to work

Create a sense of place and community for the workforce within the site both during construction and operation.

Anticipate future needs

Large infrastructure projects involve long timescales must respond accordingly by, for example, incorporating effective means of adaptation to future flood risk in response to climate change without major disturbance or disruption to the power station and local community, and designing for flexibility as the project develops in detail. Whilst some parts of the development will be fixed between now and the DCO application, our experience demonstrates that the design of some parts will continue to develop, and our designs must anticipate this.

Deliver a positive legacy

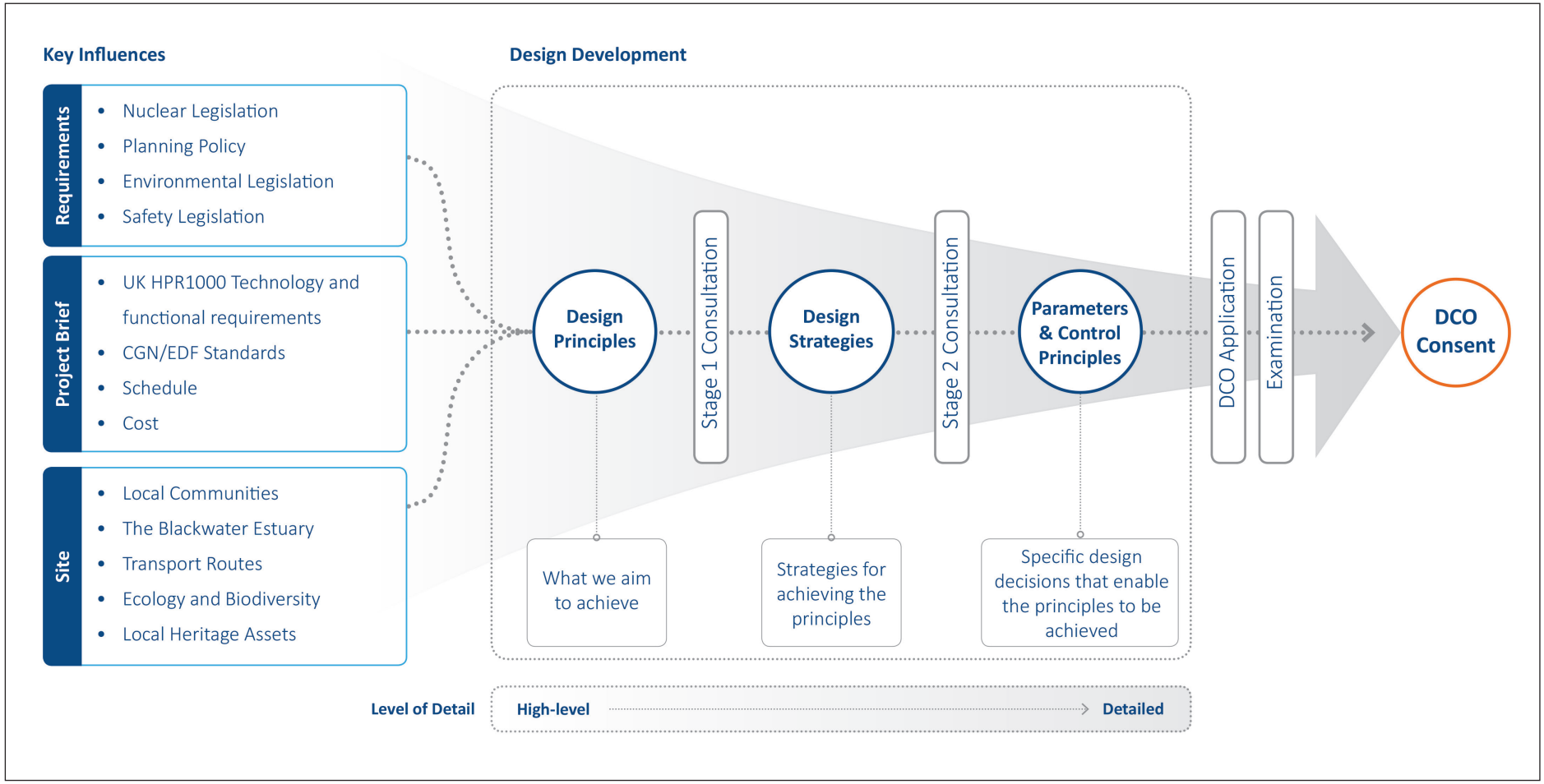
By embedding an awareness of the long-term legacy of the project within our design process, we aim to deliver a project that provides a positive legacy by, for example, considering the elements of the permanent development that will remain following decommissioning; delivering biodiversity net gain through habitat creation and restoration as part of an integrated landscape restoration strategy; and delivering enhanced public access to non-operational areas, integrated with existing networks. Put simply, our mission is to ensure that the Bradwell B power station is designed, built and operated in a way that we can all be proud of.

We welcome your feedback on the design principles described above and if there are any other matters that we should consider.

3.6.10 These principles are not isolated but interact with each other, and changes to one will likely mean changes to another. They should therefore be considered collectively, and used as a tool for us to check that our decision making processes consider the project in a holistic way. We also expect additional principles to emerge as we gather more information, and in response to feedback from this Stage 1 public consultation.

3.6.11 As the project progresses, these design principles will therefore be expanded upon and refined, in consultation with stakeholders, to develop a set of strategies that give structure to achieving each of the principles. These will then be further defined and developed to form a comprehensive design brief for the Project. Each of these stages will be consulted on in subsequent stages of consultation. Following public consultation, this proposed comprehensive design brief would be included in the application for development consent and would ensure the design principles are followed during implementation. This process is described in Figure 3.32 below.

Figure 3.32 - Route-map for Bradwell B design principles



3.7. Construction Phase Proposals

General requirements

3.7.1 Construction of Bradwell B would take between 9-12 years to complete, including works for the restoration of land used temporarily during construction. The main development site would extend to approximately 500ha in total of which around 100ha would be the permanent development site that would be occupied by the power station throughout its operational lifespan.

3.7.2 The construction of the Bradwell B power station would require the following facilities:

- Road access including an entrance plaza for HGVs and coaches, security/vehicle search facilities, and car-parking;
- Construction site fencing and lighting (including security lighting);
- Contractor working areas including materials laydown, workshops, module assembly, equipment storage; offices and welfare facilities;
- Storage areas for soil and spoil from earthworks;
- emporary structures including concrete batching plant and associated facilities to stockpile aggregates and cement;
- Marine works area for construction of cooling tunnels and headworks;
- Internal construction and haul roads, fencing, lighting and security;
- Collection, treatment and disposal facilities for surface water and sewage, including a discharge pipe into the marine environment;
- Potential infrastructure for the transport of marine dredged aggregate to site for raising the platform. This may include settlement lagoons and a pipeline to discharge sea water back to sea;
- Beach landing facilities to the west and east of the existing Bradwell power station for transporting bulk materials and AILs to site by sea;
- Temporary utilities including potable water supply, telecommunications, and electrical supplies including a temporary 132kv substation; and
- Landscape features including earthworks and planting as well as other forms of environmental mitigation, compensation and enhancement.

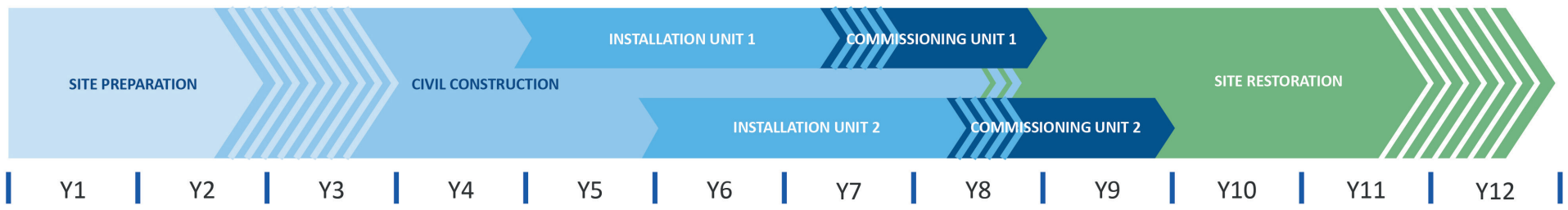
Construction phasing

3.7.3 Construction of the Project is split into five main phases. These are:

- Site preparation, duration 24 - 36 months: This would form part of the enabling works stage (described at Section 2) and involve site levelling and excavation of major earthworks as well as completion of temporary arrangements for the site. These encompass water supply, drainage, electrical supply, roads, batching plant and bulk material delivery facilities. Secondary facilities such as canteens, medical facilities and parking would also be included.
- Civil construction, duration 29 - 38 months: This would see the completion of major building construction. The goal of the civil construction phase is to complete the major building construction including installation of the reactor dome on the top of the reactor building. Other works would include the completion of main concrete construction and structural steel buildings.
- Installation, duration 27 - 33 months: This would deliver the integrated engineering of civil works, plant, and equipment to form functional systems. All systems including primary loop equipment, as well as power, water, and ventilation systems would be installed, ready for commissioning.
- Commissioning, duration 14-20 months: 'Cold' functional testing would commence in this phase, culminating in the commercial operation of the unit. 'Hot' functional testing, containment testing, fuel loading, and synchronisation to the grid would also take place, before handover to power station operations.
- Site Restoration, duration 24-36 months: This would complete landscaping works for the power station and restore those parts of the main development site not required during the operational phase in accordance with the landscape strategy. Works would include removal of temporary construction phase infrastructure, ground reprofiling, subsoil and topsoil spreading and planting/seeding.

3.7.4 These are illustrated in the programme in Figure 3.33.

Figure 3.33 – Indicative construction phasing



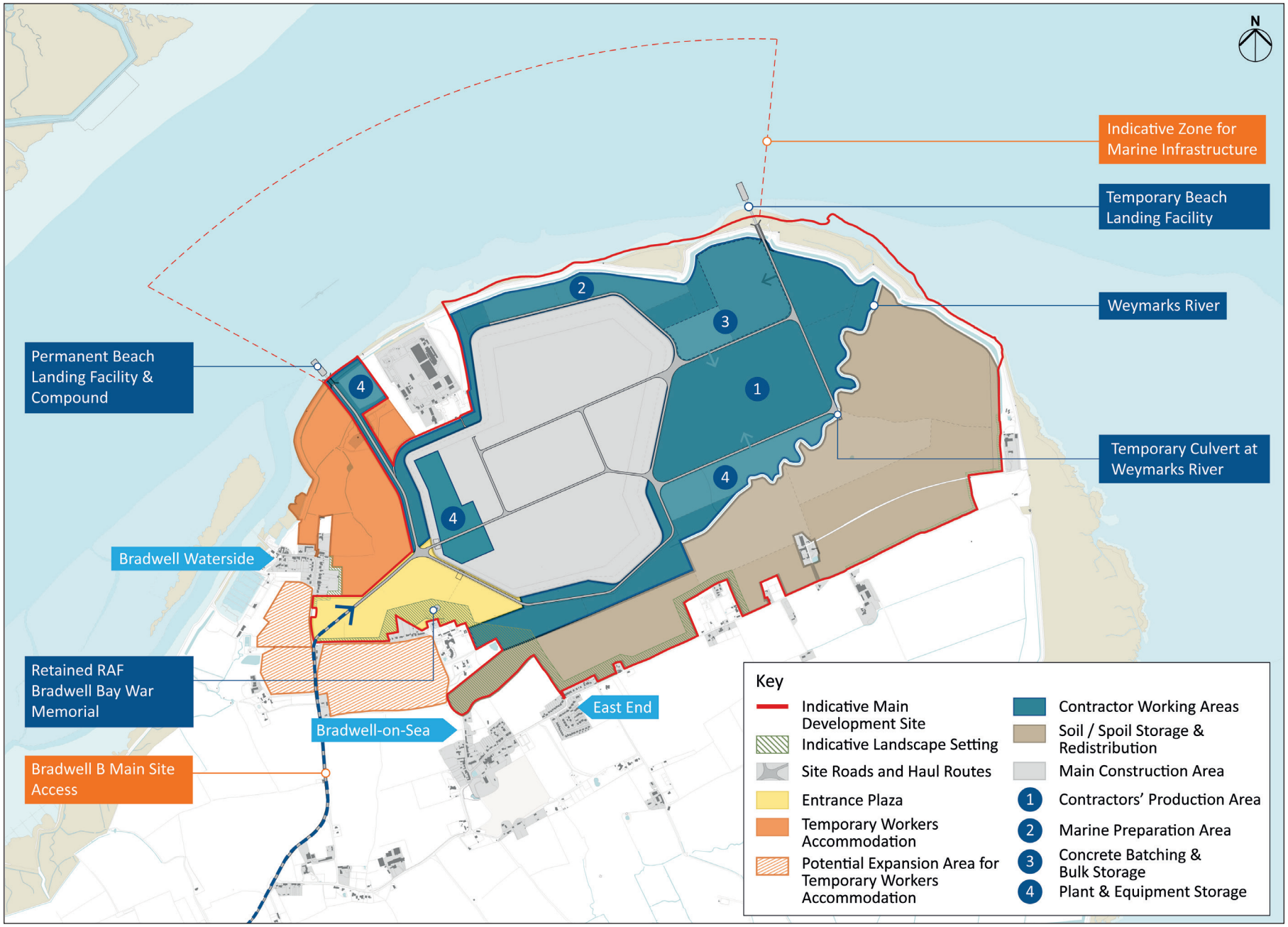
Indicative construction phase masterplan

3.7.5 Figure 3.34 illustrates our indicative construction phase masterplan which shows the proposed general layout of the main development site. The area that would be occupied permanently by the Bradwell B power station is referred to as the 'Main Construction Area' within the masterplan. This is where, initially, major excavations would be required to construct the power station's foundations. During construction, this land would be raised to the appropriate platform level (currently assumed to be 7.4m AOD) and enclosed by sea defences.

3.7.6 The temporary construction area is all of the additional land making up the main development site that would be required temporarily to construct the power station. It would be used by the contractors involved at the various stages of construction. Further details on the use of this land as given below.

3.7.7 Purpose built temporary accommodation for construction workers would be required close to the site. It is anticipated that this would be a mix of campus buildings, caravans and amenity facilities. We have identified a preferred location for this accommodation complex next to the existing Bradwell power station; additional land further to the south is also identified should this be required. The accommodation facilities do not form part of the main development site, but the area is illustrated on the indicative construction phase masterplan for clarity. See Section 4 for further details.

Figure 3.34 – Indicative construction phase masterplan



Site access and entrance plaza

3.7.8 The main development site would be accessed from the B1021 via a new entrance road. All road traffic entering and leaving the site would use this route: contractors, staff and visitors vehicles, and construction traffic including HGVs and coaches transporting construction workers to/from the construction site.

3.7.9 An entrance plaza at the primary entrance would allow for controlled and secure access into and out of the site. Our designs for this area are in the early stages, and this will be a key area for ongoing design development following Stage One consultation.

3.7.10 Access to the existing Bradwell power station would be maintained, potentially with some realignment of the existing access route to enable an efficient entrance plaza.

3.7.11 There would also be a new access road for AILs entering the site via the main development site entrance which would run from the proposed new Beach Landing Facility west of existing Bradwell power station (see Section 3.9). The access road would run between the site entrance and the layout areas for heavy plant/AILs.

Fencing, security and lighting

3.7.12 Fencing would be installed around the perimeter of the construction site to control access in accordance with regulatory requirements. Access would be limited to security checkpoints within the entrance plaza as described above.

3.7.13 Areas within the construction site would need to be lit according to their functional requirements. A lighting strategy will be developed to accompany the development consent application.

Contractors' production area

3.7.14 The Contractors' Production Area would be the central 'hub' of the construction phase masterplan, immediately alongside the permanent development site for the power station.

3.7.15 Many of the contractors for civil, structural, mechanical and electrical engineering would operate from this area. There would be a requirement for temporary buildings such as workshops and warehouses, as well as external laydown space for storage of construction plant and materials outside.

3.7.16 The current allocation of land for this area assumes a worst case of the largest area being required and is based on experience in construction of the reference design. It may be possible to reduce the size of this area as the construction masterplan is developed in more detail.

Marine preparation area

3.7.17 Construction of the cooling water tunnels, headworks, and sea defences would take place in this area. It is best located between the power station's cooling towers and the coast, to launch construction of the cooling tunnels and sea defences around the platform. The seawater intake and outfall tunnels would be buried and installed using low impact methods such as jack piping or tunnel boring so there would be no impact on the sea bed except for the headworks location. The area would include a range of contractors' facilities including laydown, workshops, warehouses and plant storage. The marine preparation area would have its own dedicated concrete batching facility. Spoil arising from construction of the cooling tunnels would be stored adjacent to this area before re-use on-site for construction or landscaping.

Concrete batching and bulk storage

3.7.18 Construction of a nuclear power station requires considerable quantities of concrete, prepared to very high technical standards for safety reasons.

3.7.19 A large concrete batching plant would be required on-site to manufacture concrete. In order to reduce HGV traffic, we intend to transport the majority of sand, aggregate and cement by sea. Therefore, the concrete batching plant would be located close to the proposed Beach Landing Facility (BLF) for bulk materials. Bulk storage of aggregate and cement would also be provided in this zone. Methods for transport of aggregate and cement from the BLF to the bulk storage facilities is under investigation. The batching plant would serve all construction apart from the Marine Preparation Area which would have its own facilities.

Plant and equipment storage

3.7.20 Areas will be allocated within the construction phase masterplan for plant and equipment storage. A heavy plant and AIL store would be needed within the construction security fence close to the construction site entrance, which would receive AILs arriving from the proposed BLF next to the existing Bradwell power station. Additional storage areas and buildings will also be required elsewhere within the site.

Site drainage, wastewater treatment and sisposal

3.7.21 A sustainable drainage strategy will be developed to capture, attenuate, treat and discharge surface water in an appropriate manner without causing an increase in flood risk off-site and ensure that the construction site is protected from flood risk associated with heavy and prolonged rainfall.

3.7.22 Run-off would be collected and treated in Water Management Zones to receive flow attenuation and treatment prior to discharge. We anticipate the need for a number of discharge points within and around the site including potentially discharges to surface water, groundwater and the sea.

3.7.23 Foul sewage arising from welfare facilities and temporary workers accommodation located close to the site entrance would be treated on-site in package treatment works and discharged to sea via an effluent pipeline.

Internal site roads and haul routes

3.7.24 The layout of internal site roads and haul routes are in the very early stages. It is envisaged that haul routes would run around the perimeter of the Main Construction Area and the main power blocks where the deep excavations would take place. The haul routes would be used by large plant used in site earthworks and would run to and from the materials storage and stockpiling areas within the site. Weymark's river would be culverted to provide site access east of the river.

3.7.25 Internal site roads would also be provided for HGVs and coaches to access work areas within the site. Engineering routing studies for the configuration of these roads is underway. The roads would separate different types of vehicles and pedestrians in accordance with site safety requirements.

3.8. Earthworks Strategy

General approach

3.8.1 The construction would involve major earthworks to strip topsoil from working areas, carry out deep excavations to construct the power station's foundations and to terrace the site west of Weymark's river for construction access. Some of this material, such as sand and gravel, would be suitable for re-use as engineered backfill. Other materials, such as London Clay, may be suitable for use in the sea defences. Some of the topsoil will be required after the power station has been built to deliver the landscape restoration.

3.8.2 Materials suitable for re-use in construction would be stored in 'working stockpiles' that would be actively used as necessary during construction. Other materials, such as topsoil that would not be required until the final site restoration would be put into long-term storage in soil mounds that would be profiled, grassed and left until needed. These mounds would have potential to be sited and managed in a manner that would help to protect the amenity of neighbouring properties, which we will explore in future design development.

3.8.3 Our preliminary estimate is that between 1 and 2 million cubic metres of excavated spoil would probably be unsuitable for re-use in construction. This could be re-used sympathetically on-site to deliver landscape and ecological mitigation and enhancement and also help balance the earthworks within the site.

3.8.4 It is intended to use this material immediately as it becomes available to deliver a proportion of the permanent new landform outside the construction working area and to provide screening from residential areas, as well as to create new ecological habitat. See Section 3.5 for further details. This would be the most sustainable option because it would help deliver important environmental mitigation and enhancement on site and avoid the negative environmental impacts associated with transporting material off-site. However, we recognise that there are limits to how much material could sustainably be re-used on site without causing negative environmental impacts, for example in relation to the setting of designated heritage assets. Our initial proposals recognise these constraints and we look forward to working with stakeholders to develop these proposals following the Stage One consultation.

3.8.5 Should excess material be generated during construction that cannot sustainably be re-used on-site, it would need to be re-used off site. We are aware of schemes, such as habitat creation being carried out by the RSPB at Wallasea Island, which may provide opportunities to utilise this material. An alternative approach would be for us to develop a 'borrow pit' in the local area to source sand and gravel for construction where surplus material could be re-used to restore the borrow pit and help to balance the site's earthworks.

Aggregate sourcing

3.8.6 We estimate that we would need to source between 2 and 3 million cubic metres of bulk fill to site to raise the power station platform to 7.4m AOD. The wider Construction Preparation Area would be terraced during the earthworks stage to facilitate platform development and internal site access.

3.8.7 Initial material sourcing studies have been carried out, including a review of the Essex Minerals Local Plan and offshore sourcing options. This identifies a number of existing quarries in Essex which are of potential interest to the Project, including a number potentially suitable for transport to site by sea.

3.8.8 Detailed technical studies will need to be carried out to confirm project needs regards the quality and quantity of aggregate. It is possible that general fill could be sourced locally, whereas the higher specification material required for concrete manufacture might not.

3.8.9 Currently, we do not envisage the need for new mineral extraction facilities. We also recognise that there is a general planning policy presumption against new mineral extraction. However, we note that the Essex Minerals Local Plan states there can be local authority support for extraction in the form of 'borrow pits', where extraction takes place over a limited period for a specific construction project. Should we identify subsequent need for a borrow pit we would consult on our proposals and options in future stages of consultation.

3.8.10 We are also considering an option to import marine-dredged aggregate to the site by sea. Further details on this option are provided in Section 3.9.

3.8.11 Overall, our objective is to work sustainably within environmental and planning constraints and policies in order to meet the Project's needs.

Construction landscape plan

3.8.12 We will continue to explore how the development of the landscape strategy can be integrated with construction phasing to ensure that landscaping works can be delivered as early as practicable, leaving an established landscape following site restoration. It is envisaged, for example, that when the new landscape and habitats have been completed in the area east of Weymark's river, the temporary culvert across the river would be removed and the construction fence pulled back to release this land from the construction site and put it under appropriate management.

3.9. Marine Transport Options

Background

3.9.1 This section describes a number of marine transport options for delivering freight to site by sea to help reduce HGV traffic on local roads. See Section 4 for further details about what types and quantities of freight would be required and what part marine transport could play in our transport strategy.

3.9.2 We recognise that the marine environment is highly sensitive and strongly protected. Our aim is therefore to develop proposals that meet the project requirements in terms of functionality, cost and schedule, whilst also taking account of environmental constraints to develop a sustainable solution for the Project. We have consulted with the marine logistics supply chain, stakeholders and specialist marine consultants in developing our proposals. We have assumed that 2 to 4 deliveries by sea would be required each day during peak construction, see Section 4.6 for more information.

3.9.3 To minimise reliance to road transport, the marine facilities must be capable of handling bulk materials such as fill for raising the platform of the power station and/or aggregate and cement used in the manufacture of concrete. It would also be beneficial if the facility is capable of transporting other cargoes such as steel reinforcement. In addition, the project requires a means of bringing AILs such as large power station components to site by sea as some of these will be too large or heavy to be transported by road. Not all marine transport facilities handle the same cargoes and therefore more than one type of facility may be required.

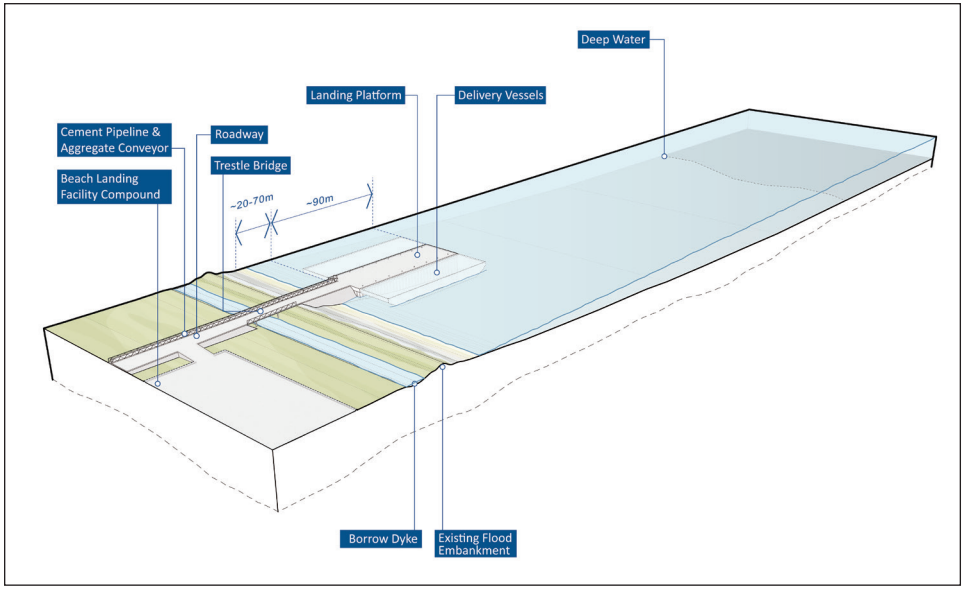
Proposed marine transport options

3.9.4 Four marine transport options have been considered, as follows:

Option 1: Beach Landing Facility (BLF)

3.9.5 This would comprise a level platform seaward of the present flood embankment formed by constructing a short open piled (stick) jetty or small embankment. The facility would extend between 20m to 70m seaward of Mean High Water Springs (MWHS). There may also be a requirement for barges up to 90m long x 30m wide berthed seaward of this structure to increase capacity for peak construction. Bulk materials would be offloaded by conveyor or truck; cement would be offloaded by pipeline or trucked from the facility to site in sealed containers. AILs would be 'rolled off' flat-top barges using specialist vehicles.

Figure 3.35 - Beach landing facility



Option 2: Bulk Material Jetty

3.9.6 This would comprise a relatively lightweight jetty approximately 600m in length in order to access sufficiently deep water to minimise dredging. The jetty deck would be suspended above the sea on piles driven into the seabed to reduce impacts on the marine environment. The jetty would have a conveyor and pipeline to unload aggregate and cement, respectively. There would be no roadway along the jetty, so it could not be used to transport other types of bulk materials, or AILs.

Option 3: Marine Offloading Facility (MOF)

3.9.7 This would be similar to Option 2 but with a wider and stronger jetty structure to support a roadway, so it could handle a wide range of freight. It would be able to cater for the same freight as Option 1.

Figure 3.36 - Bulk material jetty

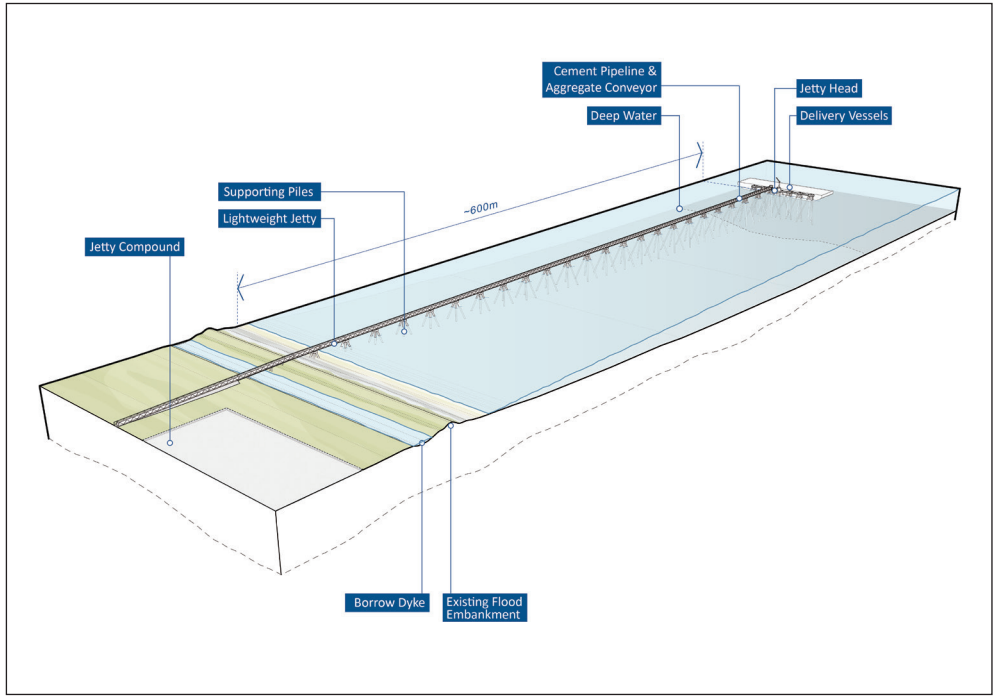
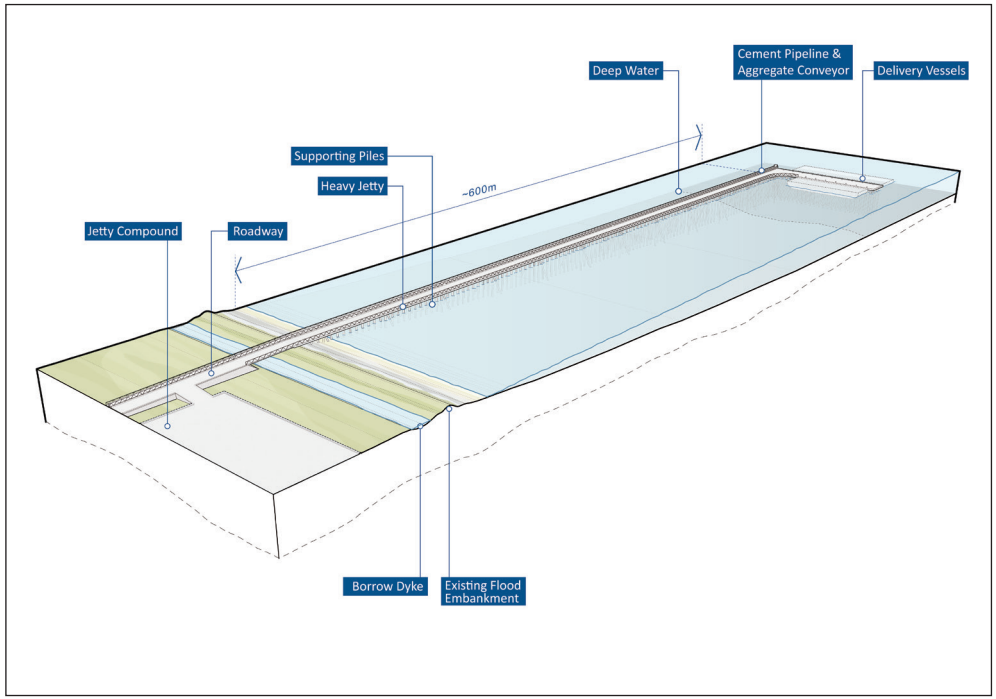


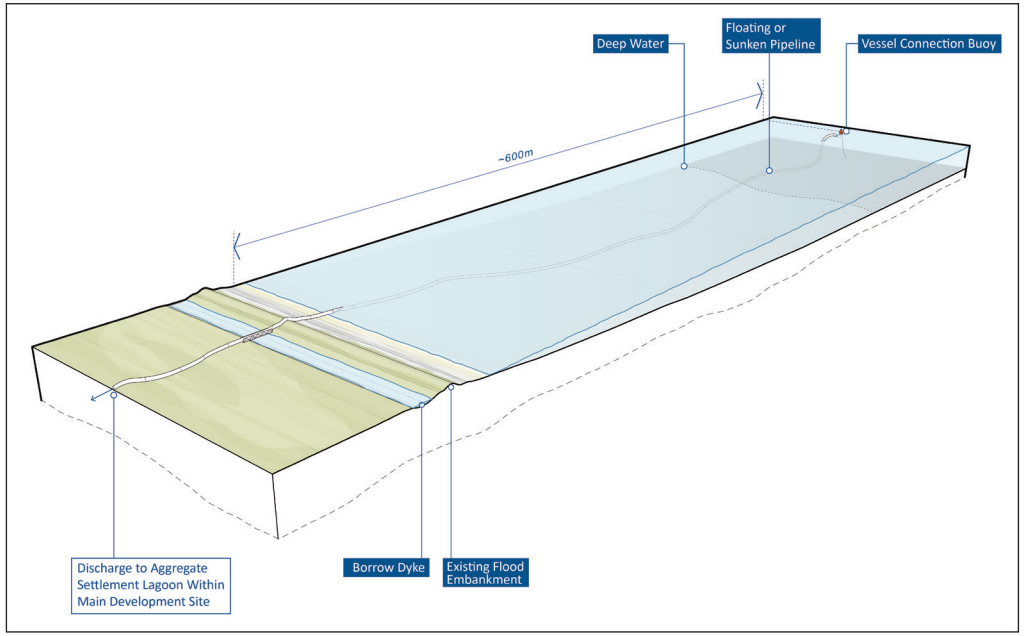
Figure 3.37 - Marine Offloading Facility (MOF)



Option 4: Aggregate Pipeline and Settlement Lagoon

3.9.8 This would comprise a vessel positioned offshore connected to a floating or sunken pipeline for hydraulic placement of bulk fill material. The vessel (a dredger) would source the material either offshore or from land sources via a muster port. The vessel would connect to the pipeline and pump sand and aggregate to a large (approx. 10 ha) on-site storage lagoon, using seawater as a transport medium. The sand and aggregate would settle out within the lagoon and the transport water would be treated as necessary and discharged back to sea via a pipeline.

Figure 3.38 - Aggregate Pipeline and Settlement Lagoon



3.9.9 Table 3.2 shows the types of freight that could be handled by each option.

Table 3.2: Freight handling capabilities of marine transport Options 1-4

Option	Bulk materials			AILs
	Bulk fill / aggregate	Concrete	Steel rein-forcement	
Option 1 Beach landing facility	✓	✓	✓	✓
Option 2 Bulk material jetty	✓	✓	✗	✗
Option 3 Marine offloading facility	✓	✓	✓	✓
Option 4 Marine-dredged aggregate pipeline	✓	✓	✗	✗

3.9.10 Options 1 and 3 would be capable of delivering all bulk materials to site and there would be no difference between them in respect of their capacities. Both options could also be used to deliver large items (such as AILs). They would therefore both have the same potential to reduce reliance on road transport. Option 2 would be capable of handling bulk fill / aggregate and concrete, but not other materials such as steel reinforcement or AILs. Option 4 would only be suitable for delivering bulk fill and aggregate. Because some AILs needed for construction would be too large to transport to site by road, Options 2 and 4 would need to be used in combination with Options 1 or 3.

3.9.11 A further consideration is that we would need to have an ability to occasionally transport AILs to site during the operational phase of the Bradwell B Project. Options 1 and 3 would both have the potential to meet this requirement by retaining them as permanent development.

3.9.12 Table 3.3 below contains further technical and environmental information on each option. We have focused on ecological impacts and functional requirements as these are the principal considerations at this stage.

Table 3.3: Technical comparison of marine transport Options 1-4

	Option 1 BLF	Option 2 Bulk Material Jetty	Option 3 MOLF	Option 4 Aggregate Pipeline
Approximate length of structure	20 – 70m (plus 90m x 30 barge or equivalent structure)	600m	600m	-
Approximate number of piles (~1m diameter)	0 to 30	145	340	-
Estimated duration of construction	1 - 3 months	6 - 9 months	12-18 months	<1 month
Estimated dredging requirement	Up to approximately 100m x 50m x 1m deep per berth	Minimal	Minimal	Minimal
Relative loss of intertidal habitat	Low/Medium	Low/Medium	High	Low
Risk of underwater noise creating a temporary barrier to migratory fish	Low	High	Very High	Low
Relative impact on coastal processes	Low	Medium	Medium	Low

3.9.13 The options differ significantly in the scale of infrastructure that would be involved resulting in differences in the likely levels of environmental impact.

3.9.14 The size/scale of the options is an important factor because larger facilities would require more piling over a longer period. Piling will generate underwater noise that could act as a temporary barrier across the estuary to migratory fish, including eel, smelt and potentially lamprey, if present. Due to these species migrating at different times of year, the only period the estuary is not likely to be used for migration is June and July. Due to the smaller size of Option 1, it should be possible to complete all necessary piling during this seasonal window which would avoid this potential impact. This is unlikely to be feasible with Options 2 or 3, which may be unacceptable to regulatory authorities.

3.9.15 The construction of all options would result in the loss of some designated intertidal mudflat habitat. The amount of habitat loss would be very small in comparison to the total amount of habitat within the Estuary. Option 4 would result in very little habitat loss if any because the pipeline would float or rest on the seabed. Of the remaining options, habitat loss would likely be lowest in Option 1 and higher in Options 2 and 3. This is a reflection of the different size of the options (see Table 3.3).

3.9.16 Options 1 and 4 would have minimal effects on coastal processes. Options 2 and 3 would both be open piled structures to reduce impacts on coastal processes, but impacts would still be higher in comparison with the other options given their length and the relatively large number of piles required.

3.9.17 We estimate that there would be up to two to four vessel movements per day at peak construction. We consider that this small level of activity is unlikely to disturb marine wildlife in the context of baseline maritime activity within the estuary and further offshore. Option 1 is nonetheless considered to have the least potential for disturbance to foraging overwintering birds, because vessels would enter and leave the facility at high tide, and would be stationary at low tide, when the mudflats are exposed.

Preferred marine transport option

3.9.18 Considering all the above information, the Beach Landing Facility (Option 1) is our preferred option. It would handle the full range of freight with the least environmental impact and could be available for use in the shortest possible time. We therefore consider that this option and would be most effective in reducing HGV traffic on local roads, including in the 'early years' period before all of our proposed road improvements are likely to be available.

3.9.19 Our construction phase masterplan, as illustrated in Figure 4.32, therefore shows Option 1, the BLF. Our current view is that for logistical reasons, two BLF facilities would likely be required although it is feasible that a single BLF could suffice. One is proposed to the west of the existing Bradwell power station, for transporting AILs to site. This location benefits from deep water close to shore, a benign wave climate, and lack of ecological features. This location would be suitable for the operational phase, meaning that it would be retained after construction for permanent use.

3.9.20 A working area around this BLF would need to be constructed, including land for materials storage/laydown, security and welfare facilities, and fencing.

3.9.21 A second facility would be required with access to the concrete batching area to be established within the temporary construction area (see Figure 4.32 Indicative construction phase masterplan). This location is also close to deep water and avoids key ecological features such as saltmarsh.

3.9.22 The existing flood defences are at the same level or lower than the proposed trestle deck, so freight could be transported over the existing flood embankment without difficulty. The integrity of the existing flood embankment would be protected, and a monitoring programme would be implemented.

3.9.23 Because the trestle bridge would cross the flood defence embankment at or around ground level it may be possible to keep the existing footpath (and proposed England Coast Path) that runs along the embankment open when the facilities are not in use. However, the footpath would need to be closed during their construction. Working with stakeholders, we will develop alternative temporary access arrangements, including use of diversion routes, and will consult on these proposals in our Stage Two consultation.

3.9.24 In addition, we intend to continue to explore Option 4 alongside the BLF because we think it has potential as an efficient and complimentary means of transporting marine-dredged aggregate to site with minimal marine infrastructure.

3.10. Summary and Next Steps

3.10.1 A key feature of the indicative masterplan is that the power station would sit on higher ground set back from the coast to the south and west of the existing Bradwell power station. This arrangement would have the following benefits:

- It would reduce the amount of engineering fill required to raise the platform, which would support the safety critical buildings for Bradwell B and reduce HGV traffic on local roads;
- It would allow retention of the existing flood embankment and borrow dyke and therefore avoid loss of associated ecologically designated habitat;
- It would focus the permanent development on areas of lowest flood risk within the main development site and reduce the risk of off-site flooding;
- Setting the permanent development in the south western part of the site would help reduce impacts on the setting of the grade I listed Chapel of St Peter-on-the-Wall and scheduled Roman Shore Fort of Othona;
- It would maximise the separation distance between the development and the extensive intertidal mudflats associated with Dengie flats to the east which should help reduce disturbance of wintering birds; and
- Pulling the boundaries of the permanent development back from the coast would maximise the land available for use in ecological mitigation and enhancement after the power station has been constructed, and would also help reduce amenity impacts on the proposed England Coast Path.

3.10.2 As we develop our designs we will continue to focus on the impact that locating the development in this location would have on local residents and the community within and around Bradwell-on-Sea and Bradwell Waterside.

3.10.3 Future design work will develop and optimise the masterplans; this work will follow the proposed design principles set out in Section 3.6 and take into account feedback received on these principles from this Stage One consultation.

3.10.4 Safety will be our over-riding priority and as the masterplan for Bradwell B evolves, we will ensure that nuclear safety risks are as low as reasonably practicable in close consultation with the regulatory authorities.

3.10.5 Locating Bradwell B back from the coast would bring it closer to the villages of Bradwell-on-Sea and Bradwell Waterside. Both our temporary construction phase and permanent masterplans incorporate off-sets and landscaping (both landform and planting) along sensitive boundaries to help protect the amenity of our neighbours and local communities. This will continue to be the subject of detailed assessment, including lighting, dust, and noise assessment, to inform how we can design these boundaries in detail to provide the most effective protection.

3.10.6 A key task will be for us to continue to refine the masterplan for the permanent development, especially the alignment of the main power blocks, and relationship between the cooling towers and turbine halls. We will work closely with our landscape architects, and stakeholders, to ensure that detailed landscape and visual impact assessment work informs this process. Alongside this, we will explore the use of colour and material at a building level, informed by detailed viewpoint assessment.

3.10.7 Careful consideration will be given to the amount of land required for the permanent development including more detailed analysis of building sizes, requirements and relationships. Opportunities to rationalise buildings and facilities such as use of shared facilities will continue to be explored. The same approach will be applied to the construction phase masterplan, which will be updated and developed as our technical studies progress.

3.10.8 We will continue to develop our marine transport proposals taking into account feedback received on the four options from this Stage One consultation. We will provide further information on our proposed marine solution in the Stage Two consultation.

3.10.9 We believe that siting the power station back from the coast, our indirect cooling strategy and preferred marine transport options are an appropriate response to the sensitive marine environment. A lot of further detailed work will be required, however, to fully assess the impacts and specify any required mitigation, and we will continue to work closely with stakeholders as this work continues.

3.10.10 We will continue to develop our proposed landscape strategy, informed by detailed environmental impact assessment on landscape and visual impacts, ecology, and recreation and amenity. We will develop the strategy in line with the approach set out in Section 3.5, and will look carefully at the timescales for implementation, looking for opportunities to integrate this with construction phasing.

3.10.11 We will work closely with stakeholders to understand what constitutes the setting of the Chapel of St Peter-on-the-Wall and scheduled Roman Shore Fort of Othona and to develop landscape proposals that would seek to maximise re-use on-site of surplus spoil without significant adverse effect.

3.10.12 We will also consider measures to enhance the setting of the RAF Bradwell Bay War Memorial to deliver a heritage legacy benefit from the Project.

TRANSPORT

4.1 Introduction

4.2 Existing Transport Context

4.3 Policy Context and Transport Objectives

4.4 Transport Strategy Objectives

4.5 Movement of Construction Workforce

4.6 Movement of Freight

4.7 Potential Highway Improvements

4.1. Introduction

4.1.1 This Section describes our initial proposals for the Bradwell B Project's transport strategy, focused on the construction phase of the proposed development when potential traffic impacts would be at their greatest.

4.1.2 Firstly, we summarise the existing transport context for the Project, including our understanding of the main transport constraints relating to all relevant transport modes. We do not underestimate the transport challenge faced by the Project given its distance from the strategic highway network, the characteristics of local roads within the Dengie Peninsula and lack of sustainable transport networks in the site's immediate vicinity, all of which are described. These conditions are not unusual for new nuclear projects.

4.1.3 We then summarise the national transport policy and our transport objectives and emerging transport strategy for the Project, which have been developed taking the existing transport constraints and planning policy into account. This includes information on the modal split for freight transporting construction materials to the site, by sustainable transport modes and road. Initial estimates of the likely average daily HGV movements to and from the main development site during the peak construction period are also provided.

4.1.4 Search areas and initial options for how we propose to facilitate the movement of construction workers and freight to the main development site by road are outlined and we welcome your feedback on these proposals. Your feedback will be taken into account alongside ongoing technical work as we continue to develop our transport strategy. Furthermore detailed information about our proposed transport strategy and preferred options for the Bradwell B Project will be contained in our Stage Two consultation.

4.1.5 This Section should also be read alongside Section 3: Main Development Site which provides information on our proposed marine transport options.

4.2. Existing Transport Context

4.2.1 This section provides a brief summary of the existing local transport context.

4.2.2 Figure 4.1 shows the Highway Options Search Area within which our proposed highway interventions would likely be located. The area encompasses the Dengie Peninsula, stretching from the A414 in the north and the A130 in the west to the River Crouch in the south. It shows the location of the Bradwell B site in the context of the local highway network.

Highway network

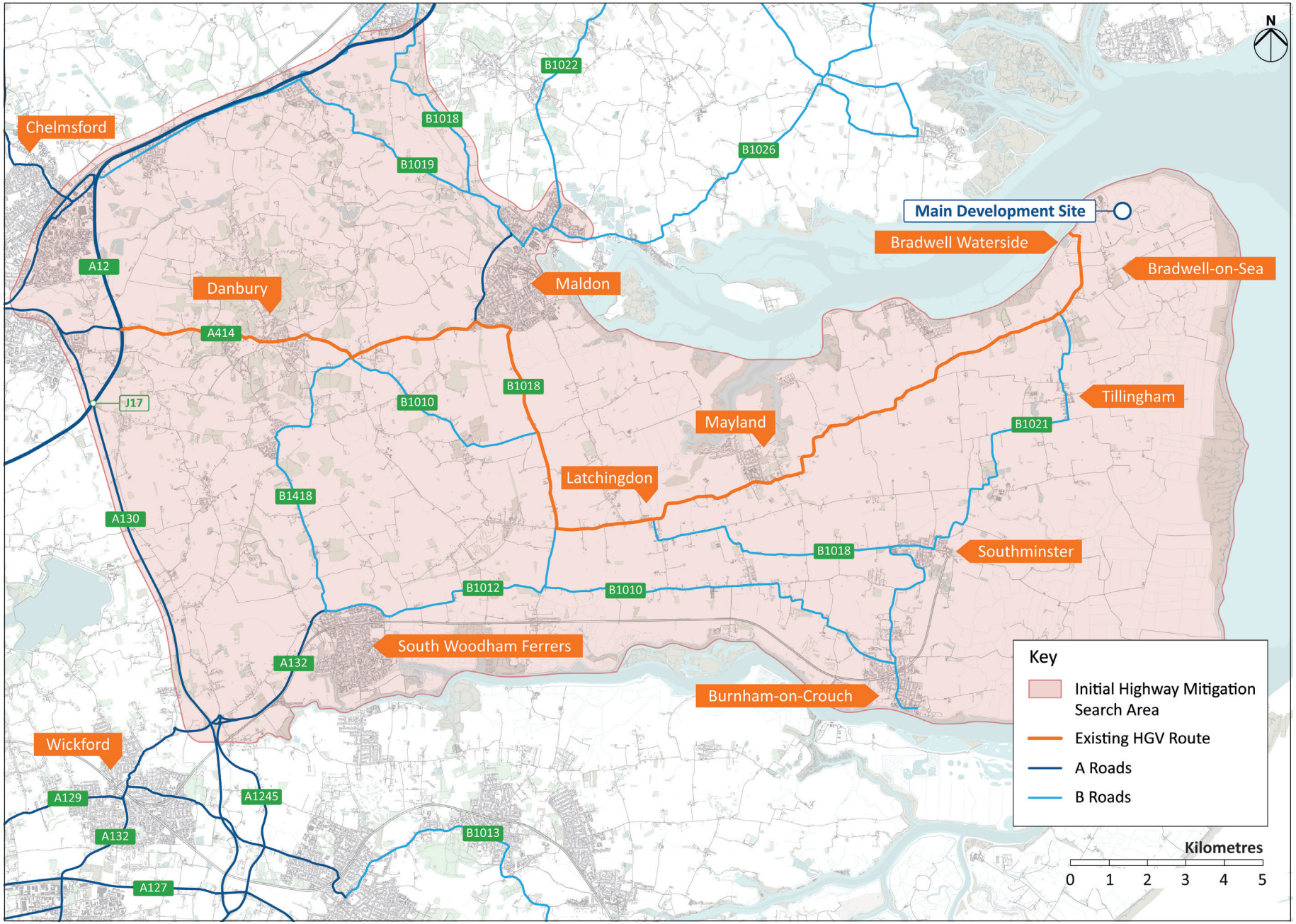
4.2.3 The A12 is part of the strategic road network and links London to Lowestoft and the ports of Felixstowe and Harwich. It is a 'heavy load route' (Highways England) between the M25 and A14 near Ipswich.

4.2.4 Further routes include the A414 through Danbury terminating at Maldon, the A130 to the south-east of Chelmsford and the A132 Burnham Road. All are subject to the national speed limit outside towns and villages and are mainly single carriageways. In general, the geometry of these roads facilitates the two-way movement of HGVs (i.e. that HGVs can safely pass each other) but sharp bends and narrow road width present restrictions in some locations.

4.2.5 From these routes the main development site can be reached either by the B1021, B1010 and B1012 or the B1018 and then unclassified roads. These routes are single carriageway with one lane in each direction. In population centres the speed limit is 30mph with approaches to these areas being predominantly 40mph.

4.2.6 Our initial work indicates that several junctions, including the A130 / A12 (junction 17) and the A12 / A414 (junction 18), currently operate within capacity during network peak hours, but we recognise that routes to these junctions run through several villages and through constrained junctions where there are limited opportunities to accommodate further HGV traffic without demand management measures and/or highway improvements being put in place. This has informed our proposed transport strategy and interventions.

Figure 4.1 - Highway Options Search Area



Rail network

4.2.7 Figure 4.2 illustrates the existing regional rail network (with potential freight transfer links by road and sea).

4.2.8 The Great Eastern Main Line (GEML) and the various branch lines link with London Liverpool Street and the wider national rail network. Most of the GEML network is electrified and offers high-frequency passenger services.

4.2.9 The nearest rail stations to the main development site are at Chelmsford (around 25 miles by road) and at Southminster (around 9 miles). Southminster is located at the terminus of the local branch line from Wickford.

4.2.10 Chelmsford, on the GEML, has some 98 passenger trains departing every weekday for London Liverpool Street between 05:17 and 23:25. Further enhancement of passenger services to and from London is anticipated with opening of the Elizabeth Line between Shenfield and Reading in 2021, with up to 24 trains per hour through the core section during peak periods.

4.2.11 The 16-mile branch line from Wickham to Southminster is single-track with a passing loop at Fambridge so that passenger trains running in each direction can pass each other. Some 27 passenger trains depart Southminster every weekday for Wickford or London Liverpool Street between 05:22 and 23:35.

4.2.12 The nearest existing points of access to the main development site for rail freight are at interchanges at Chelmsford and Southminster, where freight would need to be transferred into HGVs and hauled for the remainder of the route to site by road. New interchanges could potentially be constructed.

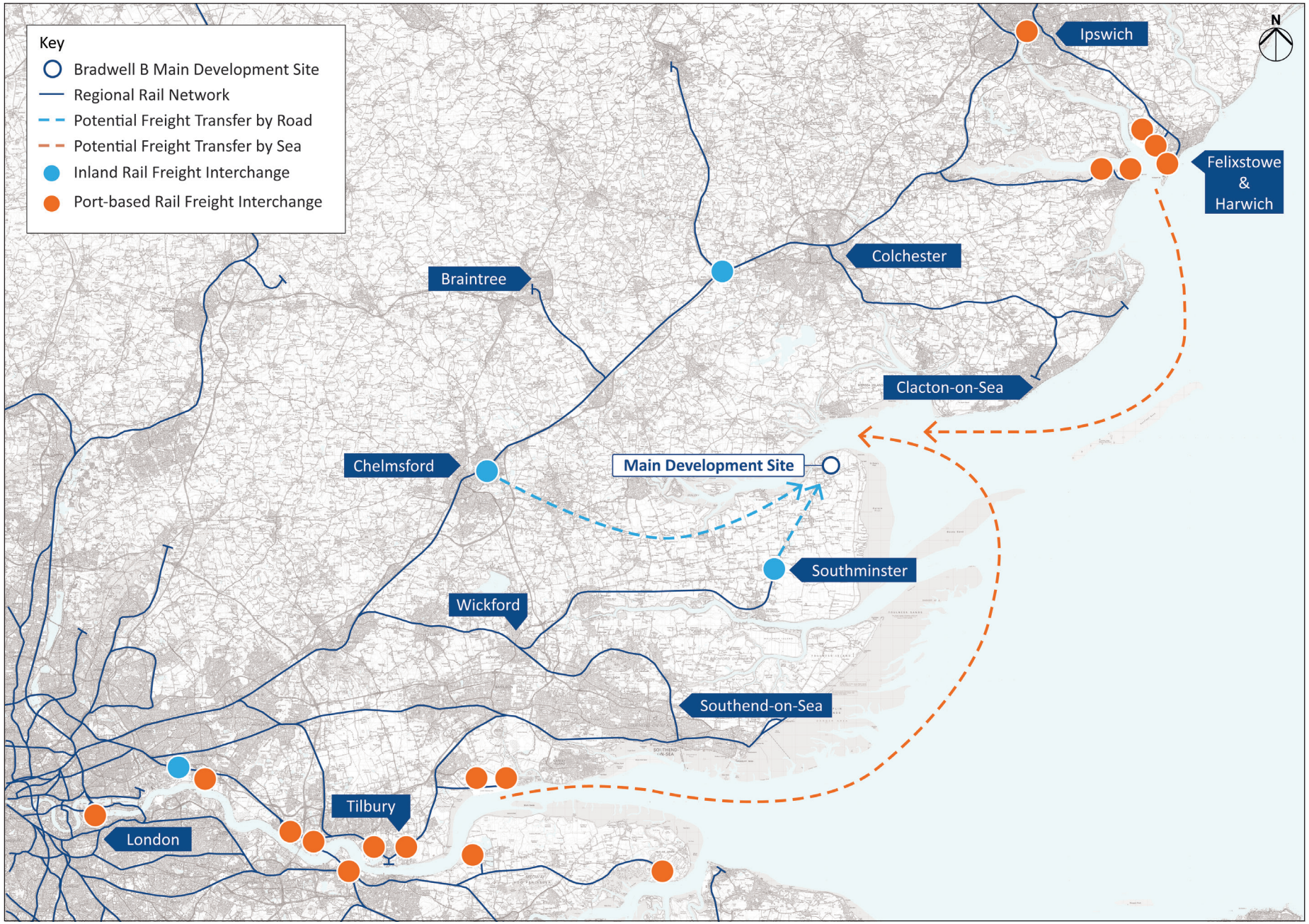
4.2.13 The route between London and Southminster via Wickford does not form part of Network Rail's "Strategic Freight Network". Although used in the recent past to move relatively small amounts of low-level nuclear waste associated with the decommissioning of the existing Bradwell power station, we understand that the local branch line to Southminster may not be capable of accommodating large freight trains without significant upgrade, including potential engineering reinforcement works. A new longer passing loop is also likely to be needed to allow passenger and freight trains to pass each other.

4.2.14 In addition to the physical constraints associated with the local branch line we understand that there are significant capacity constraints, particularly around Shenfield, which limit the availability of new freight paths. We also understand that there is only limited scope to increase capacity. Using rail to transport construction freight to site via the local branch does not therefore appear to be viable, although further discussions are required with Network Rail to fully understand the constraints associated with use of the branch line for rail freight and to identify the types and locations of possible rail interventions that could be carried out. However, as noted above, if this were feasible, HGVs would still be needed to haul freight from the existing (or new) interchanges on the branch line to the main development site.

4.2.15 Alternatively, rail freight could be taken to existing interchanges co-located with port facilities, for onward transport to the site by sea.

4.2.16 Rail appears to have more potential to transport construction workers to site, subject to provision of 'rail and ride' bus services by the Project at key railway stations, such as at Southminster, which will be fully explored as part of our ongoing transport studies following the Stage One public consultation.

Figure 4.2 - Regional Rail Network Context



Port infrastructure

4.2.17 The main development site does not benefit from any existing port facilities. As noted in Section 3, the Project therefore requires development of new marine transport infrastructure at the site in order to receive AILs, which cannot be transported by road or rail on account of their size and/or weight.

4.2.18 The nearest existing commercial port facilities are located at Felixstowe and Harwich, to the north of the main development site, and Tilbury to the south. Between them they offer a range of facilities to handle bulk materials, containers, AILs and general cargoes and could therefore operate as 'muster ports' for the Bradwell B Project's bespoke marine transport infrastructure, as part of the marine freight transport strategy to be developed for the Project.

4.2.19 The local marine environment at the main development site is well suited to marine transport. It is sheltered and has benign wave and current conditions. This is important because it means that marine navigation to and from any potential new marine transport facilities, and the unloading (or loading) of vessels using them, would generally occur in calm conditions, minimizing the risk of weather down-time. In addition, the local area benefits from a shallow sloping near-shore environment, with a soft sea bed comprising sands and clay, yet also has access to deeper water relatively close to shore. Collectively, these local marine conditions are therefore suitable for a wide range of different types of marine transport infrastructure and vessels.

4.2.20 We therefore consider that marine transport could make a major contribution to our strategy to minimise the amount of freight transported to site by road. Further details on what contribution it could make is provided in Section 4.6.

4.2.21 In Section 3: Main Development Site we identify the different types of marine transport infrastructure that we are considering and outline their advantages and disadvantages. We welcome your feedback on each of these options.

4.3. Policy Context and Transport Objectives

4.3.1 Section 5 of NPS EN-1 provides guidance on the principles and approaches that should apply to the transport and traffic impacts associated with an energy NSIP.

4.3.2 Paragraph 5.13.4 states that:

"Where appropriate, the applicant should prepare a travel plan including demand management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by public transport, walking and cycling, to reduce the need for parking associated with the proposal and to mitigate transport impacts."

4.3.3 Paragraph 5.13.6 notes that a new energy NSIP may give rise to substantial transport impacts on the surrounding transport infrastructure and that, if this is the case the application should seek to mitigate these impacts. Furthermore, clear direction is given on mitigation measures in paragraph 5.13.8 as follows:

"Where mitigation is needed, possible demand management measures must be considered and if feasible and operationally reasonably, required, before considering requirements for the provision of new in land transport infrastructure to deal with remaining transport impacts."

4.3.4 It goes on to state in paragraph 5.13.9:

"The IPC [now Secretary of State] should have regard to the cost-effectiveness of demand-management measures compared to new transport infrastructure, as well as the aim to secure more sustainable patterns of transport development when considering mitigation measures."

4.3.5 Paragraph 5.13.10 states that:

"Water-borne or rail transport is preferred over road transport at all stages of the project, where cost-effective."

4.3.6 Traffic demand management measures in this context can be broadly defined as promoting the use of alternatives to minimise single and low occupancy private car use and road-borne freight movements.

4.3.7 When referring to transport impacts, the policy states at paragraph 5.13.7 that:

> *"Provided that the applicant is willing to enter into planning obligations or requirements can be imposed to mitigate transport impacts identified in the NATA/WebTAG Transport Assessment, with attribution of costs calculated in accordance with the Department for Transport's guidance, then development consent should not be withheld, and appropriately limited weight should be applied to residual effects on the surrounding transport infrastructure."*

4.3.8 The thrust of policy, therefore, is that the applicant should take reasonable steps to provide mitigation so as to reduce impacts. We will prepare a Transport Assessment for the Bradwell B Project in line with the requirements of NPS EN-1 and this will be submitted as part of the DCO application. The Transport Assessment will demonstrate consideration of practical, cost effective and sustainable transport measures and demand management techniques that reduce road-based demand for travel and freight movement to site and support the delivery of the project in line with NPS EN-1.

4.4. Transport Strategy Objectives

4.4.1 Informed by analysis of the policy context and the requirements of the Project, the following transport strategy objectives have been developed:

- Maximise the use of marine and / or rail transport over road transport for movement of freight, where cost effective and deliverable within the Project timescales;
- Reducing the distance our construction workforce need to travel and promoting sustainable transport modes;
- Deliver appropriate demand management measures, where feasible, in preference to highway infrastructure improvements; and
- Implement highway improvements or other measures to mitigate any residual transport effects of the Project to an acceptable level.

4.4.2 Our transport strategy is based on promoting sustainable forms of transport that would reduce reliance on road transport having regard to national policy.

4.4.3 Our initial proposals have been developed in order to meet the strategic transport objectives outlined above. They take account of the environmental and community constraints that have to be identified in order to develop a sustainable transport strategy for the Project that is viable and deliverable.

4.4.4 The transport strategy set out in this Section has been divided into the following parts:

- Transport strategy for the movement of the construction workforce;
- Transport strategy for the movement of freight; and
- Potential highway improvements.

4.5. Movement of Construction Workforce

4.5.1 This section sets out our initial proposals for the movement of the Bradwell B Project workforce during the peak construction period. These initial proposals and options will be subject to further development taking into account further technical work and consultation feedback.

4.5.2 Our proposals would achieve a sustainable modal split for the Bradwell B construction workers. This would result from the provision of temporary workforce accommodation close to the main development site and through the provision of direct buses and park and ride facilities that will help minimise the daily use of private car by our construction workers.

4.5.3 A Construction Workforce Travel Plan would be developed in outline as part of the application for development consent and be implemented during the construction phase of the development to encourage sustainable travel by the construction workforce. We anticipate that this would include the formation of a Transport Review Group, which will include key transport stakeholders, to monitor performance against agreed mode share targets.

Peak construction workforce

4.5.4 For the purposes of Stage One consultation we are defining a likely realistic central estimate of up to 9,100 construction workers at peak, whilst also considering the effects of a worst-case of up to 10,600 construction workers that is intended to be used for environmental assessment purposes.

4.5.5 Further details on the construction workforce estimates are contained in Section 5: Jobs and People.

Distribution of workforce

4.5.6 In order to model the likely traffic impacts of the Bradwell B Project, it is necessary to estimate the anticipated future location of the construction workforce. For this purpose, an initial "gravity model" of the Bradwell B Project construction workforce has been developed. This is a spreadsheet based model which predicts the likely distribution of construction workers, taking account of the key factors that will influence the residential location of the workforce.

4.5.7 The "gravity" element of the model essentially takes account of the principles that, on average, the workforce will tend to choose to locate itself closer to the construction site rather than further away (subject to the availability of accommodation) and that more workers will tend to be located in towns and regions with larger populations rather than small villages and areas of lower population.

4.5.8 Development of the initial gravity model has been informed by a number of other assumptions and information sources, including those on the split of the construction workforce between "home-based" (i.e. workers who will already live in the local area) and non-home based. The initial gravity model has also been informed by an assessment of the availability and affordability of other sources of potential accommodation for non-home -based workers, based on publicly available sources for example census data. It provides a reasonable prediction of likely worker locations based on current information.

4.5.9 Outputs from the model have been used to inform the proposed park and ride areas of search and preliminary traffic modelling.

4.5.10 The gravity model itself is not the subject of this consultation, but it will be discussed with the relevant local authorities and refined as our proposals develop.

Temporary workforce accommodation

4.5.11 We are proposing to build temporary workforce accommodation close to the main development site to accommodate up to 4,500 of the non-home based construction workers required for the Bradwell B Project. This would minimise the daily traffic movements during construction and is the single most significant practical measure that we could implement to reduce construction workforce traffic impacts. Further details are provided in Section 5: Jobs and People.

On-Site car parking

4.5.12 Some construction workers would be allowed to drive direct to the main development site. This would be limited to those living in areas which would not be served by direct buses or where it would not be practical to use one of the temporary park and ride facilities that would be developed as part of the Project. In addition some workers would, for operational reasons, need to bring their car to the site to assist in the carrying out of their duties.

4.5.13 We therefore require a construction car park at the main development site. This would be managed by a permit system. Car sharing to the construction car park would be encouraged and measures implemented as part of a Construction Workforce Travel Plan. The size of the construction car park will be informed by further traffic assessment and updates to the gravity model including consideration of the park and ride provision as part of our overall sustainable transport strategy. The area identified in the indicative masterplan is capable of accommodating approximately 1,500 spaces.

Park and ride facility/facilities

4.5.14 Park and ride facilities would play an important role during the construction of the Project, intercepting workforce trips by car reducing the amount of worker traffic on local roads between the park and ride facilities and the main development site, and reduce potential environmental effects.

4.5.15 Informed by the initial gravity model assessments, we are currently looking at options for park and ride facilities in a series of search areas. The search areas have been identified with the aim of reducing traffic on local roads closer to the site and also to meet operational as well as health and safety requirements.

Functional and operational requirements of park and ride facilities

4.5.16 Park and ride facilities are usually located close to the strategic road network to reduce traffic on local roads. However, in the context of this Project they also need to be sufficiently close to the site to ensure that workers do not have to travel further than necessary at the beginning or end of their journey, which is particularly important given the nature of the work and to assist with worker well-being and productivity. Our experience has shown that these objectives can be met best in areas that are 20 to 30 minutes bus drive from the construction site including taking account of potential improvements to journey times as a result of proposed highway improvements.

4.5.17 While the precise number and size of any potential park and ride facilities is yet to be determined, initial assessment work indicates that several facilities may be required during the peak construction period, based on the likely distribution of construction workers. These facilities might serve different purposes, such as the weekday workforce or weekly/ weekend commuters.

4.5.18 The actual size and location of park and ride facilities required by the Project will depend on a number of factors including the peak workforce numbers, the number of workers resident in any temporary workforce accommodation, the size of the onsite car park, the size and location of other park and ride facilities, and the capacity of the surrounding road network to accommodate additional traffic, which will all be subject to further investigation. However in general terms, larger but fewer facilities are most efficient and cost effective.

4.5.19 Bus transfer movements linked to the park and ride proposals will be included in the traffic modelling of the development. These will assume regular movements to coincide with shift changeover times and a skeleton service outside these hours. Park and ride buses will be required to follow fixed routes to site; these are anticipated to be the same as the HGV routes.

4.5.20 Any park and ride facility would need to be designed and managed with safe entry and egress, lighting, car parking including accessible parking, bus stops, a sheltered waiting area, and a toilet block. There is also an opportunity to co-locate the park and ride with other facilities either for the management of the bus fleet and/or training / induction facilities that will be provided by the Bradwell B Project. Access and egress to the park and ride would have to be managed to avoid any delays on the surrounding roads.

4.5.21 At this stage we anticipate that the park and ride facilities would be temporary and removed after they are no longer required and the land restored to existing use. However we will engage with stakeholders on any suggested potential beneficial after-uses. Any proposal for retention or re-use of the park and ride facilities would be subject to separate planning applications.

4.5.22 At this stage we welcome feedback on the search areas for potential park and ride facilities described in this Section.

Approach to site selection/design development and search areas for park and ride facilities

4.5.23 We have identified six search areas that meet the functional and operational requirements of the Project as illustrated in Figure 4.3. It will not be necessary to provide park and ride facilities in all of these. However to meet the requirements of the Project we anticipate the need for a site capable of accommodating around 1,600 spaces in search areas 1a or 1b, and potentially one or more smaller facilities in search areas 2, 3 and/or 4. The larger facility in search areas 1a or 1b would need to be 20-30ha in size.

4.5.24 Table 4.1 provides a summary of the characteristics of each search area.

Figure 4.3 - Park and Ride Search areas

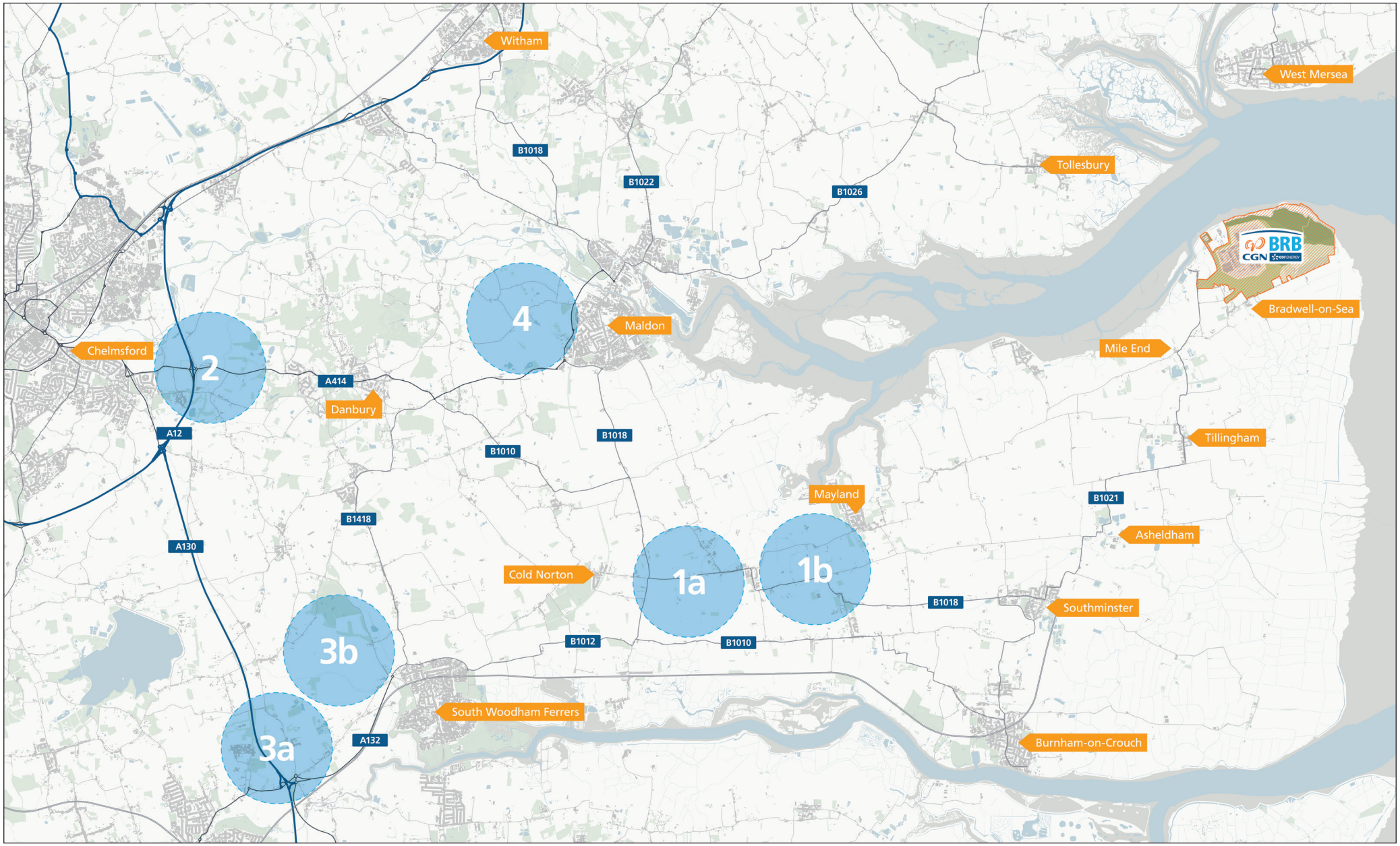


Table 4.1: Characteristics of the park and ride search areas

	Search area 1a	Search area 1b	Search area 2	Search area 3a	Search area 3b	Search Area 4
Location	Between Cold Norton and Latchingdon around the B1018 corridor	Between Latchingdon and Mayland around the B1018 corridor	Around Junction 18 of the A12	Around the A130/A132 junction	North-west of South Woodham Ferrers	North-west of Maldon, along the A414 corridor
Approximate travel time (by bus) to main development site	30 minutes	20 minutes	40 minutes	40 minutes	35 minutes	30 minutes
Areas served	Workers travelling from the south and south-west (traffic using the A132 and B1012) and north (traffic using the B1010 from Maldon)	Workers travelling from the south and south-west (traffic using the A132 and B1012) and north (traffic using the B1010 from Maldon)	Workers travelling from areas to the north of the Dengie peninsula. Primarily workers travelling on the A414	Workers travelling from areas to the south and west of the Dengie peninsula Primarily workers travelling on the A132 Would help reduce the number of movements on the B1012 ring road around South Woodham Ferrers	Workers travelling from areas to the south and west of the Dengie peninsula Primarily workers travelling on the A132 Would help reduce the number of movements on the B1012 ring road around South Woodham Ferrers	Workers travelling from the north, particularly workers residing to the east of the A12
Key environmental considerations for search area refinement	• potential for impacts on lsted buildings and their settings; • priority habitat, specifically deciduous woodland, adjacent to the search area, to the south; • impacts on existing habitat, including woodland, trees, and hedgerows; • changes to the rural landscape character and viewpoints; • interaction with a potential severance of PRoW, including St Peter's Way; and • potential for impacts on buried archaeology, which is recognised as a key risk and requires further study. • proximity of the search area to statutory designated sites Crouch and Roach Estuaries RAMSAR/SPA/SSSI and Essex Estuaries SAC, which are less than 0.75km, to the south, and potentially functionally linked habitat	• the potential for impacts on listed buildings and their settings, of which there are several within and adjacent to the search area; • priority habitat, specifically deciduous woodland, within and adjacent to the search area; • impacts on existing habitat, including woodland, trees, and hedgerow; • changes to the rural landscape character and viewpoints; • interaction with a potential severance of PRoW; and • the potential for impacts on buried archaeology, which is recognised as a key risk and requires further study. • proximity of the search area to statutory designated sites Blackwater Estuary RAMSAR/SPA/SSSI and Essex Estuaries SAC, 0.8km to the north, and Crouch and Roach Estuaries RAMSAR/SPA/SSSI, 1.2km to the south, and potentially functionally linked habitat	• the proximity of potential sites to the floodplain of Sandon Brook; • the potential for impacts on the setting of built heritage assets, such as listed buildings and the Sandon Conservation Area; • loss and severance of existing habitat, including woodland, trees, and hedgerows; and • changes to landscape character and viewpoints. • the potential for impacts on Danbury Common SSSI, Blakes Wood and Lingwood Common SSSI, (which are each located more than 1.2km from the search area) and appropriate mitigation.	• the potential for impacts on the setting of built heritage, such as listed buildings; • an area of priority habitat adjacent to the A132; • loss and severance of existing habitat, including woodland, trees, and hedgerow; and • changes to landscape character and viewpoints. • The potential for impacts on the Crouch and Roach Estuaries RAMSAR/SPA/SSSI and Essex Estuaries SAC, and any potentially functionally linked habitat	• loss and severance of existing habitat, including tress and hedgerow; and • changes to landscape character and viewpoints. • the potential for impacts on the Crouch and Roach Estuaries RAMSAR/SPA/SSSI and Essex Estuaries SAC, and any potentially functionally linked habitat	• the flood zone associated with the River Chelmer, which the northern part of the search area is located wholly within and southern part immediately adjacent to; • priority habitat within the footprint of and immediately adjacent to the search area, including deciduous woodland, lowland fens and coastal grazing marsh; • loss and severance of existing habitat, including woodland, tress and hedgerow; • potential for direct and setting impacts on listed buildings, including the Grade I Listed Beeleigh Abbey; and • changes to the landscape character and vie We invite your feedback on the four search areas described above. Further details on how • you can share your views are provided in the questionnaire that accompanies this document. • The potential for impacts on the Blackwater Estuary RAMSAR/SPA/SSSI and Essex Estuaries SAC, located less than 1km away, and any potentially functionally linked habitat

4.5.25 An extensive suite of environmental studies is currently being undertaken to better understand the environmental constraints associated with each search area which will inform the selection of the preferred site(s) and their design. The potential for impacts on residential amenity, in particular those related to air quality, noise, visual and severance will be carefully considered.

4.5.26 Our proposals will also aim to retain existing vegetation screening and deliver landscape and biodiversity enhancements as far as practicable.

4.5.27 Whilst we are currently proposing temporary park and ride facilities as noted earlier, we will consider opportunities for retention post-construction to provide a potential legacy benefit in consultation with the relevant authorities.

4.5.28 We will identify our preferred options taking account of feedback from this consultation on these search areas and ongoing technical work, and will consult on these preferred options in our Stage Two consultation.

Direct buses including rail and ride

4.5.29 Dedicated direct buses would be provided by the Project to pick up construction workers from locations where there are enough workers to warrant such a service. This is expected to include local population centres and local rail stations such as at Southminster and Chelmsford in order to encourage construction workers to make use of rail passenger services.

Walking and cycling

4.5.30 Our proposed accommodation strategy, which involves the construction of temporary workforce accommodation close to the main development site, will maximise the number of workers that would walk or cycle to work.

4.5.31 The Construction Workforce Travel Plan would encourage use of walking and cycling as far as practicable. However, at this stage, aside from workers resident at the temporary workforce campus, no construction workers have been assumed to walk or cycle to the main development site. This is a worse case assumption for the purposes of our initial transport work.

We welcome your feedback on the six search areas described above and invite suggestions for sites within or around them that meet the functional and operational requirements for the park and ride facilities.

4.6. Movement of Freight

Quantity of construction materials

4.6.1 The development of the Bradwell B power station would require the movement of substantial volumes of construction materials to the main development site. The total tonnage of construction materials required for the Project is expected to be in excess of 6,000,000 tonnes which would include AILs, bulk materials such as aggregate and cement for the manufacture of concrete as well as fill material for raising site levels, steel reinforcement and a range of other materials for example steelwork for the construction of temporary and permanent buildings, utilities, lighting and fencing materials.

4.6.2 As essential part of our strategy for the movement of freight is the modal spilt between marine, rail and road transport modes during construction. Our initial view is that we can deliver at least 50% of bulk construction materials to the main development site by sustainable modes. Initial work indicates that this target could be met by marine transport. Rail could potentially play a role, through delivery of freight to muster ports for onward transit to the main development site by sea.

4.6.3 Whilst maximising the use of sustainable modes, there will still be a requirement for bringing freight to the site by road, and this would necessitate a range of highway improvements, options for which are set out below.

4.6.4 Subject to feedback from this consultation and further technical work we will set out more detailed freight transport proposals at Stage Two consultation.

Freight transport

4.6.5 In order to facilitate the movement of freight to site by sea, it will be necessary to construct bespoke on-site marine transport facilities. A full range of marine transport options have been identified, which we have presented in Section 3: Main Development Site. We welcome your feedback on these options, which we will take into account alongside ongoing technical studies.

4.6.6 The significant opportunities to move freight by sea would deliver substantial reductions in the number of HGV movements that would otherwise occur on the local road network. However, the large quantities and wide variety of construction materials required for the Bradwell B Project both in advance of and during the peak construction period means there would still be freight that could not practically or economically be moved other than by road.

4.6.7 As we are at an early development stage of our proposals there are a number of uncertainties that could impact on our estimates of the likely number of HGV movements. These include the platform height for Bradwell B power station, the earthworks strategy, the construction sequence and schedule. Further work will be undertaken in these and other areas to confirm likely HGV movements which we will set out in our Stage Two consultation.

4.6.8 The results of our initial transport assessments and benchmarking against other nuclear new build projects in the UK have been used to determine the likely number of HGV movements during the construction phase that could be generated by the Bradwell B Project to and from the main development site. At this stage the results exclude any movements arising from the construction of any of the associated developments (e.g. project provided accommodation, park and ride facilities etc) and the construction of the highway works as the proposals for these developments are still emerging.

4.6.9 On this basis and given that further detailed traffic modelling and assessment work will need to be undertaken prior to both Stage Two consultation and the submission of the development consent application, we have taken a precautionary approach to the identification of HGV numbers at this stage, which is likely to envelope the actual numbers that are likely to be required.

4.6.10 Based on the work conducted to date, and the assumed modal spilt between marine and road, we estimate that there would be between 500-700 two way HGV movements on average per day during the peak construction period. Based on experience from other nuclear new build projects such as at Hinkley Point C, HGV movements are likely to be spread across the day.

4.6.11 Initial assessments as previously outlined suggest that the local roads between the main development site and the strategic road network (A12 and A130) are physically constrained in places and potential HGV routes pass through a number of communities, which may result significant adverse residual transport and environmental impacts that will require mitigation. Our initial proposals to mitigate these constraints are outlined in Section 4.7.

4.6.12 In addition to these potential highway interventions, we propose development of one or more temporary freight management facilities, as outlined below.

4.6.13 A Construction Traffic Management Plan will be implemented for the construction phase of the development to manage the HGV movements associated with the construction phase of the Project. A Transport Review Group will be formed, which will include key transport stakeholders, and will monitor the performance of the Construction Traffic Management Plan.

Freight management facility

4.6.14 Such a facility (or facilities) would be required to control the timing of deliveries to the main development site during the peak construction period. The importance of the reliability of deliveries for a project of this scale cannot be over-estimated. In addition, it would assist in managing HGV movements on local roads, such as to reduce movements during peak or sensitive hours.

4.6.15 It could also provide a space where paperwork, vehicles, and goods can be checked prior to delivery to site; where HGVs are held while they wait to enter the site; and where HGVs are held temporarily in the event of an incident on the road network. A freight management facility would also provide welfare facilities for drivers and could provide space for the storage of materials and an opportunity for consolidation of non-construction materials, such as post, food etc, if required. It could further support the running of the bus fleet that will be used by the Project and provide washing and parking facilities.

4.6.16 The main benefits of a freight management facility include the ability to effectively control and time HGV movements; keeping HGVs off the road network whilst they wait to be called to site, avoiding queueing at the site entrance, parking or waiting on street, circling the roads in the area; reduced vehicle mileage; and reduced stress for lorry drivers which will increase road safety for all users.

4.6.17 Early years' freight management would be mainly managed via a Freight Management System and the Bradwell B site is expected to be able to accommodate HGVs, so that additional freight management facilities may not be required at this stage. However, this requires further investigation.

Functional and operational pre-requisites of freight management facilities

4.6.18 Bradwell B has identified the main functional and operational requirements for a freight management facility as follows:

- Location on or close to the designated HGV route to site, with the potential to co-locate the freight management facility with a park and ride facility;
- A location either close to the site (up to 20 to 30 minutes' travel time) of the primarily road network to maintain reliability of journeys, taking into account any proposed road improvements;
- The facility as a temporary development should be capable of restoration back to its existing use if required; and
- In terms of facilities, it is important that the freight management facility is managed and offers safe entry and egress as well as formal and well-designed parking for approximately 100 HGVs at a time; it will require lighting, sufficient and safe storage areas as well as facilities like a toilet block and a café for the drivers.

Approach to site selection/design development of a freight management facility

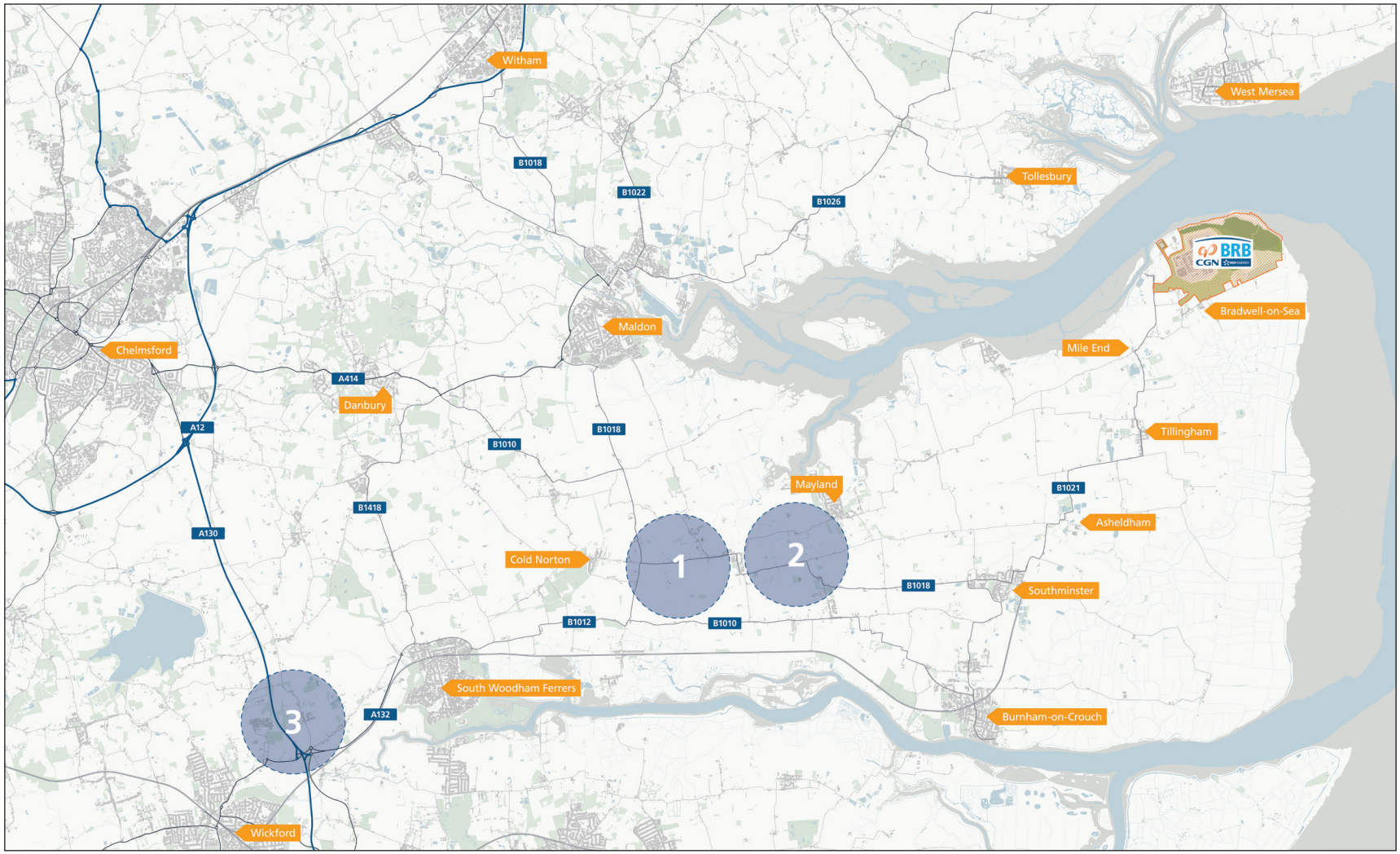
4.6.19 As part of the emerging transport options, three targeted search areas have been identified and assessed against the above requirements. Areas closer to Chelmsford were considered but discounted due to the distance to the identified HGV route options during peak construction.

4.6.20 These search areas correspond with three of the search areas considered for park and ride facilities.

4.6.21 The three search areas as shown in Figure 4.4 are as follows:

- Search Area 1: area to the west of Latchingdon and east of Cold Norton (park and ride search area 1a).
- Search Area 2: area to the east of Latchingdon and south of Mayland (park and ride search area 1b); and
- Search Area 3: area close to the where the proposed peak construction route meets the primarily road network at the junction of the A130 with the A132 (park and ride search area 3a).

Figure 4.4 - Freight Management Facilities Search areas



4.6.22 The characteristics of these areas are set out in Table 4.2.

Table 4.2 Characteristics of the freight management facility search areas

	Search area 1	Search area 2	Search area 3
Location	Between Cold Norton and Latchingdon around the B1018 corridor	Between Latchingdon and Mayland around the B1018 corridor	Around the A130/ A132 junction
Approximate travel time to main development site	30 minutes	20 minutes	40 minutes
Relationship with highways network	20 minutes from the A130	30 minutes from the A130;	Near the junction of the A130/ A132.
Potential for co-location with park and ride	Yes	Yes	Yes
Proximity to settlements	Located away from main residential settlements.	Located closer to main residential settlements than Search Area 1 as well as a greater number of isolated residential properties	Located further away from residential settlements than Search Areas 1 and 2
Other key environmental considerations	Refer to Table 4.1 (park and ride search area 1a)	Refer to Table 4.1 (park and ride search area 1b)	Refer to Table 4.1 (park and ride search area 3a)

4.6.23 Whilst further work is still required to determine the size of the freight management facilities, we anticipate that such a facility would need to accommodate up to 150 HGVs, requiring a site of between 10-15 hectares.

4.6.24 An extensive suite of environmental studies is currently being undertaken to better understand the environmental constraints within these search areas and to inform selection of the preferred sites and their design.

4.6.25 As we refine our search we will need to consider relevant environmental constraints. These are set out in Table 4.1 above in relation to the park and ride search area options.

4.6.26 In refining the search area and identifying specific sites, the potential for amenity impacts, in particular those related to air quality, noise, visual and severance will also require careful consideration.

4.6.27 At this stage we anticipate that any freight management facility would be temporary and removed after they are no longer required and the land restored to existing use. However we will engage with stakeholders on any suggested potential beneficial after-uses. any proposal for retention or reuse of the facilities would involve prior consultation with the local authority and separate planning applications under the Town and Country Planning Act.

4.6.28 Subject to feedback from this consultation and further technical work we will set out our preferred options for freight management facilities at Stage Two consultation.

We would welcome your views on whether we have identified the right search areas for Freight Management Facilities and invite suggestions for sites within or around them that meet the characteristics described above.

4.7. Potential Highway Improvements

4.7.1 There are likely to be residual highway impacts that will need to be mitigated through the implementation of a package of highway improvement works.

4.7.2 For the purposes of this Stage One consultation we have developed some initial proposals for consultation that identify a series of options for delivering HGVs from the strategic road network to the site during both the early years and during the peak construction period. These options have been informed by initial traffic modelling, assessment of the existing constraints, environmental considerations including community sensitivity and the need to deliver the Project in a manner that is efficient, viable and deliverable.

4.7.3 In identifying the potential highway improvement options we identified a broad range of proposals, taking into account outline environmental information and other Project-related considerations. This resulted in a long list of potential proposals which were then evaluated in internal project workshops bringing in relevant disciplines and expertise from across the project team, including lessons learnt from other similar projects. The process also benefitted from engagement with technical stakeholders.

4.7.4 To narrow down the long list, the proposals have been evaluated against a set of evaluation criteria as set out below:

- Community sensitivity: to keep potential significant effects on communities to a minimum;
- Functional and operational requirements: to enable the efficient and viable movement of freight and people to meet the needs of the Project;
- Environmental sensitivities: with consideration for the historic environment; biodiversity; water and flood risk; landscape and visual; and noise and air. As we continue to develop our proposals, due regard will be given to potential for significant effects on environmental sensitivities and application of the principles of the mitigation hierarchy, that, as far as is reasonably practicable, environmental effects should be:
- Avoided;
- Minimised;
- Mitigated; and, lastly
- Compensated for
- Deliverability, cost and schedule requirements: to enable the Project programme to be delivered.

4.7.5 The end result of this evaluation exercise was a shortlist of proposals described in this Stage One consultation that we consider are capable of meeting the needs of the project. This shortlist of options will be subject to further review and assessment work, in addition to further engagement with stakeholders and consideration of the Stage One consultation feedback.

Initial highway impact assessment

4.7.6 One of the key elements of the process of assessing the likely traffic impacts of a major development is the preparation of a traffic model of the parts of the local road network which are likely to be affected by the development.

4.7.7 The process begins with the preparation of a 'base model' which aims to accurately replicate the existing road conditions on the local network. This can be drawn from existing data or models used by the local highways authority. A process of calibration and validation is undertaken so that the model reflects observed traffic conditions. Traffic growth and committed developments and transport improvements are then included to estimate the future conditions which would apply on the road network in the absence of the development (the Bradwell B Project). This is known as the 'reference case' model.

4.7.8 The third stage of the process is to add estimates of traffic generated by the development to the reference case model. This 'with development' model can then be used to examine the likely future impacts of the development on the road network.

4.7.9 We are in the process of developing a traffic model for the Bradwell B Project with a preference to use the ECC's traffic model as our base model. Further engagement will take place with ECC throughout the consultation and pre-application process to reach an agreed position on the additional traffic that the Bradwell B Project is likely to generate within the highway network during construction and operation.

Potential highway works for 'early years'

4.7.10 While this Stage One consultation focuses primarily on the main construction works, we understand that there may be works necessary to support the 'early years' stage of the project (1-3 years post commencement of construction), before the park and ride and freight management facilities will be operational, or major highway improvements have been completed.

4.7.11 The transport strategy during the early years will thus focus on utilising the existing highway network as far as possible alongside improvements to the existing highway and implementation of HGV management measures.

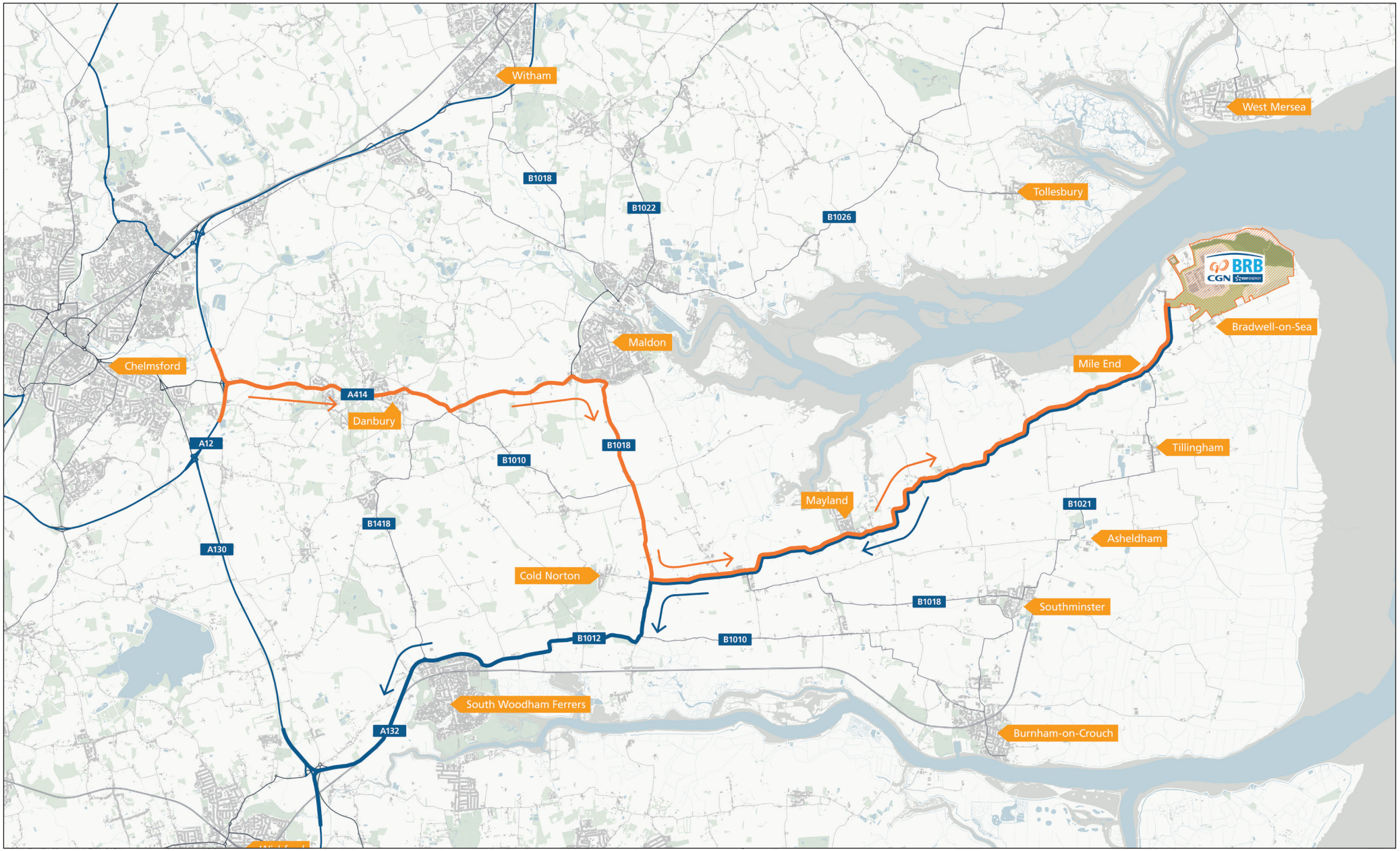
4.7.12 The following strategic options have been identified to enable the movement of freight on the existing road network during the early years:

- Freight management strategy to implement several HGV management measures including timing of HGV movements and potential load consolidation;
- On-line physical works within the designated highway boundary to be agreed with ECC such as additional signage, improved signalling at junctions and additional pedestrian crossings through sensitive communities;
- Localised junction and highway works at identified pinch points on the existing highway network which may or may not require targeted third party land outside of the designated highway boundary; and
- Environmental management measures to reduce potential impacts on communities and sensitive receptors, such as residential properties, community facilities, conservation areas and listed buildings.

4.7.13 Some of the above measures (for example signalling, signage, pedestrian crossings, traffic management measures, junction and certain highway improvements within the highway boundary) could be consented outside of the DCO if required and potentially implemented prior to commencement of main construction. Further detailed work and engagement will be undertaken with ECC as the relevant highway authority.

4.7.14 As part of the overall early years' strategy, we are also considering a proposal to create an 'in and out routing loop' for HGVs between the strategic road network and the main development site to manage HGV movements. This would mean that HGVs would travel from the strategic road network to the site via Danbury and Maldon (blue route on Figure 4.5) and return to the strategic highway network via the A132 (green route on Figure 4.5) minimising the need for two-way HGV vehicle movements on part of the local road network. This option could be implemented and controlled as part of the Construction Traffic Management Plan referred to earlier in this Section.

Figure 4.5 - Early Years routes



Potential highway works for peak construction

4.7.15 This Section considers what interventions may be required to establish an appropriate HGV route between the strategic road network and the main development site for use in the main construction period. The approach recognises that any interventions implemented during the early years could also assist in delivering the peak construction requirements of the Project.

4.7.16 In identifying these potential interventions we have collated and reviewed a wide range of data including traffic survey and accident data from ECC, census data, public transport routes and services, existing highway conditions and journey times, relevant committed developments in the area and on-site observations gathered during site visits. Potential environmental constraints have also been identified through desk-based assessment and site visits.

4.7.17 The work has focused on the following strategic physical interventions that would sit alongside freight management measures described earlier and use of the existing highway network, where possible:

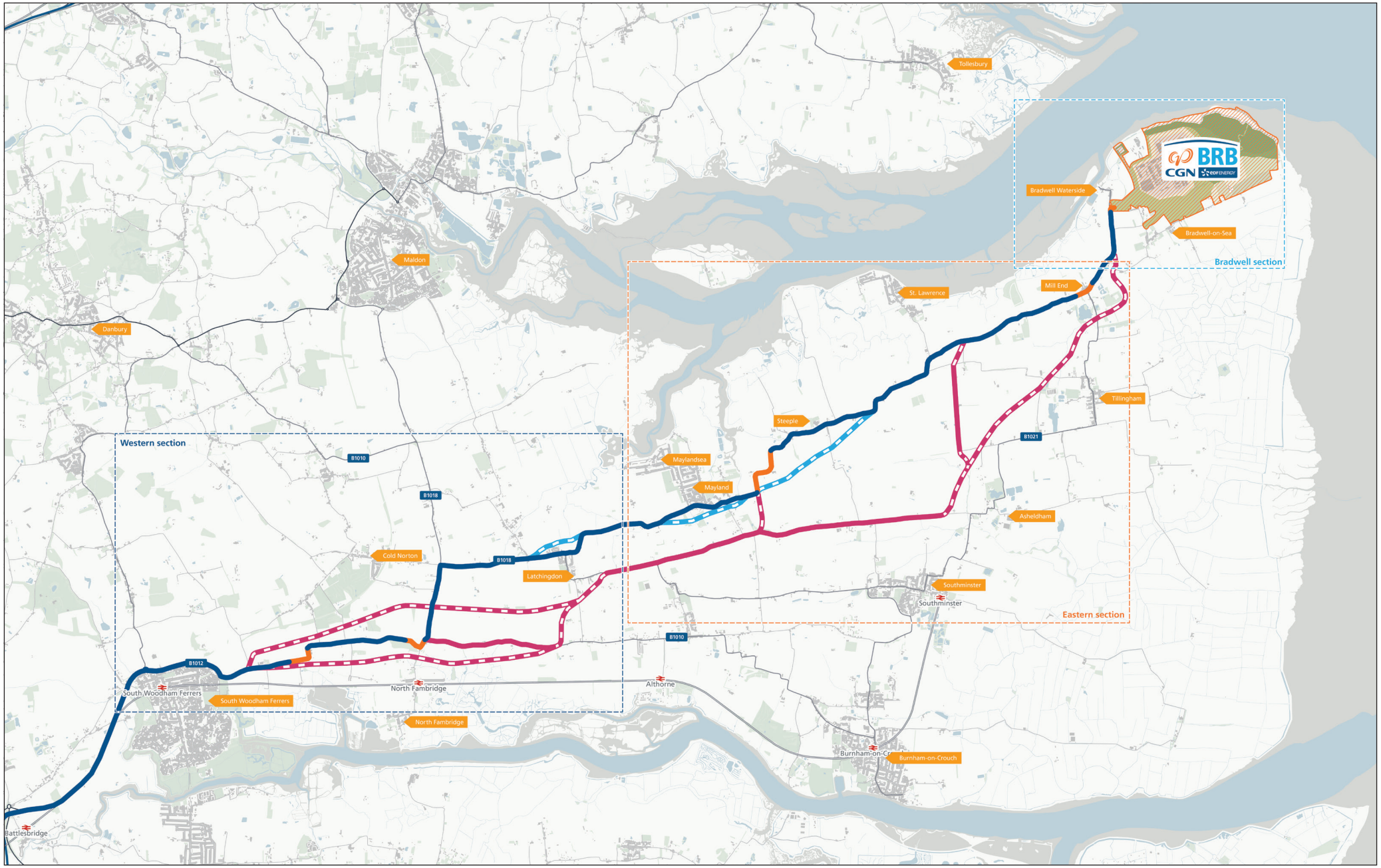
- Category 1: Upgrading of the existing highway network where considered necessary and deliverable. Upgrades are expected to be principally associated with junction improvements and localised widening;
- Category 1a: Localised highway realignments;
- Category 2: Bypasses around settlements and sensitive locations; and
- Category 3: New off-line sections of highways where upgrades of the existing highway or bypasses around settlements and sensitive locations are not considered viable or practical to deliver.
- The initial assessment work has identified two strategic routes for HGVs travelling from the strategic road network to the main development site (see Figure 4.6: Highway Peak Proposals - Route 1 and 2). These could be delivered individually or in combination to assimilate a single preferred route (i.e. the preferred route could be a combination of elements of both routes).

4.7.18 Each of these elements may require highways interventions to mitigate highway and environmental constraints. The options for intervention include junction improvements, road widening and/or creation of new lengths of highway as outlined above. The preferred elements (and their interventions) chosen from the two strategic routes will be put together based on feedback from this Stage One consultation, and the results of ongoing technical work, to identify the make up of the single preferred route. Our detailed proposals will be set out in our Stage Two consultation.

4.7.19 The two strategic routes are summarised below:

- Route 1: a route from the A130/A132 junction via the South Woodham Ferrers ring road, Lower Burnham Road, Fambridge Road, the B1018 and Steeple Road to site. Route 1 is principally aligned to the use of the existing highway, with a series of potential bypasses around settlements and sensitive receptors in addition to online highway and junction improvements; and
- Route 2: a route from the A130/A132 junction via the South Woodham Ferrers ring road, Lower Burnham Road, the B1010 with a series of alternative off-line section options to link back into the eastern part of the Route 1 near the site. This Strategic Route option would require a combination of on-line highway improvements and new sections of off-line highway alongside junction improvements.

Figure 4.6– Highways Peak proposals Routes 1 and 2



4.7.20 For clarity the two strategic routes have been subdivided into West, East and Bradwell sections for ease of presentation and recognising the different highway characteristics across the three sections.

4.7.21 Each section has the following characteristics:

- West section: comprising routes to and from the strategic and arterial road network, covering all connections between existing junctions on the A12 and A130 and Latchingdon;
- East section: comprising the section of local road network which connect existing villages, towns and commercial uses located between Latchingdon and Mill End; and
- Bradwell section: comprising local roads to the north of Mill End.

4.7.22 Entirely new offline routes from the strategic road network to the main development site were considered and discounted for the following reasons:

- The programme for designing, securing consent, and implementing an entirely new junction onto the strategic road network with significant lengths of new offline carriageway would be unlikely to be deliverable in accordance with the Project schedule;
- Significant environmental impacts could be associated with the implementation of a new cross-country route in comparison with the alternative options we are consulting on in this Stage One consultation;
- The opportunities available for making use of existing roads to minimise the need for the construction of new highway infrastructure.

4.7.23 Given the early stages of the project, the options for highway interventions have been identified at a high level and would be subject to further definition and consultation if taken forward as part of the preferred HGV route.

4.7.24 Both route options 1 and 2 and their associated options for highway interventions are described in turn below.

HGV Strategic Route 1

Strategic Route 1 western section

4.7.25 The western section of Strategic Route 1 is characterised by high volumes of traffic routing to and from the Strategic Road Network and around South Woodham Ferrers. Our initial assessments demonstrates that sufficient capacity is likely to be available supported by traffic management measures and potential junction improvements to the A130/A132 junction. Strategic Route 1 would make use of the available capacity provided by the existing highway network in this locality alongside any potential targeted interventions and new off-line bypasses.

4.7.26 The Strategic Route follows the existing A132 from the A130 junction at Battlesbridge, via the existing highway to the north of South Woodham Ferrers and the B1012 to the junction with Fambridge Road.

4.7.27 For the duration of this route to Fambridge Road, the highway is generally wide enough to cater for two-way HGV movements but the existing roundabouts, junction priorities, double bends and potentially the structural integrity of the road surface on the A132, could adversely affect the movement of peak construction traffic to and from the site.

4.7.28 We are also aware of the new roundabout that has been developed recently to service the new Sainsbury's developed on the B1012 Burnham Road at the northern end of South Woodham Ferrers. Land to the north of the B1012 has an allocation for up to 1,000 new homes within the emerging local plan and will need to be considered in our junction capacity assessment work.

4.7.29 Based on the above, the section up to Fambridge Road therefore could be subject to junction and highway upgrades and improvements, with the preference that works take place within the designated highway boundary.

4.7.30 In addition the route introduces the option to straighten out the existing S-bend on the B1012 via construction of a targeted off-line section of carriageway. Furthermore, it provides the option to improve/upgrade the B1012/B1010 Fambridge Road junction via construction of a new off-line section of carriageway which would connect Burnham Road with Fambridge Road north of its junction with the B1010.

4.7.31 Strategic Route 1 then heads north up Fambridge Road towards Cold Norton, before following the existing alignment of the B1018 (Steeple Road) towards Latchington. This section of the existing highway could be subject to targeted improvements and/or highway widening.

4.7.32 The existing S-bends on the B1012 could be straightened/realigned through the introduction of new sections of targeted off-line carriageway. These route improvements would tie into the junction improvements at the priority junction of Lower Burnham Road/ Fambridge Road and the double mini roundabout of Fambridge Road/ Cold Norton Road.

4.7.33 Strategic Route 1 also incorporates the option of routing through the village of Latchington, recognising that this route already accommodates HGV traffic associated with its status as a designated HGV route by ECC. However, given the number of community sensitivities located within Latchington, including the primary school and residential properties fronting onto the highway, we have identified an alternative option of a bypass around the settlement. An indicative bypass alignment has been identified to the north of the village. The bypass would connect back into the Steeple Road east of Latchington.

Table 4.1: Route 1 West - Summary of potential options for interventions

Route 1 Western Section: Summary of potential options for intervention	
From A132 to North Fambridge	a) Junction improvements (e.g. A130/A132, Rettendon Turnpike and Hawkhill roundabouts) and; b) Creation of short sections of offline carriageway to remove s-bends; and c) Improved pedestrian crossing facilities
North to B1018	a) Upgrade of double mini roundabout at Cold Norton; and b) Online carriageway improvements/widening
B1018 to Latchingdon i ncluding potential off line bypass	a) Online carriageway improvements/widening; and/or b) Potential Latchingdon Bypass

Strategic Route 1 West – Environmental appraisal summary

4.7.34 In the vicinity of South Woodham Ferrers, this Strategic Route 1 maximises the use of existing highway, with targeted highway improvements likely to remain within the highway boundary. Through this section of the route, key environmental sensitivities include: highway drainage and the potential for interaction with surface water flow routes; roadside built heritage assets and potential setting impacts; and roadside residential properties, which may be susceptible to noise, visual intrusion and/or air quality impacts.

4.7.35 Along the B1012 to north Fambridge and up to Cold Norton and then onwards to Latchington, key environmental sensitivities include: roadside areas of priority habitat, including deciduous woodland, ancient woodland, and coastal and floodplain grazing marsh, and a Local Wildlife Site; highway drainage and the potential for interaction with surface water flow routes and flood plain; roadside residential properties, which may be susceptible to noise, visual intrusion and/or severance; and buried archaeology.

4.7.36 By diverting traffic away from residential properties closest to the existing highway, a bypass at Latchingdon could be expected to delivery benefits in terms of reduced traffic noise and improved visual amenity, as well as improvements to pedestrian and road user safety.

Do you have views on the proposed options for intervention along strategic route 1 in the western section described above. In particular do you have any views on the option to bypass Latchington as an alternative to upgrading/improving the existing road through the village?

Strategic Route 1 Eastern section

4.7.37 The eastern section of Strategic Route 1 proceeds to the east of Latchington towards Mayland along Steeple Road. Again targeted highway improvements and/or widening could be required along the section of highway located between Latchington and Mayland.

4.7.38 Consistent with the Latchington approach, the route incorporates the option of routing through Mayland as per the existing HGV route. However community sensitivities in the village may mean that an off-line bypass is required. An indicative alignment for the bypass, located to the south of the village is shown on Figure 4.7. As before the indicative alignment has been informed by initial environmental appraisal.

4.7.39 The Mayland bypass option would re-join the existing highway Steeple Road east of Mayland.

4.7.40 Continuing along the existing highway (Steeple Road which merges into Maldon Road) eastwards, the existing highway between the villages of Mayland and Steeple is characterised by a series of S-bends which could act as a constraint for the movement of two-way HGVs and as such could justify the need for localised realignment of the existing highway. In addition, the existing highway along this section is also constrained by its width in certain locations, in addition to a number of residential properties which front directly onto the highway frontage which become more concentrated in number through the village of Steeple. The number of residential properties which front directly onto the existing highway could limit the extent of potential improvements and/or widening that could take place along this section.

4.7.41 In recognition of the both the highway physical constraints and community sensitivities present along this section of highway, Strategic Route 1 maintains the option of utilising the existing highway in addition to an off-line bypass/realignment option located to the south of Steeple Road. Both the realignment and bypass options are shown on Figure 4.7. The bypass is proposed to re-join Maldon Road once again, to the east of Steeple.

4.7.42 Strategic Route 1 than proceeds along the existing alignment of Maldon Road between Steeple and Mill End. A limited number of residential properties are interspersed along this section of highway, some of which are located quite close to the carriageway and no footways are provided. Highway verge is instead provided along the length of this route, but existing carriageway widths are likely to continue to act as a constraint. On this basis the section of highway between Steeple and Mill End could be subject to targeted improvements and/or carriage widening.

4.7.43 At Mill End, the Strategic Route 1 could be widened and/or realigned via a new section of new off-line road to its immediate south to pull the carriageway away from the existing listed properties which currently front directly onto the road. The existing junction with the B1021 could also be reconfigured to tie into the realigned road.

Strategic Route 1 East – Environmental appraisal summary

4.7.44 Key sensitivities along this section of the route include highway drainage and the potential for interaction with surface water flow routes and flood plain; several areas deciduous woodland; the rural character of the landscape and existing rural views, which may be sensitive to change; roadside residential properties, which may be susceptible to noise, visual intrusion and/or severance; and listed buildings and buried archaeology.

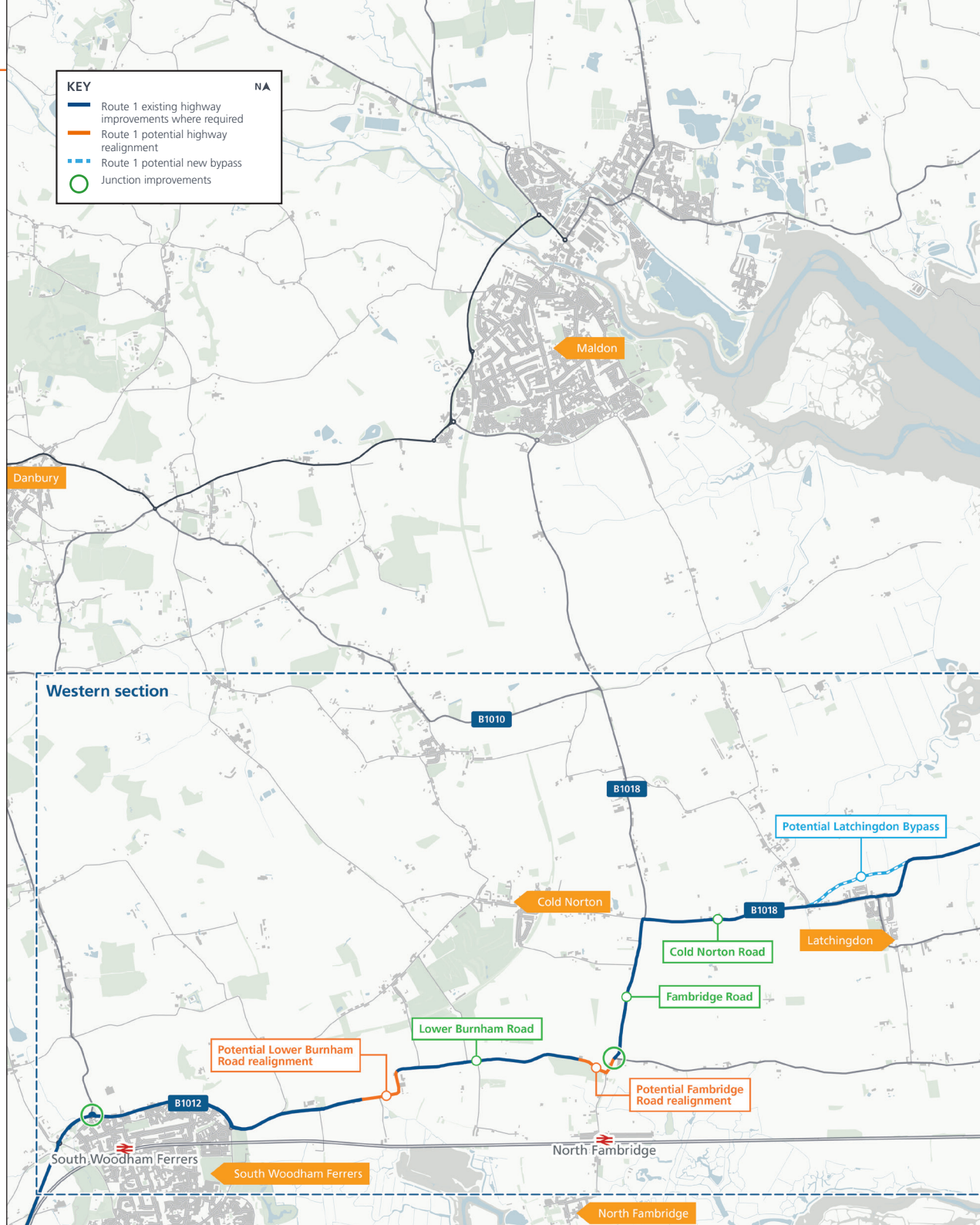
4.7.45 By diverting traffic away from residential properties closest to the existing highway, bypasses of each settlement could be expected to deliver benefits in terms of reduced traffic noise and improved visual amenity, as well as improvements to pedestrian and road user safety.

4.7.46 The proximity of some sections of the proposed route to the Blackwater Estuary RAMSAR/SPA/SSSI and Essex Estuaries SAC will also need careful consideration, as will impacts on functionally linked habitat.

Table 4.2: Strategic route 1 East - Summary of potential options for intervention

Strategic route 1 Eastern Section: Summary of potential options for intervention	
to Mayland including new offline bypass	a) Online carriageway improvements/widening; and/or b) Delivery of new Mayland Bypass
to Steeple including new offline bypass	a) Online carriageway improvements/widening; and/or b) Delivery of new Steeple Bypass
to Mill End with bypass - inc. Carriageway realignment	a) Online carriageway improvements/widening; and/or b) Localised carriageway realignment adjacent to Mill End

Do you have views on the proposed options for intervention along Strategic Route 1 in the eastern section described above. In particular do you have any views on the option to bypass Mayland and Steeple as an alternative to upgrading/improving the existing road through the villages, and in the case of Steeple potentially delivering localised highway realignments?



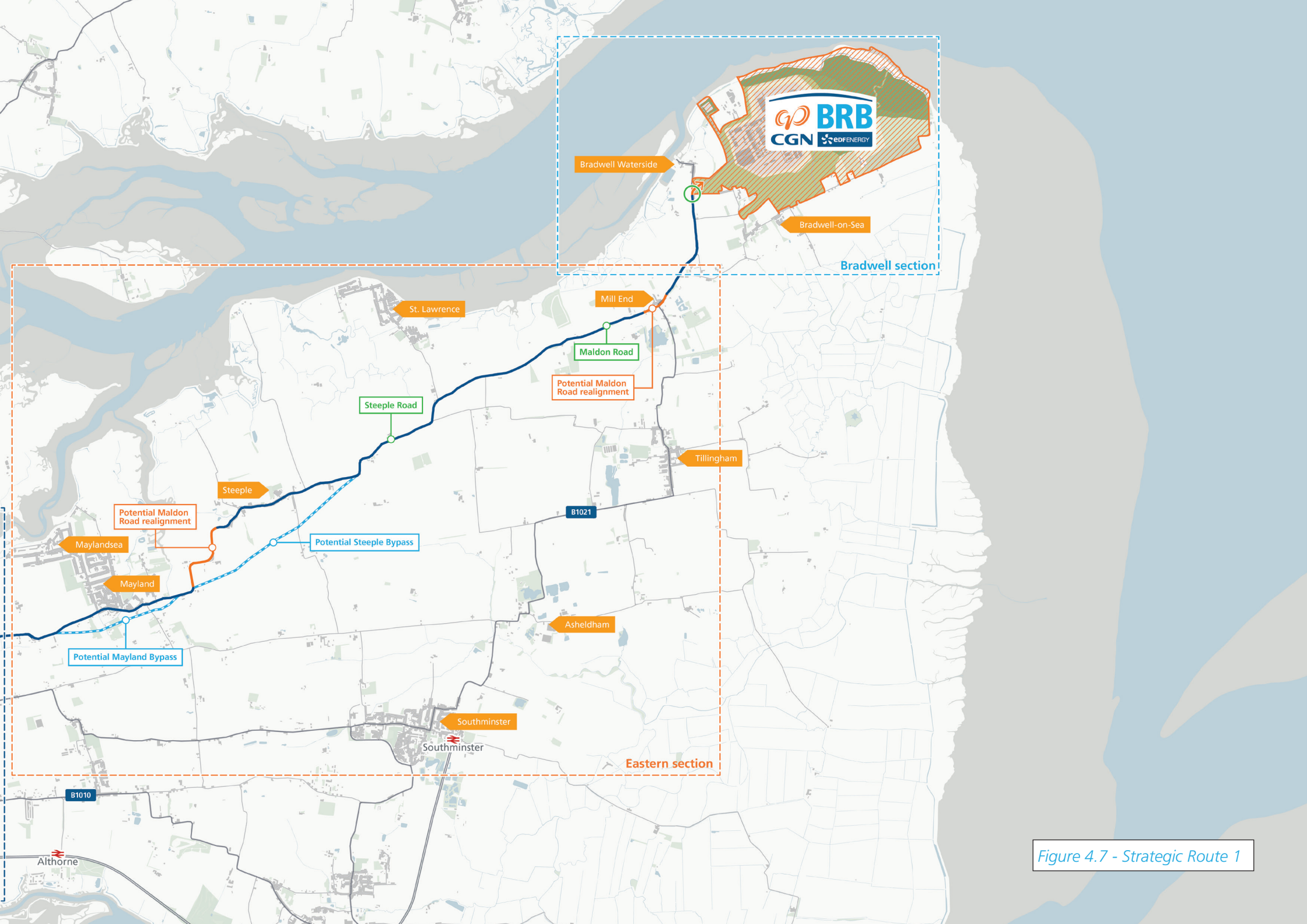


Figure 4.7 - Strategic Route 1

Strategic Route 1 – Bradwell section

4.7.47 The Bradwell section is sparsely populated, with a limited number of individual residential properties fronting onto the B1021 Waterside Road. The B1021 provides access to the Bradwell Marina and the existing Bradwell power station via Trusses Road. The Down Hall Residential Care Home is also located to the south of Trusses Road together with a number of residential properties.

4.7.48 Consistent with the other sections, the use of the existing highway is likely to require targeted improvements and/or carriageway widening. In addition, to minimise community impacts for residents living close to Trusses Road, it is proposed to connect the B1021 Waterside Road directly to the site through the delivery of a new off-line section of carriageway to the north of Trusses Road to the boundary of the main construction site. This would require a new or adapted junction from the B1021 at a point to the north of Trusses Lane.

4.7.49 The options being considered include the continuation of Waterside Road from its current alignment on to a new section of off-line highway. This arrangement would change the priority in favour of the Bradwell site whilst maintaining access to Bradwell Waterside and Bradwell Marina in the form of standard T junctions off the new section of off-line highway. The alternative is to provide a new three arm off-line roundabout on Waterside Road again to the north of Trusses Road that would enable access to the Bradwell site via the off-line section of carriageway that would continue to the site boundary as described. Again Bradwell Waterside and Bradwell Marina would be served by Waterside Road from the new roundabout junction.

Strategic Route 1 Bradwell section – Environmental appraisal summary

4.7.50 To Bradwell, this route includes online carriageway widening and a new, offline connection to the main development site. Key sensitivities include roadside listed buildings and buried archaeology; habitat, including hedgerow and scattered trees; and roadside residential receptors, which may be susceptible to noise, visual intrusion and/or severance.

Do you have any views on the proposed options for intervention along Strategic Route 1 in the Bradwell section described above?

HGV Strategic Route 2 options

Strategic Route 2 Western section

4.7.51 Strategic Route 2 is shown in Figure 4.8, which is the same as Strategic Route 1 (as described above) apart from the following exceptions:

- Instead of proceeding north at the junction of Fambridge Road towards the B1018, Route 2 as an alternative to Route 1 presents the option of continuing along the existing alignment of the B1010 (Lower Burnham Road) eastwards. This section of existing highway could be subject to targeted improvements/carriageway widening. The route would then proceed in a north-eastern direction towards Latchington via construction of a new off-line section of carriageway across open fields as indicated on Figure 4.8. The new section of carriageway in this locality would cross the minor road Rectory Lane before connecting to the B1018 south-east of Latchington;
- As an alternative to use of the existing highway associated with the B1012 and B1010, there are two new off-line options for new carriageway sections whose indicative alignments are as indicated on Figure 4.8. The option to the north (Strategic Route 2 Western Option 1) is indicated as routing off the B1012 to the east of South Woodham Ferrers proceeding eastwards before terminating at Rectory Lane. The southern option (Strategic Route 2 Western Option 2) would leave the B1012 at the same point as the option to the north, before proceeding eastwards and then re-joining the B1010.

4.7.52 All three of the alternative off-line indicative alignments detailed above have been informed by initial environmental appraisal.

Table 4.3: Route 2 West - Summary of potential options for intervention

Option	Summary
Option 1	Road widening and improvements to the existing road and a new road joining the B1010 with the B1018 Burnham Road; or
Option 2 north	A new northern section of road off the B1012 to the east of South Woodham Ferrers and connecting to the B1018 Burnham Road; or
Option 3 south	A new southern section of road off the B1012 to the east of South Woodham Ferrers, proceeding eastwards before re-joining the B1010.

Strategic Route 2 West – Environmental appraisal summary

4.7.53 Key environmental sensitivities include: roadside areas of priority habitat, including deciduous woodland, ancient woodland, and coastal and floodplain grazing marsh; highway drainage and the potential for interaction with surface water flow routes and flood plain; roadside residential properties, which may be susceptible to noise, visual intrusion and/or severance; and listed buildings and buried archaeology.

4.7.54 Further, the proximity of the corridor to the Crouch and Roach Estuaries RAMSAR/ SPA/SSSI and Essex Estuaries SAC needs careful consideration, as does potential impacts on functionally linked habitats.

Do you have any views on the proposed options for intervention along Strategic Route 2 in the western section described above? In particular we would welcome your views on the options presented as alternatives to use of the existing improved/ upgraded road?

Strategic Route 2 Eastern section

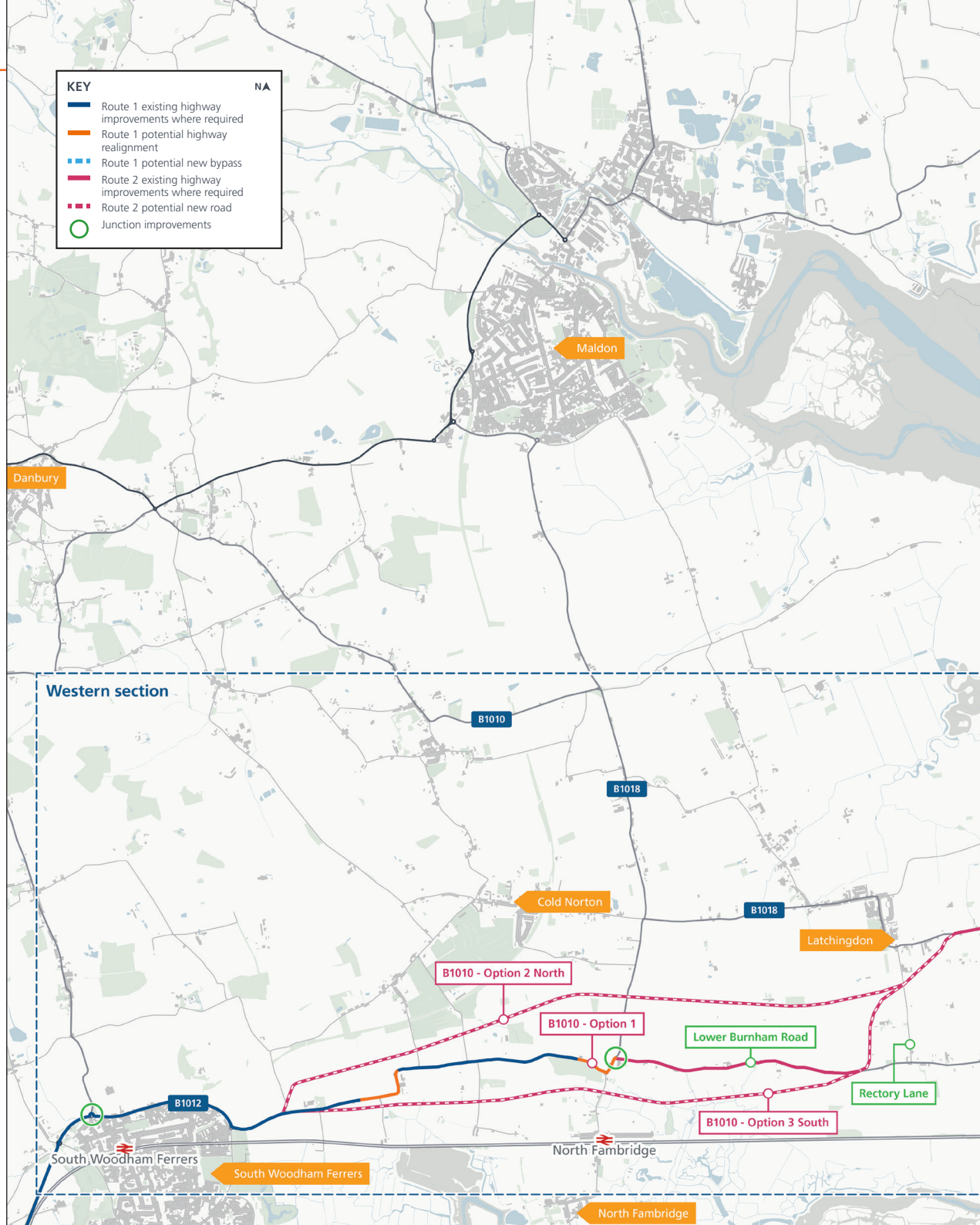
4.7.55 The eastern section of Strategic Route 2 has been identified as an alternative to Strategic Route 1 in part, to minimise use of the existing highway as far as possible whilst continuing to avoid impacts on sensitive communities and other environmental sensitivities. Inherent to the identification of the Strategic Route 2 options in the eastern section has been the need to connect all options back into Strategic Route 1 before proceeding to the main development site.

4.7.56 Strategic Route 2 eastern section is a continuation of the proposed new off-line carriageway, which forms part of the strategic route's western section, which terminates on the B1018 to the south-east of Latchington.

4.7.57 Strategic Route 2 then proceeds eastwards via use of the B1018 which could be subject to targeted improvements and/or widening. The route then proceeds into Green Lane with options to improve the junction with the B1018.

4.7.58 Moving along Green Lane in a eastwards direction towards the site and as indicated on Figure 4.8. The route provides three options to connect back into Strategic Route 1 as described below:

- **Strategic Route 2 Eastern Option 1:** This option involves construction of a new off-line section of carriageway from Green Lane (near the junction with Mayland Hill) routing in a north-easterly direction prior to connecting with the existing highway to the north located to the west of Steeple as indicated on Figure 4.8;



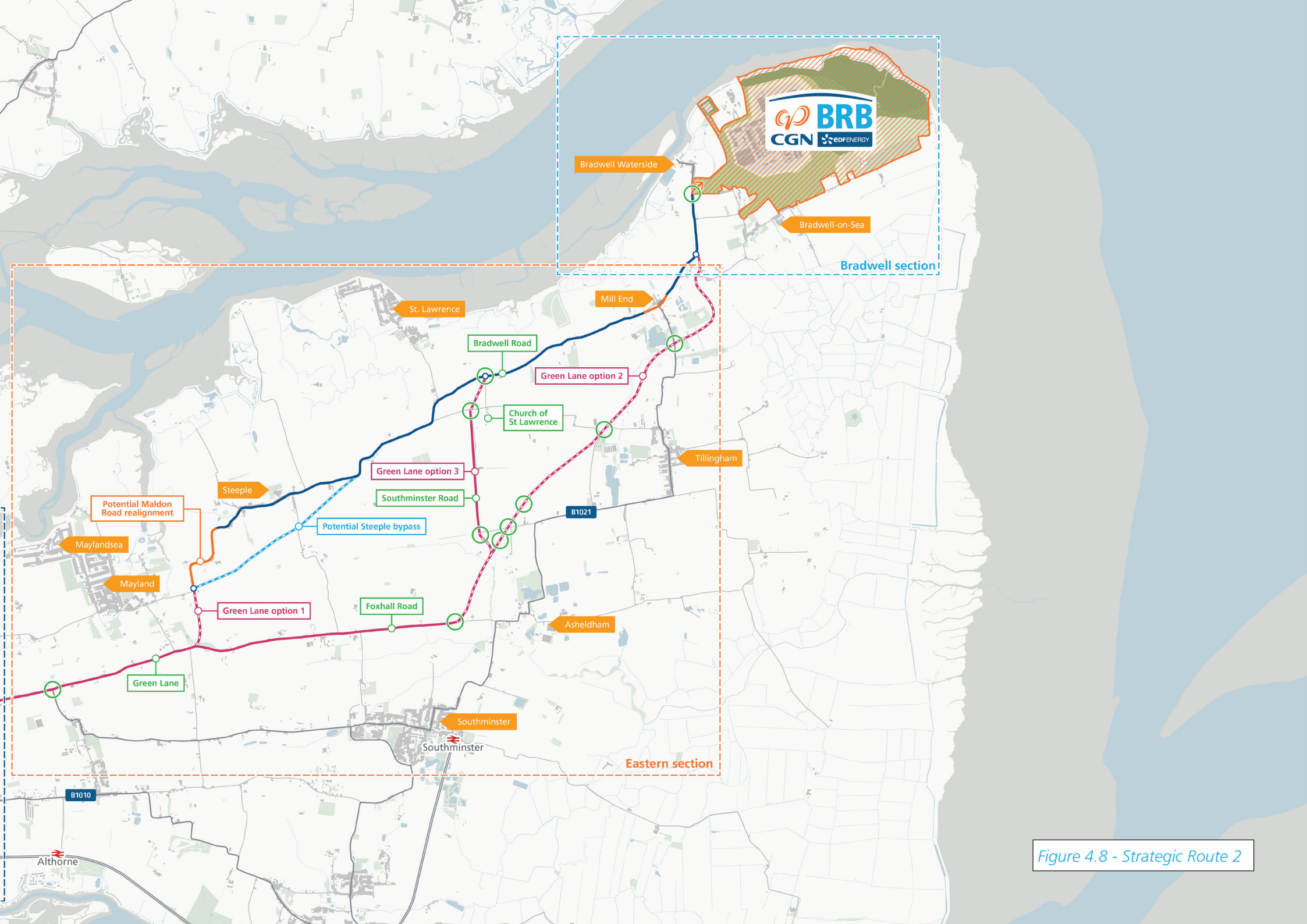


Figure 4.8 - Strategic Route 2

- **Strategic Route 2 Eastern Option 2:** Involves use of most of Green Lane which could be subject to targeted improvements and/or widening (merging into Highlands Hill and then Foxhall Road) heading east prior to construction of a new off-line section of carriageway from Foxhall Road proceeding in a north-easterly direction across open fields connecting back into the Strategic Route 1 alignment north of Mill End at the junction of the B1021 with Maldon Road. The indicative alignment for construction of this new carriageway is indicated on Figure 4.8: Strategic Route 2 Eastern Section. This indicative alignment has been informed by environmental appraisal to avoid sensitive environmental receptors but it does cross a number of minor roads in the locality which would require a number of junction improvements;
- **Strategic Route 2 Eastern Option 3:** The final option associated with Strategic Route 2 is a sub-option of Strategic Route 2 Eastern Option 2 described above. It involves an offshoot from the new off-line carriageway section to connect back into Strategic Route 1 earlier at Bradwell Road to the north of the Church of St Lawrence. Option 3 involves construction of two new short sections of carriageway (one at its southern end connecting into Southminster Road and one at its northern end from Southminster Road connecting back into Route 1). In addition the option makes use of the existing highway Southminster Road which would require upgrading/widening to accommodate two- way HGV traffic. As before, Option 3 has been informed by environmental appraisal to avoid sensitive environmental receptors such as the Church of St Lawrence which is a historic listed building.

Table 4.4: Strategic Route 2 East – Summary of potential options for intervention

Option	Summary
Option 1	a new road running north-east from Green Lane (near the junction with Mayland Hill) to connect with the existing highway to the west of Steeple or the Steeple bypass; or
Option 2	a new road running north-east from Foxhall Road and connecting to the junction of the B1021 with Maldon Road; or
Option 3	a new road running north-east from Foxhall Road and connecting to Bradwell Road to the north of the Church of St Law-rence. This option would also require improvements to Southminster Road so it could accommodate two-way HGV traffic.

Strategic Route 2 East – Environmental appraisal summary

4.7.59 Key environmental sensitivities include roadside habitat, including deciduous woodland, hedgerow and drainage ditches; highway drainage and the potential for interaction with surface water flow routes and flood plain; roadside residential properties, which may be susceptible to noise and/or visual intrusion; and roadside listed buildings and buried archaeology.

4.7.60 By diverting traffic away from residential properties closest to the existing highway, the proposed offline routes could be expected to delivery benefits in terms of reduced traffic noise and improved visual amenity, as well as improvements to pedestrian and road user safety.

Do you have any views on the proposed options for intervention along Strategic Route 2 in the eastern section described above?
In particular we would welcome your views comparing the three off-line new road options (Eastern Section Options 1-3) that connect back into Route 1 at Maldon Road or ways in which they could be improved.

Strategic Route 2 - Bradwell section of HGV route

4.7.61 Given that Strategic Route 2 connects back into Strategic Route 1 prior to the Bradwell section, the options remain as discussed above in relation to Strategic Route 1.

4.8. Summary and Next Steps

4.8.1 Following Stage one consultation and through the remainder of the pre-application consultation phase up to submission of the DCO application, transport and environmental assessment work will continue to be progressed, with further regular engagement with ECC, MDC, Network Rail and other stakeholders. Our objective will be to narrow down the highway intervention options and identify preferred options both the early years and peak construction which can be presented at Stage Two consultation. The identification of preferred options will be carried out taking account of feedback from this consultation, so your views are welcomed.

4.8.2 The work will cover a range of areas including the following:

- Further development refinement, scenario testing and agreement of the traffic model;
- Detailed highway link and junction capacity analysis – along with analysis and design of potential mitigation measures;
- Development of a detailed freight management strategy;
- Highway network condition surveys and opportunities for road widening proposals in light of the highway transport proposals;
- Consideration of detailed traffic management and contingency/ emergency planning arrangements;
- An assessment of the transport impacts of Bradwell B once the construction phase is complete and the power station is operational;
- Further consultation with Network Rail to understand the contribution that rail could play;
- Preparation of travel plans, transport strategies and a full transport assessment of the development, including preparation of all related documentation and material required for a full transport assessment.

JOBS AND PEOPLE

5.1 Introduction

5.2 National Policy

5.3 Size and Distribution of the Workforce

5.4 Approach to Managing Effects

5.5 Understanding the Project's Possible Effects

5.6 Our Proposed Jobs, Skills and Supply Chain Strategy

5.7 Accommodation Strategy

5.8 Summary and Next Steps

5.1. Introduction

5.1.1 This Section sets out our strategy on the economy and employment, and what this is likely to mean for local communities, including effects on existing forms of accommodation.

5.1.2 The Bradwell B Project would deliver lasting socio-economic benefits for this region. The cumulative effect of the increased investment, trade, wages, jobs, skills, productivity and transport improvements, new homes and improved community facilities will together create a step-change in opportunities for local people, businesses and local communities.

5.1.3 Construction of the Project would involve significant investment over 7-10 years, creating tens of thousands of jobs during construction as well as up to 1,200 apprenticeships during construction. During its 60 year operational life the Bradwell B power station would employ a permanent workforce of around 900 people (with an additional 1,000 roles during outages around every 18 months during operation).

5.1.4 The jobs, skills, and business contracts awarded by the Project would be transformative, on a scale not seen in this area since the existing Bradwell power station was built in the 1950s and will continue for decades to come.

5.1.5 As well as maximising the positive economic effects, we are making significant effort to also understand any potential adverse effects the Project could have so these can be avoided or mitigated.

5.2. National Policy

5.2.1 NPS EN-1 identifies anticipated socio-economics effects of large scale energy infrastructure projects, which could include:

- Creation of jobs and training opportunities
- Provision of local services, improvements to local infrastructure, educational and visitor facilities
- Effects on tourism
- The effect of an influx of workers
- Cumulative effects with other projects nearby.

5.2.2 NPS EN-1 notes there may be relationships between other environmental effects and socio-economic effects, for example visual impacts may have effects on the local economy and tourism.

5.2.3 The National Policy Statement for Nuclear Energy Generation (NPS EN-6) sets out potential socio-economic impacts specific to nuclear power stations including pressures on local and regional resources, demographic change and economic benefits.

5.3. Size and Distribution of the Workforce

5.3.1 At this early stage of Project development it is not possible to calculate the precise number of construction workers that will be needed to deliver the Project. Work is ongoing to estimate this, including benchmarking against other UK nuclear new build, such as Hinkley Point C, and consideration of site specific factors that will influence the duration and nature of the development of the Bradwell B Project.

5.3.2 Our initial estimates indicate at peak there could be up to 10,600 construction workers needed on site. This number is considered to be at the high end of possible outcomes, especially when compared to other UK nuclear new build projects. We expect that as more detailed modelling is carried out and the design work progresses, the range of estimates will narrow and the "worst case" for peak construction workers will reduce. Our expectation, based on experience from other nuclear new build projects is that the number could reduce to around 9,100 workers at peak.

5.3.3 We anticipate having a more certain and detailed estimate to consult on at Stage Two consultation, including more detail on the makeup of this workforce. It will include a wide range of jobs and workforce skills requirements, not just construction but site services and support. We anticipate around 3,000 jobs will go to local people (at peak). The rest will be filled by non-home based workers, including those with specialist skills from other new nuclear projects such as Hinkley Point C and Sizewell C.

Hinkley Point C Case Study: Local Employment

To date 50% of the workforce have been recruited from the local area against a target of 34%. It is anticipated that this will average out at closer to the target, as more specialist jobs occur towards the end of the construction period.

5.3.4 To understand which areas the temporary workers are likely to live in, a gravity model is being used (as introduced in Section 4 of this document). This combines what we know from other projects about how far people are willing to travel for work, with background information on where construction workers live in the area, and how much of different types of accommodation each area has.

5.3.5 Gravity modelling is a well-established technique used on many major infrastructure construction projects. It helps us understand where pressure on local housing markets could occur, and in what types of accommodation, and therefore the best way to mitigate those effects.

5.4. Approach to Managing Effects

5.4.1 An important purpose of this consultation, as well as to inform our understanding of effects, is to help shape how we can best maximise benefits and what can be done to mitigate any negative effects. We will work closely with stakeholders to achieve this as well as learning lessons from other major infrastructure projects.

Socio-economic core principles

5.4.2 To maximise socio-economic benefits, the Bradwell B Project will operate in line with a set of core principles:

- Deliver on NPS aspirations - an effective and efficient infrastructure project, that attracts a high quality workforce and employs local people where possible.
- Deliver economic and social outcomes that help raise aspirations and local opportunities in Essex, increase productivity and promoting social mobility.
- Link skills and training initiatives with the supply chain - promote competency in existing businesses to ready them for supply chain opportunities.

Manage, monitor and mitigate

5.4.3 Much mitigation to minimise potential adverse effects can take the form of embedded design – things incorporated in the scheme itself to maximise benefits and reduce negative effects.

5.4.4 Experience from other nuclear new build projects is that an effective approach includes management, monitoring and targeted mitigation where required as follows:

- Managing - anticipating likely effects and taking action to avoid them;
- Monitoring - identifying where unanticipated effects arise during the construction period; and
- Mitigation - taking action to resolve issues that arise.

5.4.5 Management of effects can be achieved proactively through voluntary or contractual arrangements with workers, for example training and management of construction workers to avoid conflict with existing communities.

5.4.6 Monitoring can be carried out using the information collected in this way, in conjunction with stakeholders such as the district and county councils who may identify issues that arise through for example their own service providers.

5.4.7 Mitigation of adverse negative effects that cannot be avoided through embedded design or management alone, would be agreed as part of the consenting process which secures commitments and funding as necessary.

5.5. Understanding the Project's Possible Effects

5.5.1 Considerable jobs, skills and trade opportunities will be created during construction and operation by the Bradwell B Project. We will work with stakeholders to maximise benefits for the local area and communities.

5.5.2 Because of the rural setting, many construction workers are expected to travel from further away – up to 90 minutes for existing residents (home based workers), or within 60 minutes for workers moving to the area to help with the construction (non-home based workers). This 60 minute travel time area includes the towns of Maldon and Chtttelmsford, and smaller communities across the Dengie Peninsula, from Burnham-on-Crouch and Southminster, to Bradwell-on-Sea itself.

5.5.3 Section 4 of this consultation document explains our current thinking on the transport improvements needed to cater for those travelling to the main development site, including park-and-ride facilities to minimise negative effects of traffic.

5.5.4 Demand for housing from the construction workforce could lead to issues in the local housing market and we want to achieve a balance so that a reasonable proportion of housing capacity is used, but without displacing or pricing out local residents.

5.5.5 As we have at Hinkley Point C and Sizewell C, we are therefore looking closely at how best to accommodate non-home based workers. Some of the workers expecting to be on the Project for a long time may choose to buy a home in the area. Others who are staying for a shorter time may choose tourist accommodation such as hotels, or caravan parks. Many of them are likely to want to rent a home or rooms in a shared house.

5.5.6 This will bring benefits to the local area through spending on local shops and services. Managing the effects on local communities and accommodation is also very important and will be a focus of the work on socio-economics, with special temporary accommodation for workers an essential part of the solution.

5.5.7 Based on experience of other major projects, the expectation is that construction workers will take up a small percentage of Maldon District's private rental accommodation during the construction peak period.

5.5.8 To avoid or manage adverse impacts and ensure the use of private rental accommodation does not exceed the low level anticipated, new accommodation will be needed. The most direct way the Project can ensure this, is by providing dedicated temporary accommodation for workers, such as a campus on or near the construction site, provision for caravans, and other measures including the possibility of some permanent new homes. This Section sets out proposed plans for project-provided worker accommodation near the site that could accommodate up to 4,500 construction workers, as required under our central realistic case.

5.5.9 Workforce and accommodation surveys would monitor where workers are living and the type of accommodation they are using. To deal with potential unanticipated issues, a flexible Housing Fund would be an option which could:

- Incentivise provision of new housing, including affordable housing;
- Augment existing empty homes programmes and bringing vacant properties back into use;
- Encourage provision of more latent accommodation (e.g. spare rooms); and
- Fund measures to improve the functioning of the housing market (e.g. helping people downsize, supporting rent deposits for people at risk of homelessness etc).

5.5.10 We will also consider how the construction workforce builds up, and is later demobilised, so that changes in demand are catered for effectively, without unacceptably affecting local housing markets. Our approach could also include use of a workforce accommodation management system to support workers to find suitable housing that meets their needs. We anticipate having further detail on this in our Stage Two consultation.

5.5.11 Workers could also create demand for community facilities and services such as health and leisure, which will be considered in more detail with stakeholders during 2020. This will be informed by the demographic profile of construction workers on other major projects such as Hinkley Point C – which suggests, for example, the effect on demand for schools will be relatively low, while demand for sports pitches may be higher. We will consult on our approach to managing this additional demand as part of our Stage Two consultation taking into account what we already know and what more we learn about the local area and its people from this Stage 1 consultation.

5.5.12 Mitigation could include on-site facilities for workers – for example a health centre and sports facilities. It is also likely to include direct additional support for existing services where they are likely to be affected.

5.5.13 Any further effects on the economic, social or environmental well-being of communities and community services would need to be monitored and adverse effects mitigated. At Hinkley Point C this has included a programme of grants to charities, voluntary groups and social enterprises, and strategic grants – for example investment in local facilities or services through a Community Fund. We are also keen to establish which communities are most likely to experience effects arising from the Project.

5.5.14 The Project could also have effects on tourism. Potential for adverse effects on visitor numbers (during construction or operation) will be considered. There could also be positive influences on visitor numbers, for example by improved accessibility to the Dengie Peninsula through local road improvements, and the potential for a visitors' centre at the power station.

5.5.15 Tourist accommodation (hotels and caravan sites) may also see demand from construction workers. This could increase occupancy and profitability, and potentially encourage increased supply of such accommodation in the area. Mitigation to protect tourist accommodation from over-demand by construction workers can also feature in our proposals, if needed.

5.5.16 We set out below some of our current strategies in relation to jobs, skills and supply chain and in relation to managing the need for construction workforce accommodation. Work in relation to tourism is at a very early stage and we will provide details as part of our Stage Two consultation.

5.6. Our Proposed Jobs, Skills and Supply Chain Strategy

5.6.1 The construction and operation of the Bradwell B Project will result in the creation of a considerable amount of skilled employment in the region both for the project and to support the backfill to local companies.

5.6.2 The workforce will be made up of roles in construction and operations and all those auxiliary role that enable it to happen such as security, catering, and drivers.

5.6.3 The proposed development is expected to employ around 3,000 local people, in construction and other related jobs. This represents a huge opportunity for the area and we want to ensure as many local people as possible can benefit from the Project. It also provides a unique opportunity to tackle unemployment and to inspire and provide career pathways for young people.

5.6.4 A key part of our jobs and skills strategy would be working with stakeholders to create an environment where people can gain sustainable employment - including those from education and those who may not normally have access to such opportunities.

5.6.5 Bradwell B is already working in partnership with stakeholders in the region to understand the skills and education landscape and identify areas for investment that will help individuals make an informed choice and create clearer pathways into work.

5.6.6 To deliver the workforce locally we recognise the importance of working collaboratively within existing structures of support for skills and education in the region in order to build a stronger infrastructure not only to deliver the Project but to leave an important and lasting legacy.

5.6.7 Bradwell B are already engaging with ECC, and other stakeholders such as the Local Enterprise Partnership (LEP) and Federation of Essex Colleges (FEDEC) and are working in context of the regions industrial strategy and the national context. These engagements focus on understanding the skills and education landscape and then working in collaboration to identify intervention opportunities.

5.6.8 The new nuclear project at Hinkley Point C has already successfully achieved major local benefits, through active interventions to train and employ local people and businesses. The experience there will inform what we do at Bradwell, and an extensive programme of measures will be developed with stakeholders across Maldon District, Essex and the wider region.

Hinkley Point C Case Study: Jobs and Skills

- Over 8,500 new job opportunities have been created on-site
- 300 young people from Somerset are working on the project
- Over 500 apprenticeships have so far been created
- Hinkley Jobs Service has been successful in matching local people to job opportunities and provides targeted support for local people facing redundancy
- Working alongside PLUSS - a local not for profit organisation that supports individuals with disabilities and other people with disadvantages into work.

5.6.9 The Project will deliver enhancement measures which will make the most of the considerable jobs, skills and supply chain benefits that will be created. Based on experience at Hinkley Point C, measures that could also be successfully implemented for the Bradwell B Project include the following:

- Implementing an Employment, Skills and Education Strategy and a Jobs Service focussed on developing a local skills base that can support the delivery of the Bradwell B Project, and delivering local initiatives that support local people into work on the project, including young people and people who are currently unemployed. This can be achieved by working with existing local organisations who benefit from existing knowledge of the local area and economy.
- This will ensure a pipeline of skills training – starting with schools to inform and engage students in the opportunities, based on the industry-leading "Inspire" programme introduced at Hinkley Point C, and providing careers advice that links directly to apprenticeships and job opportunities. This will tie into work being done for Sizewell C, so that skills learnt to work on one project can be transferred to work on the other, providing long term opportunities for local people.
- As at Hinkley Point C, we will hold jobs fairs and widespread publicity so people can access the opportunities.
- A flexible Asset Skills Enhancement and Capability (ASEC) Fund to support local skills providers to deliver appropriate training to support Project requirements alongside direct support and provision to local training centres. This could be supported by a Regional Skills Coordinator to provide a link between local providers, supply chain businesses and the Project to deliver an effective, joined-up approach on skills.
- With Sizewell C preceding the Bradwell B Project, we will build on training initiatives already established, and seek to enhance and extend them, working with the Local Enterprise Partnership, local colleges and private training providers. We would ensure the training sector in Essex and the region has the capacity to provide a major upskilling for local workers.
- We will link our construction contractors and sub-contractors with colleges and other trainers to provide advance information on the jobs and skills that will be needed, so that training can be carried out in good time.

Hinkley Point C Case Study: Jobs and Skills

1,300 members of the workforce upskilled in classroom-based training in 2018

11,700 online course completions throughout 2018

8,500 people now been trained and assessed in the Construction Skills and Innovation Centre in Bridgewater

- A Supply Chain Team and Supply Chain Portal partnering local business groups and the Project to assist local, regional and UK businesses in winning contracts for the supply of goods and services to deliver the Project.
- Some of the construction work will be very specialised, but many of the subcontracts will be accessible to established construction firms across the region and we will ensure these opportunities are maximised. This is about spreading awareness, and we will be working with the local authorities, Chambers of Commerce, and others to ensure businesses

are aware of opportunities at the right time and can plan their capacity and investment.

- There will also be significant opportunities in non-construction work to support the Project, including transport, accommodation management, catering and security. Experience of this "multiplier effect" at Hinkley Point C shows this not only benefits existing local firms but has also led to the creation of new local firms and partnerships with long term economic benefits to the area. We will engage local firms to encourage similar business growth here.

Hinkley Point C Case Study: Local and Regional Supply Chain

In 2018 1,500 regional companies were introduced to opportunities on the project

£981 million spent directly within the regional economy to date against a target of £4 billion of investment into the regional economy over the project's lifetime

£1.55 billion of contracts committed with regional companies to date

64% if value of contracts is with UK companies

5.6.10 The main development site is located between Sizewell C and London where other major developments are being built, as well as the major developments planned locally including new garden communities and the Lower Thames Crossing. This creates a major opportunity for ongoing training and employment for local people in construction and related sectors, as well as for business suppliers. Our approach throughout the construction and operational phases would be shaped by our aspiration to build long-term sustainable skills for individuals and businesses in the region.

5.7. Accommodation Strategy

5.7.1 Accommodation provided by the Bradwell B Project ('Project-provided accommodation") is principally needed for the peak construction period, to meet the demands of the Project in terms of attracting and retaining the construction workforce and to minimise impacts on the local housing market.

5.7.2 The majority of Project-provided accommodation will need to be located close to the main development site. This will deliver a number of substantial benefits. As explained in Section 4, this would minimise the number of road journeys by construction workers travelling to and from work in favour of workers walking or cycling to work. This would also reduce commuting times to maximise worker welfare and facilitate flexible shift working to meet specific construction requirements, and as a result drive up productivity.

5.7.3 The accommodation would include a range of amenity facilities, including canteens, health services, indoor recreation and sports facilities which would help attract and retain the construction workforce, contribute to good worker welfare and help mitigate pressure on local communities. The type and extent of services requirements will be informed by analysis of the local area, and likely workforce needs, together with feedback from consultation and lessons learnt from other major infrastructure projects.

Options for project-provided accommodation

Introduction

5.7.4 It is anticipated that Project-provided accommodation would be a combination of different types, needed at different stages of construction.

5.7.5 In the early stages of construction, such as site preparation, earthworks, and civil engineering, we expect that a proportion of construction workers would bring their own touring caravans to live in during the week. This is not uncommon for large infrastructure projects. It is therefore likely that part of the project-provided accommodation will be in the form of hard-standing and services for caravans, particularly in the early stages.

5.7.6 As the workforce grows, longer-term temporary accommodation will be needed. On other nuclear new build projects this has been in the form of

multi-storey campus accommodation, which can be rented by construction workers for a short or long period. Our work to date has indicated that this will need to form a major part of the project-provided accommodation, to meet project requirements and reduce local impacts.

5.7.7 During the peak of construction, which would last for only a short period, further accommodation will be needed. This demand could be met through static caravans (similar to a holiday park) alongside touring caravans.

5.7.8 The rest of this section sets out our approach for providing campus and caravan accommodation close to the main development site.

Approach to site selection and design

5.7.9 We have undertaken a site selection exercise to identify potential locations for the Project-provided accommodation. There are a number of important criteria that have been applied in selecting the site options, focused on meeting the Project's requirements and reducing impacts on local communities and the environment.

5.7.10 The core selection principles were:

- The site must be large enough to accommodate around 4,500 worker spaces, as required under our central realistic case, associated resident parking and access, amenity blocks (such as a bar, canteen, gym or other facilities) and outdoor space for sports pitches.
- It would need to be close to the main development site, near the site entrance, so that workers are able to walk or cycle to work.
- A single site is preferable to multiple smaller sites because it reduces traffic generation, maximises walking, simplifies operation and management and avoids duplication of services. It is also easier to ensure that the codes of behaviour for our workers are adhered to.
- Careful consideration of the need to protect residential amenity.
- Consideration of other environmental aspects, including impacts on biodiversity, flood risk, landscape and visual and the historic environment.

Potential campus site locations

5.7.11 We identified three search areas for the project-provided accommodation close to the main development site and of a suitable size to accommodate approximately 4,500 worker bed spaces. These are shown in Figure 5.1.

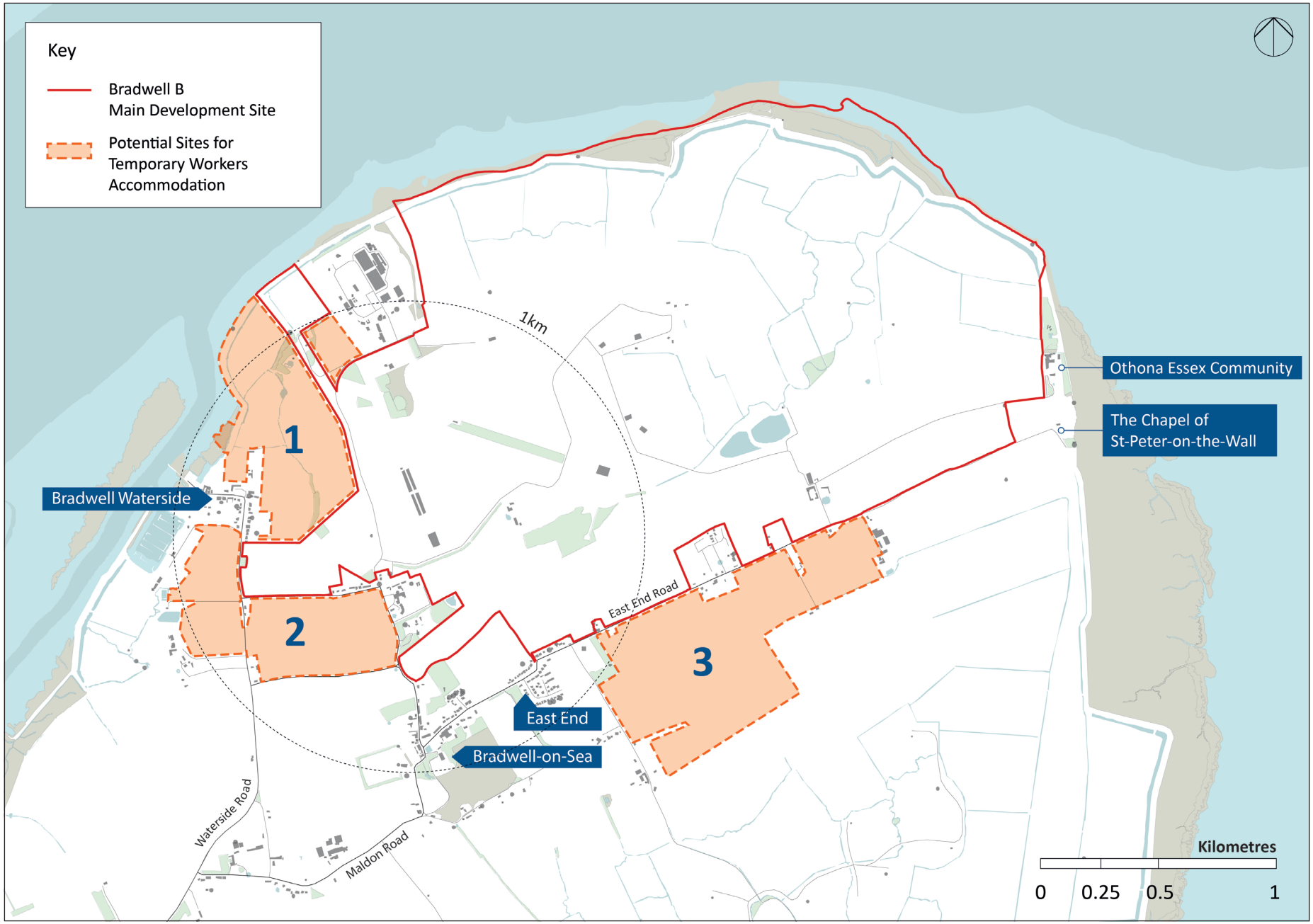
5.7.12 Table 5.1 describes the characteristics of the three campus search areas, having regard to the core selection principles.

Table 5.1: Comparison of potential campus site locations

	Location 1: Land west of the existing Bradwell power station	Location 2: Land south of Bradwell Waterside	Location 3: Land south of East End Road
Land Area	48 hectares	44 hectares	56 hectares
Proximity to the main development site entrance	Immediately adjacent	To the west but not adjacent.	To the south but not adjacent
Key Environmental Considerations	The area is close to a number of residential properties and has some potential to affect residential amenity. Proximity to listed buildings and Bradwell-on-Sea Conservation Area. Mostly within Flood Zone 1, although north and west of the area is in Flood Zone 3, which may constrain development in this area. Potential loss of foraging habitat along the coast that may be used by protected wintering wildfowl. Proximity to existing Bradwell power station likely to reduce potential landscape and visual effects compared to locations further away from existing development.	The area lies adjacent to Bradwell Waterside and therefore has a high potential to affect residential amenity. Proximity to listed buildings and Bradwell-on-Sea Conservation Area. The whole area is in Flood Zone 1. Potential loss of foraging habitat that may be used by protected wintering wildfowl.	The area lies adjacent to Bradwell village and therefore has a high potential to affect residential amenity. In addition construction traffic would need to route through the village. Proximity to listed buildings and Bradwell-on-Sea Conservation Area. Forms part of the approach along the Roman Road to the Grade I listed St Peter's Chapel and Scheduled Saxon Shore Fort, which are important heritage assets. The whole area is in Flood Zone 1. Potential loss of foraging habitat that may be used by protected wintering wildfowl.

Do you have any views on our selection principles for Project- provided accommodation? Is there anything else that you think should be considered?

Figure 5.1 - Potential site campus locations



5.7.13 After considering the constraints of each search area and surrounding land uses, and also comparing the three search areas against each other, we discounted the 'Land South of East End Road' location. This is primarily because it is furthest from the main development site entrance, which is a major disadvantage to the other two locations and would require construction workforce traffic to be routed through Bradwell village.

5.7.14 The other two search areas both meet Project requirements, and whilst they both have a number of environmental constraints, it is considered that mitigation measures have the potential to reduce these effects to acceptable levels. These locations have therefore been taken forward to the next stage.

We would welcome your views on whether we have identified the right search area and potential sites for a temporary workforce campus or whether improvements to these could be made.

Accommodation development scenarios

5.7.15 We have explored two development scenarios for the proposed temporary workforce accommodation at the two identified search areas as follows:

- **Scenario 1:** Land west of the existing Bradwell power station.
- **Scenario 2**: Land west of the existing Bradwell power station plus extension sites.

5.7.16 Scenario 1 is based on provision of temporary workforce accommodation on land west of the existing Bradwell power station. Scenario 2 would involve the same area, but with an extension of the development onto the land south of Bradwell Waterside. Both scenarios would deliver the same number of bedspaces, the difference being Scenario 1 would involve a more compact development (potentially involving taller buildings) with Scenario 2 providing a lower density development over a larger area.

5.7.17 The initial zoning plan, relating to Scenario 1, as shown in Figure 5.2 illustrates two zones for the provision of accommodation blocks. These are likely to be similar to student campus accommodation comprising en-suite single bedrooms and shared kitchen/communal facilities. At this early project stage the blocks are expected to be up to six storeys in height. The zoning plan also identifies a location for the provision of caravan accommodation which is likely to incorporate both static and touring caravans. In addition to the accommodation zones, the initial zoning plan identifies locations for the provision of amenity facilities which are likely to comprise amenity blocks, car parking and areas for outdoor recreation.

5.7.18 At this early project stage our preference is to progress Scenario 1 because it has the potential to meet Project requirements through the most efficient use of land, and in a manner which incorporates appropriate mitigation.

5.7.19 Scenario 2, as shown in Figure 5.3, could present additional opportunities to mitigate certain environmental effects, if necessary, such as flood risk and biodiversity or to reduce building height to mitigate landscape and visual effects. Three parcels of additional land are identified within the Bradwell waterside search area, which may or may not all be required by the Project.

5.7.20 We will develop a preferred option taking into account feedback from this consultation, further technical studies and engagement with stakeholders. Further details on our approach and designs will be provided at Stage Two consultation.

Figure 5.2 - Scenario 1: Land west of the existing Bradwell power station

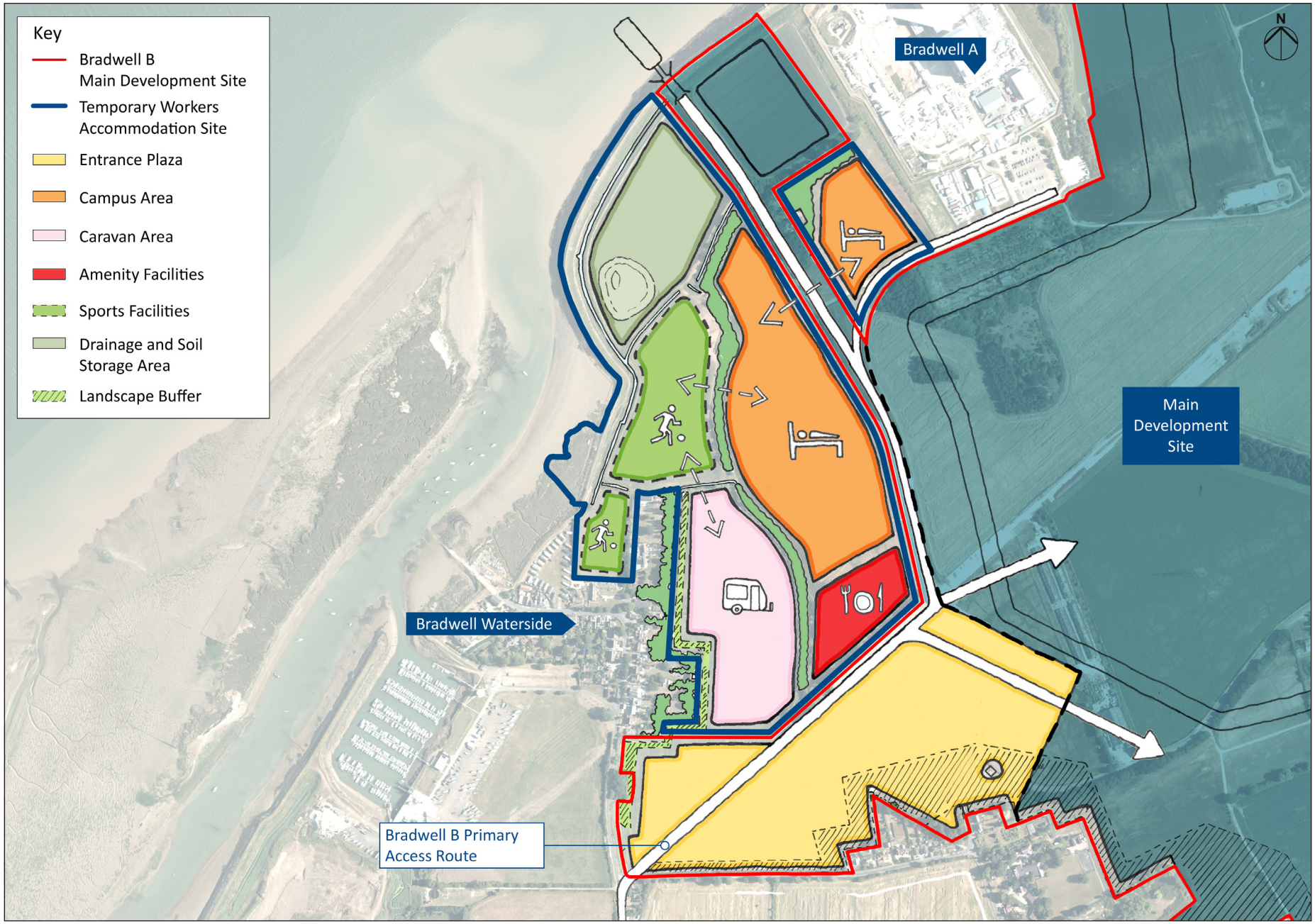
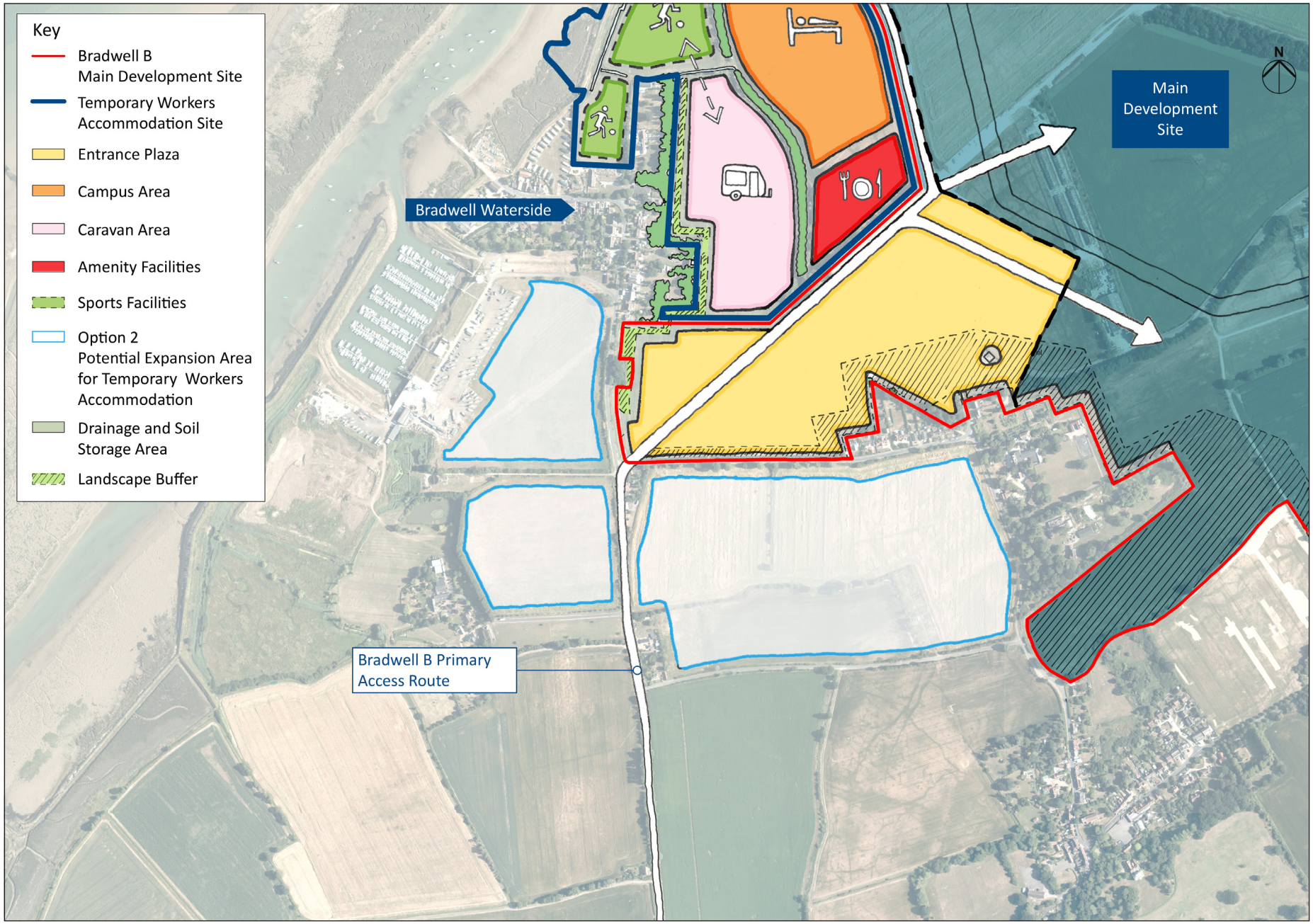


Figure 5.3 - Scenario 2: land west of the existing Bradwell power station and extension sites



Approach to mitigation and enhancement

5.7.21 Potential impacts, associated with the Project-provided accommodation, and possible mitigation measures are likely to include the following:

- Protection of residential amenity –design, screening, lighting, construction practices, traffic management etc
- Landscape and visual impact – design and screening;
- Flood risk management – application of sequential and exceptions tests and provision of compensation storage where necessary;
- Biodiversity – protection of priority habitats and species where practicable and creation of replacement habitat where necessary; and,
- Buried archaeology – design and preservation by record.

5.7.22 Mitigation will take account of feedback to consultation and will develop as the design of proposed accommodation evolves.

We would welcome your views on the two scenarios and the zoning diagram that have been presented and whether improvements to these arrangements could be made.

Other types of accommodation

5.7.23 Depending on the final size of the peak workforce and the responses received to this consultation, there may be the need to consider other forms of temporary, as well as permanent accommodation. This could involve measures to support the local housing market during the peak construction phase.

5.7.24 The DCO process allows for provision of up to 500 new permanent homes as part of an NSIP, which could therefore help cater for some of the demand for accommodation. We may also support the expansion of capacity for touring and static caravans on smaller existing or new caravan sites, away from the main development site. Any new or extensions to existing caravan sites would be carefully controlled and subject to permission being received either through the DCO application, or by the local planning authority.

5.7.25 Measures that other large scale infrastructure projects have used to support the local housing markets have included grant funding to bring empty homes back into use, working with housing associations to support the delivery of new housing, and support for growth of the tourist accommodation sector.

5.8. Summary and Next Steps

5.8.1 This is the first stage of consultation and your input and responses to this consultation will be used to inform how the project design progresses.

5.8.2 As the Project is defined in more detail, we will be working to understand the likely effects – on people, employment, businesses, accommodation, services and local places.

5.8.3 On jobs, skills and economy (including tourism) the Project will:

- Work closely with local stakeholders to define and quantify employment, skills and economic effects of the project – and develop a strategy that embeds design mechanisms to maximise local benefits.
- Bring together the networks of local partners and stakeholders needed to develop successful training and employment programmes such as those seen at Hinkley Point C.

5.8.4 On accommodation, priorities will include:

- Refining estimates of the likely construction workforce, including peak numbers, how that builds up over time, and how it breaks down by different trades and skills.
- Updating the gravity model to include new information as it becomes available, including the latest thinking on transport options.
- Using the gravity model outputs to refine the mitigation – a campus and other Project-provided accommodation, and also the other ways in which interventions could be made to help the local housing market.
- Work with Maldon District Council, Essex County Council and other local stakeholders to understand the effects on local accommodation, including tourism.

5.8.5 On community and local services:

- Based on refined estimates of the likely construction workforce as information becomes available and estimates on where workers are likely to live, work with stakeholders to define and quantify effects on existing communities and services, and develop a strategy that maximises local benefits as well as provide appropriate mitigation.

NEXT STEPS

6.1 How to Respond to this Consultation

6.2 Project Evolution

6.3 How we will Respond to Feedback

6.1. How to Respond to this Consultation

6.1.1 We would like to thank you for reading this consultation document and we welcome your feedback on our initial proposals for the Bradwell B Project.

6.1.2 Bradwell B's Stage One pre-application consultation is taking place for a period of 12 weeks, commencing on 4th March 2020. Responses to this Stage One consultation will be accepted prior to midnight on 27th May 2020.

6.1.3 The Consultation Questionnaire contains consultation questions that are particularly relevant to our emerging plans. We want to hear your views on these questions, but please do not feel constrained by them if there are other points that you wish to make that are relevant to the scope of this consultation process.

6.1.4 Our consultation documents should be read alongside the draft Statement of Community Consultation which sets out Bradwell B's general approach to consultation with the community.

6.1.5 There are a number of ways in which to respond to this Stage One consultation:

- A public questionnaire can be found online at: www.bradwellb.co.uk
- You can email your comments on this document to: info@bradwellb.co.uk
- Written responses can be posted to Freepost Bradwell B Consultation.
- You can also submit your comments via the Bradwell B Freephone hotline 01621 451 451 during normal office hours.

6.1.6 Bradwell B will host a series of events in support of this Stage One pre-application consultation. These events will generally follow three formats and will provide an opportunity for consultees to meet and ask questions face to face with a member of the Bradwell B team:

- Public exhibitions, which will be staffed by Bradwell B personnel; and
- Information Points, which display the consultation material at a number of different libraries and information centres during the consultation period. These will be unstaffed.

6.2. Project Evolution

6.2.1 Figure 1.2 in Section 1 indicates various stages of the consultation and what will be included in those stages.

6.2.2 In addition to considering feedback from the Stage One consultation, we will progress the Project's design through an iterative process, including review through regular stakeholder meetings and workshops.

6.2.3 Environmental survey work and monitoring will continue to be carried out, as a key element to inform the Project evolution and to ensure that our understanding of baseline conditions is accurate and current.

6.2.4 Environmental specialists will progress the EIA, carrying out environmental survey work and technical engagement with environmental stakeholders, then assessing likely impacts of the Project and advising on measures and design refinements to avoid or mitigate predicted significant adverse environmental effects as well as improving positive environmental effects.

6.2.5 Our Stage Two consultation will focus on our 'Preferred Proposals' for the Bradwell B Project and set out more detailed proposals for associated development identifying, in particular, the land affected by the proposals. It will also provide preliminary environmental information on the Project and likely impacts that could arise, based on that environmental impact assessment work.

6.3. How we will Respond to Feedback

6.3.1 Bradwell B is committed to considering all responses received during all stages of consultation and explaining, within our application for development consent, how they have been taken into account in the ongoing development and refinement of the Bradwell B Project. Similarly, for feedback that is considered but not incorporated into the Bradwell B Project, we will explain why.

6.3.2 We will collate and analyse feedback from all stages of consultation, identifying common themes, and will have regard to them as the Project proposals are developed and the application for a DCO is prepared.

6.3.3 Upon completion of all stages of pre-application consultation, Bradwell B will produce a Consultation Report pursuant to section 37 of the Planning Act 2008 and submit this as part of the application for a DCO. This report will explain the issues raised through consultation feedback and how these have been considered in the Bradwell B Project's evolution, including matters that have been shaped by consultee feedback.

6.3.4 Between the consultation stages, Bradwell B are committed to keeping the community updated about the progress of the Bradwell B Project. Part of this includes letters and newsletter that are sent broadly across north Essex and all available on the Project website (www.bradwellb.co.uk) and on social media.

6.3.5 We look forward to receiving your feedback and engaging with you as our proposals move forward.

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