ENVIRONMENTAL STATEMENT: 6.1 CHAPTER 7: TERRESTRIAL BIODIVERSITY

DECARBONISATION

Cory Decarbonisation Project

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7. TERRESTRIAL BIODIVERSITY

7.1. INTRODUCTION

7.1.1. This chapter reports the assessment of the likely potential significant effects of the Proposed Scheme on terrestrial biodiversity during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operation phase.

7.1.2. This assessment covers ecological features found within the land-side areas of the Site, including the freshwater habitats (i.e. drainage ditches) and fish species associated with them. However, where appropriate, it also assesses effects that can cross this boundary such as potential effects on wintering birds and the River Thames-side features resulting from surface water run-off. It does not duplicate information contained in the marine biodiversity assessment set out in **Chapter 8: Marine Biodiversity (Volume 1)**.

7.2. POLICY, LEGISLATION, AND GUIDANCE

7.2.1. The policy, legislation, and guidance relevant to the assessment of terrestrial biodiversity for the Proposed Scheme is detailed in **Table 7-1**.

Table 7-1: Terrestrial Biodiversity Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2024[1]	This Overarching National Policy Statement for Energy (EN-1) is part of a suite of NPS designated by the Secretary of State of DESNZ in January 2024. EN-1 updates the existing Policy Statement with the addition of the principles of Biodiversity Net Gain, alongside existing commitments to the protection of wildlife through avoidance of effects on designated sites, ancient woodland, veteran trees, and a commitment to avoidance and/or minimising effects rather than just mitigating for them. The following paragraphs relate to terrestrial biodiversity:

Policy, Legislation or Guidance	Description
	• *"Biodiversity net gain is an essential component of environmental net gain. Projects in England should consider and seek to incorporate improvements in natural capital, ecosystem services and the benefits they deliver when planning how to deliver biodiversity net gain"* (Paragraph 4.6.2). • *"When delivering biodiversity net gain off-site, developments should do this in a manner that best contributes to the achievement of relevant wider strategic outcomes, for example by increasing habitat connectivity or enhancing other ecosystem service outcomes or considering use of green infrastructure strategies. Reference should be made to relevant national or local plans and strategies, to inform off-site biodiversity net gain delivery. If published, the relevant strategy is the Local Nature Recovery Strategy (LNRS). If an LNRS has not been published, the relevant consenting body or planning authority may specify alternative plans, policies or strategies to use"* (Paragraph 4.6.12). • *"Although achieving biodiversity net gain is not currently an obligation on applicants, Schedule 15 of the Environment Act 2021 contains provisions which, when commenced, mean the SoS may not grant an application for Development Consent Order unless satisfied that a biodiversity gain objective is met in relation to the onshore development in England to which the application relates"* (Paragraph 4.6.1). • *"The government's policy for biodiversity in England … aim[s] … to halt overall biodiversity loss in England by 2-3- and then reverse loss by 2-42, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people. This aim needs to be viewed in the context of the challenge presented by climate change. Healthy, naturally functioning ecosystems and coherent ecological networks will be more resilient and adaptable to climate change effects. Failure to address this challenge will result in significant adverse impact on biodiversity and the ecosystem services it provides"* (Paragraph 5.4.2).

Policy, Legislation or Guidance	Description
	• *"The highest level of biodiversity protection is afforded to sites identified through international conventions. The Habitats Regulations set out sites for which an HRA will assess the implications of a plan or project, including Special Areas of Conservation and Special Protection Areas."* (Paragraph 5.4.4). • *"As a matter of policy, the following should be given the same protection as sites covered by the Habitats Regulations and an HRA will also be required:* – *potential Special Protection Areas and possible Special Areas of Conservation;* – *listed or proposed Ramsar sites; and* – *sites identified, or required, as compensatory measures for adverse effects on any of the other sites covered by this paragraph*" (Paragraph 5.4.5). • *"…development should, in line with the mitigation hierarchy, aim to avoid significant harm to biodiversity and geological conservation interests, including through consideration of reasonable alternatives (as set out in Section 4.2 above). Where significant harm cannot be avoided, impacts should be mitigated and as a last resort, appropriate compensation measures should be sought"* (Paragraph 5.4.42). • *"The Secretary of State should give due consideration to such regional or local designations. However, given the need for new nationally significant infrastructure, these designations should not be used in themselves to refuse development consent."* (Paragraph 5.4.52). • *"The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of any irreplaceable habitats, including ancient woodland, and ancient or veteran trees unless there are wholly exceptional reasons, and a suitable compensation strategy exists"* (Paragraph 5.4.53).
National Planning Policy Framework (NPPF) 2023[2]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to terrestrial biodiversity: • Section 15, paragraph 180(d) states that the planning system should contribute to and enhance the natural and local environment by: "*minimising impacts on*

Policy, Legislation or Guidance	Description
	biodiversity and providing net gains in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures"; and • Section 15, paragraph 186(a) states that: "*When determining planning applications, local planning authorities should apply the following principles: if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused*". It also states in 186(d) that: "*development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused should be refused, unless there are wholly exceptional reasons*[a] *and a suitable compensation strategy exists*".
The London Plan 2021[3]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policies GG2 and GG3 establish the principles of growth within Greater London. Policy G1, Policy G6 and Policy G7 are the key policies specific to terrestrial biodiversity within Greater London. These policies state that: • Policy GG2: Making the best use of land – states in item F that development should "*protect and enhance London's open spaces, including the Green Belt, Metropolitan Open Land, designated nature conservation sites and local spaces, and promote the creation of new green infrastructure and urban greening, including aiming to secure net biodiversity gains where possible*". • Policy GG3: Creating a healthy city – states in item G that development should "*plan for improved access to and quality of green spaces, the provision of new*

[a] For example, infrastructure projects (including nationally significant infrastructure projects, orders under the Transport and Works Act and hybrid bills), where the public benefit would clearly outweigh the loss or deterioration of habitat.

Policy, Legislation or Guidance	Description
	green infrastructure, and spaces for play, recreation and sports". • Policy G1: Green Infrastructure – *"…Green infrastructure should be planned, designed and managed in an integrated way to achieve multiple benefits. Boroughs should prepare green infrastructure strategies that identify opportunities for cross-borough collaboration, ensure green infrastructure is optimised and consider green infrastructure in an integrated way as part of a network"*. • Policy G6: Biodiversity and Access to Nature – "*Boroughs, in developing Development Plans should seek opportunities to create other habitats, or features such as artificial nest sites, that are of particular relevance and benefit in an urban context*". • Policy G7: Trees and woodlands – "*In their Development Plans, boroughs should:* – protect 'veteran' trees and ancient woodland where these are not already part of a protected site. – identify opportunities for tree planting in strategic locations". In addition to the above, The Mayor of London, Sadiq Khan, has set a target for London to be net zero carbon by 2030.
The Bexley Local Plan 2023[4]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. It addresses terrestrial biodiversity through the following policies: • SP8: Green infrastructure including designated Green Belt – "Bexley's green infrastructure, including open spaces and waterways will be protected, enhanced, restored and promoted as valuable resources to provide a healthy integrated network for the benefit of nature, people and the economy. Future development must support the delivery of a high-quality, well-connected and sustainable network of open spaces"; • SP9: Protecting and Enhancing Biodiversity and Geological Assets – paragraph 5.102 states that "this

Policy, Legislation or Guidance	Description
	strategic policy seeks to ensure that the quantity of Bexley's biodiversity is protected and enhanced, including avoiding adverse impacts from development on species and sites of nature conservation value"; and • DP19: The River Thames and the Thames Policy Area – the policy is split into six areas controlling development along the River Thames, two of which are relevant to Biodiversity. In 4. the policy states *"Proposals in the Thames Policy Area should pay attention to their impacts on the ecology of the River Thames, and on its priority habitats and protected species. Ecological enhancements will be sought from all proposals; development directly adjacent to the River should look to enhance essential fish habitats and reduce the risk of invasive species.",* seeking ecological enhancement of the River Thames through riverside developments. In 6. the policy states *"Habitat creation and enhancement will be promoted. Opportunities should also be sought for related enhancements to visitor's centres and other facilities. Habitat creation along the Thames should aim to improve the area's flood resilience and water management.",* indicating a requirement for Thames-side habitats to provide habitat creation and enhancement. • DP20: Biodiversity and Geodiversity in Developments – which presents the matters that proposed development must consider, including the mitigation hierarchy, biodiversity net gain, enhancement measures and opportunities to connect and improve the wider ecological networks, and wildlife corridors. It also states that "*development proposals that would have a direct or indirect impact on a site designated for its nature conservation or geological interest should protect and enhance the designated site's value, and will not be permitted unless all of the following criteria are met:* – there are no reasonable, less damaging, alternative solutions, locations or sites; – ecological buffer zones have been incorporated into the scheme, where appropriate, to protect and enhance the designated site's intrinsic value; – the continuity of wildlife habitat within wildlife corridors is maintained; and

Policy, Legislation or Guidance	Description
	– access to the designated site is not compromised and where possible, access and/or interpretation is improved". • DP21: Greening of development sites – requires that developments in Bexley result in 'greening' of streets, buildings and public spaces, through inclusion of "*Roofs and walls covered in plants, street trees and small pocket parks in between buildings make the borough a better place to live, work and invest*". The policy states that greening will lead to improvements for wildlife and human wellbeing. – Especially in relation to Policy SP8 but more broadly throughout the policies, the Local Plan aims to maintain and expand Bexley's green infrastructure through a network of "Green Corridors", defined as "Also known as wildlife corridor or habitat corridor; an area which connects wildlife populations separated by human activities or structures. These corridors can also provide linkages to help promote environmentally sustainable forms of transport such as walking and cycling at urban locations."
London Environment Strategy 2018[5]	The London Environment Strategy and its appendices include aims relevant to terrestrial biodiversity. By 2050, through green infrastructure the strategy states that "*London will be the world's first National Park City, where more than half of its area is green, where the natural environment is protected, and where the network of green infrastructure is managed to benefit all Londoners*". Greener outcomes under the strategy will be that "*All Londoners should be able to enjoy the very best parks, trees and wildlife. Creating a greener city is good for everyone – it will improve people's health and quality of life, support the success of businesses and attract more visitors to London*". It states these aims would be achieved through one of four strategic approaches, specifically that of "*green infrastructure and natural capital accounting*". Policies relevant to terrestrial biodiversity comprise: • Policy 5.1.1 – "*Protect, enhance and increase green areas in the city, to provide green infrastructure services and benefits that London needs now and in*

Policy, Legislation or Guidance	Description
	the future". Whose relevant constituent policy proposals relevant to terrestrial biodiversity comprise: – *"Proposal 5.1.1.a The London Plan includes policies that protect the Green Belt, Metropolitan Open Land, and the public green space network of parks and open spaces;* – *Proposal 5.1.1.b The London Plan includes policies that ensure any development outside the protected green space network, including gardens, does not lead to an overall loss of green cover; and* – *Proposal 5.1.1.d The London Plan includes policies to green streets and buildings, including increasing the extent of green roofs, green walls and sustainable drainage".* • Policy 5.2.1 – "*Protect a core network of nature conservation sites and ensure a net gain in biodiversity*". Whose relevant constituent policy proposals relevant to terrestrial biodiversity comprise: – *"Proposal 5.2.1.a The London Plan includes policies on the protection of Sites of Importance for Nature Conservation (SINCs) and Regionally Important Geological Sites (RIGS);* – *Proposal 5.2.1.b The Mayor will develop a biodiversity net gain approach for London, and promote wildlife-friendly landscaping in new developments and regeneration projects; and* – *Proposal 5.2.1.c The Mayor will provide guidance and support on the management and creation of priority habitats, the conservation of priority species, and the establishment of wildlife corridors".* • Other relevant sections comprise Chapter 5 of the strategy covering habitat creation targets for London and Appendix 2 which contains a review of Priority habitats and Species within the London Biodiversity Action Plan. Regionally Important Geological Sites (RIGS) are considered in **Chapter 17: Ground Conditions and Soils (Volume 1)**.

Policy, Legislation or Guidance	Description
The UK Post-2010 Biodiversity Framework 2012[6]	The UK Post-2010 Biodiversity Framework covers the period from 2011 to 2020 and was developed in response to two main drivers: the Convention on Biological Diversity's Strategic Plan for Biodiversity 2011-2020[7], and its five strategic goals; and 20 'Aichi Targets'. The Biodiversity Framework shows how the work of the four UK countries joins up with work at a UK level to achieve the 'Aichi Targets' and the aims of the EU Biodiversity Strategy. It identifies the activities required to complement each country's biodiversity strategy, and where work in the country strategy contributes to international obligations.
A Green Future: Our 25 Year Plan to Improve the Environment 2018[8]	Released in 2018, the UK Government's environment plan sets out goals for improving the environment within a 25 year timeframe. It details how the government will work with communities and businesses to achieve the goals, which include several of relevance to biodiversity including that wildlife and plants should thrive, resources from nature should be used more sustainably and efficiently, there should be mitigation and adaptation to climate change and that biosecurity should be enhanced.
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services 2011[9]	Biodiversity 2020 provides a comprehensive picture of how international and EU commitments are implemented in England and sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and at sea.
Bexley Biodiversity Action Plan (BAP) 2011[10]	The Bexley BAP aims to achieve targets relevant to the Royal Borough of Bexley identified in both the UK and London BAP. The action plan lists a number of habitats and species (including marine/estuarine habitat and species) within Bexley for which targets have been set to increase their range and distribution.
South East Inshore Marine Plan 2021[11]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan will help to enhance conserve and restore biodiversity through applying well-established principles of biodiversity gain and delivery of a well-managed, ecologically coherent network of marine protected areas, specific policies for biodiversity include: • Policy SE-BIO-1;

Policy, Legislation or Guidance	Description
	• Policy SE-BIO-2; and • Policy SE-BIO-3.
The Thames River Basin District Action Management Plan 2022[12]	The Thames River Basin District (RBD) River Basin Management Plan describes the challenges that threaten the water environment and how these challenges can be managed.
Legislation	
Environment Act 2021[13]	The Environment Act 2021 makes provision for targets, plans and policies for improving the natural environment. The Act includes Section 99 and Schedule 15. which provide for a system of mandatory requirement for a 10% biodiversity net gain. This is expected to come into force in November 2025 through the provision of biodiversity gain statements or updates to the relevant NPS. A BNG assessment (**Appendix 7-1: Biodiversity Net Gain Report (Volume 3)**) is submitted for the Proposed Scheme, notwithstanding that the statutory provisions for BNG are not yet in force.
The Wildlife and Countryside Act 1981 (as amended) (WCA)[14]	The primary legislation for the protection of animals, plants and habitats in the UK. This legislation covers three main areas: • Wildlife protection, including protection of wild birds, their eggs and nests, protection of other animal and protection of plants; • Nature Conservation, Countryside and National Parks; and • Public Rights of Way (PRoW).
Countryside and Rights of Way (CROW) Act 2000[15]	Part III of this Act gives greater protection to wildlife and natural features by making provision for the conservation of biological diversity, by improving protection for Sites of Special Scientific Interest (SSSIs) in England and Wales and the enforcement of wildlife legislation.
The Natural Environment and Rural Communities (NERC) Act 2006[16]	The NERC Act was designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy. The NERC Act established a new independent body (Natural England) responsible for conserving, enhancing, and managing England's natural environment for the benefit of

Policy, Legislation or Guidance	Description
	current and future generations, thereby contributing to sustainable development. The NERC Act made amendments to both the Wildlife and Countryside Act 1981 and the CROW Act 2000. Section 40 of the NERC Act imposes a duty on public authorities *"In exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*". This duty was extended by the Environment Act 2021 to refer also to the enhancement of biodiversity, going beyond the mere maintenance of biodiversity in its current state. Section 41 of the NERC Act requires the Secretary of State to *"publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity*". These are referred to as Habitats/Species of Principal Importance.
The Protection of Badgers Act 1992[17]	Under the Protection of Badgers Act it is an offence to wilfully take, kill, injure (or attempt to do so), possess or ill-treat a badger. Under this Act, setts are protected against intentional or reckless interference. Sett interference includes damaging or destroying, obstructing access to any part, or disturbance of a badger whilst it is occupying a sett. The Act defines a badger sett as *"any structure or place, which displays signs indicating the current use by a badger*" and Natural England interprets this definition to include seasonally used setts that are not occupied but that show signs of recent use by badgers.
The Hedgerows Regulations 1997[18]	The Hedgerow Regulations are designed to protect hedgerows in England and Wales and regulate their removal and replacement. They apply to any hedgerow growing in, or adjacent to, any common land, protected land, or land used for agriculture, forestry or the breeding or keeping of horses, ponies or donkeys that have a continuous length of at least 20m, or if less than 20m, meets another hedgerow at each end. A higher level of protection is afforded to *"important"* hedgerows, with a hedgerow being classified as important if it, or the hedgerow of which it is a stretch, has existed for 30 years or more and satisfies other specified criteria

Policy, Legislation or Guidance	Description
	provided for by those regulations (cross-reference with Part II of Schedule 1 to The Hedgerow Regulations 1997).
The Wild Mammals (Protection) Act 1996[19]	The Wild Mammals (Protection) Act 1996 makes provision for the protection of wild mammals from certain cruel acts; and for connected purposes. It is an offence for anyone to mutilate, kick, beat, nail (or otherwise impale), stab, burn, stone, crush, drown, drag or asphyxiate any wild mammal with intent to inflict unnecessary suffering.
The Conservation of Habitats and Species Regulations 2017 (as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) ('the Habitats Regulations') 2017[20]	The Habitats Regulations, which implement the Habitats Directive (EC Directive 92/43/EEC) in the United Kingdom, and in particular Regulation 63, require the competent authority consenting a development to determine whether appropriate assessment is necessary before deciding whether to give consent, permission or other authorisation for plan or project which: • "*is likely to have a significant effect on a European Site (either alone or in combination with other projects)*[b]; *and* • *is not directly connected with or necessary to the management of that site must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives"*. In the case of the Proposed Scheme, the competent authority is the SoS. To enable the competent authority to determine whether an appropriate assessment is necessary a person applying for any such consent, permission or other authorisation must provide such information as the competent authority may reasonably require for this purpose. If a plan or project may adversely impact a European Site, Regulation 64 of the Habitats Regulations provides that the competent authority may agree to the plan or

[b] European sites include Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Community Importance (SCI), and candidate SACs. The NPPF states that internationally important wetlands designated under the Ramsar Convention 1971 (Ramsar sites and potential Ramsar sites) are afforded the same protection as SPAs and SACs, for the purpose of considering development proposals that may affect them (and so are considered in this report as 'European sites').

Policy, Legislation or Guidance	Description
	project notwithstanding that adverse assessment of the implications for the European Site only where it is satisfied that: • there is no alternative solution to the plan or project to avoid the adverse impact; and • the plan or project must be carried out for imperative reasons of overriding public interest including those of a social or economic nature. Where the site to be adversely impacted hosts a priority natural habitat type[c] or a priority species, the imperative reasons of overriding public interest must be either: • *"reasons relating to human health, public safety or beneficial consequences of primary importance to the environment*; *or* • *any other reasons which the competent authority, having due regard to the opinion of the European Commission, considers to be imperative reasons of overriding public interest*"[d]. In addition, Regulation 55 requires "*Licences for certain activities relating to animals or plants*", namely where activities would lead to adverse effects on species identified by the Habitats Regulations. The Habitat Regulations have created a national site network for both terrestrial biodiversity (this chapter) and marine biodiversity (see **Chapter 8: Marine Biodiversity (Volume 1)**), including both the inshore and offshore marine areas in the UK. This new national site network includes existing Special Areas of Conservation (SAC) and Special Protection Areas (SPA), and new SAC and SPA designated under these regulations. Any references to Natura 2000 in the Conservation of Habitats and Species Regulations 2017 now refers to the new national site network.
National Parks and Access to the Countryside Act 1948[21]	The Act provides the framework for the creation of National Parks and the establishment of a National Parks Commission.

[c] See Article 1(d) of EC Directive 92/43/EEC.
[d] See Article 1(h) of EC Directive 92/43/EEC.

Policy, Legislation or Guidance	Description
	The Act confers powers on the Nature Conservancy (a now defunct government body whose functions Natural England now perform) and local authorities: for the establishment and maintenance of nature reserves; to make further provision for the recording, creation, maintenance and improvement of public paths; for securing access to open country; and to amend the law relating to PRoW.
The Salmon and Freshwater Fisheries Act 1975[22]	This Act addresses the regulation of fisheries in England and Wales, including legislation that covers the introduction of polluting effluents, the obstruction of fish passage (screens, dams, weirs, culverts etc.) illegal means of fishing, permitted times of legal fishing and fishing licencing (which covers electric fishing). Under this Act any person who causes or knowingly permits to flow, or puts or knowingly permits to be put, into any waters containing fish or into any tributaries of waters containing fish, any liquid or solid matter to such an extent as to cause the waters to be poisonous or injurious to fish or the spawning grounds, spawn or food of fish, shall be guilty of an offence. The Act requires that fish passes are installed on new and rebuilt barriers that affect waters frequented by salmon or migratory trout.
The Eels (England and Wales) Regulations 2009[23]	The Eels (England and Wales) Regulations 2009 implement Council Regulation (EC) No 1100/2007 of the Council of the European Union, which required Member States to establish measures for the recovery of the stock of European eel. The regulations apply across England and Wales. The Eels Regulations give powers to the regulators (the Environment Agency and Natural Resources Wales) to implement recovery measures in all freshwater and estuarine waters in England and Wales. The aim of the Regulations is to achieve 40% escapement of adult eels relative to escapement levels under pristine conditions. The measures, as set out in the legislation, by which this is to be achieved are to reduce fishing pressures, improve access and habitat quality and reduce the impact of impingement and entrainment.

Policy, Legislation or Guidance	Description
	Under the Regulations, regulators can serve notice to companies detailing their legal obligation to screen intakes and outfalls for eel and/or to remove or modify obstructions to eel migration. However, it is possible for companies to be granted with exemptions if the costs of works greatly exceeds the benefits. In such a situation it is likely the regulator will seek a package of more cost-effective, "alternative measures".
The Water Environment (Water Framework Directive) (England and Wales) Regulations (the 'Water Framework Regulations') 2017[24]	The Water Framework Directive (WFD) (2000/60/EC) establishes a framework for the management and protection of Europe's water resources. It was implemented in England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended). The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended) has subsequently been revoked and replaced by the Water Framework Regulations. The purpose of the Water Framework Regulations is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. All water bodies (unless artificial or heavily modified) are required to achieve 'good' ecological status unless alternate objectives are set or there are grounds for deterioration. Ecological status demonstrates the quality of the structure and function of surface water ecosystems indicated through 'quality elements'. These include hydromorphological, chemical and biological indicators (including benthic invertebrates, macroalgae, fish, phytoplankton and angiosperms). When considering the effect of a development or activity on a water body, it is a regulatory requirement under the Water Framework Regulations to assess if it will cause or contribute to a deterioration in status or jeopardise the water body achieving good status in the future. The Water Framework Regulations identify Lower and Higher Sensitivity Habitats that are considered important features requiring protection. Where a development is considered to cause deterioration, or where it may contribute to the failure of the water body to meet Good Ecological Status or Good

Policy, Legislation or Guidance	Description
	Ecological Potential Status, then an assessment to demonstrate that the development is exempt under Article 4.7. This makes provision for deterioration of status, provided that certain stringent conditions are met. Under the Water Framework Regulations water bodies can become WFD-designated. WFD-designated water bodies each have a status.
Guidance	
National Planning Practice Guidance (2021)[25]	Explains the processes and tools that can be used through the planning system in England. In relation to terrestrial biodiversity, guidance on Appropriate Assessment (i.e., the assessment of effects on sites designated under the Conservation of Habitats and Species Regulations 2017) and Environmental Impact Assessment are relevant, alongside the "Biodiversity, Geodiversity and Ecosystems" section of the Natural Environment guidance section. The guidance advises how to identify suitable mitigation and adaptation measures in the planning process. This would require the implementation of appropriate measures by the local planning authorities. The guidance particularly recommends development of brownfield sites over greenfield sites, implementation of green infrastructure networks in development, avoidance of effects on important ecological sites and species and use of appropriate mitigation where necessary.
Chartered Institute of Ecology and Environmental Management (CIEEM) Guidance 2017[26]	These pieces of guidance aim to increase the quality of ecological reports supporting development applications by laying down minimum standards for what should be covered by ecologists undertaking such studies, and also defining best practice in baseline ecological reporting.
CIEEM (2022) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Version 1.2)[33]	Current best practice guidance for undertaking ecological impact assessments in the UK and Ireland.

7.3. CONSULTATION AND ENGAGEMENT

7.3.1. **Table 7-2** provides a summary of the consultation and engagement undertaken in support of the preparation of this assessment.

7.3.2. **Table 7-3** provides a summary of comments provided as part of the statutory consultation process and an appropriate response.

7.3.3. **Appendix 4-2: Scoping Opinion Responses (Volume 3)** provides a summary of the Planning Inspectorate and consultee comments on the EIA Scoping Opinion[27] and the Applicant's responses.

Table 7-2: Consultation and Engagement Summary Table in relation to Terrestrial Biodiversity

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
17th February 2023, Email	Thames Water	Confirmation that GCN are not present at Crossness LNR[29].
12th April 2023, Meeting	Friends of Crossness Local Nature Reserve	Initial introductory consultation meeting to present the Proposed Scheme and the approach to consulting with the Friends of Crossness LNR about the design development of the Proposed Scheme.
19th June 2023, Email	Natural England	Request for opening a dialogue with respect to the Proposed Scheme. A HRA Screening Report was provided for comment[29].
4th July 2023, Email	Thames Water	Provision of biological records, ecological survey reports and quarterly wildlife reports for Crossness LNR.
13th September 2023, Meeting	Friends of Crossness Local Nature Reserve	Presentation of the Proposed Scheme in its current form including identified mitigation requirements and opportunities. Q&A and consideration of setting up a working group to progress design elements.
14th September 2023, Meeting	London Borough of Bexley	Tour of Riverside 1. Presentation and discussion of the Proposed Scheme in its current form including identified mitigation requirements.
22nd September 2023, Meeting	Natural England	Initial introductory consultation meeting to present the Proposed Scheme and decide next steps in the consultation process and assign roles. Natural England to provide a response on the HRA Screening Report following this meeting.
29th September 2023, Email	Natural England	HRA Screening Response from Natural England received[29] and confirmed agreement with the approach set out in the HRA Screening Report[29].

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
27th November 2023, Email	Friends of Crossness Local Nature Reserve (LNR), Thames Water	Provision of raw ecological data results from surveys undertaken to support the assessment of impacts, in preparation for meeting with both consultees (see row below).
4th December 2023, Meeting	Friends of Crossness LNR, Thames Water	Ecological survey methods and results as well as the content of Chapter 7: Terrestrial Biodiversity (Volume 1) of the PEIR were discussed through a question and answer session, followed by a walkover of the Site to gain insight on where the Friends of Crossness LNR members thought ecological gains could be made through enhancement and landscaping.
14th February 2023, Meeting	Friends of Crossness LNR, Thames Water	Meeting to progress the items from the meeting on 04/12, and identify further improvements that could be made to Crossness LNR that Friends of Crossness LNR thought would benefit the reserve. Concept drawings for the Proposed Scheme and landscaping were presented and discussed.

Table 7-3: Summary of the Statutory Consultation Comments in relation to Terrestrial Biodiversity

Comments	Response
London Borough of Bexley	
"Descriptions in table 7-1 should relate to considerations for the assessment of the proposed development. For example, the description of the London Plan policy refers to what the policy says boroughs should do in their development plans, rather than saying what should be considered in the assessment of a proposal. The Council already has policies in its Local Plan which address the London Plan requirements on what boroughs should include in their development plans. Using policy G6 as an example, Parts A, and C are particularly important when in considering the principle of development on a metropolitan SINC, as discussed in comments relating to chapter 3; however, these have not been mentioned in the table 7-1 description. Table 7-1 references biodiversity action plans, in that regard, the following are not mentioned: *The 2018, London Environment Strategy Chapter 5 includes Habitat creation targets for London–- Species-rich woodland, Flower-rich grassland, Rivers and streams, Reedbeds. Appendix 2 has London Biodiversity Action Plan Review of Priority Species – based on 2007 figures and BAP Priority Habitats. The GIGL pages include achieve for London Species Action Plans and Habitat Action Plans, plus update to species"*	The direction provided on policy has been noted. **Table 7-1** has been updated with further information where appropriate to indicate additional relevant sections of listed policies.
"The 2019, GLA priority species list spreadsheet tool (London Priority Species | London City Hall), includes opportunity species where there are likely to be opportunity to provide new or enhanced areas of habitat for across London's greenspaces or development, includes info on habitat requirements. 64 species in Bexley."	This information source is noted, although it has not formed part of the decision making with regards habitat creation and enhancement in relation to the Proposed Scheme. The primary focus for both has been mitigating effects on Crossness LNR's habitats and species, improvement of the LNR's habitats post-development and provision of compensatory habitat replacement for those important habitats

Comments	Response
	outside the LNR but falling within the Proposed Scheme footprint. Thus, local conditions specifically have driven the development of mitigation, compensation and enhancement measures rather than broad lists of species provided for Greater London as a whole.
"Published 2022, the updated List of priority habitats and species in England, Habitats and species of principal importance in England—-GOV.UK (www.gov.uk). UK BAP habitats species actions and strategies. Check most recent strategy."	The latest list of priority habitats and species has been used when compiling baseline data for the impact assessment.
"National Planning Practice Guidance is described in the context of EIA and AA requirements; however, no reference has been made to the Natural environment National Planning Practice Guidance."	**Table 7-1** has been updated to reference the Natural Environment guidance section of the NPPG[2].
"Table 7-1 has not been updated to include reference to CIEEM EcIA guidelines, it refers to preliminary assessments and report writing. Although the EcIA guidelines are referred to in the main text."	Reference to this document has been added to **Table 7-1**.
Natural England	
"The PEIR highlights that five nationally or internationally important statutory designated sites have been considered as part of the process, which are Epping Forest SAC, Inner Thames Marshes SSSI, Ingrebourne Marshes SSSI, Oxleas Woodlands SSSI and Ruxley Gravel Pits SSSI. Chapter 7 highlights that the preliminary assessment of likely impacts and effects is able to conclude that for both construction and operational phases there will be no impact on these statutory designated sites. *We note that there is further work to be completed with regards to air quality and that this will be included in the Environment Statement."*	Assessment of effects on these designated sites and others including non-statutory designated sites and Crossness LNR is included within **Section 7.8** for both construction and operation phases of the Proposed Scheme. This includes the assessment of effects of air quality changes.

Comments	Response
"Natural England note that a number of species surveys have been undertaken to inform the PEIR. Natural England has prepared Protected Species Standing Advice to help decision makers and applicants understand the impact of particular developments on protected species. We advise you to refer to this advice as part of the environmental assessment process. Natural England will only provide bespoke planning advice on protected species where they form part of a Site of Special Scientific Interest or in exceptional circumstances. *As this is a Nationally Significant Infrastructure Project, should impacts to licensable protected species be likely, Natural England would recommend that you seek advice on any required Letters of No Impediment (LONI) through our Discretionary Advice Service."*	The Applicant will be seeking advice on a Letter of No Impediment for a water vole mitigation licence and note that the recommended course of action is to apply through the Discretionary Advice Service.
"The Environmental Statement should fully consider the potential impacts to local sites, priority habitats and species and we acknowledge the surveys that have (or are being) undertaken across the site. There may also be opportunities to enhance local sites and improve their connectivity. Natural England does not hold locally specific information on local sites and recommends further information is obtained from appropriate bodies such as the local records centre, wildlife trust, geoconservation groups or recording societies. *Priority habitats and Species are of particular importance for nature conservation and are included in the England Biodiversity List published under section 41 of the Natural Environment and Rural Communities Act 2006. Most priority habitats will be mapped either as Sites of Special Scientific Interest, on the Magic website or as*	**Section 7.8** of this chapter considers potential impacts to local sites, priority habitats/species (as published under Section 41 of the Natural Environment and Rural Communities Act 200616) and other important habitats/species. Enhancement of habitats within both Crossness LNR and Thamesmead Golf Course SINC will be undertaken as part of the Proposed Scheme, and these proposals have been informed by consultation with those responsible for management of those sites (Thames Water, Friends of Crossness LNR and Peabody Trust), thus proposals have been informed by local knowledge. Enhancement proposals are detailed in **Appendix 7-1: Biodiversity Net Gain Report (Volume 3).** Records obtained from the local biodiversity records centre (eCountability Ltd in Greater London) have informed the baseline.

Comments	Response
Local Wildlife Sites. List of priority habitats and species can be found on Gov.uk. *Natural England does not routinely hold species data, such data should be collected when impacts on priority habitats or species are considered likely. Consideration should also be given to the potential environmental value of brownfield sites, often found in urban areas and former industrial land, further information including links to the open mosaic habitats inventory can be found here."*	The value of 'brownfield' habitats have been considered within the assessment. Open mosaic habitat, a Priority Habitat, is an ecological feature included.
"Natural England notes that there are areas of ancient woodland in close proximity to the You should consider any impacts on ancient woodland and ancient and veteran trees in line with paragraph 180 of the NPPF. Natural England maintains the Ancient Woodland Inventory which can help identify ancient woodland. Natural England and the Forestry Commission have produced standing advice for planning authorities in relation to ancient woodland and ancient and veteran trees. It should be taken into account by planning authorities when determining relevant planning applications. Natural England will only provide bespoke advice on ancient woodland, ancient and veteran trees where they form part of a Site of Special Scientific Interest or in exceptional circumstances."	The closest ancient woodland Is located at Lesnes Abbey Woods LNR/Lesnes Abbey Woods and Bostall Woods SINC, approximately 1.1km to the southwest of the Site Boundary. Both these sites have been included within the scope of this chapter's assessment. No ancient or veteran trees have been identified within the Site or the Study Area outlined in **Section 7.5**.
"Development should provide net gains for biodiversity in line with the NPPF paragraphs 180(d), 185 and 186. Development also provides opportunities to secure wider biodiversity enhancements and environmental gains, as outlined in the NPPF (paragraphs 8, 74, 108, 124, 180, 181 and 186). The Environment Act also requires Nationally Significant Infrastructure Projects to deliver biodiversity net gain.	Enhancement of habitats within both Crossness LNR and Thamesmead Golf Course SINC are proposed as part of the Proposed Scheme pursuant to DCO Requirement and Section 106 Agreement. Enhancement proposals are detailed in **Appendix 7-1: Biodiversity Net Gain Report (Volume 3).** The Proposed Scheme aims to achieve a 10% net gain in biodiversity using the UK Government's Statutory Biodiversity Metric[28].

Comments	Response
We advise you to follow the mitigation hierarchy (avoid, mitigate, compensate) and firstly consider what existing environmental features on and around the site can be retained or enhanced or what new features could be incorporated into the development proposal. Where onsite measures are not possible, you should consider off site measures. Opportunities for enhancement might include: • *Restoring a neglected hedgerow;* • *Creating a new pond as an attractive feature on the site;* • *Planting trees characteristic to the local area to make a positive contribution to the local landscape;* • *Using native plants in landscaping schemes for better nectar and seed sources for bees and birds;* • *Incorporating swift boxes or bat boxes into the design of new buildings;* • *Designing lighting to encourage wildlife; and* • *Adding a green roof to new buildings.* *The statutory biodiversity metric calculation tool may be used to calculate biodiversity losses and* *gains for terrestrial and intertidal habitats and can be used to inform any development project.* *You could also consider how the proposed development can contribute to the wider environment and help implement elements of any Landscape, Green Infrastructure or Biodiversity Strategy in place in your area.* • *Identifying opportunities for new greenspace and managing existing (and new) public spaces*	Embedded Design, Mitigation and Enhancement **(Section 7.7)** and Additional Design, Mitigation and Enhancement **(Section 7.9)** follow the Mitigation Hierarchy approach as described. Suggestions for enhancements have been noted. Connectivity and contributions to green infrastructure that will be achieved through onsite and offsite enhancement is set out in the **Outline LaBARDS (Document Reference 7.9)**. These measures will be secured via a requirement in the **Draft DCO (Document Reference 3.1)** and Section 106 agreement.

Comments	Response
• *to be more wildlife friendly (e.g. by sowing wild flower strips)* • *Planting additional street trees.* • *Identifying any improvements to the existing public right of way network or using the opportunity of new development to extend the network to create missing links.* • *Restoring neglected environmental features (e.g. coppicing a prominent hedge that is in poor condition or clearing away an eyesore).”*	
Greater London Authority	
“It will be essential to see the biodiversity net gain assessment accompanying the DCO application, and more detail on proposed mitigation, to allow assessment of the wildlife impacts of the proposed development, including the development of a new jetty facility. Any mitigation plans should aim to maintain and enhance the quantity, quality and wildlife benefits associated with the existing habitat. Further detail on offsite mitigation options that are being considered should also be provided as part of the DCO application.”	The Proposed Scheme aims to achieve a 10% net gain in biodiversity as measured through the UK Governments Statutory Metric, the full assessment is presented as **Appendix 7-1: Biodiversity Net Gain Report (Volume 3)**. Further information about the proposed habitat creation and enhancement is provided in the **Outline LaBARDS (Document Reference 7.9)**.
Buglife	
“Buglife has reviewed the Preliminary Environmental Information Report (PEIR) provided by Cory (October 2023) and welcomes the recognition of the importance of Crossness LNR for both terrestrial and aquatic invertebrates. Buglife notes that invertebrate surveys are ongoing and expects them to be a comprehensive dataset across an entire survey season to enable a robust impact assessment to be made. Buglife would anticipate that historical data will also be considered to provide a more informative baseline of the value of the site.”	The scope of baseline data collection for invertebrates is presented in **Section 7.6** (supported by **Appendix 7-8: Invertebrate Survey Report (Volume 1)**) and comprises both survey work and desk study data, the latter collected from across the past decade. This represents a comprehensive dataset using data collected across a number of survey seasons. Thus, historical data has indeed been used to provide a robust and informative baseline of the ecological importance of the Site for terrestrial invertebrates.

Comments	Response
"Buglife is aware that ongoing construction works for the adjacent 'Riverside 2' facility could also be affecting habitats on the reserve, such as negatively impacting on the water quality of recently surveyed ditches and reducing their apparent quality."	Construction of Riverside 2 is being undertaken in accordance with the approved details, including the relevant Code of Construction Practice. The Code of Construction Practice includes measures to prevent the construction of Riverside 2 resulting in unacceptable adverse effects on neighbouring environments.
"Relatively recent data from Thames Water provides figures of 69 notable species of terrestrial invertebrates from the reserve which include the European Vulnerable Moss Carder Bee (Bombus muscorum) and several Priority Species under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006, including the Shrill Carder Bee (Bombus sylvarum), Brown-banded Carder Bee (Bombus humilis) and Phoenix Fly (Doyrcera graminum). Data from the Terrestrial Invertebrate Survey report 2020-21 (Colin Plant Associates, November 2021) was run through the Pantheon invertebrate analysis database and this highlighted the favourable status of six Specific Assemblage Types, those associated with: rich flower resource, scrub edge, bark and sapwood decay, reed-fen and pool, open water on disturbed mineral sediments and undisturbed fluctuating marsh. This indicates the importance of the wide variety habitats present at the reserve to the invertebrate assemblage. Of particular concern is the loss of habitat for the Shrill Carder Bee, a species which requires a network of flower-rich sites, so can suffer from the progressive loss of sites, as has been the case in the Thames Estuary."	The importance of Crossness LNR is recognised through the evaluation undertaken in **Paragraphs 7.6.40** to **7.6.42**, which shows the reserve to be an important site for terrestrial invertebrates within Greater London. Habitat loss is recognised as an effect of the Proposed Scheme, and therefore habitat creation is proposed to mitigate and provide a net gain for biodiversity **(Appendix 7-1: Biodiversity Net Gain Report (Volume 3)** and **Outline LaBARDS (Document Reference 7.9)**). This will include flower-rich grassland habitat creation as well as improvements to the condition of existing grassland habitats to raise their biodiversity value, both intrinsically and as supporting habitat to species such as bees and other invertebrates.
"The PEIR has identified "The aquatic macroinvertebrate species present within the Site are important on a National level" and that "Preliminary results suggest high conservation values of	These statements show that the Proposed Scheme has taken impacts on invertebrates seriously and supports the level of importance assigned to invertebrate species during the impact

Comments	Response
macroinvertebrate communities in North Dyke and Norman Road River". Rare species that have previously recorded in a 2019."	assessment process. It also supports high-level of mitigation and habitat creation provided for them.
"Aquatic Invertebrate Survey of the reserve (Colin Plant Associates, July 2019) include the Vulnerable Lesser Spangled Diving Beetle (Graphoderus cinereus) and two Near Threatened water scavenger beetles, Hydrochus ignicollis and Hydrophilus piceus. The scheme will result in the loss of 756m of the ditch network which will be difficult to adequately mitigate for."	Through the proposed creation of approximately 1300m of new ditch habitat, and enhancement of a further 400m, it has been possible to both mitigate and provide a net gain in biodiversity value for the ditch network **(Appendix 7-1: Biodiversity Net Gain Report (Volume 3)**).
"Crossness LNR is part of Erith Marshes Metropolitan Site of Importance to Nature Conservation (MSINC), an important remaining area of grazing marsh on the Thames, with a wildlife-rich ditch system. Belvedere Dykes MSINC and River Thames and Tidal Tributaries MSINC, also falls within the site. There will be permanent loss and impacts to these sites from the proposals."	The terrestrial biodiversity impact assessment recognises the permanent loss of habitat as a result of the Proposed Scheme. However, it has been possible to mitigate and provide an overall net gain in biodiversity value through habitat creation to balance these losses **(Appendix 7-1: Biodiversity Net Gain Report (Volume 3)**).
"The PEIR identifies three Habitats of Principal Importance (HPI) for conservation within the site: Coastal and Floodplain Grazing Marsh, Lowland Mixed Deciduous Woodland and Intertidal Mudflats. Buglife is unclear why other habitats listed as HPI under the NERC act and identified as being present on site have not been flagged as HPI in the report. These habitats are River, Reedbed, Standing Open Waters and Open Mosaic Habitats on Previously Developed Land (OMHPDL). It is important that all HPI impacted by the proposals are identified and impacts on them fully assessed."	These have been noted and the scope of Habitats of Principal Importance included within the assessment has been extended and made clear within the assessment.
"The PEIR has already assessed that the effects of habitat loss are negligible after on-site and off-site habitat creation and enhancement. This is of concern as the mitigation plans are not developed and "subject to change depending on their feasibility" and	Although at the PEIR stage proposals were subject to change and feasibility, the Proposed Scheme committed to mitigate its effects and achieve a net gain for biodiversity. Proposals are now further developed and provided in the **Outline LaBARDS) (Document Reference 7.9)**. Reasoning is explained in the **Appendix 7-1:**

Comments	Response
therefore the residual effect would need to be reassessed for the Environmental Statement."	**Biodiversity Net Gain Report (Volume 3)**, demonstrating how onsite and offsite habitat creation is intended to be achieved and how this will lead to net gain. Where necessary this has led to amendment of the impact assessment in this chapter.
"The PEIR has identified a wide range of impacts on terrestrial and aquatic invertebrates during both the construction and operational phases. Some of the impacts highlighted in the PEIR included adverse effects from; loss of habitat, degradation and fragmentation of habitat, decrease in water quality due to pollution and Artificial Lighting at Night (ALAN)."	An assessment of construction and operation phase lighting effects has been undertaken for invertebrates, with mitigation measures proposed involving sensitive design of lighting.
"Buglife is concerned that there are multiple conflicting land use issues with the direct loss of Crossness LNR from the scheme. Firstly, Thames Water highlight in their consultation response that Crossness LNR was secured by a Section 106 agreement for a period of 99 years from 1994 as compensation for the "Sludge Powered Generator planning permission". In addition to this conflict of use, one of the main proposals to mitigate impacts is the 'enhancement' of Norman Field, adjacent to Crossness Nature Reserve. Norman Field already supports the HPI Coastal and Floodplain Grazing Marsh, as well as a network of ditches and scrub habitat. Buglife understands that this land was already used for mitigation for the Veridian Park development in Thamesmead within the last decade, so it is not appropriate for it to be utilised again for another development."	The existence and ecological importance of Crossness LNR is not disputed by the impact assessment, which recognises the Proposed Scheme seeks to use habitat within the LNR and consequent habitat loss. The existing value of Norman Road Field is recognised, as well as the limitations in the condition of habitats it supports, that are an opportunity for improvement. Discussion with Peabody Trust/Tilfen Land Ltd confirmed that this area was used to provide mitigation for habitat loss associated with Veridion Park in the past, some 20 years has passed since the works were undertaken and limited management of the area has been implemented over that time. The enhancements proposed to this area and commitment to management in the long term will lead to an improvement for biodiversity in comparison to the existing baseline scenario.
"Buglife is also concerned on how 'enhancement' of Norman Field can compensate for loss of habitats, considering the habitats the Field already supports and the likelihood that some notable and/or Priority Species of invertebrates could be present. It is important that	Details of how enhancement of Norman Road Field will benefit biodiversity, including invertebrates, are specified in the impact assessment below. The **Outline LaBARDS (Document Reference**

Comments	Response
assessment is undertaken of the current invertebrate interest of the proposed 'Environmental Mitigation Opportunities Areas' to understand the value of these areas for invertebrates in their own right and the impacts of any mitigation scheme so that genuine uplift is provided."	**7.9)** present the enhancement measures as part of the strategy to be implemented across the Mitigation and Enhancement Area.
"Whilst Buglife is aware that the mitigation proposals are not fully developed, there is real concern that there will be overall loss of important invertebrate habitats and potentially ongoing adverse impacts on the Thames Estuary South IIA that supports a nationally important assemblage of invertebrates."	The impact assessment demonstrates that effects on invertebrates will be mitigated such that the Proposed Scheme would not contribute to the ongoing adverse impacts on the Thames Estuary South Important Invertebrate Area that the consultee has identified. In addition, it will achieve a net gain for biodiversity through habitat creation and enhancement activities proposed in the **Outline LaBARDS (Document Reference 7.9)** and as set out in the **Appendix 7.1: Biodiversity Net Gain Report (Volume 3)**.
CBRE (Global Commercial Real Estate Services), on behalf of the Peabody Trust	
"..it is extremely important that we quickly develop a mutual understanding of the detail of the works on Peabody/Tilfen land, when enhancement and mitigation would be delivered, how it would be secured, and what arrangements for maintenance and management would be made."	Details of habitat creation and enhancement measures proposed both onsite and offsite are provided in the **Outline LaBARDS (Document Reference 7.9)**. The Applicant has been seeking to engage with Peabody/Tilfen Land Limited on these proposals and will continue to throughout Examination.
Creekside Developments	
"Re ecological/biodiversity effects–- it is not clear (but seems to be the case) that the proposal includes development on land identified as an area for ecological mitigation for Riverside 2 (paragraph 7.6.10). This seems undesirable, because the Project then needs to address that impact."	Restoration of Open Mosaic Habitat was included as a commitment within the Riverside 2 development, and this restoration will not be possible as a result of the Proposed Scheme. However, the baseline for the Proposed Scheme includes Open Mosaic Habitat as if restoration had occurred, and thus has been included in the assessment of impacts and effects. Its loss will be offset, likely through creation of Open Mosaic Habitat offsite at the BNG

Comments	Response
	Opportunity Area as proposed in the **Outline LaBARDS (Document Reference 7.9)**. Thus, impacts on Open Mosaic Habitat, and habitats that would have been restored with Riverside 2, have been addressed in this assessment.
Environment Agency	
"We welcome a BNG assessment undertaken by the applicant and would hope that a minimum of 10% net gain is achieved in every habitat type with ideally an aspiration of 20% and above to be realised. At present given the loss of habitat East Paddock the submission will need to demonstrate significant biodiversity net gain. We expect biodiversity net gain to be written into law January 2024."	The Proposed Scheme aims to achieve a 10% net gain in biodiversity as measured through the UK Governments Statutory Metric. This is presented as **Appendix 7-1: Biodiversity Net Gain Report (Volume 3).** Further information about the proposed habitat creation and enhancement is provided in the **Outline LaBARDS (Document Reference 7.9)**.
"If land raising is to occur in the (East Paddock) which is going to be of determent to water voles. The applicant should seek to avoid any habitat degradation. If this cannot be avoided the applicant should demonstrate reasons why this is the case and the measures set out in 7.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES should be discussed and agreed with more detailed information provided."	Water vole mitigation will be carried out where ditches will be affected. This will comprise a programme of capture and captive breeding, removing water voles from affected areas, then habitat reinstatement and creation, followed by their release. These measures are outlined in in **Section 7.9** of this chapter, and the Applicant is currently seeking to obtain a Letter of No Impediment in respect of this.
The Royal Society for the Protection of Birds	
"The RSPB thanks you for the opportunity to feed back regarding your decarbonisation facility plans at Crossness. The RSPB objects to the proposals for a decarbonisation plant at Crossness Nature Reserve which would damage and destroy much of this important part of the Erith Marshes Site of Metropolitan Importance for Nature Conservation, which also lies within the Thames Estuary South	The Applicant recognises that efforts to address climate change cannot come at the cost to declining wildlife and rare habitats. For this reason, assessment of impacts on the terrestrial biodiversity within Crossness LNR has been undertaken within this chapter. Where effects on biodiversity have been identified, the mitigation hierarchy has been followed such that the Proposed Scheme would

Comments	Response
Important Invertebrate Area. While the RSPB clearly recognises climate breakdown as a very serious issue and we support efforts to address it, the ecological crisis is also very serious and efforts to address climate change cannot come at a cost to declining wildlife and rare habitats, as would happen if the proposals for Crossness went ahead."	not result in significant residual effects. Habitat creation and enhancement is proposed as part of the Proposed Scheme and presented in the **Outline LaBARDS (Document Reference 7.9)**.
"Crossness Nature Reserve is well known, well-managed and much-loved by the community as a wildlife site. As a natural capital asset, it is already a natural carbon store and helps protect Bexley from flooding. It is a rare and precious remaining fragment of the once extensive Thames Marshes, with a corresponding portfolio of rare and declining animals and plants that call it home. Notable species using the site include Barn Owl and Skylark, while Lapwing regularly breed close to the proposed development location. Regarding Lapwing, 'the London Area and the south-east now have one of the lowest population densities for this species in Britain' (The London Bird Atlas 2017). Lapwing is red-listed as a Bird of Conservation Concern. Disturbance and landscape alterations to the area due to the proposed development would put the Crossness population of this vulnerable species, and other birds, at risk. Shrill Carder Bee, a rarity now restricted to a few mainly Thames Estuary locations, is another important species found on site and threatened by the development plans. Scarce invertebrates are a key feature of the site, and it is important that the precious mosaic of habitats at Crossness, so important for invertebrates when taken together (Crossness NR lies within Buglife's Thames Estuary South Important Invertebrate Area), are not damaged by the loss and alteration of any key component parts. In addition, there are Water Voles, Southern Migrant Hawker dragonflies and rare marsh plants found in few other	The importance of Crossness LNR and its associated wildlife has been recognised by the impact assessment process, which has considered effects on wintering and breeding birds, terrestrial and aquatic invertebrates as well as habitats. The loss of LNR has been minimised in size, and the area under the footprint of the Proposed Scheme is more heavily grazed by horses stocked at high density than other areas in the LNR. This limits its ecological value significantly. The Proposed Scheme has committed to mitigating for such effects and achieving a net gain in biodiversity through habitat creation, with details of the latter found in the **Outline LaBARDS (Document Reference 7.9)** and **Appendix 7-1: Biodiversity Net Gain Report (Volume 3)**.

Comments	Response
London area locations, amongst a long list of uncommon or range-restricted plants and animals. The list of birds that have occurred at Crossness Nature Reserve is remarkable, with for example many rarities and regular visits from birds that are scarce in London such as Marsh Harrier and Bearded Reedling, as well as passage migrants such as Wheatear and Whinchat which favour the paddocks and open areas. *A great deal of time, community effort, dedication and money has been put into creating and enhancing wildlife habitats at Crossness Nature Reserve, and it is well-studied and much visited. It would be regrettable and sadly ironic if the mosaic of important wildlife habitats and the vulnerable wildlife currently present at Crossness were to be damaged for 'green' reasons. It is doubtful that you would get the positive publicity Cory are surely hoping for by harming this popular and biodiverse location."*	
"The UK's nature is in a parlous state, we are one of the most nature-depleted countries in the world and the recent State of Nature Report tells us the grim news that one in six of our wild species are at risk of extinction. We also refer you to the Lawton Principles 4, that sites for nature need to be bigger, better, and more joined up if we are to start to address the biodiversity crisis. Given that Cory's plans would result in significant loss of or damage to valuable marsh and grassland habitats, as well as indirect impacts, it is the RSPB's view that Crossness is not a suitable location for the decarbonisation plant. The local community is clearly opposed to any harm to the site and the plant should be sited elsewhere. By siting the development at another, much more sustainable, location, Cory could avoid causing ecological harm and would avoid a bitter fight and a great deal of criticism–- instead gaining praise from the public by showing	The rationale for site selection has been detailed **in Chapter 2: Site and Proposed Scheme Description (Volume 1)**, **Chapter 3: Consideration of Alternatives (Volume 1)**, and the **Terrestrial Site Alternatives Report (Document Reference 7.5)**. The Proposed Scheme needs to be located adjacent to the existing Riverside 1 and under construction Riverside 2 facilities to perform its function of capturing carbon dioxide from The flue gas. Further, whilst the East and Stable Paddock are proposed for development of the Carbon Capture Facility, the remainder of land take will be on developed land, allocated in Local Plan policy and much of which is currently being used for construction laydown for Riverside 2.

Comments	Response
you are listening to their views and by capturing the carbon emissions in a place where there will be a net benefit to the environment."	
Seamus Gannon	
"Re ecological/biodiversity effects–- it is not clear (but seems to be the case) that the proposal includes development on land identified as an area for ecological mitigation for Riverside 2 (paragraph 7.6.10). This seems undesirable, because the Project then needs to address that impact."	Restoration of Open Mosaic Habitat was included as a commitment within the Riverside 2 development, and this restoration will not be possible as a result of the Proposed Scheme. However, the baseline for the Proposed Scheme includes Open Mosaic Habitat as if restoration had occurred, and thus has been included in the assessment of impacts and effects. Its loss will be offset through creation of Open Mosaic Habitat likely at the BNG Opportunity Area as proposed in the **Outline LaBARDS (Document Reference 7.9)**. Thus, impacts on Open Mosaic Habitat, and habitats that would have been restored with Riverside 2, have been addressed in this assessment.
Thames Water	
"Crossness Nature Reserve ("Crossness NR") is one of the last remaining areas of grazing marsh land within the Greater London area and is an important part of the Erith Marshes Site of Metropolitan Importance for Nature Conservation. It houses a variety of habitats including the largest reedbeds in the London Borough of Bexley, ponds and ditches and areas of scrub and grassland. It is also an important site for water voles and other protected species such as breeding barn owls and reptiles."	These attributes are recorded in the baseline presented in **Section 7.6** of this chapter.
"TWUL is a statutory undertaker for the purposes of the Planning Act 2008 ("2008 Act") and is owner of the land known as Crossness NR, which is included within the red line boundary of the Proposed	These points are noted, and the habitat loss within Crossness LNR is not disputed, being recognised in the impact assessment below.

Comments	Response
Application ("Proposed Acquisition Land"). 2.4ha of the Crossness NR would be permanently lost to the Proposed Development. *TWUL has a statutory duty under section 3 of the Water Industry Act 1991 in carrying out its functions to further the conservation and enhancement of natural beauty and the conservation of flora and fauna, and to have regard to the desirability of the public to have freedom of access to places of natural beauty.* *TWUL has a separate statutory duty under section 40 of the Natural Environment and Rural Communities Act 2006 to, "have regard so far as is consistent with the proper exercise of [its] functions, to the purposes of conserving biodiversity".* *TWUL owns and operates the Crossness NR consistent with and for the purposes of complying with these* *statutory duties and commitments to Ofwat. Accordingly, the land is held for the purposes of its undertaking with the scope of section 127 of the 2008 Act. It is therefore considered that the Proposed Development, in its current form, would result in a serious detriment to TWUL's undertaking by virtue of the impact on its compliance with these statutory duties."*	Thames Water's points in respect of land impacts are discussed in the **Statement of Reasons (Document Reference 4.1)**.
"In terms of footprint, the Proposed Acquisition Land represents a 2.4 hectare or 10% loss of the total of the Crossness NR. It appears that an additional 1.7% of LNR land will be impacted by the footprint of elevated flue gas pipework. A total of 11.7% of TWUL land will be subsequently impacted. *However, it is likely the acquisition and development of this land would have a disproportionate effect on the reserve as a whole, as not only does part of the Proposed Acquisition Land include the most wildlife rich part of Crossness NR (the area known as West*	The ecological value of land within the footprint of the Proposed Scheme coinciding with Crossness LNR has been recognised by the impact assessment process, which acknowledges that the loss of habitat will lead to effects on the Crossness LNR. The assessment in this chapter assumes there will be shading from the Proposed Scheme, leading to habitat loss in the West Paddock, this would be in a strip on the northern boundary, with most of the West Paddock remaining intact. Mitigation is proposed to address this potential loss. The bulk of habitat loss associated with the Proposed Scheme will

Comments	Response
Paddock), the construction and operation of the development will result in considerable, irreversible harm to habitats within the remainder of the Reserve."	be in the heavily grazed East Paddock, which is assessed in this chapter. Habitat creation and enhancement measures have been proposed to balance effects resulting from the Proposed Scheme.
"In particular, following a review of the Preliminary Environmental Information Report ("PEIR") TWUL has the following key concerns about the impacts of the construction and operation of the Proposed Development on the remaining Crossness NR: • *Contaminated run-off – contaminated run-off (during construction and potentially operation) could result in degradation of habitats and wetlands in terrestrial parts of the TWUL's retained land, and would also affect foraging resources used by wintering birds. This degradation of ditch impact would also have significant negative impacts on water quality leading to die-off and degradation of ditch habitat supporting these species. Macroinvertebrates, water voles and freshwater fish, would all be impacted through changes to water quality resulting in fish mortality and degradation of ditch habitat supporting these species."*	This chapter addresses contaminated run-off into watercourses during both the construction (**Paragraphs 7.8.27** to **7.8.33**) and operation phases (**Paragraphs 7.8.68** to **7.8.74**) of the Proposed Scheme. The assessment considers potential effects on protected and notable species supported by them, and measures which effectively reduce and mitigate any likely significant effects. The assessment concludes there will be no residual effects as a result of contaminated run-off during construction or operation of the Proposed Scheme.
• *"Lighting impacts – the impacts that lighting will have on the breeding Barn Owls, foraging bat species, and the overnight winter Dunlin roost on the adjacent West Paddock. Further clarity about how any external construction and operational lighting will impact the Reserve, and any specific mitigation measures, is required."*	The impact assessment below has covered lighting during both the construction (**Paragraphs 7.8.34** to **7.8.39**) and operation phases (**Paragraphs 7.8.75** to **7.8.79**) of the Proposed Scheme, considering potential effects on protected and notable species.
• *"Air Quality – Aquatic species in the area local to the Proposed Development are likely to experience the effects of air quality changes. This could include changes to water quality parameters through deposition of nitrogen compounds, ammonia and other*	The impact assessment below has covered changes in air quality in both the construction (**Paragraphs 7.8.40** to **7.8.50**) and operation phases (**Paragraphs 7.8.80** to **7.8.87**) of the Proposed Scheme,

Comments	Response
polluting gases. This has the potential to result in increased eutrophication in watercourses. With 99 aquatic invertebrate species within the Crossness NR, of which 3 are Nationally Rare and 14 are Nationally Scarce (Plant, 2019), this is of particular concern since the species are important on a National level. Crossness NR also supports 718 terrestrial invertebrate species, of which 5 are Section 41 species, 5 are Nationally Rare, and 56 are Nationally Scarce (Plant, 2021). These could also be significantly impacted."	considering potential effects on designated sites, habitats, protected and notable species.
• *"Noise and Vibration – the PEIR identifies direct, permanent, long term effects, from the operation phase, through disturbance to foraging and commuting areas for bats within Crossness LNR and associated habitats; breeding birds through disturbance to nesting and foraging areas within Crossness LNR and associated habitats; fish, through displacement and disruption of normal behaviour, as well as reptiles, terrestrial invertebrates, and water voles."*	The impact assessment below has covered noise and vibration during both the construction (**Paragraphs 7.8.14** to **7.8.18**) and operation phases (**Paragraphs 7.8.58** to **7.8.62**) of the Proposed Scheme, considering potential effects on protected and notable species. With mitigation, the assessment concludes there will be no residual effects as a result of noise and vibration during construction or operation of the Proposed Scheme.
• *"Shading Impacts – the long-term effects from shading to bats, breeding birds, reptiles, terrestrial invertebrates, water voles, freshwater fish, aquatic macroinvertebrates, and macrophytes, through degradation of foraging and commuting, nesting and foraging, degradation of grassland, scrub, and ditch habitat, and degradation of supporting habitat. We would request that modelling is provided of the shading impacts, with graphics showing how the infrastructure, and in particular the stacks and tall (if chosen) storage tanks, would shade out ditches and other adjacent habitat."*	The impact assessment below has covered shading during both the construction (**Paragraphs 7.8.51** to **7.8.56**) and operation phases (**Paragraphs 7.8.88** to **7.8.94**) of the Proposed Scheme, considering potential effects on designated sites, habitats protected and notable species. With mitigation, the assessment concludes there will be no residual effects as a result of shading during construction or operation of the Proposed Scheme.

Comments	Response
• *"Visual impacts – the reduced nature reserve will see significant visual impacts due to the Proposed Scheme (90m stacks and large vertical/spherical storage tanks for liquified carbon). This would have a detrimental effect on the nature reserve visitor experience and has the potential to reduce visitor numbers"*	Visual impacts are assessed by **Chapter 10: Townscape and Visual (Volume 1)**. Woodland these have been included in post-development landscaping to act as a visual barrier.
"TWUL does not consider it appropriate for Cory to reference provision of 'a larger nature reserve'. The mitigation measures offered, are based on enhancements to 8 hectares of existing habitat (Norman Road Field) under the ownership of Peabody Estates. This habitat exists as mitigation for Peabody Estates/Tilfen Land's development on Veridion Way, and does not form part of Crossness NR. Making enhancements to existing third-party owned habitat, does not offset the 2.5 hectares of direct loss to TWUL land."	Through the DCO, the Applicant is proposing to extend the LNR designation to cover the entire Mitigation and Enhancement Area which includes Norman Road Field. This will enable all of the non-developed land in this area to be managed in a cohesive fashion as one, expanded, nature reserve, with enhancement across the whole area, rather than the unmanaged collection of different units that these spaces currently are. The overall package is therefore an improvement on the current position for Crossness LNR.
"Table 7.2–- 3.3.9–- table 7-1 has not been updated to include reference to CIEEM EcIA guidelines, it refers to preliminary assessments and report writing. Although the EcIA guidelines are referred to in the main text."	Reference to this document has been added to **Table 7-1**.
"Table 7.2–- 3.3.9–- table 7-1 has not been updated to include reference to CIEEM EcIA guidelines, it refers to preliminary assessments and report writing. Although the EcIA guidelines are referred to in the main text."	Reference to this document has been added to **Table 7-1**.

7.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

7.4.1. The terrestrial biodiversity assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 7.2**.

POTENTIALLY SIGNIFICANT EFFECTS

7.4.2. As identified in the EIA Scoping Report[29] and the PEIR[30], the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - habitat loss and fragmentation;
  - noise and vibration;
  - dust;
  - surface water run-off;
  - lighting;
  - changes in air quality; and
  - shading.
- Operation Phase:
  - noise and vibration;
  - maintenance activities;
  - surface water run-off;
  - lighting;
  - changes in air quality; and
  - shading.

MATTERS SCOPED OUT

7.4.3. There are no matters that have been scoped out of further assessment.

BASELINE DATA COLLECTION

7.4.4. Ecological survey work has been completed between November 2022 and October 2023. The findings of these surveys have been reported in this chapter.

7.4.5. The surveys that have been undertaken to date are described in **Table 7-4** below, variously covering the survey areas described below (and shown in **Figure 7-10: Ecological Survey Areas (Volume 2)**) depending on requirements for each ecological feature:

- Eastern Thames Path – covering the majority of Riverside 1, mudflat and the Thames path to the east of the Middleton Jetty;
- Western Thames Path – covering the remainder of Riverside 1, the northern extents of Riverside 2, mudflat and the Thames path to the west of the Middleton Jetty;

- Norman Road – comprising the road itself, roadside verges and ditches;
- East Paddock – including the stable paddock and stable block on its southern boundary;
- West Paddock – grazing land with scrapes to attract wading birds;
- Borax North and Borax South – comprising two fields known also as 'Borax 1' and 'Borax 2', separated by an access road to Crossness Water Treatment Works;
- Norman Road Field – covering a large area of Crossness LNR accessible to the public between Eastern Way, Norman Road and Borax North and Borax South, and including parcels of land adjacent to Norman Road: Creekside, Munster Joinery and Gannon; and
- Crossness LNR – comprising areas within Crossness LNR not acceptable to the public and available exclusively for the use of wildlife.

Table 7-4: Details of Ecological Surveys Undertaken

Survey	Dates	Scope and Method Detail
Bats	May to September 2023	Covering the East Paddock, Norman Road Field and Norman Road (**Figure 7-10: Ecological Survey Areas (Volume 2)**). Bat activity surveys (static monitoring equipment) to provide a comprehensive dataset for bat activity and to identify important commuting and foraging resources within the Site, including within grazing marsh and along woodland habitats. Survey of the Site has confirmed there are no trees, buildings or other structures that could support roosting bats present. Woodland bordering the A2016 Eastern Way will be retained by the Proposed Scheme and as such assessment of potential roosts within it was not necessary. No further bat survey work focussing on roosting sites has been undertaken.
Breeding birds	March to June 2023	Covering the East Paddock, Norman Road Field, Norman Road, the eastern boundary of Crossness LNR, and terrestrial parts of the Western/Eastern Thames Path (**Figure 7-10: Ecological Survey Areas (Volume 2)**). To identify species of bird breeding within the Site.

Survey	Dates	Scope and Method Detail
Notable Plant and Invasive Species	July 2023	Survey specifically for invasive non-native species (INNS) was undertaken within the Site, supported by observation made during other ecological surveys, with surveyors made aware to report INNS. National Vegetation Classification (NVC) survey was undertaken to classify the habitat types and their importance within the Site. This included coastal and floodplain grazing marsh HPI and other habitats within the West and East Paddocks, Norman Road Field and publicly accessible areas of Crossness LNR (**Figure 7-10: Ecological Survey Areas (Volume 2)**).
Reptiles	September to October 2023	Survey for reptiles was undertaken within areas of suitable habitat within the Site (Norman Road Field, East Paddock, verges of the Eastern Thames Path; **Figure 7-10: Ecological Survey Areas (Volume 2)**). This timing has been chosen as it is optimal for reptile survey, avoiding warm summer months when the use of artificial refugia attract reptiles is not effective[31].
Terrestrial Invertebrates	August 2023	Terrestrial invertebrate survey was undertaken in the Norman Road Fields East Paddock, verges along Norman Road and verges along the Western/Eastern Thames Path (**Figure 7-10: Ecological Survey Areas (Volume 2)**) to understand the potential for the Site to support rare or notable invertebrates or an invertebrate assemblage of significance/importance[32].
Water Vole	May 2023 to September 2023	Surveys covered ditches and watercourses within the Norman Road Field, East Paddock, West Paddock, and along Norman Road (**Figure 7-10: Ecological Survey Areas (Volume 2)**) to identify the presence and distribution of water voles.
Wintering Birds	November 2022 to March 2023	Covering the East Paddock, Norman Road Field, Norman Road, the eastern boundary of Crossness LNR, and both terrestrial and marine parts of the Western/Eastern Thames

Survey	Dates	Scope and Method Detail
		Path (**Figure 7-10: Ecological Survey Areas (Volume 2)**). To identify species of bird wintering using land within the Site, and the adjacent areas of the River Thames.
Freshwater Fish (including European eel)	June 2023	Fish e-DNA samples were collected from the freshwater watercourses identified within the Site. The samples have been analysed by Naturemetrics and a species list has been produced.
Aquatic Macroinvertebrates and Macrophytes	June 2023	Survey used the following methods: • Kick sampling and sweep sampling within the freshwater watercourses identified in the Site. Samples have been processed in the laboratory and data is being analysed to identify any protected or invasive species and describe the community. • Pond Predictive System for Multimetrics (PSYM) survey to assess the conservation value of macroinvertebrates inhabiting Pond 7 (located in the northern section of Survey Area Section Norman Road Fields, as shown in **Figure 7-10: Ecological Survey Areas (Volume 2)**). • Due to access restrictions, only limited macrophyte survey of the ditch system could be undertaken. • Macrophyte survey of Pond 7 was undertaken as part of the PSYM survey.

7.4.6. Survey reports are presented as technical appendices to this Environmental Statement (ES). These are:

- **Appendix 7-1: Biodiversity Net Gain Report (Volume 3)**
- **Appendix 7-2: Preliminary Ecological Appraisal (Volume 3)**
- **Appendix 7-3: Information to Inform a Habitat Regulations Assessment (Volume 3)**
- **Appendix 7-4: Bat Survey Report (Volume 3)**
- **Appendix 7-5: Breeding Bird Survey Report (Volume 3)**
- **Appendix 7-6: Botanical Survey Report (Volume 3)**

- **Appendix 7-7: Reptile Survey Report (Volume 3)**
- **Appendix 7-8: Invertebrate Survey Report (Volume 3)**
- **Appendix 7-9: Water Vole Survey Report (Volume 3)**
- **Appendix 7-10: Wintering Bird Survey Report (Volume 3)**
- **Appendix 7-11: Shading Impacts Study (Volume 3)**

ASSESSMENT METHODOLOGY

7.4.7. This chapter has been prepared in line with current good practice from CIEEM's Guidelines for Ecological Impact Assessment[33], in addition to the specific methodology detailed in **Chapter 4: EIA Methodology (Volume 1)**. Each receptor has been evaluated within the geographic scale of reference and potential effects during the construction and operation phases of the Proposed Scheme. The assessment presented within this chapter considers potential impacts from the construction and operation of the Proposed Scheme alongside Riverside 1 and Riverside 2.

7.4.8. Based on the likely effects set out above, the scope of the assessment presented in this chapter comprises:

- determine the importance of ecological features affected, through survey and/or research;
- assess impacts potentially affecting important features;
- characterise the impacts by describing their extent, magnitude, duration, reversibility, timing and frequency;
- identify cumulative impacts (as detailed in **Chapter 21: Cumulative Effects (Volume 1)**);
- identify potential significant effects of impacts in the absence of any mitigation;
- incorporate measures to avoid and mitigate (reduce) these impacts;
- assess the significance of any residual effects after mitigation;
- identify appropriate compensation measures to offset significant residual effects (if any); and
- identify opportunities for enhancements (including assisting in delivering Biodiversity Net Gain).

7.4.9. For adverse impacts, CIEEM's Guidelines for Ecological Impact Assessment[33] have been adapted to classify the magnitude of impacts by a matrix approach to determine significance of effects. This is based on the approach used for road schemes in the UK by the Design Manual for Roads and Bridges[34]. Although the Proposed Scheme does not comprise of a road/bridge to which the public has access, this guidance provides a robust methodology for assessing impacts to terrestrial biodiversity and is considered suitable for this assessment.

7.4.10. This methodology has been used to assess both the construction and operation phases of the Proposed Scheme.

SIGNIFICANCE CRITERIA

Magnitude

7.4.11. The magnitude relates to the level of change that the receptor will receive compared to the baseline conditions, using the duration of the impact, timing, scale, size and frequency to determine the magnitude of the impact to each receptor. Magnitude of impact is evaluated in accordance with the definitions set out in CIEEM's Guidelines for Ecological Impact Assessment[33], summarised in **Table 7-5** below.

7.4.12. The following characteristics have been used to assess the magnitude of the impact on ecological features as a result of the Proposed Scheme:

- type of impact – beneficial or adverse;
- extent or spatial scope of the impact;
- reversibility of impact – whether the impact is naturally reversible or reversible through mitigation measures;
- timing and frequency of the impact, in relation to ecological changes; and
- likely duration of the impact – short term (< 1 year), medium term (1-5 years) or long term (5 or more years) (as set out in CIEEM's Guidelines for Ecological Impact Assessment[33]).
- For impacts resulting in air quality changes, whether the impact is "inconsequential"[35] in terms of airborne pollutants.

Table 7-5: Terrestrial Biodiversity Definitions of Impact Magnitude Classes

Magnitude of impact	Definition
High	Total loss or large alteration to key elements/features of the baseline conditions.
Medium	Partial loss or alteration to one or more key elements/features of the baseline conditions.
Low	Small shift away from baseline conditions.
Negligible	Very slight change from baseline conditions.

Value and Sensitivity

7.4.13. As described within **Chapter 4: EIA Methodology (Volume 1)**, sensitivity is a means to measure how affected receptors/processes and/or the receiving environment is likely to respond to change. The sensitivity is assigned at the receptor/process level. This may be defined in terms of quality, value, rarity or importance, and be classed as International, UK/National, Regional/County, District, or Local.

7.4.14. **Table 7-6** summarises the ecological feature conservation value and/or sensitivity adapted from CIEEM's Guidelines for Ecological Impact Assessment[33] for habitats and species, these have been adapted for use in this assessment. CIEEM uses the term "*Importance*" to reflect value and sensitivity, and this term has been adopted.

Table 7-6: Terrestrial Biodiversity Description of Value and Sensitivity (i.e. Ecological "Importance")

Importance	Criteria
International	• Habitats - An internationally designated site or candidate site; SPA, candidate SPA, SAC, candidate SAC, SCI, Ramsar Site, Biogenetic/Biosphere Reserve, World Heritage Site or an area that would meet the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. • Species - A sustainable population of an internationally important species or species listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) which is listed in Annex IV of the Habitats Directive, or as being of unfavourable conservation status in Europe, of uncertain conservation status or of global conservation concern in the UK BAP. Sites supporting a breeding population of such a species or supplying a critical element of their habitat requirements.
UK/National	• Habitats - A nationally designated site, SSSI, NNR, Marine Nature Reserve or a discrete area, which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). A sustainable area of a priority habitat identified in the UK BAP, or of smaller areas of such habitat which are essential to maintain the viability of a larger whole. ancient woodland or large aggregations of ancient/veteran trees. • Species - Any regularly occurring/large population of a nationally important species (e.g. Red Data Book). A large population of a species identified as a Species of Principal Importance (SPI). A species population that would qualify for SSSI designation.
Regional/County	• Habitats - viable areas of key habitat identified in county/district BAP, or smaller areas of such habitat which are essential to maintain the viability of a larger whole. County sites that the designating authority has determined meet the published ecological selection criteria for designation. A diverse and/or hedgerow network comprised of mostly Important Hedges. Areas of HPI (such as deciduous woodland and coastal and floodplain grazing marsh) or individual ancient/veteran trees. • Species - A regularly occurring, locally significant number of a nationally important species. Any regularly occurring, locally significant population of a SPI or a species listed in a county/district BAP (where available). A regularly occurring, locally significant population of a county/district important species. Sites supporting populations of

Importance	Criteria
	internationally/nationally/regionally important species that are not threatened or rare in the region or county, and not integral to maintaining those populations. Sites/features scarce in the county or that appreciably enrich the county habitat resource.
District	• Habitats - Areas of habitat that appreciably enrich the local habitat resource (e.g. species-rich hedgerows, ponds). Sites that retain other elements of semi-natural vegetation that, due to their size, quality or the wider distribution within the local area, are not considered for the above classifications. • Species - Populations/assemblages of species that appreciably enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county and are not integral to maintaining those populations.
Local	• Habitats - Common and widespread habitat, not meeting any of the above criteria. Areas of heavily modified or managed vegetation of low species diversity or low value as habitat to species of nature conservation interest. • Species - Common and widespread species, not meeting any of the above criteria. Commonplace feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.

Significance

7.4.15. The overall significance has been assessed using the matrix shown in **Table 7-7**, these have been modified to align with **Chapter 4: EIA Methodology (Volume 1)**. This uses sensitivity of the receptor and magnitude of change to determine significance. Where a range of significance of effect is identified the final assessment for each effect is based upon professional judgement.

7.4.16. In accordance with **Chapter 4: EIA Methodology (Volume 1)** any effects with a significance level of 'Moderate' or above have been concluded to be significant.

Table 7-7: Terrestrial Biodiversity Significance of Effects Matrix

		Magnitude of Impacts			
		High	**Medium**	**Low**	**Negligible**
Value /Sensitivity	**International**	Major	Major to Moderate	Moderate	Negligible
	UK/National	Major	Major to Moderate	Moderate	Negligible
	Regional/ County	Major to Moderate	Moderate	Minor to Moderate	Negligible
	District	Moderate	Minor to Moderate	Minor	Negligible
	Local	Minor	Minor	Negligible	Negligible

7.5. STUDY AREA

7.5.1. For the assessment of impacts during construction and operation, the Study Areas for potential sensitive receptors are set out in **Table 7-8**. This approach is consistent with current good practice guidelines published by the CIEEM[26].

7.5.2. The assessment will consider the likely effects of the Proposed Scheme on ecological features within its Zone of Influence (ZOI). ZOI is a term used in CIEEM guidance[26] that has been used in this chapter rather than Study Area. The ZOI is the area over which ecological features may receive impacts from the Proposed Scheme. It covers the Site and the wider landscape, where pathways exist for the transfer of impacts away from the Site.

7.5.3. The sensitivity of ecological features present is also taken into account when determining the ZOI, as it will be greater where more sensitive ecological features are present. The ZOI for the Proposed Scheme has been determined by:

- consideration of the activities during construction and operation associated with the Proposed Scheme and the scale of the works;

- emissions of the works including changes in air quality, production of dust, noise and run-off;
- the duration and timing of the works; and
- ecological data, including the use of online inventories of designated sites and habitats, aerial photography and OS mapping, records of protected and notable species, and findings from field survey work.

7.5.4. The ZOI are the same for terrestrial biodiversity for both the construction and operation phases.

7.5.5. The ZOI are shown on **Figure 7-1: Terrestrial Biodiversity Study Areas (Volume 2)**.

Table 7-8: Terrestrial Biodiversity Zones of Influence

Receptor	Zone of Influence
Statutory Designated Sites – National Network Sites (SAC/SPA/Ramsar)	Within 15km of the Site Boundary.
Statutory Designated Sites – SSSI	Within 10km of the Site Boundary.
Statutory Designated Sites – NRR, LNR	Within 2km of the Site Boundary.
Non-statutory Designated Sites	Within 2km of the Site Boundary.
Habitats of Principal Importance (HPI), ancient woodland, Ancient/Veteran Trees	Within 250m of the Site Boundary.
Other Terrestrial Habitats	Within the Site Boundary.
Bats	Within the Site Boundary and 25m of the Site Boundary.
Breeding Birds	Within the Site Boundary and 25m of the Site Boundary.
Notable Plants and Invasive Species	Within the Site Boundary and 25m of the Site Boundary.
Reptiles	Within the Site Boundary and 25m of the Site Boundary.
Terrestrial Invertebrates	Within the Site Boundary and 25m of the Site Boundary.
Water Vole	Within the Site Boundary and 25m of the Site Boundary.
Wintering Birds	Within the Site Boundary and along the adjacent section of the River Thames.

Receptor	Zone of Influence
Freshwater Fish (including European eel)	Within the Site Boundary and hydrologically connected watercourses.
Aquatic Macroinvertebrates	Within the Site Boundary and hydrologically connected watercourses.
Macrophytes	Within the Site Boundary and hydrologically connected watercourses.

SENSITIVE RECEPTORS

7.5.6. The following likely sensitive receptors have been identified within the Study Areas identified in **Section 7.5**.

Designated Sites

Statutory Designated Sites

- Epping Forest SAC;
- Inner Thames Marshes SSSI;
- Ingrebourne Marshes SSSI;
- Oxleas Woodlands SSSI;
- Ruxley Gravel Pits SSSI; and
- West Thurrock Lagoon and Marshes SSSI.

Non Statutory Designated Sites

- Crossness LNR;
- Rainham Marshes LNR;
- Lesnes Abbey Wood LNR (comprising ancient woodland);
- Erith Marshes Metropolitan Site of Importance for Nature Conservation (MSINC);
- Belvedere Dykes SINC;
- River Thames and Tidal Tributaries MSINC; and
- 18 further SINCs outside of the Site Boundary.

Habitats

Habitats of Principal Importance (HPI)

- Deciduous Woodland (lowland mixed deciduous woodland);
- Coastal and floodplain grazing marsh;
- Intertidal mudflats;
- Reedbed;
- Open mosaic habitat; and
- Coastal saltmarsh (adjacent to the Site Boundary).

Other Terrestrial Habitats

- Modified grassland;
- Other neutral grassland;
- Artificial unvegetated unsealed surface; and
- Mixed scrub.

Aquatic habitats

- River habitat (within the River Thames); and
- Ditches and standing water.

Protected/Notable Species

- Bats;
- Breeding birds;
- Notable plants and invasive species;
- Reptiles;
- Terrestrial invertebrates;
- Water vole;
- Wintering birds;
- Freshwater fish (including European eel);
- Aquatic macroinvertebrates; and
- Macrophytes.

7.6. BASELINE CONDITIONS AND FUTURE BASELINE

7.6.1. The key sources of information on baseline terrestrial and aquatic biodiversity conditions are the following:

- Open source 1:25,000 Ordnance Survey datasets[36];
- Freely downloadable Natural England datasets and citations[37];
- Multi Agency Geographic Information System Mapping (MAGIC)[38];
- Environment Agency Ecology and Fish Data Explorer[39];
- Greenspace Information for Greater London[40];
- Information provided by Friends of Crossness Local Nature Reserve; and
- Ecological surveys of the Site, including those undertaken to map habitats.

7.6.2. Baseline data on designated sites, habitats and records of protected species was collated by **Appendix 7-2: Preliminary Ecological Appraisal (Volume 3)**. Information in this report has been updated as necessary as the Proposed Scheme design has progressed.

7.6.3. Between initial habitat surveys undertaken as part of the PEA and preparation of this chapter the Site Boundary was extended to incorporate a larger area of Crossness LNR. The initial surveys conducted did not cover the extended area within the Site, however, any shortfalls were validated using data collected at a later date (including utilising data obtained from the Friends of Crossness LNR), site walkovers and mapping to ensure the data used to inform the assessment presented in this chapter is robust.

Designated Sites

7.6.4. The designated sites described within this section are described in **Table 7-9**.

7.6.5. There is one internationally designated terrestrial biodiversity site (Epping Forest SAC) within 15km of the Site Boundary (shown on **Figure 7-2: Internationally Important Statutory Designated Sites (Volume 2)**). There are five statutory nature conservation sites designated as SSSI within 10km of the Site Boundary (shown on **Figure 7-3: Nationally Important Statutory Designated Sites (Volume 2)**). Evaluation reflects the geographical basis of the designations, i.e. internationally important sites support habitats and species that are deemed important at an International biogeographical level, whilst SSSI are designated on the basis of supporting the best example(s) of particular habitat(s), species and ecosystem(s) at a National level of importance.

7.6.6. There are three statutory nature conservation sites designated as LNR within 2km of the Site Boundary (shown on **Figure 7-4: Locally Important Non-Statutory Designated Sites (Volume 2)**). They are valued as being of County importance, representing part of a London-wide network of semi-natural habitats designated for their value on this geographic scale.

7.6.7. Seven further SSSI are found within 10km of the Site Boundary. However, these are designated for geological features only, possessing no biological features in their citation, and thus they are not in the scope of this assessment. This includes Abbey Wood SSSI which is not designated an SSSI for the protection of woodland, but for the protection of fossil beds. The effects on geological sites are assessed in **Chapter 17: Ground Conditions and Soils (Volume 1)**.

7.6.8. Three non-statutory designated sites are partially located within the Site (which are described further in **Table 7-8** and shown on **Figure 7-4: Locally Important Non-statutory Designated Sites (Volume 2)**). A further 18 non-statutory designated sites are situated within 2km of the Site Boundary, the closest of which are Lower River Beam and Ford Works Ditches SINC and Dagenham Breach and the Lower Beam River in Dagenham SINC, which both lie approximately 500m to the north of the Site Boundary. They are valued as being of County importance, representing part of a London-wide network of semi-natural habitats designated for their value on this geographic scale.

7.6.9. Desk Study Areas were selected on the basis of CIEEM guidance[26] and professional judgement. Considering the characteristics of the Site and the Proposed Scheme, direct and indirect impacts are unlikely to extend beyond these areas.

Table 7-9: Designated Sites Summary

Designated Site	Approximate Distance from Site Boundary	Description
Epping Forest SAC	11.8km northwest	Epping Forest is London and Essex's largest green space, hosting over a million trees, (many of which are veteran) including ancient stands of beech, oak and hornbeam. The long history of pollarding has led to significant amounts of dead wood, making the area rich in fungi, epiphytes – including the moss *Zygodon forsteri*, and rare insect species such as the stag beetle *Lucanus cervus*.
Inner Thames Marshes SSSI	0.9km east	The Inner Thames Marshes form the largest remaining expanse of wetland bordering the upper reaches of the Thames Estuary. The SSSI comprises a major relic of low-lying grazing marsh with a variety of grassland communities dissected by a network of fresh to brackish water drains. The grasslands, particularly those on the Wennington and Aveley Marshes, are also important for the large extent and abundance of divided sedge *Carex divisa*, saltmarsh rush *Juncus gerardii* and pink water-speedwell *Veronica catenata*.
Ingrebourne Marshes SSSI	2.3km northeast	The site is the largest area of freshwater marsh in Greater London. It is very diverse, with large areas of reed sweet-grass, common reed swamp, wet neutral grassland and tall fen. These habitats have a wide variety of invertebrates and breeding birds. Invertebrates include sixteen nationally scarce fly, beetle dragonfly and cricket species. There are two nationally rare Red Data Book species, the hoverfly *Anasimyia interpuncta* and the scarce emerald damselfly *Lestes dryas*. Sixty-one species of bird regularly breed on the site. The London Borough of Havering has raised the water level and reintroduced grazing to protect the wetland.
Oxleas Woodlands SSSI	5.7km southwest	Oxleas Wood is one of the few remaining areas of ancient deciduous forest in Eltham in the Royal Borough of Greenwich (with a small amount passing over the boundary and stretching into the LBB), in southeast London. Some parts date back over 8,000 years to the end of the

Designated Site	Approximate Distance from Site Boundary	Description
		last ice age. It is part of a larger continuous area of woodland and parkland on the south side of Shooter's Hill.
West Thurrock Lagoon and Marshes SSSI	7.9km southeast	The site is important for wintering waders and wildfowl which feed on the mudflats. Migratory warblers breed on reed beds in the lagoon, and waterfowl roost on the shallow waters and grassy islands. Stone Ness saltings is a large area of salt marsh dominated by sea club-rush *Bolboschoenus maritimus.*
Ruxley Gravel Pits SSSI	9.6km south	Over 500 species of vascular plants and 169 of birds have been recorded. Fifty-three of the bird species are breeding. Insects include 23 species of butterfly, 9 dragonfly and over 500 beetles. This variety reflects the diversity of habitat: wooded islands, fringes of mature trees, scrub, fen and open water. Vegetation on the banks include the rare club rush *Schoenoplectus tabernaemontani*. The open water areas have rafts of yellow and white water-lily *Nuphar* spp.
Crossness LNR	Within, and adjacent, the Site	A network of ditches and open water, scrub and rough grassland, providing a water vole *Arvicola amphibius* stronghold. Over 200 different species of bird have been recorded at Crossness LNR. A number of rare aquatic and terrestrial invertebrates are present, as well as some important flora species. The Thames Marshes Corridor, a strategic green corridor highlighted in the Bexley Local Plan[4], runs through this site connecting its habitats with grazing marshes to the south and the River Thames to the north.
Rainham Marshes LNR	0.9km east	The grasslands, fringing reedbeds and network of ditches here support a number of rare plants, insects and birds and are also home to a large population of water voles. Plants including golden dock, scarce emerald damselfly, water voles and birds including lapwing, sedge and reed warbler have been recorded.

Designated Site	Approximate Distance from Site Boundary	Description
Lesnes Abbey Woods LNR	1.1km southwest	ancient woodland and coppice with one of the most important populations of wild daffodils in southeast England. Other habitats include parks and Open Land, heathland, wetlands and hedgerows. Stag beetles, song thrush, bats and newts as well as a wide range of other woodland and parkland birds, animals and insects have been recorded within the Reserve. A recent comprehensive study of the site has found 906 species of invertebrate, 46 birds including Red Data Book redwing and fieldfare, 59 species of fungi, 292 species of plants and 12 species of mammal.
SINCs	Ranging from within the Site Boundary, to approximately 2km from the Site Boundary	River Thames and Tidal Tributaries MSINC falls within the Site: The River Thames and the tidal sections of creeks and rivers which flow into it comprise mudflats, shingle beach, inter-tidal vegetation, islands and river channel. Erith Marshes MSINC falls within the Site: One of the few remaining examples of the Thames-side grazing marshes, important for its breeding and wintering avifauna and rare plants. The ditches also support an important population of water vole, as well as the fish rudd *Scardinius erythrophthalmus* and tench *Tinca tinca*. A variety of Red Data Book and notable invertebrates are also found on site. Belvedere Dykes SINC falls within the Site: The drainage dykes comprising reedbed, wet woodland and grassland habitats. There are 18 further SINC within 2km of the Site Boundary, comprising a mixture of lakes, wetland habitats, reedbeds, broadleaved woodland, semi-improved neutral and acid grassland, heathland and scrub habitats. The following SINC have been identified within 2km of the Site Boundary: • Dagenham Breach and the lower Beam River in Dagenham SINC (500m to the north);

Designated Site	Approximate Distance from Site Boundary	Description
		• Lower River Beam and Ford Works Ditches SINC (400m to the north); • Southmere Park & Yarnton Way/Viridion Way SINC (500m to the southwest); • Crossness Sewage Treatment Works Pond SINC (700m to the west); • Franks Park Belvedere SINC (1km to the south; supports 8 veteran trees); • Wennington, Aveley and Rainham Marshes SINC (900m to the east); • Lesnes Abbey Woods and Bostall Woods SINC (1.1km to the southwest; comprises ancient woodland); • Thamesmead Golf Course SINC (0.9km to the west); • Riverside Sewage Treatment Works SINC (1.2km to the northeast); • Mudlands SINC (1.4km to the north); • St John the Baptist Churchyard, Erith SINC (1.4km to the southeast); • Crossway Park and Tump 52 SINC (1.2km to the west); • The Ridgeway SINC (1.1km to the west); • Crossways Lake Nature Reserve and Thameside Walk Scrub SINC (1.5km to the west); • Hollyhill Open Land SINC (1.8km to the south); • Rainham Railsides SINC (1.7km to the north); • Goresbrook and the Ship & Shovel Sewer SINC (1.8km to the northwest); and • Streamway, Chapman's Land and Erith Cemetery SINC (2km to the south).

7.6.10. Specific Habitats Regulations Assessment (HRA) documentation is provided as **Appendix 7-3: Information to Inform a Habitat Regulations Assessment: (Volume 3)**.

7.6.11. Note, great crested newt *Tritutrus cristatus* is not present within Crossness LNR and has been scoped out of the assessment. Evidence supporting this position through communications with Thames Water is found within the PEIR[30] as Appendix 7-1: Consultation with Thames Water (Volume 3).

7.6.12. Sites designated for geological features (e.g. Regionally Important Geological Sites (RIGS)) are not within the scope of the Terrestrial Biodiversity assessment in this chapter. They are covered in **Chapter 17: Ground Conditions and Soils (Volume 1)**.

Habitats

Relationship with Riverside 2

7.6.13. Since the start of Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken) construction some habitats have been converted into hardstanding for car parking, cabins, storage and lay down areas. These comprised modified grassland and open mosaic habitat and are indicated on **Figure 7-6: Site UKHab Survey Map (Volume 2)**. Mitigation for the loss of these habitats will be undertaken by Riverside 2 in the following manner:

- Modified Grassland – habitat loss compensated for through offsite habitat creation; and
- Open Mosaic Habitat – habitat loss compensated for through partial reinstatement of habitat upon completion of development and through offsite habitat creation.

7.6.14. Habitat loss resulting from Riverside 2 that has been compensated for by offsite habitat creation is not considered an effect of the Proposed Scheme and is not affected by the Proposed Scheme. However, as the Proposed Scheme includes construction over the area where open mosaic habitat would be reinstated onsite, it forms part of the habitat baseline of the Proposed Scheme.

Habitats of Principal Importance (HPI)

7.6.15. Desk study data confirmed the presence of deciduous woodland HPI (lowland mixed deciduous woodland; approximately 1.9% of the Site), Coastal and floodplain grazing marsh HPI (approximately 18.7% of the Site), intertidal mudflats HPI (approximately 7.8% of the Site), reedbeds HPI (approximately 6.4%) and open mosaic habitat HPI (approximately 1.3%) within the Site. It should be noted that both reedbed and open mosaic habitat are now recognised as HPI in a change to that presented in the PEIR[29,e]. Coastal saltmarsh HPI is found adjacent to the Site Boundary but not within it.

7.6.16. The presence of these habitats was confirmed by site surveys undertaken in February 2023 and through botanical surveys in July 2023. The location of these HPI, as recorded in online datasets held by Natural England in relation to the Site are shown on **Figure 7-5: Habitats of Principal Importance (Volume 2)**. All identified HPI form part of habitats defining Crossness LNR or the three SINC found within the Site. For this reason, HPI have been evaluated as being of County importance.

7.6.17. Desk study data indicates that good-quality semi-improved grassland HPI is also present; however, results of botanical surveys indicate this is more accurately classified as coastal and floodplain grazing marsh HPI. Results of habitat and botanical surveys are discussed below.

7.6.18. There is no ancient woodland within the Site or within 250m of the Site Boundary. However, ancient woodland is found at Lesnes Abbey Woods LNR/Lesnes Abbey Woods and Bostall Woods SINC approximately 1.1km to the south-west, within the 2km Study Area defined for this feature type by **Chapter 5: Air Quality (Volume 1)**.

Other Terrestrial Habitats

7.6.19. The majority of the Site comprises river habitat (approximately 32.4%) within the River Thames and Tidal Tributaries MSINC and these have been evaluated as of County importance.

7.6.20. Terrestrial habitat types within the Site comprise modified grassland (approximately 5.4%), other neutral grassland (approximately 4.8%), scrub (approximately 2.9%), and ditches/standing water (approximately 4.2%). All are common and widespread habitat types within the UK and are frequently disturbed and modified both as a result of development and land management, and thus have been evaluated as of Local importance.

7.6.21. There are no ancient or veteran trees or important hedgerows within the Site or the wider ZOI of the Proposed Scheme.

[e] In response to the Statutory Consultation, as detailed in **Table 7-3**.

7.6.22. The remaining areas within the Site are formed of developed land, artificial unvegetated unsealed surface (comprising tracks and patches of disturbed bare ground), hardstanding and buildings. These areas have been scoped out of further assessment as they have no ecological value.

7.6.23. The habitats within the Site are shown on **Figure 7-6: Site UKHab Survey Map (Volume 2)**.

Freshwater Aquatic Habitats

7.6.24. An initial aquatic habitat survey was carried out in November 2022. This assessment has been used to characterise watercourses and identify further survey requirements.

7.6.25. The freshwater watercourses surveyed were typically realigned and over-deepened minor watercourses that were ditch-like in nature. The watercourses were characterised by small channel dimensions with limited hydrogeomorphic activity. Habitat diversity was poor, and the watercourses were typically homogenous with uniform bed and bank profiles dominated by glide/slack flow and fine sediment, with no channel features (such as pools, riffles and bars) and no marginal features (such as exposed/submerged tree roots and undercut banks). During a site visit in June 2023 the watercourses were overgrown with reed stands. Despite the anthropogenic influence on the aquatic ecosystem, due to the contribution of these habitats to overall habitat diversity, the aquatic habitats are considered to be of District importance.

7.6.26. The aquatic habitats within the Site are shown on **Figure 11-1: Surface Water Features (Volume 2)**, with the survey results detailed in this chapter.

Other Crossness LNR Habitats

7.6.27. Approximately 23% of Crossness LNR lies adjacent (outside) the Site Boundary to the west. Habitats in this portion of the LNR are continuous with those within the Site and have been described using desk study data. They comprise coastal and floodplain grazing marsh HPI, reedbed HPI, deciduous woodland HPI, other neutral grassland, scrub and ditches/standing water.

Protected/Notable Species

Bats

7.6.28. Desk study records show eight species of bats have been recorded within 2km of the Site Boundary comprising: common pipistrelle *Pipistrellus pipistrellus*; soprano pipistrelle *Pipistrellus pygmaeus;* Nathusius's pipistrelle *Pipistrellus nathusii;* brown long-eared bat *Plecotus auratus;* Natterer's bat *Myotis nattereri;* noctule *Nyctalus noctule;* Daubenton's bat *Myotis daubentonii;* and serotine *Eptesicus serotinus*. The closest record was of noctule, approximately 250m from the Site Boundary, in May 2014.

7.6.29. A Preliminary Bat Roost Assessment (PBRA) of the buildings within the Site was undertaken in July 2022. The assessment concluded that all buildings on Site, including the jetties within the River Thames, have negligible bat roost suitability. This is in line with findings of the Riverside 2 ES[41].

7.6.30. Further survey visits, undertaken in February 2023, identified no semi-mature or mature trees to be present (that can provide roosting opportunities for bats) however, this work was limited by access constraints. Further survey during spring and summer 2023, when access limitations were removed, did not identify semi-mature or mature trees that could support roosting bats in the remainder of the Site. Trees within woodland along the Site Boundary's southern perimeter could support roosts; however, the Proposed Scheme does not intend to alter it.

7.6.31. Bat foraging habitat within the Site includes the River Thames, ditches, broadleaved woodland, coastal and floodplain grazing marsh and grassland. The Site conforms to habitat of High suitability for foraging and commuting bats[42].

7.6.32. Automated Detector Surveys (**Appendix 7-4: Bat Survey Report (Volume 3)**), recorded at least six bat species including common pipistrelle, soprano pipistrelle, noctule, Nauthusius's pipistrelle, Brown long-eared, and *Myotis* spp. Unidentified calls from the Noctule/Serotine/Leisler's (NSL) genus were also recorded. Common pipistrelle was the most abundant species recorded during the surveys, followed by soprano pipistrelle and noctule. Other less widespread bat species included Nathusius' pipistrelle, brown long-eared and Myotis spp., were recorded at very low frequency's during the surveys.

7.6.33. Overall, the highest bat activity and thus a key commuting and foraging area for bats within the Site, was recorded along the woodland edge within the Norman Road Fields. The second highest bat activity at almost half the number of bat calls, was recorded along a ditch with reedbed and dense scrub that runs adjacent to the fenced industrial area within the northern part of the Norman Road Fields. The lowest bat activity was recorded along a ditch bordered by scrub within the western boundary of the East Paddock, situated in close proximity to both the operation of Riverside 1, Norman Road and the construction of Riverside 2, resulting in higher levels of background noise. This along with more open habitat with fewer patches of dense scrub, may account for the lowest bat activity recorded here.

7.6.34. The woodland habitat on the southern boundary of the Norman Road Fields is connected to suitable commuting and foraging habitat within the wider area of Bexley. However, due to activity being predominantly from common and widespread bat species, bats have been evaluated as being of Local importance.

Breeding Birds

7.6.35. Desk study results recorded 59 species of bird; 19 of WCA Schedule 1[14] species and 30 of Birds of Conservation Concern Red listed. Crossness LNR and the Crossness Sewage Treatment Works are also known to be of value to breeding bird communities. A total of 54 species were recorded within the Survey Area during the breeding bird survey (**Appendix 7-5: Breeding Bird Survey Report (Volume 3)**), 43 of which, were recorded as confirmed, probable or possible breeders. Of these 43 species, 20 are legally protected or species included on the red list of Birds of Conservation Concern (BoCC)[48] or are SPI or London Priority Species[49]. These 20 species include:

- one species listed on the Bird Directive: Peregrine *Falco peregrinus*;
- three species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended): Barn Owl *Tyto alba*, Cetti's Warbler *Cettia cetti* and Peregrine;
- three Species of Principal Importance (SPI) (also UKBAP and BoCC species): Linnet *Linaria cannabina*, Starling *Sturnus vulgaris*, and Song Thrush *Turdus philomelos*;
- four BoCC red list species were recorded: Greenfinch *Chloris chloris*, Linnet, Pochard *Aythya ferina* and Starling; and
- nine London Priority listed species, including Dunnock *Prunella modularis*, Gadwall *Mareca strepera*, Linnet, Lesser Whitethroat *Sylvia curruca*, Peregrine, Pochard, Starling, Song Thrush and Shelduck *Tadorna tadorna*.

7.6.36. The breeding bird community comprises a variety of species of conservation importance, including red and amber listed Birds of Conservation Concern, SPI and those listed on Schedule 1 of the Wildlife and Countryside Act. However, the relatively small size of the Site (especially when compared to other habitats for breeding birds along the Thames), its situation within a heavily developed landscape and sources of anthropogenic disturbance (noise, vehicle movements, pedestrians) tend to preclude more sensitive species (such as breeding lapwing, which have been present in the past but not in recent years). Grassland species including breeding meadow pipit *Anthus pratensis* and skylark *Alauda arvensis*) are also absent. Thus, the breeding bird community at the Site could be expected to be found at similar wetland sites in the London area. It has therefore been evaluated as being of County importance.

Hazel Dormouse

7.6.37. The desk study did not return results for hazel dormouse *Muscardinus avellanarius* and the majority of the Site does not contain suitable habitat for this species. The small area of woodland and scrub in the south of the Site Boundary may be suitable for supporting dormouse; however, the Proposed Scheme does not intend to alter it. Given the history of recent developments within and surrounding the Site (including Riverside 2) and the lack of dormouse evidence found by their supporting ecological surveys, as well as the lack of records of this species, it is not likely that hazel dormouse is present within the Site.

Notable Plants and Invasive Species

7.6.38. The desk study returned one non-native invasive fauna and 20 flora species within 2km of the Site Boundary, listed on WCA Schedule 9[14] and/or the London Invasive Species List[43].

7.6.39. Walkover survey was undertaken for notable plants and invasive species (**Appendix 7-6: Botanical Survey Report (Volume 3)**). It confirmed both areas comprised predominantly of coastal floodplain and grazing marsh HPI, with a small area of the Norman Road Field adjacent to Eastern Way comprising other neutral grassland.

7.6.40. No legally protected plant species were recorded, although one SPI/London Priority Species[49] listed species was identified – sea barley *Hordeum marinum*. Thus, the botanical community is recognised as important to the Greater London area and these have been evaluated as being of County importance.

7.6.41. One invasive species was identified, goat's-rue *Galega officinalis*, was identified throughout the East Paddock and Norman Road Field. It is included in London Invasive Species Initiative (LISI)[44] as Category 4 species, which is described as "*Species which are widespread for which eradication is not feasible but where avoiding spread to other sites may be required*".

Reptiles

7.6.42. Records of three species of reptiles were returned by the desk study within 2km of the Site Boundary, comprising slow worm *Anguis fragilis*, grass snake *Natrix helvetica* and common lizard *Zootoca vivipara*. coastal and floodplain grazing marsh, semi-improved grassland and scrub habitats within the Site have the potential to support common species of reptiles. All three reptile species are partially protected under WCA Schedule 5. They are also listed as SPI for the Conservation of Biodiversity in England under Section 41 of the NERC Act 2006[16].

7.6.43. Reptile surveys, undertaken during 2022 as part of the Riverside Heat Network Project ecological surveys[45], recorded two individuals of common lizard. In addition, ecological mitigation in the form of habitat manipulation has been undertaken as part of the construction of Riverside 2 to avoid effects on reptiles[46]. Further ecological surveys were undertaken to support the Proposed Scheme during September and October 2023 **(Appendix 7-7: Reptile Survey Report (Volume 3))**, identifying a single adult common lizard and single juvenile common lizard. The presence of a juvenile indicates a breeding population of this species. Whilst the desk study data shows the adjacent Crossness LNR to have a higher abundance and diversity of reptiles, the low numbers of individuals and single species recorded indicate habitats surveyed were not favourable to reptile populations, possibly due to disturbance from grazing and adjacent industrial land uses. Reptiles have therefore been evaluated as being of Local importance.

Otter

7.6.44. The desk study did not return any records of otter *Lutra lutra*, and little of the Site provides suitable habitat for otter holts, despite the proximity of the River Thames, which is known to support otter[47]. The small area of woodland and scrub within the southern boundary of the Norman Road Fields is located adjacent to the A2016 dual carriage way and so is unlikely to support otter, due to the high levels of noise disturbance and the increased risk of mortality from traffic. Given the history of recent developments within and surrounding the Site (including Riverside 2) and the lack of otter evidence included within the supporting evidence, it is not likely that otter are present within the Site.

Terrestrial Invertebrates

7.6.45. The desk study returned 23 notable terrestrial invertebrate species records, including: 17 species listed under Section 41 of the NERC Act 2006[16]; 17 London Priority Species; and two species listed under Annex II of the Habitats Regulations. 22 of these notable species were recorded within 250m of the Site Boundary, including 10 species within 20m of the Site Boundary. Public bodies have an obligation under Section 40 of the NERC Act to have regard for species of principal importance (SPI) when carrying out their functions.

7.6.46. The Site is situated within the Thames Estuary South Important Invertebrate Area (IIA) and supports habitats suitable for a wide variety of invertebrates including nectar and pollen resources (e.g. flower-rich grasslands) which provide a range of opportunities for pollinating insects, primarily a substantial food resource across the spring and summer months. Other habitat elements well represented across the Site include the open water habitats (ponds and ditches), and the Site's connectivity to the wider area through Crossness LNR.

7.6.47. Surveys (**Appendix 7-8: Invertebrate Survey Report (Volume 3)**), observed a wide range of insect pollinators visiting the wildflowers within the Site's habitats, and incidentally recorded, brown-banded carder bee *Bombus humilis*. The Site is likely to be important for other rare or notable pollinating insects. Its mix of habitats ranging from open grassland, mixed scrub, ditches/standing water and deciduous woodland creates a wide range of ecological niches and opportunities for a range of invertebrate taxa found only in disparate sites in the Greater London area. The terrestrial invertebrate community has therefore been evaluated as being of County importance.

Water Vole

7.6.48. Water vole is protected from killing and injury and its place of rest or shelter (burrow) is protected from damage, destruction or obstruction under the WCA[14]. Additional protection from disturbance is extended to individuals occupying places of rest or shelter. Water vole is also listed as SPI in accordance with Section 41 of the NERC Act 2006[16]. Public bodies have an obligation under Section 40 of the NERC Act 2006[16] to have regard for these species when carrying out their functions.

7.6.49. Two hundred and seventy-eight records of water vole *Arvicola amphibius* were returned by the desk study, not least: water vole surveys undertaken within the central part of the Site in 2022, as part of the Riverside Heat Network Project[45], and water vole surveys of several ditches within the Site from 2005 – 2022 for other projects including Riverside 2, show an important water vole population is present within the Site[46]. Management and maintenance of ditches has, and continues to be, undertaken under Natural England licence for water voles.

7.6.50. Ecological survey for water vole (**Appendix 7-9: Water Vole Survey Report (Volume 3)**), undertaken in 2023 confirmed the presence of this species in eight ditches, with populations sizes classed as low, medium and high, depending on the ditch under scrutiny. Although growth of vegetation caused access restrictions which limited the ability of surveyors to assess population size class in all ditches, survey data clearly shows a healthy population of water voles using most ditches throughout the Site and their absence only owing to dry ditches or those without sufficient vegetation cover to afford them protection. The population is one of relatively few within the Greater London area, which supports disconnected population centres of water voles in sites such as Barnes Wetland Centre, and the Lee Valley Regional Park. The water vole population has therefore been evaluated as being of County importance.

Wintering Birds

7.6.51. The River Thames lies within the Site and is regularly used by migrating birds and those seeking foraging grounds for winter. The floodplain grazing marsh within the Site also provides suitable habitat for wintering birds, and Crossness LNR is known to be important for wintering bird populations.

7.6.52. Survey work (**Appendix 7-10: Wintering Bird Survey Report (Volume 3)**), recorded 61 species of bird using the Site and its immediate surroundings during winter. Of these, 35 were water birds and 27 non-water bird species. In conservation status terms, three were Annex 1 species, three were SPI species, 12 were Birds of Conservation Concern Red[48] listed and 22 Amber Listed, and 13 listed as London Priority Species[49].

7.6.53. Aquatic habitat (open water and mudflat) beyond the Thames floodwall is used regularly by wintering birds for foraging, loafing and roosting; it supports the highest numbers of wintering birds and the widest variety of species, almost exclusively water birds. Of note is the sewage outfall from the Crossness Sewage Treatment Works, which is highlighted as a foraging area for winter bird species, particularly ducks such as teal, gadwall and wigeon. One high tide roost was found within the Site, on Belvedere Power Station Jetty (disused). A second was identified outside the Site Boundary on the opposite (north) bank of the River Thames. Whilst individual birds or pairs occasionally roosted on wooden posts within Thames-side reedbed habitat, significant numbers of birds were not seen using these structures.

7.6.54. Relatively few species of bird, in small numbers, were observed to use terrestrial habitats within the Site. The most significant area for wintering birds, was grassland in the southwest of the Site, within Crossness LNR. Fields along Norman Road were used only sparingly by wintering birds.

7.6.55. None of the peak counts of individual wintering bird species recorded during the survey were higher than the WeBS annual peak count for the River Thames – Barking recording zone. However, the peak count of Shoveler was greater than the 1% national threshold[50]. No other peak counts of individual wintering bird species reached the 1% national threshold. The wintering bird community comprises regularly occurring, significant numbers of important species, including SPIs and those of conservation concern. It has therefore been evaluated as being of County importance.

7.6.56. The Site is not considered functionally linked land in relation to the SPA designated for wintering birds found within the Thames Estuary (Thames Estuary and Marsh SPA being the closest example). This is based on the composition of species observed during surveys, comprising few species that are qualifying features of those sites, and their relatively low abundance.

Freshwater Fish

7.6.57. A search of the Environment Agency's Ecology and Fish Data Explorer[39] returned no records of fish data from within the Site. The River Thames is known to support migratory fish species including European eel *Anguilla anguilla*[31]. See **Chapter 8: Marine Biodiversity (Volume 1)**. European eel is a migratory species listed under Section 41 of the NERC Act 2006[16] as a SPI. The species is afforded further protection under The Eels (England and Wales) Regulations 2009[23] and is listed on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species[51] as being critically endangered.

7.6.58. Given the likely hydrological connection between the River Thames and the freshwater watercourses present within the Site, it is possible that European eel are present within the Site.

7.6.59. Suitably qualified aquatic ecologists assessed the watercourses within the Study Area for their ability to support fish species during the optimal survey window (June 2023). Small drainage ditches comprised poor habitats, shallow, overgrown, and clogged by vegetation. Furthermore, ditches near Riverside 1 and Riverside 2 are exposed to high levels of surface water run-off resulting in high turbidity watercourses not preferred by some species of fish. The larger watercourses provide suitable habitat for fish, with the assemblage likely comprising species that can tolerate the brackish conditions due to the vicinity to the tidal River Thames. The main channels are culverted into the River Thames, which present a barrier for migratory fish, however that does not preclude the presence of European eel.

7.6.60. Three watercourses, Norman Road River, Great Breach Lagoon and Mulberry Way River have been sampled using eDNA techniques. The results of the eDNA analysis identified the presence of three fish species within the Site at three locations: National Grid Reference (NGR) TQ 49237 80386, TQ 49372 80190 and TQ 49589 7996. These included: Crucian carp *Carassius Carassius*, three spined stickleback *gasterosteus aculeatus* and stickleback *Pugnitius* sp., however this does not preclude the presence of other species including European eel. The three spined stickleback DNA was the most prevalent of the results of the survey and were recorded at all locations. Crucian carp DNA was recorded within the Norman Road River and Great Breech lagoon.

7.6.61. Due to the potential presence of European eel, the freshwater fish community present within the Site these have been evaluated as being of National importance.

Aquatic Macroinvertebrates

7.6.62. A search of the Environment Agency's Ecology and Fish Data Explorer returned data from EA aquatic macroinvertebrate surveys at a monitoring location on Norman Road River, a watercourse within the Site (NGR TQ 49318 80312), undertaken in 2013. The desk study data identified the following Invasive Non-Native Species (INNS): the New Zealand mud snail *Potamopyrgus antipodarum*; the bladder snail *Physella acuta*; and the amphipods *Crangonyx pseudogracilis/floridanus* and *Gammarus tigrinus*. The calculated Community Conservation Index (CCI) value of 14.64 classified the aquatic macroinvertebrate community within the Norman Road River as having a Fairly High conservation value[52].

7.6.63. Four watercourses have been surveyed by aquatic ecologists: North Dyke, Mulberry Way River; Great Breach Lagoon; and Norman Road River. Preliminary results suggest high conservation values of macroinvertebrate communities in North Dyke and Norman Road River. Mulberry Way River and Great Breach Lagoon were classified as low and moderate, respectively.

7.6.64. The macroinvertebrate assemblage at North Dyke comprised of 36 taxa. The species recorded are not sensitive to reduced flows. A crawling beetle *Limnoxenus niger* designated as Near Threatened on Red listing (based on 2001 IUCN guidelines[53]) was found. Also, a diving beetle *Coelambus parallelogrammus* found is identified as Nationally Scarce. A lesser water boatman *Sigara striata* which was identified is Nationally Scarce. An aquatic beetle of the Local conservation importance *Noterus clavicornis* was found at the Site. A CCI score[54] of 16.3 indicated a high conservation value at the Site. The Proportion of Sediment-sensitive Invertebrates (PSI) scores for this Site indicate it was Heavily sedimented. Two INNS snails were present, a New Zealand mud snail (*Potamopyrgus antipodarum*) and bladder snail (*Physella acuta*), both species in low numbers.

7.6.65. The invertebrate community within the Mulberry Way River comprised of 20 taxa including non-biting midge larvae Chironomidae, snails Physidae, Lymnaeidae, Planorbidae, crustaceans *Asellus aquaticus*, the Lake Fingernail clam, *Musculium lacustre*, dragonflies *Aeshna* sp., aquatic beetles Haliplidae, Hydrophilidae, Dytiscidae, Noteridae, backswimmers Notonectidae and leeches Glossiphoniidae. The conservation value of the water course was classed as Moderate (CCI scores over 5) with a number of species of conservation value recorded. These included a flat ram's horn snail *Hippeutis complanatus* and Lake Fingernail clam *Musculium lacustre* which are both designated on the Red Data List[55] as Least Concerned. A water beetle of the Local conservation importance *Noterus clavicornis* was also recorded. The PSI scores for this site indicate the waterbody bed was Heavily sedimented. Two species of INNS: New Zealand mud-snail *Potamopyrgus antipodarum* and shrimp *Crangonyx pseudogracilis/floridanus* were recorded in low numbers.

7.6.66. There was a low species diversity within the Great Breach Lagoon with a total of 11 taxa recorded. The invertebrate community was mainly composed of non-biting midge larvae Chironomidae and crustaceans *Asellus aquaticus*. The remaining taxa included bladder snails Physidae, beetles *Haliplus sp.*, *Hydrophorus sp.*, *Helophorus brevipalpis* and Hydrophilidae, pondskaters Gerridae, water scorpion *Nepa cinerea* and soldier fly Stratiomyidae. The low species diversity and absence of any rare or notable species was reflected by the CCI score of 5, suggesting a low conservation value. The PSI scores for this Site indicate it was Heavily sedimented. No INNS were recorded at the location.

7.6.67. The composition of the invertebrate within the Norman Road River comprised of 18 taxa. The invertebrate community was mainly comprised of non-biting midge larvae Chironomidae, crustaceans *Asellus aquaticus* and snails *Planorbis carinatus*, *Planorbis corneus, Gyraulus crista*, Physidae and Hybrobiidae. Additional taxa included lesser water boatmen *Sigara dorsalis*, *Corixa punctata*, diptera Chaoboridae, Ptychopteridae, leeches *Helobdella stagnalis*, flatworm *Dendrocoelum lacteum*, freshwater pea mussel Pisidium sp. Three species of conservation value were recorded including a flat ram's horn snail *Hippeutis complanatus*, the nationally scarce lesser water boatman *Sigara striata* and a noterus water beetle of local conservation importance *Noterus clavicorni*. The PSI scores for this site indicate it was Heavily sedimented. One INNS species, the New Zealand mud-snail *Potamopyrgus antipodarum* was recorded within the Norman Road river.

7.6.68. Out of all ponds scoped in for Pond PSYM, only Pond 7 was surveyed, which is within the Site and Crossness LNR. The survey was undertaken in June 2023[f]. The remaining ponds were either dry or inaccessible due to dense vegetation at the time of survey. Data was sent to the Freshwater Habitats Trust for analysis to determine the conservation value of the pond. The macroinvertebrate community recorded within Pond 7 included the following taxa: snails Lymnaeidae and Physidae, olive mayflies Baetidae, soldierlfies Stratiomyidae, meniscus midges Dixidae, springtails Collembola, aquatic beetles Haliplidae, Helophoridae, Dytiscidae, and non-biting midges Chironomidae.

7.6.69. No protected or notable species or invasive non-native species were recorded within Pond 7.

7.6.70. Due to the potential presence of Nationally Scare species, the aquatic macroinvertebrate community present within the Site has been evaluated as being of National importance.

[f] Pond 7 was found to be too brackish to be analysed using the PSYM methodology, therefore it could not be assigned a conservation value. Therefore, information on species composition is presented instead.

Macrophytes

7.6.71. A search of the Environment Agency's Ecology and Fish Data Explorer[39] returned data from an Environment Agency macrophyte survey at a monitoring location within the Great Dyke lagoon within the Site (NGR TQ 49318 80312), in August 2013. A total of 17 macrophytes species were recorded in the survey, all of which are recorded as flowering macrophyte species. The most dominant species recorded in the Environment Agency macrophyte survey were reedmace *Typha latifolia* and common reed *Phragmites australis*. No protected or otherwise notable macrophyte species were recorded in the survey, nor were any INNS.

7.6.72. Due to Health and Safety derived access restrictions, it was not possible to undertake ditch surveys in full accordance with the standard methodology for the Coastal Grazing Marsh habitat. However, the assemblage recorded was similar to expected based on the desk study results from the Environment Agency survey conducted in 2013, thus validating the field survey results. Reedmace *Typha latifolia* and common reed *Phragmites australis* were present. Duckweed *Lemna* spp., reedmace and common reed was recorded in abundance at Horse Head Ditch. No INNS or protected species were recorded during the site visit. However, the presence of INNS was identified as part of the desk study, therefore it cannot be ruled out that INNS are present within the freshwater habitats.

7.6.73. The aquatic macroinvertebrate community present within the Site has been evaluated as being of Local importance.

Evaluation Summary

7.6.74. **Table 7-10** provides a summary of results of the evaluation of ecological features, detailing the scale at which they are important.

Table 7-10: Ecological Features Evaluation Summary

Ecological Feature	Importance
Epping Forest SAC	International
SSSIs (Inner Thames Marshes SSSI, Ingrebourne Marshes SSSI, Oxleas Woodlands SSSI, Ruxley Gravel Pits SSSI and West Thurrock Lagoon and Marshes SSSI)	National
LNR (Crossness LNR, Rainham Marshes LNR, Lesnes Abbey Woods LNR)	County
SINC (Erith Marshes SINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, 18 further SINCs outside of the Site Boundary)	County
HPI (Deciduous Woodland, Coastal and floodplain grazing marsh, Intertidal mudflats, Reedbeds, Open Mosaic Habitat, Coastal saltmarsh (adjacent to the Site Boundary))	County

Ecological Feature	Importance
Other habitats: river habitat	County
Other habitats: modified grassland, other neutral grassland, mixed scrub, ditches/standing water	Local
Bats	Local
Breeding birds	County
Notable plants and invasive species	County
Reptiles	Local
Terrestrial invertebrates	County
Water vole	County
Wintering birds	County
Freshwater fish (including European eel)	National
Aquatic macroinvertebrates	Regional/County
Macrophytes	Local

FUTURE BASELINE

Overview

7.6.75. Climate change is the single most prevalent factor when attempting to predict the future baseline of an ecosystem or species community; not least as it affects ecology via multiple pathways. Impacts on species are considered to include changes in distribution and abundance, the timing of seasonal events and habitat use and, consequently, there are likely to be changes in the composition of plant and animal communities. Habitats and ecosystems are also likely to change in character.

7.6.76. Assessing the potential impacts of climate change on ecological features is problematic as species trends in distribution and population size are influenced by this and other factors. These include environmental considerations (such as atmospheric pollution and land use) and population biology (such as density dependence). These different factors can work in combination to bring about change.

7.6.77. Moorcroft & Speakman[56] present a study that summarises key research on the impacts of climate change on habitats and species in the UK, concluding that there is strong evidence that climate change is affecting UK biodiversity. Importantly, impacts are expected to increase as the magnitude of climate change increases.

7.6.78. The distributions of many species are shifting northwards, including some species which have colonised the UK from mainland Europe, while some species are seen to be utilising habitats at a higher altitude than known previously.

7.6.79. It is difficult to predict, with considerable confidence, the likely response of the key ecological features (as described in the **Table 7-9** above) to climatic change. However, the following section presents known information on the medium and long term trends in distribution and abundance for such features.

7.6.80. The future baseline assumes that existing commercial business within the Site would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, including Middleton Jetty and Munster Joinery UK Limited. Riverside 2 would be operational in the future baseline, its construction phase completed and associated effects no longer present.

Habitats

7.6.81. Grassland habitats are widespread across the Site, particularly floodplain grazing marsh. Such areas are considered to be highly sensitive to changes in rainfall. An increase in summer drought conditions has the potential to lead to a decline in wet grassland communities including floodplain grazing marsh, which may lead to a change in species composition in these habitats. It is not possible to predict whether there would be changes in land management or land use (such as modification of the grazing regime) on floodplain grazing marsh and what the effects would be.

7.6.82. Although woodland cover in the UK has increased slightly in the last 100 years, much of this is non-native tree species. Existing native woodlands are isolated, in poor ecological condition and present a decline in woodland wildlife. As well as direct habitat loss, climate change also poses a threat through impacts on/from: growing season; imported diseases; invasive plants; mammal browsing; and air pollutants[57].

Bats

7.6.83. Collins[41] examined trends in 11 species compared to a baseline year of 1999, which found that these species were either stable or increasing. Climate change may affect bat populations through changes in their annual hibernation cycle, breeding success and food availability.

Breeding Birds

7.6.84. The British Trust for Ornithology (BTO)[58] breeding farmland bird index has reduced by more than half since 1970 in the UK. This indicates a long term decline in farmland bird populations.

7.6.85. The breeding woodland bird index for the UK has declined by 30% between 1970 and 2018, and 5% over the recent short term period (2012-2017). The breeding water and wetland bird index for the UK fell by 6% between 1975 and 2018, but over the short term (2012-2017) increased slightly by 3%.

Notable Plants and Invasive Species

7.6.86. Botanical species in the UK are generally in decline. State of Nature 2019[59] reports the occupancy indicator, an index of vascular plant diversity and abundance, is 4% lower compared to 1970, with little, short term change in average distribution. 440 plants (18%) are classified as being at risk of extinction from Great Britain. These declines are due to a variety of factors, including climate change, habitat loss, and change in land management practises. However, State of Nature 2019[59] also reports the rise in invasive species within the UK, with an average of 10–12 new non-native species becoming established in the UK annually, and that 10–20% of these cause serious adverse impacts.

Reptiles

7.6.87. Evidence from the BTO Research Report 572[60] points to general declines in common lizard, slow worm, grass snake and adder. There is a documented decline in sand lizard numbers and there is thought to be a decline in smooth snake, although current trends are largely unknown. Warming, through climate change, could increase reptile growth and reproductive rates due to longer periods of activity with reduced hibernation lengths and earlier emergence. However, research suggests the increase in food resource requirements (due to the increased periods of activity) may not be met fully by increased foraging, particularly when warm weather restricted their activity[61].

Terrestrial Invertebrates

7.6.88. State of Nature 2019[59] reports that the occupancy indicator for insects shows a decrease in average distribution of 10% over the long term, and 8% over the short term, with 405 invertebrates (12%) classified as being at risk of extinction from Great Britain. Butterflies and moths have been particularly hard hit, with numbers of butterflies down by 17% and moths down by 25% since 1970. Species, such as the High Brown Fritillary and Grayling, that require more specialised habitats have declined by more than three quarters. These declines are due to a variety of factors, including climate change, habitat loss, and change in land management practises.

7.6.89. London is a hotspot for stag beetle; however, they have been in steep decline across Europe[62]. The decline in stag beetle numbers is attributed to the tidying up of parks, gardens and greenspaces and the removal of tree stumps and dead wood.

Water Vole

7.6.90. Water voles were formerly widespread and common in England, Wales and Scotland, ranging from Cornwall to the extreme northeast of Scotland. Populations are still widespread but patchy and have undergone serious decline since the 1960s. The water vole is the UK's most rapidly declining mammal and these have been lost from 94% of places where they were once prevalent[63]. Reintroduction programmes are attempting to slow the decline, but their effect on the conservation status of water vole is as yet unknown.

Wintering Birds

7.6.91. A number of wintering wildfowl and wader species have declined significantly in their abundance in the UK, particularly in west coast estuaries, as they migrate shorter distances in the non-breeding season, and many have shifted north eastwards to new feeding grounds.

Freshwater Fish (including European eel)

7.6.92. Climate change is known to be affecting the River Thames, with both water temperature and sea levels continuing to rise above historic baselines[64]. Studies report an observed decline in the number of fish species found in the Tidal Thames, however further research is needed to determine the cause[64]. Increased water temperatures, within the freshwater watercourses and water bodies within the Site, could result in a shift of the fish community to species more tolerant of low oxygen levels and warmer temperatures.

Aquatic Macroinvertebrates

7.6.93. Many aquatic macroinvertebrate species are dependent upon good water quality for survival. As a result, they are sensitive to the effects of climate change, such as increased siltation, that may lead to a decline in water quality. Changes in annual water cycles, such as altered flow rates and the drying out of some habitats, are also likely to impact aquatic macroinvertebrate communities[65].

7.6.94. Spring aquatic macroinvertebrate numbers could decline by about 20% for every 1°C increase in temperature, whilst a 3°C increase could result in a reduction by over 40%. Some species may be replaced by other species better adapted to warmer conditions, meaning that ecosystem function may persist whilst community composition is altered[65].

7.6.95. Changes in the flow conditions of UK rivers attributed to changes in precipitation patterns are likely to affect aquatic macroinvertebrate species that are sensitive to flow rates. This may subsequently lead to a shift in the aquatic macroinvertebrate community compositions seen in UK freshwater habitats[66].

Macrophytes

7.6.96. Changes in temperature, carbon dioxide and precipitation linked to climate change have the potential to directly alter macrophyte communities within UK freshwater systems. The combined effects of climate change are likely to cause an increase in the abundance and distribution of emergent and floating macrophyte species within lakes, whilst the abundance of submerged macrophyte species diminishes. Climate change may also lead to indirect impacts on macrophyte communities, through the introduction of INNS and changes in nutrient cycles[66].

Summary

7.6.97. Whilst there may be some changes in species populations and distribution in the longer term due to climate change, changes in land management or land use (such as modification of the grazing regime) would be likely to have a greater influence on biodiversity over much of the ZOI (described in **Section 7.5** above).

7.6.98. To provide information on medium term changes in species distribution that may be affected by the construction and operation of the Proposed Scheme, and due to the mobile nature of several species of conservation concern which may be impacted by the Proposed Scheme, further surveys will be necessary for certain species prior to the commencement of construction works as detailed in the **Outline CoCP (Document Reference 7.4)** and **Section 7.7** of this chapter.

7.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

7.7.1. This section sets out the embedded design, mitigation and enhancement measures relevant to the terrestrial biodiversity assessment. Construction and operational design has been optimised to reduce effects of shading, e.g. by compressing the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area), and micro-siting of the Above Ground Pipelines. Consolidation of structures within the Carbon Capture Facility has been undertaken which seeks to create space within the Mitigation and Enhancement Area for retention of habitats or new habitats as secured through the **Design Principles and Design Code (Document Reference 5.7)** and the **Outline LaBARDS (Document Reference 7.9)**.

CONSTRUCTION PHASE

7.7.2. Relevant design, mitigation and enhancement measures include:

- implementation of full CoCP(s) which will be developed in substantial accordance with the **Outline CoCP (Document Reference 7.4)**, as secured by a requirement of the **Draft DCO (Document Reference 3.1)**.
- adherence to relevant Environmental Permits, Best Practice Guidance and Regulations, British Standards, and monitoring for the protection of ecological features.

- implementation of pollution prevention and control measures in accordance with principles set out in the construction phase elements of the **Outline CoCP (Document Reference 7.4)**.
- lighting levels would be kept to a minimum necessary for security and safety and designed (where practicable) to avoid light spillage beyond the Site. This will include maintenance of dark corridors around designated sites and key habitats. Lighting will be directed onto works areas with hoods used to prevent light spill. This would be in accordance with principles set out in the **Outline CoCP (Document Reference 7.4)**.

7.7.3. Where impacts on habitats and species cannot be avoided or mitigated through adherence to standard best practice measures, and this would otherwise result in a potential significant adverse effect, compensation measures will be implemented. This follows the Mitigation Hierarchy approach. These are described in **Section 7.9**, with details of habitat creation and enhancement in the **Outline LaBARDS (Document Reference 7.9)**. A full LaBARDS(s) will be developed in substantial accordance with the outline plan, as secured by a Requirement of the **Draft DCO (Document Reference 3.1)**.

OPERATION PHASE

7.7.4. Relevant design, mitigation and enhancement measures (following the Mitigation Hierarchy) for this phase comprise:

- Adherence to relevant Environmental Permits, Best Practice Guidance and Regulations, British Standards, and monitoring for the protection of ecological features.
- Managing operation, including maintenance activities, in order to avoid or minimise indirect effects including noise and vibration, pursuant to an Operational EMP (which will be prepared prior to the Proposed Scheme commencing operation, such plan to be in accordance with the measures set out in the **Mitigation Schedule (Document Reference 7.8)**). Measures would be confirmed in the final Operational EMP but could include timing of actions including maintenance activities to avoid sensitive periods for certain species, such as dusk/dawn for when bats are sensitive, or key breeding periods such as May/June for birds and water voles.
- Implementation of the full Drainage Strategy to be in substantial accordance with the **Outline Drainage Strategy (Document Reference 7.2)**, to avoid and control pollution events.
- Lighting levels would be kept to a minimum necessary for security and safety and designed (where practicable) to avoid light spillage beyond the Site. This would be set out in the full Lighting Strategy, to be in substantial accordance with the principles set out in the **Outline Lighting Strategy (Document Reference 7.3)** and implemented as approved. This would include control of operation phase lighting to focus it on the Carbon Capture Facility, the Proposed Jetty and Ancillary

Infrastructure and to maintain dark corridors around designated sites and key habitats.

- Implementation of standards for Site cleanliness and controls to avoid build-up of waste (including food waste, unused materials, packaging etc) and degradation of habitats retained/created within the Proposed Scheme. To include a focus on waste attractive to rats (which can displace water voles).

7.7.5. Further information on these measures are set out in the relevant sections below, as well as the **Outline LaBARDS (Document Reference 7.9)** and illustrated in the **Design Approach Document (Document Reference 5.6)**.

7.8. ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

7.8.1. This section details the assessment of impacts and effects for the Proposed Scheme during both the construction and operation phases, considering the embedded design, mitigation and enhancement measures detailed in **Section 7.7**. The assessment presented within this chapter considers potential impacts from the construction and operation of the Proposed Scheme alongside Riverside 1 and Riverside 2.

7.8.2. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two options for the construction programme of the Proposed Scheme are being considered: Option 1 and Option 2. The estimated construction period is approximately 60 months (five years) for Option 1 and approximately 42 months (three and a half years) for Option 2. The choice between Option 1 (two phase) or Option 2 (single phase) construction programmes will not affect the outcome of the assessment of impacts and effects.

7.8.3. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two options for the design of the Carbon Capture Facility are being considered. One option is for individual lines to be connected to the exhaust stacks for Riverside 1 and Riverside 2, with two individual Stack(s) for the Carbon Capture Facility. A second option is for the two lines from Riverside 1 and Riverside 2 to be combined into a single Stack at the Carbon Capture Facility. For the purposes of this assessment, there is considered to be no difference between the two options in terms of predicted effects on terrestrial biodiversity arising from the Proposed Scheme.

7.8.4. The demolition or retention of the Belvedere Power Station Jetty (disused) will not change the outcomes of the assessment of impacts and effects reported within this chapter, due to the fact that the assessment within this chapter is limited to the landside areas within the Site. Removal of Belvedere Power Station Jetty (disused) is considered the worst case scenario for wintering and breeding birds as both use this structure as part of their habitat, and thus its removal has been part of the assessment for these ecological features. The demolition or retention of the Belvedere Power Station Jetty (disused) has been considered and confirmed in this

Environmental Statement (ES) within **Chapter 8: Marine Biodiversity (Volume 1)** and **Appendix 7-1: Biodiversity Net Gain Report (Volume 3)**.

CONSTRUCTION PHASE

7.8.5. The likely significant effects for terrestrial biodiversity associated with the construction phase are set out below.

7.8.6. The construction assessment presented in this chapter is appropriate for both construction programme options, as set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

Habitat Loss and Fragmentation

7.8.7. Many ecological features within the Study Area are located at distance from the Proposed Scheme, and for this reason are not connected by habitat in the intervening landscape to it, with the primarily urban/industrial landscape in which the Proposed Scheme lies forming a barrier to movement of many species. In addition, deciduous woodland to the south of the Site, river habitat within the River Thames, and coastal saltmarsh outside of the Site will not be lost as a result of the Proposed Scheme directly, nor will connectivity with other habitats be altered. These features will therefore not be affected by habitat loss and fragmentation. These features comprise:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- Habitats of Principal Importance (HPI):
  - Deciduous woodland (lowland mixed deciduous woodland); and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat (within the River Thames).

7.8.8. Statutory and non-statutory designated sites within and adjacent to the Site Boundary (Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC; **Figure 7-4: Locally Important Statutory Designated Sites, Non-statutory Designated Sites (Volume 2)**) will be subject to habitat loss to allow construction of the Proposed Scheme. Fragmentation may also affect these sites but will be ameliorated through retention of important habitat links across the Proposed Scheme (e.g. ditch habitat within Erith Marshes MSINC) and their location within an industrialised landscape. All four sites are important at the County level.

7.8.9. Northeastern areas of the Crossness LNR are included within the Site, resulting in the loss of habitats in the East and West Paddocks (**Figure 7-10**: **Ecological Survey Areas (Volume 2)**). Both are fields used for horse grazing and have associated stabling. The East Paddock will be lost entirely, whereas the West Paddock is assumed (within this assessment) to lose a thin strip along its northern boundary (comprising a mixture of grasses, bare ground scrapes and reedbed). The area under the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area) represents 11.7% of the total area of Crossness LNR. Therefore, the magnitude of change is medium, and there is likely to be a direct, permanent, long term, **Moderate Adverse (Significant)** effect on Crossness LNR.

7.8.10. Erith Marshes MSINC is coincident with Crossness LNR and therefore falls under the footprint of the Proposed Scheme at the same locations, but also at the drainage ditch adjacent to Norman Road. The area under the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area) represents 3.5% of the total area of Erith Marshes MSINC. Therefore, the magnitude of change is medium, and there is likely to be a direct, permanent, long term, **Moderate Adverse (Significant)** effect on Erith Marshes MSINC.

7.8.11. Belvedere Dykes SINC is found along the eastern side of the Site Boundary. Small areas of the SINC will be used for laydown requiring temporary habitat clearance, but without permanent loss. An area of grassland adjacent to the eastern side of Riverside 1, and at the northern extent of the SINC within the Site, will be permanently lost to infrastructure providing connection to the Proposed Jetty. These areas represent 20.7% of the total area of Belvedere Dykes SINC. Therefore, the magnitude of change is medium, and there is likely to be a direct, permanent, long term, **Moderate Adverse (Significant)** effect on Belvedere Dykes SINC.

7.8.12. River Thames and Tidal Tributaries MSINC coincides with the location of the Proposed Jetty, located on the interface between mudflat and river habitat within the Thames. Therefore, the magnitude of change is medium, and there is likely to be a direct, permanent, long term, **Moderate Adverse (Significant)** effect on River Thames and Tidal Tributaries MSINC.

7.8.13. Habitats, including HPI, some of which lie within the statutory designated sites identified above, will also be lost and may also be subject to fragmentation. They are shown on **Figure 7-5: Habitats of Principal Importance (Volume 2)** and **Figure 7-6: Site UKHab Survey Map (Volume 2)** and comprise:

- coastal and floodplain grazing marsh HPI;
- intertidal mudflats HPI;
- open mosaic habitat HPI;
- reedbed HPI;
- other neutral grassland;
- modified grassland;
- mixed scrub; and
- ditches/standing water (ponds and water features within Crossness LNR, and the Site drainage ditch network).

7.8.14. Coastal and floodplain grazing marsh HPI and reedbed HPI are coincident with areas of Crossness LNR/Erith Marshes MSINC in the East, Stable and West Paddocks under the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area), and intertidal mudflat HPI located within the River Thames under the footprint of the Proposed Jetty. Open mosaic habitat HPI also falls under the Proposed Scheme footprint. All are important at the County level. The magnitude of change is medium. Therefore, there is likely to be a direct, permanent, long term, **Moderate Adverse (Significant)** effect on Coastal and floodplain grazing marsh HPI, intertidal mudflat HPI, reedbed HPI and open mosaic habitat HPI. The magnitude of the remaining habitats falling under the footprint of the Proposed Scheme are important at the Local level. The magnitude of change is medium. Therefore, there is likely to be a direct, permanent, long term, **Minor Adverse (Not Significant)** effect on other neutral grassland, modified grassland, mixed scrub and ditches/standing water.

7.8.15. Assessment for the remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: The area under the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area) is used as a foraging and commuting habitat for common and widespread bat species. However, the level of activity indicates limited use for these purposes and the Site itself relatively small, subject to significant disturbance from adjacent industrial land uses, and used by a low number of individual bats. Higher quality, more extensive foraging habitat is found in the wider Crossness LNR to the west and the landscape beyond, such as over sludge tanks in Crossness Sewage Treatment Works (where insect food is common) and over grassland/ditches to the south of the A2016 Eastern Way. Bats are important at the Local level. The magnitude of change is low. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on bats.

- **Breeding birds**: Habitats within the Site including reedbed, scrub and woodland support a wide variety of breeding bird species, largely comprised of those that are common and widespread, but also supporting notable species rare for a site within an urban/industrial area of greater London (such as barn owl). The Proposed Scheme would lead to loss of breeding bird habitat through removal of areas used for nesting (reedbed/scrub) and also for foraging (grassland), and destruction of nests and mortality of adults and young could occur as a result of the act of habitat clearance. Habitat loss will occur in areas close to existing industrial land uses and in areas subject to intensive grazing and are therefore subject to disturbance when compared to the wider Crossness LNR to the west. In addition, the area of grassland used by foraging barn owls, and that would be lost, is small (approximately 2.5ha); typical barn owl home range (30-40ha[67]). The Norman Road Fields where a barn owl nest box used by this species is present, will be retained and subject to enhancement. Breeding birds are important at the County level. The magnitude of change is low. Therefore, there is likely to be a direct, permanent, long term **Moderate Adverse (Significant)** effect on breeding birds.
- **Notable plants and invasive species**: Habitat loss within the East Paddock would remove an area where important plants such as sea barley are found. However, this field is intensively grazed pushing such species to marginal areas and thus is restricted in its distribution and abundance within this parcel of land. Furthermore, the Norman Road Field where notable plants are also found will be retained by the Proposed Scheme, limiting the spatial scale of effects on them. Invasive goat's-rue is found throughout both the East Paddock and Norman Road Field and could be spread by works in the construction phase if not controlled. Notable plants are important at the County level. The magnitude of change is low. Therefore, there is likely to be a direct, permanent, long term, **Minor Adverse (Not Significant)** effect on notable plants and invasive species.
- **Reptiles**: Individual reptiles could be killed or injured during the construction phase as a result of the act of habitat clearance within the East Paddock and other terrestrial habitats adjacent to Crossness LNR. They would also be excluded from the newly developed areas due to loss of grassland, scrub and other semi-natural habitats in these areas they would use for foraging and shelter. However, reptile populations identified during the survey were small and limited to a single species (common lizard), thus there are only small numbers present under the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area), limiting the scale of effects on the wider population that exists within Crossness LNR. Reptiles are important at the Local level. The magnitude of change is low. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on reptiles.
- **Terrestrial invertebrates**: Habitat loss within the East Paddock would remove habitat supporting the wider nationally important terrestrial invertebrate community at Crossness LNR. However, this field is intensively grazed with food plant species of likely importance to invertebrates such as pollinators (e.g. brown banded carder bee) pushed to marginal areas and thus is limiting its role as supporting habitat. Furthermore, the Norman Road Field will be retained and enhanced by the

Proposed Scheme, preserving and improving this as invertebrate habitat within the LNR and limiting the spatial scale of effects on the wider invertebrate community. Terrestrial invertebrates are important at the County level. The magnitude of change is low. Therefore, there is likely to be a direct, permanent, long term, **Minor Adverse (Not Significant)** effect on terrestrial invertebrates.

- **Water voles**: The Proposed Scheme would lead to the removal of approximately 540m of drainage ditch, representing 11% of the total length of this habitat type within the Site. No ponds or larger watercourses fall within the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area) but do fall within the Mitigation and Enhancement Area. Ditches provide habitat for water voles and their removal to allow for construction presents a risk to individual water voles from killing/injury works and would reduce the amount of habitat available to the water vole population. Water voles are important at the County level. The magnitude of change is low. Therefore, there is likely to be a direct, permanent, long term, **Moderate Adverse (Significant)** effect on water voles.
- **Wintering Birds**: Habitat loss within the River Thames for construction of the Proposed Jetty, and terrestrial parts of the Site will remove foraging resources used by wintering birds. However, the location of the Proposed Jetty is not in an area used by large numbers of wintering birds for foraging, with only small numbers of water birds found using it for this purpose during survey. In addition, terrestrial habitats were not used by large numbers of wintering birds for foraging, and no high tide roosts are found within the Site. Retention of the Belvedere Power Station Jetty (disused) (with modifications) would allow wintering birds to roost on the structure in the future. Wintering birds are important at the County level. The magnitude of change is low. Therefore, there is likely to be a direct, permanent, long term, **Moderate Adverse (Significant)** effect on wintering birds.
- **Freshwater fish**: The Proposed Scheme would lead to the removal of approximately 540m of drainage ditch, representing 11% of the total length of this habitat type within the Site. No ponds or larger watercourses fall within the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area) but do fall within the Mitigation and Enhancement Area. In addition, a number of the drainage ditches that will be impacted are not permanently wetted and thus do not form suitable habitat for fish species. In addition, no fish species were recorded from the eDNA surveys on ditches that will be lost as part of Proposed Scheme. Thus, the magnitude of impact is likely to be negligible. Freshwater fish species range in importance from National (European eel) to low (Crucian carp and stickleback sp), therefore there will be a direct, permanent, long term, **Negligible (Not Significant)** effect through loss of supporting habitat.
- **Aquatic macroinvertebrates**: The Proposed Scheme would lead to the removal of approximately 540m of drainage ditch, representing 11% of the total length of this habitat type within the Site. No larger water bodies such as those in the Norman Road Field or in Crossness LNR that fall within the footprint of the Proposed Scheme, excluding the Mitigation and Enhancement Area. Macroinvertebrate species recorded within the site range from local to national importance, however no species of conservation importance were recorded in

watercourses and ditches that will be impacted by the Proposed Scheme. In addition, a large proportion of the ditches that will be lost are not permanently wetted, thus they do not provide suitable habitat for macroinvertebrate species. Consequently, the magnitude of impact is considered to be negligible. Therefore, this has the potential to result in a direct, permanent, long term, **Negligible (Not Significant)** effect through loss of supporting habitat.

- **Macrophytes**: The Proposed Scheme would lead to the removal of approximately 540m of drainage ditch, representing 11% of the total length of this habitat type within the Site. No ponds or larger watercourses fall within the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area) but do fall within the Mitigation and Enhancement Area. The macrophyte species that would potentially be impacted by this removal are of Local conservation value, with no rare or notable species recorded on Site. Due to the ability of macrophytes to grow in occasionally wetted areas rather than fully aquatic habitats (if compared to fish, for example), there is potential for a greater area of habitat loss due to the Proposed Scheme. Therefore, the magnitude of change is considered to be low, consequently this would result in a direct, permanent, long term, **Negligible (Not Significant)** effect through loss of supporting habitat.

Noise and Vibration

7.8.16. The effects of noise and vibration during construction will be limited to the Site and its immediate surroundings as they would not be transmitted at distance further than the Proposed Scheme's local area. Modelling work undertaken to inform the assessment in **Chapter 6: Noise and Vibration (Volume 1)** has analysed likely changes in noise and vibration during construction at five locations in the area surrounding the Proposed Scheme, at distances between approximately 70m and 600m from the Site Boundary, and the local trunk road network. Although the approach used is focussed on effects on human receptors, it anticipates that most construction phase activities will produce noise and vibration of negligible magnitude at these locations. It is therefore reasonable to conclude noise and vibration will only affect ecological features found within and adjacent to the Site Boundary (its 'local area'), with attenuation of noise over distance and screening by industrial, commercial and residential buildings limiting the transmission of effects. In addition, habitats are not considered to be sensitive to noise and vibration which adversely affects animals through disturbance rather than plants and the physical substrates they grow in.

7.8.17. Thus, the following features will not be affected by noise and vibration:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;

  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh;
  - Intertidal mudflats;
  - Reedbed HPI;
  - Open mosaic habitat HPI; and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat (within the River Thames);
  - Modified grassland;
  - Other neutral grassland;
  - Mixed scrub; and
  - Ditches/standing water.
- Protected/notable species:
  - Notable plants;
  - Aquatic macroinvertebrates;
  - Macrophytes; and
  - Invasive species.

7.8.18. Noise and vibration impacts will affect animal species using designated sites and other habitats within and surrounding the Proposed Scheme. Construction of the Proposed Scheme, including vessel movements associated with construction of the Proposed Jetty, will produce noise and vibration over and above that which already exists within the Site due to existing industrial land uses (whether or not this were to include Riverside 2 construction), however, effects will be ameliorated due to these existing sources of noise and vibration.

7.8.19. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is low given the baseline noise environment and measures to avoid excessive noise that are included within the **Outline CoCP (Document Reference 7.4)**. Therefore, there is likely to be a direct, temporary, medium term **Moderate Adverse (Significant)** effect on all four designated sites.

7.8.20. Assessment for remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: Operation of construction machinery and vehicles will, for the most part, be undertaken during the day when bats are at roost in locations remote from the Proposed Scheme, limiting the potential for noise and vibration disturbance to bats. Disturbance may occur where work occurs during the evening and at night during the bat active season (nominally April to October) to foraging and commuting bats, although survey data indicates relatively low levels of activity close to the footprint of the Proposed Scheme (excluding the Mitigation and Enhancement Area) and higher levels of activity in areas of retained habitat within the Norman Road Field to the south and west at distance from disturbance. In addition, due to the industrial use of the area of land close to existing facilities such as Riverside 1 and along Norman Road, bats are already subject to relatively high levels of background noise and vibration in the environment and are present despite this. The bat community on Site is important at the Local level. The magnitude of change is low. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on bats.
- **Breeding birds**: Construction will take place against an environment where noise and vibrational disturbance is already present (i.e. from Riverside 1, Norman Road traffic), but would present additional disturbing stimuli over and above that which the breeding bird community is acclimated. This could lead birds to avoid nesting sites close to works areas, such as habitats along the western Site Boundary. The effect would dissipate with distance from works with areas well within Crossness LNR least affected. Breeding birds are important at the County level. The magnitude of change in medium. Therefore, there is likely to be a direct, temporary, medium term **Moderate Adverse (Significant)** effect on breeding birds.
- **Reptiles**: Small numbers of one species of reptile were identified by surveys, indicating noise and vibration would have a limited effect on the wider population of reptiles known to be present within Crossness LNR. Habitat close to works and subject to noise and vibration may be vacated and avoided by reptiles or used to a lesser degree as foraging and breeding areas. Reptiles are important at the Local level. The magnitude of change is low. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on reptiles.
- **Terrestrial invertebrates**: Invertebrate communities show limited sensitivity to noise and vibration as evidenced by the success of using areas subject to high levels of such disturbance, namely roadside verges, in conservation efforts[68,69,70]. In particular, this evidence shows that pollinators can thrive in areas of high noise and vibrational disturbance. Increasing noise and vibration levels in retained habitat is therefore not expected to affect terrestrial invertebrates unless within the immediate vicinity (i.e. several meters from) works. Terrestrial invertebrates are important at the County level. The magnitude of change is low. Therefore, there is likely to be a direct, temporary, medium term **Minor Adverse (Not Significant)** effect on terrestrial invertebrates.

- **Water voles**: Water voles are known not to be sensitive to noise and vibration, with populations found in suitable habitat even where high levels of this sources of disturbance exist[71]. The current population lives in an area with a relatively high level of background noise and vibration from the Riverside 1 facility and traffic along Norman Road; ditches along Norman Road itself support water vole as shown by survey data. Water voles are important at the County level. The magnitude of change is low. Therefore, there is likely to be a direct, temporary, medium term **Minor Adverse (Not Significant)** effect on water voles.
- **Wintering Birds**: Disturbance of Thames-side habitats for construction of the Proposed Jetty (including vessel movements), and terrestrial parts of the Site will affect foraging resources used by wintering birds. Wintering birds are important at the County level. The magnitude of change is low given the baseline noise environment and measures to avoid excessive noise included within the **Outline CoCP (Document Reference 7.4)** will be in place. Therefore, there is likely to be a direct, temporary, medium term **Moderate Adverse (Significant)** effect on wintering birds.
- **Freshwater fish**: Noise and vibration have the potential to result in modifications to fish behaviour (avoidance), and have the potential to result in mortality, if exposed to high enough levels (typically above 207 dB re 1 µPa²s in fish species with a swim bladder[72]). The fish community is exposed to a relatively high level of background noise and vibration from Riverside 1. There are also no plans to undertake piling or damaging noise generating activities directly within watercourses. In addition, the lack of suitable fish habitat within the watercourses adjacent to the Proposed Scheme (excluding the Mitigation and Enhancement Area) reduces the potential for impacts as fish species will be separated from the noise generation activities by intervening land. The fish identified within the desk study and field surveys are important at the National level due to the potential presence of European eel. The magnitude of change is negligible given the baseline noise environment and measures to avoid excessive noise that are included within the **Outline CoCP (Document Reference 7.4)** will be in place. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on freshwater fish.

Dust

7.8.21. The effects of dust produced during construction will be limited to the Site and its immediate surroundings and would not be transmitted at distance further than the Proposed Scheme's local area. These has been defined using dispersion modelling work undertaken to support the analysis in **Chapter 5: Air Quality (Volume 1)**, where a maximum distance band of 50m these have been used for effects on dust on ecological features. Thus, 'local area' can be defined by the 50m dispersion band. Thus, the following ecological features outside this will not be affected by dust:

- Statutory Designated Sites:
  - Epping Forest SAC;

  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.

7.8.22. Degradation of habitat, and the loss of that habitat's function to species it supports would be the effect of deposition of dust released during the construction phase. Dust would cause an effect in the local area around the Proposed Scheme through smothering of vegetation, changed soil conditions, transmission of polluting substances and irritation of animal species. Although dust is currently raised by operational facilities such as Riverside 1 and its associated traffic, measures associated with these facilities keep it under control.

7.8.23. However, dust suppression measures, such as water sprays, will be used during construction as part of embedded mitigation defined within the **Outline CoCP (Document Reference 7.4)**. These will control dust release and degradation of habitats, and consequent effects on species they support.

7.8.24. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. With dust suppression measures that will be included in the **Outline CoCP (Document Reference 7.4)**, the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on all four designated sites.

7.8.25. HPI (deciduous woodland, coastal and floodplain grazing marsh, intertidal mudflats, reedbed, open mosaic habitat and coastal saltmarsh) are important at the County level. With dust suppression measures that are included in the **Outline CoCP (Document Reference 7.4)**, the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on HPI.

7.8.26. River habitat within the Thames is important at the County level. With dust suppression measures that are included in the **Outline CoCP (Document Reference 7.4)**, the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on river habitat. Remaining habitats (modified grassland, other neutral grassland, mixed scrub and ditches/standing water) are important at the Local level. With dust suppression measures that are included in the **Outline CoCP (Document Reference 7.4)**, the

magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on other habitats.

7.8.27. Dust deposition and degradation of both Thames-side habitats and terrestrial parts of the Site would affect foraging resources used by wintering birds (important at the County level). With dust suppression measures that are included in the **Outline CoCP (Document Reference 7.4)**, the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on wintering birds.

7.8.28. For remaining ecological features for which, the impact is relevant (bats, breeding birds, reptiles, notable plants and invasive species, terrestrial invertebrates, water voles, freshwater fish, aquatic macroinvertebrates and aquatic macrophytes), with dust suppression measures that are included in the **Outline CoCP (Document Reference 7.4)**, the magnitude of change for all these features will be negligible. Therefore, they will be subject to a direct, temporary, medium term **Negligible (Not Significant)** effect as a result of construction phase dust.

Surface Water Run-off

7.8.29. The effects of surface water run-off during construction will be limited to the Site and areas hydrologically connected (through run-off, the drainage network or ground water) to it, and would not be transmitted upstream or to areas without a hydrological connection to the Site. Effects would extend to non-aquatic habitats within the Site. The following ecological features fall into these categories and will not be affected by surface water run-off:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland); and
  - Open mosaic habitat.
- Other Terrestrial Habitats:
  - Modified grassland;

  - Reedbeds;
  - Other neutral grassland; and
  - Mixed scrub.

- Protected/notable species:
  - Notable plants and Invasive species.

7.8.30. Run-off from the Proposed Scheme would enter the drainage ditch network within the Site and eventually the River Thames. This presents a possible vector for sediment and chemical pollution that may affect water quality. The build-up of sediments and pollutants may occur within the drainage network and/or ground water, adversely altering key conditions for habitats and species.

7.8.31. The **Outline CoCP (Document Reference 7.4)** provides details as to the mitigation measures and management processes within the design of the Proposed Scheme to control the quality of the surface water runoff that is discharged from the Site during construction. With regard to the potential for salinity increases, no new pathways to the tidal River Thames are to be created as part of the Proposed Scheme. However, the Proposed Scheme will introduce minor additional areas of hardstanding (which may require gritting during winter months) to the catchment, which already receives highway runoff via Norman Road. Any gritting would only be undertaken only for short periods of time when subzero conditions occur, and subject to dilution and flushing from winter precipitation.

7.8.32. Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC are hydrologically linked to the Proposed Scheme, and all are important at the County level. However, with application of the mitigation measures within the **Outline CoCP (Document Reference 7.4)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on all three designated sites.

7.8.33. HPI (Coastal and floodplain grazing marsh, intertidal mudflats, reedbed and coastal saltmarsh (adjacent to the Site Boundary)) are hydrologically linked (by run-off, the ditch network and ground water) to the Proposed Scheme and are important at the County level. However, with application of the mitigation measures within the **Outline CoCP (Document Reference 7.4)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on HPI.

7.8.34. River Thames and Tidal Tributaries MSINC and its river habitat will be the ultimate destination for run-off from the Proposed Scheme during construction. It is important at the County level. Due to dilution effects within the River Thames, application of the mitigation measures within the **Outline CoCP (Document Reference 7.4)**, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on River Thames and Tidal Tributaries MSINC and river habitat. Remaining habitats that are hydrologically

linked (by run-off, the ditch network and ground water) to the Proposed Scheme are important at the Local level. With application of mitigation measures within the **Outline CoCP (Document Reference 7.4)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on other habitats.

7.8.35. The assessment for the remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: Degradation of ditches and other water bodies may affect the availability of flying insects emerging from them, thus lowering the suitability of habitat for foraging bats. Bats are important at the Local level. However, with application of mitigation measures within the **Outline CoCP (Document Reference 7.4)**, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on bats.
- **Breeding birds**: Degradation of ditches and other water bodies may affect the availability of suitable nesting and foraging habitat for breeding birds associated with reedbeds and other aquatic habitats. Breeding birds are important at the County level. However, with the application of mitigation measures within the **Outline CoCP (Document Reference 7.4)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on breeding birds.
- **Reptiles**: Although UK reptiles are primarily terrestrial or fossorial, grass snake (known to be present in Crossness LNR) forages within ponds and ditches and is strongly associated with freshwater[73]. Thus, this species could be affected by degradation of water quality in the wider Crossness LNR. Reptiles are important at the Local level. However, with the application of mitigation measures within the **Outline CoCP (Document Reference 7.4)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on reptiles.
- **Terrestrial invertebrates**: Degradation of ditches and other water bodies may affect the availability of habitat for terrestrial invertebrates, which are important at County level. However, with the application of mitigation measures within the **Outline CoCP (Document Reference 7.4)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on terrestrial invertebrates.
- **Water voles**: Degradation of ditches and other water bodies may affect the availability of habitat for water voles, both for breeding and foraging. Water voles are important at the County level. However, with application of mitigation measures within the **Outline CoCP (Document Reference 7.4)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on water voles.
- **Wintering birds**: Degradation of Thames-side habitats, and wetlands in terrestrial parts of the Site, could occur through contaminated run-off and would affect foraging resources used by wintering birds. Wintering birds are important at the

County level. However, with the application of mitigation measures within the **Outline CoCP (Document Reference 7.4)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on wintering birds.

- **Aquatic macroinvertebrates:** Degradation of water quality in ditches and other water bodies through contaminated run-off could result in adverse effects upon macroinvertebrates which are important at the Regional/County level, such as mortality events, and reductions in population size. However, with the application of mitigation measures within the **Outline CoCP (Document Reference 7.4)** (including the use of attenuation ponds and controlling water discharge rate), the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on aquatic macroinvertebrates.
- **Freshwater Fish**: Degradation of water quality in ditches and other water bodies through contaminated run-off could result in adverse effects upon freshwater fish, which are important at the National level due to the potential presence of European Eel. These impacts could range from mortality events, and reductions in fish health and thus reproductive ability. However, with application of mitigation measures within the **Outline CoCP (Document Reference 7.4)** (including the use of attenuation ponds and controlling water discharge rate), the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect upon the freshwater fish community.
- **Macrophytes** Degradation of water quality in ditches and other water bodies through contaminated run-off could result in adverse effects upon macrophytes, which are important at the Local level. This could include mortality, or reduced ability to grow. However, with application of mitigation measures within the **Outline CoCP (Document Reference 7.4)** (including the use of attenuation ponds and controlling water discharge rate), the magnitude of change will be negligible. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on macrophytes.

Lighting

7.8.36. Lighting produced during construction would be focussed on works areas within the Site but light spill from these areas could affect adjacent designated sites (Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal MSINC), habitats within the Site but outside works areas, and species associated with both.

7.8.37. Light spill would not affect distant designated sites and habitats, being blocked by intervening development and ameliorated by distance. In addition, habitats are not considered to be sensitive to lighting, which adversely affects animals through disturbance rather than plants and the physical substrates they grow in. Thus, the following features will not be affected by lighting:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh;
  - Intertidal mudflats;
  - Reedbeds;
  - Open mosaic habitat; and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat (within the River Thames);
  - Modified grassland;
  - Other neutral grassland;
  - Mixed scrub; and
  - Ditches/standing water.
- Protected/notable species:
  - Notable plants; and
  - Invasive species.

7.8.38. Species that use habitats within designated sites and other habitats within the Site may be disturbed from construction phase flood lighting, preventing them using certain areas or affecting their ability to feed, breed or undertake important ecological functions in their life cycle. However, areas within and surrounding the Proposed Scheme are already subject to external lighting due to its industrialised nature.

7.8.39. Effects of construction lighting will be controlled through their design, with lighting directed onto works areas with hoods used to prevent light spill. These measures form part of embedded mitigation defined within the **Outline CoCP (Document Reference 7.4)** and will reduce disturbance resulting from lighting on habitats, and consequent effects on species they support.

7.8.40. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. However, with the lighting control measures included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on all four designated sites.

7.8.41. Assessment for remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: Lighting of construction areas would lead to disturbance of bats foraging and commuting in areas of adjacent habitat during the active season (April to October), leading to them avoiding potentially important resources supporting the local population. Bats are important at the Local level. However, with the lighting control measures included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on bats.
- **Breeding birds**: Construction lighting could prevent birds from using habitat within the Site for nesting and foraging, limiting the resources available to the breeding bird community. Breeding birds are important at the County level. However, with the lighting control measures included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on breeding birds.
- **Water voles**: Water voles exhibit low sensitivity to lighting disturbance with populations found in suitable habitat even where high levels of lighting exist, as exemplified by the populations found in ditches adjacent to Norman Road, which is permanently lit. Water voles are important at the County level. However, with the lighting control measures included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, as well as the low sensitivity of water voles to such disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on water voles.
- **Reptiles**: The small population of reptiles found in the area adjacent to the Proposed Scheme may be subject to disturbance from lighting, moving to unlit areas and preventing use of habitats subject to such disturbance. Reptiles are important at the Local level. However, with the lighting control measures included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on reptiles.
- **Terrestrial invertebrates**: Lighting of construction areas could lead to disturbance of nocturnal invertebrate species but may also attract other species which are drawn to artificial lighting. Thus, the construction phase lighting may affect the

invertebrate community composition using habitats surrounding the works area. Terrestrial invertebrates are important at the County level. However, with the lighting control measures included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on terrestrial invertebrates.

- **Wintering Birds**: Lighting disturbance of Thames-side habitats for construction of the Proposed Jetty, and terrestrial parts of the Site will affect foraging resources used by wintering birds. Wintering birds are important at the County level. However, with the lighting control measures included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on wintering birds.
- **Aquatic macroinvertebrates**: Lighting of the construction area has the potential impact aquatic macroinvertebrates through alterations to photoperiod and potentially increasing predation levels. Aquatic macroinvertebrates are important at the Regional/County level. However, with the lighting control measures (such as directional lighting) included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on aquatic macroinvertebrates.
- **Freshwater fish**: Lighting of the construction area has the potential to impact freshwater fish (which are important at the National level due to the potential presence of European eel) through potential modifications to behaviour (attraction for photophilic species and repulsion for photophobic species), which could result in delays to migration (European eel), or increased predation (Stickleback etc). However, due to the ephemeral nature of the ditches adjacent to the Proposed Scheme (excluding the Mitigation and Enhancement Area), fish are unlikely to be present within the ditches adjacent to the works area in great numbers. This would reduce the potential exposure of fish species to construction related light impacts. In addition, the lighting control measures included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, will result in a negligible magnitude of change. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on freshwater fish.
- Macrophytes: Lighting of the construction area has the potential to impact macrophytes (which are important at the Local level) through changes to photoperiod. However, with the lighting control measures included in the **Outline CoCP (Document Reference 7.4)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on macrophytes.

Changes in Air Quality

7.8.42. During construction, air quality may be affected by increased road traffic on the local road network and increased vessel movements on the River Thames, which in turn would affect ambient pollutant levels. These movements will be concentrated along Norman Road and roads within southeast London that link to the wider strategic road network, including the A2016, A253, A206 and A2000 (that define the Study Area for **Chapter 18: Landside Transportation (Volume 1)**), away from the majority of the designated sites within the Proposed Scheme's ZOI. **Chapter 5: Air Quality (Volume 1)** demonstrates that emissions from vehicles and plant associated with the construction phase, in-combination with background emissions associated with the Riverside 1, Riverside 2 and existing road traffic emissions, will be in the areas immediately adjacent to the Site. In addition, non-aquatic animal species are not considered sensitive to changes in air quality, but aquatic animals could be affected by flux of pollutants from air to water. Thus, the following features will not be affected by changes in air quality during the construction stage:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- Protected/notable species:
  - Bats;
  - Breeding birds;
  - Reptiles;
  - Terrestrial invertebrates; and
  - Water vole.

7.8.43. Emissions from Proposed Scheme construction vehicles, including vessels on the River Thames, and equipment would lead to deposition of nitrogen compounds resulting from exhausts during the construction phase including nitrogen dioxide and nitrate, as well as acids including ammonia and organic compounds. These would lead to degradation of habitats through nutrient enrichment and pollution. However, background levels of air pollution in the industrialised area of Belvedere are relatively

high already affecting terrestrial and aquatic habitats, and thus the magnitude of change would be low.

7.8.44. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **Moderate Adverse (Significant)** effect on all four designated sites.

7.8.45. HPI (deciduous woodland, coastal and floodplain grazing marsh, intertidal mudflats, reedbed, open mosaic habitat and coastal saltmarsh (adjacent to the Site Boundary)) are important at the County level. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **Moderate Adverse (Significant)** effect on HPI.

7.8.46. River habitat within the Thames is important at the County level. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **Moderate Adverse (Significant**) effect on river habitat.

7.8.47. Remaining habitats (modified grassland, other neutral grassland, mixed scrub and ditches/standing water) are important at the Local level. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **Minor Adverse (Not Significant)** effect on other habitats.

7.8.48. Notable plants and invasive species are important at the County level. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **Moderate Adverse (Significant)** effect on river habitat.

7.8.49. Aquatic species (freshwater fish and aquatic macroinvertebrates) in the area local to the Proposed Scheme may also receive effects of air quality changes. This could include changes to water quality parameters through deposition of nitrogen compounds, ammonia and other polluting gases. This has the potential to result in increased eutrophication in watercourses.

7.8.50. Freshwater fish species present within the Site are important at a National level due to the potential presence of European eel. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term, **Moderate Adverse (Significant)** effect on European eel.

7.8.51. The aquatic macroinvertebrate species present within the Site are important on a Regional/County level due to the presence of several notable and Red Book macroinvertebrate species. The magnitude of the change is low. Therefore, there is likely to be an indirect, temporary, medium term, **Minor Adverse (Not Significant)** effect on the macroinvertebrate community.

7.8.52. The macrophyte community within the Site is important at a Local level based upon the community present. The magnitude of change is low. Therefore, there is likely to be an indirect, temporary, medium term **Negligible (Not Significant)** effect on the macrophyte community.

Shading

7.8.53. The effects of shading from buildings will be greatest at the operation phase; however, there is potential for localised shading during construction of structures and equipment. This would be limited to be adjacent to building footprints within the Site and its immediate surroundings and will not affect distant ecological features or those some distance from construction activities. In addition, shading would not affect Thames-side ecological features as no vegetation is present within the Site in aquatic habitat beyond the river wall. Lastly, open mosaic habitat will be removed early in the construction phase and will therefore not be present during construction work that creates shade. Thus, the following features will not be affected by shading:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - River Thames and Tidal Tributaries MSINC; and
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal saltmarsh (adjacent to the Site Boundary);
  - Open mosaic habitat; and
  - Intertidal mudflats.
- Other Terrestrial Habitats:
  - River habitat (within the River Thames).

7.8.54. Although primarily an operation phase consideration (i.e. resulting from completed buildings and structures), shading could also affect ecological features during the construction phase, for example from temporary buildings in the construction compounds. Further, as structures such as Above Ground Storage Tanks, Above Ground Pipelines and buildings are completed, they will shade habitats in the area within and in the immediate surrounds of the Proposed Scheme (excluding the Mitigation and Enhancement Area), but for most of the construction period only limited shadow will be cast by them, with shading effects fully realised at operation. To a limited extent, equipment used during construction will also contribute to shading but

the mobility of vehicles and cranes would mean it would be temporary and they would cast only limited shadow.

7.8.55. Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC either overlap or are 25-50m of plant and buildings to be constructed for the Proposed Scheme, and all are important at the County level. However, the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on all four designated sites.

7.8.56. Coastal and floodplain grazing marsh HPI and reedbed HPI and are found close to the footprint of buildings and structures (including ducting) to be constructed for the Proposed Scheme and are important at the County level. However, shade thrown by construction equipment and structures as they are built will be limited, and therefore the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on Coastal and floodplain grazing marsh HPI and reedbed HPI.

7.8.57. Habitats that could be shaded as a result of the Proposed Scheme are important at the Local level. However, shade thrown by construction equipment and structures as they are built will be limited, and therefore the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on other habitats.

7.8.58. Assessment for remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: Shading of vegetation during the construction phase would affect bat flightlines and foraging habitat. Bats are important at the Local level. However, shade thrown by construction equipment and structures as they are built will be limited, and therefore the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on bats.
- **Breeding birds**: Shading of vegetation during the construction phase would degrade habitat used by birds for nesting. Breeding birds are important at the County level. However, shade thrown by construction equipment and structures as they are built will be limited, and therefore the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on breeding birds.
- **Reptiles**: Shading of vegetation during the construction phase would degrade reptile foraging habitat. Reptiles are important at the Local level. However, shade thrown by construction equipment and structures as they are built will be limited, and therefore the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on reptiles.
- **Notable plants and invasive species**: Shading of vegetation during the construction phase would affect the ability of notable plants to grow, and they are important at the County level. However, shade thrown by construction equipment

and structures as they are built will be limited, and therefore the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on notable plants and invasive species.

- **Terrestrial invertebrates**: Shading of vegetation during the construction phase would degrade habitat used by terrestrial invertebrates, which are important at the County level. However, shade thrown by construction equipment and structures as they are built will be limited, and therefore the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on terrestrial invertebrates.
- **Water voles**: Shading of vegetation during the construction phase would degrade habitat used by water voles, which are important at the County level. However, shade thrown by construction equipment and structures as they are built will be limited, and therefore the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on water voles.
- **Wintering birds**: Degradation of wetlands in terrestrial parts of the Site through shading would affect foraging resources used by wintering birds. Wintering birds are important at the County level. However, shade thrown by construction equipment and structures as they are built will be limited, and therefore the magnitude of change is negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on wintering birds.
- **Aquatic macroinvertebrates:** Shading of vegetation during the construction phase of the Proposed Scheme (excluding the Mitigation and Enhancement Area) may lead to vegetation dieback, which has the potential to degrade habitat used by aquatic macroinvertebrates which are important at the Regional/County level. However, the ditches that are likely to be impacted by shading are ephemeral in nature, and do not provide suitable habitat for the majority of macroinvertebrate species recorded in the surveys, therefore the magnitude of change is deemed to be negligible. Therefore, there is likely to be an indirect, temporary, medium term, **Negligible (Not Significant)** effect on aquatic macroinvertebrates.
- **Freshwater fish:** Shading of vegetation within the ditches adjacent to the works area during the construction phase may result in a vegetation dieback causing degradation of habitat used by freshwater fish (which are important at the National level due to the potential presence of European eel). This could impact fish species through reduced cover and result in increased predation, however it should be noted that the ditches in the vicinity of the Proposed Scheme (excluding the Mitigation and Enhancement Area) are ephemeral, thus reducing the potential for fish to be using these habitats. Based upon this the magnitude of change is anticipated to be negligible. Therefore, there is likely to be an indirect, temporary, medium term, **Negligible (Not Significant)** effect on freshwater fish.
- **Macrophytes:** Shading of macrophytes (which are of local importance) during the construction phase has the potential to result in changes to growth and potential dieback within the ditch network adjacent to the Site Boundary. However, the

magnitude of change is likely to negligible. Therefore, there is likely to be a direct, temporary, medium term, **Negligible (Not Significant)** effect on macrophytes.

OPERATION PHASE

7.8.59. The likely significant effects for terrestrial biodiversity associated with the operation phase are set out below.

Noise and Vibration

7.8.60. The effects of noise and vibration during operation would arise as a result of automated equipment. Modelling work undertaken to inform the assessment in **Chapter 6: Noise and Vibration (Volume 1)** has analysed likely changes in noise and vibration during operation at five locations in the area surrounding the Proposed Scheme, at distances between approximately 70m and 600m from the Site Boundary. Although the approach used is focussed on effects on human receptors, it predicts operational noise and vibration would be of negligible magnitude during the daytime but of moderate magnitude at night at the closest locations. However, this is significantly attenuated over distance and through screening by industrial, commercial and residential limiting the transmission of effects. It is therefore reasonable to conclude noise and vibration will only affect ecological features found within and adjacent to the Site Boundary (its 'local area').

7.8.61. In addition, habitats are not considered to be sensitive to noise and vibration, which adversely affects animals through disturbance rather than plants and the physical substrates they grow in. Thus, the following features will not be affected by noise and vibration:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh;
  - Intertidal mudflats;
  - Reedbeds;

  - Open mosaic habitat; and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat (within the River Thames);
  - Modified grassland;
  - Other neutral grassland;
  - Mixed scrub; and
  - Ditches/standing water.
- Protected/notable species:
  - Notable plants;
  - Aquatic macroinvertebrates;
  - Macrophytes; and
  - Invasive species.

7.8.62. Operational noise and vibration coming from the Proposed Scheme, including vessel movements to and from the Proposed Jetty, will affect animal species using designated sites and other habitats within and surrounding the Site. Operation of the Proposed Scheme will produce noise and vibration over and above that which already exists at the Site, even recognising its industrial land use; however, effects will be ameliorated due to these existing sources of noise and vibration. Wider consideration of the likely significant effects of the Proposed Scheme on noise and vibration are presented in **Chapter 6: Noise and Vibration (Volume 1)**.

7.8.63. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is negligible with measures to control operational noise included within the Operational EMP, which will be prepared prior to the Proposed Scheme commencing operation. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on all four designated sites.

7.8.64. Assessment for remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: Operational disturbance may occur where machinery associated with the Proposed Scheme is in operation during the evening and at night during the bat active season (nominally April to October), where foraging and commuting bats could be affected, although survey data indicates relatively low levels of activity close to works areas and higher levels of activity in areas of retained habitat within the Norman Road Field to the south and west, away from the source of the disturbance. In addition, due to the industrial use of the area land close to existing facilities such as Riverside 1 and along Norman Road, bats are already subject to relatively high levels of background noise and vibration in the environment, are present despite this, and would be expected to acclimate to the Proposed Scheme over time. The magnitude of change is negligible with measures to control

operational noise included within the Operational EMP. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on bats.

- **Breeding birds**: Operation of the Proposed Scheme will take place against an environment where noise and vibrational disturbance is already present (i.e. from Riverside 1, Norman Road traffic), but would present additional disturbing stimuli over and above that which the breeding bird community is acclimated. This could lead birds to avoid nesting sites close to operational Proposed Scheme, such as habitats along the western Site Boundary. The effect would dissipate with distance from works, and acclimation to operational noise and vibration would be expected over time, as has occurred to that from the existing environment. Breeding birds are important at the County level. The magnitude of change is negligible with measures to control operational noise included within the Operational EMP. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on breeding birds.
- **Reptiles**: Small numbers of one species of reptile were identified by surveys, indicating operational noise and vibration would have a limited effect on the wider population of reptiles known to be present within Crossness LNR. Habitat close to the operational Site and subject to noise and vibration may be vacated and avoided temporarily by reptiles or used to a lesser degree as foraging and breeding areas, but acclimation will occur in the longer term. Reptiles are important at the Local level. The magnitude of change is negligible with measures to control operational noise included within the Operational EMP. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on reptiles.
- **Terrestrial invertebrates**: Invertebrate communities show limited sensitivity to noise and vibration as evidenced by the success of using areas subject to high levels of such disturbance, namely roadside verges, in conservation efforts[68,69,70]. In particular, this evidence shows that pollinators can thrive in areas of high noise and vibrational disturbance. Operational noise and vibration is therefore not expected to affect terrestrial invertebrates unless within the immediate vicinity of the Proposed Scheme (i.e. several meters from operational machinery), and they would be expected to acclimate to this over time. Terrestrial invertebrates are important at the County level. The magnitude of change is negligible with measures to control operational noise included within the Operational EMP. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on terrestrial invertebrates.
- **Water voles**: Water voles are known not to be sensitive to noise and vibration, with populations found in suitable habitat even where high levels of this sources of disturbance exist[71]. The current population lives in an area with a relatively high level of background noise and vibration from Riverside 1 and traffic along Norman Road; ditches along Norman Road itself support water vole as shown by survey data, acclimated to existing background noise, with the expectation they will acclimate to noise and vibration generated by the Proposed Scheme as well. Water voles are important at the County level. The magnitude of change is negligible with measures to control operational noise included within the

Operational EMP. Therefore, there is likely to be a direct, temporary, medium term **Negligible (Not Significant)** effect on water voles.

- **Wintering birds**: Disturbance of Thames-side habitats as a result of the use of the Proposed Jetty, and wetland in terrestrial parts of the Site will affect foraging resources used by wintering birds. Wintering birds are important at the County level. However, the magnitude of change will be negligible with measures to control operational noise included within the Operational EMP. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on wintering birds.
- **Freshwater Fish**: The fish species identified within the desk study are important at the National level for European eel and local level for other species recorded. Noise and vibration have the potential to result in modifications to fish behaviour (avoidance), and have the potential to result in mortality, if exposed to high enough levels (typically above 207 dB re 1 μPa²s in species with a swim bladder[72]). The fish community recorded within the Study Area, are already exposed to a relatively high level of background noise and vibration from Riverside 1 and operations alongside Norman Road and therefore will be habituated to noise to a certain level. In addition, suitable habitat for fish is not located directly adjacent to the noise generating activities, therefore exposure to noise generated during operational activities will be minimal (and unlikely to reach levels that will result in mortality: above 207 dB re 1 μPa²s). The magnitude of change is negligible given the baseline noise environment and measures to avoid excessive noise to be included within the Operational EMP. Therefore, there is likely to be a direct, temporary, long term **Negligible (Not Significant)** effect on freshwater fish.

Maintenance Activities

7.8.65. In addition to operational noise and vibration, disturbance of ecological features may arise from the presence of workers inspecting and repairing equipment installed for the Proposed Scheme. This disturbance would be infrequent, occurring only when scheduled maintenance activities were required. Disturbance would result from noise, vibration and visual disturbance produced by maintenance activities.

7.8.66. Effects of maintenance activities will be limited to the Site and its immediate surroundings and would not be transmitted at distance further than the Proposed Scheme's local area. In addition, habitats are not considered to be sensitive to the visual and noise disturbance that would adversely affects sensitive animals (mammals, birds), rather than plants and the physical substrates they grow in. Thus, the following features will not be affected by maintenance activities:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;

  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh;
  - Reedbed;
  - Open mosaic habitat; and
  - Intertidal mudflats and Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat (within the River Thames);
  - Modified grassland;
  - Other neutral grassland;
  - Mixed scrub; and
  - Ditches/standing water.
- Protected/notable species:
  - Notable plants and invasive species;
  - Reptiles;
  - Terrestrial invertebrates;
  - Freshwater fish;
  - Aquatic macroinvertebrates; and
  - Macrophytes.

7.8.67. Buffer planting is proposed along the interface between the proposed Carbon Capture Facility and habitat located within the Mitigation and Enhancement Area (including the Crossness LNR to the west) to act as a physical and visual barrier. In addition, measures to control operational noise, including those from maintenance, will be included within the Proposed Scheme's Operational EMP.

7.8.68. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. The magnitude of change is negligible, with buffer planting and measures to control operational noise included within the Operational EMP. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on all four designated sites.

7.8.69. Assessment for remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: Maintenance activities are unlikely to interact with foraging or commuting bats, as during their active season (April-October) works will be undertaken during daylight hours, avoiding interactions between maintenance and active bats. During autumn and winter when bats hibernate, maintenance will also not come into contact with bats. Bats are important at the Local level. The magnitude of change is negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on bats.
- **Breeding birds**: Disturbance as a result of maintenance activities would affect foraging resources used by breeding birds. Breeding birds are important at the County level. However, the magnitude of change is negligible, with buffer planting proposed and measures to control operational noise included within the Operational EMP. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on breeding birds.
- **Water voles**: Water voles are known not to be sensitive to noise and vibration associated with maintenance activities, with populations found in suitable habitat even where high levels of this sources of disturbance exis[t71], and are important at the County level. The magnitude of change is negligible, with buffer planting and measures to control operational noise included within the Operational EMP. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on water voles.
- **Wintering birds**: Disturbance as a result of maintenance activities would affect foraging resources used by wintering birds. Wintering birds are important at the County level. However, the magnitude of change is negligible, with buffer planting and measures to control operational noise included within the Operational EMP. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on wintering birds.

Surface Water Run-off

7.8.70. The effects of surface water run-off from the operational Proposed Scheme will be limited to the Site and areas hydrologically connected (through run-off, the drainage network or ground water) to it, and would not be transmitted upstream or to areas without a hydrological connection to the Site. Effects would not extend to non-aquatic habitats within the Site. The following ecological features fall into these categories and will not be affected by surface water run-off:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and

  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland)
  - Reedbeds.
- Other Terrestrial Habitats:
  - Open mosaic habitat;
  - Modified grassland;
  - Other neutral grassland; and
  - Mixed scrub.

7.8.71. Run-off presents a possible vector for sediment and chemical pollution from stored materials, waste and spillages that may affect water quality, and salts that may change the salinity of water in which plants and animals live. The build-up of sediments and pollutants may occur within the drainage network and/or ground water, adversely altering key conditions for habitats and species.

7.8.72. The **Outline Drainage Strategy (Document Reference 7.2)** presents the mitigation measures and management processes within the Proposed Scheme to control the quality of the surface water runoff that is discharged from the Carbon Capture Facility. The management of water discharge through controlled flows has been designed to result in an improvement in habitat quality, through increased water flows. With regard to the potential for salinity increases, no new pathways to the tidal River Thames are to be created as part of the Proposed Scheme. However, the Proposed Scheme will introduce minor additional areas of hardstanding (which may require gritting during winter months) to the catchment, which already receives highway runoff via Norman Road. Any gritting would only be undertaken only for short periods of time when subzero conditions occur, and subject to dilution and flushing from winter precipitation.

7.8.73. Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC are hydrologically linked to the Proposed Scheme, and all are important at the County level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on all three designated sites.

7.8.74. HPI (Coastal and floodplain grazing marsh, intertidal mudflats, reedbed and coastal saltmarsh (adjacent to the Site Boundary)) are hydrologically linked to the Proposed Scheme and are important at the County level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on HPI.

7.8.75. River Thames and Tidal Tributaries MSINC and its associated river habitat, the ultimate destination for run-off from the Proposed Scheme during operation, is important at the County level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** and dilution effects in the River Thames the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on River Thames and Tidal Tributaries MSINC and river habitat.

7.8.76. Remaining habitats that are hydrologically linked to the Proposed Scheme (ditches/standing water) are important at the Local level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on other habitats.

7.8.77. Assessment for remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: Degradation of ditches and other water bodies may affect the availability of flying insects emerging from them, thus lowering the suitability of habitat for foraging bats. Bats are important at the Local level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on bats.
- **Breeding birds**: Degradation of ditches and other water bodies may affect the availability of suitable nesting and foraging habitat for breeding birds associated with reedbeds and other aquatic habitats. Breeding birds are important at the County level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on breeding birds.
- **Reptiles**: Although UK reptiles are primarily terrestrial or fossorial, grass snake (known to be present in Crossness LNR) forages within ponds and ditches and is strongly associated with freshwater[73]. Thus, this species could be affected by degradation of water quality in the wider Crossness LNR. Reptiles are important at the Local level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on reptiles.
- **Terrestrial invertebrates**: Degradation of ditches and other water bodies may affect the availability of habitat for terrestrial invertebrates, which are important at County level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** on terrestrial invertebrates.

- **Water voles**: Degradation of ditches and other water bodies may affect the availability of habitat for water voles, both for breeding and foraging. Water voles are important at the County level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on water voles.
- **Wintering birds**: Degradation of Thames-side habitats, and wetlands in terrestrial parts of the Site, could occur through contaminated run-off and would affect foraging resources used by wintering birds. Wintering birds are important at the County level. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on wintering birds.
- **Aquatic macroinvertebrates:** Degradation of water quality in ditches and other water bodies through contaminated run-off could result in adverse effects upon macroinvertebrates (which are important at the Regional/County level), such as mortality events, and reductions in population size. However, with the application of mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** (including the use of attenuation ponds and controlling water discharge rate), the magnitude of change will be negligible. In addition, the management of water discharge through controlled flows, could actually result in an improvement in habitat quality, through increased water flows. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on aquatic macroinvertebrates.
- **Freshwater Fish**: Degradation of water quality in ditches and other water bodies through contaminated run-off could result in adverse effects upon freshwater fish, (which are important at the National level due to the potential presence of European eel). These impacts could range from mortality events, and reductions in fish health and thus reproductive ability. However, with application of mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** (including the use of attenuation ponds and controlling water discharge rate), the magnitude of change will be negligible. In addition, the management of water discharge through controlled flows, is designed to result in an improvement in habitat quality, through increased water flows. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect upon freshwater fish.
- **Macrophytes** Degradation of water quality in ditches and other water bodies through contaminated run-off could result in adverse effects upon macrophytes, (which are important at the Local level). This could include mortality, or reduced ability to grow. However, with application of the mitigation measures within the **Outline Drainage Strategy (Document Reference 7.2)** (including the use of attenuation ponds and controlling water discharge rate), the magnitude of change will be negligible. In addition, the management of water discharge through controlled flows, is designed to result in an improvement in habitat quality, through

increased water flows. Therefore, there is likely to be a direct, temporary, long term **Negligible (Not Significant)** effect on macrophytes.

Lighting

7.8.78. Lighting used during operation would be focussed on works areas within the Site but light spill from these areas could affect adjacent designated sites (Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal MSINC), habitats within the Site but outside works areas, and species associated with both.

7.8.79. Light spill would not affect distant designated sites and habitats, it being blocked by intervening development and ameliorated by distance. In addition, habitats are not considered to be sensitive to lighting, which adversely affects animals through disturbance rather than plants and the physical substrates they grow in. Thus, the following features will not be affected by lighting:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Coastal and floodplain grazing marsh;
  - Intertidal mudflats;
  - Open mosaic habitat;
  - Reedbed; and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat (within the River Thames);
  - Modified grassland;
  - Other neutral grassland;
  - Mixed scrub; and
  - Ditches/standing water.
- Protected/notable species:
  - Notable plants; and

- Invasive species.

7.8.80. During operation, species that use habitats within designated sites and habitats both within and adjacent to the Proposed Scheme, may be disturbed from flood lighting or other forms of illumination, preventing them using certain areas or affecting their ability to feed, breed or undertake important ecological functions in their life cycle. However, areas within and surrounding the Proposed Scheme are already subject to external lighting due to its industrialised nature.

7.8.81. Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC are all important at the County level. However, with lighting control measures included in the **Outline Lighting Strategy (Document Reference 7.3)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on all four designated sites.

7.8.82. Assessment for remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: Lighting of the operational Proposed Scheme would lead to disturbance of bats foraging and commuting in areas of adjacent habitat during the active season (April to October), leading to them avoiding potentially important resources supporting the local population. Bats are important at the Local level. However, with lighting control measures included in the **Outline Lighting Strategy (Document Reference 7.3)**, and existing baseline lighting disturbance, the magnitude of change will be low. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on bats.
- **Breeding birds**: Operation phase lighting could prevent birds from using habitat within the Site for nesting and foraging, limiting the resources available to the breeding bird community. Breeding birds are important at the County level However, with lighting control measures included in the **Outline Lighting Strategy (Document Reference 7.3)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on breeding birds.
- **Water voles**: Water voles exhibit low sensitivity to lighting disturbance; populations are found in suitable habitat even where high levels of lighting exist, as exemplified by the populations found in ditches adjacent to Norman Road, which is permanently lit. Lighting from operation of the Proposed Scheme may lead to disturbance of ditches along the boundary of the Carbon Capture Facility, but as described above the water vole population is not considered particularly sensitive to this and will adapt to this situation over time. In addition, lighting control measures included in the **Outline Lighting Strategy (Document Reference 7.3)**. Water voles are important at the County level. The magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on water voles.

- **Reptiles**: The small population of reptiles found in the area adjacent to the Proposed Scheme may be subject to disturbance from lighting, moving to unlit areas and preventing use of habitats subject to such disturbance. Reptiles are important at the Local level. However, with lighting control measures included in the **Outline Lighting Strategy (Document Reference 7.3)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Negligible (Not Significant)** effect on reptiles.
- **Terrestrial invertebrates**: Lighting of the operational site could lead to disturbance of nocturnal invertebrate species but may also attract other species which are drawn to artificial lighting. Thus, operation phase lighting may affect the invertebrate community composition of habitats surrounding the operational site area. However, this area will be small compared to the wider Crossness LNR site. Terrestrial invertebrates are important at the County level. With lighting control measures included in the **Outline Lighting Strategy (Document Reference 7.3)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, temporary, long term **Minor Adverse (Not Significant)** effect on terrestrial invertebrates.
- **Wintering birds**: Lighting disturbance of Thames-side habitats for operation of the Proposed Jetty, and terrestrial parts of the Site will affect foraging resources used by wintering birds. Wintering birds are important at the County level. However, with lighting control measures included in the **Outline Lighting Strategy (Document Reference 7.3)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on wintering birds.
- **Aquatic Macroinvertebrates:** Operational lighting has the potential to impact aquatic macroinvertebrates (which are important at the Regional/County level) through alterations to photoperiod and potentially increasing predation levels. However, with lighting control measures (such as directional lighting) included in the **Outline Lighting Strategy (Document Reference 7.3)**, and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on aquatic macroinvertebrates.
- **Freshwater Fish:** Operational lighting has the potential to impact freshwater fish (which are important at the National level due to the potential presence of European eel) through potential modifications to behaviour (attraction for photophilic species and repulsion for photophobic species), which could result in delays to migration (European eel), or increased predation (Stickleback etc). However due to the ephemeral nature of the ditches adjacent to the Proposed Scheme (excluding the Mitigation and Enhancement Area), fish are unlikely to be present within the ditches adjacent to the Proposed Scheme except during periods of elevated rainfall. This would reduce the potential exposure of fish species to construction related light impacts. In addition, lighting control measures included in the **Outline Lighting Strategy (Document Reference 7.3)** (including directional

lighting, dark areas and bunds) and existing baseline lighting disturbance, will result in a negligible magnitude of change. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on freshwater fish.

- **Macrophytes:** Operational lighting has the potential to impact macrophytes (which are important at the Local level) through changes to photoperiod. However, with lighting control measures included in the **Outline Lighting Strategy (Document Reference 7.3)** (including directional light, dark areas and bunds), and existing baseline lighting disturbance, the magnitude of change will be negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on macrophytes.

Changes in Air Quality

7.8.83. Analysis of operation phase emissions for designated sites has been undertaken with the approach and modelling undertaken as described in **Chapter 5: Air Quality (Volume 1**). Note, as all open mosaic habitat within the Site will be under the footprint of the Proposed Scheme, this habitat would not be present at the operation phase to receive effects.

7.8.84. Characteristics of the emissions plumes released from the Riverside 1 and Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken) will change when the Proposed Scheme is operational. Changes can spread some distance from the Proposed Scheme and ecological features in a wide ZOI have been assessed for effects changes in airborne ammonia, nitrogen oxides, sulphur dioxides, and for the deposition of nitrogen and acid. Following the approach adopted in **Chapter 5 Air Quality (Volume 1)**, which uses criteria from Environment Agency guidance[74], where the percentage change in concentration of these pollutants is <1% (rounded to 1dp), the change is described as 'negligible' regardless of the concentration.

7.8.85. The following designated sites fall below the concentration threshold for all five pollutants modelled:

- Epping Forest SAC;
- Oxleas Woodlands SSSI;
- West Thurrock Lagoon and Marshes SSSI;
- Ruxley Gravel Pits SSSI; and
- Lesnes Abbey Woods LNR (comprising ancient woodland).

7.8.86. Whilst aquatic animals could be affected by flux of pollutants from air to water, non-aquatic animal species are not considered sensitive to changes in air quality. Consequently, the following features will not be affected by changes in air quality during the operation stage:

- Protected/notable species:

- Bats;
- Breeding birds;
- Reptiles;
- Terrestrial invertebrates;
- Water vole; and
- Wintering birds.

7.8.87. The operational Proposed Scheme would not lead to material changes in local road traffic patterns. However, two sources of air quality change would comprise:

- increase in vessel movement frequency; and
- changes in characteristics of the emissions plumes released from the Riverside Campus following the installation of the Carbon Capture Facility.

7.8.88. Vessel movements would lead to changes in air quality in the local area only, whereas changes in emissions plume characteristics would be transmitted both locally and at distance. Changes in air quality could lead to degradation of habitats through nutrient enrichment and pollution. However, background levels of air pollution in the industrialised area of Belvedere are relatively high already affecting terrestrial and aquatic habitats. Modelling work has taken into account background levels of air pollution.

7.8.89. Modelling detailed in **Chapter 5: Air Quality (Volume 1)** indicates changes to the emissions arising from the Riverside Campus following the installation of the Carbon Capture Facility may be transmitted to, and/or affect deposition levels for designated sites and habitats. These comprise:

- Inner Thames Marshes SSSI is important at the National level and is coincident with Rainham Marshes LNR that is important at the County level. Dispersion modelling shows that impacts of ammonia (NH_3), oxides of nitrogen (NO_X), sulphur dioxide (SO_2) and nitrogen deposition are predicted to be greater than 1% of the relevant Critical Level/Load for each pollutant. Notwithstanding this, the Predicted Environmental Concentration (PEC) for NH_3, NO_X and SO_2 are below the relevant Critical Levels at Inner Thames Marshes SSSI/Rainham Marshes LNR and impacts can be screened as negligible, but the PEC exceeds the Critical Load for nitrogen deposition. This is more of a function of background deposition already exceeding the Critical Load across the site, rather than the Proposed Scheme creating the exceedance. Inner Thames Marshes SSSI is large (approximately 486ha, and approximately 4km along its axis adjacent to the north bank of the River Thames) and the zone where the impact of nitrogen deposition is greater than 1% of the Critical Load covers habitats only at its north-western end where neutral grassland habitats occur[75], and the A13 represents a strong existing source of atmospheric nitrogen. Rainham Marshes LNR occupies a much smaller area within the SSSI boundary but is coincident with the area where nitrogen deposition is above threshold. Habitats in this area are in an ‘unfavourable’ condition currently but are recovering due to long term management undertaken

by the landowner[75]. The nitrogen deposition contributed by the Proposed Scheme would not threaten the recovery of these habitats, especially given more local background nitrogen sources such as the A13 and faecal matter from wildfowl such as ducks and geese that graze the area in winter (including teal for which the site is designated)[76]. Improvements in technology have been lowering nitrogen deposition levels since approximately 1996 with this trend expected to continue[77]. Thus, the recovery of neutral grassland habitat at Inner Thames Marshes SSSI/Rainham Marshes LNR will continue despite the nitrogen deposition predicted to occur as a result of the Proposed Scheme. Other habitats at Inner Thames Marshes SSSI are located within areas where impacts of nitrogen deposition are predicted to be below 1% of the Critical Load. This includes salt marsh habitat that is sensitive to nitrogen deposition, approximately 1.9km from the area of the site where the impact exceeds 1% of the Critical Load. Considering that the zone of where the impact of the Proposed Scheme is greater than 1% of the Critical Load does not cover the nitrogen sensitive salt marsh, the magnitude of change is therefore negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** on Inner Thames Marshes SSSI and Rainham Marshes LNR.

- Ingrebourne Marshes SSSI is important at the National level. Impacts of NH_3, NO_X, SO_2 and nitrogen deposition are less than 1% of the relevant Critical Level/Load across the whole of the site. The magnitude of change is therefore negligible. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on Ingrebourne Marshes SSSI.
- Crossness LNR is important at the County level. Above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition are predicted by modelling at these sites. However, increases above the threshold are relatively small and thus the magnitude of change is low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to Moderate Adverse (Significant)** effect on Crossness LNR and Rainham Marshes LNR.

7.8.90. Modelling of effects on further ecological features has not been undertaken, but the following conclusions can be drawn:

- Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC, important at the County level, are coincident or adjacent to Crossness LNR. Therefore, it is reasonable to assume that above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition will occur at these sites, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to Moderate Adverse (Significant)** effect on Erith Marshes MSINC, Belvedere Dykes SINC and River Thames and Tidal Tributaries MSINC.
- 18 further SINC outside the Site are all important at the County level. Modelling work for each site has not been completed, but a conservative estimate of the magnitude of change would be that it is low (given that these sites are further away than Crossness LNR). Therefore, an indirect, permanent, long term

potentially up to Moderate Adverse (Significant) effect on these designated sites is possible.

- HPI (deciduous woodland, coastal and floodplain grazing marsh, reedbed, intertidal mudflats and coastal saltmarsh (adjacent to the Site Boundary)) are important at the County level, and coincident or adjacent to Crossness LNR. Therefore, it is reasonable to assume that above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition will occur at these sites, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to Moderate Adverse (Significant)** effect on HPI.
- River habitat within the Thames is important at the County level and is adjacent to Crossness LNR. Therefore, it is reasonable to assume that above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition will occur within the Thames, but that such increases would be small and the magnitude of change low. Therefore, an indirect, permanent, long term **potentially up to Moderate Adverse (Significant)** effect on river habitat is possible.
- Remaining habitats (modified grassland, other neutral grassland, mixed scrub and ditches/standing water) are important at the Local level and are within/adjacent to Crossness LNR. Therefore, it is reasonable to assume that above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition will occur in these habitats, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on other habitats.
- Notable plants and invasive species are important at the County level and are found within the Site and within/adjacent Crossness LNR. Therefore, it is reasonable to assume that above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition will affect notable plants and invasive species (inhibiting notable plants by promoting ruderal species, and possibly favouring invasive plants), but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **potentially up to Moderate Adverse (Significant)** effect on notable plants and invasive species.
- Aquatic species (freshwater fish and aquatic macroinvertebrates) in the area local to the Proposed Scheme may also receive effects of air quality changes arising from changes to the emissions arising from the Riverside Campus following the installation of the Carbon Capture Facility:
  - Freshwater fish species present within the Site are important at a National level due to the potential presence of European eel. Modelling indicates Crossness LNR, which is within the Site, will receive above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **Moderate Adverse (Significant)** effect on freshwater fish.

  - The aquatic macroinvertebrate species present within the Site are important on a Regional/County level due to the presence of several notable and Red Book macroinvertebrate species. Modelling indicates Crossness LNR, which is within the Site, will receive above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **Minor Adverse (Not Significant)** effect on the macroinvertebrate community.
- The macrophyte community within the Site is important at a Local level based upon the community present. Modelling indicates Crossness LNR, which is within the Site, will receive above-threshold changes in ammonia, nitrogen oxides, sulphur dioxide and nitrogen deposition, but that such increases would be small and the magnitude of change low. Therefore, there is likely to be an indirect, permanent, long term **Negligible (Not Significant)** effect on the macrophyte community.

Shading

7.8.91. The effects of shading from buildings will be greatest during operation of the Proposed Scheme, not least because they are permanent, as opposed to the transient shading effects during construction. However, operation phase shading will be localised to areas close to building footprints within the Site and its immediate surroundings and will not affect distant ecological features or those some distance away. In addition, shading would not affect Thames-side ecological features as no vegetation is present in aquatic habitat beyond the river wall within the Site. Thus, the following features will not be affected by shading:

- Statutory Designated Sites:
  - Epping Forest SAC;
  - Inner Thames Marshes SSSI;
  - Ingrebourne Marshes SSSI;
  - Oxleas Woodlands SSSI;
  - Ruxley Gravel Pits SSSI;
  - West Thurrock Lagoon and Marshes SSSI;
  - Rainham Marshes LNR; and
  - Lesnes Abbey Woods LNR (comprising ancient woodland).
- Non-statutory Designated Sites:
  - River Thames and Tidal Tributaries MSINC; and
  - 18 SINC outside and not adjacent to the Site Boundary.
- HPI:
  - Deciduous woodland (lowland mixed deciduous woodland);
  - Intertidal mudflat;

  - Open mosaic habitat; and
  - Coastal saltmarsh (adjacent to the Site Boundary).
- Other Terrestrial Habitats:
  - River habitat (within the River Thames).

7.8.92. Structures including Above Ground Storage Tanks, Above Ground Pipelines and buildings will shade habitats in the area within and in the immediate surrounds of the Proposed Scheme during its operation. Effects of shading are modelled in **Appendix 7-11: Shading Impacts Study (Volume 3)**, and show shading is highly localised to the Carbon Capture Facility structures, with effects of shading not extending further than approximately 10-20m from them. The Mitigation and Enhancement Area will see only very minor changes in availability of solar radiation where it abuts the operational Carbon Capture Facility. However, significant shading is assessed to occur under the Above Ground Pipelines, this being a substantial raised structure. This constitutes a localised effect on 0.3ha of habitat within Crossness LNR (25.5ha in total area); thus, 1% of the LNR's total area would be affected by Above Ground Pipelines shading.

7.8.93. Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC either overlap or are close to the footprint of buildings associated with the operational Proposed Scheme, and all are important at the County level. As shading is limited to the immediate surroundings of structures associated with the Proposed Scheme, the magnitude of change will be **Negligible (Not Significant)**. Therefore, there is likely to be a direct, permanent, long term effect on all three designated sites.

7.8.94. Coastal and floodplain grazing marsh HPI is close to the footprint of buildings to be constructed for the Proposed Scheme and is important at the County level. As shading is limited to the immediate surroundings of structures associated with the Proposed Scheme, the magnitude of change will be negligible. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on coastal and floodplain grazing marsh HPI.

7.8.95. Reedbed HPI in the majority of the Site Boundary does not lie close to buildings associated with the Proposed Scheme and would not be subjected to operation phase shading. However, reedbed associated with ditches underneath Above Ground Pipelines will be shaded by these structures and receive approximately half the solar radiation that is currently available to them. Reedbed HPI is important at the County level. The magnitude of change, taking into account the amount of reedbed habitat shaded by Above Ground Pipelines is small, will be low. Therefore, there is likely to be a direct, permanent, long term **Moderate (Significant)** effect on Reedbed HPI.

7.8.96. Terrestrial habitats that could be shaded as a result of the Proposed Scheme are important at the Local level. Many lie in areas not subject to shading but others are close to the operational Carbon Capture Facility and would experience some shading, therefore the magnitude of change is low. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on other habitats.

7.8.97. Assessment of remaining ecological features for which the impact is relevant is detailed in the bullet points below:

- **Bats**: habitats within the Site Boundary would not receive significant shading (other than the exceptions noted above under Above Ground Pipelines) and would not be degraded. In addition, only limited bat activity occurs in habitats close to the proposed Carbon Capture Facility, with the majority of bat foraging and commuting occurring along woodland edges within the Norman Road Field and Crossness LNR. Bats are important at the Local level. The magnitude of change will be negligible. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on bats.
- **Breeding birds**: habitats within the Site Boundary would not receive significant shading (other than the exceptions noted above under Above Ground Pipelines) and would not be degraded. Thus, only a highly localised, limited area of breeding bird habitat would be affected by shading. Breeding birds are important at the County level. The magnitude of change will be negligible. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on breeding birds.
- **Notable plants and invasive species**: habitats within the Site Boundary would not receive significant shading (other than the exceptions noted above under Above Ground Pipelines) and would not be degraded. Thus, only a highly localised, limited areas of habitat where notable plants grow would be affected by shading. Notable plants and invasive species are important at the County level. The magnitude of change will be negligible. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on notable plants and invasive species.
- **Reptiles**: habitats within the Site Boundary would not receive significant shading (other than the exceptions noted above under Above Ground Pipelines) and would not be degraded. Thus, only a highly localised, limited area of reptile habitat would be affected by shading. Reptiles are important at the Local level. The magnitude of change will be negligible. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on reptiles.
- **Terrestrial invertebrates**: the majority of habitats within the Site Boundary would not receive significant shading (other than the exceptions noted above under Above Ground Pipelines) and would not be degraded. Thus, only a highly localised, limited area of terrestrial invertebrate habitat would be affected by shading. Terrestrial invertebrates are important at the County level. The magnitude of change will be negligible. Therefore, there is likely to be a direct, permanent, long term **Negligible (Not Significant)** effect on terrestrial invertebrates.
- **Water voles**: the majority of water vole habitat within the Site Boundary would not be shaded by the Proposed Scheme. However, ditches shaded by Above Ground Pipelines will receive approximately half the solar radiation of those not subject to shading in the wider Site Boundary, leading to degradation of aquatic vegetation water voles use for feeding and shelter. Water voles are important at the County level. The magnitude of change, taking in account both water vole habitat that will

not be shaded at all and that which lies under Above Ground Pipelines, will be medium. Therefore, there is likely to be a direct, permanent, long term **Moderate (Significant)** effect on water voles.

- **Aquatic macroinvertebrates:** The majority of aquatic macroinvertebrate habitat within the Site Boundary would not be shaded by the Proposed Scheme. However, ditches shaded by Above Ground Pipelines will receive approximately half the solar radiation of those not subject to shading in the wider Site Boundary, leading to degradation of aquatic vegetation aquatic macroinvertebrates use for feeding and shelter. However, the ditches in the vicinity of the Proposed Scheme (excluding the Mitigation and Enhancement Area) are ephemeral in nature, and do not provide suitable habitat for the majority of macroinvertebrate species recorded in the surveys across the Site (ditches that were dry at the time of the surveys did not contain any aquatic invertebrates). Aquatic macroinvertebrates are important at the Regional/County level. The magnitude of change, taking in account the available aquatic habitat that will not be shaded at all and that which lies under Above Ground Pipelines that is unsuitable to support most aquatic macroinvertebrate species, will be low. Therefore, there is likely to be a direct, permanent, long term **Minor (Not Significant)** effect on aquatic macroinvertebrates.
- **Freshwater fish:** The majority of fish habitat within the Site Boundary would not be shaded by the Proposed Scheme. The ditches shaded by Above Ground Pipelines will receive approximately half the solar radiation of those not subject to shading in the wider Site Boundary, leading to degradation of aquatic vegetation fish use for spawning and shelter. This could impact fish species through reduced cover and result in increased predation, however it should be noted that the ditches in the vicinity of the Proposed Scheme (excluding the Mitigation and Enhancement Area) are ephemeral, thus reducing the potential for fish to be using these habitats. Based upon this the magnitude of change is anticipated to be negligible. Therefore, there is likely to be an indirect, permanent, long term, **Negligible (Not Significant)** effect on freshwater fish.
- **Macrophytes:** The majority of macrophytes within the Site Boundary would not be shaded by the Proposed Scheme. The ditches shaded by Above Ground Pipelines will receive approximately half the solar radiation of those not subject to shading in the wider Site Boundary, leading to degradation of aquatic vegetation and therefore reduction in macrophyte cover within these ditches. Shading of macrophytes are of local importance. The magnitude of change is likely to be low. Therefore, there is likely to be a direct, permanent, long term, **Negligible (Not Significant)** effect on macrophytes.

7.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

7.9.1. This section sets out the additional mitigation and compensation measures that are relevant for terrestrial biodiversity.

CONSTRUCTION PHASE

7.9.2. Habitat creation and enhancements form the majority of additional measures to be undertaken by the Proposed Scheme in relation to effects on terrestrial biodiversity. Creation of new habitat to replace those potentially lost to the Proposed Scheme, alongside improvement of existing areas of habitat, will occur within the Mitigation and Enhancement Area located in the south and west of the Site (**Figure 1-1: Site Boundary Location Plan (Volume 2)**) and are proposed within the BNG Opportunity Area offsite to the west. These measures are set out in the **Outline LaBARDS (Document Reference 7.9)**. Any full LaBARDS(s) will be developed to be in substantial accordance with the **Outline LaBARDS (Document Reference 7.9)**, as secured by a requirement in the **Draft DCO (Document Reference 3.1)**:

- Enhancement of floodplain grazing marsh, other neutral grassland and woodland within the Mitigation and Enhancement Area to replace important habitats of Crossness LNR/Erith Marshes MSINC and support an overall net gain for biodiversity.
- Enhancement of mudflat habitat within the River Thames to replace losses due to installation of new pilings associated with the Proposed Jetty[g].
- Creation of new habitats within the Mitigation and Enhancement Area and Carbon Capture Facility comprising floodplain grazing marsh, other neutral grassland, reedbed, woodland and ditches to replace important habitats of Crossness LNR, Erith Marshes MSINC and Belvedere Dykes SINC and support an overall net gain for biodiversity. This would include buffer planting to provide physical and visual screening between the Carbon Capture Facility and Mitigation and Enhancement Area/Crossness LNR.
- Enhancement of other neutral grassland at the BNG Opportunity Area to support a net gain for biodiversity.
- Creation of new open mosaic habitat and reedbed habitat at the BNG Opportunity Area to support a net gain for biodiversity.
- Habitat creation would replace lost supporting habitat for other protected and notable species, foraging and commuting habitat for bats, nesting habitat for breeding birds, foraging habitat for wintering birds, habitat for reptiles and

[g] This assumes retention of the Belvedere Power Station jetty, the scenario chosen as the precautionary approach with regards BNG. However, removal of the Belvedere Power Station jetty would yield mudflat habitat creation where its piling and supports were removed.

invertebrates. Open water and reedbed creation will be a key feature to provide replacement habitat for water voles due to loss of such habitats within the Site.

- Creation of features to offer replacement breeding, sheltering and hibernating opportunities for animal species within the Mitigation and Enhancement Area, for example, reptile hibernacula, bat and bird boxes.
- Improvement works to ditches, such as silt removal, litter picking and management to improve the habitat quality.
- Measures to reduce emissions from idling vehicles (as outlined in **Chapter 5: Air Quality (Volume 1)**), such as switching engines off when stationary to reduce air-borne pollutants.

7.9.3. Species specific interventions will also be used to mitigate effects of the Proposed Scheme, and will follow the approaches below may be grouped into the following general approaches:

- Timing of works to avoid sensitive periods for particular species, such as avoidance of the bird nesting season for habitat clearance, and the migration periods for sensitive freshwater fish species.
- Water voles are present within the Site and will be subject to a programme of translocation to move animals present within works areas to newly created compensatory habitat within the Mitigation and Enhancement Area (shown on **Figure 1-1: Site Boundary Location Plan (Volume 2)**). This work would be carried out under a protected species mitigation licence for water vole obtained from Natural England, comprising specific mitigation and monitoring measures for this species, laid out in a method statement. The Applicant is currently seeking to obtain a Letter of No Impediment in respect of this.
- Reptiles would be moved from works area through hand searching in combination with vegetation clearance. Captured reptiles would be released into a safe area within Crossness LNR away from active works. Finally, it is noted that construction of the Proposed Jetty presents an enhancement opportunity for birds using the River Thames, as it would provide a new feature for resting and roosting. This would support existing resting and roosting space on the existing Belvedere Power Station Jetty (disused) (with modifications), if retained. The Applicant has not accounted for this in its BNG calculations.

OPERATION PHASE

7.9.4. These measures are set out in the **Outline LaBARDS (Document Reference 7.9)**. A full LaBARDS(s) will be developed to be in substantial accordance with the **Outline LaBARDS (Document Reference 7.9)**, as secured by a requirement in the **Draft DCO (Document Reference 3.1)**:

- Management of habitat enhancements – continuing and maintaining biodiversity gains for habitats within the within the Mitigation and Enhancement Area and operational Carbon Capture Facility through a programme of woodland management, and increasing the value of floodplain grazing marsh/other neutral

grassland habitats by a mixture of changes in their management over time and seeding/planting.

- Management of habitat enhancements within the BNG Opportunity Area as also described in **Appendix 7-1: Biodiversity Net Gain Report (Volume 3)**.

7.9.5. The following will be set out in the Operational EMP which will be prepared prior to the Proposed Scheme commencing operation, in accordance with the measures set out in the **Mitigation Schedule (Document Reference 7.8)**:

- Measures set out within **Section 5-9** of **Chapter 5: Air Quality (Volume 1)** to manage air quality effects.
- Management of ditches and watercourses to improve macrophyte species diversity, with consequent improvement in diversity of macroinvertebrates and fish species, and availability of food plants for water voles. This would buffer potential vegetation changes resulting from air quality changes, pursuant to the **Outline LaBARDS (Document Reference 7.9)**.
- Improvement of water flow through ditches, by controlling surface water discharge, pursuant to the **Outline Drainage Strategy (Document Reference 7.2)** and **Outline LaBARDS (Document Reference 7.9)**.
- Control of American mink (an invasive species and significant predator of water vole) through survey and trapping to ensure water vole populations are not predated by this species, pursuant to the **Outline LaBARDS (Document Reference 7.9)**.

7.10. MONITORING

7.10.1. The following provisions are required during the construction and operation of the Proposed Scheme:

- Clerk of works monitoring during the construction phase and other measures such as including monitoring light spill onto adjacent habitats, quality of surface water run-off and effectiveness of implementation of dust suppression measure as described in the **Outline CoCP (Document Reference 7.4).**
- Monitoring requirements in the **Outline LaBARDS (Document Reference 7.9)** including:
  - Inspection of habitat creation works to ensure groundwork and plant growth are on path to generate the expected vegetation community and contribute to the biodiversity value as intended.
  - Inspection of open water habitat creation to ensure features created hold water and are suitable as replacement habitat able to support protected species (e.g. water voles).
  - Survey of habitats subject to enhancement (deciduous woodland, floodplain grazing marsh) to demonstrate increase in biodiversity value and allow interventions as necessary.

- Monitoring of water vole population to determine the success of habitat creation and translocation for this species pursuant to a licence. This will include survey for American mink.
- Monitoring of aquatic invertebrate species within water bodies and watercourses to determine the value of newly created ponds.
- Monitoring of fish species within watercourses to determine the success of habitat improvements.
- Monitoring of water quality parameters within the network of watercourses within the Crossness LNR.

7.11. RESIDUAL EFFECTS

7.11.1. **Table 7-11** below summarises the residual effects associated with the Proposed Scheme.

Table 7-11: Terrestrial Biodiversity Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Construction Phase				
Habitat loss and fragmentation	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, Coastal and floodplain grazing marsh HPI, Intertidal mudflats HPI, open mosaic habitat HPI, reedbed HPI, breeding birds, wintering birds.	**Moderate Adverse (Significant)**	Habitat creation and enhancement both within the Carbon Capture Facility, the Mitigation and Enhancement Area and BNG Opportunity Area and potentially other offsite areas, pursuant to the **Outline LaBARDS (Document Reference 7.9)**, comprising: • Enhancement of floodplain grazing marsh, other neutral grassland and woodland within the Mitigation and Enhancement Area. • Enhancement of mudflat habitat within the River Thames. • Creation of new habitats within the Mitigation and Enhancement Area and Carbon Capture Facility comprising floodplain grazing marsh, other neutral grassland, reedbed, woodland and ditches. Including buffer planting to provide physical and visual screening between the Carbon Capture Facility and	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			Mitigation and Enhancement Area/Crossness LNR. • Enhancement of other neutral grassland at the BNG Opportunity Area. • Creation of new open mosaic habitat and reedbed habitat at the BNG Opportunity Area. • Creation/enhancement of habitats would provide supporting habitat.	
Habitat loss and fragmentation	Modified grassland, other neutral grassland, mixed scrub, ditches/standing water, notable plants and invasive species, terrestrial invertebrates	**Minor Adverse (Not Significant)**	Habitat creation and enhancement both within the Carbon Capture Facility, the Mitigation and Enhancement Area and BNG Opportunity and potentially other offsite areas, pursuant to the **Outline LaBARDS (Document Reference 7.9)**, comprising: • Enhancement of floodplain grazing marsh, other neutral grassland and woodland within the Mitigation and Enhancement Area. • Enhancement of mudflat habitat within the River Thames. • Creation of new habitats within the Mitigation and Enhancement Area and	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			Carbon Capture Facility comprising floodplain grazing marsh, other neutral grassland, reedbed, woodland and ditches. Including buffer planting to provide physical and visual screening between the Carbon Capture Facility and Mitigation and Enhancement Area/Crossness LNR. • Enhancement of other neutral grassland at the BNG Opportunity Area. • Creation of new open mosaic habitat and reedbed habitat at the BNG Opportunity Area. • Creation/enhancement of habitats would provide supporting habitat.	
Habitat loss and fragmentation	Water vole	**Moderate Adverse (Significant)**	Proposals for habitat creation and enhancement, including creation of new ditch habitat targeted at water voles pursuant to a licence. Capture and captive breeding of water voles during works and establishment of new ditch habitat, with release of water voles upon completion of construction and	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			readiness of new habitat pursuant to a licence.	
Habitat loss and fragmentation	Bats, reptiles	**Negligible (Not Significant)**	Habitat creation and enhancement both within the Site and potentially other offsite areas pursuant to the **Outline LaBARDS (Document Reference 7.9).** Search and removal of reptiles from the works areas to a safe area within Crossness LNR prior to works and establishment of temporary reptile exclusion fencing to avoid reptiles entering the works area pursuant to the **Outline CoCP (Document Reference 7.4)**.	**Negligible (Not Significant)**
Habitat loss and fragmentation	Aquatic macroinvertebrates, freshwater fish (including European eel), macrophytes.	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**
Noise and vibration	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal	**Moderate Adverse (Significant)**	Timing of certain works to avoid sensitive periods (e.g. vegetation clearance in bird breeding season, wintering period for certain birds and fish migration and	**Minor Adverse (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	Tributaries MSINC, breeding birds, wintering birds.		spawning periods) pursuant to **Outline CoCP (Document Reference 7.4)**.	
Noise and vibration	Terrestrial invertebrates, water vole	**Minor Adverse (Not Significant)**	Timing of certain works to avoid sensitive periods (e.g. summer flying period for insects) pursuant to **Outline CoCP (Document Reference 7.4)**.	**Negligible (Not Significant)**
Noise and vibration	Bats, reptiles	**Negligible (Not Significant)**	Timing of certain works to avoid sensitive periods (e.g. at night when bats are active) pursuant to **Outline CoCP (Document Reference 7.4)**.	**Negligible (Not Significant)**
Noise and vibration	Freshwater fish (including European eel).	**Negligible (Not Significant)**	Timing of certain works to avoid sensitive periods (e.g. fish migration and spawning periods). Avoid works in watercourses where possible pursuant to the **Outline CoCP (Document Reference 7.4)**.	**Negligible (Not Significant)**
Dust	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, deciduous woodland HPI,	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, coastal saltmarsh HPI, open mosaic habitat HPI, reedbed HPI, river habitat (River Thames), modified grassland, other neutral grassland, mixed scrub, ditches/standing water, bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, wintering birds, freshwater fish (including European eel), aquatic macroinvertebrates, macrophytes.			
Surface water run-off	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, coastal	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	and floodplain grazing marsh HPI, intertidal mudflats HPI, reedbed HPI, coastal saltmarsh HPI, river habitat (River Thames), ditches/standing water, bats, breeding birds, reptiles, terrestrial invertebrates, water vole, wintering birds, aquatic macroinvertebrates, freshwater fish (including European eel), macrophytes.			
Lighting	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, bats, breeding birds, reptiles, terrestrial invertebrates, water vole, wintering birds, aquatic macroinvertebrates,	**Moderate Adverse (Significant)**	Control of construction phase lighting to focus it on construction areas pursuant to the **Outline CoCP (Document Reference 7.4)**.	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	macrophytes and freshwater fish.			
Changes in air quality	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, deciduous woodland HPI, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, open mosaic habitat HPI, reedbed HPI, coastal saltmarsh HPI, river habitat (River Thames), notable plants and invasive species, freshwater fish (including European eel).	**Moderate Adverse (Significant)**	Measures to reduce emissions from idling vehicles, pursuant to the **Outline CoCP (Document Reference 7.4)**.	**Minor Adverse (Not Significant)**
Changes in air quality	Modified grassland, other neutral grassland, mixed scrub, ditches/standing water, aquatic macroinvertebrates.	**Minor Adverse (Not Significant)**	Measures to reduce emissions from idling vehicles, pursuant to the **Outline CoCP (Document Reference 7.4)**.	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Changes in air quality	Macrophytes	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**
Shading	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, coastal and floodplain grazing marsh HPI, open mosaic habitat HPI, reedbed HPI, modified grassland, other neutral grassland, mixed scrub, ditches/standing water, bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, wintering birds, aquatic macroinvertebrates, freshwater fish (including European eel), macrophytes.	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Operation Phase				
Noise and vibration	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, Bats, breeding birds, reptiles, terrestrial invertebrates, water vole, wintering birds, freshwater fish (including European eel).	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**
Maintenance activities	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, bats, breeding birds, water vole, wintering birds.	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**
Surface water run-off	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, coastal	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	and floodplain grazing marsh HPI, intertidal mudflats HPI, reedbed HPI, coastal saltmarsh HPI, river habitat (River Thames), ditches/standing water, bats, breeding birds, reptiles, terrestrial invertebrates, water vole, wintering birds, aquatic macroinvertebrates, freshwater fish (including European eel).			
Lighting	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, bats, breeding birds, reptiles, terrestrial invertebrates, water vole, wintering birds, aquatic macroinvertebrates, freshwater fish (including	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	European eel), macrophytes.			
Changes in air quality	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, River Thames and Tidal Tributaries MSINC, 18 further SINCs outside of the Site, deciduous woodland HPI, coastal and floodplain grazing marsh HPI, intertidal mudflats HPI, reedbed HPI, coastal saltmarsh HPI, river habitat (River Thames), notable plants and invasive species.	**Potentially up to Moderate Adverse (Significant)**	None.	**Potentially up to Moderate Adverse (Significant)**
Changes in air quality	Inner Thames Marshes SSSI, Ingrebourne Marshes SSSI, Rainham Marshes LNR, modified grassland, other neutral grassland, mixed scrub,	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
	ditches/standing water, macrophytes.			
Changes in air quality	Freshwater fish (including European eel)	**Moderate Adverse (Significant)**	Habitat management and improvement to buffer potential vegetation changes resulting from air quality changes, pursuant to the **Outline LaBARDS (Document Reference 7.9)**.	**Negligible (Not Significant)**
Changes in air quality	Aquatic macroinvertebrates.	**Minor Adverse (Not Significant)**	Habitat management and improvement to buffer potential vegetation changes resulting from air quality changes, pursuant to the **Outline LaBARDS (Document Reference 7.9)**.	**Negligible (Not Significant)**
Shading	Reedbed HPI, water voles	**Moderate Adverse (Significant)**	Habitat creation and enhancement pursuant to the **Outline LaBARDS (Document Reference 7.9)**. Proposals for habitat creation and enhancement, including creation of new ditch habitat targeted at water voles. Capture and captive breeding of water voles during works and establishment of new ditch habitat, with release of water voles upon completion of construction and	**Negligible (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
			readiness of new habitat, pursuant to a licence.	
Shading	aquatic macroinvertebrates,	**Minor (Not Significant)**	Habitat management and improvement pursuant to the **Outline LaBARDS (Document Reference 7.9)**.	**Negligible (Not Significant)**
Shading	Crossness LNR, Erith Marshes MSINC, Belvedere Dykes SINC, Coastal and floodplain grazing marsh HPI, modified grassland, other neutral grassland, mixed scrub, ditches/standing water, bats, breeding birds, notable plants and invasive species, reptiles, terrestrial invertebrates, water vole, wintering birds, freshwater fish and macrophytes.	**Negligible (Not Significant)**	None.	**Negligible (Not Significant)**

7.12. LIMITATIONS AND ASSUMPTIONS

7.12.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking terrestrial biodiversity reported in this chapter:

- The initial freshwater aquatic habitat scoping survey within the Site was not completed during the optimal macrophyte survey season, generally accepted to be from June to September (inclusive). A further survey was conducted in June 2023, which was limited due to access restrictions. However, for those areas surveyed, the macrophyte assemblage was typical of that expected based on desk study information. It is therefore considered that sufficient information was gathered to enable a robust assessment of the macrophyte species present, and to determine residual effects, both within the freshwater watercourses and the ponds present within the Site.

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