DECARBONISATION

OUTLINE LANDSCAPE, BIODIVERSITY, ACCESS AND RECREATION DELIVERY STRATEGY: 7.9

Cory Decarbonisation Project

PINS Reference: EN010128

February 2025

Revision D

Note: Some document reference numbers were updated throughout the examination process, in response to questions and representations, and with the aim of clarifying issues regarding the proposed scheme, mechanisms for delivery, monitoring and maintenance. The latest submissions will be used in the final Outline LaBARDS.

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EXECUTIVE SUMMARY

1.1.1. This Outline Landscape Biodiversity, Access and Recreation Delivery Strategy (Outline LaBARDS) has been prepared by LDA Design on behalf of Cory Environmental Holdings Ltd (hereafter referred to as the Applicant). It accompanies the application for a Development Consent Order ('the DCO Application') in relation to the Cory Decarbonisation Project ('the Proposed Scheme') in Bexley, London. The DCO Application has been made under section 37 of the Planning Act 2008 (as amended) ('PA 2008') and submitted to the Secretary of State ('the SoS') for Energy Security and Net Zero (DESNZ). The resultant development consent order, if made by the SoS, would be known as the Cory Decarbonisation Order.

1.1.2. The Applicant is seeking development consent for the proposed construction, operation, maintenance and decommissioning of a carbon capture facility to capture carbon dioxide from energy from waste facilities Riverside 1 and Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken) at the Riverside Campus, located adjacent to the River Thames at Belvedere in the London Borough of Bexley ('LBB'). The technology to be utilised is referred to as post-combustion carbon capture as the carbon dioxide ('CO2') is captured from the flue gas produced during the combustion of waste in Riverside 1 and 2. The Proposed Scheme is designed to remove at least 95% of the carbon dioxide from the flue gas from each of Riverside 1 and Riverside 2, resulting in overall negative emissions of greenhouse gases.

1.1.3. The Proposed Scheme also incorporates: a Proposed Jetty, to export the liquified CO2 offsite to permanent storage; the Mitigation and Enhancement Area, to provide improved access to open land, habitat mitigation, compensation and enhancement and contribute to biodiversity net gain; temporary construction compounds; and utilities connections and site access works.

1.1.4. This document is submitted for approval and provides a single point of reference for all elements of the Applicant's landscape, biodiversity, access and recreation proposals including provision of mitigation and Biodiversity Net Gain (BNG) in support of the Proposed Scheme. This document is intended to demonstrate that the Applicant has made appropriate undertakings to support the delivery of the Proposed Scheme and specifically the landscape, biodiversity, access and recreation proposals including BNG. The Proposals are informed by an appreciation of, and strategy to, minimise the effects of the Proposed Scheme on MOL in relation to its purposes and its performance with regard to Bexley Local Plan Policy SP8, to address relevant nature conservation policies in relation to SINC and Local Nature Reserves, and to consider impacts to green infrastructure and open space.

1.1.5. This Outline LaBARDS seeks to provide a clear context for the proposals and how they will be developed and delivered and is structured as follows:

- Extents of Outline LaBARDS – Section 4
- Introduction to the Environment, Access and Recreation Proposals – Section 5

- Planning Policy background and nature conservation designations – Section 6
- The Proposed Development – Section 7
- Design Principles and Design Code – Section 8
- The Environmental Proposal, Access and Recreation Proposals – Section 9
- The Proposed Biodiversity Net Gain (BNG) Strategy – Section 10
- The Delivery Mechanism/s for the Strategy – Section 11
- Outline of Required Works to Deliver the Landscape, Biodiversity, Access and Recreation Delivery Proposals and Strategy – Section 12
- Detailed Management Plan – Section 13
- Appendix

1.1.6. The Environmental Proposals, Access and Recreation Proposals and BNG Strategy within the Site and Order limits, will be secured via inclusion in the full LaBARDS, which must be in substantial accordance with this outline. The element of the BNG Strategy and Access Proposals that lie offsite will be secured via a Deed of Obligation. As such, the creation and management measures set out in this document are secured through the DCO.

1.1.7. The DCO requires that in submitting the full LaBARDS(s) for approval, the Applicant must show how the Design Principles and Design Code have been taken into account in developing it.

1.1.8. The construction of the CCF and connecting pipework, will require land that currently forms part of an extant section 106 commitment that led to the establishment of the Crossness LNR. The Applicant proposes to mitigate this loss of land that currently forms part of the LNR, with the expansion of the existing Crossness LNR to encompass Norman Road Field to achieve delivery of an expanded Crossness LNR.

1.1.9. The Outline LaBARDS describes the management proposals for landscape and habitat works (proposed and existing) across the Site comprising the CCF Area and the expanded Crossness LNR with reference to field names and area references.

1.1.10. Details of the full management practices across the Site and on the BNG Opportunity Area (but not any alternative mechanism which will be dealt with purely by Deed of Obligation) must be set out in the full LaBARDS approved by LBB under DCO Requirement. These will be developed by the Applicant in engagement with relevant landowners.

1.1.11. Alongside delivering national, and local climate change priorities, the Proposed Development integrates proposals for the Mitigation and Enhancement Area addressing biodiversity, access and recreation as demonstrated through this Outline LaBARDS.

2. INTRODUCTION

2.1. DESCRIPTION OF THE PROPOSED SCHEME

2.1.1. LDA Design has been instructed by Cory Environmental Holdings Ltd (hereafter referred to as the Applicant) to prepare an Outline Landscape Biodiversity, Access and Recreation Delivery Strategy (Outline LaBARDS) for the Cory Decarbonisation Project to be located at Norman Road, Belvedere in the London Borough of Bexley (LBB) (National Grid Reference/NGR 549572, 180512).

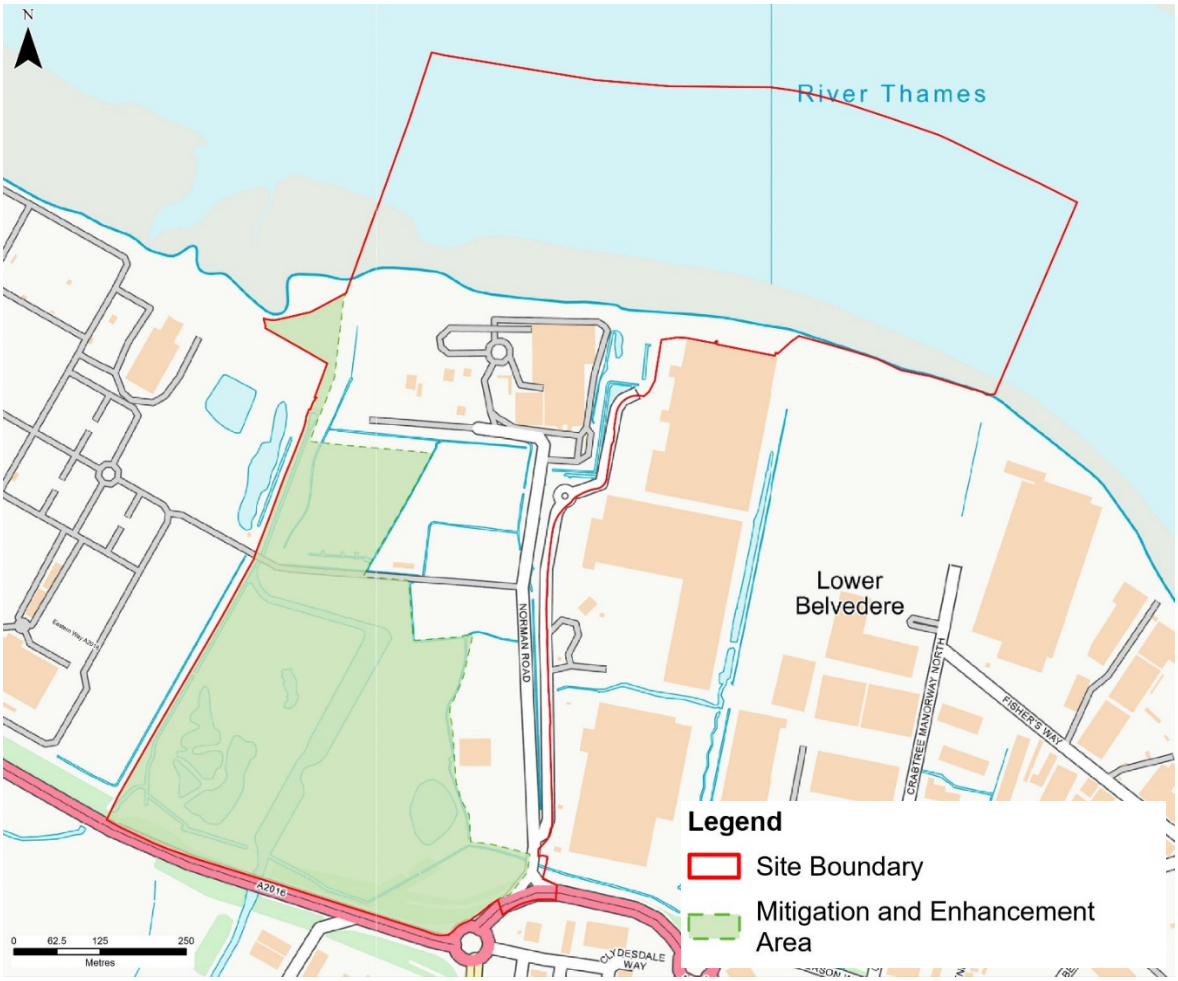

Figure 1 - Site boundary

2.1.2. **Figure 1** illustrates the Site boundary. The following Figures are available in the **Environmental Statement (ES) (Document Reference 6.2)**:

- Figure 1-1: Site Boundary Location Plan (Volume 2); and
- Figure 1-2: Satellite Imagery of the Site Boundary Plan (Volume 2).

2.1.3. The Applicant intends to construct and operate the Proposed Scheme to be linked with the River Thames. It comprises of the following key components, with further detail provided within the **Environmental Statement (ES) Chapter 2: Site and Proposed Scheme Description (Document Reference 6.1.2):**

- The Carbon Capture Facility (CCF) (including its associated Supporting Plant and Ancillary Infrastructure): the construction of infrastructure to capture a minimum of 95% of carbon dioxide (CO2) emissions from Riverside 1 and 95% of CO2 emissions from Riverside 2 once operational, which is equivalent to approximately 1.3Mt CO2 per year. The capture rate is the annual average. The Carbon Capture Facility will be one of the largest carbon capture projects in the UK.
- The Proposed Jetty: a new and dedicated export structure within the River Thames as required to export the CO2 captured as part of the Carbon Capture Facility.
- The Mitigation and Enhancement Area: land identified to provide improved access to open land, habitat mitigation, compensation and enhancement (including forming part of the drainage system and Biodiversity Net Gain delivery proposed for the Proposed Scheme) and planting. The Mitigation and Enhancement Area provides the opportunity to improve access to outdoor space and to extend the area managed as the Crossness Local Nature Reserve (LNR). This Outline LaBARDS describes how the proposals are delivered.
- Temporary Construction Compounds: areas to be used during the construction phases for activities including, but not limited to office space, warehouses, workshops, open air storage and car parking, as shown on the **Works Plans (Document Reference 2.3)**. These include the core Temporary Construction Compound, the western Temporary Construction Compound and the Proposed Jetty Temporary Construction Compound.
- Utilities Connections and Site Access Works: The undergrounding of utilities required for the Proposed Scheme in Norman Road and the creation of new, or the improvement of existing, access points to the Carbon Capture Facility from Norman Road.

2.1.4. Together, the Carbon Capture Facility (including its associated Supporting Plant and Ancillary Infrastructure), the Proposed Jetty, the Mitigation and Enhancement Area, the Temporary Construction Compounds and the Utilities Connections and Site Access Works are referred to as the 'Proposed Scheme'. The land upon which the Proposed Scheme is to be located is referred to as the 'Site' and the edge of this land referred to as the 'Site Boundary'. The Site Boundary represents the Order Limits for the Proposed Scheme as shown on the **Works Plans (Document Reference 2.3).**

3. PURPOSE OF THE DOCUMENT AND DELIVERY OF COMMITMENTS

3.1.1. The development of this Outline LaBARDS into the full LaBARDS for the Proposed Scheme, will be the mechanism to ensure the successful delivery, implementation and management of the Applicant's mitigation and enhancement proposals onsite (Mitigation and Enhancement Area and the CCF) and offsite. This Outline LaBARDS deals with:

1. the proposals to deliver the Applicant's onsite mitigation and enhancement measures including Environmental Proposals and Access and Recreation Proposals;
2. the proposals for delivery of the Biodiversity Net Gain (BNG) Strategy – on site and offsite;
3. the delivery mechanisms for the proposals;
4. the required works to deliver the Proposals and BNG Strategy; and
5. a framework for the detailed management including objectives.

3.2. DELIVERY COMMITMENT

3.2.1. A Requirement of the **Draft DCO (Document Reference 3.1)** will ensure that the onsite measures identified to mitigate effects on landscape, biodiversity, access and recreation, and to provide enhancements to the same, along with onsite BNG provision, are included in any full LaBARDS(s), to be prepared for the Proposed Scheme prior to the construction phase commencing. The full LaBARDS(s) will detail the mitigation and enhancement measures to be implemented, and their ongoing management and monitoring, and will be in substantial accordance with this Outline LaBARDS. The extent of onsite works relevant to this LaBARDS (known as the 'Mitigation and Enhancement Area' and 'CCF Area' - see section 4), is illustrated in **Figure 2**.

3.2.2. The BNG provision will make reference to a schedule of habitat types and areas required to support the delivery of a minimum 10% BNG (onsite and offsite – see below) for the Proposed Scheme and to support a flexible delivery model.

3.2.3. The onsite BNG provision will be secured via the DCO Requirement. The offsite BNG proposals (and offsite access improvements) will be secured via a Deed of Obligation with reference to a schedule of habitat types and areas required to support the delivery of a minimum 10% BNG (onsite and offsite) for the Proposed Scheme and to support a flexible delivery model. The BNG delivery opportunity at the former Thamesmead Golf Course (known as the 'BNG Opportunity Area' – see section 4) is illustrated in **Figure 2**.

3.2.4. This Outline LaBARDS may be developed into multiple full LaBARDS(s) given the different measures to be delivered onsite and offsite or relating to phasing of works, for example. References to 'the full LaBARDS' can therefore also be read as 'any' LaBARDS, and any full LaBARDS(s) need only contain the measures relevant to the scope of the works that are the subject of that full LaBARDS.

3.2.5. As set out throughout this report, the Applicant is committed to engaging with stakeholders including throughout development of the full LaBARDS(s) that is ultimately submitted for approval. Where this outline LaBARDS indicates engagement is to occur, the Applicant commits that this engagement will include meetings, not just written/email correspondence. An engagement report will be produced to accompany any full LaBARDS submission, which will set out the engagement activities that have been undertaken in the preparation of that document and how feedback has been taken into account.

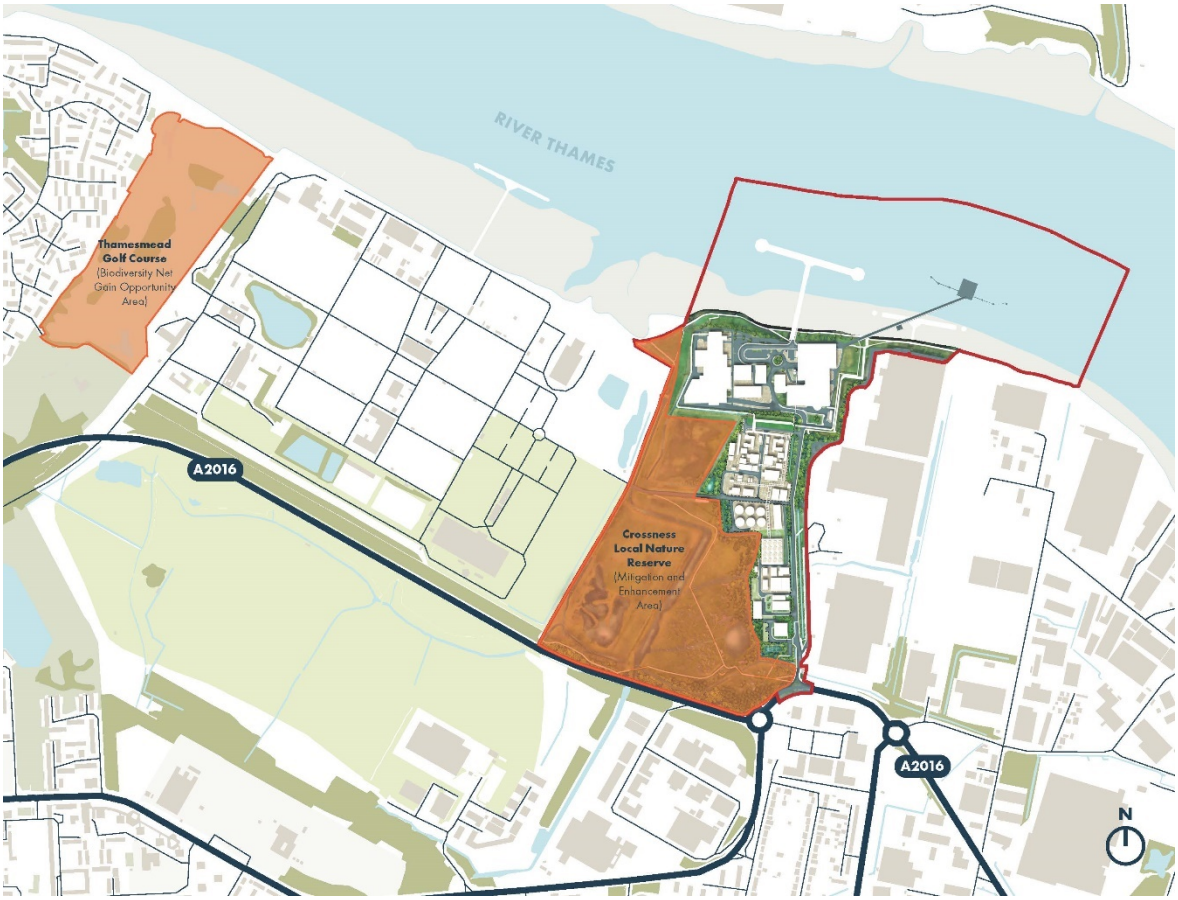

Figure 2 - Location of onsite and offsite works

4. STRUCTURE AND STATUS OF THE OUTLINE LABARDS

4.1. STRUCTURE

4.1.1. The Outline LaBARDS is structured as follows:

- Extents of Outline LaBARDS – Section 4
- Introduction to the Environment, Access and Recreation Proposals – Section 5
- Planning Policy background and nature conservation designations – Section 6
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- References

4.2. STATUS

4.2.1. This document is submitted to provide a single point of reference for all elements of the Applicant's landscape, biodiversity, access and recreation proposals including provision of mitigation and Biodiversity Net Gain (BNG) in support of the Proposed Scheme.

4.2.2. The Environmental Proposals, Access and Recreation Proposals and BNG Strategy within the Site and Order limits, will be secured via inclusion in the full LaBARDS and in compliance with and secured via the DCO Requirement. The element of the BNG Strategy and Access Proposals that lie offsite will be secured via a Deed of Obligation.

4.2.3. As outlined above, the full LaBARDS, shall be prepared for the Proposed Scheme prior to the construction phase commencing and shall be approved through the discharge of relevant DCO Requirements. The full LaBARDS will detail the mitigation and enhancement measures to be implemented, ongoing management regimes, monitoring and review processes,and will be in substantial accordance with this Outline LaBARDS.

5. EXTENTS OF THE OUTLINE LABARDS

5.1. INTRODUCTION

5.1.1. This section provides a brief description of the key spatial elements of this Outline LaBARDS.

5.2. THE MITIGATION AND ENHANCEMENT AREA

5.2.1. The Mitigation and Enhancement Area is illustrated in **Figure 3**. It extends across Norman Road Field to the east and to the west to encompass a portion of the Crossness LNR up to FP1, a definitive PRoW that extends along the eastern boundary of the Protected Area of the Crossness LNR, which is located behind fencing. The Norman Road Field area forms the focus of the majority of the Proposed Scheme's mitigation for landscape, biodiversity and on-site BNG provision, and is currently in use as grazing land occupied by a single long-term grazier. Grazing is recognised as an essential element in the maintenance of the valued grazing marsh habitat and its future conservation, and will be maintained by the Applicant as part of its ongoing obligations to habitat management. The Crossness LNR, provides opportunities for access and recreation mitigation and wider opportunities for enhancement of LNR habitats.

5.2.2. The area is identified to allow for comprehensive masterplanning of a coordinated green infrastructure strategy and to support the proposed enlargement of the Crossness LNR to include Norman Road Field. This proposal is outlined in section 9.

5.2.3. Both the Norman Road Field and Crossness LNR have been subject to ecological surveys to inform an understanding of the presence of existing habitats and their current condition.

Figure 3 - Mitigation and Enhancement Area

5.3. BNG OPPORTUNITY AREA

5.3.1. The BNG Opportunity Area is a possible area for offsite BNG provision located at the former Thamesmead Golf Course on the Thamesmead Estate, illustrated in **Figure 4**. The land is owned by the Peabody Trust and comprises a disused golf course that formed part of the Thamesmead development masterplan and has been identified in Peabody's 'Living in the Landscape' framework document as an area with potential for enhancement. The golf course has been subject to an ecological survey to understand the presence of existing habitats and their current condition.

Figure 4 - Offsite BNG Opportunity Area

5.4. CROSSNESS LOCAL NATURE RESERVE

5.4.1. The Crossness LNR comprises a terrestrial nature reserve of approximately 25ha lying to the east of the existing Thames Water Sewage Treatment Works and west of Norman Road Field. The Crossness Nature Reserve was established as part of a section 106 Agreement between Thames Water and the London Borough of Bexley, in 1994 as part of the development of the (no longer operational) Crossness Sewage Sludge Incinerator.

5.4.2. Under the terms of the agreement Thames Water are to provide a Conservation Management Plan which seeks to conserve and maintain the existing value of the nature conservation land and where practicable, to enhance the existing habitats and nature conservation importance of the nature land for a period of 99 years, including through continued grazing.

5.4.3. The Crossness LNR is managed in accordance with the agreed Conservation Management Plan. The current management plan is appended at Appendix 2.

5.4.4. **Figure 5** illustrates the extents of the Crossness LNR.

Key

Site boundary

Existing Nature Reserve

5.5. CARBON CAPTURE FACILITY (CCF) INC NORMAN ROAD

5.5.1. The CCF Area is illustrated in **Figure 6** and comprises a secure operational area adjoining the Mitigation and Enhancement Area to the west and Norman Road to the east. Norman Road comprises an adopted road that extends to the roadside kerb to the west (including a narrow grassed verge, portions of the existing ditch/ main river feature) and a pavement to the west.

5.5.2. The CCF Area includes planting and habitat proposals to the east and western boundaries inside and outside the secure fence line. To the east, the existing ditch (water course) network is retained adjoining the Norman Road corridor along with new planted areas. To the west, the existing ditch profile is to be improved to support habitat development and soil rewetting along with new planting. To the southern end of the CCF Area, opportunities for habitat creation and planting are identified in combination with water management infrastructure and associated with the proposed LNR visitor car park.

Figure 6 Carbon Capture Facility (CCF) Area

6. INTRODUCTION TO THE ENVIRONMENTAL, ACCESS AND RECREATION PROPOSALS

6.1.1. This Outline LaBARDS seeks to provide clear objectives and general principles for establishment and longer-term management of the Environmental Proposals comprising landscape, and ecological mitigation and BNG proposals onsite, within the Mitigation and Enhancement Area and CCF Area onsite, and offsite within the BNG Opportunity Area. This document also sets out the process for delivery of the Access and Recreation Proposals including proposals for Public Rights of Way (PRoW) identified for the area within the Site and offsite areas.

6.1.2. The Environmental Proposals and Access and Recreation Proposals are briefly introduced in this section with additional detail provided in section 9 and the BNG Strategy in section 10.

6.2. ENVIRONMENTAL PROPOSALS

6.2.1. The onsite works are illustrated on **Figure 15** in section 9. Plan area and field references are used to support the description of the proposals in section 9. The Environmental Proposals and Access and Recreation Proposals and BNG Strategies are scheduled in section 12 (Outline of Required Works to deliver the Proposals and Strategy) and the field references are illustrated on **Figure 7**.

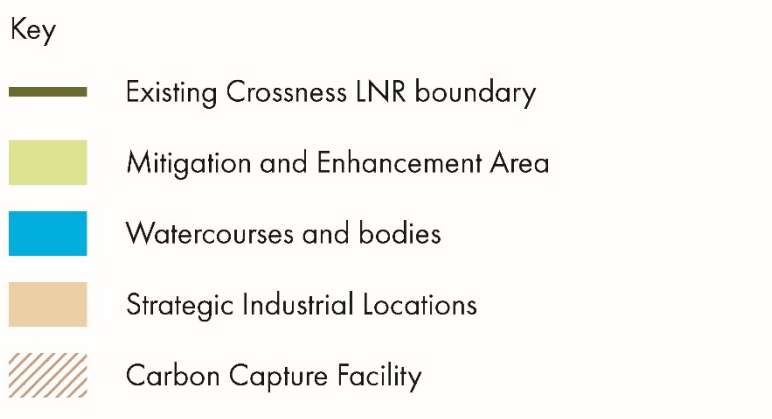
6.2.2. The onsite works relating to the CCF Area substantially overlay land identified as SIL policy (Strategic Industrial Location) but also East Paddock and Stable Paddock, which form part of Crossness LNR.

6.2.3. The onsite works relating to the Mitigation and Enhancement Area extends across the following fields (from south to north):

- Norman Road Field - habitat mitigation
- Island Field - habitat enhancement
- Lagoon Field - Proposed PRoW diversion and stable relocation (mitigation) and habitat enhancement
- West Paddock - CCF pipework connection and associated new ditch (mitigation) and habitat enhancement
- Sea Wall Field - CCF pipework connection and associated new ditch (mitigation) and habitat enhancement

Note: the Mitigation and Enhancement Area also extends across the existing Thames Water access road. The intention, where practicable, is to avoid additional land take within Crossness LNR for works or adjustments to existing vehicular access routes. Any additional land take, if it were to occur, would be a result of design to allow for emergency vehicles to

access Crossness Sewage Treatment Works. Realignment of the access road would require temporary land-take to allow its construction, as well a new permanent paved road broadly of similar width as the current one. Thus, although temporary land take would be required this would be remediated through restoration of habitats to their former condition. Permanent land take for any newly aligned road would be balanced by replacement compensatory habitat creation. Details of such compensatory habitat creation would be included in the full LaBARDS submitted for approval to LBB.



6.2.4. The extents of the CCF Area and onsite mitigation works overlay in part, the existing Crossness Local Nature Reserve (CLNR).

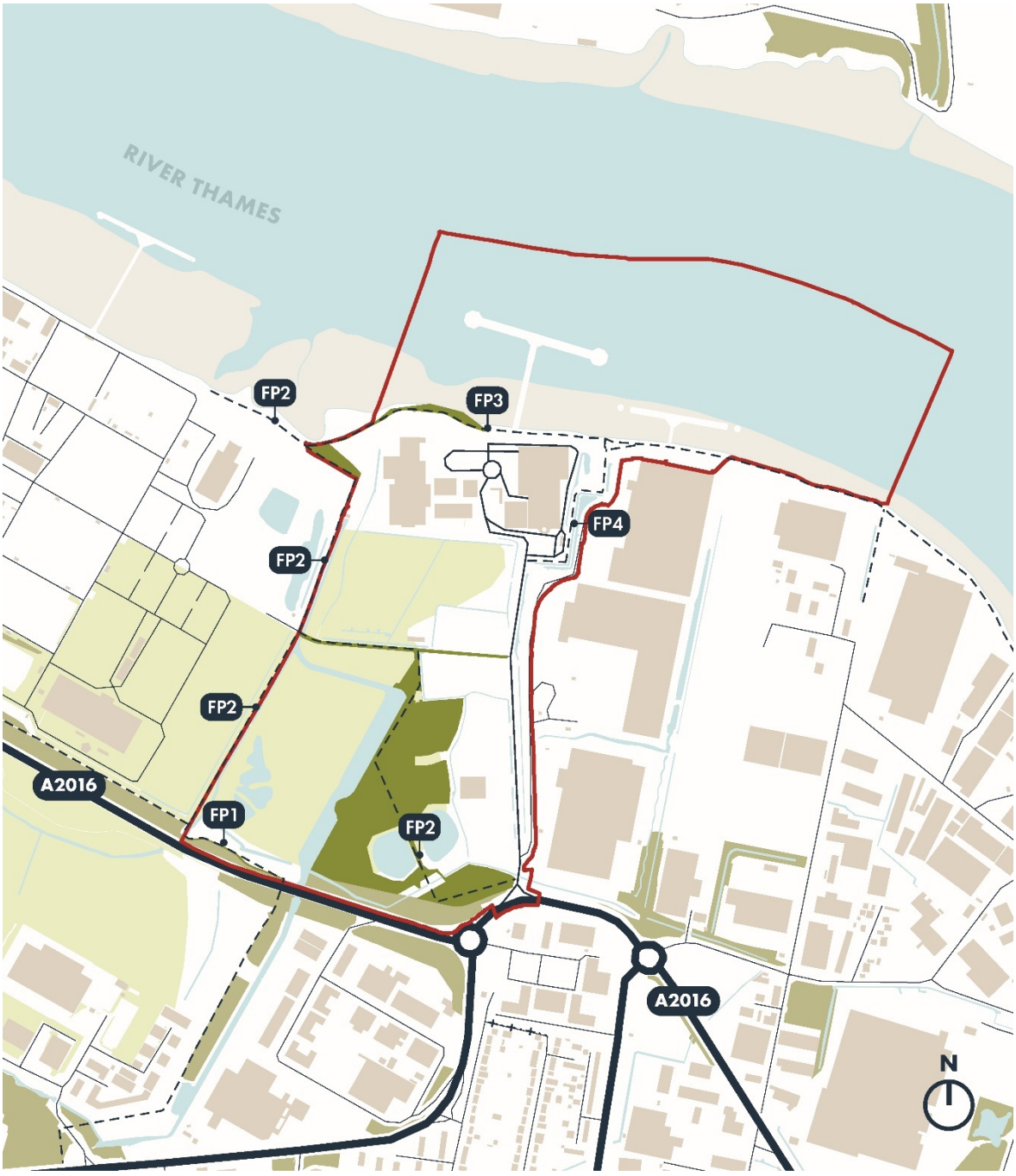
6.3. BNG

6.3.1. Provision of Biodiversity Net Gain (BNG) associated with the Proposed Scheme will be made both onsite and offsite. A full description of the BNG requirement is outlined in **Appendix 7 -1 BNG Report** of the **ES (Document Reference 6.3)** and relevant details are provided in section 10 of this document (The Proposed Biodiversity Net Gain (BNG) Strategy).

6.3.2. One option for provision of offsite BNG is at the former Golf Course at Thamesmead. This document outlines in section 10 the relevant work and mechanism for the delivery of BNG at Thamesmead and alternative approaches to BNG delivery, in the event that the Thamesmead delivery option is not progressed. **Figure 4** illustrates the location of the Thamesmead Golf Course.

6.4. PUBLIC RIGHTS OF WAY

6.4.1. A description of the construction and operational phase works associated with PRoW is outlined below. The existing PRoW subject to diversion (temporary or permanent) are illustrated in **Figure 8** and additional proposed PRoW are illustrated in **Figure 9.**



Key

Site boundary

Accessible Open Land

PRoW - Footpath

CONSTRUCTION PHASE

6.4.2. The existing PRoW subject to diversion during construction (temporary) comprise:

- FP3/NCN1 - England Coastal Path;
- FP 2 - extending through the Crossness LNR; and
- FP4 - extending east of Riverside 1.

6.4.3. **Chapter 14 of the ES (Document Reference 6.1)** sets out the construction phase mitigation strategy in relation to FP3, which is summarised here for ease of reference.

6.4.4. The design will ensure that routes used by walkers, graziers and cyclists (including PRoW, long distance walking routes and NCN routes) will, where practicable, remain open and accessible to users during construction. Where this is not practicable, suitable temporary diversions will be identified, which will ensure that appropriate surfaced roues are provided for all current users of these routes.

6.4.5. Any temporary diversion routes will be agreed with London Borough of Bexley (LBB) before implementation pursuant to approval of the full Code of Construction Practice.

6.4.6. FP2 is located within the Site and would need to be permanently diverted as a result of the construction activities and for the operational requirements of the Carbon Capture Facility. It may also need to be temporarily diverted prior to this in the construction phase on routes to be agreed with LBB.

6.4.7. It is also anticipated that the construction works would be phased and, therefore, the remaining informal routes within Crossness LNR and Erith Marshes SINC (which are publicly accessible and classed as Accessible Open Land) would be closed to the public in phases (rather than in full) during the construction phase. These temporary restrictions would cease upon completion of construction.

6.4.8. FP4 is located within the Site and provides a link between the England Coast Path (FP3/NCN1) and Norman Road. During construction, a number of Above Ground LCO2 Pipelines are likely to be installed along the eastern side of the Site Boundary, to connect the Carbon Capture Facility to the Proposed Jetty. It is expected that this PRoW will be closed for shorter periods (i.e. less than a day) throughout the construction phase, whilst specific activities are undertaken – namely lifting heavy objects. Due to the ad hoc nature and limited duration of closures, no diversion is anticipated, Chapter 2 of the ES sets out the proposed footpath control mechanisms in priority order.

OPERATION PHASE

6.4.9. The existing PRoW subject to amendment during operation (permanent) comprise:

- FP2 – realignment;
- FP2 - extension/provision of additional 'arm' to connect to FP3; and
- FP1 – extension.

6.4.10. **Chapter 14 of the ES (Document Reference 6.1)** sets out the operational phase strategy in relation to PRoW, which is summarised here for ease of reference.

6.4.11. The permanent diversion of FP2 is required for CCF safety reasons. The diversion route will be agreed with LBB as part of agreeing the full LaBARDS, to enable the diversion route to dovetail with the wider landscape and habitat proposals in the Mitigation and Enhancement Area.

6.4.12. Similarly, the final routing and details of the extensions to FP1 and FP2 proposed would be approved by LBB alongside agreeing the full LaBARDS.

6.4.13. The start and end points of these permanent changes are shown on the Access and Rights of Way Plans (Document Reference 2.4) and comprise a likely diversion of a portion of the FP2 route between Norman Road and the connection to the north- south route of FP2 to the west of the Crossness LNR.

6.4.14. Additional PRoW routes are proposed illustrated on Figure 9 and detailed in section 9. Additionally, enhancements will be developed and provided including for example, interpretation boards and localised works to the boundaries to the immediate context of the England Coast Path (FP3/NCN1). These will be detailed as part of the full LaBARDS.The DCO also provides for the Applicant to be able to authorise motorised use of FP1 – FP4 during both the construction and operational phases – this is for the Applicant's requirements, but also to allow for improved access arrangements for graziers and the Friends of Crossness LNR, if requiredProposals for new footpath and permissive paths or links will be developed with terrestrial biodiversity in mind and through engagement with LBB and relevant user groups to ensure that potential negative impacts are understood, mitigated and managed through construction and operation phases. This could include installation of boardwalks, fences, all weather surfacing, gates and signage, with the aim of improving the user experience and conservation of habitats. The alignment of new public rights of way (footpaths) will be secured through submission and approval of the full LaBARDS

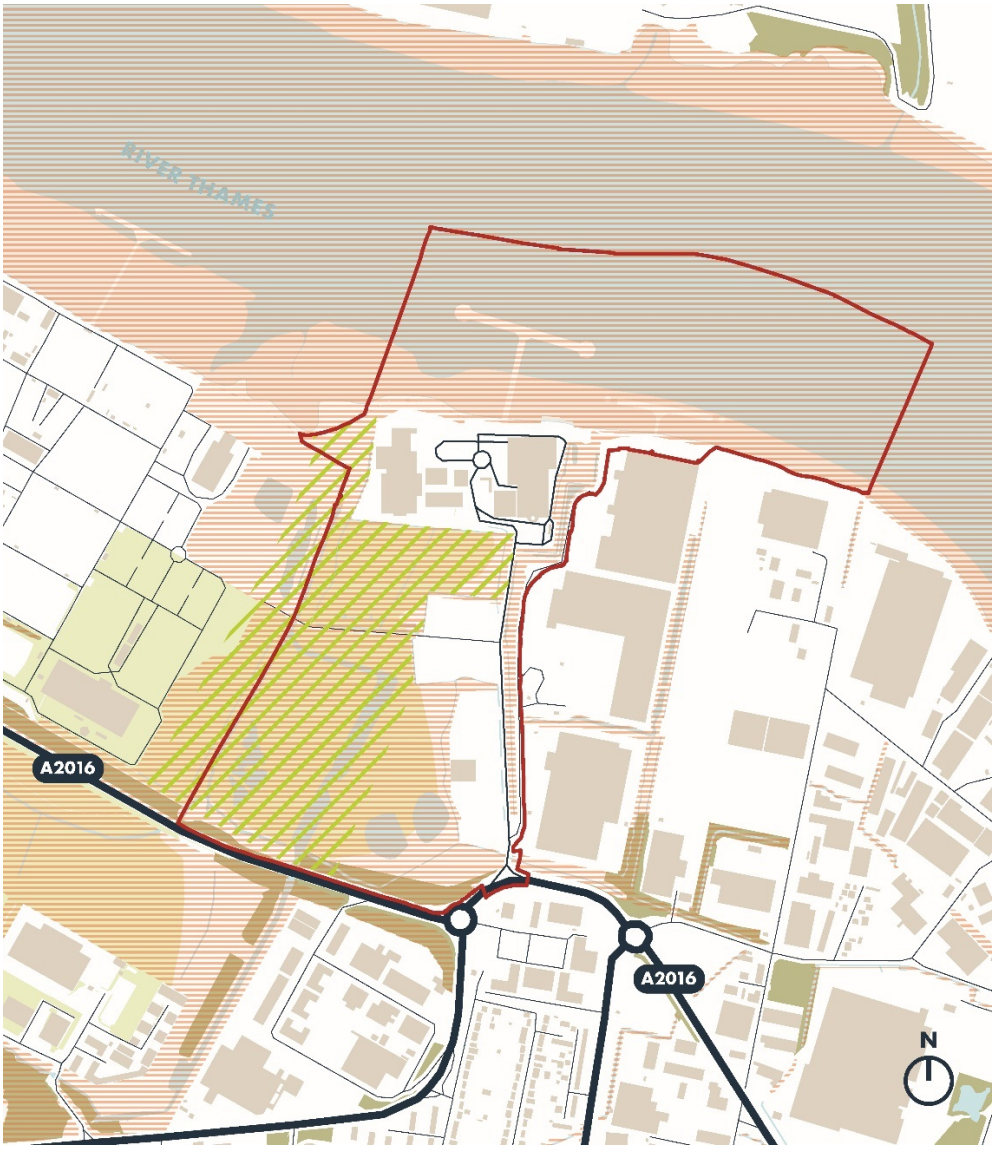
6.4.15. .

Key

- Site boundary
- Public Rights of Way (PRoW)
- PRoW Diversion
- New PRoW
- Other public access route and cycleway
- Security fenceline to carbon capture facility
- Existing fenceline
- Amended fenceline
- Proposed fenceline
- Direction/access towards nearby locations
- Proposed gates
- Vehicular access
- Proposed pedestrian crossings
- Proposed car park

7. PLANNING POLICY BACKGROUND AND NATURE CONSERVATION DESIGNATIONS

7.1.1. The Site is covered by a number of nature conservation, green infrastructure and planning policy designations illustrated in **Figures 10 and 11**. The policies are, in cases, interrelated, addressing several topics in a single policy.

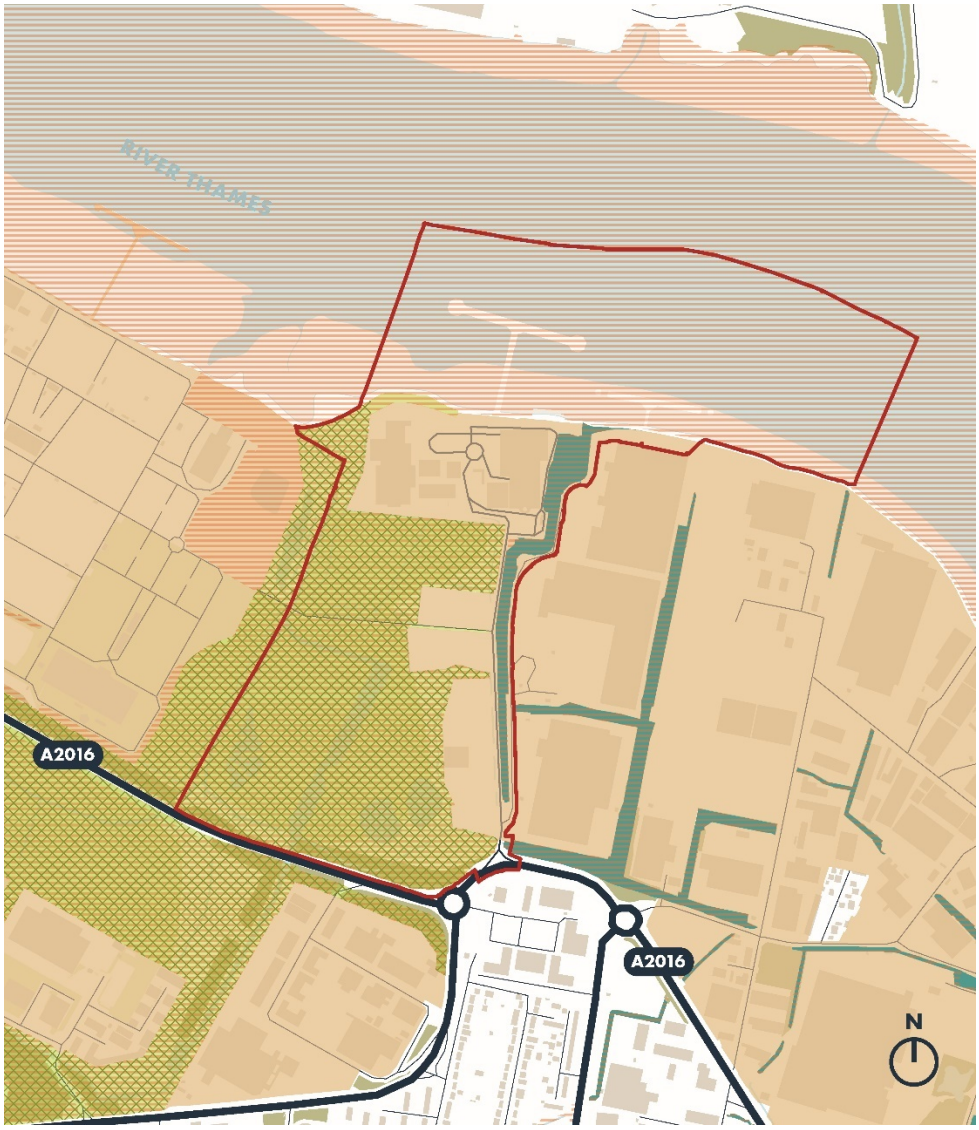


Key

Site boundary

Local Nature Reserve

Site of Importance for Nature Conservation



Key

- Site boundary
- Strategic Industrial Locations
- Metropolitan Open Land
- Southeast London Green Chain
- Urban Open Space
- Sites of Importance to Nature Conservation

7.2. NATURE CONSERVATION:

7.2.1. The Site straddles the Erith Marshes Site of Importance for Nature Conservation (SINC), and the Belvedere Dykes SINC. Crossness Nature Reserve (LNR) which forms part of the Erith Marsh complex, is designated as a Site of Metropolitan Importance for Nature Conservation and forms part of the Southeast London Green Chain.

7.2.2. These SINC are connected to the River Thames SINC and also reflected in identified Strategic Green Wildlife Corridors identified in LLB's SINC Report Addendum 2022.

7.3. GREEN INFRASTRUCTURE

NATIONAL PLANNING PRACTICE GUIDANCE 1 (NPPG 1) AND LONDON ENVIRONMENTAL STRATEGY

7.3.1. National Planning Practice Guidance 1 defines Green Infrastructure as:

7.3.2. "*A network of multifunctional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities. Green infrastructure is not simply an alternative description for conventional open space. As a network it includes parks, open spaces, playing fields, woodlands, but also street trees, allotments and private gardens. It can also include streams, canals and other water bodies and features such as green roofs and walls*."

7.3.3. The inclusion of green infrastructure as part of new development has been identified by the Intergovernmental Panel on Climate Change (IPPC) as having a wide range of climate benefits relating to both mitigating and adapting to climate change.

7.3.4. The London Environment Strategy provides additional detail on the benefits of Green Infrastructure (GI): *'London's green infrastructure is the network of parks, green spaces, gardens, woodlands, rivers and wetlands (as well as features such as street trees and green roofs) that is planned, designed and managed to: Promote healthier living; Lessen the impacts of climate change ; Improve air quality and water quality; Encourage walking and cycling ; Store carbon; and Improve biodiversity and ecological resilience*.'

BEXLEY LOCAL PLAN POLICY SP8

7.3.5. The Bexley Local Plan Policy SP8 – '*Green Infrastructure including designated Green Belt', notes that Green Infrastructure is a 'valuable asset delivering a number of environmental, societal and health benefits..... and ……that Bexley's green*

infrastructure comprises a series of spaces and corridors, forming a network that stretches throughout and beyond the borough. Blue infrastructure includes tidal/inland waterways and water features.'

7.3.6. This policy seeks to protect both open space and green infrastructure, making clear an expectation that mitigation will be required in response to development which affects provision of these assets. It also seeks to protect sites of nature conservation (including SINC and LNR) for their biodiversity value, recognising that they are important spaces for people, and policy encourages access to them.

7.3.7. Bexley's ambitions for local green and blue infrastructure include improving access to open space and nature; supporting maintenance and enhancement of blue infrastructure; ensuring existing and new green infrastructure is maintained and enhanced to a high standard and protecting and enhancing biodiversity and strategic green corridors.

BEXLEY GREEN INFRASTRUCTURE STUDY 2022

7.3.8. The Bexley Green Infrastructure Study 2022 aimed to develop a comprehensive understanding of existing green infrastructure assets, future demands, surpluses and deficiencies, and opportunities to inform the development of policies such as SP8.

7.3.9. **Figure 12** illustrates the local GI assets in relation to the Site and the following text considers how the GI Study characterised those assets.

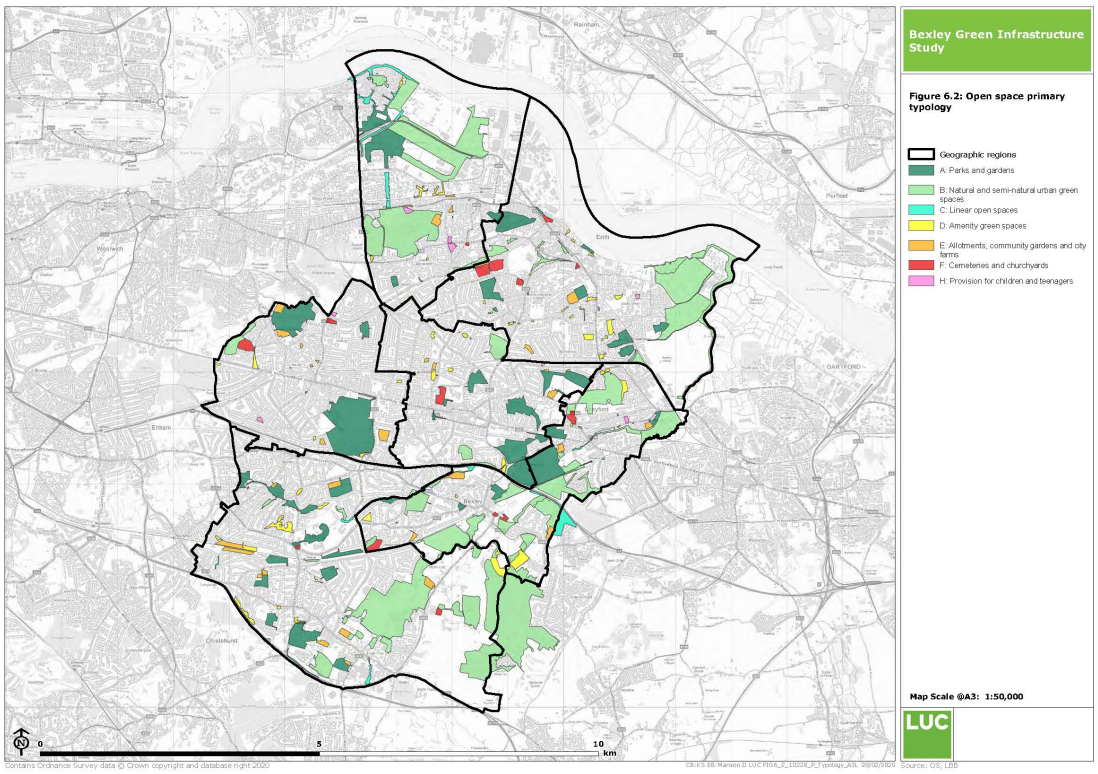


Figure 12 – Local GI assets

7.3.10. Parts of the Site form part of the Southeast London Green Chain which is described as forming a linked system of approximately 300 open spaces including a series of circular walks that link major open spaces extending from the River Thames to Crystal Palace Park.

7.3.11. Other highlights from the Green Infrastructure Study relevant to the Proposed Scheme are as follows:

- Biodiversity: In relation to biodiversity there are four Local Nature Reserves (LNR) distributed throughout the borough, covering 130.02ha. Access to LNR is more limited in the north east of the borough which is assumed to include the Site.
- Green Infrastructure: The Study outlines a range of existing and emerging strategies as well as consideration of the drivers for GI. The Study culminates in a GI Opportunities Map that sets out potential opportunities to strengthen and optimise the GI network. The Site is identified as 'Thames Path and Northern Boundary'. Opportunities identified include '*enhance opportunities for recreation through improved links towards the Thames Path…and strengthen the Thames*

Path link to the east…….. enhance interpretation of the area's history and cultural assets. Mitigate against detracting features through landscape enhancements and appropriate planting.'

- Metropolitan Open Land (MOL): In relation to MOL the Study identified the undeveloped areas of the Site and those lying outside land identified for development in the Local Plan (MOL1c Land to north and south of Eastern Way including Southmere Park and Crossway Park), as having '*strong openness'*.
- Open space: The Study identified the open land within the Site as being of '*Higher quality/higher value*' open space. Such sites are '*considered to be best open spaces within the borough offering the greatest value and quality for the surrounding communities. Future management should seek to maintain the standard for these spaces and ensure they continue to meet the requirements of the communities they serve*.' However, the Study noted that natural and seminatural urban green space are considered to feel less open and secure and that it is therefore important to have a frequent flow of people within open spaces to offer self-surveillance.

7.4. PLANNING

7.4.1. The majority of the Carbon Capture Facility area forming part of the Proposed Scheme, falls within an 'Employment Opportunity Area' allocated under the London Plan policy 4.12 and at a local level, 'Employment growth, innovation and enterprise' Bexley Local Plan policy SP3 and also forming part of the Belvedere Industrial Area – Bexley Local Plan policy DP7.

7.4.2. The areas of undeveloped land and lying outside policy SP3 and DP7, are designated as MOL, under London Plan Policy G3 – 'Metropolitan Open Land' and Bexley Local Plan policy SP8 - 'Green Infrastructure including designated Green Belt' and associated supporting text.

7.4.3. LBB Policy SP8 'Green Infrastructure including designated Green Belt' notes the following (which underpins the Environmental Proposals and Access and Recreation Proposals that form part of the Proposed Scheme):

- that beneficial use of MOL should be encouraged for public access, outdoor recreation, retaining and enhancing landscapes, visual amenity, biodiversity or to improve damaged or derelict land;
- protecting Urban Open Space, only allowing development where the public benefit of development clearly outweighs harm;
- agreeing proposals for creating or improving habitat, implementing priorities for the recovery of nature outlined in local nature recovery strategies etc;

- protecting land that forms part of the Southeast London Green Chain as important environmental, recreational and educational resource…. seeking to improve public access to and through the area and promoting it as a recreational resource and visual amenity;
- supporting the creation of new cycling and walking routes to connect publicly accessible open spaces….;
- ensuring all new development deliver a net increase to green infrastructure;
- protecting …existing amenity space that has been provided as part of a development…; and
- protecting and enhancing the biodiversity, heritage … values of open spaces….

7.4.4. The rationale for the Proposed Scheme and Carbon Capture Facility location in relation to both the MOL and SINC/Crossness LNR, is outlined in the **Terrestrial Site Assessment Report (TSAR) (Document Reference 7.5)** and **DAD (Document Reference 5.6)** and seeks to minimise impacts on these designations. The Environment Proposal and Access and Recreation Strategy outlined in section 9 seeks to respond to the aforementioned nature conservation and planning policy designations.

7.4.5. It should be noted that open space, identified in Bexley Local Plan policy SP8, extends across the undeveloped areas of the Site and excludes land identified for industrial development. However, the open space as illustrated in the Bexley Local Plan Key Diagram, is not necessarily accessible to the public. For clarity the Applicant has identified 'Accessible Open Land', **Figure 9**, to inform the understanding of any mitigation that may be appropriate in the light of policy. Accessible Open Land comprises land of an open character within the Site, that is accessible to the public and that is not fenced for the purposes of restricting access. The Applicant considers that this land can also be classified as 'public open space' for Planning Act 2008 purposes as it is accessed and used by the public for recreational walking and activities. This land is designated as:

- 'publicly accessible open space' and as part of the Southeast London Green Chain in the Bexley Local Plan 2023; and
- Metropolitan Open Land in the London Plan 2021

7.4.6. Note: Part of the Accessible Open Land also falls within the Crossness LNR and Erith Marshes SINC.

7.4.7. Whilst the Proposed Scheme involves the loss of land within these designations, it does not result in the loss of any Accessible Open Land.

7.4.8. Planning policy compliance is considered further in the **Planning Statement (Document Reference 5.2)**.

8. THE PROPOSED SCHEME

8.1. THE PROPOSED SCHEME

8.2. The Proposed Scheme (operation phase) is composed of four elements illustrated in **Figure 13**:

- Carbon Capture Facility (CCF);
- Interactions with Riverside 1 and 2;
- Proposed Jetty; and
- Mitigation and Enhancement Area.

8.2.1. These elements are described in full in the ES Chapter 2 (Document Reference 6.1.2) and defined in the **Works Plans (Document Reference 2.3)** which are submitted for approval and accompanied by the **Design Principles and a Design Code (Document Reference 5.7)**, also submitted for approval.

8.2.2. This Outline LaBARDS supports the delivery of key elements of the Proposed Scheme for the terrestrial element of the Proposed Scheme only. Marine design elements of the Proposed Scheme are controlled through the same controls listed above and will also be considered through a Requirement of the DCO.

8.2.3. The **Design Approach Document (DAD) (Document Reference 5.6)** describes the evolution of the design and its interaction with the natural environment and the approach to mitigating impact on the natural environment and planning policy designations which is summarised in section 6 of this document. The consideration of options is also summarised in the **DAD (Document Reference 5.6)** and detailed in the **TSAR (Document Reference 7.5) and JSAR (Document Reference 7.6)**.

8.2.4. The effects of the Proposed Scheme are recorded in the **ES (Document Reference 6.1)** and summarised in the **ES Non-Technical Summary (Document Reference 6.4)** under construction and operation phases.

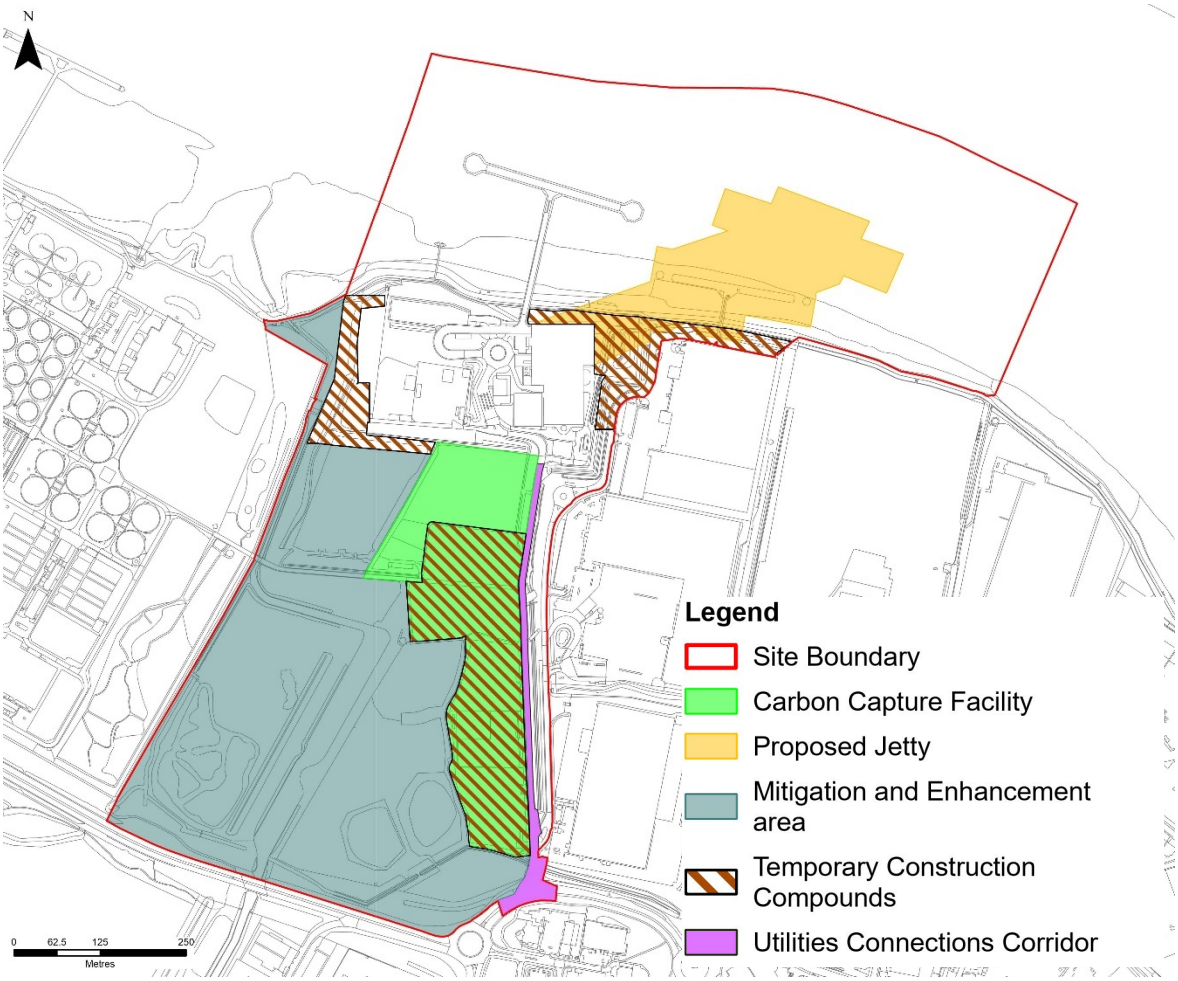


Figure 13 Key elements of Proposed Scheme

8.3. CONSTRUCTION PHASE

8.3.1. The construction phase effects are recorded in the **ES (Document Reference 6.1)** and summarised in the **ES Non-Technical Summary (NTS) (Document Reference 6.4)**. The main effects and mitigation measures relevant to this Outline LaBARDS arising from the Proposed Scheme and summarised in the NTS are as follows.

BIODIVERSITY

8.3.2. The construction of the Proposed Scheme results in the loss of the following habitats due to the installation of the Carbon Capture Facility and alignment of connecting pipework to Riverside 1 and 2:

- Reedbed: 0.373ha;
- Other neutral grassland (moderate condition): 0.665ha;

- Other neutral grassland (poor condition): 0.037ha;
- Coastal floodplain grazing marsh: 2.042ha;
- Modified grassland: 0.905ha;
- Bramble scrub: 0.905ha;
- Open Mosaic habitat on previously developed land (to be reinstated by Riverside 2 but falling under the footprint of the CCF): 0.982ha;
- Ditch habitat: 400m/0.091ha; and
- Mudflat (littoral mud): 0.001ha.

8.3.3. During the construction of the Proposed Scheme works to mitigate effects comprising the enhancement of existing habitats or the establishment of new habitats will commence and be subject to ongoing management to deliver the proposed mitigation defined in this Outline LaBARDS. **Figure 14** illustrates the existing habitats and those to be established which are detailed in section 9 and 12 of this document.

8.3.4. Land utilised to accommodate temporary construction compounds, processes and construction routes in the Mitigation and Enhancement Area, such as within Sea Wall field, will be appropriately restored following its temporary use.

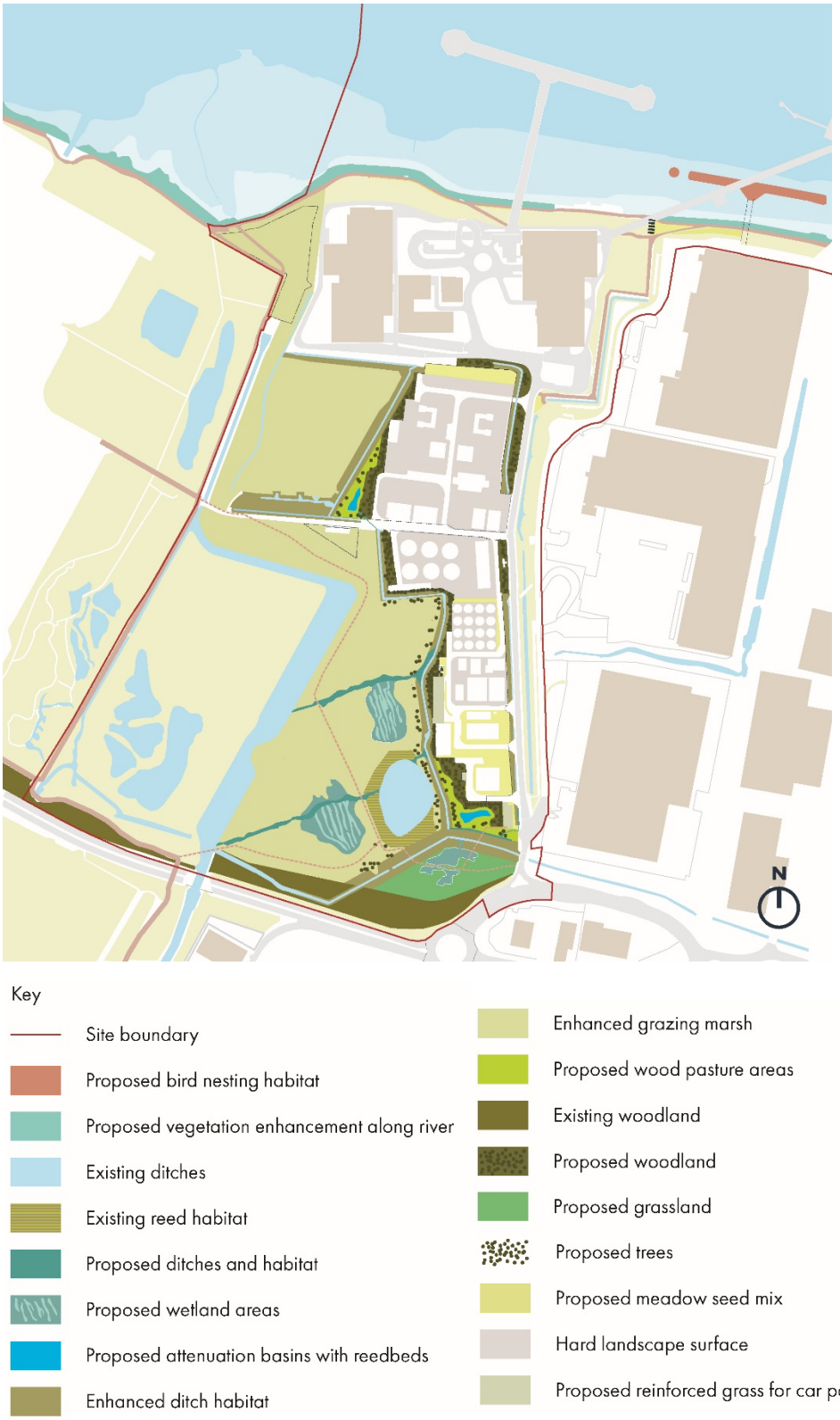


Figure 14 – Existing Habitats, New Habitats and Landscape Proposals

8.3.5. Key onsite habitat mitigation in the Mitigation and Enhancement Area secured in this Outline LaBARDS comprises:

- improvement in Flood Plain Grazing Marsh habitat from Poor condition to Moderate condition secured through improved ground wetting delivered via proposed drainage proposals associated with improved existing ditches and new ditches;
- establishment of new ditch and reedbed habitat;
- establishment of new neutral grassland habitat;
- establishment of ditch, reedbed replacement habitat and enhancement of existing ditch habitat for water voles, secured pursuant to licensing;
- establishment of supporting habitat for protected and notable species including bats: foraging and commuting habitat; breeding birds: nesting habitat; wintering birds: foraging habitat; and habitat for reptiles and invertebrates;
- increasing biodiversity of existing deciduous woodland habitat through management; and
- management of ditches and water courses to improve aquatic planting species diversity.

8.3.6. The control of America Mink through survey and trapping to support water vole populations is secured through the **Outline Code of Construction Practice (CoCP) (Document Reference 7.4)**.

8.3.7. Impacts to ongoing grazing activities will be minimised during construction, including through temporary relocation of horses and facilities, and establishment of new permanent equivalent facilities. The intention is to enable horses to remain within the Mitigation and Enhancement Area throughout the construction phase where practicable.

TOWNSCAPE AND VISUAL

8.3.8. The construction activities associated with the Proposed Scheme may generate significant adverse effects for the local character, vegetation cover within the Site, and views from the Accessible Open Land and open spaces in the surrounding area. The effects on other sensitive receptors are not anticipated to be significant. A key mitigation measure will be to sensitively manage diversions of PRoW, which is dealt with in the **Outline CoCP (Document Reference 7.4)**.

8.4. OPERATION PHASE

8.4.1. The operation phase effects are recorded in the **ES (Document Reference 6.1)** and summarised in the **ES Non-Technical Summary (Document Reference 6.4)**

8.4.2. The main operation phase effects relevant to this Outline LaBARDS arising from the Proposed Scheme comprise:

BIODIVERSITY

8.4.3. During operation of the Proposed Scheme, the only potentially significant residual effect to terrestrial biodiversity is in relation to changes in air quality. These can be considered further, and sought to be managed, through detailed design and the measures set out in **Chapter 5: Air Quality** of the **ES (Document Reference 6.1.5)** which will be delivered through implementation of the Operational Environmental Management Plan, as secured by a requirement of the **Draft DCO (Document Reference 3.1)**.

8.4.4. Through an Operational Environmental Management Plan, work will be timed to avoid sensitive periods of the year for specific species, such as avoidance of bird nesting season.

8.4.5. Managed grazing is an important factor in maintenance of the valued flood plain grazing marsh habitat and will be retained to perform this function, with suitable provision made for the graziers.

TOWNSCAPE AND VISUAL IMPACT

8.4.6. Once the Proposed Scheme becomes operational, it is likely to be a dominant feature in views for users of accessible open land in close proximity to the Site. Significant effects are anticipated for changes in character and visual amenity from accessible open land in proximity to the Site. The effects on other receptors are not anticipated to be significant. Mitigation measures to limit the effects on sensitive receptors will be implemented pursuant to this Outline LaBARDS:

- the creation of a landscape buffer along the boundaries of the Site to minimise any potential visual effects;
- a permanent diversion of FP 2 within the CLNR to reduce ‘up close’ views of the Site for users of this footpath; and
- incorporating additional tree planting to provide screening to operational equipment in suitable areas, without compromising the distinctiveness or condition of valued existing habitats

9. DESIGN PRINCIPLES AND DESIGN CODE

9.1.1. The **Design Principles and Design Code (Document Reference 5.7)** submitted as a document for approval are set out in the **DAD (Document Reference 5.6)** within supporting narrative. The Design Principles and Design Code information of relevance to the LaBARDS, is provided in this document.

9.1.2. The DCO requires that in submitting the full LaBARDS(s) for approval, the Applicant must show how the Design Principles and Design Code have been taken into account in developing it.

9.2. DESIGN PRINCIPLES

9.2.1. As described in the **DAD**, the Design Principles have been developed for the Proposed Scheme and should be read alongside this Outline LaBARDS as together they will control the development of the Environmental, Access and Recreation Proposals set out in this strategy.

9.2.2. These Design Principles are structured to accord with the National Infrastructure Commission's guidance under the thematic headings of: Climate, People, Places and Value. The most relevant Design Principles within these themes are as follows:

CLIMATE

9.2.3. Deliver resilient habitat mitigation and compensation that is capable of being sustained and ensure that building and infrastructure fabric retains integrity:

- DP_CL 1.1 Direct site drainage from the main operational area hard standing areas to support local ground water levels and to enhance grazing marsh and existing and proposed wetland habitat. Attenuate and treat surface run-off from the main operational areas onsite before releasing into the local ditch network to support wetland water quality site wide.
- DP_CL 1.3 Provide increased species diversity within defined grazing marsh areas and adjacent habitats to provide further resilience in the face of changing climate.
- DP_CL 1.4 Contribute to habitat enhancement, creation, and resilience at Thamesmead through provision of off-site mitigation and Biodiversity Net Gain works.

PEOPLE

9.2.4. Deliver benefits to people and communities reflecting what the community wants:

- DP_PE 1.1 Improve the local public footpath connections to deliver a recreation and commuting route linking Thamesmead to the Crossness Local Nature

Reserve and promotion of local circular route via Thames Path including local enhancements for wayfinding and information.

- DP_PE 1.2 Make provision for new interventions in addition to the retention and enhancement of existing features to improve public awareness of local nature and points of cultural and educational interest.
- DP_PE 1.4 Work with stakeholders to further their objectives and balance conflicts of interest including the FoCLNR (Friends of Crossness Local Nature Reserve) and existing graziers.
- DP_PE 1.5 Provide a visually attractive environment that secures a sense of belonging and personal security that is of consistent quality in terms of open space, natural habitat access, landscape design and architectural quality.

PLACES

9.2.5. Deliver a project that promotes a sense of identity, improves the quality of and access to the natural environment and mitigates changes in the character and visual environment through good design:

- DP_PL 1.2 Provide well organised and well designed and managed boundaries to the operational areas. Control the visual appearance of the operational area in views from adjoining areas to deliver a coherent appearance. Provide planted boundaries appropriate to local character around the CCF Area to support the natural character of the Local Nature Reserve and an organised interface with Norman Road.
- DP_PL 1.3 Extend the extent of the Local Nature Reserve and improve existing habitats to compensate for the loss resulting from the development.
- DP_PL 1.7 Optimise the performance of retained Metropolitan Open Land purposes and secure enhancement through good design and management, improved interpretation and access.
- DP_PL 1.10 Existing points of access and vehicular routes should be maintained in their current locations where practicable, including the Thames Water Access Road to Norman Road. Where temporary diversions or minor changes to alignment are required, full remediation of habitats and compensatory planting should be provided.

VALUE

9.2.6. Deliver a project that is efficient and secures benefits beyond the immediate CCF Area boundary:

- DP_VA 1.2 Minimise the loss of open land and natural habitat including through a transparent optioneering process focused on efficiency in the final layout and detailed design delivery.
- DP_VA 1.3 Provide benefits to the local community through direct proportionate mitigation and compensation for loss of open land, public access, and access to natural areas.
- DP_VA 1.5 Support the delivery of a more attractive and useable Local Nature Reserve through any alteration of area or configuration, support to improved management and provision of improved access, interpretation, and activation recognising the sensitivity of existing habitats.

9.3. DESIGN CODE

9.3.1. The **Design Code** is also submitted for approval **(Document Reference 5.7)** and should be read alongside this Outline LaBARDS. The Code is arranged under the following headings.

- Campus Wide;
- Carbon Capture and Storage Facility;
- Nature Reserve and Open Space;
- Thames Path and Jetties; and
- Norman Road.

10. THE PROPOSALS AND STRATEGIES: ENVIRONMENT AND ACCESS AND RECREATION

10.1.1. The Proposals are informed by an appreciation of, and strategy to, minimise the effects of the Proposed Scheme on MOL in relation to its primary aim to be '*a break within the built-up area*' and its purposes and its performance with regard to Bexley Local Plan Policy SP8, to address relevant nature conservation policies in relation to SINC and Local Nature Reserves, and to consider impacts to green infrastructure, open space and its user groups.

10.1.2. In relation to the performance of the MOL to its defined purposes, consideration has focused on the purpose '*to check unrestricted sprawl of large built up areas*'. However, local plan policy also sets broader purposes for the MOL, not least London Plan policy G3 of the London Plan which recognises that '*It plays and important role in London's green infrastructure'* such that paragraph A(2) introduces a requirement on boroughs to *'work with partners to enhance the quality and range of uses of MOL'* and the supporting text at paragraph 8.3.4 (replicated at paragraph 5.65 of the Bexley Local Plan) states that '*proposals to enhance access to MOL and to improve poorer quality areas such that they provide a wider range of benefits for Londoners that are appropriate within the MOL will be encouraged.*' The text advises that examples of this would include *'improved public access for all, inclusive design, recreation facilities, habitat creation, landscaping improvement and flood storage'*. In its undeveloped state, the Site including the CCF, is visually open but the character is compromised by the presence of industrial and large scale logistics development, and infrastructure that adjoins the Site. In its developed state, the CCF Area will be characterised by built development and infrastructure reducing in intensity of scale from north to south, with a focus of higher elements to the north associated with existing tall structures associated with Riverside 1 and 2. The proposed CCF layout in the south is lower, less dense and less 'industrial' in character and supports a looser and more 'visually open' development character that steps down to engage with the nearby local community of Belvedere as illustrated in the **DAD (Document Reference 5.6).**

10.1.3. This layout supports the establishment of a generous physical and visual approach to the expanded and reconfigured Crossness LNR off Norman Road illustrated in the DAD. The open areas of the Site comprising the proposed expanded and reconfigured Crossness LNR, will be visually open and characterised by an increased coherence of 'natural' landscape and delivery of the 'One Nature Reserve' concept. This concept is delivered through the Environmental Proposals and Access and Recreation Proposals in this document and takes into

consideration the Green Infrastructure Strategy, the Levels, Hydrology and Drainage Strategy and Edges and Interfaces Strategy described in the DAD.

10.1.4. This indicative masterplan has been designed to respond positively to the wider aims and purposes attributed to MOL by policies G3 and SP8 of The London Plan and Bexley Local Plan respectively, which extend beyond the simple spatial intentions of Green Belt policy. These local development plan documents require MOL not only to provide a break within a built up area, but also to improve Londoners' quality of life by providing wider benefits for residents, including improved access to enhanced outdoor spaces that also function effectively for eg nature conservation and flood storage..

10.1.5. It is acknowledged that the proposed CCF results in the loss of an area of Crossness LNR and MOL immediately south of Riverside 1 and 2. The reasoning for this is outlined in the DAD, Terrestrial Sites Alternatives Report (TSAR) and Planning Statement and in Examination submissions.

10.1.6. The proposal for the expanded Crossness LNR provides compensation for loss of habitat and resilience for the LNR, following the proposed removal of East and Stable Paddock to enable the delivery of the CCF. The expansion proposes the inclusion of Norman Road Field to provide an expanded Crossness LNR, provide mitigation for the loss of flood plain grazing marsh and ditch habitat and an opportunity to improve water levels in the LNR from improved ditch engineering, management and control water levels arising from the Proposed Scheme. Improved control and regulation of water levels also seeks to benefit graziers (an important component of the grazing marsh landscape) and reduce the impact of flooding. The expanded Crossness LNR would be defined to the east, by existing ditch habitat enhancement works that tie into the boundary planting proposals for the CCF itself.

10.1.7. The total area of the existing Crossness LNR is 25ha. In total, the Proposed Scheme would lead to the following impacts:

- The area of LNR lost to the CCF footprint comprises: 2.3ha
- The area of LNR lost to the CCF connecting pipework connecting to Riverside 1 and 2 requiring the relocation of the existing ditches to establish a new LNR boundary to the north, comprises: 1ha (worst case)
- The land proposed to be incorporated into the management of the existing LNR: 8.4ha.
- The net area by which the Crossness LNR would be expanded: 5-6ha.

10.1.8. The Environmental Proposals are illustrated in **Figure 15** and reflect how the Applicant has sought to respond to planning policy constraints identified during

design development, the results of the EIA process and the desire to integrate the CCF into its setting.

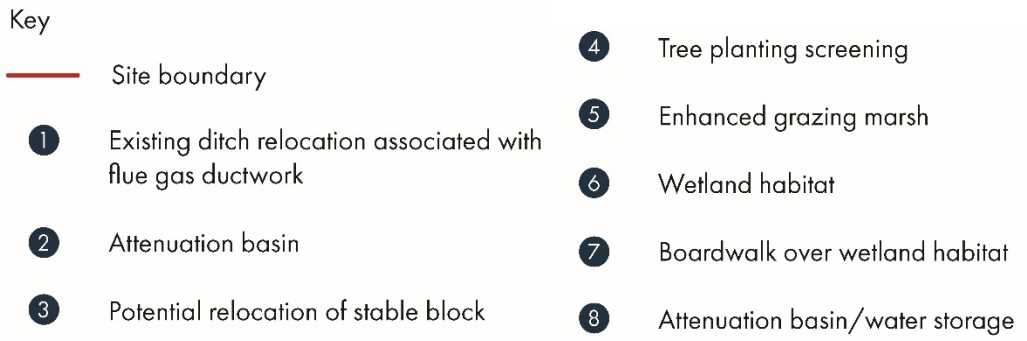


Figure 15 – Environmental Proposals

10.1.9. The Environmental Proposal is underpinned by 3 main elements:

ONE NATURE RESERVE

10.1.10. Expand the existing Crossness Local Nature Reserve (CLNR) into the land immediately south and west of the CC Facility providing a gain of 5-6ha for land under CLNR management.

10.1.11. The Proposed Scheme results in the loss of an area of the existing Crossness LNR. The proposal is to compensate for this loss of LNR area through the dedication of an existing area of grassland habitat including poor quality grazing marsh to establish an expanded LNR under a single management regime. This proposal allows for the ongoing Crossness LNR management to be retained and the additional benefits of a single and enlarged LNR to be secured through the Proposed Scheme. **Figure 16** illustrates the existing and proposed extents of the LNR. The DAD provides a description of the LNR proposals and the benefits, which address relevant policies and policy ambitions in relation to MOL, open space and green infrastructure. The proposed approach to management of the expanded LNR is addressed in section 12.

DIVERSE GRAZING MARSH AND BIODIVERSITY

10.1.12. Improve the distinctiveness and condition of existing valued flood plain grazing marsh habitats, delivered by raising water table and managed grazing densities, delivering direct mitigation for the physical loss of grazing marsh habitat; provide additional habitat measures to mitigate impacts and improve biodiversity; and onsite BNG. These measures and proposals are described and illustrated below and are to be delivered within the CCF Area and Mitigation and Enhancement Area.

10.1.13. The habitat enhancements are secured through improved management and creation outlined below. The post development biodiversity strategy is illustrated in Figure 17. The proposals will be delivered in defined areas outlined in section 11 of this report and identified by area and field name, as appropriate.

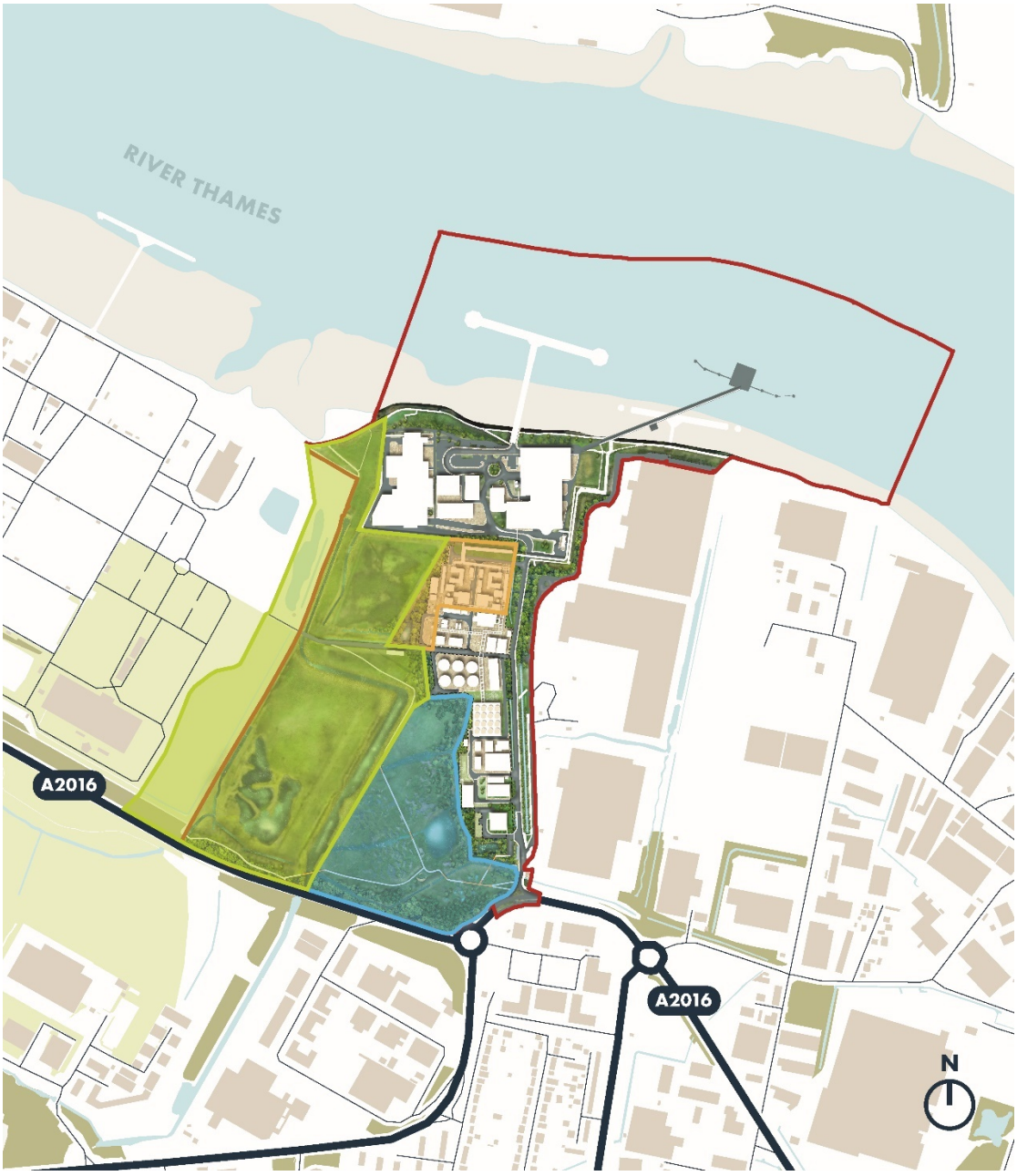
10.1.14. The proposed habitat measures include the following:

- nesting habitat;
- vegetation enhancement – bramble scrub and introduced scrub;
- works to enhance existing ditches and reed habitat;
- ditches and habitat creation;
- wetland areas – ponds and standing water;
- attenuation basins;
- enhanced coastal and floodplain grazing marsh;
- lowland mixed deciduous woodland and management of existing;
- creation and management of existing neutral grassland and modified grassland, including habitats to benefit invertebrates; and
- increased water supply to support ground water levels to support grazing marsh habitat restoration.

10.1.15. The Environmental Proposals would be developed through engagement with stakeholders (including the graziers, Buglife, Friends of Crossness LNR and Thames Water) and agreed with LBB alongside the approval of the full LaBARDS.

OFFSITE COMPENSATION

10.1.16. Offsite compensation is focussed on delivering habitats to support the Proposed Scheme's ambition to deliver at least 10% BNG. The offsite BNG Strategy is described in section 11 below.



Key

- Site boundary
- Existing Nature Reserve used for CCF
- Existing Nature Reserve retained
- Extended and managed Nature Reserve

Figure 16 – Existing and Proposed expanded Crossness LNR

Figure 17 – Post Development Biodiversity Strategy

10.1.17. The priorities of the Environmental Proposals include:

- mitigating the loss of Local Nature Reserve area and habitats within the Site;
- mitigating visual impact of the development through landscape proposals which will establish a buffer zone comprising planting of appropriate character associated with an enhanced ditch habitat that will minimise the impact on visual openness arising from the CCF and integrate the CCF into its setting;
- securing the beneficial use of Metropolitan Open Land (MOL) supporting the promotion of public access, grazier activities, outdoor recreation, retaining and enhancing landscapes, visual amenity, biodiversity or to improve damaged or derelict land;

- protecting open space, avoiding loss of Accessible Open Land;
- protecting land where possible, that forms part of the Southeast London Green Chain as important environmental, recreational and educational resource and seeking to improve public access to and through the area and promoting it as a recreational resource and visual amenity;
- protecting and enhancing the biodiversity, heritage and value of open spaces, through habitat enhancement and creation, and the enhancement of the proposed open space through the development of an expanded Crossness LNR;
- support bringing forward proposals for creating and improving habitat, implementing priorities for the recovery of nature, and continuing an appropriate level of grazing by horses;
- protecting existing amenity space that has been provided as part of a development, through the provision of an extend Crossness LNR to address loss of area required for the CCF; and
- delivery of enhanced ecological value through a minimum 10% Biodiversity Net Gain (BNG)
- Consultation and engagement with Friends of Crossness Nature Reserve and Buglife has identified further opportunities for enhancement following ongoing consultation which would be subject to ongoing scoping and confirmation in the full LaBARDS including:
  - establishment of bird and owl boxes; and
  - enhanced habitat within the existing Crossness LNR, including the Member's Protected Area; and
  - promoting (i.e. enhance) the topographical mosaic within Norman Road Field such that it is enhanced for invertebrates as well as resulting in improved condition of Floodplain Grazing Marsh

10.1.18 Establishment of Key Habitats and Species

It is important that the mitigation measures required to balance the impacts of the Proposed Scheme on habitats and species, are successfully and sustainably established within the required timeframes. None more so important than for establishment of new and enhanced water vole habitats, ahead of their translocation/reintroduction. Any Water Vole Method Statement approved by Natural England will be implemented as approved. The below gives a summary of expected works.

- Existing ditches will be enhanced and approximately 1.3km of ditches will be dug creating two wetland areas within the Mitigation and Enhancement Area to create two water vole receptor sites. Each site will be fenced off to prevent colonisation prior to translocation of voles from the affected area. Excavation of ditches within the receptor sites, and installation of vegetation will be carried out in sufficient time to allow for two growing seasons to ensure full establishment in readiness for the voles, prior to the start of CCF construction works which may impact the affected ditches. Establishment will be monitored to ensure that water voles have sufficient vegetation to provide food and cover, before release, which could be earlier than the 2 growing seasons estimate.
- During digging within existing wetland areas in the Mitigation and Enhancement Area, effort will be made to retain any extant food or cover plant species, including some associated bank top cover to aid re-growth of vegetation in the area. Any mature turf stripped during excavation will be retained for placement on top of the final bare soil areas to also aid re-growth of vegetation.
- Additionally, approximately 540m of existing ditches within the Site, will be enhanced. These ditches will be enhanced by:
  - planting of emergent vegetation to increase the species diversity to >10 species present within 20m ditch length;
  - improving water levels to sufficient water levels all year round (a minimum summer depth of approximately 50cm in minor ditches and 1m in main drains) by removing silt and excess vegetation and allowing open water to return;
  - improving water quality by removal of rubbish and waste that pollutes the ditches;
  - thinning out reed; and
  - planting water vole food plants such as reedmace Typha latifolia, yellow flag iris Iris pseudacorus and reed canary grass Phalaris arundinacea.

10.2. ACCESS AND RECREATION PROPOSALS

10.2.1. The Access and Recreation Proposals are illustrated in **Figure 18** and supported by the Access and Movement Strategy illustrated in the **DAD (Document Reference 5.6)**.

10.2.2. The Access and Recreation Proposals provide enhanced PRoW routes and connectivity within the Site and works offsite. The proposals encourage improved opportunity for active travel access, improved amenity and recreation experience and safety of routes.

Key

- Site boundary
- Hide/wildlife viewing area
- Rationalisation of fencing
- Bird nesting habitat feature
- Outdoor education area
- Improved and new pedestrian connections
- Biodiversity enhancements
- Woodland management improvements
- Improved signage strategy
- Visitor parking opportunity

Figure 18 – Access and Recreation Proposal

Figure 9 – Operational phase ProW diversions and ProW creations (repeat)

10.2.3. Opportunities have been identified for enhancement to existing ProW within the Order Limits for onsite works or via contributions to LBB via Deed of Obligation for offsite works. The proposed permanent alterations to PRoW are illustrated in **Figure 9** and comprise:

- establishing a generous new entrance to Norman Road Field and the proposed expanded Crossness LNR at the southern end of Norman Road setting back the existing field boundary to allow for a wide paved entrance to support improved visitor experience, safe grazier access and orientation signage;
- FP1 - the existing route extending west towards Thamesmead and parallel to Eastern Way including improved signage and vegetation management;
- FP3 - improvement in the existing context of the Thames Path including possible removal of redundant/ dilapidated river wall structures, improvements in river wall access openings (gates etc) subject to relevant approvals and provision of quality signage; and
- FP4 - improvement in the quality of the public realm associated with the existing PRoW extending east of Riverside 1.

10.2.4. New PRoW connections have been identified comprising:

- establish a link connecting FP2 to FP1 forming a connection from Norman Road Field to Thamesmead extending over the south end of Great Breach Lagoon; and
- establish a link between FP3 Thames Path, to the Crossness LNR approaching from the east forming an extension to the existing FP2.

10.2.5. The exact routes of these PROW alterations on-site would be agreed with LBB pursuant to the provisions of the DCO, alongside the approval of the full LaBARDS. Off-site proposals would be delivered through LBB via Deed of Obligation contributions.

10.2.6. The Recreation Proposals include provision of way finding, visitor and education facilities as part of the expanded Crossness LNR and will define through improved visitor interpretation facilities an enhanced appreciation and enjoyment of the recreation amenity forming part of the expanded Crossness LNR proposal. The proposals include cycle parking provision, relocated stable block, the potential for a new visitor car park as part of a generous southern entrance and gateway to the LNR and to the north, a more obvious presence of the Crossness LNR off the Thames Path marked by an additional PRoW and proposed visitor interpretation facilities.

10.2.7. Further engagement with graziers should feed into development of equine related facilities (eg stabling, water, power supply) and access requirements, with the

matters agreed to be set out in the full LaBARDS. Details relevant to the design of replacement stables would be a matter for the detailed design phase of the Proposed Scheme. However, at this stage, the Applicant expects the replacement stables to be on a like-for-like basis, and materially the same size and shape as its current formation.

10.2.8. These proposals will improve access to the Accessible Open Land for the local community and user groups in close proximity to the local community, in the vicinity of the existing rights of way and road crossing facilities and local public transport connections

10.2.9. The Access and Recreation Proposals would be agreed with LBB alongside the approval of the full LaBARDS to ensure that potential negative impacts to biodiversity are understood, mitigated and managed.

11. THE PROPOSED BIODIVERSITY NET GAIN (BNG) STRATEGY

11.1. BNG DELIVERY

11.1.1. The BNG Assessment outlined in the **ES Appendix 7.1 (Document Reference 6.3)** identifies the following habitats and condition targets to deliver a minimum 10% BNG onsite and offsite.

UKHab Code	Habitat Description	Action	Area (m^2)	Target Condition
f2e	Reedbed	Create	5051	Moderate
f2e	Reedbed	Retain	45816	No Change
g3c	Other Neutral Grassland	Create	17379	Moderate
g3c	Other Neutral Grassland	Enhance	463	Moderate
g3c	Other Neutral Grassland	Retain	29873	No Change
g3c(19)	Coastal and Floodplain Grazing Marsh	Create	6610	Moderate
g3c(19)	Coastal and Floodplain Grazing Marsh	Enhance	67854	Moderate
g3c(19)	Coastal and Floodplain Grazing Marsh	Retain	53981	No Change
g3c(19,d)	Coastal and Floodplain Grazing Marsh	Create	110	Moderate
g3c(19,d)	Coastal and Floodplain Grazing Marsh	Enhance	2033	Moderate
g4	Modified Grassland	Retain	6539	No Change
h3d	Mixed Scrub	Retain	13321	No Change
r1(39,41)	Cory Pond 6 / CNR Waterbodies	Retain	20762	No Change
r2	Ditches	Create	1761	Poor
r2	Ditches	Retain	11038	No Change
w1f	Woodland	Create	7381	Poor
w1f	Woodland	Enhance	9979	Moderate
w1f	Woodland	Retain	4806	No Change

11.1.2. Onsite baseline habitats will be lost, retained or enhanced, post-development.

11.1.3. Onsite baseline habitat is quantified in Table 3-1 for Area Habitats, and Table 3-2 for Watercourse Habitats, and Table 3-3 for offsite baseline habitats which are provided in Appendix 1 of this Outline LaBARDS.

11.1.4. New habitats will also be created onsite, and are detailed in Table 4-3 for Terrestrial and Marine, Table 4-4 for Watercourses and 4-6 for offsite habitat creation which are provided in Appendix 1 of this Outline LaBARDS.

11.1.5. Table 4-1 details onsite habitats retained, enhanced and lost and Table 4-2 onsite Watercourse Habitats retained, enhanced and lost. Table 4-5 details offsite Area Habitats retained, enhanced and lost. These are provided in Appendix 1 of this Outline LaBARDS.

11.1.6. It is assumed that the majority of habitat creation and enhancement work, both onsite and offsite, will take place concurrently with construction of the Carbon Capture Facility and connecting pipework. However, woodland and other neutral grassland creation identified on the boundary of the CCF will follow the completion of construction work and begin alongside CCF commissioning, which is anticipated to result in a delay of two years.

ONSITE

11.1.7. The post-development habitats expected onsite after construction within the CCF Area and Mitigation and Opportunities Area, are based on the Environmental Proposals set out in this document and are shown as UKHab habitat types in **Figure 17**. The location of this BNG provision is outlined in the schedule in section 11 of this report.

OFFSITE

11.1.8. Habitat plans for the offsite BNG Opportunity Area are yet to be finalised. Deficits identified by the Metric resulting from construction of the Proposed Scheme have allowed identification of broad proposals for possible provision offsite currently intended to be located at the former Thamesmead Golf Course.

11.1.9. The proposed habitats required comprise:

- Creation of 0.88ha of open mosaic habitat of Moderate condition;
- Creation of 0.21ha of reedbed habitat of Moderate condition; and
- Enhancement of 7.70ha of neutral grassland from Poor to Moderate condition.

11.1.10. Elements of offsite post-development biodiversity following usage of this area are quantified in Table 5 for area habitats and Habitat creation is detailed in Table 6 which are provided in the Appendix to this Outline LaBARDS.

11.1.11. The offsite BNG provision will be delivered pursuant to a Deed of Obligation. For the avoidance of doubt, this Outline LaBARDS does not require that off-site habitat delivery for BNG has to be delivered at the BNG Opportunity Area – alternative proposals may be brought forward to achieve a 10% minimum, including all onsite if this is achievable.

11.2. BNG OUTCOME

11.2.1. The overall net change in biodiversity, with the onsite and offsite provision in the terrestrial and intertidal environments equates to 10.01% for area habitats and over 10% for terrestrial environments when considered in isolation, and 13.71% for watercourses.

11.2.2. Trading rules are satisfied, such that net gain is achieved both within terrestrial parts of the Site and habitats within the River Thames. This result utilises a combination of habitat creation and enhancement within the Site Boundary, at the offsite BNG Opportunity Area, and as further habitat improvements proposed to mudflat within the River Thames corridor discussed separately in the **BNG Report Appendix 7.1 (Document Reference 6.3)** and secured through separate DCO Requirement, to achieve a total net gain for biodiversity.

11.2.3. The approximate split of the 10%+ BNG provision between onsite and offsite is 3% onsite and 7% offsite.

12. THE DELIVERY MECHANISM/S FOR THE PROPOSALS AND BNG STRATEGY

12.1. DELIVERY OF ENVIRONMENT PROPOSAL: ONSITE

12.1.1. The onsite aspects of the proposals are secured by their inclusion within the Order Limits for the Proposed Scheme, and the DCO requiring that the Proposed Scheme is carried out in accordance with the full LaBARDS, which must be in substantial accordance with this outline. As such, the creation and management measures set out in this document are secured through the DCO. This is explained further below.

12.1.2. The construction of the CCF and connecting pipework, will require land that currently forms part of an extant section 106 commitment that led to the establishment of the Crossness LNR. The Applicant proposes to mitigate this loss of land that currently forms part of the LNR, with the expansion of the existing Crossness LNR to encompass Norman Road Field to achieve delivery of an expanded Crossness LNR.

12.1.3. The DCO deals with these matters by:

- abrogating the existing section 106 provisions so they no longer apply;
- formally extending the LNR in legal terms; and
- requiring that the full LaBARDS incorporate an updated management plan based on the detailed design of the full LaBARDS measures.

12.1.4. This is to be supplemented by a Deed of Obligation which provides for relevant funding mechanisms to cover the staffing costs of managing the extended Nature Reserve and dealing with the interaction of the Protected Area part of the Nature Reserve.

12.1.5. The existing management plan (see Appendix 2) for the Crossness LNR provides a sound framework for future management. The existing LNR management plan identifies aims and objectives and the Applicant's proposals provide opportunities for those remaining objectives to be delivered.

12.1.6. It is proposed that the management plan is replicated and updated for the expanded LNR following engagement with Thames Water, Buglife, graziers and the Friends of Crossness LNR and this will be provided as part of the full LaBARDS for approval. It is intended that the management plan would deliver the required management to deliver the on-site specified mitigation, enhancements and BNG targets set out in this Outline LaBARDS.

12.1.7. A review of the full LaBARDS(s), and any detailed habitat management and monitoring plans derived from it, will be undertaken through engagement with the above parties and LBB not less than every 3 years (or less frequent if agreed by LBB) , for the lifetime of the Proposed Scheme, to ensure that the document remains fit for purpose, as set out in section 13.

12.1.8. The Applicant will be obligated to manage the extended LNR in accordance with the full LaBARDS for the period that is the shorter of the remaining period of the existing Deed of Obligation commitment, or the operational life of the Carbon Capture Facility, unless another arrangement is agreed by LBB.

12.1.9. It is acknowledged that the existing LNR has an existing section 106 commitment for a remaining period of some 80 years which is longer than the current planned design life for the Proposed Scheme. The Deed of Obligation will provide a mechanism for any ‘gap’ in time between the end of the design life for the scheme and that remaining section 106 period.

12.1.10. The full LaBARDS will set out that the BNG Opportunity Area, or any alternative BNG delivery mechanism should be maintained for 30 years from the date it is put in place.

12.1.11. The inclusion of Norman Road Field, currently under the ownership of Tilfen Land (part of Peabody Trust), supports the provision of habitat mitigation principally comprising the improvement in the condition of existing flood plain grazing marsh from Poor to Moderate, mitigating the physical loss of existing flood plain grazing marsh on the LNR lost as a result of the CCF footprint.

12.1.12. The Crossness LNR land identified within the Order limits that is not affected by the Carbon Capture Facility, has been included to provide opportunities for further enhancement works, including habitat creation/ improvement, ditch works, relocation/ provision of equine facilities and improved public rights of way connections and to improve interpretation/visitor experience works. It has not been included to provide for habitat mitigation. Details of proposals for this area will be included in the full LaBARDS following additional engagement with Thames Water and Friends of Crossness LNR.

12.1.13. The works proposed onsite for the Environmental Proposal are required to be consistent with the approved **Design Principles and Design Code (Document Reference 5.7)**, approved under other DCO Requirements, and the approved surface water drainage strategy for the Proposed Scheme.

12.2. DELIVERY OF ENVIRONMENT PROPOSAL: OFFSITE TERRESTRIAL

12.2.1. Offsite commitments will be secured via a Deed of Obligation (Heads of Terms for which are submitted with the DCO Application).

12.2.2. Two possible offsite BNG delivery options are available to the Applicant:

- Delivery of BNG via habitat creation works at the former Golf Course at Thamesmead in the BNG Opportunity Area. The discussions with Peabody are ongoing. Cory have provided a schedule of quantified habitat requirements to support the delivery of the remaining BNG provision to be provided offsite. The proposal is that Peabody would deliver relevant habitats through a co masterplanning process for the former Golf Course, led by their masterplan team working with the community masterplan group as is currently being undertaken; or
- Delivery of BNG via alternative mechanism agreed with LBB, such as, but not limited to, an agreed provider registered on the Biodiversity Gain Site Register.

12.3. DELIVERY OF THE ACCESS AND RECREATION PROPOSALS: INCLUDING PROW ALTERATIONS AND UPGRADES

12.3.1. The Access and Recreation Proposals are set out in section 9 of this document.

12.3.2. Delivery of these proposals within the Order limits will be secured via:

- inclusion in the full LaBARDS, compliance with which is secured via DCO Requirements. This will ensure delivery of all improvements to the amenity of existing public rights of way such as interpretation boards and any new provision of informal/permissive paths and educational facilities. Sufficient land powers have been included in the DCO to facilitate these works; and
- where new PRoW are to be created or diversions are to be put in place, the route of these will be agreed with LBB pursuant to the drafting of the DCO. The DCO provides for this to happen formally and for the necessary modifications to the Definitive Map to be made.

12.3.3. The Access and Recreation Proposals offsite will be secured via the proposed Deed of Obligation. The Applicant would pay an Access Improvements Contribution to LBB for the costs of these works and any associated Statutory Order(s).

13. OUTLINE OF REQUIRED WORKS TO DELIVER THE PROPOSALS AND BNG STRATEGY

13.1. OVERVIEW

13.1.1. **Table 1** sets out the schedule of management proposals for landscape and habitat works (proposed and existing) across the Site comprising the CCF Area and the expanded Crossness LNR. For ease of reference the field name and area reference plan **Figure 7** is repeated to support the interpretation of the schedule.

13.1.2. Details of the full management practices across the Site and on the BNG Opportunity Area (but not any alternative mechanism which will be dealt with by the mechanism set out in the Deed of Obligation) must be set out in the full LaBARDS approved by LBB under DCO Requirement. These will be developed by the Applicant in engagement with the graziers, Thames Water, Friends of Crossness Local Nature Reserve and Buglife in relation to the expanded Crossness LNR,and with Peabody in respect of offsite provision at the BNG Opportunity Area.

13.1.3. The public rights of way within the Site including the expanded Crossness LNR, will be maintained to accord with LBB requirements and described in the **Design Code (Document Reference 5.7)**. Initial establishment and aftercare works for new planting and habitat creation works will be carried out by an approved landscape contractor in accordance with good horticultural practice for a duration of 5 years and with specific reference to:

- BS 4428: Code of practice for general landscape operations;
- BS 7370: Grounds maintenance;
- BS 8545: Trees: from nursery to independence in the landscape recommendations;
- Common Standards Monitoring Guidance for Lowland Wetland Habitats; and
- Common Standards Monitoring Guidance for Lowland Woodland Habitats.

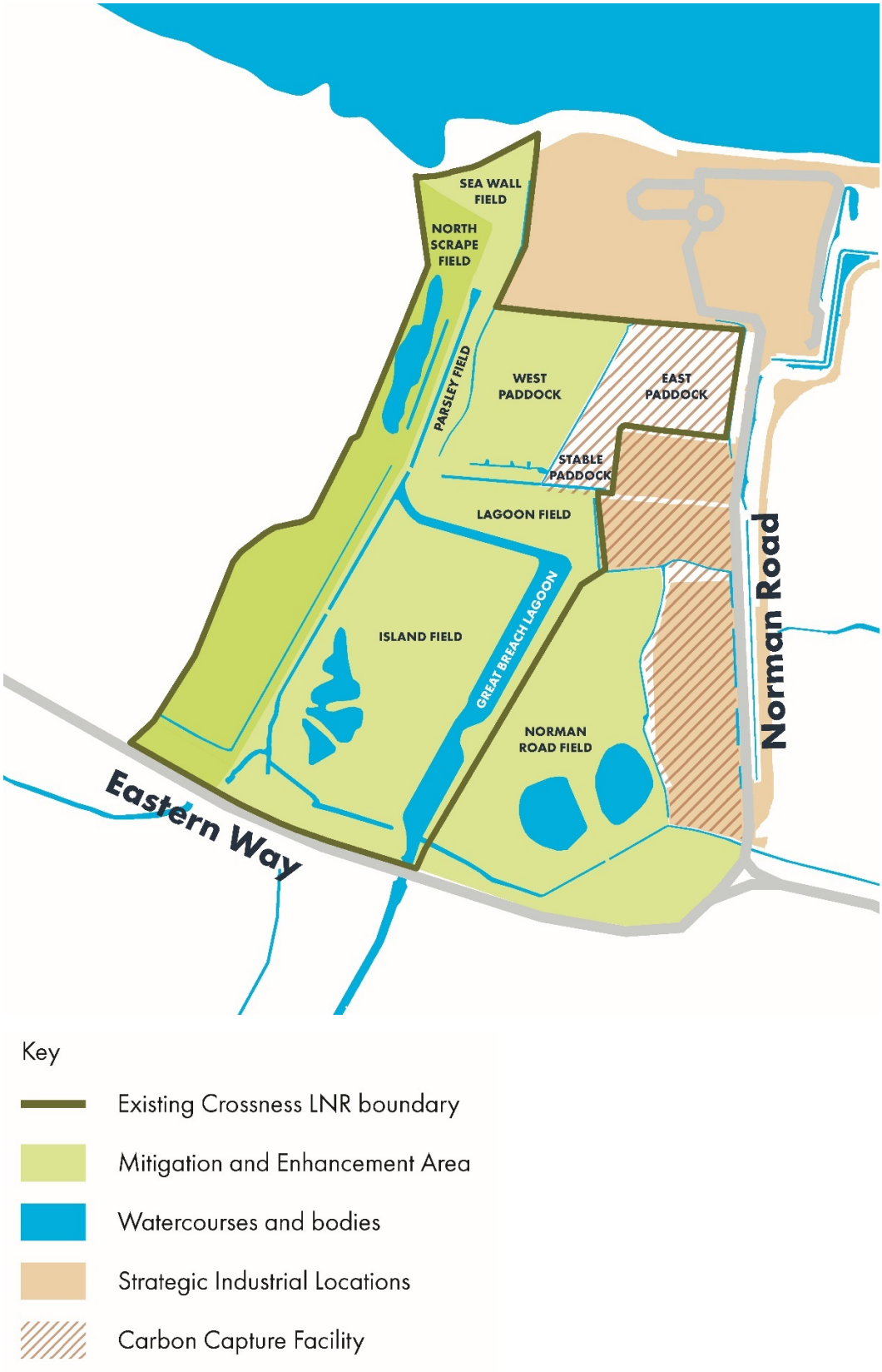


Figure 7 – Onsite area and field reference plan (repeat)

Table 1 - Schedule of management proposals for landscape and habitat works

Area	Field	Habitat	Target Condition	Required Characteristics and Management Actions
CCF	CCF	Lowland Mixed Deciduous Woodland; Creation	Poor	• To be composed of tree species native to lowland England. • Establish and maintain woodland to maturity across the 30-year management period, avoiding significant mortality of planted trees over this period, and re-planting of any gaps that occur. The larger areas of woodland planting will be protected by protective fencing including rabbit proof netting (rather than individual tree guards). The height of the fencing will be a minimum of 1.2m. Tree guards will be used for smaller areas of woodland/ scrub planting. Any stakes, guards and ties will be monitored, replaced and adjusted to ensure tree growth is not adversely affected. Any trees that fail or become damaged or diseased will be removed and replaced in the next planting season with others of similar size and species. Regular checks will be made during the first five years of establishment to replace dead or diseased specimens, control weeds, re-stake plants and check deer/rabbit fencing. Monitoring will follow the Common Standards Monitoring Guidance for Woodland Habitats. This will weight desirable species against the injurious ones. Monitoring results will be recorded and actions agreed on an annual basis to support establishment of diverse woodland and scrub.

				• As trees mature and gain size smaller saplings can be allowed to be shaded out, but a consistent woodland canopy should be maintained. • Poor condition has been assumed due to the limitations of the woodland block sizes and proximity to the working CCF site. No further specific management prescriptions are required, but if possible marginal or understorey vegetation would raise the ecological importance of the woodland.
CCF	CCF	Neutral Grassland; Creation	Moderate	• Species composition and structure would be based on the specifications provided by the UKHab V2.01 habitat classification system for this habitat type. • Sward height will be managed such that a variable structure is created; at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm, creating microclimates which provide opportunities for insects, birds and small mammals to live and breed. • Cover of bare ground is kept low to between 1% and 5% of the area of each habitat patch. • Physical damage (such as excessive poaching, damage from machinery use or storage, damaging levels of access, or any other damaging management activities) will be kept less than 5% of total area, and any invasive non-native plant species (as listed on Schedule 9 of Wildlife and Countryside Act) are prevented from establishing. • Seeding with a broad mix of wildflowers native to lowland England and a cutting regime to maintain them in the sward.
CCF	CCF	Reedbed; Creation	Moderate	• Species composition and structure based on the specifications provided by the UKHab V2.01 habitat classification system for reedbed, primarily planted with common reed Phragmites australis dominant.

				• Water supplies are of good water quality, with low turbidity and no obvious signs of pollution; this requirement is expected to be met by existing supplies of water at the site. • Cover of scrub and scattered trees maintained at less than 10% of the reedbed (i.e. colonising trees such as willow Salix sp. and bramble Rubus fruticosus agg. to be controlled), with bare ground cover less than 5%. • Invasive non-native plant species (as listed on Schedule 9 of Wildlife and Countryside Act) are prevented from establishing. • The reedbed will have a diverse structure with areas of dense reed and open water.
CCF	CCF	Ditches; Creation	Poor	• Provide open water throughout the year. • Provide a diverse range of emergent planting, including food plants for water voles such as yellow flag iris Iris pseudacorus (the rhizomes of which a particularly high-quality food for water voles), pendulous sedge Carex pendula and soft rush Juncus effusus. Reedmace Typha latifolia can also be included in the planting mix to provide a diverse structure. Dominance of reeds which may choke the vegetation community shall be controlled through cutting and to maintain open water. • Regular management to remove rubbish and waste that may be dumped into the ditches from Norman Road will be undertaken.
Mitigation and enhancement area	Norman Road Field	Floodplain Grazing Marsh; Creation and Enhancement	Moderate	• Water supply to Norman Road Field will be modified to increase and retain ground water such that it is near the surface throughout the year. • Species composition and structure based on the specifications provided by the UKHab V2.01 habitat classification system for Floodplain Grazing Marsh.

				• Water supplies are of good water quality, with low turbidity and no obvious signs of pollution; this requirement is expected to be met by existing supplies of water at the site. • Cover of scrub and scattered trees maintained at less than 10% of the reedbed (i.e. colonising trees such as willow Salix sp. and bramble Rubus fruticosus agg. to be controlled), with bare ground cover less than 5%. • Invasive non-native plant species (as listed on Schedule 9 of Wildlife and Countryside Act) are prevented from establishing. • The planting mix will provide a diverse mix of native UK wetland grasses and wildflowers whilst maintaining the composition of botanical community associated with floodplain grazing marsh. • Two ditches will be added as integral parts of the grazing marsh system to manage water supplies linking those on the boundary of the CCF to the Great Breach Dyke.
Mitigation and enhancement area	Norman Road Field	Reedbed; Creation	Moderate	• Species composition and structure based on the specifications provided by the UKHab V2.01 habitat classification system for reedbed, primarily planted with common reed Phragmites australis dominant. • Water supplies are of good water quality, with low turbidity and no obvious signs of pollution; this requirement is expected to be met by existing supplies of water at the site. • Cover of scrub and scattered trees maintained at less than 10% of the reedbed (i.e. colonising trees such as willow Salix sp. and bramble Rubus fruticosus agg. to be controlled), with bare ground cover less than 5%. • Invasive non-native plant species (as listed on Schedule 9 of Wildlife and Countryside Act) are prevented from establishing.

				• The reedbed will have a diverse structure with areas of dense reed and open water.
Mitigation and enhancement area	Norman Road Field	Ditches; Creation	Poor	• Poor condition is assumed due to the limitations of the site's location close to several industrial facilities and the need to maintain open water to support other habitats. This would be dependent on the development of an emergent plant community of importance and is not considered feasible. • Provide open water throughout the year. • Provide a diverse range of emergent planting, including food plants for water voles such as yellow flag iris Iris pseudacorus (the rhizomes of which a particularly high-quality food for water voles), pendulous sedge Carex pendula and soft rush Juncus effusus. Reedmace Typha latifolia can also be included in the planting mix to provide a diverse structure. • Invasive non-native plant species (as listed on Schedule 9 of Wildlife and Countryside Act) are prevented from establishing.
Mitigation and enhancement area	Norman Road Field	Woodland; Enhancement	Moderate	• Selective felling and trimming of trees to promote other gaining mature status to diversity the age structure of the woodland. • Retention of dead wood (as logs from felling or brash piles from trimming works) within the woodland. • Promotion of understorey plants through creation of space and removal of dominant plants such as bramble. • Invasive non-native plant species (as listed on Schedule 9 of Wildlife and Countryside Act) are prevented from establishing.
Crossness LNR	West Paddock	Floodplain Grazing Marsh; Enhancement	Moderate	• Water supply to the West Paddock will be modified to increase and retain ground water such that it is near the surface throughout the year.

				• Species composition and structure based on the specifications provided by the UKHab V2.01 habitat classification system for Floodplain Grazing Marsh. • Water supplies are of good water quality, with low turbidity and no obvious signs of pollution; this requirement is expected to be met by existing supplies of water at the site. • Cover of scrub and scattered trees maintained at less than 10% of the reedbed (i.e. colonising trees such as willow Salix sp. and bramble Rubus fruticosus agg. to be controlled), with bare ground cover less than 5%. • Invasive non-native plant species (as listed on Schedule 9 of Wildlife and Countryside Act) are prevented from establishing. • The planting mix will provide a diverse mix of native UK wetland grasses and wildflowers whilst maintaining the composition of botanical community associated with floodplain grazing marsh.

13.2. POST DEVELOPMENT DITCH MANAGEMENT FOR WATER VOLES

METHODOLOGY AND APPROACH TO MANAGEMENT

13.2.1. The plan has been developed broadly following guidelines for management planning published by Countryside Council for Wales (CCW) in its document "A Guide to Management Planning for SSSIs" Alexander, M. (2020). 'A Guide to Management Planning'. WTSWW, Bridgend Wales, UK. This is a practical framework for management plans which focuses on the identification of the key habitat features that could vary over time (e.g. the growth of scrub vegetation, the expansion of reedbeds etc) and cause detrimental impacts on the valuable ecological receptors within a site.

13.2.2. Once the key features have been identified, Limits of Acceptable Change (LAC) are defined for each. LAC can have both upper limit and lower limits and are generally expressed as percentage cover of a site by particular plant species (however they can also be applied to populations of animals within a site). The key feature of LAC is that they should be easily monitored in the field and should not require labour-intensive survey work or scientific investigation. Thus, LAC have been defined for five key water vole habitat features within ditches at the Mitigation and Enhancement Area receptor sites:

- open water within ditches (as opposed to that covered by riparian vegetation);
- depth of available open water (and not clogged by sediment, organic matter etc);
- riparian vegetation cover (including food plants and those used for shelter);
- scrub cover of ditch (which excludes food plants from riparian habitats but may provide shelter); and
- presence of mink.

13.3. LIMITS OF ACCEPTABLE CHANGE AND MANAGEMENT ACTIONS

13.3.1. Table X describes the LAC for the five key habitat features identified, and management actions that will be undertaken if these limits are exceeded. All LAC will be monitored by an ecologist/land manager walking the Site and estimating vegetation cover and water depth by eye. Additional accuracy that may be afforded by quadrat mapping of vegetation of measuring depth directly are unlikely to provide additional benefits to determining if management actions are required but will pose additional costs to monitoring. A walkover and estimation of whether LAC have been exceeded provides a sufficient level of accuracy to maintain water vole habitat in a suitable stat

Key Habitat Feature	Limits of Acceptable Change	Management Actions if LACs Exceeded
Open water within ditches	**Lower limit**: 75% open water/25% emergent vegetation cover. **Upper Limit**: 90% open water/10% emergent vegetation cover.	**Lower limit**: Cut back and dig out vegetation (e.g. reedbed) to return to within LAC limits. **Upper Limit**: Translocate emergent plants from other local ditches or plant new plugs into ditch. Fencing small plots with chicken wire if significant damage by waterfowl is suspected.
Depth of available open water	**Lower limit**: 1m water depth in centre of channel. **Upper Limit**: Not required; maintain depth greater than 1m.	**Lower limit**: Dig out silt/organic matter from centre of channel. **Upper Limit**: None required (ditch will only fill with material and get shallower).
Riparian vegetation cover	**Lower limit**: 80% of ditch bank covered by riparian vegetation. **Upper Limit**: Not required; 100% of ditch bank covered by riparian vegetation optimal.	**Lower limit**: Translocate riparian plants from other local ditches or plant new plugs into ditch. Fencing small plots with chicken wire if significant damage by waterfowl is suspected. **Upper Limit**: N/A
Scrub cover of ditch	**Lower limit**: 10% of ditch covered or overhung by scrub[1].	**Lower limit**: Plant scrub plants to provide some overhanging vegetation.

	Upper Limit: 25% of ditch covered or overhung by scrub.	**Upper Limit**: Cut back scrub reduce amount of overhanging vegetation.
Presence of mink	**Lower limit**: no lower limit, preferable to have no mink within the Site. **Upper Limit**: mink detected within the Site.	**Lower limit**: None. **Upper Limit**: Trap and destroy mink using mink rafts (see **Paragraph 2.1.25**).

[1] Some scrub vegetation overhanging the ditch is likely to be of benefit by providing shelter for water voles from aerial predators.

14. MANAGEMENT. MAINTENANCE AND MONITORING

14.1. PRINCIPLES

14.1.1. The management objectives for onsite habitat and landscape proposals extending across the CCF Area and the Mitigation and Enhancement Area will be set out in the full LaBARDS but will be underpinned by the overarching strategy for the Proposed Scheme, which includes the following principles:

JOINED UP

14.1.2. An overarching Riverside Campus management body with clear roles and responsibilities will be established. A single management body will be responsible for co-ordination, consistency and single point of contact.

ONE NATURE RESERVE

14.1.3. The management responsibility for the expanded Crossness LNR will include Thames Water and the Applicant. It is assumed that management activities will be undertaken in conjunction with the Friends of CLNR supported by specialists for defined works based on an agreed management programme and where required.

QUALITY

14.1.4. The quality and maintenance standards of the landscape, habitats, PRoW and recreation facilities will be defined in the full LaBARDS to ensure the quality of provision is maintained.

LEADERSHIP

14.1.5. There will be a fully funded warden who will be responsible for community development, engagement and co-ordination between stakeholders and the voluntary sector including the Friends of the CLNR.

MANAGING FOR POSITIVE OUTCOMES

14.1.6. Management of the Site and expanded LNR will ensure that the key aim of providing an appropriate visual setting for the Riverside Campus, a healthy natural environment for the community and an attractive landscape and recreational setting which will support a range of recreational activities as well as a range of thriving and diverse habitats are achieved. These will be achieved by overseeing and monitoring the regular management and maintenance operations discussed below.

14.1.7. Management would be considered effective if it maintains both the character of habitats in reference to their definition (primarily with reference to the UK Habitats Classification system, which incorporates definitions of Habitats of Principal Importance) and their target condition. Monitoring would assess:

- ditches against the criteria within the Statutory Biodiversity Metric to ensure they are meeting targets detailed, as well as against habitat definitions within the UK Habitats Classification system to check they are not deviating from their desired habitat type;
- plant species diversity in line with expectation of their UK Habitats Classification type; and
- that ground water levels are being maintained at the desired raised level.

14.2. MANAGEMENT AND MONITORING REGIME

14.2.1. Details of monitoring, management and maintenance procedures should be defined in the submission of the full LaBARDS(s), following engagement with Thames Water, Buglife, graziers, and the Friends of Crossness LNR. These procedures should provide for the following matters.

14.2.2. The management of the Site and expanded LNR will work to a detailed and agreed annual programme of maintenance works.

14.2.3. The programme of works can be adjusted through the course of any year, if necessary, if conditions require this but should be reviewed not less than every 2 years seeking input from stakeholders including graziers, to ensure the annual maintenance requirements are still appropriate as the planting matures and habitats establish.

14.2.4. Any maintenance measures would take into consideration the recommendations set out in the Operational Environmental Management Plan secured through DCO Requirement, including seasonal constraints to address any on timings of works as a result of wildlife nesting, breeding or emergence must be strictly adhered to.

14.2.5. Once in place a review of the full LaBARDS(s), and any detailed habitat management and monitoring plans derived from it, should be carried out not less than every 3 years (or less frequent if agreed by LBB), for the lifetime of the Proposed Scheme, to ensure that the document, and the expanded Crossness Local Nature Reserve, remains fit for purpose and delivers on desired landscape, biodiversity, access and recreation outcomes. This review will be undertaken alongside engagement with Thames Water, Buglife, graziers, LBB and the Friends of Crossness LNR.

14.2.6. Any updates to the full LaBARDS(s) as a result of that review will be issued to LBB for record purposes and form the basis for ongoing management from that point.

Appendices

APPENDIX 1 - BNG DATA TABLES 1 – 6

Table 0-1: Onsite Baseline Area Habitats

Habitat Type	Area (ha)	Condition	Strategic Significance	% of Site Area
Reedbeds	4.954	Moderate	Formally identified in local strategy	6.4
Other neutral grassland	2.197	Moderate	Area not in local strategy	2.8
Other neutral grassland	1.538	Poor	Area not in local strategy	2.0
Coastal floodplain and grazing marsh	14.429	Poor	Formally identified in local strategy	18.7
Modified grassland	1.771	Poor	Area not in local strategy	2.3
Bramble scrub	2.238	N/A	Area not in local strategy	2.9
Ponds and Standing Water (Priority Habitat) (Crossness LNR ponds and Waterbodies including Pond 6)	2.076	Good	Formally identified in local strategy	2.7
Open mosaic habitat on previously developed land	0.982	Poor	Location ecologically desirable but not in local strategy	1.3
Developed land; sealed surface (including buildings and hardstanding)	9.799	N/A	Area not in local strategy	12.7
Artificial unvegetated unsealed surface (footpaths, gravel surfaces etc)	0.176	N/A	Area not in local strategy	0.2
Habitat already offset by Riverside 2	2.364	N/A	Area not in local strategy	3.1
Introduced Shrub	0.038	N/A	Area not in local strategy	<0.1
Lowland mixed deciduous woodland	1.479	Poor	Formally identified in local strategy	1.9
Watercourse footprint – Ditches	1.193	N/A	N/A	1.5

Habitat Type	Area (ha)	Condition	Strategic Significance	% of Site Area
Littoral mud	6.131	Moderate	Formally identified in local strategy	7.9
Developed land; sealed surface (Middleton Jetty and Belvedere Power Station Jetty (disused) piers/supports)	0.218	N/A	Formally identified in local strategy	0.3
Intertidal hard structures (Middleton Jetty and Belvedere Power Station Jetty (disused))	-	Poor	Formally identified in local strategy	0.0
Watercourse footprint – Sub-tidal River Thames	25.569	N/A	N/A	33.1

Table 0-2: Onsite Baseline Watercourse Habitats

Habitat Type	Length (km)	Condition	Strategic Significance	Watercourse Encroachment	Riparian Encroachment
Ditches	4.8	Poor	Formally identified in local strategy	Minor	Minor/Minor

Habitat Type	Length (km)	Condition	Strategic Significance	Watercourse Encroachment	Riparian Encroachment

Table 0-3: Offsite Baseline Area Habitats

Habitat Type	Area (ha)	Condition	Strategic Significance	% of Site Area
Reedbeds	0.264	Moderate	Formally identified in local strategy	1.6
Modified grassland	0.925	Poor	Formally identified in local strategy	5.7
Other neutral grassland	7.671	Poor	Formally identified in local strategy	46.9
Other neutral grassland	2.219	Poor	Area/compensation not in local strategy/no local strategy	13.6
Bramble scrub	0.667	N/A	Formally identified in local strategy	4.1
Mixed scrub	1.954	Poor	Formally identified in local strategy	11.9
Mixed scrub	0.123	Poor	Area/compensation not in local strategy/no local strategy	0.8
Ponds and standing water (priority habitat)	0.262	Moderate	Formally identified in local strategy	1.6
Artificial unvegetated, unsealed surface	0.463	N/A	Area/compensation not in local strategy/no local strategy	2.8
Developed land; sealed surface	0.397	N/A	Area/compensation not in local strategy/no local strategy	2.4
Other coniferous woodland	0.04	Poor	Formally identified in local strategy	0.2
Other woodland; broadleaved	1.378	Poor	Formally identified in local strategy	8.4

Table 0-1: Onsite Area Habitats Retained, Enhanced and Lost

Habitat Type	Strategic Significance	Area Retained (ha)	Area Enhanced (ha)	Area Lost (ha)	Enhancement Condition
Reedbeds	Formally identified in local strategy	4.581	0.000	0.373	N/A
Other neutral grassland (Moderate Condition)	Area/compensation not in local strategy/no local strategy	1.532	0.000	0.665	N/A
Other neutral grassland (Poor Condition)	Area/compensation not in local strategy/no local strategy	1.455	0.046	0.037	Moderate
Coastal floodplain and grazing marsh	Formally identified in local strategy	5.398	6.989	2.042	Moderate
Modified grassland	Area/compensation not in local strategy/no local strategy	0.654	0.000	1.117	N/A
Bramble scrub	Area/compensation not in local strategy/no local strategy	1.333	0.000	0.905	N/A
Ponds and standing water (Priority Habitat) (Crossness LNR ponds and Waterbodies including Pond 6)	Formally identified in local strategy	2.076	0.000	0.000	N/A
Open mosaic habitat on previously developed land	Location ecologically desirable but not in local strategy	0.000	0.000	0.982	N/A

Habitat Type	Strategic Significance	Area Retained (ha)	Area Enhanced (ha)	Area Lost (ha)	Enhancement Condition
Developed land; sealed surface (including buildings and hardstanding)	Area/compensation not in local strategy/no local strategy	9.182	0.000	0.617	N/A
Artificial unvegetated unsealed surface (footpaths, gravel surfaces etc)	Area/compensation not in local strategy/ no local strategy	0.135	0.000	0.041	N/A
Habitat already offset by Riverside 2	Area/compensation not in local strategy/no local strategy	0.000	0.000	2.364	N/A
Introduced Shrub	Area/compensation not in local strategy/no local strategy	0.038	0.000	0.000	N/A
Lowland mixed deciduous woodland	Formally identified in local strategy	0.481	0.998	0.000	Moderate
Watercourse footprint – Ditches	Formally identified in local strategy	1.102	(See **Table** 0-2)	0.091	(See **Table** 0-2)
Littoral mud	Formally identified in local strategy	6.130	0.000	0.001	N/A
Developed land; sealed surface (Middleton Jetty, Belvedere Power Station Jetty (disused) and Proposed Jetty piers/supports)	Area/compensation not in local strategy/no local strategy	0.218	0.000	0.000	N/A
Intertidal hard structures (Middleton Jetty, Belvedere Power	Formally identified in local strategy	0.000	0.000	0.000	N/A

Habitat Type	Strategic Significance	Area Retained (ha)	Area Enhanced (ha)	Area Lost (ha)	Enhancement Condition
Station Jetty (disused) and Proposed Jetty piers/supports)					
Watercourse footprint – Sub-tidal River Thames	Formally identified in local strategy	25.569	0.000	0.000	N/A

Table 0-2: Onsite Watercourse Habitats Retained, Enhanced and Lost

Habitat Type	Length Retained (km)	Length Enhanced (km)	Length Lost (km)	Enhancement Condition
Ditches	4.2	0.2	0.4	Moderate

Table 0-3: Onsite Area Habitat Creation (Terrestrial and Marine)

Habitat Type	Area Created (ha)	Condition	Strategic Significance	Delay in Starting Habitat Creation (Years)
Other neutral grassland	1.738	Moderate	Area/compensation not in local strategy/no local strategy	2
Floodplain wetland mosaic and CFGM	0.672	Moderate	Formally identified in local strategy	0
Developed land; sealed surface	5.365	N/A - Other	Area/compensation not in local strategy/no local strategy	0
Reedbeds	0.505	Moderate	Formally identified in local strategy	0
Watercourse footprint – Ditches	0.176	N/A - Other	Formally identified in local strategy	0
Lowland mixed deciduous woodland	0.738	Poor	Formally identified in local strategy	2
Artificial unvegetated, unsealed surface	0.039	N/A - Other	Area/compensation not in local strategy/no local strategy	0
Developed land; sealed surface (Proposed Jetty piling in mudflat)	0.001	N/A - Other	Area/compensation not in local strategy/no local strategy	0

Table 0-4: Onsite Watercourse Habitat Creation

Habitat Type	Length (km)	Condition	Strategic Significance	Watercourse Encroachment	Riparian Encroachment	Delay in Starting Habitat Creation (Years)
Ditches	1.3	Poor	Formally identified in local strategy	Minor	Minor/Minor	0

Table 0-5: Offsite Area Habitats Retained, Enhanced and Lost

Habitat Type	Strategic Significance	Area Retained (ha)	Area Enhanced (ha)	Area Lost (ha)	Enhancement Condition
Reedbeds	Formally identified in local strategy	0.264	0.000	0.000	N/A
Modified grassland	Formally identified in local strategy	0.925	0.000	0.000	N/A
Other neutral grassland	Formally identified in local strategy	1.530	6.141	0.000	Moderate
Other neutral grassland	Area/compensation not in local strategy/ no local strategy	0.000	1.559	0.660	Moderate
Bramble scrub	Formally identified in local strategy	0.667	0.000	0.000	N/A
Mixed scrub	Formally identified in local strategy	1.954	0.000	0.000	N/A
Mixed scrub	Area/compensation not in local strategy/no local strategy	0.123	0.000	0.000	N/A

Habitat Type	Strategic Significance	Area Retained (ha)	Area Enhanced (ha)	Area Lost (ha)	Enhancement Condition
Ponds and standing water (priority habitat)	Formally identified in local strategy	0.262	0.000	0.000	N/A
Artificial unvegetated, unsealed surface	Area/compensation not in local strategy/no local strategy	0.031	0.000	0.432	N/A
Developed land; sealed surface	Area/compensation not in local strategy/no local strategy	0.397	0.000	0.000	N/A
Other coniferous woodland	Formally identified in local strategy	0.040	0.000	0.000	N/A
Other woodland; broadleaved	Formally identified in local strategy	1.378	0.000	0.000	N/A

Table 0-6: Offsite Area Habitat Creation

Habitat Type	Area Created (ha)	Condition	Strategic Significance	Delay in Starting Habitat Creation (Years
Open mosaic habitat on previously developed land	0.882	Moderate	Formally identified in local strategy	0
Reedbeds	0.210	Moderate	Formally identified in local strategy	0

APPENDIX 2 – CROSSNESS LNR MANAGEMENT PLAN

Thames Water site management plan 2016–2020

Crossness Nature Reserve & Crossness Southern Marsh



Karen Sutton

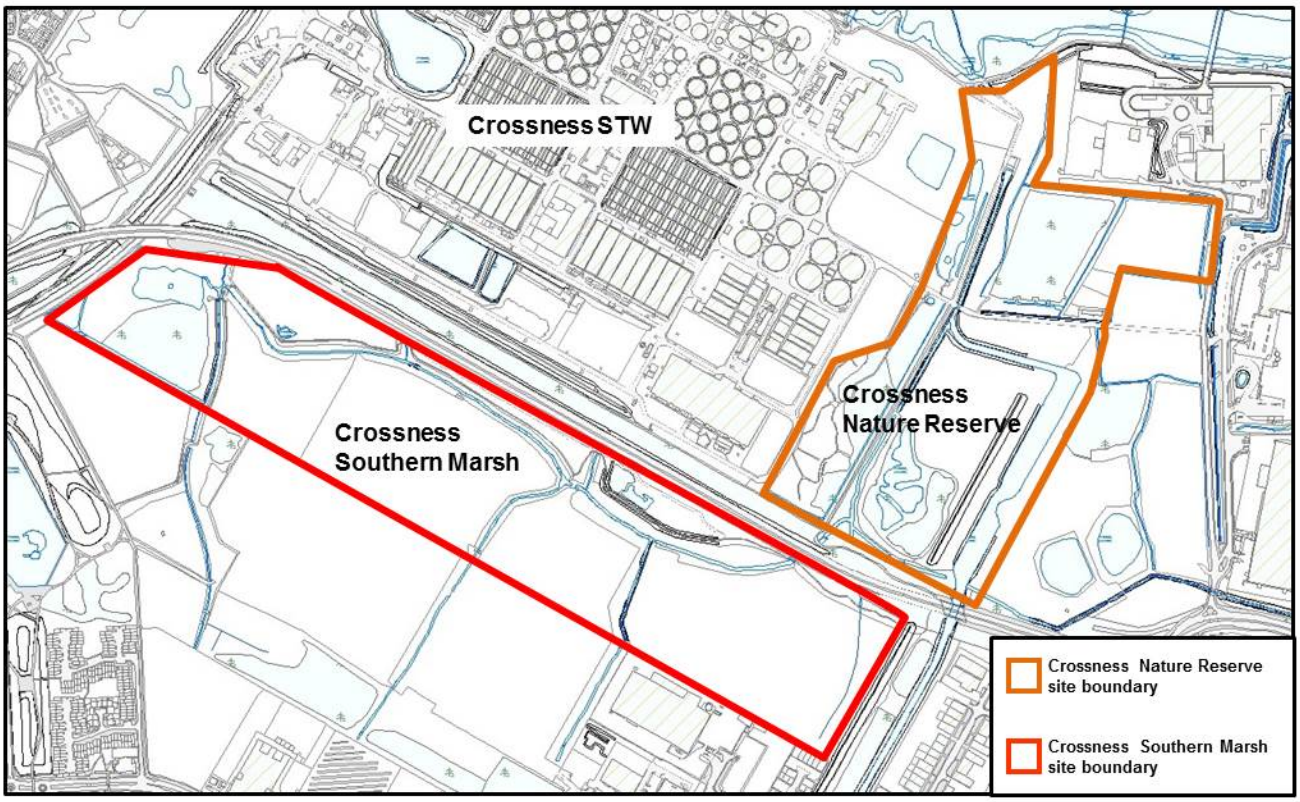
CONTENTS

1. Where are we now?

1.1 Introduction

Crossness Nature Reserve, located in Abbey Wood, south-east London, is a 20ha Local Nature Reserve (LNR), owned and managed by Thames Water. In addition to the LNR, the area also comprises the Crossness Southern Marshes, an additional 30ha of grazing marsh. Both sites are managed for conservation, access and recreation by Thames Water's External Affairs department.

Fig. 1



1.2 Policy Context

Crossness Nature Reserve and Crossness Southern Marsh form part of the Erith Marsh complex, as such they are Sites of Metropolitan Importance for Nature Conservation (SMINCs). Crossness Nature Reserve is a Section 106 reserve, set up in 1994 as part of a planning obligation for the Crossness Sewage Treatment Works' sludge powered generator. The southern marshes were not formally

opened to the public until 2006 following a large enhancement scheme under the Managing the Marshes programme.

1.2.1 Thames Water vision statement and executive summary

Vision statement:
'To develop Crossness Nature Reserve as a flagship nature reserve for London, demonstrating Thames Water's commitment towards wildlife, sustainability, access and local communities'.

Executive summary:

Since its establishment as a nature reserve in 1994, Thames Water has made a positive commitment towards developing Crossness Nature Reserve, and Crossness Southern Marshes, as a significant site for wildlife and local people within the London Borough of Bexley and beyond. Major successes and additions to the site over previous years include: the installation of two windpumps to facilitate water level management throughout a number of key areas; the creation of new ditches, scrapes, reedbeds and lagoons; conducting baseline surveys for a range of key groups and species; the erection of stock fencing and the successful implementation of a grazing regime; the installation of a permissive path on the southern marshes, and the creation of a numerous features such as viewing screens, seating, and interpretation boards.

In addition to habitat management and creation, this five-year management plan will look to develop the site for visitors and the local community. This involves the promotion of the 'Friends of Crossness Nature Reserve' scheme which enables people to become more actively involved in the nature reserve; the further development of an educational programme for visiting schools; and the establishment of an annual events calendar encompassing open days, guided walks and talks, and volunteer workdays where people can help in the practical management of the reserve.

Through all of these actions, it is hoped that Crossness Nature Reserve and Southern Marshes will become a key open space for local people, allowing people the chance to enjoy this unique 'urban wilderness' and its myriad of wildlife for many years to come.

1.2.2 Thames Water mission statement

Thames Water manages hundreds of sites across London and the Thames Valley, and the work we do has an inevitable impact on the environment.

We aim to protect the wide variety of plants, animals and ecology that could be affected by our activities, as well as the many examples of archaeological and cultural heritage involved in our operations.

In striving to achieve this, we invest to improve our sites, carefully check our planned capital programme and work in partnership with a range of organisations.

1.2.3 Extract from Thames Water's Environmental Policy

- Comply with all relevant environmental laws, regulations and standards.

- Identify our significant environmental impacts, and take action to manage these throughout our capital programme and wider operations.
- Incorporate environmental considerations into our business decision-making and investment appraisal processes.
- Protect and, where possible, enhance biodiversity, and conserve our cultural heritage both on our land holdings and where our activities may have an impact.

1.2.4 Thames Water Biodiversity Policy

Good environmental management is central to our activities.

We actively seek to limit our environmental impact to enhance environmental quality in areas where we have influence.

Protection and enhancement of biodiversity, both on our land holdings and where our activities may have an impact across the wider environment, is a responsibility we take seriously.

On privatisation, we formally adopted the Government's Code of Practice on Conservation, Access and Recreation (issued under section 5 of the Water Industry Act 1991).

We are committed to fulfilling our obligations towards the 18 Sites of Special Scientific Interest on our landholdings, two European Special Protection Areas for birds, and other statutory protected sites.

1.3 General Information

1.3.1 Location

Crossness Nature Reserve and Crossness Southern Marshes (grid reference TQ 495002) (OS Landranger sheet 177) is located within the London Borough of Bexley, close to the border of Kent and approximately 15 kilometres downstream from central London (London Bridge) along the Thames.

The nature reserve and southern marshes occur within an area of grazing marsh known collectively as the Erith Marshes. The nature reserve covers a total area of 20.3 hectares, (see map in Appendix B) and the southern marshes cover a total area of 30 hectares (Appendix B). Crossness Nature Reserve is located immediately east of Crossness Sewage Treatment Works (STW) and comprises approximately two-thirds of the open land between the STW and the industrial areas associated with Norman Road.

To the south of the nature reserve is the A2016, also known as Eastern Way. This dual carriageway bisects the Erith Marshes, separating Crossness Nature Reserve to the north, from the Crossness Southern Marshes to the south.

1.3.2 Transport Links

There are good transport links to both sites, with the nearest train stations being Abbey Wood or Belvedere. For access to the nature reserve from the west, the buses 229, 117, 401, 472 can be used for access to the Thames Path near the Thamesview Golf Club, or a 180 to Harrow Manor Way to access the Belvedere Road Path.

To access the southern marshes from the east, a 180, 401 or 601 bus will bring visitors to Eastern Way; a 180 to Harrow Manor Way enables access from the west through the footpath by Southmere Lake.

Crossness Nature Reserve is bounded to the north by the Thames Pathway which is a pedestrian and cycle route.

1.3.3 Ownership

Thames Water Utilities Ltd. is the freehold owner, absolute in possession of Crossness Nature Reserve and Crossness Southern Marshes. The nature reserve is managed under a Section 106 Agreement (Town & Country Planning Act, 1990) with the London Borough of Bexley, dated 21st January 1994. The registered company address for Thames Water is: Clearwater Court, Vastern Road, Reading RG1 8DB.

The Environment Agency has access to the site (either through the operational works or along the access track from Norman Road) for the maintenance of the Great Breach Pumping Station and the dykes designated as Main River. These include all of the Great Breach Dykes, and the Great Breach Lagoon. The National Grid Company had access to maintain electricity pylons, but these were removed in 2010.

A tenant has grazing rights (subject to the grazing agreement) in a number of areas throughout the reserve. These include, the East & West Paddocks, Parsley Field, Lagoon Field and Island Field.

A separate tenant has grazing rights (subject to the grazing agreement) in a number of areas throughout the southern marshes. These include Main Paddock, Little Paddock, Great Breach Paddock, South Dyke Paddock and Pond Meadow.

Cory Environmental own the two fields north and south of the access track at Norman Road (east end of Crossness Nature Reserve). Until 2009, these fields (often referred to as the Borax fields referring to historical use) were non-developed rough grassland. In 2009, Cory made use of them for the construction of the Waste to Energy Incinerator known as the Riverside Resource Recovery facility north-east of Crossness. As such, they have been used as areas for plant and materials storage, as well as overflow car parking associated with the RRRL construction.

Tilfen Land own and manage Norman Road Field (south-east of Crossness Nature Reserve). In 2010, this area underwent habitat creation (wader scrape and grazing marsh) as mitigation for development impacts elsewhere. Tilfen also own the land immediately south, and east, of Crossness Southern Marshes.

1.3.4 Management/organisational infrastructure

The nature reserve is managed as part of a Section 106 Agreement (Town & Country Planning Act 1990) between Thames Water and the London Borough of Bexley (20.1.1994). The nature reserve is the responsibility of Thames Water's Operations Manager for Crossness Sewage Treatment Works, who is assisted by Thames Water's External Affairs department. A Management Committee, comprised of two representatives from Thames Water and two representatives from the London Borough of Bexley, controls management of the reserve. In addition, there are a number of key partners who have an advisory capacity but do not have any voting powers. These partners include the Environment Agency, Bexley Natural Environment Focus Group and the London Wildlife Trust. Thames Water employs a full time Nature Reserve Manager to deliver the management objectives and to manage the reserve on a day-to-day basis.

1.3.5 Map coverage

The site is covered by the Ordinance Survey 1:50,000 Sheet Number 177 (East London, Billericay & Gravesend) and Sheet Numbers TQ 47/57 & 48/59 at a 1:10,000 scale.

1.3.6 Statutory and non-statutory designations

Crossness Nature Reserve and Crossness Southern Marshes have a Site of Metropolitan Importance for Nature Conservation (SMINC) designation. This is a non-statutory regional designation which protects areas of importance for wildlife at a county scale. It protects the designated sites by the local authority (in this case London Borough of Bexley) from most developments.

Crossness Nature Reserve also has a Local Nature Reserve designation (LNR). LNR's are places of wildlife or geological features that are of interest locally. The designation was awarded in 2002 by the London Borough of Bexley.

1.3.7 Other agreements / legal requirements

Section 106 Agreement – Thames Water is committed to providing this nature reserve under the terms of a planning agreement pursuant to Section 106 of the Town and Country Planning Act 1990. This agreement was made between Thames Water and the London Borough of Bexley on the 20th January 1994 as a result of the development of the Crossness sludge incinerator. Under the terms of this agreement Thames Water will provide a Conservation Management Plan which seeks to conserve and maintain the existing value of the nature conservation land and, where practicable, to enhance the existing habitats and nature conservation importance of the nature conservation land for a period of 99 years.

1.4 Site heritage & history

Historically the land in this area has been used for a number of purposes including sea defence, land drainage, industry, housing and agriculture. The semi-improved grassland is one of London's few surviving remnants of grazing marsh. Although traditionally grazed, records suggest that a large proportion of the site's grassland (approximately 80%) was under arable cultivation during at least part of the 19th century (London Ecology Unit, 1988).

The information which is currently available on the past land use is based predominantly on map evidence; and is as follows:

Approximate date of survey	Description	Maps (with publication date where provided*)
1863-1866	Little encroachment onto original area of Erith Marshes, except for manure works (on the site that later housed the Belvedere Power Station) and two small powder magazines. Map evidence suggests that Halfway Reach Bay only embanked in one small area	Sheet II. Kent 1870
1893-1895	Southern Outfall works constructed. River extensively embanked around Halfway Reach Bay. First encroachment of housing north of Woolwich-Belvedere railway line.	Sheet 1A S.E. 8 II N.E
1895-1938	Housing extended further onto marshes north of Woolwich-Belvedere railway line. Some extension of Belvedere Mills and fish and guano works.	Kent Sheet II N.E. 1910 Kent Sheet II N.E. 1938
1938-1963	Borax works and spoil heaps created during this period. Eastern Industrial Estate encroaches on further area of marsh	Kent Sheet II. N.E. 1938 Sheet TQ47 N.E. 1966
1964	Crossness Sewage Treatment Works commissioned.	
1963-1979	Great Breach Lagoon created at some point during these two dates. The large spoil bank west of the lagoon was presumably created at the same time. Major revision of the drainage system occurred at this time.	Sheet TQ48 S.E. 1969 Second Series 1:25,000, TQ 48/58
1984	New Great Breach Dyke Pumping Station commissioned; Great Breach Dyke North (leading to pumping station) was deepened.	

1979-1987	Eastern Way constructed, further fragmenting the marshes.	Second Series 1:25,000, TQ 48/58, 1988
1994	Crossness Sludge Powered Generator commissioned and nature reserve set up under a Section 106 agreement with the London Borough of Bexley	
2012	Riverside Resource Recovery Facility (Cory Waste to Energy facility) constructed at the north end of Norman Road	
2014	Thames Water's Crossness Sewage Treatment Works expanded by 40% with the new expanded works located immediately west of Crossness Nature Reserve	

* Survey dates differ from publication dates. Maps are 1:10,560 or 1:10,000 scale unless stated otherwise.

1.5 Physical aspects of Crossness Nature Reserve and Crossness Southern Marshes

1.5.1 Area

Size: Crossness Nature Reserve: 22 hectares; Crossness Southern Marsh: 30 hectares

1.5.2 Access

There are a number of entrance points to Crossness Nature Reserve and Crossness Southern Marshes, and a number of ways to reach them by car or by public transport. Please see Appendix D for detailed access arrangements.

1.5.3 Topography

Climate:

In line with the rest of southeast England, patterns suggest that in recent years there has been a general decline in levels of rainfall. The minimum temperature experienced in this area is rarely below 5°C, with the maximum temperature being approximately 32°C. Due to its exposed position Crossness experiences high levels of wind and there are few days when the air is completely still.

One cause for concern is the impact of global warming that may effect the management of Crossness Nature Reserve in years to come. If the predictions of the Intergovernmental Panel on Climate Change are correct, it would appear that Britain will experience a warmer, damper climate. As the climate gets warmer, this will result in higher levels of evaporation from ground and open water bodies and evapotranspiration from plants, this will lead to a net reduction in the amount of water within wetland ecosystems.

Geology:

Crossness Nature Reserve and Southern Marshes lies predominantly between 0-2 metres AOD. Apart from the large bank to the west of the Lagoon (a man-made feature) the landscape is relatively flat, although it is intersected by ditches and dykes.

The sites' soils are alluvial gleys of the Wallasea series. British Geological Survey maps indicate that these soils are underlain by river alluvium, and below this by the Woolwich Beds and London Clay. In 1994 ten 3 metre deep boreholes were dug in order to install dip-wells for hydrological monitoring. The depth of topsoil varied from 0 metres to 5 metres. Below the topsoil all cores showed the presence of alluvial horizons (0.7m - 2.3m+ thick). In seven of the boreholes this alluvial layer was underlain by peat deposits (up to 1.5m+ thick), which extend to the bottom of the 3 metre core sections. For further detailed information on the borehole profiles and hydrological survey please refer to the Conservation Development and Management Plan of 1994 (Pond Action, 1994).

Hydrology:

Hydrological and hydraulic information about the Marsh Dyke catchment generally is limited. Flood defence and maintenance of adequate urban land drainage are major issues in the catchment, much of which lies below the height of spring high tides. The last serious flood in the area took place in September 1958, when up to 3 metres of water covered the land which now forms the nature reserve. The area technically lies within the floodplain of the Marsh Dykes catchment and flooding of the nature reserve would be accompanied by very severe flooding in lower-lying parts of the Marsh Dykes catchment.

Previous hydrological studies suggest that there is a variation in depth of water table from 1.9m to 0.4m below the surface (Pond Action, 1994). Seasonal trends evident from existing data suggest that water table movements are not synchronous across the whole site. This may reflect differential water movement between the groundwater and dykes. However, more detailed surveys would be required to model the true position of the water table across the site, and to determine the relationship between the water table and surface levels, and water movement between the water table and adjacent dykes.

The ditch system:

The nature reserve is crossed by a number of ditches and dykes. The four main dykes (Great Breach Dyke North & West, Great Breach Lagoon and Horse Head Dyke) are an important component of the local drainage system, as are Erith Marsh Dyke West & East, Belvedere Road Path Ditch and Erith Marsh Dyke South on the Crossness Southern Marshes. In addition to receiving run-off from the marshes, these take water from the eastern part of Thamesmead and the industrial areas of Erith (a total area of 6.2 kilometres square). All of these dykes drain to the Great Breach Pumping Station at the northern edge of the site and out to the River Thames. Water levels in the Great Breach Dykes are controlled by the pumping station, where pumps are set to maintain water levels at approximately 0.8 m AOD.

The Environment Agency reserve the right to remove any weed, reeds or rubbish from the main channels if there is a risk that flooding could occur as a result of their presence. Consequently, these are periodically dredged by the Environment Agency, removing any accumulated silt, rubbish and excessive vegetation. All works are undertaken at the least sensitive times of year with respect to water voles and breeding birds, using best practice recommendations to ensure that any damage to water vole habitat is limited.

There are also a number of smaller ditches on the site, which are not directly connected to the main system. These are perched well above the levels of the main drain and are filled by surface and near-surface runoff. There is no evidence that the grasslands are under-drained. In the summer of 2000, a 5 metre Poldaw windpump on a 9 metre high latticed tower was installed with associated pipework to enable water level control throughout these subsidiary water bodies. The windpump is used to abstract water (under license from the Environment agency) from Great Breach Dyke North (from a point just upstream of the bridge on the western bank) to provide water to the following water bodies: West Paddock Ditch, Education Pond and the ridge & furrow reedbed, and the wader scrape. An incremental valve system allows fine control over the amount of flow that each area receives. A second windpump was installed in May 2011 to provide adequate water levels to the West Paddock and surrounding ditches.

Surface flooding:

Some surface flooding of the grassland occurs in winter. It is not fully known whether surface water stands on the site because of impeded drainage through the alluvium or because of high groundwater levels. However, past studies have indicated that the latter is more likely, although further hydrological monitoring during the winter and spring periods would confirm or refute this.

The West Paddock is flooded, via the windpump, during the winter months to attract wintering wildfowl and roosting waders. A series of shallow scrapes have been excavated in the Paddock in order that splash pools are available at other times of the year. The water is pumped directly into the West Paddock ditch to the west, which then spills over into the paddock itself. Because it has always been hard to maintain sufficient levels here, even with the windpump, a second Poldaw windpump was installed in May 2011. This allows us to achieve the desired levels in West Paddock, while also providing water to the newly created Sea Wall Ditch.

Current and historical groundwater levels:

There is a general belief that the Crossness site became drier in the mid-1980's, coincident with the loss of breeding waders from the site. However, there is no current or historical data describing groundwater levels on the site, so this water level drop cannot be corroborated by factual evidence. It is also not clear whether the perception of drying-out has been due to lower groundwater levels or to a reduction in the duration of standing surface water on the site. It has been suggested that lower water level declines might have been associated with the construction of the Great Breach Pumping Station in 1984 (which replaced an old pump). However, the Environment Agency state that the new pumps were set to the same levels as those they replaced. A number of piezometer tubes (used to measure groundwater levels) were installed on the Erith Marshes in the early 1980's by the then Thames Water Authority to monitor the newly rebuilt sea wall. Nearly all of these tubes have been destroyed and previous monitoring data from these tubes has now been lost.

Although recent changes in the hydrology of the area are hard to substantiate, there have undoubtedly been major changes to the hydrology of the site over the last 25 years. In particular, map evidence indicates that at some time between 1963 and 1979, drainage of the southern half of the site was considerably modified (Pond Action, 1994). This involved substantial re-routing and straightening the Great Breach South, and creating the Great Breach Dyke Lagoon as a completely new waterbody. It is quite possible that the creation of the Lagoon could be responsible both for local decrease in groundwater and for a reduction in standing water area on the site.

Water quality:

The main dykes crossing the site receive water and sediments draining from the industrial and urban areas of the Marsh Dykes catchment. These areas are known to receive pollutants from a number of sources, all of which are exacerbated by seasonal low flows. These pollutants are mostly a combination of consented discharges, industrial pollution incidents, illegal connections, fly tipping, and the input of urban sediments including run-off from roads. In the industrial area, pollution problems can be severe. Inspection of the ditches also indicates evidence of oil contamination of sediment in some areas (e.g. Horse Head Dyke), almost certainly derived from the adjacent main road (the Eastern Way).

A number of the smaller surface-water ditches on the site may be contaminated by water and sediments with high levels of boron draining from the Cory Environmental site. A number of the surface water drains draining from the old borax site were connected to surface water ditches on the eastern side of the reserve. Although all ditches on the reserve have been isolated from the Cory Environmental ditches, and during 2001 the site was decontaminated, it may be possible that there is still some residues of this highly phytotoxic material left in the surface water ditches on the eastern side of the reserve.

On 16th December 2017, a major pollution event occurred on Crossness Nature Reserve from the adjacent sewage treatment works. A 2m diameter pipe, carrying activated sludge under pressure to the aeration lanes, had been exposed by contractors for investigation. During this period, a weld fractured, causing the pipe to burst and release over 20 million litres of sludge onto the nature reserve. This polluted the water courses and reedbeds at the lower end of the Protected Area – from the boardwalk south – and the Great Breach Dyke West and Horse Head Dyke in the public area of the site.

A Water Vole capture programme was initiated through Derek Gow Associates, leading to the capture of 60 water voles from the southern section of the Protected Area and the Great Breach Dyke. These were held in captivity while a clean-up operation took place. The clean-up involved raking and bagging the sludge deposits on terrestrial areas, then draining the water bodies and cutting the reedbed to rake and flush the sludge within the riparian areas. This was carried out by Rainbow and took six months to complete. An electric pump was installed in the south-east corner of the STW to capture any further run-off and pollutants from entering the reserve in the south-west corner (the low-lying area of ditch immediately adjacent the STW) and a bagwork wall installed to provide a further buffer. Currently Water Vole fencing excludes the wider population from colonising the now-clean areas, and the Water Voles are due to be released in Spring 2019.

A major problem in recent years on many of the water bodies has been excessive growth of filamentous weed (blanket weed). Excessive amounts of weed cause the pumps and screens in the pumping station to become blocked, which result in operation difficulties. The growth of such weed is

usually linked to excessive amounts of nutrients in the water body, although the source of this nutrient addition has, as yet, not been identified but it is likely to be diffused.

Unfortunately there is very little current or historical data about the quality of water in the main ditches on the nature reserve itself. Water quality in the Marsh Dykes catchment is not routinely monitored by the Environment Agency. A survey undertaken by the National Rivers Authority in 1990 suggested that the water quality on the site was "moderate" (NRA, 1990). Overall, a general assessment of the character of aquatic plant and invertebrate communities taken from all the available ditch surveys suggested that the water quality if fair to locally poor on a four point scale of bad, poor, fair and good (NRA, 1990; Plant, 1993: Pond Action 1993). However, aquatic invertebrate surveys that took place in 2016/17 across the nature reserve and southern marsh, found a good water beetle community (Plant, 2017). These surveys are due to be repeated in Autumn 2018 and Spring 2019.

To evaluate a site, the scores are summed for all species caught to give the WETSCORE. This index rises with collecting effort, so to correct for this the Species Quality Score (SQS) is calculated by dividing the WETSCORE by the number of species used in its derivation. This gives an index that is almost independent of sampling effort. Good sites for water beetles are signified by total scores of greater than 100 and an SQS of 2 or more (see full report in Appendix ??).

For the Nature Reserve area, a WETSCORE analysis may be performed as follows:

Wetscore qualifying species = 50

1 x	RDB3 species		
1 x	Na species	WETSCORE =	117
15 x	Nb species		
33 x	Common species	SQS = 2.34	

For the Southern Marsh, a WETSCORE analysis may be performed as follows:

Wetscore qualifying species = 37

2 x	RDB3 species		
1 x	Na species	WETSCORE =	98
8 x	Nb species		
26 x	Common species	SQS = 2.64	

Sea level rise:

Sea level rise is occurring as a result of isostatic (the south of England is sinking due to changes in the pressure of the Earth's mantle related to the retreat of ice during the last ice age) and eustatic (the planet has been experiencing a natural gradual warming since the last ice age) process combined with global warming (human induced warming of the planet). It is predicted that in the south of England the sea may rise between 0.8 and 1.65 metres during the next 100 years (IPCC, 1990; ITE, 1989). This will have major implications for the entire coastline of southern England and may have direct effects on the management of the marshes of the upper Thames and the Thames Estuary involving the

possibility of utilising managed retreat strategies in future years to come (*pers. comm*, R. Hill).

Site infrastructure:

Great Breach Pumping Station: This building is located at the north end of Great Breach Dyke North, near the northern edge of the site. The Pumping Station is used by the Environment Agency to control water levels in the Great Breach Dykes. It is secured by a 2.4 metre high palisade fence.

Stables: The stables are located within Stable Paddock with access provided from the concrete track. They were comprised of temporary buildings built out of corrugated iron sheets, but with funding secured through the London Borough of Bexley in 2010, a new stable block was built with an external face of fibre-cement cladding. The stable block is maintained by the grazier.

Windpump: In the summer of 2000 a 5 metre Poldaw windpump on a 9 metre latticed tower was installed by G.B. Windpumps Ltd to provide a water level management system for the nature reserve. The windpump is contained within a 2.4 metre high palisade fenced compound, located just outside of the s106 area. The associated valves and water meter are contained within chambers located by the side of the track within the Protected Area. In 2011, a second windpump was installed to facilitate new ditches and better flooding control of the West Paddock, as part of the ecological mitigation works for the Crossness expansion project, known as the Tidal Thames Quality Improvement Project (TTQI). Through an Environment Agency abstraction licence ref 28/39/44/41, our licenced annual max is 30,000m3 and our daily max is 864m3. This is monitored by ABB Aquamaster flow meters.

Roads/footpaths: As part of the Section 106 Agreement, Thames Water created the Crossness Pathway, which runs along the entire length of the operational works and the nature reserve along the Thames bank. This is part of the National Cycle Network and was officially opened in 2000. Motorcycle barriers at both sides protect access into this stretch of pathway, which enters the reserve. A similar motorcycle barrier is located at the southern entrance to the nature reserve at the southern end of Great Breach Dyke West. Following removal of the Thames Path barriers by motorbike users, a more robust barrier was installed in 2007 at the extreme east of the site. This provides access to pedestrians and cycles, while prohibiting motorbikes. It is constructed of 100mm box steel in order to deter removal or damage by hacksaw or angle-grinder. Unfortunately, motorbikes have still accessed the north of the reserve at Sea Wall Field. In June 2010, the east section of this field was stock-fenced to reduce the problem, but bike access to the footpath running through Sea Wall Field is likely to be an ongoing problem. In 2016, as part of the TfL and LB Bexley Quietways project, these barriers were removed to promote access to cyclists.

A central concrete track runs through the reserve leading to Norman Road. There is a Type 1 surfaced footpath that runs through Sea Wall Field and connects to the Thames Pathway, and three surfaced paths leading to wildlife viewing screens. In 2009, the Environment Agency surfaced (Type 1) the footpath alongside Great Breach Dyke North. All other footpaths and tracks are unsurfaced.

Riverside viewing platform: On the top of the sea wall there is a platform belonging to the Environment Agency which gives elevated views of the River Thames and the Nature Reserve. In 2006, as part of the LB Bexley ODMP-funded Managing the Marshes project, Thames Water were able to put in steps and new handrails to provide a viewing platform across the reserve. In 2010/11, LB Bexley made further improvements to this structure, including providing ramped access to the viewing platform, providing seating, and reorienting the bird viewing screens on the flood defence.

Fencing: All stock proof fencing throughout the site is under the responsibility of the grazier. The palisade fence that divides the Protected Area from the rest of the site is the responsibility of Thames Water. In 2015, the gates and immediate frontage of the Protected Area were replaced with Weldmesh Security Fencing to prevent the unlawful access that was recurring through the palisade fencing and gates. Weldmesh fencing was also installed on the Crossness Southern Marsh Belvedere Road/Bazalgette Way frontage in 2014 and in November 2017, the same style of fencing was installed on a part of our boundary between the Southern Marsh's Wetland Field and the adjoining Peabody-owned Southmere Park, to the south.

Pylons: Until November 2010, overhead electricity cables ran southwest across the southern edge of the nature reserve and north through Crossness Southern Marshes. Management of the pylons was the responsibility of National Grid Ltd. on behalf of the London Electricity Board. Two pylons were within the boundaries of the nature reserve, and a further two within the boundaries of the southern marsh. These were all removed in 2010 because they were redundant and subject to vandalism and metal theft.

Sea wall: The Environment Agency state that the existing ground level immediately adjacent to the sea wall should not be altered nor should the sea wall be subjected to any additional horizontal or vertical loading, either temporarily or permanently, without prior written approval from the planning authority. This is to maintain the integrity of the existing flood defences. Under the terms of the Water Resources Act 1991 and the Land Drainage Bylaws 1981, the prior written consent of the Environment Agency is required for any proposed works or structures either affecting or within 16m of the tidal flood defence sea wall. Under the terms of the Thames River (Prevention of Floods) Acts 1879-1962, the statutory tidal flood defence level, which is 7.1m AOD at this site, must be maintained at all times, with temporary works if necessary. The existing flood defence wall adjacent to the Thames should not be jeopardised by any engineering or landscaping works.

Bird hide: A block-built bird hide within the Protected Area of the nature reserve was condemned in 2012 following the discovery of structural fissures. In 2013/14, a new two-storey, octagonal, timber bird hide was constructed in the same location overlooking the wader scrape. This provided, for the first time, elevated views of the wetlands and also the extended sewage treatment works. This was officially opened by David Lindo – the Urban Birder – in 2014 at a stakeholder event.

1.5.4 Site hazards

The main hazards at Crossness are proximity to open water and steep banks. In most areas, this has been addressed by fencing. All of the newly restored and newly created ditches on Crossness Southern Marshes have stock fencing approximately 4m from the ditch bank. Anybody using the southern marsh footpath therefore has no direct link to the waterbodies without having to climb fences. On the nature reserve, most ditches are fenced or in suitably gated paddocks. Recent (2009) ecological improvements to the land adjacent the lagoon (Norman Road Field, owned by Tilfen Land) has resulted in the re-establishment

Another hazard is fire. In summer 2005, an accidental fire started in an industrial area immediately north-east of the reserve (east of the Ford car park). This resulted in the Sea Wall Field being caught alight, which then travelled west into the operational area south of the Sludge Powered Generator.

As a result of old landfill in this area, and possibly the presence of peat, this resulted in an on-going underground fire that burned for two years. Because such large amounts of peat are present at Crossness, and because the peat that was unearthed in 2010 in Island Field (when the new reedbed was constructed) was transported to the area of the previous underground fire, this is an ongoing hazard. On Crossness Nature Reserve, we have only recently been allowed to have fires in order to burn cut vegetation. These take place very rarely and under very tightly controlled conditions with a fire extinguisher and fire beaters to hand.

1.5.5 Ecological Evaluation

Site Status - Managed as a Local Nature Reserve

Size – The site and individual habitats are small nationally, but locally large due to the urban nature of the surrounding area. Development within the London Borough of Bexley has resulted in decreased green space and habitat fragmentation, making the conservation of the marshes more important than ever. Crossness is one of only two areas of grazing marsh within the borough and it supports the largest reedbed in the London Borough of Bexley.

Diversity – The site has high diversity due to the range of habitats present: grazing marsh, open water, dykes and ditches, wet meadows, scrub, small woodland.

Naturalness – Though some of the habitats have been artificially created, the site is a former floodplain; some of the relic reedbed is therefore natural and the grazing marsh semi-natural.

Vulnerability - Due to the small size of the habitats there is a problem with succession. Some of the wetland habitats are also reliant on an artificial water supply. The site is also isolated and is therefore vulnerable to vandalism, as well as limiting its genetic variety.

There has been increased pressure from neighbouring developments. On the Crossness Nature Reserve, the sewage treatment works is being expanded immediately west of the reserve (completion due 2014). Cory Environmental's Energy from Waste facility (RRRL) is located immediately north-east of the reserve (construction complete in 2011). In 2010, EDF laid a 132Kv high-power cable through the nature reserve along Footpath 2 to facilitate Cory's waste incinerator. The old disused electric substation east of Norman Road Field has also been sold. At the time of writing (2010), the plans for this area are unknown. On Crossness Southern Marsh, the land immediately south of the marshes is owned by Peabody Estates (formerly) Tilfen Land who plan to erect warehousing. In 2016, Cory Energy receiving outline planning permission to develop the Cory/Borax Fields, by building two four-storey data storage facilities on them. The proposal was deeply opposed by the Friends group and other parties due to their ecological impacts. The Cory Fields annually support breeding Skylark, and sometimes breeding Ringed Plover. Linnet and Cetti's Warbler also breed here. Surveys have revealed that they are regionally, if not nationally important areas for terrestrial invertebrates. In 2018, Cory Energy released plans to build a Riverside Energy Park immediately west of the RRRL and east of Sea Wall Field. This comprises another waste incinerator, aneorobic digestion, battery storage etc, but sits immediately north of the West Paddock – our most ecologically sensitive area. As a large National Infrastructure Project, the planning request went direct to the Secretary of State in December 2018. In February 2019, the deadline for representations to the Planning Inspectorate closed and we

now wait for a hearing. All this development in the immediate vicinity of Crossness will have ecological impacts.

In December 2017, we were affected by a large pollution incident on the adjacent Crossness Sewage Treatment Works. Over 20 million litres of activated sludge spilled into the nature reserve from a fractured 2m diameter pipe carrying sludge under pressure. It entered the reserve at the southern end of the Protected Area (behind the Blackthorn thicket) and polluted the reedbeds and water courses. It also breached the Protected Area fence and polluted the Footpath 2 and adjacent Great Breach Dyke South and Horsehead Dyke. An immediate translocation of Water Voles took place and an extensive clean-up operation which lasted well into the summer. Proximity to the sewage treatment works and the various leaks associated with it make the nature reserve vulnerable.

Rarity – A number of rare species occur at Crossness. It is a water vole stronghold (the UK's fastest declining mammal species); it contains some rare plant species such as Knotted Hedge Parsley, Marsh Dock, Dittander, and Borrer's Saltmarsh Grass; a number of rare invertebrates are present; and rare bird species are frequently recorded, including Squacco Heron (2007), Purple Heron (2009), Richard's Pipit (2008), Jack Snipe (2018), Red-backed Shrike (2018), Penduline Tit (Nov 2018 and Feb 2019). Britain's rarest bumblebee – the Shrill Carder Bee – and the scarce Brown-banded Carder Bee, were discovered on the nature reserve by Bumblebee Conservation Trust surveys in 2012. Barn Owls and Kestrels frequently breed within the purpose-built nest boxes in the Protected Area of the reserve, as well as in the pole-mounted box located in Norman Road Field (Tilfen-owned land, now Peabody).

Typicalness – The habitats are typical of the historic nature of the floodplain landscape: grazing marsh, wetland, reedbeds.

Recorded history – A range of flora and fauna surveys have been carried out. Fauna surveys include water voles, birds, bats, reptiles and amphibians, invertebrates, fish and owl pellet analysis.

Potential value - As one of the only open spaces in an increasingly developed area, Crossness provides a haven for wildlife and an educational resource for local and regional communities.

1.5.6 Success stories

- Crossness Nature Reserve was officially opened in 1998; the Crossness Southern Marshes were officially opened in 2006.
- A Friends of Crossness Nature Reserve was launched in 2004. In 2018, the scheme has 339 members.
- We secured an investment of over £400,000 funding in 2006 through the London Borough of Bexley through the ODPM-funded Managing the Marshes programme. Most of this funding was allocated to Crossness Southern Marshes, but a number of enhancements were also made to Crossness Nature Reserve. These include an extended wader scrape, the creation of a pond-dipping platform, the installation of three wildlife viewing screens, and a viewing platform. On the southern marshes, 1.5km of ditches were restored, a 1.5km footpath was created, fencing and gating to control access and grazing was installed, a wader scrape with nesting islands was built, and signage and seating was installed.

- In 2010, as a result of the TTQI ecological mitigation works, the Crossness Southern Marsh wader scrape was extended by 2750m^2 (0.3ha). On Crossness Nature Reserve, a 1.2ha reedbed was created with 3 deep water lagoons, and new ditches were created in Sea Wall Field and West Paddock.
- In 2010, as part of the London Borough of Bexley Belvedere and Erith Marsh Green Links programme, a new stable block has been constructed on Crossness Nature Reserve, the reedbed boardwalk in the Protected Area has been extended and benches have been installed: three portland stone benches, and two timber and steel. The same number and style of benches have also been installed on Crossness Southern Marshes and additional benches in the surrounding area on Southmere Park.
- A team of 3 regular volunteers have been undertaking practical conservation tasks two mornings per week since 2008. This has greatly improved the management of the site. In addition, several volunteer tasks are run each year for members of the Friends scheme and the general public. These have included reed cutting, ragwort pulling, reedmace control, litter picking, bramble bashing, and vegetation clearance.
- A programme of education visits has run since 2007. Schools that have undertaken educational visits at Crossness include Parkway Primary School, Barnes Cray Primary, St Augustines Primary, Jubilee Primary, Normandy Primary School, Bishop Ridley Church of England Primary School, Barrington Primary, Christ Church CE VA Primary School, St Stephen's Primary School and St Columbus School. An education pack containing 12 activity sheets has been created to tie in with the Key Stage 2 Science curriculum. Pupils are given the opportunity to undertake pond-dipping (QCA objectives include: variation and classification; habitats: observing habitats; interdependence and adaptation); mini-beasting (plants and animals in the local environment: investigative skills; habitats: observing invertebrates; annotating invertebrates; interdependence and adaptation) and owl pellet analysis (interdependence and adaptation: feeding relationships; making observations and measurements; plants and animals in the local environment; scientific enquiry). There are numerous other worksheets and activities such as bird watching and species identification, which encourage pupils to think about species adaptation and habitat management.

  In 2010, 120 children from 4 schools visited Crossness Southern Marshes to take part in a partnership event with LB Bexley marketed as the Erith Marsh Treasure Hunt. This was a very successful event and positive feedback was received from all schools involved: Parkway Primary, St Augustine of Canterbury CE Primary School, Belvedere Junior School and Northwood Primary.
- Community events have been running at Crossness Nature Reserve and Crossness Southern Marshes since 2004 when the Friends of Crossness Nature Reserve scheme was first launched. A minimum of 6 events is expected as part of the S106 agreement, but many more than this are offered each year. Events have included bat walks, moth evenings, bird walks, butterfly and dragonfly walks, botanical identification days, water vole awareness days, bird ringing demonstrations, health walks, barn owl awareness days, birdsong identification workshops, breeding bird survey events and wild food walks.
- In 2011, an internal awareness project was launched. This is known as 'Wild About Thames' and aims to raise awareness, among Thames Water staff, of the wildlife value of some of our sites; it

will also serve to promote the work of the External Affairs department. At Crossness Nature Reserve, we will be running Wild About Water Voles and Wild About Bats events.

- In 2012, two composting toilets were installed on Crossness Nature Reserve.
- We began beekeeping at Crossness in 2012, with the Crossness Nature Reserve Manager and two regular volunteers being trained as beekeepers. Two colonies were kept for two seasons before the Nature Reserve Manager developed an allergic reaction to bee stings. Beekeeping operations were subsequently ceased on health and safety grounds.
- In 2013, a new waterbody was created on Crossness Southern Marsh in Saline Field. A boardwalk/dipping platform was also created to facilitate school visits on the marsh. Other works included the extension of the Triangle Pond (near Great Breach Lagoon) along with the provision of a pond dipping platform; an extension of the pond in the Protected Area, and the reedbed boardwalk replaced and raised.
- A block-built bird hide within the Protected Area of the nature reserve was condemned in 2012 following the discovery of structural fissures. In 2013/14, a new two-storey, octagonal, timber bird hide was constructed in the same location overlooking the wader scrape. This provided, for the first time, elevated views of the wetlands and also the extended sewage treatment works.
- In 2014/15, a part of the artificial Sand Martin bank was replaced with a better, updated design, and the pond dipping platform within the Protected Area was replaced.
- 2014 saw the planting of 72000 Phragmites plugs in the Island Field reedbed. This habitat was created as mitigation for the TTQI upgrade, but became dominated by Typha. We subsequently removed the Typha and plug-planted Phragmites through Ebsford.
- A Sand Martin nesting barrel was installed in 2016 on the nature reserve's Island Field Lagoon (visible from the viewing screen), and another on the Wetland Field on Crossness Southern Marsh, and the Protected Area Barn Owl box was replaced with a new design in early 2017. As of 2018, this box hasn't been used, but this may also be related to the disturbance, and effect on small mammals, of the 2017/18 pollution incident and subsequent clean-up.
- In 2016, we created a Kingfisher nesting bank on the Great Breach Dyke and created a new bird viewing screen on the raised bank of the Protected Area. This provides elevated views over the reedbeds for the first time.
- In 2017, we completed a reptile translocation from the former Linpac site in Erith. From previous surveys at the development site, we were expecting low populations, however numbers were far higher than expected with 1244 reptiles being brought to Crossness. This comprised 854 Slow Worms and 390 Common Lizards.

1.6 Local community & visitor usage

1.6.1 Visitor capacity, facilities and services

Facility	Comments

Staff and volunteers	There is one full-time member of staff managing the Crossness Nature Reserve and Crossness Southern Marshes. There are 352 members of the Friends of Crossness Nature Reserve scheme, and currently (in Feb 2019) 1 volunteer who comes out 2 mornings per week to undertake conservation tasks. In addition, there is a programme of planned volunteer work parties which are attended by up to 20 volunteers. Members of the Friends scheme also contribute greatly, particularly in respect to birds, to the biological recording of the site. A number of staff volunteer days are also held as part of the Thames Water 'Time to Give' volunteering campaign
Viewpoints and screens	There is a bird hide located within the protected area of the nature reserve overlooking a wader scrape complex, and an elevated viewing screen overlooking the Protected Area reedbeds. Within the publically accessible area of the nature reserve there are 4 viewing screens. One overlooks the River Thames; another provides views of the seasonally flooded West Paddock; another looks out over the Great Breach Lagoon, and a fourth screen overlooks the newly-created reedbed complex in Island Field. On the Crossness Southern Marshes, a viewing screen overlooks a wader scrape with nesting islands, while a viewing deck is positioned at the junction of 3 ditches.
Facilities for visitors with disabilities	All paths are DDA (Disability Discrimination Act 1995) compliant in terms of gradient. Kissing gates enable mobility vehicles through them and/or provide access with use of a Radar key.
Facilities for children	There is a pond and a mini-beast area sited within the Protected Area which is designed for planned educational visits by children. There is also a pond and dipping platform referred to locally as The Triangle, which is located to the north-east of the Great Breach Lagoon. Another pond and boardwalk area is located on the Crossness Southern Marsh. There are no play facilities and there are no plans to install them.
Events	An average of 14 community events are run at Crossness annually. These include bat walks, moth trapping evenings, winter bird walks, bird ringing demonstrations and breeding bird survey events. We have also run events such as wildfood walks, dragonfly and butterfly walks, birdsong identification walks, barn owl awareness days, water vole awareness days, and wildlife identification. A range of volunteer task days are also run annually.

	These include reed cutting tasks, ragwort pulling, scrub bashing, reedmace pulling, coppicing, path cutting, tree thinning, pond clearance and general vegetation management. Events in the past have also included putting out reptile refugia, and modifying an artificial sand martin bank. We also run guided walks for organisations such as Bexley RSPB, the London Natural History Society, the Sidcup Natural History Group and Walk London. In addition to publically promoted volunteer taskdays, we are also engaged with the London Wildlife Trust to deliver an 'Earn Your Travel Back' (led by TfL) volunteer scheme for youths.
Reserve leaflet	There is currently no leaflet in place for Crossness Nature Reserve and Southern Marshes. We were unsuccessful in an internal bid for funding for such a leaflet but hope to produce one in the near future.
Publicity and promotion	We aim to run at least two press releases per year in local papers to promote the nature reserve. The 'Friends of Crossness Nature Reserve newsletter' is distributed to approximately 400 people including key stakeholders and organisations within the community

1.6.3 Accessibility

All access routes and signs are to DDA (Disability Discrimination Act 1995) specifications.

1.6.4 Local / regional community

- Local: live within 3 miles of the site
- Regional: live in London, Kent and Essex Boroughs but not within 3 miles
- National customers: live outside of London, Kent and Essex

The nearest catchments are Belvedere, Thamesmead and Abbey Wood.

1.6.5 Visitor tracking research

Formal visitor tracking has not taken place, but we are currently investigating the installation of visitor trackers at entrances.

1.6.6 Community involvement and consultation

A Friends of Crossness Nature Reserve scheme was set up in 2004. In 2019, there are 352 members. Membership allows access to the protected area of the nature reserve, and to attend a range of community conservation events and task days. They also receive newsletters which is now distributed

more widely to other groups, partners and organisations, as well as internally to key Thames Water personnel.

In addition to planned volunteer events which are opened up to all members, a dedicated group of three volunteers come to site twice a week to undertake conservation tasks.

The Crossness Nature Reserve Manager is also in touch with a variety of local groups including the Bexley Natural Environment Focus Group, the Bexley Civic Society, the Belvedere Community Forum, the London Natural History Society, Thames21 and Bexley RSPB. Representatives of the BNEFG and RSPB sit on the CNR Management Committee.

Our twice-annual Management Committee meetings also provide a forum for public consultation, with one member representing the Friends of Crossness Nature Reserve Group.

1.6.7 Volunteers

Crossness has a strong and inclusive volunteer programme, which involves local and regional people in its management and specific activities. This site has a number of opportunities for volunteers to get involved and Thames Water works with regular practical conservation volunteers as part of the conservation task programme, as well as corporate groups, school groups and other organised groups to achieve the work on the site.

In addition to voluntary habitat management, members of the Friends scheme are heavily involved in the biological recording of the sites. Wildlife sightings – with a particular emphasis on avian fauna – are recorded in a wildlife log book. The nature reserve manager then uses this data to electronically record the site's biological records, and to distribute these records to relevant parties such as GiGL.

- Conservation Work Parties
- Projects or events involving volunteers
- Biological monitoring by members of the Friends of Crossness Nature Reserve scheme
- Partnership events
- Looking to offer corporate volunteer days
- We have recently held volunteer events in partnership with the London Wildlife Trust for the Earn Your Travel Back Scheme. This scheme allows youths who have misused their Oyster cards and subsequently lost their privilege to free travel, to earn back their cards by doing a day's conservation volunteering. Four such events were held at Crossness in 2010. Tasks included clearing and raking vegetation, litter picking and ragwort pulling.This scheme has unfortunately now come to a close.

1.7 Current management

1.7.1 Land use

Crossness Nature Reserve was designated a nature reserve in 1994 as part of a S106 agreement. This was part of a planning obligation for the creation of the Crossness Sludge Powered Generator.

The site officially opened in 2002 when it received Local Nature Reserve designation. In 2004, a Friends of Crossness Nature Reserve scheme was started and community and education events were held on site. In 2006, as part of the Managing the Marshes project, enhancements were made which included an extended wader scrape, two wildlife viewing screens – one overlooking the West Paddock and another overlooking Great Breach Lagoon. A new pond-dipping platform was built and a mini-beast area created. As part of the Managing the Marshes project, the Crossness Southern Marshes were enhanced for conservation, recreation and access. This led to the site being opened to the public for the first time in generations. A 1.5km footpath was created with seating, signage and wildlife observation points. 1.5km of ditches were restored and some new ditches created, and a wader scrape was created in Wetland Field.

In 2010, as part of the Tidal Thames Quality Improvement Project (TTQI), further ecological enhancements were made. A 1.6ha reedbed and deep water lagoons were created in Island Field, new ditches were created in West Paddock and Sea Wall Field, and the Crossness Southern Marsh wader scrape was extended. A second windpump was installed as part of this programme in 2011.

In 2010/11, the London Borough of Bexley enhanced the stables and the Thames Path viewing platform as part of the Belvedere Green Links program.

In 2012/13, a number of ponds, dipping platforms and boardwalks were created to facilitate school visits, in addition to the installation of two composting toilets.

A new two-storey, timber bird hide was construction in the winter of 2013.

In 2016, Cory Environmental received outline planning permission to build two, four-story, data storage facilites on Cory Field North and Cory Field South. This was heavily objected by the Friends group and other stakeholders due to the presence of breeding birds, including red-list species. Skylark breed there every year, and in most years Ringed Plover and Cetti's Warbler. Little Ringed Plover have also bred on this open mosaic habitat.

In 2018, Cory Environmental (now Cory Energy) have submitted proposals to build a new waste incinerator between the existing facility and Crossness Nature Reserve's Sea Wall Field. This will have an aesthetic impact on the nature reserve and increase the hemmed-in feeling of recent years with all the surrounded development (the site of the former electricity sub-station on Norman Road has multiple approved planning applications for warehousing etc).

1.7.1.1 Grazing

Crossness Nature Reserve managed grazing: The majority of the grasslands throughout the site are managed through grazing horses. A tenant grazier (Jay Anderson, previously parents Diane and William Bruce) is responsible for ensuring continual compliance with the grazing agreement to which he/she is bound (Grazing Agreement, 2000), the main points of which are as follows: no more that twelve horses shall be grazed throughout the nature reserve; grazing of the West Paddock is restricted to the period of 1st August to 31st October; the grazier shall cut or pull thistles and other noxious weeds (including Ragwort); the grazier at her own expense will ensure that all fences and gates are in good order and condition; any worming drugs used should exclude Ivermectin; the grazier shall keep the land and watercourses free of litter.

In 2010/11, the eastern section of Sea Wall Field was fenced and brought into grazing.

Crossness Southern Marshes managed grazing: Until Autumn 2018, the grasslands south of the ditch network, and in Pond Meadow north of the ditch, were managed through grazing horses. A tenant grazier (Moses Brazil) was responsible for ensuring continual compliance with the grazing agreement to which he was bound, the main points of which are as follows: no more that thirty horses shall be grazed throughout the site; the grazier shall cut or pull thistles and other noxious weeds (including Ragwort); the grazier at his own expense will ensure that all fences and gates are in good order and condition; any worming drugs used should exclude Ivermectin; the grazier shall keep the land and watercourses free of litter.

As a result of continual problems with the tenant grazier (Moses Brazil Junior who it was handed down to), the grazing agreement was not renewed and we took action to remove them and take back possession of the land. As well as continual overgrazing and cutting of fences and gates to put horses onto the non-permitted areas (including the permissive footpath), in January 2018, they unlawfully erected large dog kennels and began breeding Caucasian Mountain dogs and Turkish Kangols. Nine dogs were being held on site, plus ten puppies, including through the snow in February and March of that year. We engaged solicitors to have them vacate. Following various extensions to the deadline, the graziers had still not removed their horses (though they did remove the kennels) and as such, in June 2018, we issued possession proceedings through the courts. All the foals were removed by the graziers, but the other horses remained, such that we were forced to have equine bailiffs (GRC Group) seize 13 horses from the Southern Marsh in September 2018 and rehomed to two different horse charities. Two further horses were released onto our land from the east (Tilfen Land) in December 2018 and we had these seized and rehomed at a horse sanctuary also. Following the horse seizure, the grazier's stole the Southern Marsh metal field gates. Due to some issues with the graziers repeatedly cutting the padlocks off of the grazier gate and gaining entry, we have plans to remove the gate and replace with weldmesh fencing in February 2019.

1.7.1.2 – Land drainage

The Environment Agency manages the pumping station and the main ditches, which receive run-off from the Marsh Dykes catchment. Although in the early stages of discussion, it is possible that the EA might dispose of the Great Breach Pumping Station in favour of a single pumping station to drain the marsh dykes.

1.7.1.3 – Water levels

Since 2000, water has been provided to the West Paddock, the wader scrape, the pond and reedbed via a Poldaw windpump located immediately west of the reserve on Operational land. In 2011, a second windpump was installed within the Protected Area to better control levels in the West Paddock and the new Sea Wall Ditch and surrounding system, with the top of the abstraction pipe located 500mm from the bed of the ditch.

Under an abstraction license from the Environment Agency, we are permitted to abstract 30,000m^3 per annum. An increased abstraction license is being sought in 2014 following over-abstraction in two

consecutive years. A gauge board was installed on the Great Breach Dyke, upstream of the abstraction point, in July 2014, at which point the water depth was 0.75m.

The Environment Agency were planning to dredge the Great Breach during winter of 2017/18 but the project was delayed due to the impacts of the Thames Water pollution event. This instead took place in winter 2018. We were also exploring some desilting works on the nature reserve, and in particular on the Southern Marsh, following continued flooding of the permissive footpath at Bridge Meadow, the boardwalk in Saline Field, and the southern wooded ride of the nature reserve, however this was delayed due to the pollution impacts. In the meantime, Ebsford Environmental are due to cut the in-channel emergent vegetation from the Southern Marsh ditches in February 2019.

1.7.2 Security

The site manager carries out weekly site patrols. Volunteers are also on site twice per week and report any issues, as does a number of visitors from the Friends group. On the nature reserve, the palisade boundary fences are checked by Operations. In 2010/11, there have been security issues on both sites with vandalism and damage caused by off-road motorbikes and quad bikes. We have engaged with local police and Thames Water's security personnel in an attempt to resolve these issues. In 2014 there have been a number of security breaches in the Protected Area of the nature reserve, resulting in the breaking-in, and setting fire to, of our Portakabin, in which was stored educational and volunteer equipment.

Travellers are a problem. They accessed the Cory Fields in 2014 (??) via the Norman Road Field gates and caused a lot of damage and expense with fly-tipping of hazardous waste etc. This led to Cory fencing their fields and getting tough on the Norman Road access gates (they own the gates but we own the road). In March 2018, there was a reoccurrence. This time, because they were getting stuck on the wet Cory Field South, they pulled up on our access road. Our bailiffs removed them a week later, but the Norman Road gates weren't replaced until June meaning that there could be no vehicular movement from that end of the site.

1.7.3 Maintenance & management operations

Grass cutting, weed control, hedge maintenance, hard surface maintenance, site furniture maintenance, cleansing and dog waste removal are carried out by the reserve manager. The Crossness Southern Marsh paddocks are cut and baled by Thames Water's grounds maintenance contractors, as is the CSM path cutting.

1.7.4 Corporate structure, staff duties and areas of responsibility.

Biodiversity Team Manager and Crossness Nature Reserve Manager: responsible for on site operations, participating in all activities necessary to promote the safe use and enjoyment of the site by visitors whilst maintaining the balance between recreational use and nature conservation. Reporting to Corporate Responsibility and Sustainability Manager.

Corporate Responsibility and Sustainability Manager: responsible for conservation, access and recreation across the Thames Water catchment. Also Line Manager for Crossness Nature Reserve Manager, reporting to External Affairs Director.

1.8 Biodiversity

Habitats/Communities:

Crossness Nature Reserve and Southern Marsh supports six main vegetation communities:

1. Grazing marsh: (semi-improved neutral grassland)
2. Ungrazed semi-improved neutral grassland (probably derived from grazing marsh)
3. Open water and their margins: ditches, dykes, ponds, lagoon and wader scrape
4. Mixed scrub: consisting mainly of hawthorn, blackthorn, elder, plum and guelder rose.
5. Reedbed: *Phragmites australis* reed swamp
6. Ruderal and tall herb communities: small areas are located alongside paths and elsewhere. The short ruderal communities are important for invertebrates such as the UK BAP species, brown-banded carder bee (*Bombus humilis*), while tall herbs support good numbers of whitethroat.

1.8.1 Flora & Fauna

A botanical survey of Crossness Nature Reserve was undertaken in July 2000 to provide a full species list for the reserve and to provide a baseline for future botanical monitoring (Chipchase, 2001). All accessible areas of the reserve were surveyed and separate species lists drawn for different areas/habitats together with an estimate of abundance using the DAFOR scale. One hundred and forty-nine plant species were recorded.

The survey did not repeat the National Vegetation Classification survey (NVC) as undertaken previously by Tim Rich (Rich, 1994). However, the communities identified during the survey would appear to remain consistent with those NVC types classified previously:

MG6 - Perennial Rye-grass/ Crested Dogstail grassland (*Lolium perenne/ Cynosurus cristatus)*

MG1 - False Oat-grass grassland (*Arrhenatherum elatius*)

SM23 - Reflexed satmarsh-grass saltmarsh (*Puccinellia maritima/ P. distans*).

SM 28 - Common Couch saltmarsh (*Elytrigia repens*).

S4 - Common reed swamp (*Phragmites australis*)

Although certain species were not recorded for the saltmarsh and aquatics, i.e. *Puccinellia spp.*, and *Lemna gibba*, it is not to be assumed that these are now entirely absent. The presence of these species was limited at the time of the 1994 survey, and they may simply have been overlooked. A further development since the 1994 survey has been the development of scrub, particularly in the southern part of the Protected Area.

A survey undertaken in 1989 by the Kent Trust for Nature Conservation (Pitt & Blatchley,1989) identified and mapped the presence of four species of particular interest within the site:

- Marsh dock (*Rumex palustris*).
- Borrer's saltmarsh grass (*Puccinellia fasciculata*).
- Knotted hedge-parsley (*Torilis nodosa*).
- Corn caraway (*Petroselinum segetum*).

Of these four plants only knotted hedge-parsley (*Torilis nodosa*) was located in the 2001 survey. In 2005, *Torilis nodosa* and *Rumex palustris* were recorded on Crossness Southern Marsh.

During the 2001 survey, two alien species and nuisance aquatic species were recorded: New Zealand Swamp Stonecrop (*Crassula helmsii*) and Parrot's Feathers (*Myriophyllum brasilense*). Both were associated with the Great Breach Dyke Lagoon and Great Breach Dyke East. In recent years the Environment Agency has undertaken work to eradicate these species. In the 2000 survey there were no longer any signs of *Crassula helmsii,* however, a number of stands of *Myriophyllum brasilense* recorded in Great Breach Dyke East and its intersection with Great Breach Dyke West. One further alien species of concern recorded in the Sea Wall Field was Japanese Knotweed (*Fallopia japonica*) which appeared to have been eradicated, but has returned in 2011.

In 2005, prior to site enhancements being undertaken, a botanical survey of the Crossness Southern Marshes was carried out by Joyce Pitt on behalf of the Kent Wildlife Trust. Good stands of Marsh Dock was recorded (*Rumex palustris*) and Crossness was noted as containing the species' most westerly distribution in London. Knotted Hedge-parsley (*Torilis nodosa*) was recorded in the closely grazed areas.

In 2006, the invasive aquatic species Water Fern (*Azolla filiculoides*) was present on the Crossness Southern Marsh ditches. This was biologically treated, with great success by introducing the weevil *Stenopelmus ruphinasus*. Water Fern did however return in 2007 and again was controlled biologically. Fortunately, Crossness has not had any further problems with this alien species.

A single stand of giant hogweed (*Heracleaum mantegazzianum*) has been recorded on the Crossness Southern Marsh, but it also occurs on the Thames Path and within the Crossness Sewage Treatment Works. Likewise, Japanese knotweed (*Fallopia japonica*) has been recorded on the Thames Path, along the southern boundary of the Sewage Treatment Works (Public Footpath 1) and on the Ridgeway.

A botanical survey of the marshes also took place in 2011/12 by David Miller.

In 2012, we began a reintroduction project of the locally extinct Marsh Sow-thistle. A total of 54 plants were planted across the nature reserve over 2 years. These were located in the Ridge and Furrow area in the Protected Area, the wader scrape, West Paddock and Island Field reedbed.

1.8.2 Fauna

Birds

Crossness Nature Reserve and the whole of the Erith Marshes form part of a complex of sites throughout the Inner Thames, which provide valuable bird habitats. Other key areas include: the mudflats at Barking, Rainham Marshes, and the mudflats at Grays and West Thurrock Marshes on the Essex shoreline; and on the Kent shore, Dartford Marshes, Crayford Marshes, and Swanscombe Marshes.

Within Crossness Nature Reserve there are a number of key areas for birds:

Great Breach Lagoon: The margins and open water of the lagoon attract a variety of wildfowl and waders. Species recorded in recent years include, Little Grebe, Moorhen, Coot, Mallard, Gadwall, Teal, Pochard, Tufted Duck, Lapwing and Snipe. A Purple Heron was recorded here in 2008, and a Penduline Tit in 2018.

West Paddock: This paddock has raised earth bunds around its boundaries that provide an area of land suitable for winter flooding and a relatively disturbance-free environment. There are also a number of scrapes excavated to provide areas of water in spring and early summer. Grazing in this area is restricted to the period of 1st August to 31st October inclusive. In 2018, two pairs, possibly three pairs, of Lapwing bred here.

East Paddock: This paddock is currently grazed by horses, and is a good area for Stonechat and Meadow Pipits.

Reedbed: The reedbed provides suitable habitat for a range of birds including Reed Warblers, Sedge Warblers, Reed Bunting. It is also suitable habitat for breeding Gadwall, wintering Water Rail and Bearded Tit is a rare visitor to the site. Bearded Tit bred for the first time in 2017 in the reedbed at the top of the boardwalk to the west.

Thames Foreshore: This area is extremely important for a wide range and number of species. Birds using the foreshore will sometimes use the nature reserve as a high tide roost, but increasingly they choose to use the ledge on the riverward side of the sea wall located immediately north of the Crossness Beam Engines.

In contrast to reports from earlier years, waders using the nature reserve as a high tide roost or as a breeding site, appear to have declined during the last 30 years. Although exact reasons for the decline cannot be defined precisely it is possible that regional and national declines, changes in water levels, drought, grazing pressure, human disturbance and regional habitat fragmentation caused by increased urbanization, may have all contributed. The argument for a water level drop is predominantly circumstantial, with change in bird populations (particularly the decline of breeding Lapwing, Redshank and Yellow Wagtail, all of which are commonly associated with high water tables) providing the main source of evidence that water levels are lower than formerly. However, these three species have declined both regionally and nationally.

In 2011, we experienced a loss of breeding Meadow Pipit and Stonechat. The loss of breeding Meadow Pipit is possibly due to the lack of tall grass associated with the habitat loss of the Crossness Sewage Treatment Works expansion, and the loss of Stonechat is possibly due to recent harsh winters (2010, 2011). Breeding successes have included a huge number of breeding Whitethroat, as well as several pairs of breeding Cetti's Warbler which bred for the first time at Crossness in 2011.

On the Crossness Southern Marshes, the main area of interest for birds is the wader scrape and reedbed in Wetland Field. Breeding Reed and Sedge Warbler are present in the reedbed, Coot, Moorhen and Canada Geese frequently breed around the margins or islands associated with the scrape. Redshank and other waders have been recorded but do not breed here. In 2007, a Squacco Heron came into the scrape and stayed for a week. This was the first Squacco recorded in London since 1866. This bird attracted a lot of bird watchers to Crossness, and it made national news in some of the broadsheets, was in numerous local papers and was on the BBC London News. While the bird watchers were on site, Quail was also recorded.

The paddocks have been known to have breeding skylark, and the reed fringed ditches support good numbers of breeding warblers. The scrub, particularly at the east end of the Southern Marshes, attract Goldfinch, Long-tailed Tit and Linnet.

Crossness Nature Reserve was also a Constant Effort Site, which means that its bird populations were continually monitored as part of the BTO's bird ringing scheme. This scheme provided the reserve with an astonishing amount of invaluable data from which to compare patterns of species success and/or declines on the site, and allowed us to adjust the site management prescriptions accordingly. Unfortunately, constant ringing was seized when foxes began to predate on the nets on a regular basis. Bird ringing now only takes place on an adhoc basis.

Fish

Until recently, the fish community of the main drainage ditches on the site (particularly Great Breach Lagoon) was typical of established grazing marsh dykes with Rudd and Tench dominant. This contrasts with the fauna of the newer Thamesmead canals, which are dominated by Roach, Pike and Bream. One netting survey of Great Breach lagoon was undertaken by the National Rivers Authority (now the Environment Agency) in 1990 and revealed good populations of Eels (120 fish caught, 30-60 cm length), Rudd (55 fish caught, 5-25 cm length) and Tench (39 fish caught, 15-55 cm length). Health and growth rates of fish inspected in this survey were good (Chris Dutton, NRA, pers. comm.).

However, in two electro-fishing surveys of netted 100m sections, undertaken by the EA on 27th October 2009 on Great Breach Dyke North (TQ 49318 80314) and Great Breach Dyke South (TQ 49120 79636), no fish were found and no reason could be found for their disappearance following water quality sampling.

Amphibians and reptiles

Smooth newts are recorded fairly frequently on both Crossness Nature Reserve and Crossness Southern Marshes. They will often be found under the refugia in the mini-beast area, and under refugia in the southern marsh paddocks. Common frogs are occasionally recorded and grass snake are seen now and then. Grass snake have been recently recorded swimming across the Great Breach Dyke, and under refugia on the southern marshes. Common Lizard have been recorded particularly at the north end of the reserve. In 2017, a large population of reptiles was translocated from a development site in Erith, to Crossness Nature Reserve. A total of 1244 reptiles (854 Slow Worms, and 390 Common Lizards) were released into the north scrape area. Several reptile hibernacula were created, and various habitat piles were created and maintained for them. Three years of monitoring was built in to the programme.

Mammals

Crossness Nature Reserve and Crossness Southern Marshes continue to be a water vole stronghold despite this species being in national decline. In 2006, the Crossness Southern Marsh ditches (previously unmanaged) were restored and water voles subsequently expanded out from an original 130m within Erith Marsh Dyke East to over 1.5km of reprofiled ditches. In 2007, a new ditch was created at the southern end of Wetland Field on Crossness Southern Marshes. Water voles immediately colonised this new habitat. Stock fencing was erected to protect the banksides from grazing and this has proved particularly successful with regard to water vole burrowing activities.

On Crossness Nature Reserve, water voles continue to do well in existing ditches. In 2010, two new ditches and a new reedbed were created. The bank profiles and planting were designed specifically with water voles in mind. Captive-bred water voles (progeny of those water voles removed from the TTQI development area), were due to be released into these receptor sites in spring 2011, but due to a lack of sufficient vegetation and colonisation from the wider area, the release did not take place.

Sixty Water Voles were captured from the Protected Area South and Great Breach Dyke South from December 2017 to Spring 2018 following the STW pollution incident. These were taken into captivity and held at Derek Gow's facility in Devon with a view to releasing them back at Crossness in Spring/Summer 2019.

The most frequently recorded mammal at Crossness is the fox. Small mammal sightings are usually incidental. Field vole have been recorded under refugia, and a number of common and pygmy shrews have been seen. Owl pellet analysis indicates that there is a good range of small mammal fauna at Crossness, including shrews, voles and mice. In 2010, it was discovered that moles are present on Crossness Nature Reserve; tunnelling evidence was recorded in the southern half of the protected area, close to one of the Dartford Ringing Group's net rides.

Incidental recordings of weasel are recorded several times a year, and a visiting ecologist saw a stoat run across the main reserve access track in 2010.

Bat surveys and community bat walks have revealed good numbers of common and soprano pipistrelles on both sites. Noctules are recorded feeding less frequently, more commonly over the Crossness Southern Marshes. Surprisingly few Daubenton's bats (associated with open water) are recorded, however there are large numbers that feed regularly over the nearby Southmere Lake. A bat survey took place in 2018 (Andy Howard and Nina Egleton for Derek Gow Associates) covering both Crossness Nature Reserve and Crossness Southern Marsh. This picked up Nathusius's Pipistrelles as well as Common and Soprano.

Invertebrates

A number of important invertebrate species have been recorded in the ungrazed areas of Crossness Nature Reserve. Two NNB species include the leaf hopper *Euscekidius variegates*, and the chrysomelid beetle *Podagrica fuscicornis.* The beetle *Olibrus flavicornis* has also been recorded.

Surveys of the *Phragmites australis* reedbed undertaken in August 1994 indicate that they support at least a moderately diverse invertebrate community including one RDB3 moth, four NNB species and four regionally notable (London context) invertebrates. Two of the uncommon moths recorded (the Twin-spotted Wainscot, *Archanara geminepuncta* (RDB3), and the Fen Wainscot, *Arenostola phragmitidis* (RDB3)) are reedbed specialists with larva that feed internally on reed stems.

Another record of note is Roesel's Bush-cricket (*Metrioptera roeselii*), a species which was common in the Thames estuary, but considered rare or absent from the rest of Britain, however in recent years, it has vastly expanded its range, possibly due to climate change, and is now common throughout much of the England. Its survival depends upon the continued existence of grassland sites in this area, and it has been frequently recorded within the ungrazed grasslands within the protected area. The reedbed seems to support good numbers of the bush-cricket: Long-winged Conehead (*Conocephalus discolor*), there is a large population of the Great Green Bush-Cricket (*Tettigonia viridissima*)across the whole of the reserve and southern marshes. Although nationally common, this species is rare in London.

Moth trapping community events have taken place on both Crossness Nature Reserve, and more frequently on Crossness Southern Marshes. This has produced some good species lists with a number of rarities or uncommon species.

Aquatic invertebrate surveys took place in Autumn 2015 and Spring 2016 (Marcel Ashby and Tristan Bantock, for Colin Plant Associates). Results can be found in Appendix ??. Due to the Dec 2017 pollution incident, repeat surveys were commissioned for Autumn 2018 and Spring 2019 in order to help measure the impacts. These results are not yet available.

2. Where do we want to get to?

2.1 Vision

To protect & enhance the conservation value of Crossness Nature Reserve and Crossness Southern Marshes whilst encouraging community involvement and public access. We will create a high quality customer experience and provide a range of environmental learning opportunities for visitors from across the region.

2.2 Analysis assessment

2.2.1 SWOT analysis

Strengths	Weaknesses
▪ One of London's few surviving remnants of grazing marsh ▪ Extensive area of open space in a heavily crowded industrial and urban landscape. ▪ Perception of an 'Urban Wilderness' ▪ Strong population of Water Voles with ideal habitat and suitable watercourses ▪ Good numbers of roosting and foraging waders and wildfowl ▪ A number of locally or regionally uncommon plant species in the dykes and grasslands ▪ The site supports two Nationally Notable B invertebrate species, one Red Data Book K insect, and one Red Data Book 3 invertebrate species ▪ Windpump and the ability to control water levels throughout the majority of water courses ▪ Good sized reedbed in a local context ▪ Wide range of available expertise for management issues ▪ Continuity of ecological blocks: Erith Marsh,	▪ Accessibility and lack of car parking ▪ Lack of visitor centre ▪ Area east of CNR (providing best access options) owned by a third-party and currently under construction ▪ Illegal grazing on Crossness Southern Marsh since neighbouring landowners got their grazing under control ▪ History of undesirable activities including fly-tipping, illegal access and occupation, illegal grazing, off road motorcycles and dumping of stolen motor vehicles ▪ Backdrop of industrial buildings and waste ground giving the site a bleak and run-down appearance ▪ Lack of wind in summer and therefore reduced capacity from the windpump at a time when the water balance is usually at its lowest ▪ Lack of on-site electricity preventing use of CCTV, wildlife cameras and volunteer welfare facilities

Dartford Marsh, Crayford Marsh, Rainham Marsh, West Thurrock Marsh and Swanscombe Marsh ▪ Meeting local/regional/national BAP targets ▪ Close proximity to local communities ▪ Grazing agreement with tenant grazier to maximise conservation benefits ▪ Good recorded history with land use records dating from the mid 19th century and a range of ecological surveys dating back to the 1980's ▪ Full time Nature Reserve Manager ▪ Dedicated volunteers and good community involvement ▪ Good relations with adjacent landowners	
Opportunities ▪ Increased community involvement in the management and use of the nature reserve ▪ Increased publicity of the site through interpretation, biodiversity achievements and community involvement ▪ Achieving national/ regional/ local Biodiversity Action Plan targets ▪ Raising water levels ▪ Tree planting in identified areas to provide additional habitat and to 'screen' unsightly buildings ▪ Developing the site as a valuable educational and research resource for local schools, colleges, universities and amongst the general public and professional people ▪ Thames Water flagship site for London ▪ Surveys of all major groups and on-going monitoring ▪ Improve the site for breeding birds	**Threats** ▪ Neighbours, Cory Energy, developing their landholding that sits on or immediately adjacent our landholding (Data Storage facilities on Cory Fields, and Riverside Energy Park on north-east boundary) ▪ Uncontrolled access and site security, including illegal grazing and motorcycles ▪ Pollution and contamination of watercourses. ▪ Increase of vandalism as the sites becomes more publicised and accessible ▪ Sea level rise, climate change and uncontrolled flooding ▪ Further industrial development along Norman Road ▪ Invasive and alien plant species, including noxious weeds ▪ Damage to grassland from over-grazing

2.2.2 Site specific wish list

WISH LIST FOR CROSSNESS NATURE RESERVE
Staffing One site manager with 2 or 3 regular volunteers, plus one person(s) that can be called upon to help deliver outdoor education visits (i.e. retired school teacher) so that school groups can be split and visits are therefore more manageable.
Financial Funding to carry out robust monitoring of wildlife and habitat including botanical, invertebrate and small mammal surveying.
Building A small education facility would be desirable to facilitate school visits. This would need to be a self-contained building with room enough for a class of 30 plus adult supervision. A small storage area would be required for pond-dipping equipment etc, and toilet facilities. This would ideally be located within the Protected Area close to pond, mini-beast and bird hide; otherwise these features could be incorporated into the area surrounding the facility.
Education A self-guided education pack so that schools can undertake visits in the absence of the nature reserve manager. A box of equipment (i.e. dipping nets, trays, microscopes, bug pots etc) could be made available to hire by the school to facilitate these visits.
Environmental More ponds (with platforms) on both sites; small scrapes and foot drains on the southern marsh paddocks; areas of rough grassland for barn owls and other raptors. More bird and bat boxes, more mini-beast towers/walls and insect boxes, a swift nest tower, a sand martin barrel on Crossness Southern Marsh wader scrape. Improvements to bat hibernaculum; more bat surveying equipment. Controlled water levels on Crossness Southern Marsh. Raised flower/herb/wildlife garden beds. More robust monitoring programme and funds to hire in expertise
Biodiversity Breeding Sand Martins in artificial bank Return of breeding Meadow Pipit Successful breeding by waders Return of fish in Great Breach Lagoon

2.3 Management aims & objectives

Objective 1: Maintain and enhance heritage and biodiversity

P1.1 Maintain and enhance the wildlife value of Crossness Nature Reserve and Crossness Southern Marshes, supporting Biodiversity Action Plan processes
P1.2 Record and monitor flora and fauna
P1.3 Work with partner organisations and agencies

Objective 2: Encourage use and enable community engagement

P2.1 Maintain and enhance a robust Friends of group
P2.2 Develop Crossness as a regionally important site, providing easy, safe and enjoyable access for all members of the community
P2.3 Provide opportunities for education and community involvement, achieving a high level of awareness and instilling a sense of pride and local ownership through the development of local partnerships
P2.4 Provide voluntary opportunities for all communities
P2.5 Monitor visitor use of the site

Objective 3: Increasing public understanding and awareness of Thames Water's environmental credentials and commitments

P3.1 Provide signage/interpretation of the site's wildlife, landscape and historical features
P3.2 Provide a programme of events and activities that promote Thames Water's environmental credentials
P3.3 Promote the reserve and other Thames Water environmental commitments through a range of media applications
P3.4 Deliver a programme of environmental education

Objective 4: Encourage appropriate public access

P4.1 Maintain site furniture in accordance with H&S standards
P4.2 Ensure regular site patrols
P4.3 Ensure site access improvements comply with DDA regulations
P4.4 Work with partners to encourage access

Objective 5: Maximise revenue and funding opportunities

P5:1 Develop funding and income opportunities for the site
P5.2 Incorporate income generation into site budget

2.3.1 Constraints

- Access:
- Facilities: parking, toilets, base
- Public transport links
- Funding
- Staffing
- Neighbouring developments
- Vulnerability to vandalism due to isolation

2.3.2 Management aims of biodiversity

2.3.2.1 Watercourses and riparian communities

Objective

To provide and maintain a range of conditions which support in optimal condition a variety of ditch, dyke and open water flora and fauna, characteristic of the Inner Thames floodplain.

Description

The sites watercourses are classified into two types, main channel and subsidiary channel. The Environment Agency has overall responsibility for the main channels, ensuring that the land drainage functions are maintained through dredging and vegetation clearance. Other ditches are managed with the primary focus being on nature conservation. Management aims to maximise conditions for a wide diversity of flora and fauna by allowing for a range of habitat conditions ranging from areas of open water through to areas of dense mature vegetation. This is achieved through vegetation management, bank-side grazing and water level management strategies.

2.3.2.1.1 Management actions

Water quality

Monitor watercourses for pollution, fly tipping, nutrient enrichment, invasive species. Water Fern (*Azolla* spp) has been a problem in previous years (2006, 2007 and 2011) and continues to be monitored.

Water quantity

Collect monthly abstraction levels to provide to the Environment Agency as part of our abstraction licence agreement.

Manage water levels on subsidiary ditches to minimise impacts on Water Voles by using sluice gates and the windpump to ensure that there are few fluctuations.

Manage water levels on the wader scrape via the windpump and sluiceboards, in order to expose muddy margins for waders in the spring.

Watercourse and bankside management

Ensure that bankside grazing is managed to protect ditches and associated flora and fauna. Ensure that fencing is maintained and grazing animals are prevented from straying into excluded areas. Most ditches on the Crossness Southern Marsh are fenced to exclude grazing, and dedicated horse drinking pools have therefore been provided. On Crossness Nature Reserve, most ditches are fenced to exclude grazing except Lagoon Dyke and Great Breach Lagoon. This does provide a range of bankside habitat including bare trampled margins which may be of interest to a range of species such as Marsh Dock (*Rumex palustris*).

Management of the main channels throughout the sites are undertaken periodically in order to maintain the land drainage functions of the watercourses. This usually involves dredging and vegetation removal in the channel itself, and cutting of bankside vegetation. In order to combine land drainage needs with ecological requirements, the following best practice techniques for management are recommended:

- Desilting without interfering with the banks by not covering riparian vegetation with removed mud and silt.
- Working from one bank only, progressing in an upstream direction, working short stretches (enabling plant propagules and invertebrates to float downstream onto the disturbed substrate to readily colonise it).
- Bank-side vegetation should be cut on a 3-5 year rotation, thus creating a rich grass sward and preventing the development of woody scrub.
- Mowing regimes should aim to retain patches of uncut vegetation of varying lengths; leaving gaps of 10 - 20 metres as untouched refugia for wildlife; in total at least one third of the ditch should remain untouched.
- Only a single bank should be cut in any one year or staggered blocks of uncut vegetation retained on either side of the bank.
- A strip of vegetation should be retained at the toe of the bank.
- Areas identified as supporting dense water vole populations should be avoided or given special small-scale treatment.
- Arisings should be left adjacent to the channel for a short period to allow them to drain of water and allow mobile species the chance to re-colonise the watercourse; disposal of arisings should be done sensitively in line with current best practice.
- Avoid heavy machinery such as flail mowers that may compact the bank-sides; the use of hand held strimmers is preferred.
- Avoid use of herbicides where possible.
- Timing of operation needs to be considered to minimise impact during breeding season; early spring or late autumn are usually the least sensitive periods.

In-course management to date: Great Breach Dyke West was dredged by the Environment Agency in 2002 and 2009. Fords Dyke dredged in 2002. Crossness Southern Marsh ditches desilted and reprofiled in 2005/6. Fords Dyke East dredged and reprofiled 2010. Crossness Nature Reserve ditches cleared (mid-channel only) in 2010/11: Parsley Field Ditch, Fords Dyke West and West Paddock Ditch. Crossness Southern Marsh ditches to be cleared (mid-channel only) in 2010/11: Erith Marsh Dyke West, Eastern Way Dyke West, Eastern Way Dyke East. In-channel vegetation cutting of all Southern Marsh ditches in February 2019.

Bankside management to date: Crossness Nature Reserve banks strimmed in alternate 30m sections on one bank only on Wader Scrape Ditch, Reedbed Ditch and Parsley Field Ditch. Crossness Southern Marsh banks strimmed in alternate 10m sections: Erith Marsh Dyke West (north bank in 2006; south bank in 2010), Erith Marsh Dyke South (2010/11), Erith Marsh Dyke East south bank in 2011. Parsley Field east, North Dyke south and West Paddock west were all cut in alternate sections in 2013. Willow removal took place on Erith Marsh Dyke East south bank on Crossness Southern Marsh in 2013. Great Breach Dyke Lagoon east bank cut in alternate 10m sections 24th Oct 2014 [add bankshide work]

Riparian habitat creation

Throughout the sites, there are opportunities to create additional sections of watercourse to link existing areas of habitat. In recent years, the historic dry ditches of the Crossness Southern Marshes were restored in 2005/6 to create Eastern Way Dyke East, Erith Marsh Dykes East and West, Eastern Way Dyke South and Belvedere Road Path Ditch. A wader scrape was created at the west end of the marsh, adjacent an existing reedbed. In 2007, a new 200m ditch was created on Crossness Southern Marsh at the southern end of Wetland Field. In 2010, the wader scrape was extended by 0.3ha.

On Crossness Nature Reserve, the wader scrape was extended in 2005/6. In 2010, new ditches were created in West Paddock (95m) and Sea Wall Field (82m) with ditch restoration taking place at the southern end of Sea Wall Field, and 120m of Fords Dyke (east section, north of East Paddock) was also restored. A 1.2ha reedbed was created in 2010 incorporating 3 open water lagoons. In 2013, a new waterbody was created in Saline Field on Crossness Southern Marsh, and on Crossness Nature Reserve, two ponds (Protected Area Pond and Triangle Pond) were both desilted and expanded.

Flora and fauna

Monitor the flora and fauna of the ditch network, carrying out field signs surveys at 10m intervals for Water Voles. Monitor presence and absence of American Mink using mink rafts.

Targets

Water Voles present on all suitable habitat where grazing is excluded. No American Mink on any riparian habitat. Refugia managed and maintained, and backwaters provided for nesting wildfowl. An average of 10 aquatic macrophyte species per 20m of unshaded ditch in mid successional stages. Return of Rudd/Tench community in Great Breach Lagoon.

2.3.2.2 Grazed grassland

Objective

To maintain and enhance the grazed grassland communities in a favourable condition, with particular regard to its flora, through the implementation of the grazing agreement.

Description

Surveys of the sites grasslands suggest that they are relatively species poor, and that the main community types are MG6a and MG1. It is worth noting that coastal grazing lands such as Erith Marshes are often relatively poor floristically. On Crossness Nature Reserve, a total area of 14.8 hectares has been identified as grassland where grazing is permitted; on Crossness Southern Marsh, a total of 25 hectares may be grazed. Grazing is undertaking through a tenant grazier on each site who grazes the grasslands using horses under an agreement with Thames Water.

The majority of the prescriptions relating to the grazed grasslands are described in the grazing agreement. The main points are as follows:

Grazing of up to twelve horses is permitted at any one time throughout the nature reserve. Taking into account that there is 14.8 hectares of grassland where grazing is permitted, this total equates to 1.23 livestock units per hectare. However, there are certain restrictions imposed with respect to timing of grazing on the West Paddock. In the West Paddock, grazing is restricted to the period of 1st August to 31st October inclusive unless prior written consent is given by Thames Water for grazing outside this period. The tenant shall not keep any animals other than horses on the site. Grazing is required in Parsley Field to maintain the open conditions required to maintain and increase the population of Knotted Hedge-parsley (*Torilis nodosa*). On Crossness Southern Marsh, there is 25 hectares of grassland where grazing is permitted (Pond Meadow 1.3ha; Little and Main Paddocks 13ha; South Dyke Paddock 3.5ha; Great Breach Paddock 7.5ha). This total equates to 1.25 livestock units per hectare.

It is important to note that, although the sites have frequently been described as 'overgrazed', most of the more notable plant species found to occur within the nature reserve and southern marsh are directly associated with areas that are currently heavily grazed. For example, Knotted Hedge-parsley (*Torilis nodosa*) is a prostrate species associated with open conditions created by grazing.

The grazing agreement also specifies that the tenant is responsible for pulling and cutting thistles and other noxious weeds (including Common Ragwort) throughout the fields where grazing is permitted. Ragwort is present in a number of areas and is particularly numerous in the Island Field and Parsley Field. This should be hand-pulled regularly on an annual basis to reduce its total coverage.
The effectiveness of this treatment should be closely monitored.

The use of insecticides, pesticides or herbicides is not permitted without written consent of Thames Water. The tenant is also required to maintain all fences, gates and watercourses within the grazing land in good order and condition at their own expense.

The use of the broad-spectrum anti-parasitic drug, Ivermectin, is not permitted. The use of all worming drugs should be avoided where possible, but if use is essential, there should be discussions with a veterinarian over alternative treatments. These are likely to include alternative chemicals such as benzimidazoles, imidazothiazoles or tetrahydropyrimidines. Alternatives containing organophosphate dichlorvus are not recommended as residues in horse dung have been found to have an adverse effect on its beetle fauna (Crofts & Jefferson, 1994; Ausden & Treweek, 1995).

2.3.2.2.1 Management actions

Grazing agreement

Grazing is the key anthropogenic factor in maintaining the grassland, sustaining the character of the swards and preventing succession to scrub and ultimately woodland. The grazing agreement (between Thames Water & the tenants) stipulates the timing, frequency & intensity of grazing throughout the sites' different grazing compartments. The grazier also has a duty to control noxious weeds and maintain all stock fencing. The Crossness Nature Reserve Manager will liase with the graziers to ensure that the grazing agreement is adhered to in terms of grazing intensities, timings and duration. Ensure that fencing is maintained and animal welfare issues are dealt with.

It is the responsibility of the grazier to manage the welfare of livestock. In 2010, as part of the London Borough of Bexley's Belvedere Green Links Programme, a stable block was built to replace the existing ramshackle structure. The stables contain four large stalls, plus a tack room and hay storage area. The grazier is responsible for the maintenance of the stable block.

Grazing was seized on Crossness Southern Marsh in September 2018 due to a breakdown of relationship with the horse owners. At some point, grazing will need to be reinstated, but the previous graziers are still upset by the removal and will retaliate if we do anything too soon. We need to let the dust settle before reintroducing grazing. In the meantime, we will continue to cut and remove with tractors in the Autumn. This is currently carried out through Sodexo, using Rob Jochinsem and Co. Although previously cutting in late July/August to control Ragwort, due to the reptile translocation, this has now been changed to an October cut.

Tree and scrub development

There are at present a few existing trees on the grazed grassland areas, however further scrub should not be permitted to develop. The current level of grazing employed should provide the main prevention of the development of tree seedlings. However, in certain areas, such as dunging areas that are subsequently avoided by grazing stock, the development of scrub may occur.

The Nature Reserve Manager will monitor the presence and development of scrub on grazed compartments and control accordingly by cutting and spraying where necessary.

Ragwort and other noxious weeds

Although the control of weeds such as Thistle and Ragwort are the responsibility of the grazier under the licence agreement, the problem has been extensive. As such, a cutting/topping regime has been created for the Crossness Southern Marsh where growth is particularly excessive, and a number of Ragwort pulling volunteer tasks are run on both sites each year in order to reduce the problem. The Nature Reserve Manager will visually monitor the presence of Ragwort and other noxious weeds and liaise with the grazier over the removal of the plant.

Botanical monitoring

A full survey conducted by a specialist botanist should be conducted every five or ten years, depending on resources. These should follow the methodology of the 2001 botanical survey (Chipchase, 2001). The objective of these surveys is to maintain a record of floristic diversity, its changes, the establishment and occurrence of new species and the stability (or otherwise) of invasive alien species. A survey of Crossness Southern Marshes and parts of Crossness Nature Reserve was conducted in 2005 by Joyce Pitt; a further survey was carried out in 2011/12 by Dave Miller.

2.3.2.3 Ungrazed grassland

Objective

To maintain and enhance the ungrazed grassland in a favourable condition, with particular regard to its invertebrate communities.

Description

There are a number of areas throughout the site where grazing is either not permitted or practical. These include all areas within the Protected Area of Crossness Nature Reserve, and all grassland north of the ditch network (except for Pond Meadow) on Crossness Southern Marsh.

2.3.2.3.1 Management actions

Tree and scrub development

As these areas are not grazed, mechanical means of scrub prevention are necessary. The development of scrub, including trees, would reduce the extent of the vegetation feature. No scrub or trees of any species (beyond that which already exists at the southern end of the Protected Area) will be allowed to develop within the ungrazed grassland.

Alien and problematic species

Historically there has been two stands of Japanese Knotweed within the ungrazed areas of Crossness Nature Reserve. One stand occurred within the Sea Wall Field by the raised platform and the other on the mound above the reedbed. The invasive potential of these species means that these and any other stands must be treated using an appropriate herbicide. These two stands, through a robust

cutting regime appear to be under control. On the Crossness Southern Marsh, one stand of Giant Hogweed was identified in the reedbed area at the base of the raised path at its east end. This was controlled early and was pulled in 2010. All stands of invasive species are monitored weekly for possible re-growth and extent.

Management of Japanese Knotweed (*Fallopia* japonica): Due to the plants invasive nature it is important that any stands present throughout the site are eradicated at the earliest opportunity. The most viable method of removing Japanese Knotweed is by the use of a non-persistent herbicide. Both Glyphosate and 2 4-D amine are known to be equally effective (approximately 50% eradication). Of the two herbicides 2 4-D amine is preferable as it is mores specific and allows the retention of the grass sward (Beerling & Palmer, 1994). The effectiveness of the treatment should be monitored, satellite populations searched for, and repeat applications made as necessary. All operatives using herbicides must ensure that they receive the necessary instruction, guidance and training to enable them to use pesticides safely and legally, in conjunction with the guidelines laid down in Thames Water's Pesticide Policy (Thames water, 2001). The presence of other invasive and alien plant species, such as Giant Hogweed, should be monitored and eradicated at the earliest opportunity.

Grass cutting

Management of the ungrazed grasslands to prevent the successional development of scrub is to be undertaken by strimming or mowing. Cutting differs from grazing in being a sudden and largely unselective form of vegetation removal, thus producing a sward of uniform height and structure. The effects of cutting can be varied by rotationally cutting areas at different frequencies and times of the year and to different heights. It should be done on a small random scale with some areas kept short by receiving regular cutting and others left to develop taller and bulky vegetation. For example, some areas should be cut 2 or 3 times a year, and others on a 2 -3 year rotation. This will help to reduce the harmful effects of cutting on invertebrate populations by providing a variety of different grassland types. Cuttings left in situ will cause nutrient enrichment, smother smaller plants and prevent seeds from reaching the soil surface and germinating. They should therefore always be removed. Removal of cuttings will also tend to reduce nutrient levels and will therefore help increase plant diversity.

Targets

Create habitat suitable for nesting Skylark and Meadow Pipit. Increase Field Vole population to support breeding Barn Owls.
Using a strimmer/brushcutter, rotationally cut small patches of vegetation in the ungrazed compartments. All cuttings are to be raked and removed into a pile at the side of the compartment.

2.3.2.4 Inundation grassland

Objective

To manage inundation grassland with particular regard to over-wintering and breeding bird species, through implementing appropriate grazing and water level management in the West Paddock.

Description

These are grasslands that are wet for between three and twelve months of the year. Flooding in winter is perhaps the most important requirement for wintering wildfowl and waders providing feeding opportunities and secure roost sites. Although surface water flooding occurs in a number of areas throughout the site during the winter months, the main area of this type of grassland occurs in the West Paddock (an area of approximately 1.5 hectares). Flooding in this area is achieved through natural flooding caused by storm conditions and by pumping water using the wind pump. The whole field is bunded around the edges to aid water retention within the unit.

Water levels throughout the site have dropped over past decades and there are few periods when the grasslands are inundated with water. Consequently, the grasslands rely on artificial means of water provision.

2.3.2.4.1 Management actions

Water levels

Using the windpump and sluices to artificially flood the West Paddock, aim for 30-60% water coverage over the entire field from 1st December to 31st March, and ensure that the water table is maintained at a high level (<50mm) throughout the breeding season. Measure the average water depth and roughly estimate the percentage coverage of water at different periods of the year.

The recommended prescriptions for the flooding of MG6 grassland are as follows (Benstead, 1997):

- **1st December to 31st March**
  Maintain shallow (<20cm) surface water over 30-60% of the West Paddock in order to attract wintering wildfowl and roosting waders. This will usually result in the development of the grassland from a MG6a grassland to a MG13 grassland. Such grassland is favoured by feeding Wigeon and Lapwing due to its short open sward. Un-flooded areas provide suitable conditions for waders to feed on soil invertebrates.

- **1st April to 30th April**
  Allow the area of shallow water on the West Paddock to decrease to 20% of the area by the end of this period. This will lead to aquatic invertebrates being concentrated into small pools that are suitable feeding areas for broods of waders and wildfowl.

- **1st May to 30th June**
  Maintain areas of shallow flooding on the West Paddock so that they still cover approximately 10% of the area by the end of June. This will provide Lapwings with muddy margins at a time when sward height is increasingly unsuitable. Surface waters present will contain high biomasses of non-biting midge larvae and other aquatic invertebrates, and are good feeding locations for wader broods.

Grazing

Ensure that the grazing agreement is adhered to with grazing in the West Paddock restricted to period of 1st August to 31st October inclusive.

Wintering and breeding birds

The West Paddock offers the potential for breeding Snipe. The preferred vegetation structure for this field is a tussocky grassland sward to allow concealment of birds (>250mm)

During the breeding season, record number of breeding pairs. During weekly visits, record any acts of predation on ground nesting birds, noting the species involved and number of kills. Also make casual observations on the degree of impact by general activities (i.e. walkers, bikes, horses) on wintering and breeding bird species.

Targets

Maintain and increase populations of over-wintering wildfowl and waders, and increase successful breeding pairs of waders.

2.3.2.5 Reedbed

Objective

To protect, maintain and increase the amount of reedbed, whilst allowing for a variety of successional conditions which support characteristic flora and fauna.

Description

Reedbeds are comprised largely of Common Reed (*Phragmites australis*). Although Common Reed occurs throughout the site on the waterbody margins, the main area of reedbed occupies an area of approximately 1.3 hectares in the southeastern corner of the nature reserve. Due to its size, the reedbed at Crossness Nature Reserve has been highlighted as one of the main sites within the London Borough of Bexley. Other areas of reed throughout the site are found at the intersection of Horsehead Dyke and Great Breach Dyke West.

On the Crossness Southern Marsh, an area of reedbed occupies the south-west corner of the site, and another large area of reedbed occurs towards the eastern end of the marsh, alongside Erith Marsh Dyke East.

The community is National Vegetation Classification Type S4 and may support characteristic communities of nationally uncommon birds and invertebrates. A number of reed specialist moths such as Obscure Wainscot, Silky Wainscot, Fen Wainscot, Webb's Wainscot, Bulrush Wainscot, Southern Wainscot and Smokey Wainscot have all been recorded within our reedbeds. The CNR reedbed, and the ditch running through the centre of the stand, are amongst the longest established features of the

nature reserve. Reed and marsh vegetation is marked on this location on the first edition of the Ordinance Survey maps which were surveyed in the 1860's.

Reedbeds are also important for several bird species, particularly breeding Reed Bunting and Reed, Sedge and Cetti's Warblers, as well as breeding wildfowl such as Gadwall, and wintering Water Rail.

Reedbeds were once extensive throughout the country. However, land drainage and lack of management have resulted in dramatic declines and deterioration of this habitat. As such, reedbeds are identified as a priority habitat in both Bexley's and National Biodiversity Action Plans.

As a result of the Crossness Southern Marsh restoration that took place as part of the Managing the Marshes programme, fencing and exclusion of grazing along the banks have enabled marginal reed growth to extend out considerably along the Erith Marsh Dyke East.

In 2010/11, as part of the TTQI ecological mitigation, a new 1.2ha reedbed was created in Island Field, incorporating 3 open water lagoons, however much of the reedbed area has been colonised by *Typha*, such that the east section of the reedbed is currently (in spring 2012) a monoculture of *Typha*.
An action plan is in place to get control of this.

In 2014, 72,000 *Phragmites* reedplugs were planted in the Island Field reedbed, following removal of *Typha* via the amphibious Truxor vehicle.

In 2018, the Protected Area reedbed was cut in order to carry out the clean-up associated with the pollution incident. Vegetation, as well as sludge and silt was removed. This will have resulted in loss of leaf litter and a negative impact on over-wintering reedbed specialists such as Wainscott moths.

2.3.2.5.1 Management actions

Reedbed and scrub encroachment

Existing areas of reedbed are to be improved with focus on the prevention of further scrub encroachment. Scrub encroachment is a serious problem for reedbeds, however some scrub in close proximity to a reeds is valuable for birds, particularly Cetti's and Sedge Warbler. Overall however, reed management should ensure the dominance of wet reed and allow for the retention of some patches of dry reedbed.

Without management a reedbed will generally dry out, becoming colonised by other grasses and tall herbs, eventually developing into scrub and woodland. Reed management generally helps maintain the dominance of reed and slow down/reverse succession. Areas of wet reed and open water are important for a wide range of species, particularly birds. Conversely, many invertebrates require more mature and drier areas of reedbed. Management should aim to provide a balance of different habitat types throughout the site.

The Nature Reserve Manager should estimate the percentage dominance of Common Reed over other species in the reedbed, and monitor for colonising vegetation such as Great Willowherb, Nettle, Bittersweet Nightshade and Thistle. The Manager should also monitor the spread and/or encroachment of any developing scrub.

The Nature Reserve Manager should measure the extent of reedbed in square metres/hectares on an annual basis.

Reed cutting

Reed cutting is practiced in order to reduce the rate of litter build-up (and hence drying out and subsequent succession), improve the quality of reed, maintain reed edge and structural diversity, and to create temporary open water. However, it can be detrimental to some invertebrates and nesting birds.

Cutting all of the reedbed in one go disadvantages many specialist reedbed species since the absence of standing reed removes the very habitat they depend upon. Rotational cutting on a random 5-10 year basis offers the opportunity to help maintain or increase wildlife interest. The size of the plots will be determined by resources, particularly labour, but should be kept reasonably small in order to prevent grazing of new shoots by Canada Geese (which will find it difficult to fly into small plots) and allow less mobile species the chance to move into adjacent areas of uncut reed.

In order to maintain the dominance of reed, cutting should be undertaken in winter, from November to March. Cutting can be done by hand-scythes and sickles, or by using a brushcutter with either a rotating or reciprocating blade. Cut reed should be moved out of the reedbed and piled along the margins to rot down. In this way an alternative habitat is provided for invertebrates, nesting wrens, bearded tits and small mammals. Grass snakes also are often associated with reedbeds and may use such piles of decaying vegetation to incubate their eggs (Langton, 1989).

Scrub management

Invasion by scrub (particularly willow and alder) as a result of neglect or under-management is probably the largest management problem in Britain's reedbeds. Although beneficial to some species, scrub will directly compete with reed for nutrients and space, cause shading, utilise large quantities of water, produce large quantities of litter and impede cutting equipment.

Scrub can be controlled through a variety of methods, although at Crossness the most appropriate way will be cutting. Small to medium sized scrub (2-10cm diameter) can be cut using bow saws and bill hooks, although larger scrub may require the use of a chainsaw. Very small scrub and seedlings can be hand pulled or cut using a bruchcutter, although the latter method may encourage a vigorous re-growth unless the cut stumps can be flooded throughout the growing system. Cut scrub can be burned off in bonfires or stacked to form 'habitat piles' for wildlife. Where cut scrub is to be controlled permanently, the application of herbicide to the stumps is essential. Roundup is most often used and can be either sprayed or painted onto the cut surfaces to prevent re-growth. Willow can be very persistent and may re-grow even after treatment, requiring a second application (Burgess & Evans, 1989). All operatives using herbicides must ensure that they receive the necessary instruction, guidance and training to enable them to use pesticides safely and legally, in conjunction with the guidelines laid down in Thames Waters Pesticide Policy (Thames Water, 2001). It is important that, where possible, the stumps left after final cutting should not protrude more than 2 cm above the soil surface. Low stumps facilitate the operation of reed cutting equipment later on and increase the chances of submersion when the water level rises, preventing re-growth the following spring.

Litter removal

Bed regeneration, through the reduction of accumulated litter and soil, helps to return the habitat to an earlier stage of succession. Deep litter layers (30 - 100 cm) inhibit reed growth, dry out the reedbed and allow other plants to colonise thus leading to a complete change in habitat through succession. Although, it must be noted that reed litter is also beneficial to a range of wildlife, particularly litter-dwelling invertebrates that require mature areas of reedbed.

Due to access and machinery constraints, the most appropriate method to remove litter at Crossness is hand raking. Although raking is labour-intensive it can easily be achieved on small plots. As with reed cutting this should be undertaken on a rotational and random basis allowing for the retention of areas of deep litter (30-100cm) and thin litter (5cm). This will allow a wide range of specialist species to benefit from the different conditions. Dry litter can be difficult to rake due to the presence of roots, runners and stubble and the use of metal rakes is advisable. The litter should be raked out as far as is practicable and piled along the margins to drain and rot down. In 2018, this had to occur across the whole reedbed due to the pollution incident, and so the rotational cutting did not take place.

Water levels

The simplest way to maintain almost pure reed is to ensure the water level remains above the soil surface all year round. This greatly reduces competition from other plants and provides valuable aquatic habitat to a range of wildlife, including fish, amphibians and invertebrates. Maintaining high water levels in spring also helps to prevent re-growth of cut scrub. It may, however, be necessary at certain times of the year (usually winter) to draw-down water levels in order to undertake reedbed management (i.e. cutting).

Water levels in the CNR reedbed is provided by ground water, surface water run-off and water pumped via the windpump. On the southern marshes, a weir holds back winter rainfall at the west end of the site, thereby keeping the reedbed wet, but further downstream there is little control over water levels and the eastern reedbeds are therefore provided purely by ground water and surface water.

Where levels can be managed, the following water level management programme will be followed:

- Raise water levels on the site as soon as winter cutting as finished (usually late March-early April) to a maximum depth on the reedbed of 300mm.
- Maintain surface water in the range 50-300mm throughout spring and summer.
- Draw-down water level slowly to just below the reedbed surface from October onwards to facilitate management work, principally cutting.
- Where possible, maintain some wet reed habitat during winter.
- In winter, when management is not undertaken, ensure that the maximum surface water depth on the reedbed does not exceed 1m.

Typha control and other invasives

Typha is generally managed at Crossness by hand-pulling, however Typha invasion within the new Island Field reedbed is significant and beyond manual eradication. A 3 year plan is in place (see Appendix E) to grub out (with a digger) the east section of the reedbed in winter 2012. Water levels will be monitored and controlled via a diesel pump over the winter and following spring. In spring 2013, a high density of *Phragmites* plugs (72000, equating to 9 plants per square meter) will be planted in the east section.

In winter/early spring of 2012, locally-sourced mature reeds were planted in two sections of the east reedbed (where *Typha* dominates). In spring 2012, these are showing new growth and the translocation looking to be a success. This, coupled with the planting of *Phragmites* plugs in spring 2013, is hoped to get control and outcompete the dominant *Typha*. Please see Appendix E for Island Field reedbed management plan.

Targets

Maintaining existing areas of reedbed in favourable status and identifying areas where reedbeds can be increased or created.

Maintaining and increasing breeding Cetti's Warbler and retaining the scarce moth species.

Reintroduction of Marsh Sow-thistle (*Sonchus palustris*). The last London population of this nationally scarce plant was on Crayford Marshes until probably destroyed by a fire a few years ago (John Archer, pers comm). Mark Spencer of the Natural History Museum has grown plants from seed taken from the Crayford plants with the aim of re-establishing the species in the wild in London. The first reintroduction took place in 2011 at Thames Road Wetland, Barnes Cray. Crossness is within the historic range of the plant and seems to be a suitable habitat for this species; we have therefore planted four mature Marsh Sow-thistle plants in May 2012.

2.3.2.6 Scrub

Objective

To maintain existing designated areas of scrub and identify and create new areas where the development of scrub will make a positive and complementary contribution towards the site's wildlife and aesthetic qualities.

Description

On Crossness Nature Reserve, scrub occurs as individually isolated tree species throughout a number of areas of the site. There is also a large patch of scrub located at the southern edge of the site comprised mainly of Hawthorn (*Crataegus monogyna*). This acts as a barrier between the site and the dual carriageway, Eastern Way (A2016). The southern access to the site, via a public footpath (PF2),

also runs through this patch of scrub. A further large patch of scrub occurs south of the reedbed, at the bottom of the protected area, on what appears to be an old waste dump.

The 2001 botanical survey (Chipchase, 2001) noted that there had been a considerable development of scrub since the previous 1994 survey (Rich, 1994), particularly in both the South and North Scrapes. This scrub was mainly composed of Elder (Sambucus nigra) and Willow species, including a curious specimen of Contorted Willow (*Salix matsudana 'Tortuosa'*). However, ongoing management and habitat creation has reduced the amount of scrub in the North Scrape, and Willow is being controlled around the wader scrape to maintain open water and reedbed.

As well as a few isolated trees south of the ditch network on Crossness Southern Marshes, there is considerable scrub at the east end of the site, north of the Erith Marsh Dyke East. Much of this, mainly Hawthorn, follows the raised footpath south of Saline Field. There is a also a linear scrub feature running north-south between Main Paddock and Great Breach Paddock. Trees border the whole site to the north but are north of our boundary fence. These trees act as a buffer between the marsh and Eastern Way.

The Urban Forestry Strategy for Thames Gateway, London, aims to increase tree cover in order to help improve the quality of life for people who live and work in the Gateway. At Crossness, the maintenance of existing areas of scrub and creation of suitable additional habitat can clearly make a contribution towards this strategy.

2.3.2.6.1 Management actions

Scrub removal

Scrub should not be permitted to develop in the main fields of the nature reserve and southern marshes, as this would affect the open landscape qualities of the site. Permitting scrub to develop in other areas helps improve the overall diversity of the site and is particularly valuable for passerines, as shown by the bird monitoring undertaken by the Dartford Ringing Group. As a result, recent management has led to the removal of scrub in the grazed paddocks, and of the willow species that grow around the wader scrapes and along ditch banks. Rotational bankside cutting along the ditch network has also reduced the volume of scrub appearing in the non-grazed buffer zone.

Excessive amounts of scrub should not be permitted to develop along watercourses in order to maintain them as optimum Water Vole habitat. One further important aspect is to ensure that individual scrub species which are situated close to areas which are used by roosting waders and wildfowl are kept low and shrubby. If these are allowed to develop into mature trees they will then provide suitable look-out posts for corvids which may predate on the birds of interest. Furthermore, ensuring that scrub does not develop into mature trees is essential in maintaining the open character of the landscape at Crossness.

Scrub thinning

The large patch of scrub at the southern end of the Protected Area is frequently thinned so as not to allow encroachment into the reedbed, and also to maintain the quality of existing scrub. Rotational cutting maintains patches of scrub at different stages of growth from freshly cut to closed canopy.

Coppicing

The Willows that are located east of the bird hide entrance are coppiced on rotation.

Scrub creation

Scrub has been allowed to develop on the western boundary of Public Footpath 2, along the north-south boundary of the Protected Area. This has a number of functions. In addition to providing diversity for wildlife, it also acts as a screening barrier between the protected area reedbeds and the footpath, and a barrier to access for anybody wishing to breach the palisade fence. In 2010/11 there are plans to plant a hedge at the north end of Public Footpath 2 where it runs alongside the wader scrape in the Protected Area. This is primarily to screen the wildlife on the scrape from the frequent pedestrian and vehicle movements on FP2 towards the Great Breach Pumping Station. Again, it will also provide a thorny barrier for unwanted access, and the density and diversity of species will provide valuable breeding, feeding and roosting habitat for numerous bird species, invertebrates and small mammals, as well as providing a commuting and foraging route for bats. This will also lead them towards the artificial bat hibernaculum that was built in 2002 but has yet to be used.

2.3.2.7 Ruderal and tall herb vegetation

Objective

To protect, maintain and increase the amount of ruderal and tall herb vegetation.

Description

Much of Crossness Nature Reserve and Crossness Southern Marsh is under a grazing regime, however there are areas of ruderal and tall herb vegetation most extensively in the Protected Area of the Nature Reserve, in the west section and boundary areas of Sea Wall Field, and along field boundaries and alongside paths. On the southern marshes, the tall ruderal vegetation occurs on the north side of the ditch network, most extensively in Saline Field. The ruderal vegetation is key for nesting bumblebee species, particularly the rare Shrill Carder Bee that is present at Crossness NR.

2.3.2.7.1 Management actions

Existing ruderal and tall herb communities are managed via a rotational cutting programme, whereby mowing and/or strimming occurs in September after the flora has set seed

2.3.2.7 Biodiversity Action Plan (BAP) targets

Objective

To maintain and enhance BAP species and habitat at Crossness Nature Reserve and Southern Marshes, in accordance with the local Bexley Biodiversity Action Plan targets. These are chiefly for bats, grazing marsh habitat, ponds, reedbed and water vole.

Description

Grazing marsh (see 2.3.2.4), ponds (see 2.3.2.1) and reedbed (see 2.3.2.5) targets and management actions are covered elsewhere within this document. The overall aim for each is to effectively manage these habitats where they already exist, and to increase the habitats where possible.

We have seen an increase in reedbed habitat with the creation of a 1.2ha reedbed in Island Field in 2010, in addition to the extensive marginal reedbeds that have been created as a result of stock fencing on the Crossness Southern Marshes. Water bodies and ponds have been increased: the Crossness Southern Marsh wader scrape was doubled in size in 2010, and three deep water lagoons were created within the Island Field reedbed complex. However, there is room to increase the number of smaller ponds on both sites. Not only is this required to achieve BAP targets, but they are required for increased education activities. Currently, all pond-dipping takes place in one pond on the protected area of the nature reserve. The resultant repeated disturbance is not healthy for the aquatic life within the pond to; at least one further education pond is required on the nature reserve. Another is required on the Crossness Southern Marsh in order to open up this site as an educational resource where access and parking is often easier for schools.

All riparian management actions at Crossness are targeted at water voles, with many new ditches and waterbodies, plus the Island Field reedbed, having been created to encourage greater colonisation and breeding success; all management – both in-channel and on the banks – is carried out on rotation to maximise opportunities for water voles (see 2.3.2.1 and 2.3.2.5).

An artificial bat hibernaculum exists, but has not been used, on Crossness Nature Reserve, and 4 bat nest boxes were installed within the stables complex in 2011.

2.3.2.7.1 Management actions

Bats

Increase foraging, roosting and breeding habitat for bat species. Carry out modifications to reduce some of the outer crevices of the artificial bat hibernaculum (thereby reducing influence of outside temperature) and install a data-logger.

Install a further 14 bat boxes on trees along the southern boundary of Crossness Nature Reserve and the area of scrub in the protected area, and along the northern boundary of Crossness Southern Marsh.

Annual cutting of wildflower meadows to increase bat foraging opportunities.

Grazing marsh

Maintain and enhance areas of grazing marsh (see section 2.3.2.4 for detail), and increase inundation grassland on Crossness Southern Marsh.

Ponds

Seek funding to create at least one new pond with dipping platform on the nature reserve, and a larger pond with boardwalk and/or dipping platform, on Crossness Southern Marsh in Saline Field. See section 2.3.2.1 for further detail.

Reedbed

Maintain and enhance areas of reedbed in favourable status, seeking opportunities to increase reedbed on both sites. See section 2.3.2.5 and Appendix E for detailed management prescriptions.

Water vole

Maintain and enhance existing population and seek opportunities for further habitat creation to enable further colonisation.

Monitor and eradicate American Mink if found to be present.

2.3.2.8 Site promotion

Objective

To promote Crossness Nature Reserve and Crossness Southern Marshes on local and regional levels in order to attract a wider range of visitors.

Description

To date, the sites have been promoted primarily through press releases, attending local forums, delivering presentations, inviting schools to attend planned education visits and promoting and increasing the Friends of group.

A Friends of Crossness Nature Reserve was created in 2005 and currently (in 2019) has 352 members. As part of this scheme, a newsletter is produced and distributed to over 300 people which promotes the site's successes and activities. A range of community events and volunteer taskdays are promoted through the newsletter, and also through our website.

We have released a number of press releases in local papers, and a local wildlife columnist for the Bexley Times, frequently includes Crossness within his column. He also maintains the local RSPB group (Bexley RSPB) and as such includes information about Crossness Nature Reserve and forthcoming events. Local press releases have included the promotion of community events, the promotion of the Friends scheme, information about our breeding Barn Owls, the Squacco Heron, Water Vole stories, beekeeping and school visits. National coverage was received when the newly created Southern Marsh wader scrape was visited by a Squacco Heron. The species had not been recorded in London for over 140 years and the story drew a lot of regional and national press coverage.

The sites have also been promoted through a number of partnership projects such as Managing the Marshes, and the Belvedere Green Links Programme. There is however, further work to be carried out with regards to promotion and a site leaflet would be particularly useful.

A local wildlife platform – Bexley Wildlife – runs a website and Facebook page. This covers Crossness issues extensively. In addition to this, there exists a Facebook page called Crossness Nature Reservers. However this is run by a non-member and the page owner generally just shares Bexley

Wildlife posts. In 2018, active member of the Crossness Friends group, Donna Zimmer, set up a new Facebook group called Friends of Erith Marshes. This has been successful in terms of getting lots of wildlife photos, especially rarities. The third-party Facebook presence has been very good at promoting the reserve and gaining interest from further afield.

2.3.2.8.1 Management actions

Websites

Although Crossness features on the Thames Water website and all our newsletters can be downloaded from it, it is difficult to navigate to from the homepage. Once reached, it provides very little information about the sites. The Crossness Nature Reserve Manager will work more closely with Thames Water's website managers to update the Crossness pages and to use it to provide fresh, up-to-the-minute information, and to promote the sites and encourage visitors.

The Nature Reserve Manager will also ensure that Crossness activities and events are promoted on our Intranet pages, so that the importance of the site is recognised internally. A 'Warden's blog' with frequent chatty entries about management, wildlife sightings and other issues, could be a popular feature.

Internally, Crossness Nature Reserve is promoted through the use of Yammer – an internal social media platform. This has proved successful and generated an increased awareness of our nature reserve within Thames Water.

Press releases

The Crossness Nature Reserve Manager will work with Thames Water's Press Department to publicise and celebrate successes such as enhancements, public events and the presence of interesting species. We will aim to produce a minimum of two press releases per year.

Leaflet

The Crossness Nature Reserve Manager will seek to acquire internal funding for the production of a leaflet, providing an opportunity to publicise the site to a wider audience. The leaflet could be made available through the Thames Water Customer Centre as well as through local libraries and community groups.

Presentations and community groups

Accept invitations to present information about Crossness Nature Reserve and Southern Marshes to local community groups and forums. Also, invite local groups to attend a tour of the site. Groups could include Bexley RSPB, London Natural History Society, Sidcup Natural History Group, Bexley Natural Environment Focus Group, Belvedere Community Forum, Orpington Field Club, Kent Field Club and others. Presentations do not have to be exclusively wildlife related groups; presentations have been delivered to the Erith and Crayford Scout Leaders, and groups such as the Bexleyheath and District Rose Society, the Blackheath Scientific Society, and the Eltham Green Fingers Group.

2.3.2.9 Interpretation

Objective

To highlight the nature reserve and its main features, allowing the site to be enjoyed by visitors in a manner which is appropriate, safe and of low impact.

Description

A range of interpretation boards have been created for both the Crossness Nature Reserve and Crossness Southern Marshes. These are boards illustrated by Greg Poole and provide background information about the sites and the wildlife that visitors might see. There are introductory interpretation boards for site entrances, as well as a board for the Crossness Southern Marsh wader scrape featuring waders and wildfowl that can be seen, and a board that is mounted on the Crossness Southern Marsh viewing deck that discusses the aquatic invertebrates that are present in the ditches.

Because of the vandalism that occurs at Crossness, we opted to have panels that can be cheaply printed and laminated, and slotted into a frame so that it sits behind a perspex cover. Glass reinforced plastic, etched steel and other options would be high maintenance, particularly with regard to graffiti removal, and costly to replace, so this seemed like a good solution. Unfortunately, our original frames were stainless steel and were stolen, presumably for scrap metal, so these were replaced with timber frames in 2011.

In addition to the formal interpretation, we also have a range of popular informal interpretation in the bird hide. This includes photo boards which enable members of the Friends scheme to pin up wildlife photos taken around the site. This has proved to be very popular; not only does it demonstrate the vast number of species recorded at Crossness, but it also shows some of the rare species such as the Squacco Heron that appeared in 2007. The photo board is a great way to demonstrate the importance of the site to visitors when doing site tours. The bird hide also houses a range of species identification charts. These are primarily bird-related, but also include plants, mammals and invertebrates.

2.3.2.9.1 Management actions

Installation of interpretation panels

Visitors should be aware of the sites' location and how to access it, and should enjoy the experience of visiting the site and made aware of its main features by on-site interpretative panels which are Thames Water branded. Arrange for the printing and laminating of existing signs, and install the timber frames and artwork. Ensure that the locking mechanism of each panel is tamper proof, and ensure a supply of perspex for replacement following graffiti damage and any scratching following removal. Install four panels on Crossness Southern Marshes, and two on Crossness Nature Reserve.

Directional signage

In addition to interpretation panels, directional fingerposts are required. These should start at the west entrance of Crossness Southern Marsh and finish at the Thames Path at the north end of Crossness

Nature Reserve. The fingers should provide both destination (Crossness Southern Marsh, Crossness Nature Reserve and River Thames) and distance on each fingerpost. Installation in Q2 2012. We will also endeavour to get signs erected on surrounding roads, particularly on the main roads through Thamesmead and Belvedere), that will help direct people to the nature reserve and southern marsh.

Prevention of undesirable activities

Motorbike and quad bike access is an increasing problem. Signs are to be installed stating that bike access is not permitted. Prohibitive fishing signs are also to be installed at key waterbodies such as the Great Breach Lagoon, and the Crossness Southern Marsh wader scrape.

2.3.2.10 Access

Objective

To encourage the sustainable use and enjoyment of the sites by visitors, while ensuring that access is compatible with maintaining the sites' conservation and landscape values, the site fabric and infrastructure.

Description

The provision of access to the nature reserve and southern marshes is a key function, however due to the sensitivity of the sites, access needs to be adequately controlled and managed. The sites are currently used by walkers, joggers, bird watchers and cyclists, but the present level of use is quite low. Unfortunately, access by bikes, quad bikes and illegal grazing are all problems faced at Crossness.

Crossness Nature Reserve has a number of public footpaths running through it and the Thames Pathway runs across its northern boundary. On the reserve, there is also controlled access within the Protected Area. This is a wildlife sensitive area that is accessible (via a keycode gate) only by members of the Friends scheme, or by planned access via the Nature Reserve Manager. Elsewhere on the reserve, access is not permissible in the horse grazed paddocks for safety reasons.

On Crossness Southern Marshes, access is provided by a 1.5km permissive footpath that was opened in 2006. Apart from Pond Meadow, all areas north of the ditch network are accessible to visiting members of the public, but south of the main ditch are the horse-grazed paddocks. Access within these areas is not permitted on health and safety grounds.

There are kissing gates prohibiting motorbike access at all main entrance points, however vandalism of these structures by bike and quad bike owners is a frequent issue, and also by horse owners on Southmere Park who damage our boundary gates and turn out their horses on Crossness Southern Marsh. Striking a balance between allowing public access and access to people with buggies or mobility vehicles, whilst keeping out motorbikes is a challenge.

Access to both sites is limited by the lack of car parking facilities. On Crossness Nature Reserve, visitors with cars are encouraged to park at the Thamesview Golf Course, west of the reserve, and walk the 1.2km along the Thames Path and join the reserve at the north end. Alternatively, people can park on Belvedere Road and walk along the southern boundary of Crossness Sewage Treatment Works and the nature reserve, joining the site at the southern end; or they can enter the reserve at the south-east corner from Norman Road, and following the public footpath through Tilfen Land until they reach the nature reserve. On Crossness Southern Marsh, visitors are encouraged to park at Southmere Lake, walk around the lake and through Southmere Park onto the marshes. Unfortunately, all access arrangements are fairly difficult unless visitors are already familiar with the routes.

2.3.2.10.1 Management actions

Visitor access

Use on-site interpretation signs and waymarkers to direct visitors through our sites. Provide access information via our website and through a promotional leaflet. Ensure that barriers to undesirable access do not appear unwelcoming to regular site visitors. Ensure that paths are cut and maintained to provide uninhibited access, and that any overhanging vegetation is cut back.

Undesirable activities

Respond quickly and efficiently to undesirable activities so that it is clear that the site is monitored, managed and maintained. Maintain site infrastructure, repairing damaged and removing graffiti as quickly as possible. Erect prohibitive signs where required and engage with the local police to ensure that the sites are patrolled and that they will respond to incidents and reported criminal damage.

2.3.2.11 Education

Objective

To develop the site as a valuable educational resource for local schools and colleges, providing a safe and enjoyable learning environment.

Description

Providing advice and educational facilities for local youth groups, schools, colleges and many other group visits can be a useful method of raising awareness and understanding of wildlife and the environment, and also of Thames Water’s access and recreational sites. Developing the site as an educational resource will undoubtedly strengthen links with local communities.

We have been running a small number of school visits since 2007 for Key Stage 2 pupils from local primary schools within the London Borough of Bexley. We have produced an educational activity pack containing 12 worksheets from which the schools are asked to choose the activities that best suit the part of the Science curriculum that they are currently working on. All activities are largely based

around habitats and classification, and include pond-dipping, mini-beast activities, habitat analysis, owl pellet analysis etc.

We have also had several visits from Secondary students undertaking pond dipping and photography on Crossness Nature Reserve. In partnership with LB Bexley in 2010, we ran a treasure hunt event for 5 local primary schools on Crossness Southern Marshes.

Our educational visits have been limited in numbers, with our biggest limitations being lack of toilet and parking facilities, lack of a centre from which students can work and/or take shelter when weather prohibits outdoor learning, and difficult access arrangements. In the past, we have had to hire in Portaloos to facilitate school visits; because this is not cost-effective throughout the year, we have hired in for a block period of 2 or 3 weeks and had schools visit just within that period. This doesn't always work around the requirements of schools, and the pupils and staff tend to dislike Portaloos.

Similarly, in the past we have had coaches drop off at the Crossness Sewage Treatment Works and the Nature Reserve Manager has walked them down to the nature reserve. However, this is not possible during the Crossness expansion programme which will not be complete until 2014, and access from Norman Road is not possible due to the construction of the RRRL Waste to Energy facility in Norman Road (scheduled for completion 2011).

2.3.2.11.1 Management actions

Develop opportunities for working with schools, including going into schools if they are unable to undertake site visits due to construction and access constraints.

Develop opportunities for the provision of a dedicated education facility and look to develop access and parking for school visits at Crossness.

Provide increased infrastructure (i.e. pond dipping, mini-beast area) for education visits at Crossness Southern Marsh, because parking at Southmere Lake is more suited to school visits during the STW expansion.

Consider possibility of producing a school's teacher-led education package.

2.3.2.12 Survey and monitoring

Objective

Ensure that site management is achieving its objectives by carrying out baseline surveys and a robust monitoring program.

Description

Some baseline surveys and monitoring have taken place in recent years, but the monitoring program is not currently robust enough to measure the success, or otherwise, of the current management plan. Our most robust monitoring is that of birds. Together with the ongoing efforts of the Friends Scheme to record all species seen during adhoc visits, and the records provided by the Dartford Ringing Group who undertake bird ringing on the nature reserve as part of the BTO Constant Effort Site monitoring scheme, we have a good, solid monitoring system in place. However, we have not undertaken regular, formal breeding bird surveys and this is something that needs to be addressed. The most recent breeding bird survey was undertaken in Spring 2018 following the pollution incident, but this did not cover the whole reserve. Survey report can be seen in Appendix ??

The Crossness Nature Reserve Manager has undertaken a number of field-signs surveys of Water Voles, and also Barn Owl pellet analysis to get an indication of the health of the small mammal population. We have had students undertake some Water Vole surveys on Crossness Southern Marshes (but not on the nature reserve), and another student undertook Barn Owl pellet analysis in 2006. A more robust system is required, and the site would benefit from mark-recapture surveys to determine small mammal presence and absence. We had some formal bat surveys take place in 2005; since then the site manager has delivered at least two community bat walks each year, which provides a snapshot of species presence. In 2018, another snapshot survey was undertaken which turned up three Nathusius's Pipistrelles. This is still quite a rare species, so nice to have this record. Common and Soprano Pipistrelles were recorded, as well as Daubenton's Bat.

Crossness has the highest number of mammals recorded in the borough. This includes the Common and Grey Seals that are frequently recorded on the foreshore, bat species, and small mammals including weasel and water vole. In ?? 2018, an American Mink was recorded by regular visitor and Friend of Crossness Nature Reserve. He spotted it leaving the Great Breach Dyke North and entering the Protected Area. We subsequently commissioned Derek Gow Associates to monitor the Protected Area for mink sightings as there was a fear that it could jeopardise the proposed Water Vole rerelease in Spring 2019. No mink were recorded.

There have been adhoc botanical surveys, usually prior to the undertaking of large-scale enhancement projects. The Crossness Nature Reserve was surveyed by Annie Chipchase in 2002 prior to creation of the CNR wader scrape complex; the Southern Marsh and parts of the nature reserve were surveyed in 2005 prior to the Managing the Marshes enhancement programme; and a couple of community events have included botanical identification on the nature reserve. Again, the surveys have been somewhat adhoc and a proper monitoring programme is required. Botanist

Dave Miller undertook botanical surveys in 2012, and Kent botanist and botanist for the London Natural History Society has undertook a number of visits, including a community wildflower walk in 2018, providing a species list.

Similarly, invertebrates are under-recorded. The Crossness Southern Marshes has had the more robust invertebrate surveys prior to the enhancements associated with Managing the Marshes. We also had some terrestrial surveys take place by Colin Plant Associates on the Crossness Nature Reserve before the wader scrape extension took place in 2005. Most years have seen at least one moth-trapping community event (delivered by Colin Plant) which has provided a snap-shot of the moth species present at Crossness and revealed a number of notable species. Aquatic invertebrates were recorded by a student of Plymouth University in 2007 in order to measure water quality based on biological indices. Since then, we have had two rounds of surveys for aquatic invertebrates. These were undertaken in Autumn 2015 and Spring 2016. Following a pollution incident in Dec 2017, we undertook repeat surveys in Autumn 2018 and Spring 2019. Results to come.

Reptiles and amphibians are also under-recorded. A survey was undertaken in 2002 on Crossness Nature Reserve, and another in 2006 on Crossness Southern Marsh. Surprisingly low numbers of reptiles were recorded and annual monitoring would perhaps provide a clearer picture. However, Crossness Nature Reserve became the receptor site for a large reptile translocation project in 2017. 1244 reptiles were brought to Crossness, comprising 854 Slow Worms and 390 Common Lizards. These were released in the north of the Protected Area where several hibernacula and habitat piles were created for them. They have distributed across the site and frequently found in the southern section of the Protected Area. A Slow Worm was recorded by the SPG in 2018, and they were also recorded along Footpath 2 as part of Peter Brett Associates ecology surveys for Cory's Riverside Energy Park proposal.

2.3.2.12.1 Management actions

Seek to recruit volunteers from the Friends Scheme, or elsewhere, to undertake as much biological monitoring as possible. The Crossness Nature Reserve Manager should engage with local university students of geography, biology and environmental sciences to undertake research on our sites to contribute to their dissertation. Of particular use at this point (2010) would be botanical surveying, terrestrial invertebrates, and mark-recapture surveys of small mammals.

The Nature Reserve Manager should undertake as much biological monitoring as possible and continue to provide community events that will contribute to the biological records, however the primary management action would be to hire in specialist consultants to undertake robust survey and monitoring on an annual basis, or if funds preclude this, surveys should be repeated every 3 years.

2.3.2.13 Community engagement

Objective

Raise the profile of the sites by offering a variety of community events and activities to the general public. Ensure that the local community feel a sense of pride and ownership of Crossness Nature Reserve and Southern Marshes by inviting them to attend numerous events and volunteer activities.

Description

One of the best ways to raise the profile of Crossness and for Thames Water to create a positive relationship with the local community, is to invite them to our sites. Crossness Nature Reserve and Crossness Southern Marsh provides a unique opportunity to do this and as such, we have in the past run community events that include bat walks, moth watches, bird walks, barn owl awareness days, water vole awareness days, botanical identification, bird ringing demonstrations, breeding bird monitoring events, dragonfly and butterfly walks, birdsong identification etc; where possible these events have been timed to coincide with national events such as National Moth Night or European Bat Weekend, in order to maximise the PR potential.

In addition, we have invited a number of local primary and secondary schools to come to Crossness to undertake pond-dipping, mini-beasting and other activities. The Crossness Nature Reserve Manager has also delivered a number of presentations to local community groups and schools.

This has all been largely successful, however there is room for improvement, particularly in terms of attracting attendees to events that are not already members of the Friends Scheme.

2.3.2.13.1 Management actions

We need to engage a wider audience. The access arrangements and lack of facilities plays a big role in this and prohibits a number of visitors coming to site, particularly families, but also the promotion of community events and/or the Friends Scheme can be improved.

More press releases and advertising of events in the local media are required; the promotion of events on our website and that of other relevant organisations needs improving; and circulation of the Friends of Crossness Nature Reserve newsletter could be improved.

Engagement internally with other Thames Water staff is also required. Currently, staff seem tpo understand little of what our team does and what our sites offer, and yet there does seem to be interest. The Crossness Nature Reserve Manager therefore needs to promote the sites internally and invite staff, in the form of events or team-building days, to come and enjoy what Thames Water’s access and recreation sites have to offer. This will also provide staff with an appreciation of wildlife sensitivity and perhaps guide operational activities to consider the biological impacts. The internal Wild about Thames scheme has addressed this to some degree. This scheme provides opportunities for staff to get involved on our sites of biodiversity interest, but there has been little uptake at Crossness. The introduction of Yammer as an internal publicity tool has also increased awareness of what our team does in recent years. We aim to post at least one story per month on Yammer. This has also provided a good platform for our media team and social media team to pick up stories that they think might be of wider interest.

2.3.2.14 Site infrastructure

Objective

To maintain and enhance our existing infrastructure and to seek further improvement with the provision of visitor infrastructure.

Description

Our existing infrastructure includes fencing and gates, bird hide, bat hibernaculum, sand martin bank, boardwalk, stable block, pole-mounted nest boxes, viewing platform and wildlife viewing screens on Crossness Nature Reserve; on Crossness Southern Marsh, a viewing deck, wildlife viewing screen, pedestrian and vehicle bridges, fencing and gates.

All of these structures require maintenance, repairs and improvements at some point. The largest maintenance input is in fencing which is frequently weakened by livestock and by the ground conditions. Repairs and improvements are made by the Crossness Nature Reserve Manager, volunteers and graziers, however fencing also requires frequent replacement at considerable cost. Gates frequently require repair or replacement due to damage caused by vandalism with off-road bikers and quad bikes being the largest problem, frequently cutting through gates and barriers with portable angle-grinders. Graffiti is another issue which is currently managed by the Crossness Nature Reserve Manager. This problem mostly occurs at the north end of the Nature Reserve on the viewing platform and wildlife viewing screens.

Structures should be monitored at least weekly for signs of damage and repaired as quickly as possible.

What Crossness lacks in terms of infrastructure is dedicated visitor facilities. In order to successfully run community events and deliver education visits, a small facility is required that can offer shelter and toilets, and could potentially be used as a classroom for school visits. We do have a two-storey bird hide which is a great facility, but an electricity source would be enhance the site further.

More ponds and dipping platforms are required. A second dipping platform is required on the nature reserve to relieve the burden on the existing. Following frequent consecutive school visits, the existing pond becomes turbid, visibility minimal and diversity minimised; a second pond to relieve the existing during busy periods if required. A new pond and platform on the southern marsh would enable school visits to take place here instead of on the nature reserve during busy periods. Access is often easier on the southern marsh with better transport links than the nature reserve; a pond here would provide choice and ease of access. We could seek to work in partnership with the North West Kent Countryside Partnership (NWKCP) to deliver infrastructure such as dipping platforms.

Further bird and bat nest boxes are required across the two sites. Bird and bat boxes were installed in the new stable block in 2011, but tree mounted boxes are required along the northern boundary of Crossness Southern Marsh, along the southern boundary of Crossness Nature Reserve as well as in the Protected Area. The nature reserve would also benefit from the installation of a Swift nesting tower located within the wader scrape complex.

2.3.2.14.1 Management actions

Continue to monitor site infrastructure and repair and replace damaged structures as quickly as possible. Ensure that maintenance costs are included in the Opex budget and that replacement of structures or additional installations are included within Capex budgets.

Seek to secure funding for the creation of a small education facility to be sited within the Protected Area of Crossness Nature Reserve, either internally or through externally-funded partnership projects.

3. How will we get there?

3.1 Five Year Work Plan (beginning with Y1 2010/11)

Objective	Prescription	Description	Location	Year					Priority 1=High 4=Low	Month	Resources (Budget, Staffing)	Remarks
				1	2	3	4	5				
Annual reviews	Management Plan (Six Month Review)			✓	✓	✓	✓	✓	1	6		
	Management Plan (Annual Review)			✓	✓	✓	✓	✓	1	12		
	Risk Assessments			✓	✓	✓	✓	✓	1	10		
	Grounds Maintenance			✓	✓	✓	✓	✓	1	2		
	Licence Agreements			✓	✓	✓	✓	✓	1	9/10		
	Budgets			✓	✓	✓	✓	✓	1	9/10		

Objective	Prescription	Description	Location	Year					4=Low Priority 1=High	Month	Resources (Budget, Staffing)	Remarks
				1	2	3	4	5				
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain reedbeds to provide mosaic of different sward heights and water levels	CNR and CSM	✓	✓	✓	✓	✓	1	9-2	CNR Manager & volunteers	
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain wader scrapes to keep 80% open water and bare mud	CNR and CSM	✓	✓	✓	✓	✓	1	9-2	CNR Manager & volunteers	
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ponds to keep 80% open water	CNR and CSM	✓	✓	✓	✓	✓	1	12	CNR Manager & volunteers	

Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage ditch banks to prevent scrub encroachment	CNR and CSM	✓	✓	✓	✓	✓	2	8-3	CNR Manager & volunteers	Strim alternate 30m sections on one bank Y1; opposite bank alternate sections Y2 etc
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ditches to provide at least 50% open water channels	CNR and CSM	✓			✓		2	9-2	CNR Manager & volunteers	Handcut central channels, not affecting toe of bank; or staggered sections where appropriate. When required, hire in an excavator to undertake desilting operations
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain grazed grasslands	CNR and CSM	✓	✓	✓	✓	✓	3	1-12	Graziers CNR Manager	Allow horse grazing of designated areas at a rate of 1.2 horses per 1ha as per grazing licence agreement. Cut and top mechanically as required after July.

Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	CNR and CSM	✓	✓	✓	✓	✓	1	7-3	CNR Manager, volunteers, grounds maintenance contractors	Strim/mow ungrazed grasslands, baling arisings where ragwort is present and storing in non-grazed areas
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Control growth of ragwort in grazed paddocks	CNR and CSM	✓	✓	✓	✓	✓	1	7, 8	CNR Manager, volunteers, graziers & GM contractors	Handpull ragwort in grazed paddocks, leave elsewhere for Cinnabar Moth larvae. Cut and bale where growth is excessive
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of thistle	CNR and CSM	✓	✓	✓	✓	✓	3	6-8	CNR Manager & volunteers	Top areas of thistle to prevent seeding before Aug. Cut at base of leaves
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Control scrub at current levels not allowing any more to develop	CNR and CSM	✓	✓	✓	✓	✓	3	7-3	CNR Manager & volunteers	Control scrub in non-grazed areas by digging saplings from root or cutting and treating

												more mature growth
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Control scrub at current levels not allowing any more to develop	CNR and CSM	✓	✓	✓	✓	✓	3	7-3	CNR Manager & volunteers	Thin existing scrub in southern half of protected area and along southern boundary footpath
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of bramble	CNR and CSM	✓	✓	✓	✓	✓	3	7-3	CNR Manager & volunteers	Maintain bramble to ensure no increase on current levels
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage coppiced willow	CNR	✓	✓	✓	✓	✓	3	11-2	CNR Manager & volunteers	Coppice 2 or 3 willows adjacent birdhide on rotation
Objective 1: Maintain and enhance the sites	**P1.1:** Manage and improve habitats for flora	Manage wet meadow to provide	CNR	✓	✓	✓	✓	✓	1	8-2	Grazier CNR Manager	Allow grazing of West Paddock 1st Aug-31st Oct

heritage and biodiversity	and fauna in conjunction with BAP	wintering habitat for waders and wildfowl										Begin hard flooding Oct. Control levels to provide 80% shallow floods until March Maintain high water table Mar-Oct
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in reedbed	CNR	✓	✓	✓	✓	✓	1	1-12	CNR Manager & volunteers	Maintain high water levels throughout year, draining down in winter to enable cutting
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in CNR wader scrape	CNR	✓	✓	✓	✓	✓	1	1-12	CNR Manager & volunteers	Maintain high water levels throughout year, draining down in spring/early summer to expose muddy margins using windpump controls and sluice boards

Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in CSM wader scrape	CSM	✓	✓	✓	✓	✓	1	9-3	CNR Manager & volunteers	Close penstock sluice on Erith Marsh Dyke West to hold back winter rainfall at west of site
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Control invasive species	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager & volunteers	Remove and treat where necessary any Japanese Knotweed and Giant Hogweed. Remove Azolla using biological control methods
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.1:** Manage and improve habitats for flora and fauna in conjunction with BAP	Install bird and bat nest boxes	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager & volunteers Contractors	Bird and bat boxes installed in eaves of new stable block 2011. Tree mounted bird and bat boxes, plus a Swift tower and mini-beast hotel, will be installed in 2012 as part of THP ecological mitigation

Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.2:** Record and monitor flora and fauna	Birds	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager, Dartford Ringing Group, volunteers and visitors	Collate all bird records from hide log book and DRG records. Distribute records to county recorder, GiGL, LNHS and Bexley RSPB
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.2:** Record and monitor flora and fauna	Mammals	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager, volunteers and visitors, students, specialist consultants	Collate incidental sightings. Carry out water vole field signs surveys preferably with students. Carry out small mammal mark-recapture surveys Carry out bat surveys
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.2:** Record and monitor flora and fauna	Butterflies and dragonflies	CNR & CSM	✓	✓	✓	✓	✓	3	3-10	CNR Manager Volunteers	Collate incidental sightings. Carry out transect surveys with volunteers

Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.2:** Record and monitor flora and fauna	Invertebrates	CNR & CSM			✓			3	3-9	Consultant entomologist or expert volunteer	Collate incidental sightings. More robust survey by specialist consultant. Moth trapping by CNR Manager
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.2:** Record and monitor flora and fauna	Flora	CNR & CSM			✓			3	5	Consultant botanist or expert volunteer	Robust survey by specialist consultants
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.2:** Record and monitor flora and fauna	Reptiles	CNR & CSM	✓	✓	✓	✓	✓	3	3-9	CNR Manager Volunteers	Refugia surveys carried out in appropriate areas
Objective 1: Maintain and enhance the sites heritage and biodiversity	**P1.2:** Record and monitor flora and fauna	Amphibians	CNR & CSM	✓	✓	✓	✓	✓	3	3-9	CNR Manager Volunteers	Torch surveys and egg surveys of water bodies

Objective 2. Encourage use and enable community involvement in the site	**P2.1** Maintain Friends of Group	Maintain and increase members to Friends group	CNR	✓	✓	✓	✓	✓	1	1-12	CNR Manager	Market and advertise the Friends scheme. Ensure a desirable programme of events and newsletters
Objective 2. Encourage use and enable community involvement in the site	**P2.4** Provide voluntary opportunities for all communities	Run voluntary events throughout year for community members, regular volunteers and TW staff	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager	Plan and market a range of voluntary events
Objective 2. Encourage use and enable community involvement in the site	**P2.5** Monitor visitor use of the site	Monitor number of Friends Group members	CNR & CSM	✓	✓	✓	✓	✓	2	1-12	CNR Manager	Keep Friends scheme database updated
Objective 2. Encourage use and enable community involvement in the site	**P2.5** Monitor visitor use of the site	Monitor number of site visitors	CNR & CSM	✓	✓	✓	✓	✓	2	1-12	CNR Manager	Install visitor counters at entrances?
Objective 2. Encourage use and enable community involvement in the	**P2.5** Monitor visitor use of the site	Seek to provide a dedicated visitor / education facility on CNR	CNR	✓	✓	✓	✓	✓	2	1-12	CNR Manager	Small-scale facility similar to that of Stoke Newington

site		including toilet(s)										Reservoir
Objective 3: **Increase public understanding and awareness of TW**	**P3.1** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Install and maintain welcome and interp boards at entrances and features	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager	Interp boards procured and ready to install; artwork requiring completion
Objective 3: **Increase public understanding and awareness of TW**	**P3.1** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Install temporary interp, i.e. featuring a different species each month	CNR & CSM	✓	✓	✓	✓	✓	3	1-12	CNR Manager	
Objective 3: **Increase public understanding and awareness of TW**	**P3.1** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide fingerposts directing visitors to features, providing distances	CNR & CSM	✓					2	1-12	CNR Manager	Fingerposts procured ready to install
Objective 3: **Increase public understanding and awareness of TW**	**P3.2** Provide a programme of events and activities	Run a minimum of 6 community events and activities	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager	Bat walks, moth nights, bird watching days, bird ringing demos,

												dragonfly and butterfly walks, wild food walks etc
Objective 3: **Increase public understanding and awareness of TW**	**P3.3** Promote the site through a range of media applications	Increase site profile on TW website	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager	Feature access arrangements, maps, list of events, recent sightings, news
Objective 3: **Increase public understanding and awareness of TW**	**P3.3** Promote the site through a range of media applications	Increase site profile on external websites	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager	Forge relationships with partners and stakeholders to generate weblinks (Bexley RSPB, LNHS etc)
Objective 3: **Increase public understanding and awareness of TW**	**P3.3** Promote the site through a range of media applications	Produce a leaflet for distribution in libraries etc	CNR & CSM			✓			4	1-12	CNR Manager	
Objective 3: **Increase public understanding and awareness of TW**	**P3.3** Promote the site through a range of media applications	Produce quarterly newsletters	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager	Distribute newsletters to Friends group, partners, stakeholders, libraries, TW personnel
Objective 3: **Increase public**	**P3.3** Promote the site through a	Promote Crossness	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager	Ensure Crossness

understanding and awareness of TW	range of media applications	through internal communication										stories included in The Source, Operational News, and on Intranet
Objective 3: **Increase public understanding and awareness of TW**	**P3.3** Promote the site through a range of media applications	Enter site for awards for excellence	CNR & CSM	✓	✓	✓	✓	✓	2	1-12	CNR Manager	Enter Bexley Business Environmental Challenge Awards
Objective 3: **Increase public understanding and awareness of TW**	**P3.4** Deliver a program of environmental education	Deliver at least 6 school visits to CNR	CNR	✓	✓	✓	✓	✓	1	5-6	CNR Manager	May need to put on hold due to construction activities
Objective 4: **Encourage appropriate public access**	**P4.1** Maintain site furniture in accordance with H&S standards	Carry out immediate repairs to damage or graffiti	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager, volunteers, contractors	
Objective 4: **Encourage appropriate public access**	**P4.2** Ensure regular patrols	Patrol sites and boundaries in order to identify damage and repairs	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager	
Objective 4: **Encourage appropriate public access**	**P4.3** Ensure site access improvements comply with DDA regulations.	Ensure paths, gates and site furniture are DDA compliant	CNR & CSM	✓	✓	✓	✓	✓	1	1-12	CNR Manager, contractors	

Objective 5. Develop revenue opportunities	**P5.1** Develop site revenue through Friends group membership	Promote Friends membership and renewal to ensure income generation	CNR	✓	✓	✓	✓	✓	1	1-12	CNR Manager	
Objective 5. Develop revenue opportunities	**P5.1** Develop site revenue	Explore logistics of corporate volunteer days to generate revenue	CNR	✓	✓	✓	✓	✓	1	1-12	CNR Manager	May not be possible until visitor/toilet facilities in place?
Objective 5. Develop revenue opportunities	**P5.1** Develop site revenue	Work with partners to secure externally-funded capital projects	CNR	✓	✓	✓	✓	✓	1	1-12	CNR Manager	Belvedere and Erith Marsh Green Links Programme

3.2 Work plan 2010/11

Target year	Location / description	Prescription number	Project	Area/ length/ no:	Month	Resource (budget, staffing)	Who	Progress Green = completed/on target Amber = Slippage Red = Behind
2010-2011	CNR & CSM	N/A	Management plan six month review	n/a	4	2.5 days per week	CNR Manager	
2010-2011	CNR & CSM	N/A	Management plan annual review	n/a	10	2.5 days per week	CNR Management Committee	First draft of management plan completed
Manage and improve habitats								
2010-2011		**P1.1** Manage and improve habitats for flora and fauna. In conjunction with BAP	Reedbed management	n/a	8-11	12 days	CNR Manager Volunteers	100m^2 of CSM Wetland Field reedbed cut as part of volunteer event Jan 11 712m of marginal reedbed cut and cleared (cut in alternate sections, 712m remaining)
2010-2011	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR wader scrape as 80% open water by clearing vegetation	n/a	8-11	4 days	CNR Manager & volunteer	Vegetation strimmed and removed throughout winter 2010, including community volunteer events
2010-2011	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Complete Dec 2010

2010-2011	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CSM pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Horses repeatedly broke fencing and grazed marginal vegetation. Fencing replaced with higher spec in Mar 11
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Monitor silt levels in ponds, remove silt to original levels on rotation	n/a	1	2 days	Contractor	Current levels acceptable
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in pond via windpump and sluice	n/a	1-12	1 day	CNR Manager	Ongoing
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage siltation of ditches and remove vegetation to ensure at least 50% open water	n/a	8-11	5 days	Contractors	West Paddock Ditch (West) and Ford's Dyke had central channel desilted in Feb 11 by Dickinson Engineers. 300m of Erith Marsh Dyke West desilted by Dickinson Engineers
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage ditch banks to prevent scrub encroachment	n/a	8-11	14 days	CNR Manager Volunteers	South banks of Erith Marsh Dyke West East cut in 30m sections. East and west banks of Erith Marsh Dyke South cut in 10m sections. Work undertaken by volunteers. Volunteer youth groups (Earn Your Travel Back) helped clear arisings in Sept and Feb 11

2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Grazing	n/a	1-12		CNR Manager	2010 grazing regime disrupted by TTQI ecological mitigation. West Paddock grazed earlier than planned; Sea Wall Field East fenced off to provide more grazing. CSM horse numbers coming down. Illegal grazing on CSM managed by CNR Manager
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	n/a	1-12		CNR Manager Volunteers	CNR ungrazed grasslands managed by CNR Manager and volunteers strimming and raking
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control ragwort in grazed paddocks		4		CNR Manager Volunteers	2 community ragwort pulling events in Jul 2010. One Earn Your Travel Back volunteer day and one Friends of CNR volunteer taskday cleared most ragwort growth on CSM Great Breach Paddock and South Dyke Paddock. Lagoon Field and Parsley Field cleared by volunteers on CNR
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of thistle		3-5		CNR Manager Volunteers	Thistle topping carried out on CNR by volunteer groups in Protected Area

2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain scrub at current levels		8-11		CNR Manager Volunteers	Bankside scrub managed by rotational cutting. Large section of scrub removed and treated from south bank of Erith Marsh Dyke East Jan 11 Scrub in CNR Protected Area thinned and removed Jan 11 Hedge planted west of Footpath 2 to screen off CNR wader scrape Mar 11
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage coppiced willow		8-12		CNR Manager Volunteers	Four willows alongside bird hide entrance coppiced Feb 11
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage wet meadow for waders and wildfowl		1-12		CNR Manager	Delayed construction of TTQI sluice at Ford's Dyke junction prevented artificial flooding of West Paddock. However, good levels were maintained due to winter rainfall, but drying out rapidly in Mar 11
2010-2011		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control of invasive species		1-6		CNR Manager Volunteers Grounds Maintenance	One stand of Giant Hogweed removed from CSM. Ongoing monitoring of invasive species; no Azolla in 2010/11
2010-2011		**P1.1** Manage and improve	Habitat creation		1-12		CNR Manager Volunteers	New 1.2 reedbed/deep water lagoons created in

		habitats for flora and fauna in conjunction with BAP					Contractors Grounds Maintenance	Island Field Oct 2010 95m new ditch created in West Paddock 82m new ditch created in Sea Wall Field 0.25 ha new CSM extended wader scrape 150m native mixed hedge planted Mar 2011 alongside Footpath 2 north
Record and monitor flora and fauna								
2010-2011		**P1.2:** Record and monitor flora and fauna	Produce fixed point photography map and photos		1-12	1 day	CNR Manager	On target
2010-2011		**P1.2:** Record and monitor flora and fauna	Record and monitor birds		1-12	3 days	CNR Manager Dartford Ringing Group Visitors and volunteers Consultants	Bird records collated from visitor sightings (wildlife log book) and DRG records. ?? species recorded 2010/11 Kestrels bred in [redacted] for first time in 2010, possible breeding 2011. Barn owl roosting in [redacted] over winter 2010/11. Two seen in Apr 11 and hopeful for breeding attempt.
2010-2011		**P1.2:** Record and monitor flora and fauna	Record and monitor mammals		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Ad hoc mammal sightings only, including first record of Mole in Protected Area. Barn Owl pellets collected for small mammal analysis.

								Bat walks provided species records in Aug and Sept 11
2010-2011		**P1.2:** Record and monitor flora and fauna	Record and monitor butterflies and dragonflies		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Ad hoc butterfly/dragonfly records No systematic monitoring took place
2010-2011		**P1.2:** Record and monitor flora and fauna	Record and monitor terrestrial and aquatic invertebrates		1-12	1 day	Consultants	No systematic monitoring took place Moth traps procured
2010-2011		**P1.2:** Record and monitor flora and fauna	Record and monitor flora		1-12	1 day	Consultants	No systematic monitoring took place
2010-2011		**P1.2:** Record and monitor flora and fauna	Record and monitor amphibians and reptiles		1-12	3 days	CNR Manager Volunteers	No systematic monitoring took place – ad hoc sightings only
Maintain tools and equipment								
2010-2011		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain tools and equipment	n/a	1-12	1 day	CNR Manager	Ongoing
2010-2011		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Procure new tools and equipment as and when required	n/a	1-12	3 days	CNR Manager	Sickle-bar mower procured for grass and reed cutting Trailer procured for transportation of mower and arisings Procured a Portakabin to use as welfare and storage facility

								New hand tools included hay rakes, hay forks, loppers, post-hole spade, post-hole auger New Stihl strimmer Full suite of PPE for regular volunteers
2010-2011		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Vehicle checks	n/a	1-12	1 day	CNR Manager	Ongoing
2010-2011		**P1.4:** Maintain tools & equip in accordance with H&S guidelines	Monitor water levels and record water abstraction	n/a	1-12	Daily meter readings	CNR Manager	Abstraction meter faulty. Estimated abstraction records submitted to EA via Daniel Stubbs Mar 11
2010-2011		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain and service windpump	n/a			Contractors	Windpump repaired (replaced damaged seals) by Engenica 8th Sept 2010
Provide voluntary opportunities								
2010-2011		**2.4:** Provide voluntary opportunities for all communities	Create and update database for volunteers	n/a	1-12	1 day	CNR Manager	Ongoing
2010-2011		**2.4:** Provide voluntary opportunities for all communities	Run a programme of community volunteering days	n/a	1-12	6 days	CNR Manager	Ragwort pulling Jul 10 EYTB ragwort pulling Jul 10 EYTB (youth group) bankside clearance Sept 10 Bankside clearance Dec 10

								Vegetation control Jan 11 EYTB bankside clearance Feb 11 Reedbed cutting Feb 11 Great Big Litter Pick Feb 11
Provide site signage and interpretation								
2010-2011		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide interpretation boards at entrances and features	n/a	1-12	4 days	CNR Manager	Finger posts and interp frames procured and in storage Greg Poole CSM illustration procured Aug 2010 Waiting on internal graphics to update interp before installation
2010-2011		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide temporary interpretation on species and habitat works throughout the year.	n/a	1-12	12 days	CNR Manager	Delayed – need to procure frames
Provide programme of events and activities								
2010-2011		**P3.2:** Provide programme of events and activities	All site events and walks promoted in the newsletter and on website	n/a	1-12	12 days	CNR Manager Andy Freeman / Jamie Elborn	Bird ringing demonstration May 2010 CNR bat walk Aug 2010 CSM bat walk Sept 2010 Erith Marsh Treasure Hunt for 4 local schools Sept 2010 Wildlife photography

								presentation Nov 2010 Winter bird walk cancelled due to bad weather Dec 10
2010-2011		**P3.2:** Provide programme of events and activities	All events added to the TW website and other partner or local "what's on" websites.		1-12	6 days	CNR Manager Andy Freeman / Jamie Elborn	Added to TW website through inclusion of newsletter. Need to include direct listings.
Promote through media								
2010-2011		**P3.3:** Promote the reserve through a range of media applications	Ensure internal and external press coverage		1-12	6 days	CNR Manager Press Office	External coverage of TTQI habitat creation Internal coverage of Earn Your Travel Back volunteer days, Friends of CNR volunteer days, Erith Marsh Treasure Hunt event, bird ringing demo event
Education								
2010-2011		**P3.4:** Deliver a programme of environmental education	Devise and market educational programme		1-12	5 days	CNR Manager	Educational programme complete School visits postponed in 2010/11 due to health and safety risks associated with site developments Took part in an in-school STEM career networking event at Bexleyheath School (Feb 11) promoting Thames Water and CNR Manager role

Maintenance of infrastructure								
2010-2011		**P4.2** Maintain site furniture in accordance with H & S standards	Carry out site safety checks and undertake any action required		1-12	26 days	CNR Manager	Repaired CSM pond fencing numerous times Jun-Sept10 CSM kissing gate welded following damage April 11 Welded straps onto space next to stable gates to prevent motorbike/quad bike entry (Nov 10) Repaired misaligned CNR pedestrian gate Dec 10 Repaired damaged CNR palisade fencing Feb 2011 CSM kissing gate replaced Mar 2011 Numerous repairs to CSM timber kissing gates and fencing May 2010–Mar 2011 Timber kissing gate replaced with metal Mar 11 Numerous temporary repairs to CNR GB kissing gate. Welded hinges Jan 11 Gates replaced Mar 11 CNR northern kissing gate, sanded and painted (Mar 11) CNR southern kissing gate welded, sanded and galvanised (Mar 11) Cleaned up after several deliberate fires on CSM Repaired fencing that was removed for fires Mar 11

2010-2011		**P4.2:** Ensure regular site patrols and enforcement of bylaws	Increase site presence		1-12	52 days	CNR Manager	At least one site patrol per week. Safer Neighbourhood Police will now undertake adhoc patrols at weekends to prevent motorbike access and damage
2010-2011		**P4.3:** Ensure site access improvements comply with DDA regulations			1-2	1 day	CNR Manager Contractors	Kissing gates installed Mar 11 are all DDA compliant (Woodstock large mobility kissing gates) Enhancements to the Thames Path viewing platform have made the feature DDA compliant with ramped access (Mar 11)
2010-2011		**P5.1** Develop funding and income opportunities for the site	Improve links with funding bodies and partners		1-12		CNR Manager	Working with LB Bexley to deliver funded enhancements as part of Belvedere Green Links project: new stable block and improved access to viewing platform

3.3 Work plan 2011/12

Target year	Location / description	Prescription number	Project	Area/ length/ no:	Month	Resource (budget, staffing)	Who	Progress Green = completed/on target Amber = Slippage Red = Behind
2011-2012	CNR & CSM	N/A	Management plan six month review	n/a	10	2.5 days per week	CNR Manager	Complete
2011-2012	CNR & CSM	N/A	Management plan annual review	n/a	3	2.5 days per week	CNR Management Committee	Complete
Manage and improve habitats								
2011-2012		**P1.1** Manage and improve habitats for flora and fauna. In conjunction with BAP	Reedbed management	n/a	8-11	12 days	CNR Manager Volunteers	Cut north-east section of CSM reedbed – Oct 11 Cut reed north of scrape – Oct 11 Cut alternate sections on north bank of Erith Marsh Dyke East reedbed – Jan 12
2011-2012	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR wader scrape as 80% open water by clearing vegetation	n/a	8-11	4 days	CNR Manager & volunteer	Complete
2011-2012	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Complete

2011-2012	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CSM pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Complete – made repairs to damaged fencing (which allowed horses in) – Jan 12
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Monitor silt levels in ponds, remove silt to original levels on rotation	n/a	1	2 days	Contractor	Silt levels monitored, de-silting not required
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in pond via windpump and sluice	n/a	1-12	1 day	CNR Manager	Ongoing New windpump installed 18th May 2011 Original windpump: major repair and overhaul – Jan 12 Meter on 2nd pump installed – 6 Jul 11 Sluices installed at head of Parsley Field/West Paddock ditch and Fords Dyke – Nov Meter on 2nd pump removed for repair – Feb 12
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage siltation of ditches and remove vegetation to ensure at least 50% open water	n/a	8-11	5 days	Contractors	Complete Attended LB Bexley's 'Erith Marshes Management Workshop' regarding company responsibility for managing and desilting of ditches – 11 Jul 2011
2011-2012		**P1.1** Manage and improve	Manage ditch banks to prevent scrub	n/a	8-11	14 days	CNR Manager Volunteers	Cut alternate sections of Horsehead Dyke and Great

		habitats for flora and fauna in conjunction with BAP	encroachment					Breach Dyke West (north and east banks respectively) on CNR; Cut alternate sections on north bank of Erith Marsh Dyke West and Erith Marsh Dyke East
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Grazing	n/a	1-12		CNR Manager	CSM still over-grazed, need Legal to respond. East Paddock (CNR) soon to be removed from grazing for two year period to encourage ruderal/scrubby area
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	n/a	1-12		CNR Manager Volunteers	CNR ungrazed grasslands managed by CNR Manager and volunteers strimming and raking North scrape cut - ??
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control ragwort in grazed paddocks		4		CNR Manager Volunteers	CNR Ragwort pulled on Island Field, Lagoon Field, East Paddock and Parsley Field – Jul/Aug 2011 CSM Ragwort pulled on Main Paddock as a volunteer day – Jul 2011 – greater resources needed to manage, arrange more volunteer days in 2012
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with	Control spread of thistle		3-5		CNR Manager Volunteers	Thistle cut/topped in Island Field and Sea Wall Field – Jul 2011

		BAP						
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain scrub at current levels		8-11		CNR Manager Volunteers	Scrub removed and treated from CNR reedbed and Parsley Field – Jan 12 Some scrub removal from Great Breach Dyke West and North – Feb 12 Scrub removed from CSM Erith Marsh Dyke East and West – Dec 11/Jan 12
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage coppiced willow		8-12		CNR Manager Volunteers	Three trees coppiced alongside birdhide – Feb 2012
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage wet meadow for waders and wildfowl		1-12		CNR Manager	Levels very high following installation of new pump, making access to West Paddock prohibitively deep; laid Type 1 path for access
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control of invasive species		1-6		CNR Manager Volunteers Grounds Maintenance	Japanese Knotweed growth on Thames Path at north end of reserve – sprayed May 2011
2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Habitat creation		1-12		CNR Manager Volunteers Contractors Grounds Maintenance	New hedge weed spray May 2011 Plant hedge gaps – Feb 2012

2011-2012		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Beekeeping		1-12		CNR Manager Volunteers	CNR Manager and 2 regular volunteers underwent beekeeping practical course (10 weeks) with Ruxley Beekeepers – June 2011 Underwent 6 week beekeeping theory course in Feb 2012 Attending BBKA Spring Convention in April 2012 Delivery of 2 bee hives expected April 2012
Record and monitor flora and fauna								
2011-2012		**P1.2:** Record and monitor flora and fauna	Record and monitor birds		1-12	3 days	CNR Manager Dartford Ringing Group Visitors and volunteers Consultants	Bird records collated and distributed from visitor sightings (wildlife log book) and DRG records. Barn owl nest boxes checked – 17 June 2011 – 3 young in original nest box Barn owl chicks ringed (2 in orig nest box; third eaten by siblings) by DRG – 8 Jul 11 Kestrels nested in compartment above, raising 3 young – not ringed
2011-2012		**P1.2:** Record and monitor flora and fauna	Record and monitor mammals		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Barn Owl pellets collected for small mammal analysis. Bat walks - June 2011 Monitoring mink rafts on Island Field reedbed, Horsehead Dyke, Great

								Breach Dyke, Sea Wall Dyke and West Paddock Ditch. Mink recorded and photographed in Jan 2012 at nearby Thamemere Lake
2011-2012		**P1.2:** Record and monitor flora and fauna	Record and monitor butterflies and dragonflies		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Complete – adhoc sightings recorded but no systematic monitoring Butterfly and dragonfly walk (community event) – 28 Jun
2011-2012		**P1.2:** Record and monitor flora and fauna	Record and monitor terrestrial and aquatic invertebrates		1-12	1 day	Consultants	Adhoc sightings only
2011-2012		**P1.2:** Record and monitor flora and fauna	Record and monitor flora		1-12	1 day	Consultants	Botanical surveys carried out by Dave Miller in July 2011; second stage surveys to be carried out spring 2012
2011-2012		**P1.2:** Record and monitor flora and fauna	Record and monitor amphibians and reptiles		1-12	3 days	CNR Manager Volunteers	Torch surveys to be carried out in April
Maintain tools and equipment								
2011-2012		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain tools and equipment	n/a	1-12	1 day	CNR Manager	Ongoing
2011-2012		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Procure new tools and equipment as and when required	n/a	1-12	3 days	CNR Manager	Bat detectors procured May 2011 Beekeeping equipment procured – Feb 12 Storage and shelving for lock-up and portakabin

								procured – Jul 11
2011-2012		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Vehicle checks	n/a	1-12	1 day	CNR Manager	Ongoing
2011-2012		**P1.4:** Maintain tools & equip in accordance with H&S guidelines	Monitor water levels and record water abstraction	n/a	1-12	Daily meter readings	CNR Manager	Ongoing
2011-2012		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain and service windpump	n/a			Contractors	First windpump major repairs and maintenance (all bearings etc replaced) – Jan 12
Provide voluntary opportunities								
2011-2012		**2.4:** Provide voluntary opportunities for all communities	Create and update database for volunteers	n/a	1-12	1 day	CNR Manager	Ongoing
2011-2012		**2.4:** Provide voluntary opportunities for all communities	Run a programme of community volunteering days	n/a	1-12	6 days	CNR Manager	Ragwort pulling - 10 Aug 11 Wader scrape and reedbed clearance – Sept 11 Island Field reedbed Typha pulling event – 5 Oct 11 Wader scrape conservation day – Oct 11 Great Big Litter Pick – Nov 11 Vegetation control – Jan 12 Reedbed management –

								Feb 12
Provide site signage and interpretation								
2011-2012		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide interpretation boards at entrances and features	n/a	1-12	4 days	CNR Manager	Behind – installation now planned for April/May 2012
2011-2012		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide temporary interpretation on species and habitat works throughout the year.	n/a	1-12	12 days	CNR Manager	Behind
Provide programme of events and activities								
2011-2012		**P3.2:** Provide programme of events and activities	All site events and walks promoted in the newsletter and on website	n/a	1-12	12 days	CNR Manager Andy Freeman / Jamie Elborn	Bexley RSPB beginners bird watching event Sun 15 May 2011 Bat walks – June 11 Wild About Water Voles event for Thames Water staff – 20 June 2011 Butterfly and dragonfly walk – 28 June 2011 Barn owl watch – 15 Jul 11 Wild about Water Voles community event – 30 Jul 11 Winter bird walk – Dec 11 Wild about Bats internal

								event – 10 Aug 11 Indoor presentation: bees and beekeeping – Jan 12 7 public volunteer days delivered in addition to 8 volunteer days per month for regular volunteer group
2011-2012		**P3.2:** Provide programme of events and activities	All events added to the TW website and other partner or local "what's on" websites.		1-12	6 days	CNR Manager Andy Freeman / Jamie Elborn	Newsletter issue 18 uploaded to website – May 11 Issue 19 uploaded – Aug 11 Issue 20 uploaded – Jan 12
Promote through media								
2011-2012		**P3.3:** Promote the reserve through a range of media applications	Ensure internal and external press coverage		1-12	6 days	CNR Manager Press Office	Internal press coverage of 9 year old reed warbler returning to Crossness (Apr 2011) Internal coverage of breeding barn owls and kestrels (May 2011) Local external coverage of breeding barn owls and kestrels (Aug 2011) Coverage of red-breasted goose at Crossness STW (May 2011) Coverage of Wild about Water Voles event internal event (June 2011) Coverage of reedmace pulling day (Oct 2011)
Education								
2011-		**P3.4:** Deliver a programme of	Devise and market educational		1-12	5 days	CNR Manager	Delivered presentation for LB Bexley's Family Learning

2012		environmental education	programme					Day at Erith Library – 28 Oct Presentation to Ruxley Beekeeping Association public event and AGM – 24 Dec 11 Kent Reptile and Amphibian Group/NWKCP carrying out Great Crested Newt survey training on CSM – 3 Mar 12 Taking part in STEM career networking event at Bexleyheath Academy – 17 April 2012 2 education visits booked for Our Lady of Rosary School – 22 May 2012 2 education visits booked for St Paulinus School – 29 May 2012 2 education visits booked for St Joseph's School – 30 May 2012
Maintenance of infrastructure								
2011-2012		**P4.2** Maintain site furniture in accordance with H & S standards	Carry out site safety checks and undertake any action required		1-12	26 days	CNR Manager	Thames Path kissing gate replaced/welded at west end of site to act as motorbike barrier from Thamesmead residential area CSM kissing gate modifications to deter motorbike access No motorbike/quad bike signs erected around site – Apr 11

								Graffiti removal from Sea Wall platform – 22 June 11 Installed drainage pipes on Footpath 1 (north-south to Thames) to alleviate winter flooding issues – Nov 2011 Post and wire fencing installed alongside watercourses: Great Breach Dyke West and Great Breach Lagoon – Nov 2011 Two separate repairs of boundary fencing with Southmere Park where illegal graziers have gained access from Gallions' Land – Jan 2012 Illegal grazing legal notices erected – 11 Jan 2012 Repair of chainlink fence on CSM north boundary – Jan 2012 Raised Footpath 1 following continued flooding issues – Feb 2012
2011-2012		**P4.2:** Ensure regular site patrols and enforcement of bylaws	Increase site presence		1-12	52 days	CNR Manager	At least one site patrol per week. Safer Neighbourhood Police undertaking adhoc patrols at weekends to prevent motorbike access and damage. Meeting with TW security May 2011

2011-2012		**P4.3:** Ensure site access improvements comply with DDA regulations	Ensure any new installations are DDA compliant		1-2	1 day	CNR Manager Contractors	Enhancements to the Thames Path viewing platform have made the feature DDA compliant with ramped access (May 2011) Compost toilets with one unit provided as a disabled unit and therefore DDA compliant
2011-2012		**P4.3:** Ensure site access improvements comply with DDA regulations	Install composting toilets for use by school groups and other visitors	2	1-3	8 days	CNR Manager Contractors	2 Compus twin composting toilets (supplied by Natsol) installed Jan 2012 by Lloyd Turner Ltd
2011-2012		**P5.1** Develop funding and income opportunities for the site	Improve links with funding bodies and partners		1-12		CNR Manager	Applied for All London Green Grid funding for CNR and CSM improvements – Jan 2012 Internal Capex bid submitted for capital improvements: path resurfacing on CSM and new sand martin bank on CNR

3.4 Work plan 2012/13

Target year	Location / description	Prescription number	Project	Area/ length/ no:	Month	Resource (budget, staffing)	Who	Progress Green = completed/on target Amber = Slippage Red = Behind
2012-2013	CNR & CSM	N/A	Management plan six month review	n/a	10	2.5 days per week	CNR Manager	Completed
2012-2013	CNR & CSM	N/A	Management plan annual review	n/a	3	2.5 days per week	CNR Management Committee	Completed
Manage and improve habitats								
2012-2013		**P1.1** Manage and improve habitats for flora and fauna. In conjunction with BAP	Reedbed management	n/a	8-11	12 days	CNR Manager Volunteers	On target Mature *Phragmites* translocation completed Mar 2012. Mechanical Typha removal Dec 2012 Marsh sow-thistle reintroduction completed on ridge and furrow reedbed May 2012 A further 16 plants planted on ridge and furrow in Oct 2012, and a further 35 planted in Spring 13 (21 in Island Field reedbed; 7 on wader scrape; 7 on West Paddock)
2012-2013	Protected area	**P1.1** Manage and improve	Keep the CNR wader scrape as 80% open	n/a	8-11	4 days	CNR Manager & volunteer	Completed

		habitats for flora and fauna in conjunction with BAP	water by clearing vegetation					
2012-2013	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Completed
2012-2013	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CSM pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Completed
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Monitor silt levels in ponds, remove silt to original levels on rotation	n/a	1	2 days	Contractor	Completed
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in pond via windpump and sluice	n/a	1-12	1 day	CNR Manager	Completed
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage siltation of ditches and remove vegetation to ensure at least 50% open water	n/a	8-11	5 days	Contractors	Completed

2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage ditch banks to prevent scrub encroachment	n/a	8-11	14 days	CNR Manager Volunteers	Winter cutting of alternate sections of ditch bank
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Grazing	n/a	1-12		CNR Manager	Ongoing Working with Property/Legal team to get CSM grazing under better control
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	n/a	1-12		CNR Manager Volunteers	Complete
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control ragwort in grazed paddocks		4		CNR Manager Volunteers	Ragwort pulling events in Aug 12 on CSM South Breach Paddock; Jul 13 on CNR Lagoon Field. All paddocks cut and baled on CSM, and Island Field, Sea Wall Field and Parsley Field in Aug 12. All paddocks cut and baled Aug 13 on CSM except Pond Meadow and Great Breach Paddock. Island Field, Parsley Field and Sea Wall Field cut and baled on CNR

2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of thistle		3-5		CNR Manager Volunteers	Grazed paddocks cut and baled Aug 12 and Aug 13
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain scrub at current levels		8-11		CNR Manager Volunteers	Complete
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage coppiced willow		8-12		CNR Manager Volunteers	Coppiced 3 trees winter 2012
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage wet meadow for waders and wildfowl		1-12		CNR Manager	Complete
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control of invasive species		1-6		CNR Manager Volunteers Grounds Maintenance	Complete
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in	Habitat creation		1-12		CNR Manager Volunteers Contractors Grounds	Wildflower meadow seeded in April 13 on Long Meadow. Mix: Autumn Hawkbit, Cowslip, Meadow

		conjunction with BAP					Maintenance	Cranesbill, Red Clover, Betony, Goatsbeard, Meadow Vetchling, Tufted vetch, Birdsfoot Trefoil, Greater Burnet, Ox-eye daisy, Yarrow, Black Knapweed, Meadow Buttercup, Selfheal and Yellow rattle
2012-2013		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Beekeeping		1-12		CNR Manager Volunteers	Attended BBKA Spring Convention in April 2012 Delivery of 1 bee hive in April 2012; a 2nd hive in May 2012
Record and monitor flora and fauna								
2012-2013		**P1.2:** Record and monitor flora and fauna	Record and monitor birds		1-12	3 days	CNR Manager Dartford Ringing Group Visitors and volunteers Consultants	Ongoing: bird records collated and distributed from visitor sightings (wildlife log book and emailed sightings)
2012-2013		**P1.2:** Record and monitor flora and fauna	Record and monitor mammals		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Barn Owl pellets collected for small mammal analysis. Ongoing monitoring of mink rafts on CNR. Bat walks providing a snapshot of bat presence.
2012-2013		**P1.2:** Record and monitor flora and fauna	Record and monitor butterflies and dragonflies		1-12	1 day	CNR Manager Visitors and volunteers Students	Incidental sightings captured and recorded, no robust monitoring in place

							Consultants	
2012-2013		**P1.2:** Record and monitor flora and fauna	Record and monitor terrestrial and aquatic invertebrates		1-12	1 day	Consultants	Ongoing Aquatic invertebrate event scheduled took place August 2012.
2012-2013		**P1.2:** Record and monitor flora and fauna	Record and monitor flora		1-12	1 day	Consultants	Botanical surveys carried out by Dave Miller in spring/summer 2012
2012-2013		**P1.2:** Record and monitor flora and fauna	Record and monitor amphibians and reptiles		1-12	3 days	CNR Manager Volunteers	Limited torch survey carried out in April 2012
Maintain tools and equipment								
2012-2013		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain tools and equipment	n/a	1-12	1 day	CNR Manager	Complete
2012-2013		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Procure new tools and equipment as and when required	n/a	1-12	3 days	CNR Manager	Complete
2012-2013		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Vehicle checks	n/a	1-12	1 day	CNR Manager	Complete
2012-2013		**P1.4:** Maintain tools & equip in accordance with	Monitor water levels and record water abstraction	n/a	1-12	Daily meter readings	CNR Manager	ABB Magnetic Flow meters installed May 2012 to monitor abstraction

		H&S guidelines						
2012-2013		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain and service windpump	n/a			Contractors	First windpump major repairs and maintenance (all bearings etc replaced) – Jan 12
Provide voluntary opportunities								
2012-2013		**2.4:** Provide voluntary opportunities for all communities	Create and update database for volunteers	n/a	1-12	1 day	CNR Manager	Complete
2012-2013		**2.4:** Provide voluntary opportunities for all communities	Run a programme of community volunteering days	n/a	1-12	6 days	CNR Manager	2 volunteer work parties per week, plus 4 wider volunteer events
Provide site signage and interpretation								
2012-2013		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide interpretation boards at entrances and features	n/a	1-12	4 days	CNR Manager	Interp boards installed across CSM (3) and CNR (2)
2012-2013		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide temporary interpretation on species and habitat works throughout the year.	n/a	1-12	12 days	CNR Manager	Behind

Provide programme of events and activities								
2012-2013		**P3.2:** Provide programme of events and activities	All site events and walks promoted in the newsletter and on website	n/a	1-12	12 days	CNR Manager Andy Freeman / Jamie Elborn	8 volunteer days per month for regular volunteer group plus public volunteer days/company team builds
2012-2013		**P3.2:** Provide programme of events and activities	All events added to the TW website and other partner or local "what's on" websites.		1-12	6 days	CNR Manager Andy Freeman / Jamie Elborn	Quarterly newsletter detailing events uploaded to website
Promote through media								
2012-2013		**P3.3:** Promote the reserve through a range of media applications	Ensure internal and external press coverage		1-12	6 days	CNR Manager Press Office	Ongoing Mink coverage in Bexley and Bromley Times, Bexley Newshopper etc in May 2012. Beekeeping initiative covered on intranet and company-wide newsletter May 12
Education								
2012-2013		**P3.4:** Deliver a programme of environmental education	Devise and market educational programme		1-12	5 days	CNR Manager	Taking part in STEM career networking event at Bexleyheath Academy – 17 April 2012 2 education visits booked for Our Lady of Rosary School – 22 May 2012 2 education visits booked for St Paulinus School – 29 May 2012 2 education visits booked for St Joseph's School – 30 May 2012

								Presentations to 7 classes at Belmont Primary School
Maintenance of infrastructure								
2012-2013		**P4.2** Maintain site furniture in accordance with H & S standards	Carry out site safety checks and undertake any action required		1-12	26 days	CNR Manager	Complete
2012-2013		**P4.2:** Ensure regular site patrols and enforcement of bylaws	Increase site presence		1-12	52 days	CNR Manager	At least one site patrol per week
2012-2013		**P4.3:** Ensure site access improvements comply with DDA regulations	Ensure any new installations are DDA compliant		1-2	1 day	CNR Manager Contractors	Complete
2012-2013		**P4.3:** Ensure site access improvements comply with DDA regulations	Install composting toilets for use by school groups and other visitors	2	1-3	8 days	CNR Manager Contractors	Complete – Jan 12
2012-2013		**P5.1** Develop funding and income opportunities for the site	Improve links with funding bodies and partners		1-12		CNR Manager	Applied for All London Green Grid funding for CNR and CSM improvements. Internal Capex bid successfully submitted for capital improvements

3.5 Work plan 2013/14

Target year	Location / description	Prescription number	Project	Area/ length/ no:	Month	Resource (budget, staffing)	Who	Progress Green = completed/on target Amber = Slippage Red = Behind
2013-2014	CNR & CSM	N/A	Management plan six month review	n/a	10	2.5 days per week	CNR Manager	On target
2013-2014	CNR & CSM	N/A	Management plan annual review	n/a	3	2.5 days per week	CNR Management Committee	On target
Manage and improve habitats								
2013-2014		**P1.1** Manage and improve habitats for flora and fauna. In conjunction with BAP	Reedbed management	n/a	8-11	12 days	CNR Manager Volunteers	On target Mechanical Typha removal took place with Truxor amphibious vehicle Nov 13 72000 reed plugs delivered and stored on CSM wader scrape Aug 13 Spraying of Typha regrowth Feb 14 Planting of Phragmites expected spring 14
2013-2014	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with	Keep the CNR wader scrape as 80% open water by clearing vegetation	n/a	8-11	4 days	CNR Manager & volunteer	On target Reed cut and raked in Dec 13 when windpump wasn't sufficiently working. Began working again in Dec, and

		BAP						scrape now flooded
2013-2014	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	On target
2013-2014	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CSM pond (Pond Meadow) as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Not achieving this currently due to Phragmites growth. Intend to remove fencing so grazing can control growth, and fence small units of bankside vegetation
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Monitor silt levels in ponds, remove silt to original levels on rotation	n/a	1	2 days	Contractor	On target
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in pond via windpump and sluice	n/a	1-12	1 day	CNR Manager	Ongoing
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage siltation of ditches and remove vegetation to ensure at least 50% open water	n/a	8-11	5 days	Contractors	On target
2013-2014		**P1.1** Manage and improve habitats for flora	Manage ditch banks to prevent scrub encroachment	n/a	8-11	14 days	CNR Manager Volunteers	Cut alternate sections of bankside vegetation on Parsley Field east bank;

		and fauna in conjunction with BAP						Fords Dyke south bank; West Paddock west bank Dec 13 Sapling/willow removal from ditch banks Jan 14
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Grazing	n/a	1-12		CNR Manager	Ongoing Working with Property/Legal team to get CSM grazing under better control
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	n/a	1-12		CNR Manager Volunteers	On target
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control ragwort in grazed paddocks		4		CNR Manager Volunteers	All paddocks cut and baled on CSM Aug 13 except Great Breach Paddock (access) and Pond Meadow (good growth and lack of ragwort)
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of thistle		3-5		CNR Manager Volunteers	Grazed fields cut and baled
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with	Maintain scrub at current levels		8-11		CNR Manager Volunteers	On target

		BAP						
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage coppiced willow		8-12		CNR Manager Volunteers	On target
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage wet meadow for waders and wildfowl		1-12		CNR Manager	Ongoing
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control of invasive species		1-6		CNR Manager Volunteers Grounds Maintenance	Japanese Knotweed on Southern Marsh north boundary requiring treatment
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Habitat creation		1-12		CNR Manager Volunteers Contractors Grounds Maintenance	Small wetland area created on CSM Main Paddock (north-east corner) (size??) Nov 13
2013-2014		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Beekeeping		1-12		CNR Manager Volunteers	Bee hives removed Nov 13 following severe allergic reactions
Record and monitor flora and fauna								
2013-		**P1.2:** Record and monitor	Record and monitor		1-12	3 days	CNR Manager	Ongoing: bird records collated and distributed from

2014		flora and fauna	birds				Dartford Ringing Group Visitors and volunteers Consultants	visitor sightings (wildlife log book and electronic submissions)
2013-2014		**P1.2:** Record and monitor flora and fauna	Record and monitor mammals		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Barn Owl pellets collected for small mammal analysis. MSc student carried out analysis of 2011 pellets in 2013 to form dissertation. Ongoing monitoring of mink rafts on CNR. Bat walks in Aug 13
2013-2014		**P1.2:** Record and monitor flora and fauna	Record and monitor butterflies and dragonflies		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Ongoing
2013-2014		**P1.2:** Record and monitor flora and fauna	Record and monitor bumblebees		1-12	1 day	Volunteers	A voluntary recorder is undertaking bumblebee transect surveys (May-Sept 13). Recorded the very rare Shrill Carder Bee and Brown-banded Carder Bee. A community bumblebee walk and talk event led by Bumblebee Conservation Trust confirmed Shrill Carder Bees on FP2 Attended BBCT bumblebee conservation conference Nov 13

2013-2014		**P1.2:** Record and monitor flora and fauna	Record and monitor terrestrial and aquatic invertebrates		1-12	1 day	Consultants	LNHS entomological day Jul 13 recorded 141 species, of which 14 notable and 2 RDK
2013-2014		**P1.2:** Record and monitor flora and fauna	Record and monitor flora		1-12	1 day	Consultants	LNHS botanical day Jul 13 recorded 40 species of flora
2013-2014		**P1.2:** Record and monitor flora and fauna	Record and monitor amphibians and reptiles		1-12	3 days	CNR Manager Volunteers	Torch surveys to be carried out in April 2014
Site infrastructure enhancements								
2013-2014	Protected area	**P4.2:**	Create new bird hide		12-1		Contractors	Scheduled for completion Jan 14
2013-2014	Protected area	**P4.2:**	Replace boardwalk		12-1		Contractors	Complete May 13
2013-2014	CSM Saline Field	**P4.2:**	New pond and boardwalk/dipping platform		12-1		Contractors	Complete Aug 13
2013-2014	CSM	**P4.2:**	Resurface CSM path		12-1		Contractors	Ongoing. Scheduled for completion Feb 14
2013-2014	Protected area	**P4.2:**	Extend pond		12-1		Contractors	Scheduled for completion Feb 14
2013-2014	CNR Triangle	**P4.2:**	Extend pond and create dipping platform		12-1		Contractors	Scheduled for completion Feb 14
Maintain tools and equipment								
2013-2014		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain tools and equipment	n/a	1-12	1 day	CNR Manager	Ongoing

2013-2014		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Procure new tools and equipment as and when required	n/a	1-12	3 days	CNR Manager	Ongoing
2013-2014		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Vehicle checks	n/a	1-12	1 day	CNR Manager	Ongoing
2013-2014		**P1.4:** Maintain tools & equip in accordance with H&S guidelines	Monitor water levels and record water abstraction	n/a	1-12	Daily meter readings	CNR Manager	Ongoing
2013-2014		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain and service windpump	n/a			Contractors	Ongoing
Provide voluntary opportunities								
2013-2014		**2.4:** Provide voluntary opportunities for all communities	Create and update database for volunteers	n/a	1-12	1 day	CNR Manager	Ongoing
2013-2014		**2.4:** Provide voluntary opportunities for all communities	Run a programme of community volunteering days	n/a	1-12	6 days	CNR Manager	2 regular volunteer days per week, plus wider volunteer events: Ragwort pulling on CNR Lagoon Field Aug 13 Reedbed clearance on CSM

								Wetland (south-west section) Dec 13 Reed clearance on CNR wader scrape Dec 13
Provide site signage and interpretation								
2013-2014		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide interpretation boards at entrances and features	n/a	1-12	4 days	CNR Manager	Complete
2013-2014		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide temporary interpretation on species and habitat works throughout the year.	n/a	1-12	12 days	CNR Manager	Behind
Provide programme of events and activities								
2013-2014		**P3.2:** Provide programme of events and activities	All site events and walks promoted in the newsletter and on website	n/a	1-12	12 days	CNR Manager Andy Freeman / Jamie Elborn	Events: Ecology and Entomology day Jul 13 Bumblebee walk and talk Jul 13 Youth bat walk Aug 13 Indoor presentation: Water and Wetlands in Waders Nov 13 Presentation to Eltham Nature Club Nov 13

								Winter bird walk Jan 14 Bird hide opening event for stakeholders 28th March 14
2013-2014		**P3.2:** Provide programme of events and activities	All events added to the TW website and other partner or local "what's on" websites.		1-12	6 days	CNR Manager Andy Freeman / Jamie Elborn	Quarterly newsletters detailing events uploaded to website
Promote through media								
2013-2014		**P3.3:** Promote the reserve through a range of media applications	Ensure internal and external press coverage		1-12	6 days	CNR Manager Press Office	Ongoing Bat walks covered in News Shopper, Bexley Times etc Press coverage of new bird hide expected Spring 14
Education								
2013-2014		**P3.4:** Deliver a programme of environmental education	Devise and market educational programme		1-12	5 days	CNR Manager	School visits did not take place in 2013 due to capital works taking place, but visited schools instead
Maintenance of infrastructure								
2013-2014		**P4.2** Maintain site furniture in accordance with H & S standards	Carry out site safety checks and undertake any action required		1-12	26 days	CNR Manager	Ongoing
2013-2014		**P4.2:** Ensure regular site patrols and enforcement of bylaws	Increase site presence		1-12	52 days	CNR Manager	At least one site patrol per week
2013-2014		**P4.3:** Ensure site access improvements comply with	Ensure any new installations are DDA compliant		1-2	1 day	CNR Manager Contractors	Ongoing

		DDA regulations						
2012-2013		**P5.1** Develop funding and income opportunities for the site	Improve links with funding bodies and partners		1-12		CNR Manager	Involved with Big Green Fund Lesnes to Crossness Link project

3.6 Work plan 2014/15

Target year	Location / description	Prescription number	Project	Area/ length/ no:	Month	Resource (budget, staffing)	Who	Progress Green = completed/on target Amber = Slippage Red = Behind
2014-2015	CNR & CSM	N/A	Management plan six month review	n/a	10	2.5 days per week	CNR Manager	
2014-2015	CNR & CSM	N/A	Management plan annual review	n/a	3	2.5 days per week	CNR Management Committee	
Manage and improve habitats								
2014-2015		**P1.1** Manage and improve habitats for flora and fauna. In conjunction with BAP	Reedbed management	n/a	8-11	12 days	CNR Manager Volunteers	Winter reedcutting Typha pulling Typha removal in Island Field reedbed in 2013 and 2014 72000 Phragmites plugs planted 15th Sept 2014 by Ebsford Environmental Further Typha removal with Truxor 18th Sept 2014
2014-2015	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with	Keep the CNR wader scrape as 80% open water by clearing vegetation	n/a	8-11	4 days	CNR Manager & volunteer	Cut vegetation in spring and again in winter 14 Put 2 horses to graze scrape area 12th Sept 14

		BAP						
2014-2015	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Pond desilted and expanded in winter 2013/14. Triangle pond also desilted and expanded with a new dipping platform created.
2014-2015	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CSM pond (Pond Meadow) as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Cut marginal vegetation and drag rake emergent vegetation 22nd Sept 2014
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Monitor silt levels in ponds, remove silt to original levels on rotation	n/a	1	2 days	Contractor	Ongoing
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in pond via windpump and sluice	n/a	1-12	1 day	CNR Manager	Data downloaded from magflow meters. Gauge board installed on Great Breach Dyke bridge, upstream of abstraction point in July 2014
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage siltation of ditches and remove vegetation to ensure at least 50% open water	n/a	8-11	5 days	Contractors	Winter 2014

2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage ditch banks to prevent scrub encroachment	n/a	8-11	14 days	CNR Manager Volunteers	Cut alternate sections of bankside vegetation winter 2014 Cut east bank of Great Breach Dyke Lagoon 24th Sept 2014
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Grazing	n/a	1-12		CNR Manager	Ongoing
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	n/a	1-12		CNR Manager Volunteers	Ongoing Cutting and clearing on CSM and CNR 15th July 2014
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control ragwort in grazed paddocks		4		CNR Manager Volunteers	Cut and bale vegetation after 15th July 14. Ragwort pulling event for Trade Effluent team as part of Time to Give scheme 22nd July 2014 in Parsley Field
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of thistle		3-5		CNR Manager Volunteers	Grazed fields cut and baled July 2014
2014-2015		**P1.1** Manage and improve habitats for flora	Maintain scrub at current levels		8-11		CNR Manager Volunteers	Ongoing Cutting back bramble in

		and fauna in conjunction with BAP						Protected Area and West Paddock 29th and 31st Oct 2014 Removing bramble from Great Breach Dyke West as community event 14th Jan 2015 Willow removal from Wader Scrape as community event 23rd Jan 2015
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage coppiced willow		8-12		CNR Manager Volunteers	Ongoing
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage wet meadow for waders and wildfowl		1-12		CNR Manager	Ongoing
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control of invasive species		1-6		CNR Manager Volunteers Grounds Maintenance	Japanese Knotweed stand being treated by Sodexo in 2014 and 2015 (1 x stem injection, 2 x foliage sprays, 1 x cut down canes)
2014-2015		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Habitat creation		1-12		CNR Manager Volunteers Contractors Grounds Maintenance	New pond created in CSM Saline Field. New wetland area created in CSM Main Paddock. CNR Triangle pond doubled in size

Record and monitor flora and fauna								
2014-2015		**P1.2:** Record and monitor flora and fauna	Record and monitor birds		1-12	3 days	CNR Manager Dartford Ringing Group Visitors and volunteers Consultants	Ongoing: bird records collated and distributed from visitor sightings (wildlife log book and electronic submissions)
2014-2015		**P1.2:** Record and monitor flora and fauna	Record and monitor mammals		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Barn Owl pellets collected for small mammal analysis. 4 pellets collected from Norman Road Field box and analysed by Amy ?? Ongoing monitoring of mink rafts on CNR. Bat walks planned
2014-2015		**P1.2:** Record and monitor flora and fauna	Record and monitor butterflies and dragonflies		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Set up transect surveys
2014-2015		**P1.2:** Record and monitor flora and fauna	Record and monitor bumblebees		1-12	1 day	Volunteers	Volunteer transect surveys taking place in 2014 following success of surveys in 2013
2014-2015		**P1.2:** Record and monitor flora and fauna	Record and monitor terrestrial and aquatic invertebrates		1-12	1 day	Consultants	The scarce Great Silver Water Beetle (largest UK aquatic beetle) found in Protected Area in Aug 2014
2014-2015		**P1.2:** Record and monitor flora and fauna	Record and monitor flora		1-12	1 day	Consultants	Botanist visit took place 11th Sept 2014

2014-2015		**P1.2:** Record and monitor flora and fauna	Record and monitor amphibians and reptiles		1-12	3 days	CNR Manager Volunteers	Torch surveys to be carried out in March 14/April 2015. One newt seen off CNR boardwalk. One newt (not fully metamorphosed) in CSM Saline Pond
Site infrastructure enhancements								
2014-2015	Protected area	**P4.2:**	Replace damaged sand martin bank		12-1		Contractors	SEBA 2014/15
Maintain tools and equipment								
2014-2015		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain tools and equipment	n/a	1-12	1 day	CNR Manager	Ongoing
2014-2015		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Procure new tools and equipment as and when required	n/a	1-12	3 days	CNR Manager	Ongoing - many tools lost in Portacabin fire in June 2014 and in need of replacement
2014-2015		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Vehicle checks	n/a	1-12	1 day	CNR Manager	Ongoing
2014-2015		**P1.4:** Maintain tools & equip in accordance with H&S guidelines	Monitor water levels and record water abstraction	n/a	1-12	Daily meter readings	CNR Manager	Ongoing via magflow meters
2014-		**P1.4:** Maintain	Maintain and service	n/a			Contractors	Windpumps serviced June

2015		tools and equipment in accordance with H and S guidelines	windpump					2014, with first pump being repaired (replacement seals and cylinder)
Provide voluntary opportunities								
2014-2015		**2.4:** Provide voluntary opportunities for all communities	Create and update database for volunteers	n/a	1-12	1 day	CNR Manager	Ongoing
2014-2015		**2.4:** Provide voluntary opportunities for all communities	Run a programme of community volunteering days	n/a	1-12	6 days	CNR Manager	Summer programme complete. Winter programme in progress
Provide site signage and interpretation								
2014-2015		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide interpretation boards at entrances and features	n/a	1-12	4 days	CNR Manager	Maintain interp boards
Provide programme of events and activities								
2014-2015		**P3.2:** Provide programme of events and activities	All site events and walks promoted in the newsletter and on website	n/a	1-12	12 days	CNR Manager Andy Freeman / Jamie Elborn	Events programme planned, and published in newsletter, and on Bexley Wildlife website
2014-2015		**P3.2:** Provide programme of events and	All events added to the TW website and other partner or local		1-12	6 days	CNR Manager Andy	Quarterly newsletters detailing events uploaded to

		activities	"what's on" websites.				Freeman / Jamie Elborn	website
Promote through media								
2014-2015		**P3.3:** Promote the reserve through a range of media applications	Ensure internal and external press coverage		1-12	6 days	CNR Manager Press Office	Internal and external coverage of bird hide open event (May 2014) Internal and external coverage of rare Great Silver Water Beetle (Sept 14)
Education								
2014-2015		**P3.4:** Deliver a programme of environmental education	Devise and market educational programme		1-12	5 days	CNR Manager	Ongoing Abbey Wood nursery visit (pond dipping) 8th July 2014 Abbey Wood nursery visit (pond dipping) 15th July 2014 Smiley Ark summer club visit (pond dipping, mini-beasting, butterfly hunts, bird watching) 12th Aug 14 Brownies, girl guides and rainbows visit to CNR 11th Oct 2014

								Smiley Ark summer club visit (pond dipping, mini-beasting, butterfly hunts, bird watching) 28th Oct 14
Maintenance of infrastructure								
2014-2015		**P4.2** Maintain site furniture in accordance with H & S standards	Carry out site safety checks and undertake any action required		1-12	26 days	CNR Manager	Ongoing Palisade frontage to Protected Area being replaced with 3m high weldmesh 3rd Nov 14
2014-2015		**P4.2:** Ensure regular site patrols and enforcement of bylaws	Increase site presence		1-12	52 days	CNR Manager	At least one site patrol per week CCTV being investigated following arson (June), bird hide window breakage (14th Oct)
2014-2015		**P4.3:** Ensure site access improvements comply with DDA regulations	Ensure any new installations are DDA compliant		1-2	1 day	CNR Manager Contractors	Ongoing
2014-2015		**P5.1** Develop funding and income opportunities for the site	Improve links with funding bodies and partners		1-12		CNR Manager	Working in partnership with Thamesmead and Marsh Dykes Catchment Improvement Group

3.7 Work plan 2015/16

Target year	Location / description	Prescription number	Project	Area/ length/ no:	Month	Resource (budget, staffing)	Who	Progress Green = completed/on target Amber = Slippage Red = Behind
2015-2016	CNR & CSM	N/A	Management plan six month review	n/a	10	2.5 days per week	CNR Manager	
2015-2016	CNR & CSM	N/A	Management plan annual review	n/a	3	2.5 days per week	CNR Management Committee	
Manage and improve habitats								
2015-2016		**P1.1** Manage and improve habitats for flora and fauna. In conjunction with BAP	Reedbed management	n/a	8-11	12 days	CNR Manager Volunteers	
2015-2016	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR wader scrape as 80% open water by clearing vegetation	n/a	8-11	4 days	CNR Manager & volunteer	Cut vegetation in spring and again in winter 14 Put 2 horses to graze scrape area 12th Sept 14
2015-2016	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Pond desilted and expanded in winter 2013/14. Triangle pond also desilted and expanded with a new dipping platform created.
2015-	Protected	**P1.1** Manage	Keep the CSM pond	n/a	8-11	1 day	CNR Manager	Cut marginal vegetation and

2016	area	and improve habitats for flora and fauna in conjunction with BAP	(Pond Meadow) as 80% open water by clearing vegetation				& volunteers	drag rake emergent vegetation Sept 2015
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Monitor silt levels in ponds, remove silt to original levels on rotation	n/a	1	2 days	Contractor	Ongoing
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in pond via windpump and sluice	n/a	1-12	1 day	CNR Manager	Data downloaded from magflow meter and meter calibrated by Z-Tech March 2015
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage siltation of ditches and remove vegetation to ensure at least 50% open water	n/a	8-11	5 days	Contractors	
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage ditch banks to prevent scrub encroachment	n/a	8-11	14 days	CNR Manager Volunteers	Cut alternate sections of bankside vegetation winter 2015
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with	Grazing	n/a	1-12		CNR Manager	Ongoing

		BAP						
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	n/a	1-12		CNR Manager Volunteers	Ongoing – cutting ungrazed areas with regular twice-weekly volunteers Cutting and clearing of CSM and CNR grassland late July/early August 2015
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control ragwort in grazed paddocks		4		CNR Manager Volunteers	Cut and bale vegetation after 15th July 15. Ragwort pulling event with CNR volunteer 22nd July
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of thistle		3-5		CNR Manager Volunteers	Grazed fields cut and baled July 2015. Southern end of Protected Area cut and removed by CNR manager and volunteers
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain scrub at current levels		8-11		CNR Manager Volunteers	Ongoing Cutting back bramble in Protected Area and West Paddock Oct 2015 Removed tree saplings from CSM raised path (adjacent Saline Meadow) as a volunteer workday – winter 2015 Cut back bramble along Belvedere Rd path ditch – winter 2015
2015-		**P1.1** Manage	Manage coppiced		8-12		CNR Manager	Ongoing over winter with

2016		and improve habitats for flora and fauna in conjunction with BAP	willow				Volunteers	volunteers
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage wet meadow for waders and wildfowl		1-12		CNR Manager	Ongoing
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control of invasive species		1-6		CNR Manager Volunteers Grounds Maintenance	Monitored
2015-2016		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Habitat creation		1-12		CNR Manager Volunteers Contractors Grounds Maintenance	
Record and monitor flora and fauna								
2015-2016		**P1.2:** Record and monitor flora and fauna	Record and monitor birds		1-12	3 days	CNR Manager Dartford Ringing Group Visitors and volunteers Consultants	Ongoing: bird records collated and distributed from visitor sightings (wildlife log book and electronic submissions)
2015-2016		**P1.2:** Record and monitor flora and fauna	Record and monitor mammals		1-12	1 day	CNR Manager Visitors and volunteers	Barn Owl pellets collected for small mammal analysis.

							Students Consultants	
2015-2016		**P1.2:** Record and monitor flora and fauna	Record and monitor butterflies and dragonflies		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Transect surveys set-up and monitored by volunteer Mike Robinson. Data included in quarterly wildlife records and distributed to various data centres and relevant stakeholders
2015-2016		**P1.2:** Record and monitor flora and fauna	Record and monitor bumblebees		1-12	1 day	Volunteers	Volunteer transect surveys continuing in 2014 by Martin Petchey
2015-2016		**P1.2:** Record and monitor flora and fauna	Record and monitor terrestrial and aquatic invertebrates		1-12	1 day	Consultants	
2015-2016		**P1.2:** Record and monitor flora and fauna	Record and monitor flora		1-12	1 day	Consultants	
2015-2016		**P1.2:** Record and monitor flora and fauna	Record and monitor amphibians and reptiles		1-12	3 days	CNR Manager Volunteers	Smooth newts frequently recorded under logs in mini-beast area
Site infrastructure enhancements								
2015-2016	Protected area	**P4.2:**	Create Kingfisher bank on Great Breach Lagoon Field		12-1		Contractors	SEBA 2015/16
Maintain tools and equipment								
2015-2016		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain tools and equipment	n/a	1-12	1 day	CNR Manager	Ongoing

2015-2016		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Procure new tools and equipment as and when required	n/a	1-12	3 days	CNR Manager	Ongoing
2015-2016		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Vehicle checks	n/a	1-12	1 day	CNR Manager	Ongoing
2015-2016		**P1.4:** Maintain tools & equip in accordance with H&S guidelines	Monitor water levels and record water abstraction	n/a	1-12	Daily meter readings	CNR Manager	Ongoing via magflow meters
2015-2016		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain and service windpump	n/a			Contractors	Windpumps serviced – heads greased
Provide voluntary opportunities								
2015-2016		**2.4:** Provide voluntary opportunities for all communities	Create and update database for volunteers	n/a	1-12	1 day	CNR Manager	Ongoing
2015-2016		**2.4:** Provide voluntary opportunities for all communities	Run a programme of community volunteering days	n/a	1-12	6 days	CNR Manager	Complete
Provide site signage and interpretation								
2015-		**3.1:** Provide	Provide interpretation	n/a	1-12	4 days	CNR Manager	Maintain interp boards

2016		signage and interpretation of the sites' wildlife, landscape and historical features	boards at entrances and features					
Provide programme of events and activities								
2015-2016		**P3.2:** Provide programme of events and activities	All site events and walks promoted in the newsletter and on website	n/a	1-12	12 days	CNR Manager Andy Freeman / Jamie Elborn	Events programme planned, and published in newsletter, and on Bexley Wildlife website/Facebook page
2015-2016		**P3.2:** Provide programme of events and activities	All events added to the TW website and other partner or local "what's on" websites.		1-12	6 days	CNR Manager Andy Freeman / Jamie Elborn	CNR newsletters detailing events uploaded to website
Promote through media								
2015-2016		**P3.3:** Promote the reserve through a range of media applications	Ensure internal and external press coverage		1-12	6 days	CNR Manager Press Office	
Education								
2015-2016		**P3.4:** Deliver a programme of environmental education	Devise and market educational programme		1-12	5 days	CNR Manager	Ongoing Smiley Ark summer club visit (pond dipping, mini-beasting, butterfly hunts, bird watching) April 2015

								Smiley Ark summer club visit (pond dipping, mini-beasting, butterfly hunts, bird watching) August 2015
Maintenance of infrastructure								
2015-2016		**P4.2** Maintain site furniture in accordance with H & S standards	Carry out site safety checks and undertake any action required		1-12	26 days	CNR Manager	Ongoing
2015-2016		**P4.2:** Ensure regular site patrols and enforcement of bylaws	Increase site presence		1-12	52 days	CNR Manager	At least one site patrol per week CCTV being investigated but no electrical connection currently
2015-2016		**P4.3:** Ensure site access improvements comply with DDA regulations	Ensure any new installations are DDA compliant		1-2	1 day	CNR Manager Contractors	Ongoing
2015-2016		**P5.1** Develop funding and income opportunities for the site	Improve links with funding bodies and partners		1-12		CNR Manager	Working in partnership with Thamesmead and Marsh Dykes Catchment Improvement Group

3.8 Work plan 2016/17

Target year	Location / description	Prescription number	Project	Area/ length/ no:	Month	Resource (budget, staffing)	Who	Progress Green = completed/on target Amber = Slippage Red = Behind
2016-2017	CNR & CSM	N/A	Management plan six month review	n/a	10	2.5 days per week	CNR Manager	
2016-2017	CNR & CSM	N/A	Management plan annual review	n/a	3	2.5 days per week	CNR Management Committee	
Manage and improve habitats								
2016-2017		**P1.1** Manage and improve habitats for flora and fauna. In conjunction with BAP	Reedbed management	n/a	8-11	12 days	CNR Manager Volunteers	
2016-2017	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR wader scrape as 80% open water by clearing vegetation	n/a	8-11	4 days	CNR Manager & volunteer	Cut vegetation in spring and again in winter 16
2016-2017	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	
2016-	Protected	**P1.1** Manage	Keep the CSM pond	n/a	8-11	1 day	CNR Manager	Cut marginal vegetation

2017	area	and improve habitats for flora and fauna in conjunction with BAP	(Pond Meadow) as 80% open water by clearing vegetation				& volunteers	winter 2016
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Monitor silt levels in ponds, remove silt to original levels on rotation	n/a	1	2 days	Contractor	Ongoing
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in pond via windpump and sluice	n/a	1-12	1 day	CNR Manager	Data downloaded from magflow meter and meter calibrated by Z-Tech March 2017
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage siltation of ditches and remove vegetation to ensure at least 50% open water	n/a	8-11	5 days	Contractors	
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage ditch banks to prevent scrub encroachment	n/a	8-11	14 days	CNR Manager Volunteers	Cut alternate sections of bankside vegetation winter 2016
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with	Grazing	n/a	1-12		CNR Manager	Ongoing

		BAP						
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	n/a	1-12		CNR Manager Volunteers	Ongoing – cutting ungrazed areas with regular twice-weekly volunteers Cutting and clearing of CSM and CNR grassland late July/early August 2016
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control ragwort in grazed paddocks		4		CNR Manager Volunteers	Cut and bale vegetation after 15th July 16. Ragwort pulling event in Lagoon Field
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of thistle		3-5		CNR Manager Volunteers	Grazed fields cut and baled August 2016. Southern end of Protected Area cut and removed by CNR manager and volunteers
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain scrub at current levels		8-11		CNR Manager Volunteers	Ongoing Cutting back bramble in Protected Area and West Paddock winter 2016/17
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage coppiced willow		8-12		CNR Manager Volunteers	Coppiced bird hide Willows winter 2016/17
2016-		**P1.1** Manage	Manage wet meadow		1-12		CNR Manager	Ongoing

2017		and improve habitats for flora and fauna in conjunction with BAP	for waders and wildfowl					
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control of invasive species		1-6		CNR Manager Volunteers Grounds Maintenance	Monitored Japanese Knotweed present on northern boundary of Crossness Southern Marsh, but on Highways land. Reported to LB Bexley who claim to have an eradication programme in place
2016-2017		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Habitat creation		1-12		CNR Manager Volunteers Contractors Grounds Maintenance	
Record and monitor flora and fauna								
2016-2017		**P1.2:** Record and monitor flora and fauna	Record and monitor birds		1-12	3 days	CNR Manager Dartford Ringing Group Visitors and volunteers Consultants	Ongoing: bird records collated and distributed from visitor sightings (wildlife log book and electronic submissions)
2016-2017		**P1.2:** Record and monitor flora and fauna	Record and monitor mammals		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Barn Owl pellets collected for small mammal analysis.
2016-		**P1.2:** Record and monitor	Record and monitor butterflies and		1-12	1 day	CNR Manager	Butterfly transect surveys monitored by Mike

2017		flora and fauna	dragonflies				Visitors and volunteers Students Consultants	Robinson. Data included in quarterly wildlife records and distributed to various data centres and relevant stakeholders
2016-2017		**P1.2:** Record and monitor flora and fauna	Record and monitor bumblebees		1-12	1 day	Volunteers	Martin Petchey seized to monitor due to health issues. Adhoc records submitted
2016-2017		**P1.2:** Record and monitor flora and fauna	Record and monitor terrestrial and aquatic invertebrates		1-12	1 day	Consultants	
2016-2017		**P1.2:** Record and monitor flora and fauna	Record and monitor flora		1-12	1 day	Consultants	
2016-2017		**P1.2:** Record and monitor flora and fauna	Record and monitor amphibians and reptiles		1-12	3 days	CNR Manager Volunteers	Smooth newts frequently recorded under logs in mini-beast area
Site infrastructure enhancements								
2016-2017	Protected area	**P4.2:**	Replace CSM boundary fencing along Southmere section		12-1		Contractors	SEBA 2016/17
Maintain tools and equipment								
2016-2017		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain tools and equipment	n/a	1-12	1 day	CNR Manager	Ongoing
2016-2017		**P1.4:** Maintain tools and	Procure new tools and equipment as and	n/a	1-12	3 days	CNR Manager	Ongoing

		equipment in accordance with H and S guidelines	when required					
2016-2017		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Vehicle checks	n/a	1-12	1 day	CNR Manager	Ongoing
2016-2017		**P1.4:** Maintain tools & equip in accordance with H&S guidelines	Monitor water levels and record water abstraction	n/a	1-12	Daily meter readings	CNR Manager	Ongoing via magflow meters
2016-2017		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain and service windpump	n/a			Contractors	Windpumps serviced – heads greased
Provide voluntary opportunities								
2016-2017		**2.4:** Provide voluntary opportunities for all communities	Create and update database for volunteers	n/a	1-12	1 day	CNR Manager	Ongoing
2016-2017		**2.4:** Provide voluntary opportunities for all communities	Run a programme of community volunteering days	n/a	1-12	6 days	CNR Manager	Complete
Provide site signage and interpretation								
2016-2017		**3.1:** Provide signage and interpretation of	Provide interpretation boards at entrances and features	n/a	1-12	4 days	CNR Manager	Maintain interp boards

		the sites' wildlife, landscape and historical features						
Provide programme of events and activities								
2016-2017		**P3.2:** Provide programme of events and activities	All site events and walks promoted in the newsletter and on website	n/a	1-12	12 days	CNR Manager Andy Freeman / Jamie Elborn	Events programme planned, and published in newsletter, and on Bexley Wildlife website/Facebook page
2016-2017		**P3.2:** Provide programme of events and activities	All events added to the TW website and other partner or local "what's on" websites.		1-12	6 days	CNR Manager Andy Freeman / Jamie Elborn	CNR newsletters detailing events uploaded to website
Promote through media								
2016-2017		**P3.3:** Promote the reserve through a range of media applications	Ensure internal and external press coverage		1-12	6 days	CNR Manager Press Office	
Education								
2016-2017		**P3.4:** Deliver a programme of environmental education	Devise and market educational programme		1-12	5 days	CNR Manager	Ongoing Smiley Ark summer club visit (pond dipping, mini-beasting, butterfly hunts, bird watching) April 2016 Smiley Ark summer club visit (pond dipping, mini-

								beasting, butterfly hunts, bird watching) August 2016 Kids go Wild! events run during Summer Holidays – one midweek event and one at the weekend
Maintenance of infrastructure								
2016-2017		**P4.2** Maintain site furniture in accordance with H & S standards	Carry out site safety checks and undertake any action required		1-12	26 days	CNR Manager	Ongoing
2016-2017		**P4.2:** Ensure regular site patrols and enforcement of bylaws	Increase site presence		1-12	52 days	CNR Manager	At least one site patrol per week
2016-2017		**P4.3:** Ensure site access improvements comply with DDA regulations	Ensure any new installations are DDA compliant		1-2	1 day	CNR Manager Contractors	Ongoing
2016-2017		**P5.1** Develop funding and income opportunities for the site	Improve links with funding bodies and partners		1-12		CNR Manager	Working in partnership with Thamesmead and Marsh Dykes Catchment Improvement Group. Sitting on the Ridgeway Working Group

3.9 Work plan 2017/18

Target year	Location / description	Prescription number	Project	Area/ length/ no:	Month	Resource (budget, staffing)	Who	Progress Green = completed/on target Amber = Slippage Red = Behind
2017-2018	CNR & CSM	N/A	Management plan six month review	n/a	10	2.5 days per week	CNR Manager	
2017-2018	CNR & CSM	N/A	Management plan annual review	n/a	3	2.5 days per week	CNR Management Committee	
Manage and improve habitats								
2017-2018		**P1.1** Manage and improve habitats for flora and fauna. In conjunction with BAP	Reedbed management	n/a	8-11	12 days	CNR Manager Volunteers	Following a large pollution incident in Dec 2017 (20m litres of activated sludge), a clean-up operation took place Jan 2017-Aug 2018. This resulted in Rainbow having to cut the whole reedbed in the southern end of the Protected Area in order to rake and bag the sludge). They also bagged all the terrestrial deposits. Water voles were removed (60) and taken into captivity until Spring 2019. A water vole fence was erected around the southern section of the Protected Area until the voles are re-released.

2017-2018	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR wader scrape as 80% open water by clearing vegetation	n/a	8-11	4 days	CNR Manager & volunteer	Cut bankside vegetation as needed, cut and removed marginal vegetation in southern section of wader scrape in early Spring and Autumn 2017
2017-2018	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Cut emergent reeds in winter 2017
2017-2018	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CSM pond (Pond Meadow) as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Not cut
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Monitor silt levels in ponds, remove silt to original levels on rotation	n/a	1	2 days	Contractor	Investigating having some dredging carried out by Ebsford Environmental on Crossness Southern Marsh ditches due to increased water levels
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in pond via windpump and sluice	n/a	1-12	1 day	CNR Manager	Data downloaded from magflow meter and meter calibrated by Z-Tech March 2018
2017-		**P1.1** Manage	Manage siltation of	n/a	8-11	5 days	Contractors	

2018		and improve habitats for flora and fauna in conjunction with BAP	ditches and remove vegetation to ensure at least 50% open water					
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage ditch banks to prevent scrub encroachment	n/a	8-11	14 days	CNR Manager Volunteers	Cut alternate sections of bankside vegetation winter 2017
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Grazing	n/a	1-12		CNR Manager	Looking to remove Southern Marsh graziers due to continued breach of licence with overgrazing (up to 60 horses at times) and the construction of unlawful dog kennels on Little Paddock in January 2018). A long battle involving court hearings resulted in horses being seized from CSM – 13 horses (the graziers had removed the foals) removed in Sept 2018. A further two horses were seized by GRC group (with assistance from Eversheds-Sutherland Solicitors) in Dec 2018 Continued grazing on Crossness Nature Reserve with Jay Anderson (daughter of Bill and Diane Bruce – original graziers)

2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	n/a	1-12		CNR Manager Volunteers	Ongoing – cutting ungrazed areas with regular twice-weekly volunteers Cutting and clearing of CSM and CNR grassland late July/early August 2017 Cut and remove The Triangle Sept 2017
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control ragwort in grazed paddocks		4		CNR Manager Volunteers	Cut and bale vegetation after 15th July 17. Ragwort pulling event in Lagoon Field
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of thistle		3-5		CNR Manager Volunteers	Grazed fields cut and baled August 2017. Southern end of Protected Area cut and removed by CNR manager and volunteers
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain scrub at current levels		8-11		CNR Manager Volunteers	Ongoing
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage coppiced willow		8-12		CNR Manager Volunteers	Ongoing

2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage wet meadow for waders and wildfowl		1-12		CNR Manager	Ongoing
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control of invasive species		1-6		CNR Manager Volunteers Grounds Maintenance	Ongoing
2017-2018		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Habitat creation		1-12		CNR Manager Volunteers Contractors Grounds Maintenance	
Record and monitor flora and fauna								
2017-2018		**P1.2:** Record and monitor flora and fauna	Record and monitor birds		1-12	3 days	CNR Manager Dartford Ringing Group Visitors and volunteers Consultants	Ongoing: bird records collated and distributed from visitor sightings (wildlife log book and electronic submissions)
2017-2018		**P1.2:** Record and monitor flora and fauna	Record and monitor mammals		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Barn Owl pellets collected for small mammal analysis.
2017-2018		**P1.2:** Record and monitor	Record and monitor butterflies and		1-12	1 day	CNR Manager Visitors and	Butterfly transect surveys monitored by Mike Robinson. Data included in

		flora and fauna	dragonflies				volunteers Students Consultants	quarterly wildlife records and distributed to various data centres and relevant stakeholders. Held two butterfly walks for Friends of CNR members. One on the nature reserve and one on the southern marsh
2017-2018		**P1.2:** Record and monitor flora and fauna	Record and monitor bumblebees		1-12	1 day	Volunteers	Adhoc records submitted. No regular monitoring taking place
2017-2018		**P1.2:** Record and monitor flora and fauna	Record and monitor terrestrial and aquatic invertebrates		1-12	1 day	Consultants	Marcel Ashby and Tristan Bantock surveying aquatic invertebrates on behalf of Colin Plant Associates. Twelve monitoring stations on each of CNR and CSM. Autumn 2016 and Spring 2017. Surveys to be repeated in 2018/19 following pollution incident
2017-2018		**P1.2:** Record and monitor flora and fauna	Record and monitor flora		1-12	1 day	Consultants	
2017-2018		**P1.2:** Record and monitor flora and fauna	Record and monitor amphibians and reptiles		1-12	3 days	CNR Manager Volunteers	Reptile translocation from former Linpac site in Erith in 2017. 1244 reptiles comprising 854 Slow Worms and 390 Common Lizards. Delivered via Lloyd Bore Ecological Consultants (John Young) to North

								Scrape Field. Several hibernacula created as well as multiple habitat piles
Site infrastructure enhancements								
2017-2018	Protected area	**P4.2:**	No SEBA projects put forward		12-1		Contractors	
Maintain tools and equipment								
2017-2018		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain tools and equipment	n/a	1-12	1 day	CNR Manager	Ongoing
2017-2018		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Procure new tools and equipment as and when required	n/a	1-12	3 days	CNR Manager	Ongoing
2017-2018		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Vehicle checks	n/a	1-12	1 day	CNR Manager	Ongoing
2017-2018		**P1.4:** Maintain tools & equip in accordance with H&S guidelines	Monitor water levels and record water abstraction	n/a	1-12	Daily meter readings	CNR Manager	Ongoing via magflow meters
2017-2018		**P1.4:** Maintain tools and equipment in accordance with	Maintain and service windpump	n/a			Contractors	Windpumps serviced – heads greased

		H and S guidelines						
Provide voluntary opportunities								
2017-2018		**2.4:** Provide voluntary opportunities for all communities	Create and update database for volunteers	n/a	1-12	1 day	CNR Manager	Ongoing
2017-2018		**2.4:** Provide voluntary opportunities for all communities	Run a programme of community volunteering days	n/a	1-12	6 days	CNR Manager	Complete
Provide site signage and interpretation								
2017-2018		**3.1:** Provide signage and interpretation of the sites' wildlife, landscape and historical features	Provide interpretation boards at entrances and features	n/a	1-12	4 days	CNR Manager	Require updating to refreshed branding – currently contain the old TW logo
Provide programme of events and activities								
2017-2018		**P3.2:** Provide programme of events and activities	All site events and walks promoted in the newsletter and on website	n/a	1-12	12 days	CNR Manager Andy Freeman / Jamie Elborn	Events programme planned, and published in newsletter, and on Bexley Wildlife website/Facebook page, and Friends of Erith Marshes Facebook page
2017-2018		**P3.2:** Provide programme of events and activities	All events added to the TW website and other partner or local "what's on" websites.		1-12	6 days	CNR Manager Andy Freeman /	CNR newsletter detailing events uploaded to website

							Jamie Elborn	
Promote through media								
2017-2018		**P3.3:** Promote the reserve through a range of media applications	Ensure internal and external press coverage		1-12	6 days	CNR Manager Press Office	
Education								
2017-2018		**P3.4:** Deliver a programme of environmental education	Devise and market educational programme		1-12	5 days	CNR Manager	Ongoing Smiley Ark summer club visit (pond dipping, mini-beasting, butterfly hunts, bird watching) Easter 2017 Smiley Ark summer club visit (pond dipping, mini-beasting, butterfly hunts, bird watching) Summer Holidays 2017 Kids go Wild! events run during Summer Holidays – one midweek event and one at the weekend
Maintenance of infrastructure								
2017-2018		**P4.2** Maintain site furniture in accordance with H & S standards	Carry out site safety checks and undertake any action required		1-12	26 days	CNR Manager	Ongoing
2017-2018		**P4.2:** Ensure regular site	Increase site presence		1-12	52 days	CNR Manager	At least one site patrol per week

		patrols and enforcement of bylaws						
2017-2018		**P4.3:** Ensure site access improvements comply with DDA regulations	Ensure any new installations are DDA compliant		1-2	1 day	CNR Manager Contractors	Ongoing
2017-2018		**P5.1** Develop funding and income opportunities for the site	Improve links with funding bodies and partners		1-12		CNR Manager	Working in partnership with Thamesmead and Marsh Dykes Catchment Improvement Group. Sitting on the Ridgeway Working Group

4.0 Work plan 2018/19

Target year	Location / description	Prescription number	Project	Area/ length/ no:	Month	Resource (budget, staffing)	Who	Progress Green = completed/on target Amber = Slippage Red = Behind
2018-2019	CNR & CSM	N/A	Management plan six month review	n/a	10	2.5 days per week	CNR Manager	
2018-2019	CNR & CSM	N/A	Management plan annual review	n/a	3	2.5 days per week	CNR Management Committee	
Manage and improve habitats								
2018-2019		**P1.1** Manage and improve habitats for flora and fauna. In conjunction with BAP	Reedbed management	n/a	8-11	12 days	CNR Manager Volunteers	Following a large pollution incident in Dec 2017 (20m litres of activated sludge), a clean-up operation took place Jan 2017-Aug 2018. This resulted in Rainbow having to cut the whole reedbed in the southern end of the Protected Area in order to rake and bag the sludge). They also bagged all the terrestrial deposits. Water voles were removed (60) and taken into captivity until Spring 2019. A water vole fence was erected around the southern section of the Protected Area until the voles are re-released. Following pre-release

								surveys, 18 water voles were released into the Protected Area reedbeds on 20th May 2019. Exploring Riverside STW as a possible receptor site for remaining voles
2018-2019	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR wader scrape as 80% open water by clearing vegetation	n/a	8-11	4 days	CNR Manager & volunteer	Cut bankside vegetation as required. Cut and removed marginal vegetation in southern section of wader scrape in early Spring and Autumn 2018
2018-2019	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CNR pond as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Cut outer emergent reeds in winter 2018
2018-2019	Protected area	**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Keep the CSM pond (Pond Meadow) as 80% open water by clearing vegetation	n/a	8-11	1 day	CNR Manager & volunteers	Not cut – grazier issues
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Monitor silt levels in ponds, remove silt to original levels on rotation	n/a	1	2 days	Contractor	Unable to deliver silt removal due to impacts of pollution incident. Water levels on Southern Marsh remain high. Plan to have Lanes pump through/clean out the Southern Marsh culverts. In Feb 2019, Ebsford Environmental have

								been commissioned to cut the in-channel emergent vegetation using a Truxor (amphibious vehicle) without touching the banks
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage water levels in pond via windpump and sluice	n/a	1-12	1 day	CNR Manager	Data downloaded from magflow meter and meter calibrated by Z-Tech March 2019 (abstraction team requested Feb as CNR Manager can no longer download abstraction data due to cyber security restrictions, having to ask Z-Tech to download the data)
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage siltation of ditches and remove vegetation to ensure at least 50% open water	n/a	8-11	5 days	Contractors	
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage ditch banks to prevent scrub encroachment	n/a	8-11	14 days	CNR Manager Volunteers	Cut bramble patches on Sea Wall Field ditch, Parsley Field Ditch, Ford Dyke, West/East Paddock ditch – winter 2018/19
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with	Grazing	n/a	1-12		CNR Manager	Removed Southern Marsh graziers due to continued breach of licence with overgrazing (up to 60 horses at times) and the

		BAP						construction of unlawful dog kennels on Little Paddock in January 2018). A long battle involving court hearings resulted in horses being seized from CSM – 13 horses (the graziers had removed the foals) removed in Sept 2018. A further two horses were seized by GRC group (with assistance from Eversheds-Sutherland Solicitors) in Dec 2018 Continued grazing on Crossness Nature Reserve with Jay Anderson (daughter of Bill and Diane Bruce – original graziers)
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain ungrazed grasslands	n/a	1-12		CNR Manager Volunteers	Ongoing – cutting ungrazed areas with regular twice-weekly volunteers Cut and cleared all CSM paddocks and CNR Island Field and Parsley Field in October 2018 – moved cut back due to introduction of reptiles. Cut and remove The Triangle Oct 2018
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with	Control ragwort in grazed paddocks		4		CNR Manager Volunteers	Cut and bale vegetation in October 2018 Adhoc Ragwort pulling

		BAP						
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control spread of thistle		3-5		CNR Manager Volunteers	Grazed fields cut and baled October 2018. Southern end of Protected Area cut and removed by CNR manager and volunteers
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Maintain scrub at current levels		8-11		CNR Manager Volunteers	Cut areas east and west of footpath at the southern end of the Protected Area Targetted brambled cutting on CSM and CNR
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage coppiced willow		8-12		CNR Manager Volunteers	Ongoing
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Manage wet meadow for waders and wildfowl		1-12		CNR Manager	Lapwing breeding on West Paddock floods. Two, possibly three pairs in Spring/Summer 2018. Two pairs breeding in Spring 2019. Three chicks to first pair.
2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Control of invasive species		1-6		CNR Manager Volunteers Grounds Maintenance	Ongoing

2018-2019		**P1.1** Manage and improve habitats for flora and fauna in conjunction with BAP	Habitat creation		1-12		CNR Manager Volunteers Contractors Grounds Maintenance	
Record and monitor flora and fauna								
2018-2019		**P1.2:** Record and monitor flora and fauna	Record and monitor birds		1-12	3 days	CNR Manager Dartford Ringing Group Visitors and volunteers Consultants	Ongoing: bird records collated and distributed from visitor sightings (wildlife log book and electronic submissions) Breeding bird surveys undertaken by Andy Warren for Derek Gow Associates on CNR – areas limited to pollution incident Bearded Tits breeding in 2019 in Island Field reedbeds and Protected Area. Two pairs Lapwing breeding on West Paddock. At least two pairs of Skylark breeding on Cory Fields. Barn Owl roosting/breeding in Norman Road Field
2018-2019		**P1.2:** Record and monitor flora and fauna	Record and monitor mammals		1-12	1 day	CNR Manager Visitors and volunteers Students Consultants	Barn Owl pellets collected for small mammal analysis.
2018-		**P1.2:** Record	Record and monitor		1-12	1 day	CNR Manager	Butterfly transect surveys

2019		and monitor flora and fauna	butterflies and dragonflies				Visitors and volunteers Students Consultants	monitored by Mike Robinson. Data included in quarterly wildlife records and distributed to various data centres and relevant stakeholders. Held two butterfly walks for Friends of CNR members. One on the nature reserve and one on the southern marsh. Two more scheduled for June and July 2019
2018-2019		**P1.2:** Record and monitor flora and fauna	Record and monitor bumblebees		1-12	1 day	Volunteers	Adhoc records submitted. No regular monitoring taking place. Brown-banded Carder Bee recorded with BugLife officer in April 2019
2018-2019		**P1.2:** Record and monitor flora and fauna	Record and monitor terrestrial and aquatic invertebrates		1-12	1 day	Consultants	Marcel Ashby and Tristan Bantock surveying aquatic invertebrates on behalf of Colin Plant Associates. Twelve monitoring stations on each of CNR and CSM. Autumn 2018 and Spring 2019 following pollution incident Mottled Shieldbug (first recorded in UK in 2010) recorded with Rosie Earwaker from BugLife 30th April 2019 on Footpath 2

								Phil Rhodes recorded Mottled Shieldbug, Rambur's Pied Shieldbug and Golden-bloomed Grey Longhorn in May 2019
2018-2019		**P1.2:** Record and monitor flora and fauna	Record and monitor flora		1-12	1 day	Consultants	
2018-2019		**P1.2:** Record and monitor flora and fauna	Record and monitor amphibians and reptiles		1-12	3 days	CNR Manager Volunteers	Lloyd Bore Ecologists undertaking 1 reptile visit as translocation follow-up. Peter Brett Associates (on behalf of Cory Energy for their proposed Riverside Energy Park) undertook reptile surveys along Footpath 2. The southern end of the path was closed to access for a time due to the clean-up incident
Site infrastructure enhancements								
2018-2019	Protected area	**P4.2:**	No SEBA projects put forward		12-1		Contractors	No SEBA projects delivered due to site closure for pollution incident
Maintain tools and equipment								
2018-2019		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain tools and equipment	n/a	1-12	1 day	CNR Manager	Ongoing
2018-2019		**P1.4:** Maintain tools and	Procure new tools and equipment as and	n/a	1-12	3 days	CNR Manager	Ongoing

		equipment in accordance with H and S guidelines	when required					
2018-2019		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Vehicle checks	n/a	1-12	1 day	CNR Manager	Ongoing
2018-2019		**P1.4:** Maintain tools & equip in accordance with H&S guidelines	Monitor water levels and record water abstraction	n/a	1-12	Daily meter readings	CNR Manager	Ongoing via magflow meters and Z-Tech download
2018-2019		**P1.4:** Maintain tools and equipment in accordance with H and S guidelines	Maintain and service windpump	n/a			Contractors	Windpumps serviced – heads greased in January 2019
Provide voluntary opportunities								
2018-2019		**2.4:** Provide voluntary opportunities for all communities	Create and update database for volunteers	n/a	1-12	1 day	CNR Manager	Ongoing
2018-2019		**2.4:** Provide voluntary opportunities for all communities	Run a programme of community volunteering days	n/a	1-12	6 days	CNR Manager	Complete
Provide site signage and interpretation								
2018-2019		**3.1:** Provide signage and interpretation of	Provide interpretation boards at entrances and features	n/a	1-12	4 days	CNR Manager	Require updating to refreshed branding – currently contain the old TW

		the sites' wildlife, landscape and historical features						logo
Provide programme of events and activities								
2018-2019		**P3.2:** Provide programme of events and activities	All site events and walks promoted in the newsletter and on website	n/a	1-12	12 days	CNR Manager Andy Freeman / Jamie Elborn	Events programme being planned. Will be published in newsletter, and on Bexley Wildlife website/Facebook page, and Friends of Erith Marshes Facebook page
2018-2019		**P3.2:** Provide programme of events and activities	All events added to the TW website and other partner or local "what's on" websites.		1-12	6 days	CNR Manager Andy Freeman / Jamie Elborn	CNR newsletter detailing events uploaded to website
Promote through media								
2018-2019		**P3.3:** Promote the reserve through a range of media applications	Ensure internal and external press coverage		1-12	6 days	CNR Manager Press Office	
Education								
2018-2019		**P3.4:** Deliver a programme of environmental education	Devise and market educational programme		1-12	5 days	CNR Manager	Ongoing – SmileyArk Summer club booked in for 2 visits in August 2019
Maintenance of infrastructure								
2018-		**P4.2** Maintain	Carry out site safety		1-12	26 days	CNR Manager	Ongoing

2019		site furniture in accordance with H & S standards	checks and undertake any action required					
2018-2019		**P4.2:** Ensure regular site patrols and enforcement of bylaws	Increase site presence		1-12	52 days	CNR Manager	At least one site patrol per week Crossness Southern Marsh presence stepped-up to reduce risk of unlawful grazing following the horse removal
2018-2019		**P4.3:** Ensure site access improvements comply with DDA regulations	Ensure any new installations are DDA compliant		1-2	1 day	CNR Manager Contractors	Ongoing
2018-2019		**P5.1** Develop funding and income opportunities for the site	Improve links with funding bodies and partners		1-12		CNR Manager	Working in partnership with Thamesmead and Marsh Dykes Catchment Improvement Group. Sitting on the Ridgeway Working Group

4. How will we know when we have arrived?

4.1 Monitoring the plan

The plan is monitored in-house against the objectives and work programme set for the site on an annual basis. It will also be monitored by the Crossness Nature Reserve Management Committee. The outcome of this process will feed into the future work plans for this management plan.

4.2 Reviewing the management plan

Although the plan is going to be continually reviewed, it must also take into account the time for the management plan to achieve its goals, some of which will take a few years to accomplish in full. These are all identified and planned; any variations to the plan will be outlined and planned.

The review will consult stakeholders, users of the reserve and staff.

As in the production of this plan, the review will be based on good, current baseline information, objective analysis of that information, and on consultation with a wide cross-section of the people working in and using the reserve.

Appendices

Appendix A: Site contacts

Direct site management / operation

Crossness Nature Reserve and Biodiversity Team Manager:
Karen Sutton

[redacted]

Tel: [redacted]

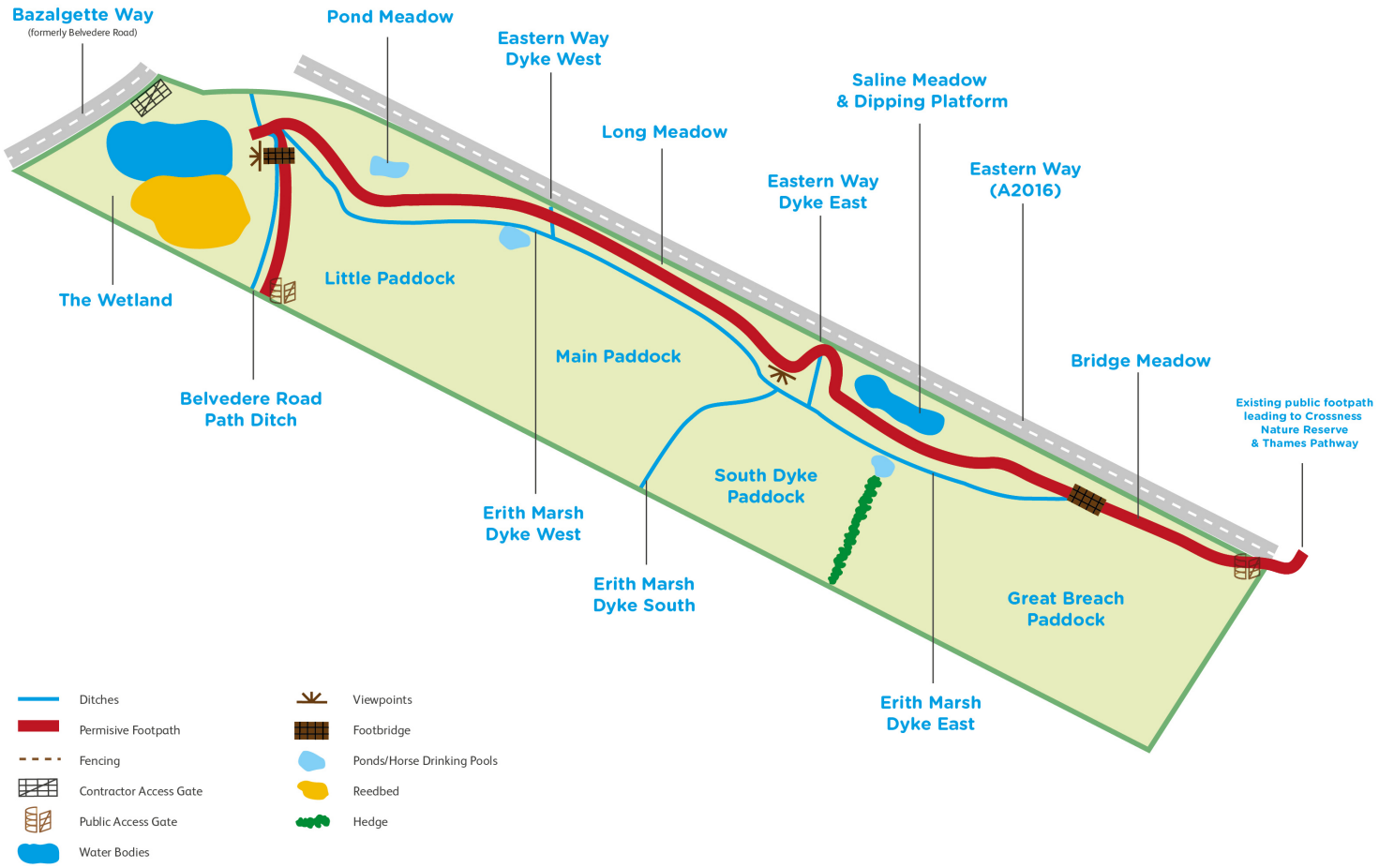
Corporate Responsibility and Sustainability Manager:
Rosemary Waugh

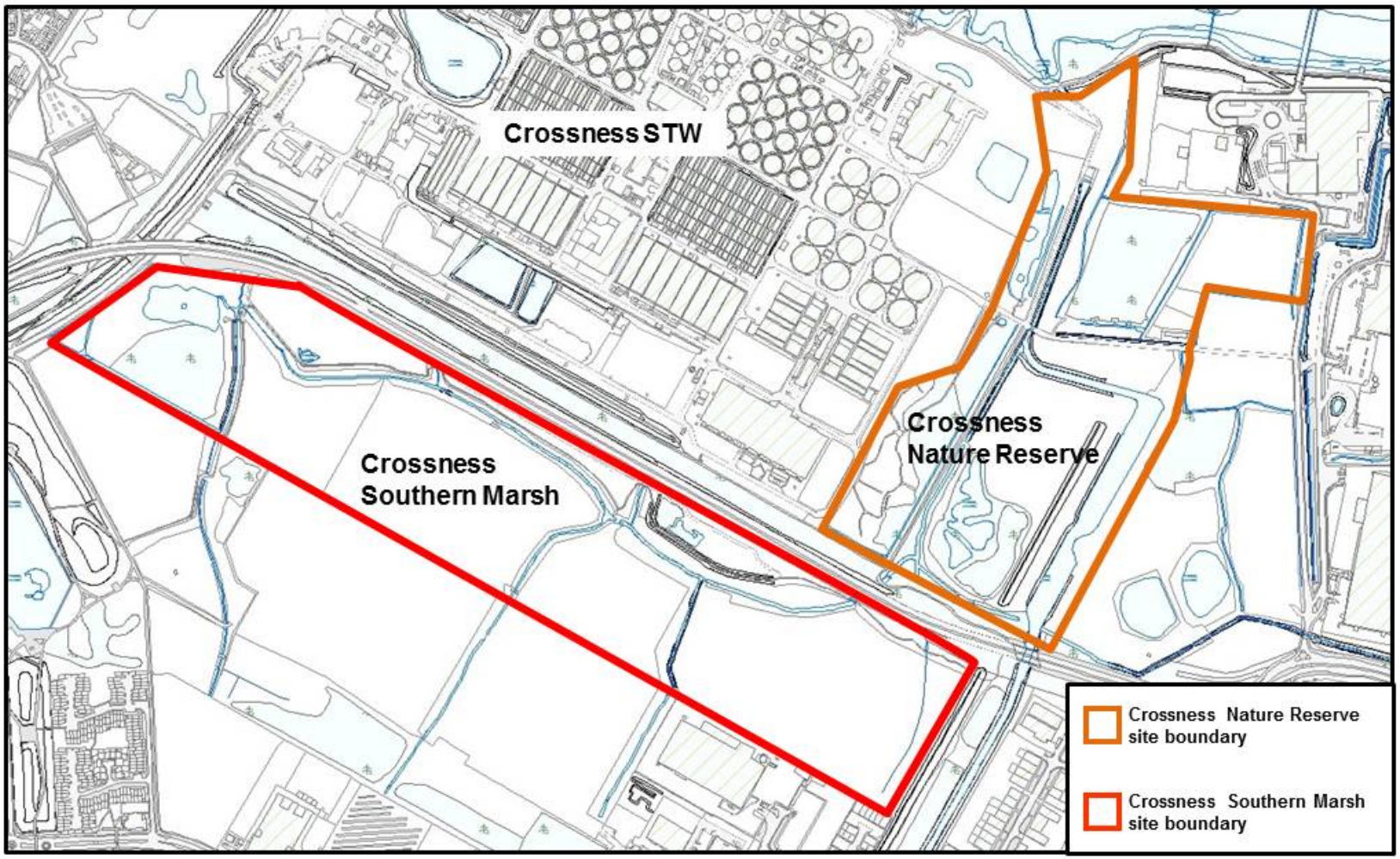
[redacted]

Tel: [redacted]

Appendix B: Maps of site

Crossness Southern Marshes




Crossness STW
Crossness
Nature Reserve
Crossness
Southern Marsh
Crossness Nature Reserve
site boundary
Crossness Southern Marsh
site boundary

Appendix C: Aerial photograph

[to come]

Appendix D: Access to Crossness Nature Reserve & Southern Marshes

Crossness Nature Reserve

Travelling from London (rail and buses)

Travel from London Bridge station, via Greenwich or Blackheath, to Abbey Wood station (25 minutes). Take a 229 bus to Crossway, alight at the Lister Walk stop and walk to Summerton Way. Follow this road to Fairway Drive and follow signs to the Thamesview Golf Course. Walk left through the car park and turn right. This enables you to enjoy a 20 minute Thameside walk along the National Cycle Route and public footpath where you can join the reserve from the Thames Pathway entrance by the viewing platform.

Alternatively, from Abbey Wood train station, take a 180 bus to Eastern Way (ask for Belvedere Industrial Estate) via Harrow Manor Way and Yarnton Way (approx. 20 minutes). Follow the public footpath across fields from the Norman Road south-east entrance and enter Crossness Nature Reserve near the lagoon.

Travelling from London (by car)

To Thames Pathway entrance: Travel from Greenwich towards Erith on the A206 following signs for the M25. Leave the A206 following signs for Thamesmead (A2014). From the roundabout, take the first exit (left) towards Thamesmead Central (A2014). At the next roundabout, turn right (third exit) onto Crossway and then right again (2nd exit) at the next roundabout to Summerton Way. Head straight down to Fairway Drive, turn right and follow the signs for Thamesview Golf Course where you will be able to park and use the facilities (toilets–including disabled–and refreshments). Walk through the car park to the north where you will join the National Cycle Route and public footpath. Follow the Thames riverside walk until you reach the Thames Pathway entrance to Crossness Nature Reserve.

To Norman Road/Eastern Way entrance: Travel from Greenwich towards Erith on the A206 following signs for the M25. The A206 joins the A2016 (Eastern Way). Continue along this road until you reach a roundabout, turn left and on your immediate left, one or two cars could be left in the bay by the Norman Road North junction (cars are left at owner's risk and as there is no path, visitors should take care on the road). Alternatively, park in Norman Road South (off Yarnton Way). Join the reserve from the Norman Road entrance at the south-east of the reserve, or walk west to enter the site from Eastern Way.

To Belvedere Road entrance: Travel from Greenwich towards Erith on the A206 following signs for the M25. Leave the A206, following signs for Abbey Wood (A2014). Drive down Harrow Manor Way and take the fourth exit at the roundabout so that you are coming back up Harrow Manor Way. Take the second left (you will see signs for Thames Water) and follow the road to the end, turn right on to Belvedere Road. The footpath is located on the right approximately 100m back from the Thames Water Crossness Sewage Treatment Works site entrance. You may park in Belvedere Road. Please note that there is no access to the reserve through the main sewage treatment works.

Travelling from Kent (rail and station buses)

Join the London bound train from Dartford to Belvedere (10 minutes) and take the 401 bus to Eastern Way via Picardy Manorway or stay on and alight at Crossway to join the reserve from Thamesview Golf Course taking in the 20 minute riverside walk.

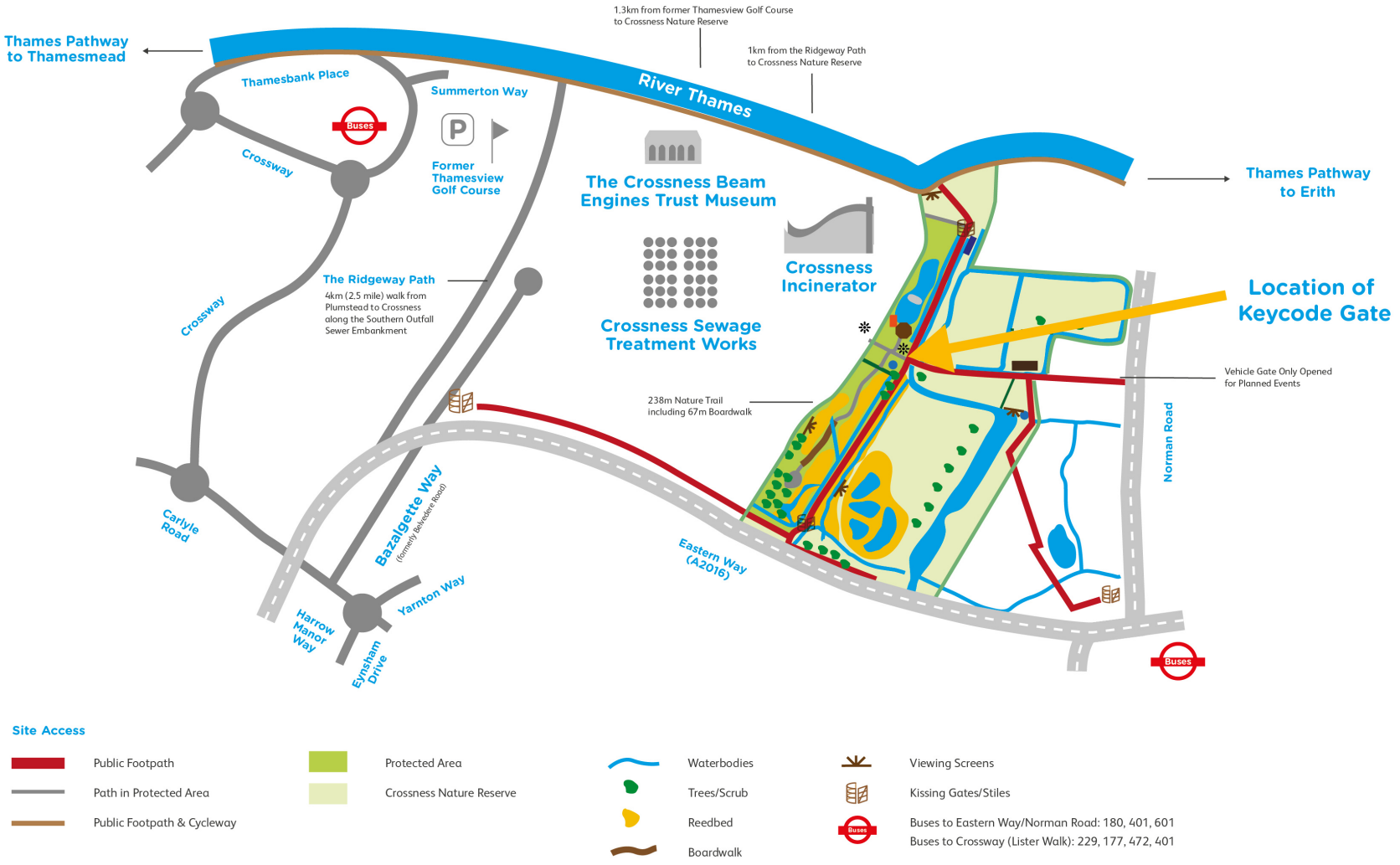
Travelling from Kent (by car)

To Thames Pathway entrance: From Dartford, follow the signs towards Plumstead, Woolwich and Greenwich. Join the A2016 at Erith (Bronze Age Way). Go straight over the first roundabout, at the second roundabout take the second exit (turning right) where you will join Eastern Way. Continue along the A2016 where you will see the Thames Water sludge powered generator on your right. Come off at the first exit and at the roundabout, take the third exit (A2041) towards Thamesmead (Carlyle Road). At the next roundabout, turn right (third exit) onto Crossway and then right again (2nd exit) at the next roundabout to Summerton Way. Head straight down to Fairway Drive, turn right and follow the signs for Thamesview Golf Course where you will be able to park and use the facilities (toilets–including disabled–and refreshments). Walk through the car park to the north where you will join the National Cycle Route and public footpath. A 20 minute riverside walk leads you to the sea wall entrance to Crossness Nature Reserve.

To Norman Road/Eastern Way entrance: From Dartford, follow the signs towards Plumstead, Woolwich and Greenwich. Join the A2016 at Erith (Bronze Age Way). Go straight over the first roundabout, at the second roundabout take the third exit where you will come back on yourself and be travelling back down Eastern Way. Immediately on your left is a lay-by joining Norman Road North where there is unofficial parking for one to two cars, but vehicles are left at owner's risk. Alternatively, park in Norman Road South (off Yarnton Way). Care should be taken on the road, as there is no footpath by this bay. Follow the public footpath across fields from the Norman Road south-east entrance and enter Crossness Nature Reserve near the lagoon. Alternatively, take the short walk west to enter from the Eastern Way entrance.

To Belvedere Road entrance: From Dartford, follow the signs towards Plumstead, Woolwich and Greenwich. Join the A2016 at Erith (Bronze Age Way). Go straight over the first roundabout, at the second roundabout take the second exit (turning right) where you will join Eastern Way. Continue along the A2016 where you will see the Thames Water sludge powered generator on your right. Come off at the first exit and at the roundabout, take the first exit (A2041) towards Abbey Wood. Drive down Harrow Manor Way and take the fourth exit at the roundabout so that you are coming back up Harrow Manor Way. Take the second left and follow the road to the end, turn right on to Belvedere Road. The footpath is located on the right approximately 100m back from the Thames Water site entrance. You may park on Belvedere Road. Please note that there is no access to the reserve through the main sewage treatment works.

Location of Keypad Pedestrian Gate



Crossness Southern Marshes

Travelling from London (rail and buses)

Through Crossness Nature Reserve: Travel from London Bridge station, via Greenwich or Blackheath, to Abbey Wood station (25 minutes). Take a 229 bus to Crossway, alight at the Lister Walk stop and walk to Summerton Way. Follow this road to Fairway Drive and follow signs to the Thamesview Golf Course. Walk left through the car park and turn right. This enables you to enjoy a 20 minute Thameside walk along the National Cycle Route and public footpath where you can join the reserve from the Thames Pathway entrance by the viewing platform. Walk south through the reserve down to the Eastern Way entrance (please note that this requires climbing up a bank which brings you on to a busy dual carriageway – please approach with care). Cross the dual carriageway (A2016 Eastern Way) following Public Footpath 1. Go through the kissing gate, turn right and through the timber kissing gate where you will join Crossness Southern Marshes.

To Eastern Way entrance: Alternatively, from Abbey Wood train station, take a 180 bus to Eastern Way (ask for Belvedere Industrial Estate) via Harrow Manor Way and Yarnton Way (approx. 20 minutes). Pick up Public Footpath 1 as above.

Travelling from London (by car)

To Belvedere Road entrance (preferred route): Travel from Greenwich towards Erith on the A206 following signs for the M25. Leave the A206, following signs for Abbey Wood (A2014). Drive down Harrow Manor Way and take the fourth exit at the roundabout so that you are coming back up Harrow Manor Way. Take the second left (you will see signs for Thames Water) and follow the road to the end, turn right on to Belvedere Road. Park on Belvedere Road or at the Lakeside Complex (Southmere Lake). Follow the path round the lake and go up and over the large hill on the left (if mobility problems make this difficult, keep following the path, turn left at the end, left again and then follow the small path to the right). This will bring you to Southmere Park where you will see tethered horses. Head north-east towards the kissing gate entrance to Crossness Southern Marshes. If you have difficulty seeing the kissing gate, just head straight towards the post and rail fencing in front of you and follow it to the right until you come to the entrance gate.

To Thames Pathway entrance: Travel from Greenwich towards Erith on the A206 following signs for the M25. Leave the A206 following signs for Thamesmead (A2014). From the roundabout, take the first exit (left) towards Thamesmead Central (A2014). At the next roundabout, turn right (third exit) onto Crossway and then right again (2nd exit) at the next roundabout to Summerton Way. Head straight down to Fairway Drive, turn right and follow the signs for Thamesview Golf Course where you will be able to park and use the facilities (toilets–including disabled–and refreshments). Walk through the car park to the north where you will join the National Cycle Route and public footpath. Follow the Thames riverside walk until you reach the Thames Pathway entrance to Crossness Nature Reserve. Walk south through the reserve down to the Eastern Way entrance (please note that this requires climbing up a bank which brings you on to a busy dual carriageway – please approach with care). Cross the dual carriageway (A2016 Eastern Way) following Public Footpath 1. Go through the kissing

gate, turn right and through the timber kissing gate where you will join Crossness Southern Marshes.

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Travelling from Kent (rail and station buses)

Join the London bound train from Dartford to Belvedere (10 minutes) and take the 401 bus to Eastern Way via Picardy Manorway or stay on and alight at Crossway to join the reserve from Thamesview Golf Course taking in the 20 minute riverside walk. Walk south through the reserve down to the Eastern Way entrance (please note that this requires climbing up a bank which brings you on to a busy dual carriageway – please approach with care). Cross the dual carriageway (A2016 Eastern Way) following Public Footpath 1. Go through the kissing gate, turn right and through the timber kissing gate where you will join Crossness Southern Marshes.

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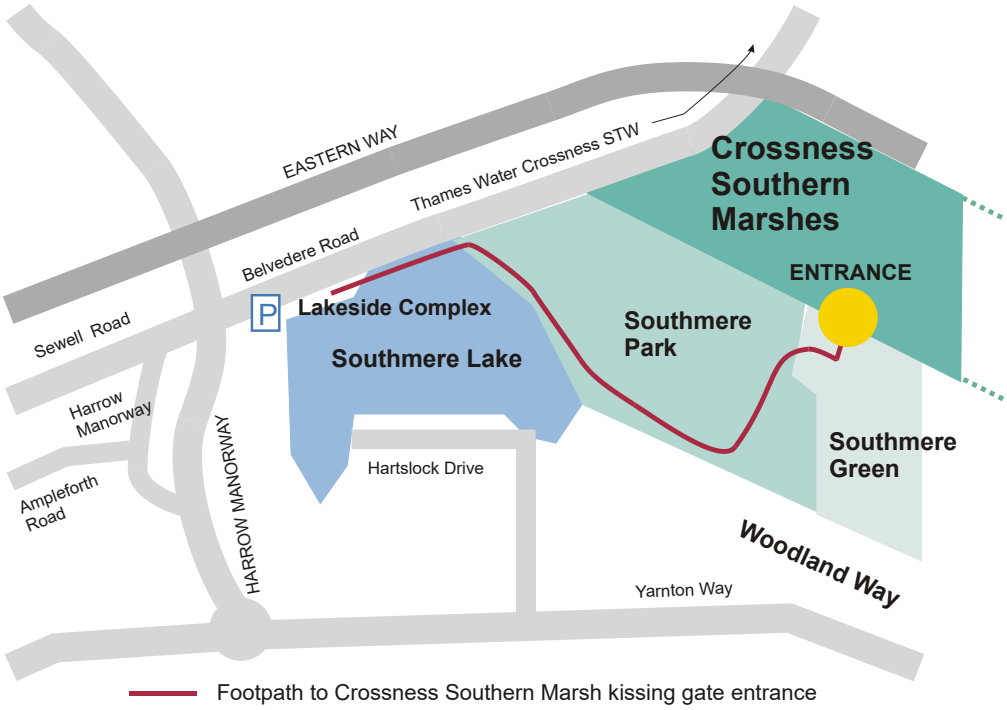
Drive down Harrow Manor Way and take the fourth exit at the roundabout so that you are coming back up Harrow Manor Way. Take the second left and follow the road to the end, turn right on to Belvedere Road. Park on Belvedere Road or at the Lakeside Complex (Southmere Lake). Follow the path round the lake and go up and over the large hill on the left (if mobility problems make this difficult, keep following the path, turn left at the end, left again and then follow the small path to the right). This will bring you to Southmere Park where you will see tethered horses. Head north-east towards the kissing gate entrance to Crossness Southern Marshes. If you have difficulty seeing the kissing gate, just head straight towards the post and rail fencing in front of you and follow it to the right until you come to the entrance gate.

To Thames Pathway entrance: From Dartford, follow the signs towards Plumstead, Woolwich and Greenwich. Join the A2016 at Erith (Bronze Age Way). Go straight over the first roundabout, at the second roundabout take the second exit (turning right) where you will join Eastern Way. Continue along the A2016 where you will see the Thames Water sludge powered generator on your right. Come off at the first exit and at the roundabout, take the third exit (A2041) towards Thamesmead (Carlyle Road). At the next roundabout, turn right (third exit) onto Crossway and then right again (2nd exit) at the next roundabout to Summerton Way.

Head straight down to Fairway Drive, turn right and follow the signs for Thamesview Golf Course where you will be able to park and use the facilities (toilets–including disabled–and refreshments). Walk through the car park to the north where you will join the National Cycle Route and public footpath. A 20 minute riverside walk leads you to the sea wall entrance to Crossness Nature Reserve. Head south through the reserve to the Eastern Way entrance as above.

To Eastern Way entrance: From Dartford, follow the signs towards Plumstead, Woolwich and Greenwich. Join the A2016 at Erith (Bronze Age Way). Go straight over the first roundabout, at the second roundabout take the third exit where you will come back on yourself and be travelling back down Eastern Way. Immediately on your left is a lay-by joining Norman Road North where there is unofficial parking for one to two cars, but vehicles are left at owner's risk. Alternatively, park in Norman Road South (off Yarnton Way). Care should be taken on the road, as there is no footpath by this bay. Join the Southern Marshes at Eastern Way entrance (Public Footpath 1).

Getting to the Crossness Southern Marshes



Appendix E: Island Field reedbed management plan

Island Field reedbed management plan

DRAFT

April 2012

Island Field reedbed management plan

1.1 Current status

1.1.2. Reedbed creation

A 1.2 hectare reedbed, plus 3 deep water lagoons, was created in Island Field in 2010, to mitigate the loss of reedbed and the subsequent ecological impacts within the Crossness STW expansion development area.

Three hydrological connections were made to the adjacent Great Breach Dyke West, and Horsehead Dyke so that the reedbed is in direct continuity with the water in the surrounding ditch system. This consisted of channels and drop-boards with which to control water levels.

Following excavation, the reedbed area was stock-fenced, and water vole exclusion fencing was installed around its perimeter to prevent natural colonisation by water voles from other areas of the nature reserve. This was followed by the planting of 60000 common reed (*Phragmites australis*) plugs across the shallow water areas.

1.1.3 Water voles

In addition to mitigating the loss of reedbed on the development site, the reedbed was intended as a receptor site for the progeny of the 29 water voles removed from the development area in 2009. The voles were held in a captive breeding programme at Wildwood in Herne Bay, and were due to be released into the new habitat in spring 2011. Unfortunately, following a very harsh winter in 2010/11 followed by a dry spring, the vegetation within the reedbed had not grown sufficiently to accommodate the foraging and predator cover required by water voles. The release was therefore put back to spring 2012.

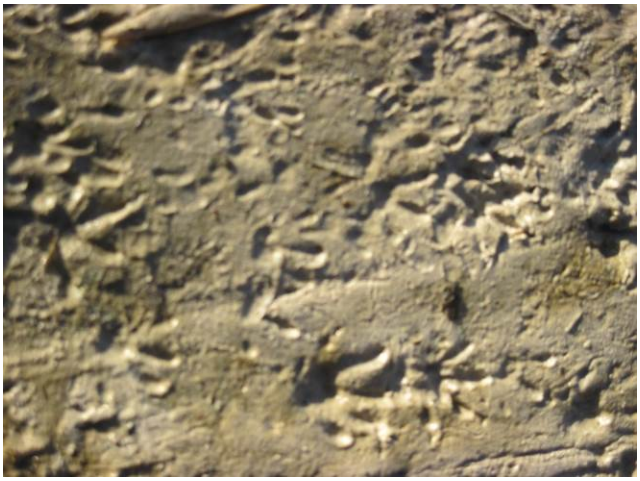
In the winter/early spring of 2012, while carrying out mink monitoring within the reedbed, the Crossness Nature Reserve Manager discovered water vole field signs within the reedbed (Fig. 1). A more thorough survey revealed significant presence of water voles which had apparently breached the water vole exclusion fencing, and colonised from the adjacent ditches.

This jeopardised the planned water vole release. Water voles are territorial and cannot be released into an area with an existing population. We explored the possibility of ‘topping up’ the native population with our captive-bred voles, but were advised against this (which goes against the recommendations in the Water Vole Conservation Handbook), due to the territorial nature of the female voles, and also because of the habitat’s carrying capacity.

We explored other release opportunities on Thames Water sites and/or within our catchment area, but unfortunately, potential receptor sites would not be ready until 2013. We therefore explored third-party receptor sites, taking the advice of Wildwood (where our voles were being bred) and Derek Gow Associates (who carries out water vole reintroductions in the London area and beyond). Our water voles are now due to be

released in summer 2012 into the River Colne, in Essex, along with captive-bred voles held at Derek Gow Associates.

Figure 1 – Water vole (*Arvicola terrestris*) field signs (faeces, and footprints on mink cartridge) in Island Field reedbed



1.1.4. Invasive species

Unfortunately, reedmace (*Typha*) has dominated the vegetation within the reedbed. The east section of the reedbed is almost exclusively a monoculture of *Typha*, with just small amounts of marginal vegetation including *Phragmites* and *Juncus* species. The western half has proved more successful with some pockets being *Phragmites* dominated, but it does include several large areas of *Typha*.

Although *Typha* is not a problem to water voles, where it occurs as a monoculture, it is not conducive to the desired reedbed specialists such as reed warbler, reed bunting, bittern etc, nor does it provide the like-for-like habitat that was lost to the expansion project.

1.1.5. Water levels

Water levels are controlled via sluice connections to adjacent ditches, whereby drop-boards can halt or encourage flow. The top water level in the reedbed reflects the water level in the adjacent ditch.

During the winter, the water in the adjacent ditch system is 0.75 to 1.5m below ground level. With the reedbed excavated to a depth of 200mm below summer water level in the adjacent ditches, the surface water depth within the reedbed will fluctuate between 200mm (summer) and 500mm (winter).

We will aim to ensure that water levels remain above the soil surface all year round to reduce competition from other plants, and to provide aquatic habitat for a range of

wildlife. Maintaining high water levels in spring will help reduce the regrowth of cut scrub, but levels will be reduced in October to aid winter reed cutting. A diesel pump will be used, where required, to facilitate more accurate water level management.

1.2. Short-term management

In theory, the reedbed should require minimal management for at least the first two years of establishment. The greatest threat to establishment, and therefore the greatest management priority during this time, is the control of unwanted plants that might compete with the reeds.

The submerging of the reedbed with water will control most weed species such as rosebay willowherb (*Chamerion angustifolium*) and nettle (*Urtica dioica*). Manual removal of species such as willow (*Salix* spp.) and reedmace (*Typha* spp.) will be necessary.

1.2.1. Typha management

Following dominant *Typha* colonisation in Year 1 (2011) where the east section of the reedbed was found to be approx 95% cover and the west section approx 65%, remedial action is required (Fig. 2).

Figure 2 – *Tyhpa* dominated reedbed	
	

Hand-pulling small sections of *Typha* on both the east and west reedbed was attempted in October 2011, however without the ability to replant *Phragmites* at that time, *Typha* is growing back, at a lower density, in Year 2.

In March 2012, a local source of mature, hand-pulled *Phragmites* were translocated into two areas within the east section reedbed. Majority were planted in the central section of shallow water devoid of vegetation (Fig. 3), and a smaller number in the hand-pulled section where *Typha* was beginning to return, but was not yet mature or dense, in the hope that *Phragmites* might eventually outcompete the *Typha*.

In April/May 2012, the translocation is looking positive, with all translocated reeds displaying new shoots (see Fig. 4).

In order to remedy the monoculture of *Typha* elsewhere in the east section, we plan to grub this out with a small excavator in autumn 2012 (Year 2), removing the rhizomes. The arisings will be placed in a designated area, on site, to rot down.

Figure 3 – Mature reeds translocated into shallow pool in March 2012 showing new growth evident by green shoots, in May 2012

Figure 4 – New *Phragmites* growth in main pool	***Phragmites* among *Typha* in southern reedbed section**

Water levels will be monitored and controlled via the existing sluice connections to adjacent ditches and a temporary pump, to ensure that levels remain high and therefore less suitable for *Typha* colonisation.

New *Phragmites* plugs will be planted in the 0.8 ha excavated area in spring 2013, at a higher density of 9 plugs per square meter. This is a recommended density for successful reedbed creation; it is also closer to the density planted in the south-west reedbed: the only area where *Phragmites* is dominant. This will result in the planting of 72000 *Phragmites* plugs. Water level control, and hand-pulling of *Typha* and other invasive species, will be managed by the Crossness Nature Reserve Manager.

1.2.3. Water voles

Our captive-bred water voles will be released into the River Colne in spring 2012 as detailed in Section 1.1.3. The reedbed will be continually monitored for water voles in accordance with Section 1.3.1. Mink monitoring will continue to be carried out in the reedbed and adjacent ditches, using mink rafts and clay cartridges to monitor f or prints. An American mink (*Mustela vison*) was spotted at nearby Thamesmere East Lake in January 2012, but monitoring at Crossness has not revealed mink presence so far. Should evidence of mink be observed during monitoring, an eradication programme will be implemented.

1.3. Long-term Management

The reedbed will require ongoing management to maintain the quality and condition of the habitat. Reed cutting will be required to reduce the level of litter build-up and to maintain a surface water depth of at least 10mm above the litter surface. This will prevent succession to a drier habitat type caused by the build up of reed detritus.

Some reed cutting will be required to prevent encroachment into the deep water areas, thereby maintaining the open water and reed edge habitats required by breeding birds.

Reed cutting improves the quality of the reed bed, creates temporary open water and maintains the reedbed edge and structural diversity. Cutting will be carried out by hand (using scythes or sickles) or by a brush cutter. Raking will be undertaken on a rotational and random basis to allow for the retention of areas of deep litter (300mm to 1m) and thin litter (50mm). Cut reeds will be moved out of the reedbed and placed along the margin to rot down. This provides an alternative habitat for invertebrates, birds and small mammals, and provides potential for Grass snakes (*Natrix natrix*) to use the decaying vegetation to incubate eggs.

The frequency of reed cutting will depend on the rate of litter accumulation with an initial reed cutting programme of two to five years. Only one section of the reedbed will be cut in any one year. To minimise impacts on water voles and breeding birds, reed cutting will be carried out over the winter period.

As litter accumulates in the deeper water areas, there is an increased risk of reeds encroaching into such areas. Dredging of silt and detritus from the open water may be required on an occasional basis. Due to the more intensive nature of this activity and the potential to cause damage, dredging or ‘slubbing’ should be carried out on a long

rotation of between 10 and 25 years, dependent on the rate of litter accumulation. Regular reed cutting will reduce the need for slubbing considerably.

To facilitate winter cutting, from October onwards, water levels will be reduced slowly to just below the reed bed surface, using the drop boards connected to adjacent ditches and temporary pumps. Open water channels connecting the reedbed to the Great Breach Dyke West and Horsehead Dyke, will be maintained to prevent encroachment of reed and scrub into the central channel.

Prior to any management activity, a water vole survey will be undertaken to determine the location of water vole activity. Works will be undertaken in accordance with best practice guidance detailed in the Water Vole Conservation Handbook.

1.3.1. Monitoring

The newly created reedbed will be monitored over a ten-year period after completion of works. This will consist of an annual visit for the first two years and biennial visits for the remaining eight. The surveys will be aimed at determining the condition of habitats on the site and whether or not the management prescriptions require adjusting; if they do, the management plan will be updated accordingly.

Vegetation surveys will be undertaken in the period May to September. Each species of vascular plant will be recorded and the abundance of each species will be recorded using the DAFOR scale, where:

D = dominant; A = abundant; F = frequent; O = occasional; R = rare

A programme of water vole surveys will be implemented. Annual surveys will be carried out for the first five years between March and September (at the same time of year for each survey), to monitor the success of water vole colonisation and the continued suitability of the habitat. Biennial surveys will be undertaken for the remaining five years. The following signs of vole activity will be searched for:

- Faeces – these are 8-12mm long and 4-5mm wide, cylindrical with blunt ends. They are often green in colour, although this can vary, and odourless with specific putty-like consistency;
- Latrines – droppings are often deposited at latrine sites as territory markers or at favoured feeding locations. Latrines may consist of a flattened mass of old droppings with fresh ones on top, although heavy rainfall or high water levels often result in these being washed away;
- Feeding stations – pieces of vegetation (~10cm long with gnawed ends) are often taken to favoured feeding platforms at the water's edge, where the remains are left in neat piles;
- Burrows – typically wider than they are high, with a diameter of 4-8cm. Burrow entrances may occur above or below the water line. During the breeding season lactating females may create grazed 'lawns' around burrow entrances at the top of the bank;
- Nests – may be found where vegetation is dense often woven into the base of rushes, sedges or reeds;

- Footprints – often found in the soft muddy margins of the water's edge; and
- Runways – low tunnels pushed through vegetation often leading to and from the water's edge or favoured feeding areas.

The results of the above surveys will be used to adjust the management regime, if required.

Reedbed maintenance schedule

	Management task	Performance standard	Timing	Frequency	Responsibility	Monitoring
Short term (Years 1and 2)[1]	Flooding and installation of drop boards.	No spread of algal blooms into connecting watercourses.	Immediately post construction.	As required	CNR Manager / Main Works Contractor	Regular monitoring of CNR watercourses by CNR Manager.
	Maintain water level, through use of drop boards and wind pump as appropriate, to prevent drying out of reedbed and establishment of weed species.	No establishment of weed species (e.g. *Chamerion angustifolium* and *Urtica diocia*).	Throughout year	As required	CNR Manager	Regular monitoring by CNR Manager. Annual vegetation surveys (Year 1 and 2).
	Manual removal of weed species.	No establishment of weed species (e.g. *Salix* spp. and *Typha* spp.).	No specific timing	Annually, or as necessary	CNR Manager	Regular monitoring by CNR Manager Annual vegetation surveys (Year 1 and 2).
	Prevention of grazing by wildfowl by regular human disturbance. Possible tapes run across reedbed to discourage wildfowl.	Successful establishment of reedbed vegetation. Limited grazing damage to reeds.	Throughout year	Throughout years 1 and 2, during establishment of reed.	CNR Manager / Main Works Contractor	Regular monitoring by CNR Manager. Annual vegetation surveys (Year 1 and 2)
	Monitoring and maintenance water vole exclusion fencing and 1m wide mown strip at base.	Breaches in fence repaired immediately. No natural water vole colonisation of reedbed.	From construction through to water vole release (anticipated spring of Year 2 [2011]).	Weekly	Main Works Contractor	Weekly monitoring by main works contractor. Periodic checks by CNR Manager. A record of all checks and repairs to be maintained.

[1] Year 1 of management has been taken to be 2011, following construction of new habitats during autumn 2010

	Monitoring and maintenance of livestock fencing.	Breaches repaired immediately	Ongoing	As required	CNR Manager / Main Works Contractor	Regular monitoring by CNR Manager.
	Vegetation surveys.	Record of reedbed vegetation establishment. Modifications to management regime, as required.	May to September	Annually	Thames Water Ecology & Heritage Team	
	Water vole surveys.	Dataset showing trends in water vole distribution and abundance. Modifications to management regime, as required.	Monthly (post water vole release)	Monthly throughout Year 2	Thames Water Ecology & Heritage Team	
Long term (Years 3 to 10)	Maintenance of water depth of at least 10mm above reed litter surface.	Maintenance of reedbed with no drying out.	Throughout year.	As required	CNR Manager	Regular monitoring by CNR Manager. Vegetation surveys in Years 4, 6, 8 and 10 to monitor establishment of weed species.
	Reed cutting.	Maintenance of areas of open water.	Winter	Cutting of cells in 2 to 5 year rotation, dependant on rate of litter accumulation.	CNR Manager	Regular monitoring by CNR Manager. Vegetation surveys in years 4, 6, 8 and 10. Water vole survey undertaken immediately prior to works.
	Raking of cut reed on a rotational basis.	Retention of areas of deep litter (30 to 100cm) and thin litter (5cm). Creation of habitat piles on the margins of the reedbed using raked litter.	Winter	As for reed cutting, above.	CNR Manager	Regular monitoring by CNR Manager. Vegetation surveys in Years 4, 6, 8 and 10.
	Dredging.	Maintenance of areas of open water.	Winter	On 10 to 25 year rotation,	CNR Manager	Regular monitoring by CNR Manager.

				depending on rate of silt and litter accumulation.		Vegetation surveys in Years 4, 6, 8 and 10. Water vole survey undertaken immediately prior to works.
	Management of bankside vegetation by mowing or occasional grazing to prevent scrub establishment.	No encroachment of scrub into reedbed.	Early spring or late autumn	3 to 5 year rotation.	CNR Manager	Regular monitoring by CNR Manager. Vegetation surveys in Years 4, 6, 8 and 10.
	Monitoring and maintenance of livestock fencing.	Breaches repaired immediately.	Ongoing	As required	CNR Manager	Regular monitoring by CNR Manager.
	Vegetation surveys.	Record of reedbed vegetation establishment. Modifications to management regime, as required.	May to September	Years 4, 6, 8 and 10	Thames Water Ecology & Heritage Team	
	Water vole surveys.	Dataset showing trends in water vole distribution and abundance. Modifications to management regime, as required.	April to September	Years 3, 4, 5, 6, 8 and 10	Thames Water Ecology & Heritage Team	
	Mink raft monitoring.	Early identification of mink and implementation of programme of local eradication, if required.	Throughout year	Ongoing	CNR Manager	Regular monitoring by CNR Manager.

DECARBONISATION

10 Dominion Street
Floor 5
Moorgate, London
EC2M 2EF
Contact Tel: 020 7417 5200
Email: enquiries@corygroup.co.uk
corygroup.co.uk