

Cambridge Waste Water Treatment Plant Relocation Project
Anglian Water Services Limited

Preliminary Ecological Appraisal

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1 Executive summary

- 1.1** Mott MacDonald Limited has been commissioned by Anglian Water to undertake a Preliminary Ecological Appraisal (PEA) and Aquatic Habitat Scoping Assessment at the Proposed Development and associated infrastructure for the new Cambridge Waste Water Treatment Plant (WWTP). The PEA and Aquatic Habitat Scoping Assessment also covered the existing WWTP. This report presents the findings of the PEA and Aquatic Habitat Scoping Assessment, which identifies the likely ecological constraints, mitigation measures, and additional surveys that may be required for the three sites and their associated infrastructure.
- 1.2** The PEA comprised of a desk study (background data search) and extended Phases 1 habitat survey. The background data search was conducted in August 2020. The extended Phase 1 habitat surveys were carried out by suitably qualified ecologists between July 2020 and November 2020. The Aquatic Scoping Assessment comprised information from the PEA desk study and rapid site visits to all possible ditches, ponds, lakes, streams, and rivers within 100m of the scheme extent, an area termed the 'aquatic Zone of Influence' (or 'aquatic Zol'). The Aquatic Scoping Assessment was undertaken between July 2020 and October 2020, with all visits led by a suitably qualified freshwater ecologist.
- 1.3** The background data search identified that the Proposed Development is within 10km of Wicken Fen Ramsar, Fenland Special Area of Conservation (SAC), and Devils Dyke SAC. The production of the Construction Environmental Management Plan (CEMP), the design, and the use of controls and permits should prevent any Likely Significant Effects (LSE) on these statutory designated sites. However, a Stage 1 Screening HRA for the Ramsar and SAC to determine LSE will be undertaken to assess the potential impacts from construction and operation.
- 1.4** Twenty-four nationally designated statutory sites are present within the 10km study area. These include 11 SSSI and eight SSSI impact risk zones, one of which is also classified as a NNR (Wicken Fen), and 13 Local Nature Reserve (LNR). Of these, eight SSSI's and all 13 LNRs are designated for biodiversity features. The closest two SSSIs are Wilbraham Fens SSSI and Stow-cum-Quy Fen SSSI. Further assessment is required to assess the potential hydrological and air quality impacts in more detail, although effects are likely to be low or insignificant. Twelve of the 13 LNRs are unlikely to be impacted as they were considered to be of a sufficient distance from the site and no impact pathways are anticipated; they are either south of the A14, south and west of Cambridge and/or south of Cambridge airport.
- 1.5** Four non-statutory designated sites known as County Wildlife Sites and City Wildlife Sites (CWS) have been scoped in for further consideration. There is potential for direct impact on three CWSs, including Low Fen Drove Way Grasslands and Hedges County Wildlife Site, Milton Road Hedgerows City Wildlife Site, and the River Cam County Wildlife Sites. There could be an indirect impact without mitigation on Allicky Farm Pond CWS due to hydrological links associated with the Proposed Development. Further assessment is required.
- 1.6** Further habitat and botanical surveys will be required including hedgerow surveys (to evaluate hedgerows against the criteria for 'important hedgerows' under the Hedgerow Regulations 1997) and national vegetation classification (NVC) surveys to collect detailed information on the terrestrial plants, habitats composition, and condition.

- 1.7** Within 5km of the Proposed Development (proposed WWTP area only), the background data search identified records of brown trout, likely from further upstream on the River Cam; and aquatic plant and invertebrate species associated with good quality wetland habitats. A study of the Waterbeach barracks area (Lane, 2015) revealed the presence of several Nationally Rare and Nationally Scarce water beetle species. The Waterbeach transfer pipeline for the Proposed Development may result in the loss of habitats supporting these species.
- 1.8** With regards to aquatic habitat constraints, the aquatic Zol of the Waterbeach transfer pipeline for the Proposed Development includes habitats which support locally uncommon aquatic plant species, indicating a localised clean water source such as groundwater connection.
- 1.9** The Proposed Development has the potential to support the following protected and notable species assemblages/groups:
- Roosting, foraging and commuting bats;
 - Badger *Meles meles*;
 - Breeding birds;
 - Barn owl *Tyto alba*;
 - Reptiles;
 - Great crested newt *Triturus cristatus*;
 - Terrestrial invertebrates;
 - Fish;
 - Aquatic macroinvertebrates;
 - White-clawed crayfish *Austropotamobius pallipes*; and
 - Macrophytes.
- 1.10** In addition to the groups/species listed above, the PEA and Aquatic Scoping Assessments identified suitable habitat for the following species, within the associated infrastructure corridor:
- Otter *Lutra lutra*;
 - Water vole *Arvicola amphibius*;
 - European eel *Anguilla anguilla*; and
 - Spined loach *Cobitis taenia*.
- 1.11** Further detailed ecological surveys for the above protected and notable species and assemblages are required to determine their presence, likely absence, or population size class to enable a detailed assessment of the likely impacts of the development proposals and appropriate mitigation and compensation measures to be developed.
- 1.12** Further macrophyte, aquatic plants, macroinvertebrate, and fish surveys are recommended for ponds, lakes streams, rivers, and ditches that are fully or partially located within the aquatic Zol. River Habitat Surveys (RHS) are also recommended for stream or river reaches where there is the potential for river physical habitat to be affected.
- 1.13** All recommendations for impact avoidance and mitigation are given in the report in line with the National Planning Policy Framework (NPPF) and best practice guidelines. The mitigation hierarchy should be followed to limit any negative impacts on biodiversity and achieve a biodiversity net gain (BNG). The sequential steps include avoidance measures, minimisation of impacts through mitigation, and as a last resort compensate for losses that cannot be avoided. With the implementation of habitat and species mitigation via a CEMP and compensation measures, such as the reinstatement of habitat following construction, habitat creation and the

planting of replacement species-rich grassland, hedgerows and woodlands to compensate for the loss of wildlife corridors, minimising surface runoff, discharge, sensitive timing of works and ecological enhancements, the impact from construction and operation would be reduced.

2 Introduction

2.1 Background

- 2.1.1 A site selection process, comprising a number of detailed appraisal steps was developed to identify sites that may be suitable for the relocation of the waste water treatment plant (WWTP) to replace the existing Cambridge WWTP.
- 2.1.2 One of the first steps was an Initial Options Appraisal, which examined the strategic issues to be considered in investigating relocation options, and also identified the most appropriate area in which to search for new WWTP sites. The Initial Options Appraisal concluded that the preferred solution for the relocation of the Cambridge WWTP would comprise a single new WWTP, within a Study Area covering the existing Cambridge and Waterbeach drainage catchment areas (Mott MacDonald Ltd, 2020).
- 2.1.3 The next steps in the process were Stage 1 – Initial Site Selection, Stage 2 – Coarse screening, and Stage 3 – Fine Screening of the shortlisted site areas. These steps have progressively looked in finer detail at each site option for the relocated WWTP. To date, the site selection exercise has assessed the suitability of potential site locations for the relocated WWTP including, in broad terms, the potential transfer infrastructure corridors to serve each site.
- 2.1.4 The final stage of the site selection process, Stage 4, applied the finest grain of screening to the three remaining shortlisted site areas and associated infrastructure requirements. The Stage 4 assessment used the information collated during the first four stages of the site selection process combined with the results of further technical feasibility assessments, initial environment walkover surveys and phase one consultation to assess each of the site area options against one another. The remaining shortlisted sites to be assessed were I, J and L, which will be referred to as site areas 1, 2 and 3, respectively, from this point onwards. Their location is shown in Figure 1 below. However, this PEA covers site area 3 only.

2.2 Site Location

- 2.2.1 The Proposed Development site area 3 is shown in Figure 1, and the different transfer infrastructure sub-options associated with the site area based on transfer corridor alignment and infrastructure type (particularly, whether the treated effluent returns to the River Cam through a tunnel or dual pipeline) is shown in Figure 2. Details of the Proposed Development and sub-options are listed below:
- i. Treated effluent transfer tunnel or pipeline to discharge location directly north of the A14 bridge on the east bank of the River Cam CWS.
 - ii. Sub-option (i) – Tunnel
 - iii. Sub-option (ii) – Pipeline
- 2.2.2 In addition to the above, the following infrastructure requirements will also be assessed alongside:
- An indicative WWTP location within the shortlisted site areas
 - A waste water transfer tunnel from the existing WWTP to the new WWTP
 - A waste water transfer pipeline from Waterbeach drainage catchment (the Waterbeach transfer pipeline)
 - Diversions of existing rising mains from other outlying villages

- Access to the WWTP site via the existing road network and any new private access roads required.

2.3 Scope of the Report

2.3.1 The purpose of the Preliminary Ecological Appraisal (PEA), which is the subject of this report is to:

- identify the likely ecological constraints associated with the proposed development;
- identify the habitats and designated sites within the Zone of Influence (ZoI) of the proposed options;
- assess the likelihood of protected species being present on, near or adjacent to proposed works;
- identify any mitigation measures likely to be required (following the mitigation hierarchy);
- identify additional ecological surveys that may be required to inform an Ecological Impact Assessment (EclA);
- help to inform the site selection process for the Stage 4 assessment; and identify opportunities to deliver ecological enhancement through the project.

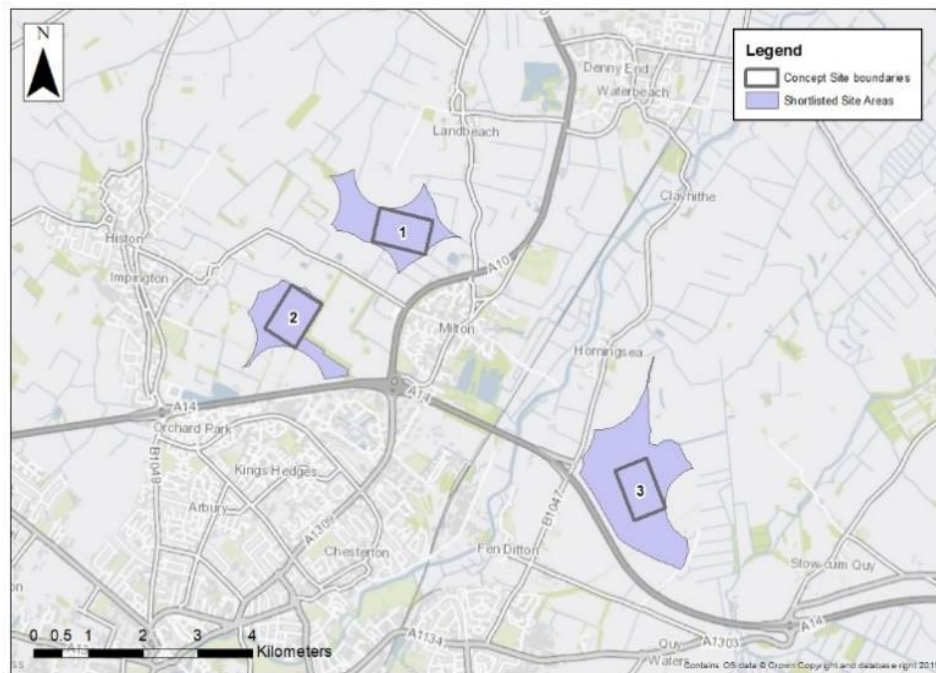


Figure 1: Proposed Development Shortlisted Site Areas

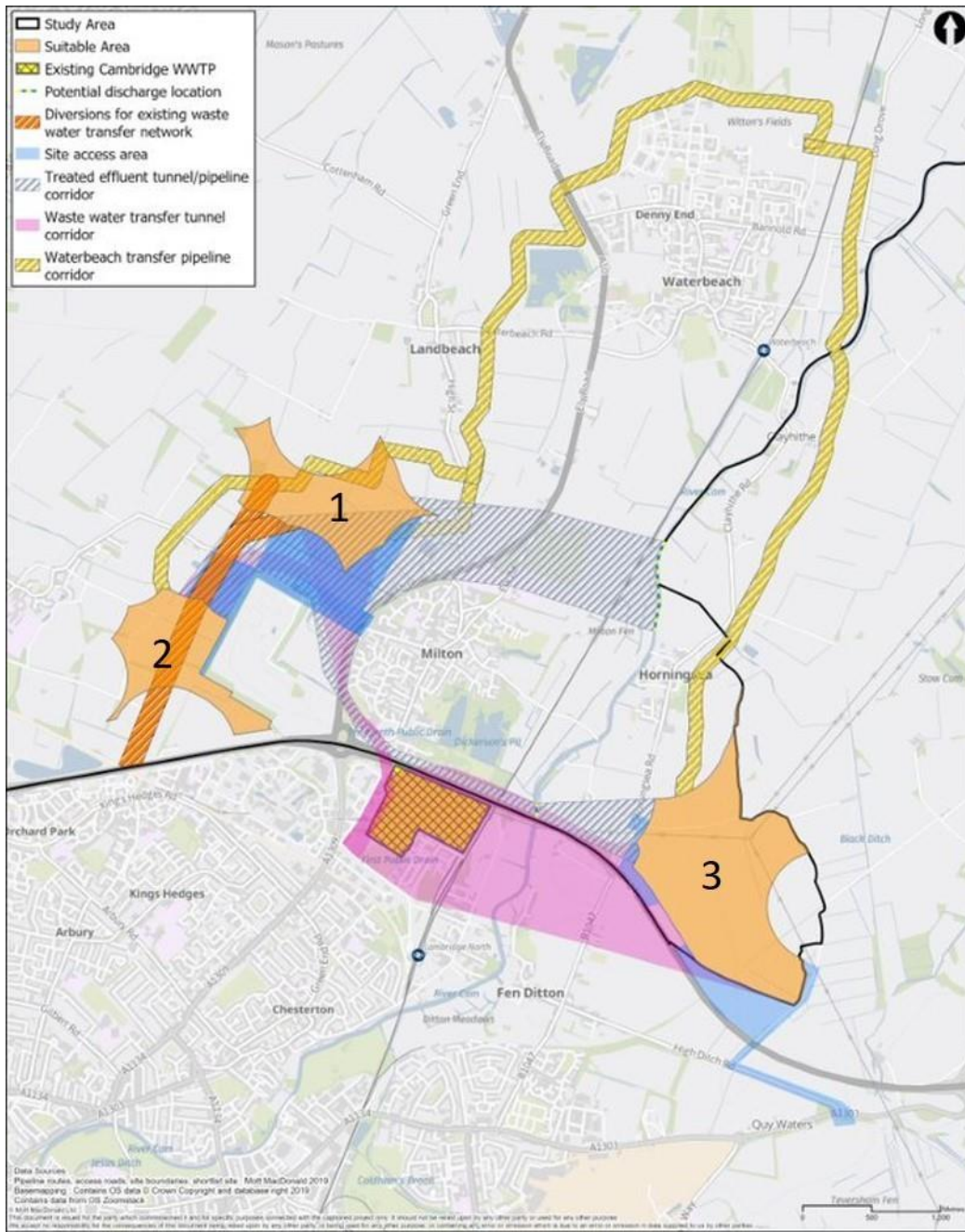


Figure 2: WWTW site areas and infrastructure sub-options

3 Legislation and Planning Policy

3.1 International Legislation Conventions

3.1.1 The construction and operational activities for the development should comply with International legislation. The following EC Directives and international conventions are relevant to the ecological assessment:

- Convention on Biological Diversity 1992;
- Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979);
- Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979); and
- Ramsar Convention on Wetlands of International Importance 1971.

3.2 National Legislation and Planning Policy

3.2.1 The construction and operational activities must comply with UK nature conversation legislation, and with national and local biodiversity policies. International agreements and directives are implemented through domestic legislation. The following lists key legislation relating to wildlife and nature conservation in England:

- The Conservation of Habitats and Species Regulations 2017 (as amended);
- Wildlife and Countryside Act 1981 (as amended);
- The Natural Environment and Rural Communities Act 2006 (the NERC act);
- UK Environmental Bill 2020;
- Animal Welfare Act 2006;
- National Planning Policy Framework (NPPF) 2019; and
- UK Post-2010 Biodiversity Framework.
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

3.2.2 Under the Natural Environment and Rural Communities (NERC) Act 2006, all public bodies are required to have regard to biodiversity conservation when carrying out their function. Under this act a list of habitats and species that are of principal importance for the conservation of biodiversity in England are published under Section 41 (S41). These include those former UK Biodiversity Action Plan (UK BAP) priority habitats and species that occur in England.

3.2.3 Schedule 15 of the UK Environmental Bill 2020 indicates that all new development should include biodiversity net gain, as a planning condition under the Town and Country Planning Act 1990 (DEFRA. 2020). To deliver biodiversity net gain measures for development, the net gain requirements are calculated through a metric based system referred to as the “Defra Metric 2.0” and the system calculates these requirements, based upon habitat area, distinctiveness, condition, connectivity and difficulty of delivering habitat creation/restoration measures. The biodiversity net gain metric calculation permits local planning authorities to have clear and objective biodiversity information as part of the biodiversity net gain plan and achieve biodiversity net gain as required under the NERC Act 2006, NPPF and UK environmental Bill 2020 (Natural England, 2020).

3.2.4 The NPPF sets out the government’s planning policies for England and includes references to conserving and enhancing the natural environment. The NPPF requires Local Authorities in England to take measures to:

- Conserve and enhance biodiversity;
- Protect the habitats of these species from further decline;
- Protect the species from the adverse effect of development; and
- Refuse planning permission for development, if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts) adequately mitigated, or, as a last resort, compensated for.

3.2.5 The UK Post-2010 Biodiversity Framework covers the period 2011 - 2020 and replaces the UK Biodiversity Action Plan (UKBAP) 1994 – 2010. Its aim is to address the underlying causes of biodiversity loss and improve and enhance biodiversity and ecosystem services. The UKBAP priority habitats and species background information is still widely used at country level.

3.2.6 Legislation to individual species likely to be present on site are presented in Appendix B.

3.3 Local Planning Policy

3.3.1 A number of relevant planning policies relating to ecology and biodiversity are set out within the following documents:

- The South Cambridgeshire Local Plan (South Cambridgeshire District Council, 2018)
- Cambridge Northern Fringe East Action Plan (South Cambridgeshire District Council, 2010).
- Cambridge East Area Action Plan (South Cambridgeshire District Council, 2008).
- The Cambridge Local Plan (Cambridge City Council, 2018). The Cambridge Local Plan forms part of the Development Plan for Cambridge. The local plan sets out the vision, policies and proposals for the future development and land use in Cambridge to 2031.
- Cambridge City Nature Conservation Strategy aims to guide nature conservation activities to enhance the biodiversity and nature conservation value of the City of Cambridge through the planning process (Cambridge City Council, 2006). The main aim of the conservation strategy is “To ensure the City has a strong green structure with an accessible network of green spaces rich in biodiversity”. The local plan provides a detailed vision for biodiversity based on achieving a “net gain” in biodiversity and building an ecological network.
- Waterbeach Neighbourhood Plan (Waterbeach Parish Council, 2019). The neighbourhood plan identifies important sites for biodiversity, such as coastal and floodplain grazing marsh sites within the Waterbeach transfer pipeline for site 3, and these sites are to be protected and enhanced by management plans. Any development proposals must contribute to the biodiversity of these sites rather than detract from them.
- National Policy Statement for Waste Water (DEFRA, 2012). The policy statement underlines a framework document for the planning decisions on nationally significant waste water infrastructure. The document states “where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species, and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The applicant should provide environmental information proportionate to the infrastructure where EIA is not required. The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests”.

- 3.3.2 Cambridgeshire and Peterborough Biodiversity Partnership Group and 20 Local planning policies specific to individual species likely to be present on site are presented in Appendix B.

3.4 Local Biodiversity Action Plan

Cambridgeshire and Peterborough Local Biodiversity Action Plan

- 3.4.1 The Cambridgeshire and Peterborough Local Biodiversity Action Plan sets out a list of over 200 UK priority habitats and species that are in decline in Cambridgeshire and Peterborough and require conservation efforts to halt their decline. The presence of priority species and habitats are to be determined for a planning application, and where applicable practical conservation efforts are to be implemented as part of mitigation and biodiversity enhancement to grant planning permission (Cambridgeshire and Peterborough Biodiversity Partnership Group, 2020).

3.5 Green Infrastructure Strategies or Initiatives

National Trust's Wicken Fen Vision

- 3.5.1 Site area 3 includes part of the National Trust's Wicken Fen Vision area. The 100-year vision aims to restore habitats and create a landscape-scale space for people and wildlife between Cambridge and the Wicken Fen Nature Reserve. The vision is a strategic element of green infrastructure in the adopted development plans for both South Cambridgeshire District Council (adopted 2018) and East Cambridgeshire District Council (adopted 2015) (National Trust, 1999).

Cambridgeshire Strategic Green Infrastructure Network

- 3.5.2 Site area 3 also includes part of the proposed Cambridgeshire Strategic Green Infrastructure Network (Strategic Network Area 6: Cambridge and Surrounding Areas). The strategy is used to design green infrastructure across Cambridgeshire County by implementing these four objectives (Cambridge City Council, 2011):
- Reverse the decline in biodiversity;
 - Mitigate and adapt to climate change;
 - Promote sustainable growth and economic development; and
 - Support healthy living and wellbeing.

4 Methodology

4.1 Study Area and Zone of Influence

4.1.1 The current guidance on ecological assessments recommends that all ecological features that occur within a Zol for a proposed scheme are investigated (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018). The potential Zol includes:

- Areas to be directly affected within the land take for the proposed scheme and access;
- Areas that would be temporarily affected during construction;
- Areas likely to be impacted by hydrological disruption; and
- Areas where there is a risk of pollution and noise disturbance during construction and/or operation.

4.1.2 The Zol is normally variable, depending on the ecological features concerned. The following study areas have been used to gather information on ecological features with the potential to be affected by the Scheme:

- 10km from the boundary of the Proposed Development for statutory designated sites such as international designated nature conservation sites, including Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar Sites in line with Guidelines for Preliminary Ecological Appraisal, (CIEEM, 2017) on European sites (including Appropriate Assessment) and nationally designated sites, including Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), and Local Nature Reserves (LNRs);
- 10km from the boundary of the Proposed Development for SACs designated for bat populations also in line CIEEM's Guidelines for Ecological Impact Assessment (CIEEM, 2018) with on European sites (including Appropriate Assessment);
- 5km from the boundary of the Proposed Development for non-statutory designated nature conservation sites including County Wildlife Sites and City Wildlife Sites (CWS). This study area has been defined by professional judgement to ensure that all potential effects were identified within the Zol;
- 5km from the boundary of the Proposed Development for local biological records of protected species and or notable species. A 5km radius of a central point (grid reference: TL 49740 61214) in the new WWTP site area was used.
- 500m from the boundary of the Proposed Development for a review of historical great crested newt *Triturus cristatus* (GCN) environmental DNA (eDNA) pond surveys for district level licensing, and GCN Class licence survey returns; and
- 100m from the boundary of the Proposed Development for the extended Phase 1 habitat survey and 250m from the boundary of the proposed options to identify ponds and waterbodies. This study area was defined through professional judgement and the Cambridge WWTP Relocation - Initial Options Appraisal, to ensure that all habitats were identified within the vicinity of the Scheme and to inform the forthcoming Phase 2 protected species surveys.

4.2 Background Data Search (BDS)

4.2.1 A data search was undertaken in August 2020 for reference materials relating to the ecology of the proposed scheme and its wider context. A list of sources is given in Table 1.

4.2.2 The desk study records were considered historic if they are more than 10 years old and unlikely to provide relevant information to inform the baseline for the assessment.

Table 1: Data sources for background data search

Information obtained	Obtained from
Protected and notable species records Non-statutory designated sites	Biological records within a 5km Zol of the site area was provided by Anglian Water (who acquired the records from the Cambridgeshire and Peterborough Environmental Records Centre) in August 2020. This included protected and notable species, Ancient Woodlands and non-statutory designated sites known as County Wildlife Sites and City Wildlife Sites (CWS). Protected and notable species included: Species of Principal Importance (SPI) in England for the Conservation of Biodiversity listed under Section 41 of the Natural Environment & Rural Communities (NERC) Act 2006; Local Biodiversity Action Plan (LBAP) ¹ , species; Cambridgeshire and Peterborough Biodiversity Partnership, have developed their own local list of SPI, which are selected based upon the National Biodiversity Action Plan which is now known as the "UK Priority Habitats and Species" and the LBAP list of species available from the Cambridgeshire and Peterborough Biodiversity Group website ² . Species listed on the schedules of the Wildlife and Countryside Act, 1981 (as amended); Red List species that are designated as "Nationally rare" (i.e. occurring in 15 or fewer hectads in Great Britain) or "Nationally scarce" (i.e. occurring in 16-100 hectads in Great Britain), excluding rare species qualifying under main International Union for the Conservation of Nature (IUCN) criteria Responses from the stakeholder consultation, which included references to the presence of protected and notable species in specific locations.
Statutory designated site locations and citations	The Zol was extended to 10km for statutory designated sites. Sites of Special Scientific Interest (SSSI) impact risk zones (IRZ) ² were also reviewed. The results are shown in Appendix C. Online databases including Multi Agency Geographic Information for the Countryside (MAGIC) ³ and the Joint Nature Conservation Committee (JNCC) were consulted to identify and locate qualifying features of interest for SSSI IRZ and Local Nature Reserves (LNR). Any Special Areas for Conservation (SAC) designated for bats within 10km was also recorded. The results are shown in Appendix C.
Great crested newt data	The review of historical great crested newt (GCN) environmental DNA (eDNA) pond surveys for district level licensing and GCN Class licence survey returns within a 500m Zol around each of the proposed site areas and their associated corridors and access areas. This assessment was conducted because there is Natural England open source data for GCN unlike for other European Protected Species (EPS). This included, where required an assessment of the likelihood of GCN being present within a 500m Zol around each of the proposed site areas and their associated corridors and access areas if records were absent.
European protected species (EPS) licence applications	Use of MAGIC website to review historical EPS licence applications within 5km of the site areas. The results are shown in Appendix D.
Phase 1 habitats and Habitats of Principal	Use of aerial imagery, Master Map (OS high detail base mapping to determine Phase 1 habitats), and Natural England's open source data set for Priority Habitat Inventory ⁴ to assess broad habitat types and to identify the presence of Habitats

¹ Cambridgeshire and Peterborough Biodiversity Group, (2020). Priority Species and Habitats. Available online: <http://www.cpbiodiversity.org.uk/habitats>

² Natural England (2019) Natural England's Impact Risk Zones for Sites of Special Scientific Interest, (For use by Local Planning Authorities to assess planning applications for likely impacts on SSSIs/SACs/SPAs & Ramsar sites and determine when to consult Natural England), The Impact Risk Zones (IRZs) are a GIS tool developed by Natural England to make a rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts. The IRZs also cover the interest features and sensitivities of European sites, which are underpinned by the SSSI designation and "Compensation Sites", which have been secured as compensation for impacts on European/Ramsar sites. Available online: https://magic.defra.gov.uk/Metadata_for_magic/SSSI%20IRZ%20User%20Guidance%20MAGIC.pdf

³ <https://magic.defra.gov.uk/>

⁴ <https://data.gov.uk/dataset/4b6ddb7-6c0f-4407-946e-d6499f19fcde/priority-habitat-inventory-england> Habitats of Principal Importance (previously referred to as BAP priority habitats) are of material consideration for planning purposes. The list of habitats are derived from Section 41 list of the Natural Environmental and Rural Communities (NERC) Act 2006. There are 65

Information obtained	Obtained from
Importance (priority habitats)	of Principal Importance (HPI; listed under Section 41 of the Natural Environment & Rural Communities (NERC) Act 2006), LBAP habitats, and ancient woodland inventories within each of the indicative proposed site areas and their associated corridors and access areas.

4.3 Field Survey

Personnel

- 4.3.1 Field surveys were completed by Mott MacDonald Ecologists between July 2020 and November 2020. All surveys were undertaken by experienced Mott MacDonald ecologists meeting the CIEEM survey competencies.

Preliminary Ecological Appraisal

- 4.3.2 The Preliminary Ecological Appraisal field visit involved an extended Phase 1 habitat survey, which recorded habitats within 100m of the Proposed Development and an assessment of the habitats suitability to support protected or notable species.

Extended Phase 1 Habitat Survey

- 4.3.3 The BDS identified broad habitat types within 100m of the scheme extent ("100m ZoI"), using aerial imagery and Master Map (OS high detail base mapping to determine Phase 1 habitats) in accordance with the Handbook for Phase 1 Habitat Survey (JNCC, 2010). This approach provided a baseline of likely habitats present in which the extended Phase 1 habitat survey would ground-truth and add detail to. During the extended Phase 1 habitat survey, the habitats within the ZoI were 'ground-truthed'⁵ and classified according to JNCC habitat types, using electronic tablets and ArcGIS. Where possible, plant species were identified to species level. The species lists were compiled and incorporated into the Phase 1 habitat survey target notes. The Phase 1 habitat plans are shown in Appendix A and photographs of the site are in Appendix F. Target notes are available in the GIS spatial dataset.
- 4.3.4 In areas where there is more residential development, the survey areas are likely to be restricted in extent and limited to the route and areas with public access. Where possible, the extended Phase 1 habitat survey will be completed up to 100m from the scheme, however, if the 100m buffer includes small land parcels dominated by residential homes and small gardens, these areas will not always require a survey.
- 4.3.5 The habitat classification system allows an area to be described according to its vegetative structure and content. Species lists are noted in areas considered particularly noteworthy or typical of the survey area. In some cases, plant species are given a code (see Table 2: DAFOR Scale of Relative Abundance) identifying its relative abundance within the habitat. Once habitats were classified during the field survey, ArcGIS was used to calculate total habitat area and length within 100m of the scheme extent (see Appendix E).

Habitats of Principal Importance on the Section 41 list. These are habitats in England that were identified as requiring action in the UK BAP and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. They include terrestrial habitats such as upland hay meadows to lowland mixed deciduous woodland, and freshwater and marine habitats

⁵ Habitats mapped at BDS stage were then ground-truthed, i.e. the classification of broad habitat types was checked for accuracy by means of on-site observation.

Table 2: DAFOR Scale of Relative Abundance

Reference	Description	Percentage Cover
D	Dominant	>75%
A	Abundant	51 - 75%
F	Frequent	26 - 50%
O	Occasional	11 - 25%
R	Rare	1 - 10%

Protected and Notable Species Assessment

- 4.3.6 The suitability of the area within 100m of the scheme extent for protected and notable species was assessed. The assessment used a combination of local records, geographical distribution, field signs and the condition of habitats to support protected or notable species. From this initial assessment, additional protected or notable species surveys may be recommended and/or required. The assessment was based on professional judgement and best practice survey guidance methodologies for identifying field signs of protected species. As with the extended Phase 1 habitat survey, the survey findings were recorded on an electronic tablet with access to Survey 123 and ArcGIS.
- 4.3.7 The extended Phase 1 habitat survey identified habitats or features of potential significance for protected species and recorded these as target notes. Target notes are available in the GIS spatial dataset. A selection of photographs has also been provided in Appendix F, the photos include habitats, which have the potential to support protected species and photos of species presence.
- 4.3.8 A terrestrial invertebrate scoping survey was completed in September 2020 and is provided in a separate report (Lane, 2020). The results from this terrestrial invertebrate scoping survey report were reviewed and also summarised within this report.

Great Crested Newt Habitat Suitability Index Assessment

- 4.3.9 The methodology used for the GCN Habitat Suitability Index (HSI) survey is in accordance with the guidelines produced by Oldham et al. (2000).
- 4.3.10 The assessment calculates a score of habitat suitability for all accessible waterbodies to support GCN based upon the following ten suitability indices:
1. Geographic location;
 2. Pond or ditch area;
 3. Pond or ditch permanence;
 4. Water quality;
 5. Shading;
 6. Presence of waterfowl;
 7. Presence of fish;
 8. Pond density in the area;
 9. Terrestrial habitat quality; and
 10. Macrophyte cover in waterbody.
- 4.3.11 The locations of waterbodies within a 250m radius of the site boundary (herein referred to as the Zol for GCN) were identified via GIS using aerial imagery and review of a 1:10,000 scale Ordnance Survey map. Relevant local landowners were contacted in advance of the survey in order to gain access to waterbodies.
- 4.3.12 The HSI assessment score is used to determine the likelihood for great crested newt to be present within the Zol of the scheme. The HSI assessments assign a suitability score to

each waterbody from poor to excellent (see Table 3: Categorisation of HIS scores³ below). In general, ponds with high HSI scores (average, good or excellent) are more likely to support GCN than those with low scores (below average or poor). The habitat suitability score is used to inform the need for further survey effort, rather than an alternative to surveys. A table outlining each HSI score is available in Appendix G.

Table 3: Categorisation of HIS scores

HSI Score	Pond Suitability
< 0.50	Poor
0.50 - 0.59	Below average
0.60 - 0.69	Average
0.70 - 0.79	Good
> 0.80	Excellent

Aquatic Habitat Scoping Assessment

- 4.3.13 The aquatic habitat scoping assessment was conducted on all known waterbodies within a 100m buffer of the scheme extent, herein referred to as the aquatic ZoI. Waterbodies within the aquatic ZoI were identified via GIS using aerial imagery and review of a 1:10,000 scale Ordnance Survey map of the local area.
- 4.3.14 This assessments were led by Freshwater Ecologists from Mott MacDonald. Surveys were conducted between July and October 2020, inclusive.
- 4.3.15 The aims of the aquatic habitat scoping assessment were to determine the potential for waterbodies to support aquatic biological communities (e.g. fish, macrophytes and macroinvertebrates), and the potential to support protected or notable aquatic species.
- 4.3.16 A methodology was devised in order to enable a rapid assessment of the large number of waterbodies within the aquatic ZoI. The first stage of the assessment was to characterise the waterbody as either a pond/lake, river/stream, or ditch. The following pro forma was developed to guide the assessment of ponds and lakes (see Table 4: Habitat scoping assessment survey proforma⁴ below). Survey results were recorded on an electronic tablet with access to ArcGIS.

Table 4: Habitat scoping assessment survey proforma

Waterbody type	Lake or pond / river or stream / ditch
Dry	Yes / No
Water depth	cm (record as 'dry' if applicable)
Water clarity	Bed not visible / bed semi-visible / bed clearly visible
Flow type	NA / disconnected pools / pool / glide / run / riffle / no perceptible flow (NPF)
Bank characteristics	Substrate - artificial / clay / earth Vegetation structure - bare / uniform / simple / complex
Bed substrate	Artificial / earth / peat / clay / silt / sand / gravel / cobble / boulder / bed rock / not visible

Aquatic plants	Approximate % cover of lake/pond area Number of species
Other notable features	Add description if applicable e.g. overhanging trees
Aquatic community suitability	Fish / macrophytes / macroinvertebrates
Potential to support protected species	List potential protected species

- 4.3.17 Characterisation of bank vegetation of all waterbody types was based on the River Habitat Survey (RHS) methodology (Environmental Agency, 2003). A classification of ‘uniform’ indicates that bank vegetation was predominantly comprised of one type of vegetation, ‘simple’ indicates that two or three vegetation types were present, and ‘complex’ indicates that four or more vegetation types were present. Vegetation types include bryophytes, short/creeping herbs or grasses, tall herbs/grasses, scrub, sapling and trees.
- 4.3.18 Waterbodies encountered in the field that have not been identified during the desk-based GIS and OS map review of sites, were also assessed in accordance with this methodology.
- 4.3.19 Additional observations of aquatic habitats were made on waterbodies outside of the aquatic ZoI where the lead surveyor judged this information was useful in meeting the aims of this study. These observations included understanding the connectivity of drains which extended outside the aquatic ZoI, important features or modifications, and the presence of invasive non-native species (INNS).
- 4.3.20 Sites were assessed for their suitability to support aquatic communities and protected species based on the evidence encountered on the day of survey in terms of the presence of water, physical nature of habitats, and ecological communities observed. However, it should be noted that water level in all surveyed waterbodies, including ditches, is likely to vary in response to climate variation and season.
- 4.3.21 The findings of the aquatic habitat scoping assessment were reviewed to determine the need for further targeted surveys of aquatic communities and protected species. This assessment was based on an over-arching review of the survey data, in addition to assessment of individual sites. It was informed by professional expertise and relevant survey guidance.

4.4 Survey Constraints and Limitations

- 4.4.1 It should be noted that the absence of certain protected or rare species does not preclude their presence on a site. There is always the risk of protected or rare species being overlooked, either owing to the timing of the survey or the scarcity of the species at the site.
- 4.4.2 Field surveys were confined to locations where land access permission has been granted. Where access was not available, surveys were undertaken from Public Rights of Way (PRoW), and information from aerial imagery, Master Map (OS high detail base mapping to determine Phase 1 habitats), and Natural England’s open source data set for Priority Habitat Inventory (Natural England, 2020) was used to supplement the surveys.
- 4.4.3 Due to delays with land access, the calculations of habitat area/length and target note data presented in the appendices were extracted from survey data stored on ArcGIS up to 30 September 2020. The land parcels that were not included in the appendix tables were along the eastern boundary of the 100m ZoI of Waterbeach transfer pipeline along Horningsea High street. Land access permission for the remaining land parcels was granted in October and November 2020 and the remaining surveys for these land parcels were completed. The data has been incorporated into this report; however, the land parcel’s habitat area and lengths are not included in Appendix E.

- 4.4.4 There are land parcels where land access permission was not granted within the 100m ZoI for the Waterbeach transfer pipeline (east of Horningsea High street). These land parcels do not require a PEA or an Aquatic Habitat Scoping Assessment, as the land parcels consist of residential buildings and small back gardens. Sufficient habitat survey data was collected from aerial maps and adjacent land parcel surveys to ascertain broad habitat types present and the absence of aquatic habitats (waterbodies, watercourses, and ponds). However, the buildings are likely to have the potential to support roosting bats as well as trees in the back gardens, but these will not be directly impacted by the Waterbeach transfer pipeline.
- 4.4.5 The October and November 2020 habitat surveys were completed outside the recommended season for Phase 1 habitat surveys, which is April to September (in accordance with the JNCC Handbook for Phase 1 Habitat Survey). However, most of the survey coverage was completed during the optimal season (July-September) and sub-optimal surveys were completed when vegetation was still visible to undertake an assessment of habitat types and a suitable species list was recorded.
- 4.4.6 The area south of the A14 and east of the existing WWTP, which falls within the waste water transfer tunnel footprint were not included in the 2020 PEA. These areas were not originally thought to be impacted by the waste water transfer tunnel, due to the location of the shafts being within the existing WWTP and the proposed WWTP. However, due to design changes since 2020, there are two shafts proposed within fields south of the A14. A PEA of this area will be undertaken along with any other recommended further ecological surveys.

5 Results

5.1 Background Data Search

Statutory Designated Sites

- 5.1.1 The BDS identified three internationally designated sites within 10km of the Proposed Development associated infrastructure. These are:
- Wicken Fen Ramsar;
 - Fenland SAC; and
 - Devil's Dyke SAC.
- 5.1.2 The Proposed Development is within 10km of Wicken Fen Ramsar, Fenland SAC and Devil's Dyke SAC. The associated infrastructure is within 10km of Wicken Fen Ramsar and Fenland SAC.
- 5.1.3 There are 24 nationally designated statutory sites are present within the 10km study area. These include 11 SSSIs, one of which is also classified as a NNR (Wicken Fen), and 13 Local Nature Reserve (LNR). Of these, eight SSSIs and all 13 LNRs are designated for biodiversity features.
- 5.1.4 One NNR known as Wicken Fen NNR is present within 10km of the Proposed Development. Wicken Fen NNR has the same boundary as the Fenland SAC, Wicken Fen Ramsar and SSSI designations.
- 5.1.5 There are 13 LNRs within 10km of the Proposed Development, however 12 of these have been excluded from this assessment as they were considered to be of a sufficient distance from the site with no impact pathways anticipated; they are either south of the A14, south and west of Cambridge, and/or south of Cambridge airport.
- 5.1.6 An overview of the statutory designated sites (biological) scoped in for further assessment is given in Table 5: List of Designated Site. The location of the statutory designated sites is provided in Appendix A, Figure A.1.
- 5.1.7 A list of the designated sites, their areas, distances from the site and its associated infrastructure, and designation citation is provided in Appendix C.

Table 5: List of Designated Sites

Wicken Fen Ramsar, SSSI, NNR
Fenland SAC
Devils Dyke SAC
Stow-cum-Quy-Fen SSSI
Wilbraham Fens
Cam Washes
Great Wilbraham Common
Fulbourn Fen
Devil's Dyke
Worts Meadow LNR

Non-statutory Designated Sites

There were 58 CWSs within 5km of the Proposed Development (total area).

However, only four of these sites have been scoped in for further consideration; the rest were considered to be of a sufficient distance from the site and no impact pathways have been identified. The non-statutory designated sites scoped in for further assessment include:

- Milton Road Hedgerows City Wildlife Site (CWS);
- Allicky Farm Pond County Wildlife Site (CWS);
- River Cam County Wildlife Site (CWS); and
- Low Fen Drove Way Grasslands and Hedges County Wildlife Site (CWS).

5.1.8 The location of the non-statutory designated sites is provided in Appendix A, Figure A.2, list of these sites, their areas, distances from each site area and its associated infrastructure, and designation citation is provided in Appendix C.

5.1.9 No ancient woodland was present within the scheme's footprint or within 500m of the scheme extent.

Protected and Notable Species

5.1.10 The BDS identified records of protected and notable species within 5km of the Proposed Development (site area only). A detailed list of species is listed in Appendix D and these records have been considered within the report for protected and notable species assessments. The records of protected and notable species within the scheme extent and within a 100m Zol from the boundary of the scheme extent are listed in Appendix D and Table 6. These records are used to assess the suitability of habitats to support protected or notable species.

Table 6: Protected and notable species within the Zol

Common Name	
Brown long-eared bat roost	<i>Plecotus auritus</i>
Grass snake	<i>Natrix helvetica</i>
European otter	<i>Lutra lutra</i>
European water vole	<i>Arvicola amphibius</i>
Eurasian badger	<i>Meles meles</i>
Polecat	<i>Mustela putorius</i>
Grey partridge	<i>Perdix perdix</i>
Barn owl	<i>Tyto alba</i>
Black poplar	<i>Populus nigra subsp. betulifolia</i>

5.2 Field Survey

Habitats

5.2.1 The Phase 1 habitat plan is within Appendix A (Figures A.3, A.3a, A.3b, A.3c). The areas (in ha) and lengths (in km) of the habitats within the Proposed Development and its associated infrastructure corridors are provided in Appendix E.

Broadleaved woodland

- 5.2.2 There were no large expanses of woodland within the proposed WWTP site. Woodland in the proposed WWTP site was generally small, isolated and fragmented copses of semi-natural broadleaved woodland, such as a copse south-east of the proposed WWTP site and two blocks west and north of Long Fen Drove Way, within the proposed WWTP site. The woodlands were dominated by common ash *Fraxinus excelsior*, pedunculate oak *Quercus robur* and field maple *Acer campestre* with occasional elm *Ulmus minor* and ground flora of; cow parsley *Anthriscus sylvestris*, white deadnettle *Lamium album* and false brome *Brachypodium sylvaticum*. There was a small patch of broadleaved woodland north of the dismantled railway, within the indicative WWTP footprint and the habitat consists of; horse chestnut *Aesculus hippocastanum*, field maple and hazel *Corylus avellana*.
- 5.2.3 The Waterbeach transfer pipeline intersects a number of isolated semi-natural and plantation broadleaved woodland shelterbelts used as windbreaks. Two of these shelterbelts were dominated by elm and ash with dead and standing wood. One shelterbelt supports a diverse range of species including; Swedish whitebeam *Sorbus intermedia*, mature common ash and common lime *Tilia x europaea* trees with a dense shrub layer of coppiced hazel, dogwood *Cornus sanguinea* and bramble *Rubus fruticosus agg.* There was a patch of broadleaved woodland, east of Horningsea Road within the 100m Zol of the Waterbeach transfer pipeline, the woodland has a sparse understorey and was dominated by hazel, sycamore *Acer pseudoplatanus* and silver birch *Betula pendula*.
- 5.2.4 An abundance of managed semi-natural and areas of broadleaved woodland plantation were recorded at Milton Country Park. These habitats were within the waste water transfer tunnel and consist of poplar *Populus spp.*, crack willow *Salix x fragilis*, white willow *Salix alba*, common ash, common nettle *Urtica dioica* and ground ivy *Glechoma hederacea*.
- 5.2.5 There was an isolated patch of semi-natural broadleaved woodland, north of the A14 at Junction 34. This habitat was within the treated effluent transfer tunnel or pipeline and waste water transfer tunnel and consist of sycamore, elder *Sambucus nigra*, bramble, ground ivy and common nettle.
- 5.2.6 There were patches of semi-natural broadleaved woodland adjacent to High Ditch Road and the A1303. This habitat was within the access area and consist of pedunculate oak, cherry *Prunus sp.*, bramble and common hawthorn *Crataegus monogyna*.
- 5.2.7 There was a managed mixed orchard east of Horningsea High Street, within a 100m Zol of the Waterbeach transfer pipeline. Species included apple spp *Malus spp.*

Mixed Woodland

- 5.2.8 There is an area of mixed woodland known as Milton Road and Hedgerows CWS, adjacent to Cowley Road and falls within the waste water transfer tunnel. Species include horse chestnut, yew *Taxus baccata*, lime and elder.

Broadleaved parkland/scattered trees

- 5.2.9 There were a number of ash and sycamore trees scattered throughout the footprint of the treated effluent transfer tunnel or pipeline.
- 5.2.10 The Waterbeach transfer pipeline has areas of scattered trees, including adjacent to the River Cam CWS and the Long Drove Road. Species include horse chestnut, crack willow and osier *Salix viminalis*.
- 5.2.11 There were two veteran pedunculate oak trees east of Horningsea Road within the footprint of the Waterbeach transfer pipeline.

- 5.2.12 There was a line of black poplar *Populus x canadensis*, white willow, sycamore, pedunculate oak, field maple and common ash trees along the south-western and southern boundaries of the existing WWTP.

Scrub

- 5.2.13 There were small patches of dense and scattered hawthorn scrub recorded throughout the Waterbeach transfer pipeline at sites north of the River Cam CWS.

Tall ruderal vegetation

- 5.2.14 The Waterbeach transfer pipeline crosses one patch of tall ruderal vegetation adjacent to the River Cam CWS. The tenant informed the surveyors the vegetation was annually mown and dominated by hemlock *Conium maculatum*, creeping thistle *Cirsium arvense* and common nettle.

Semi-improved neutral grassland

- 5.2.15 The dismantled railway track (known as Low Fen Drove Way Grasslands and Hedges CWS) in the south of the proposed WWTP has a strip of rough grassland dominated by cock's-foot *Dactylis glomerata* and false oat-grass *Arrhenatherum elatius* and frequent creeping cinquefoil *Potentilla reptans*, bramble, creeping thistle, yarrow *Achillea millefolium* and common nettle.
- 5.2.16 There was one field margin of semi-improved neutral grassland within the Waterbeach transfer pipeline adjacent to Horningsea Road. The grassland was dominated by cock's-foot, meadow fescue *Schedonorus pratensis* and false oat-grass.
- 5.2.17 There was one field of semi-improved neutral grassland within the existing WWTP, south of the A14. The grassland was dominated by cock's-foot, perennial rye-grass *Lolium perenne*, false oat-grass, creeping cinquefoil *Potentilla reptans* and hemlock.

Poor semi-improved grassland

- 5.2.18 The Waterbeach transfer pipeline intersects field margins of poor semi-improved grassland north of the River Cam CWS (Coastal and Floodplain Grazing Marsh HPI). The tenant informed the surveyors the vegetation was mowed annually and consisted of false oat-grass, red fescue *Festuca rubra*, yarrow, oxeye daisy *Leucanthemum vulgare* and common bird's-foot-trefoil *Lotus corniculatus*.

Improved grassland

- 5.2.19 There were margins of improved grassland on either side of Low Fen Drove Grassland and Hedges CWS, which were frequently mown, consisting of cock's-foot and daisy *Bellis perennis* within the site access area.
- 5.2.20 There was a patch of improved grassland south-east of High Ditch Road. The grassland was dominated by perennial rye-grass with occasional cock's-foot.
- 5.2.21 There were fields of improved grassland with various sward heights and grazing pressure, south-east of Burgess Drove and east of Clayhithe Road and Horningsea Road. These habitats consist of false oat-grass, cock's-foot, meadow foxtail *Alopecurus pratensis* and perennial rye-grass.

Swamp

- 5.2.22 There was a small area of swamp habitat within the footprint of the Waterbeach transfer pipeline west of Long Drove road. This habitat was dominated by tall vegetation, mainly comprising of common reed *Phragmites australis*.

Standing water

- 5.2.23 The Waterbeach transfer pipeline has a network of wet drainage ditches north of the River Cam CWS, which support marginal plants such as common reedmace *Typha sp.* These ditches were showing signs of eutrophication.
- 5.2.24 The treated effluent transfer tunnel or pipeline has a network of wet drainage ditches east of the River Cam CWS, which support marginal plants such as common reedmace. These ditches were showing signs of eutrophication.

Running water

- 5.2.25 The Waterbeach transfer pipeline and treated effluent transfer tunnel or pipeline intersects the River Cam CWS, a large open span river which supports marginal vegetation such as common reed, common reedmace, and branched bur-reed *Sparganium erectum*.

Arable

- 5.2.26 Arable fields dominate the proposed WWTP site, the Waterbeach transfer pipeline and the treated effluent transfer tunnel or pipeline. The majority of the fields were ploughed and used to grow a wheat and potato crop.
- 5.2.27 There was an arable field east of the River Cam CWS and within the treated effluent transfer tunnel or pipeline and waste water transfer tunnel for the proposed WWTP. The habitat was a monocrop of bristly ox-tongue *Picris echioides* and seeded as a cover crop.
- 5.2.28 There were incidental records of dwarf spurge *Euphobia exigua* and round-leaved fluellen *Kickxia spuria*, within the arable fields of the proposed WWTP site.

Amenity grassland

- 5.2.29 There were numerous patches of amenity grassland which were gardens belonging to residential properties scattered throughout the Waterbeach transfer pipeline.

Ephemeral and short perennial

- 5.2.30 There was a patch of ephemeral and short perennial habitat of waste ground found at the north-western corner of the existing WWTP, within the waste water transfer tunnel. Species include common nettle and fat hen *Chenopodium album*.

Species-rich hedge

- 5.2.31 The Waterbeach transfer pipeline crosses two species-rich hedgerow, east of Horningsea Road. These were dominated by field maple, hawthorn, dogwood and blackthorn *Prunus spinosa*.
- 5.2.32 The site access area route crosses one species-rich hedgerow, south of High Ditch Road. This hedgerow was dominated by hawthorn, blackthorn, field maple, dog-rose *Rosa canina* and dogwood.

Species-poor hedge

- 5.2.33 A network of species-poor hedgerows bordering arable fields was present north of the dismantled railway. The hedgerows were dominated by hawthorn.
- 5.2.34 There was a network of species-poor hedgerows that intersect the footprint of the Waterbeach transfer pipeline. These hedgerows were unmanaged and double planted with hawthorn, field maple and elm.

Species-rich hedge with trees

- 5.2.35 The proposed WWTP site intersects five species-rich hedgerows with trees, which were part of the dismantled railway Low Fen Drove Way Grasslands and Hedges CWS. The hedgerows were infrequently trimmed and consist of hawthorn, bramble, lime, crab apple *Malus spp.*, dogrose, elder, common ash and blackthorn.
- 5.2.36 The Waterbeach transfer pipeline crosses one species-rich hedgerow with trees, east of Horningsea Road. This hedgerow was dominated by field maple, sycamore, hawthorn, dogwood and blackthorn.

Species-poor hedge with trees

- 5.2.37 The proposed WWTP site supports a network of species-poor hedgerows with trees bordering arable fields north of the dismantled railway within the Indicative the proposed WWTP site The hedgerows were dominated by hawthorn, sycamore, common ash and bramble.
- 5.2.38 There was a network of species-poor hedgerows that intersect the footprint of the Waterbeach transfer pipeline and site access area for the proposed WWTP site. These hedgerows were unmanaged and planted with hawthorn, sycamore, blackthorn and elder.

Dry ditch

- 5.2.39 The proposed WWTP site, access routes and Waterbeach transfer pipeline supports a network of dry drainage ditches with grassy banks and over shaded by hedgerows.

Aquatic Habitats

- 5.2.40 The location of waterbodies in relation to the scheme is shown in Appendix A, Figure A.4.
- 5.2.41 The river/stream sites covered five watercourses:
- The River Cam CWS.
 - An unnamed stream to the south-east of the survey area, culverted under Newmarket Road, Cambridge.
 - An unnamed stream alongside Bannold Drove, Waterbeach.
 - An unnamed stream alongside Cowley Road, Cambridge.
 - An unnamed stream within the Cambridge Water Recycling Centre site.
- 5.2.42 Plant communities are strongly influenced by hydrological conditions, and can indicate longer term site conditions rather than just those encountered on a single day. Sites that were dry but supported wetland-dependent plant species were considered for further aquatic surveys. Sites that were dry and did not appear to support wetland-dependent plant species were scoped out for further aquatic surveys.
- 5.2.43 The full results of the aquatic habitat scoping assessments are given in Appendix H. The results of assessments conducted within the aquatic ZOI is summarised below.
- 5.2.44 Four ponds were located within the aquatic ZOI for the Waterbeach transfer pipeline. Banks of all four were characterised as having earthy banks with a simple terrestrial vegetation structure. Eight taxa were identified in these ponds: common reed, yellow flag *Iris pseudacorus*, common bulrush *Typha latifolia*, duckweed *Lemna sp*, floating sweet-grass *Glyceria fluitans*, European white water lily *Nymphaea alba* (likely a cultivar), soft hornwort *Ceratophyllum submersum*, and creeping bent *Agrostis stolonifera*. In addition to macrophytes, the ponds were also considered suitable to support invertebrates.

- 5.2.45 The wastewater transfer tunnel encompasses an unnamed stream, located within the grounds of Cambridge Water Recycling Centre. Flow type was characterised as glide throughout the surveyed reach. Bank substrate was mainly comprised of earth, although there were areas of gabion embankment. Bankside terrestrial vegetation structure was predominantly simple. Bed substrate was largely a mixture of silt and gravel, with some areas of concrete channel. Aquatic plant diversity and cover were low. Identified species included common reed, common bulrush and fool's watercress *Apium nodiflorum*. The watercourse was considered suitable to support invertebrate communities.
- 5.2.46 The wastewater transfer tunnel transects the River Cam. Within this area, the River Cam is artificially embanked. Flow type was recorded as glide and bed substrate comprised silt and gravel. Macrophyte cover at the survey sites ranged from 5% to 20%. Identified aquatic plants included branched bur-reed, duckweed, Nuttall's waterweed *Elodia nuttallii*, spiked water-milfoil *Myriophyllum spicatum*, unbranched bur-reed *Sparganium emersum*, fennel pondweed *Stuckenia pectinata*, and yellow water lily *Nuphar lutea*. In addition to macrophytes, this stretch of the River Cam was considered suitable to support invertebrates and fish.
- 5.2.47 Waterbeach transfer pipeline transects the River Cam to the east of Waterbeach. Flow type along this stretch of the river was recorded as glide, and bed substrate was mainly silt with some gravel. Macrophytes covered approximately 50% of the channel at surveyed site. Identified aquatic plants included duckweed, yellow water lily, arrowhead *Sagittaria sagittifolia*, branched bur-reed, common bulrush, fennel pondweed *Potamogeton pectinatus* and rigid hornwort *Ceratophyllum demersum*. This stretch of the River Cam was considered suitable to support invertebrates and fish.
- 5.2.48 The aquatic Zol of the Proposed Development and associated infrastructure supports a network of artificial drainage ditches. The Aquatic habitat scoping assessment was conducted at 60 sites across the ditch network.
- 5.2.49 Thirty-six of the ditch survey sites within this area were recorded as being dry at the time of survey. Channel bank and bed substrate was comprised of earth at all sites. Sites were typically characterised as having a simple or uniform terrestrial vegetation growth structure along banks. Terrestrial vegetation (e.g. scrub and/or tall herbs) was observed growing densely within many of the ditches in the area, suggesting that they are typically dry.
- 5.2.50 There was no evidence of aquatic macrophytes, invertebrate or fish communities having previously existed at any of the dry ditch survey sites. As such, none of the dry ditches within the aquatic Zol of the Proposed Development and associated infrastructure were considered likely to support aquatic communities or aquatic protected species.

Twenty-four ditch survey sites were wet at the time of survey. Bed substrates of the wet ditches were predominantly earth, clay and silt. Water depths ranged from 5cm to 100cm. Aquatic plants recorded in the ditches across the aquatic Zol included duckweed, common bulrush, common reed, fool's watercress, water-starwort *Callitriche sp*, water figwort *Scrophularia auriculata*, branched bur-reed, curled pondweed *Potamogeton crispus* and opposite-leaved pondweed *Groenlandia densa*. All of the wet ditch survey sites within the aquatic Zol of the Proposed Development and associated infrastructure were considered suitable to support invertebrate and macrophyte communities. Five sites, all located within the Waterbeach transfer pipeline aquatic Zol, were also considered suitable for fish.

5.3 Protected and Notable Species

Bats

5.3.1 Landscape Features

5.3.2 Records of bats within 5km of the Proposed Development include; brown long-eared bat, common pipistrelle *Pipistrellus pipistrellus*, Daubenton's bat *Myotis daubentonii*, barbastelle *Barbastella barbastellus* (recorded 2.4km east of the proposed WWTP site at woodlands near to Anglesey Abbey), Natterer's bat *Myotis nattereri*, pipistrelle species *Pipistrellus spp*, *Nyctalus* species, serotine *Eptesicus serotinus*, and soprano pipistrelle *Pipistrellus pygmaeus*.

5.3.3 Tree lines, hedgerows, small stands of woodland, and grasslands provide suitable areas for bats to commute and forage within; all of which were abundant within the proposed WWTP site and its associated infrastructure. The Low Fen Drove Way Grasslands and Hedges CWS, within the proposed WWTP site and the site access area provides a suitable linear feature for bats to commute and forage along.

5.3.4 Buildings

5.3.5 There are three records of EPS licenses for common pipistrelle, brown long-eared bat, noctule and soprano pipistrelle bat roosts, adjacent to the River Cam and within the town of Milton (see Appendix D).

5.3.6 There were no residential buildings within 100m of the indicative WWTP footprint and the proposed WWTP site.

5.3.7 There were residential buildings east of Horningsea Road and Clayhithe Road and north of the River Cam that have bat roosting potential, and which were within the 100m Zol of the Waterbeach transfer pipeline. There was a brown long-eared bat roost record from 2008, east of Horningsea High street within the 100m Zol for the Waterbeach transfer pipeline. A landowner informed the ecologists of another bat roost in a building east of Horningsea High street, within the 100m Zol for the Waterbeach transfer pipeline.

5.3.8 There were a number of industrial buildings with various occupancy assessed as having negligible potential to support roosting bats within the existing WWTP/ waste water transfer tunnel.

5.3.9 Trees

5.3.10 There were a number of trees within the hedgerows and small patches of broadleaved woodland that have the potential to support roosting bats within the Proposed Development. Such as trees within the Low Fen Drove Grasslands and Hedges CWS that was intersected by the Proposed Development and the site access area.

5.3.11 There were also trees with bat roosting potential within hedgerows throughout the treated effluent transfer tunnel or pipeline and the Waterbeach transfer pipeline (Target Note (TN) TN543, TN542, TN460, TN472, TN664, TN876, TN670, TN542, TN714 and TN5).

Birds

5.3.12 Nesting Birds

5.3.13 Multiple records exist for birds within 5km of the Proposed Development, which includes records of county notable species such as corn bunting *Emberiza calandra*, common bullfinch *Pyrrhula pyrrhula* and common cuckoo *Cuculus canorus*.

- 5.3.14 The small copses of broadleaved woodlands and hedgerows surrounding arable fields, provide suitable bird nesting habitat. These habitats were predominantly located around the Low Fen Drove Way Grasslands and Hedges CWS and were intersected by the proposed WWTP. There were four hedgerows north of Low Fen Drove Way Grasslands and Hedges CWS that intersect the indicative WWTP footprint, which provide suitable bird nesting habitat.
- 5.3.15 Additionally, habitats such as grasslands, arable land, hedgerows, running water and standing water have potential to support populations of notable wading species, and farmland and woodland. Buzzards *Buteo buteo*, reed buntings *Emberiza schoeniclus* and skylarks *Alauda arvensis* were recorded during the surveys within the proposed WWTP site and the Waterbeach transfer pipeline.

Schedule 1 Listed Birds

- 5.3.16 The Proposed Development the potential to support breeding birds in the hedgerows, woodland and arable farmland habitats, such as SPI farmland bird species and Schedule 1 bird species (e.g. quail *Coturnix coturnix*, red kite *Milvus milvus*, hobby *Falco subbuteo*, and barn owl *Tyto alba*) and there were records for barn owls within the footprint of the proposed WWTP.
- 5.3.17 There was a mature tree in the hedgerow in the centre of the indicative WWTP footprint, and a derelict farm outbuilding in the north-east of the proposed WWTP site, which have the potential to support nesting barn owl.
- 5.3.18 The Waterbeach transfer pipeline has records of barn owls with suitable foraging habitat and buildings with a possible barn owl roost and two barn owl boxes with pellets (TN664 and TN749). In addition, there was three farm buildings within the Waterbeach transfer pipeline, which have the potential to support nesting barn owl with suitable foraging habitat.
- European Otter**
- 5.3.19 The River Cam has the potential to support foraging otter, there were also records of otter within the River Cam. There was potential for holt creation on the eastern banks of the River Cam within the 100m Zol of the treated effluent transfer tunnel or pipeline, which will discharge into a location on the east bank of the River Cam. The Waterbeach transfer pipeline intersects the River Cam, but there was limited suitable habitat for holt creation, within a 100m Zol of the Waterbeach transfer pipeline.
- 5.3.20 The network of drainage ditches recorded throughout the Proposed Development and associated infrastructure were assessed as too narrow and shallow with no adequate food resources to support populations of otters. However, within the Zol for the treated effluent tunnel or pipeline and the Waterbeach transfer pipeline and existing WWTP there was potential for otters to use ditches to disperse through.
- 5.3.21 There were two drains recorded within the existing WWTP that has no records of otter, however, otters may use the drains for dispersal and the potential presence of water vole *Arvicola amphibius* may provide a food source too.

Water vole

- 5.3.22 There were records of water voles at the River Cam CWS and existing WWTP, which are within the waste water transfer tunnel, treated effluent transfer tunnel or pipeline and the Waterbeach transfer pipeline. The River Cam CWS has the potential to support foraging water voles as there was a suitable food supply from emergent vegetation. The River Cam also has the potential to support water vole burrows. The treated effluent transfer tunnel or pipeline will discharge into a location on the east bank of the River Cam.
- 5.3.23 There were two drains recorded within the existing WWTP that has recent records of water voles and provided suitable habitat to support water voles due to the presence of standing water and food resources.
- 5.3.24 The network of drainage ditches within the proposed WWTP site, site access and indicative WWTP footprint offer low quality habitat for water voles, as the ditches have no records for water voles, were mostly dry, and do not provide suitable habitat to support a water vole population at any point during the year. This was due to insufficient food (plant) resources to support a population.
- 5.3.25 The surveys recorded possible water vole burrows at a wet ditch (WB129) south of Bannold Road, the ditch has direct connectivity to a network of wet drainage ditches within the Waterbeach transfer pipeline. The ditches has no records of water voles and provided moderate quality habitat of standing water with suitable food resources to support water vole populations.
- 5.3.26 The wet drainage ditches north of the River Cam CWS within the Waterbeach transfer pipeline provided suitable habitat of standing water with food resources to support water vole populations.

Eurasian Badger

- 5.3.27 The proposed WWTP site offers limited habitats for badgers; however, hedgerows and a small patch of woodland in the south-eastern corner of the site and site access area, provide suitable cover for sett construction and high value areas to forage.
- 5.3.28 No badger setts were recorded within the indicative WWTP footprint. However, within the proposed WWTP site, there was a potential subsidiary sett and outlier badger sett.
- 5.3.29 There were two partially used outlier setts found within the 100m Zol of Waterbeach transfer pipeline, and there was evidence of badger foraging and territories (latrines and snuffle holes), within the Waterbeach transfer pipeline. There were two outlier badger setts (dung pits and fresh digging present) within the 100m Zol and footprint for site access areas.
- 5.3.30 There was one partially used outlier badger sett within the existing WWTP and waste water transfer tunnel.

Hazel Dormouse

- 5.3.31 Habitats such as hedgerows and broadleaved woodland across the Proposed Development have the potential to support hazel dormouse *Muscardinus avellanarius*. However, no records were returned within 5km of the red line boundary.

Widespread reptiles

- 5.3.32 There were no records of reptile species within the proposed WWTP site. However, multiple records exist for common lizard *Zootoca vivipara*, grass snake *Natrix helvetica* and slow worm *Anguis fragilis* within 5km of the Proposed Development.

- 5.3.33 Field margins (approximately 2m wide) within the indicative WWTP footprint has low potential to support widespread reptiles. However, the semi-improved grassland along the dismantled railway (Low Fen Drove Grasslands and Hedges CWS) which intersects the proposed WWTP site and the rough grassland road verges that boarder Low fen Drove Way has high potential for reptiles with plenty of cover and refugia.
- 5.3.34 The rough grassland habitats north of the River Cam and within the Waterbeach transfer pipeline provides high quality habitats for reptiles with plenty of cover and refugia. There were also possible sightings of grass snakes as reported by a tenant. There were rough grassland habitats recorded east of Horningsea Road, north of the A14, south of High Ditch Road and west of Long Drove within the Waterbeach transfer pipeline, waste water transfer tunnel, treated effluent transfer tunnel or pipeline and site access area that provided cover and basking opportunities for reptiles.
- 5.3.35 There was a mosaic of scrub and waste ground recorded at the eastern and northern boundaries of the existing WWTP and within the waste water transfer tunnel footprint. These habitats provide suitable cover and basking opportunities for reptiles.

Great Crested Newts

- 5.3.36 There was a GCN record approximately 250m north of the Waterbeach transfer pipeline, east of the Network Rail line. There were no GCN records within the proposed WWTP site or within 500m of the boundary.
- 5.3.37 HSI assessment surveys to identify the potential for waterbodies to support GCN were summarised in Table 7 and a detailed list of HSI scores are outlined within Appendix G.

Table 7: GCN HSI scores of waterbodies and ponds within 0.25km of the Proposed Development and all associated infrastructure

Site area	Number of waterbodies	Number of ponds	HSI assessment score
Proposed WWTP site	22 waterbodies within 0.25km of the proposed WWTP site.	Three ponds within 0.25km of the proposed WWTP site	Out of 22 waterbodies, two were HSI scored. one was assessed as excellent and one was given a below average score. Out of the three ponds, two were HSI scored. Two ponds were assessed as good for GCN and one pond was dry.
WWTP site area and all associated infrastructure	198 waterbodies within 0.25km of the proposed WWTP site.	10 ponds within 0.25km of the proposed WWTP site and its associated infrastructure.	Out of 198 waterbodies, 19 were HSI scored. Six were assessed as poor, three were assessed as below average, four were assessed as average, four were assessed as good and two were assessed as excellent. Out of 10 ponds, 9 were HSI scored. Two were assessed poor, two were assessed as below average and three were assessed as good.

- 5.3.38 There were 22 waterbodies (ditches) within 250m of the proposed WWTP site and five waterbodies (ditches), of those two were within the indicative WWTP footprint. Out of the 22 waterbodies, 20 were dry at the time of the site visit in August 2020. One waterbody was assessed as excellent and another waterbody was assessed as below average. However, it was possible that the waterbodies recorded as dry at the time of the survey visit in August 2020 may be wet during the spring months, when GCN were using waterbodies.

- 5.3.39 There were no ponds within the proposed WWTP site and three within 250m that have potential to support GCN. There was suitable terrestrial habitat for GCN within site area 3, although this was limited to hedgerows and small patches of woodlands.
- 5.3.40 There was a network of 198 waterbodies (ditches), and 10 ponds within 250m of the Proposed Development and associated infrastructure. There was suitable terrestrial habitat for GCN including rough grassland, hedgerows and scrub with refugia to support hibernating GCN. At least five out of the 10 ponds and 19 waterbodies out of the 197 has the potential to support GCN. The remaining 178 waterbodies and five ponds were dry at the time of the site visit between the months of July and September 2020. The waterbodies have grassy banks and hedgerows on one bank at the time of the site visit, the grassy banks suggest the waterbodies are dry throughout the year and, therefore unlikely to be suitable for GCN.
- 5.3.41 There were two ponds within 250m of the treated effluent transfer tunnel or pipeline. These ponds were assessed as poor for GCN, as they were large bodies of standing water (lakes) that support significant populations of fish or waterfowl, and therefore reduces the habitat suitability for GCN to occupy these ponds. There are also sufficient barriers between the scheme and ponds due to the presence of the River Cam CWS and A14. There was one pond dry at the time of visit, within 250m of the proposed WWTP access area.
- 5.3.42 There are two vertical walled concrete wells within the existing WWTP/waste water transfer tunnel that were assessed as having negligible potential for GCN. A HSI assessment was not completed.

Terrestrial invertebrates

- 5.3.43 There was a mosaic of species-rich grassland flanked with treelines along the Low Fen Drove Grasslands and Hedges CWS, with the proposed WWTP site and the site access area. The habitats were dominated by shrubs, with mature trees and occasional dead elm trees and suitable nectar resources for bees and wasps. The Nationally Scarce species of flea beetle *Longitarsus ballotae* was recorded at the CWS. Responses from the stakeholder consultation also report the presence of rare and vulnerable species of Hymenoptera at the Low Fen Drove Grasslands and Hedges CWS and Honey Hill area.
- 5.3.44 The Waterbeach transfer pipeline crosses habitats suitable for supporting invertebrates including; elm copses and managed hawthorn hedgerows with fair quantities of standing dead elm and diverse tree shelterbelts dominated by whitebeam.
- 5.3.45 Within the existing WWTP and waste water transfer tunnel there were old settling pools, with good wetland habitat; standing water emergent vegetation of common reedmace and short turf rabbit-grazed grassland that provide suitable habitat for notable invertebrate species.

Invasive Species

- 5.3.46 There were large mats of floating pennywort *Hydrocotyle ranunculoides* recorded along the River Cam CWS. There are stands of Indian balsam *Impatiens glandulifera* on the banks of the River Cam CWS.
- 5.3.47 There were patches of *Rhododendron* recorded west of the existing WWTP (TN19), within the waste water transfer tunnel.
- 5.3.48 *Rhododendron* and floating pennywort are listed on Schedule 9 of the Wildlife Countryside act 1981, as amended.

- 5.3.49 There were small patches of *Buddleia* sp⁶ recorded at the existing WWTP (TN22) and within the waste water transfer tunnel.

Notable Plant species

- 5.3.50 Dwarf spurge, a plant listed on the Cambridgeshire Rare Plant Register (Botanical Society of Britain and Ireland (BSBI) 2019) and round-leaved fluellen were recorded within the indicative WWTP footprint of site area 3. Dwarf spurge is classified as near threatened in Great Britain and vulnerable in England on the Red Data List (BSBI 2019). Round-leaved fluellin is of least concern on the Red Data List. Both species are associated with arable field margins.

Other Notable Fauna

- 5.3.51 There were no records for common toad *Bufo bufo* within the Proposed Development, but there was suitable common toad habitats of woodlands, grasslands and hedgerows found throughout the Proposed Development and all associated infrastructure with suitable breeding ponds found outside the scheme extent.
- 5.3.52 One rabbit warren was found within the 100m Zol of the access area, adjacent to High Ditch Road, two were found within the Waterbeach transfer pipeline, north of the River Cam and three were found within the waste water transfer tunnel, east of the River Cam.

5.4 Aquatic Protected and Notable Species

- 5.4.1 The background data search identified a report of an invertebrate survey undertaken in 2015 on the Waterbeach Army Barracks, including 13 ponds and lakes (Lane, 2015), some of which fall within the aquatic Zol. Nationally Rare or Nationally Scarce species were found in nine of these waterbodies, with three Nationally Rare water beetle species – *Berosus luridus*, *Enochrus nigrinus*, and *Hydrochus crenatus*, being recorded within two of the ponds. This study highlighted the local importance of this network of ponds.
- 5.4.2 The background data search identified a record of the NERC S.41 priority fish species brown trout *Salmo trutta* within 5km of site area 2. This would be most likely associated with an upstream reach of the River Cam, where faster flows and coarser substrates would support its requirements.
- 5.4.3 The background data search also identified some Nationally Scarce wetland-dependent plants, such as fringed water-lily *Nymphoides peltata*, fen pondweed *Potamogeton coloratus*, and tubular dropwort *Oenanthe fistulosa* within 5km of the shortlisted site areas, highlighting the likely presence of good quality wetland sites in the area.
- 5.4.4 This was further emphasised by desk study records of several records of Nationally Scarce water beetle species within 5km of the shortlisted site areas, such as the diving beetle *Hydaticus seminiger*, and water scavenger beetle *Enochrus quadripunctatus*.
- 5.4.5 Most aquatic habitats surveyed within the Proposed Development were considered unlikely to support protected aquatic species, or diverse aquatic communities. The majority of ditches were observed to be dry, very shallow and likely to only hold water intermittently. Macrophytes were either absent or limited to a small number of species tolerant of drying. However, waterbodies located elsewhere within the study area, including within other

⁶ *Buddleia* is not a legally invasive plant. It is not listed on Schedule 9 of the Wildlife and Countryside Act 1981, as amended. However, it is known to spread rapidly when not managed.

components of the scheme, were considered to have the potential to support protected aquatic species (see Appendix H for full survey results), these are discussed below.

Fish

- 5.4.6 The River Cam CWS is likely to support a diverse fish assemblage, possibly including notable and/or protected species such as European eel *Anguilla anguilla*, European bullhead *Cottus gobio*, and river lamprey *Lampetra fluviatilis*. European eel may also occupy drainage ditches within the study area that are in hydrological connectivity with the River Cam CWS.
- 5.4.7 Spined loach *Cobitis taenia* is known to occupy waterbodies, including drainage ditches, in eastern England. It is a small bottom-living fish that prefers clear, well-oxygenated waters, with patchy cover provided by submerged macrophytes, and sandy or silty substrate in which to bury. Any ditches within the aquatic ZoI matching those characteristics and with a water depth of at least 30cm were recorded as being potentially suitable to support spined loach.
- 5.4.8 A total of 13 ditch survey sites across seven watercourses were recorded as suitable. Six of the sites are outside of the aquatic ZoI, and seven are located within the aquatic ZoI, as detailed in Table 8 (see Appendix H Ditch Survey Results for full results):

Table 8: Ditch survey sites within the potential to support spined loach

Survey ID	Waterbody ID	Survey Site NGR	Within aquatic ZoI	Location details
139	WB141	TL 50590 65507	Yes	Approx. 10m from Waterbeach transfer pipeline
258	WB001	TL 48685 61829	No	Approx. 120m from treated effluent transfer tunnel or pipeline
259	WB001	TL 48603 61868	No	Approx. 160m from treated effluent transfer tunnel or pipeline
260	WB001	TL 48476 61855	No	Approx. 160m from treated effluent transfer tunnel or pipeline
261	WB335	TL 48460 61741	Yes	Approx. 40m from treated effluent transfer tunnel or pipeline
262	WB335	TL 48515 61716	Yes	Approx. 20m from treated effluent transfer tunnel or pipeline
263	WB335	TL 48535 61705	Yes	Approx. 10m from treated effluent transfer tunnel or pipeline
324	WB123	TL 50917 65690	No	Approx. 220m from Waterbeach transfer pipeline
326	WB055	TL 50441 64849	Yes	Approx. 100m from Waterbeach transfer pipeline
329	WB123	TL 50322 64706	No	Approx. 220m from Waterbeach transfer pipeline
358	WB085	TL 50493 65658	Yes	Approx. 100m from Waterbeach transfer pipeline

Aquatic Invertebrates

- 5.4.9 Most of the waterbodies within the aquatic Zol, except for permanently dry ditches, have the potential to support aquatic invertebrate communities. The diversity of aquatic invertebrate communities across much of the drainage ditch network is expected to be low on account of water level variability, low habitat diversity and poor water quality. However, such waterbodies may be utilised by specialist species which may be of individual conservation importance. Aquatic invertebrate communities within the River Cam CWS and ponds/lakes may be expected to be of greater diversity and may also include species of conservation importance.

White-clawed Crayfish

- 5.4.10 Basic requirements for the survival of white-clawed crayfish *Austropotamobius pallipes* are refuges from predation (e.g. woody debris), good water quality and food supply (e.g. macroinvertebrates, leaf litter, macrophytes). They have a preference for slow flowing glide and pool habitat types, providing they are not subject to siltation. Any waterbodies within the aquatic Zol matching those characteristics and with a water depth of at least 20cm were recorded as being suitable to support white-clawed crayfish. Ponds and lakes in excess of 0.5ha area were also considered, based upon local knowledge of the ability of such waterbodies to support the species.
- 5.4.11 An unnamed stream was also considered potentially able to support white-clawed crayfish, being a relatively deep, actively flowing watercourse with abundant macrophyte cover, with some gravel substrate among the predominant silt. This watercourse is located to the south east of the survey area. It flows outside the aquatic Zol, approximately 150m beyond the site access area for the proposed WWTP site. Surveys were conducted in the reach immediately upstream of where the watercourse is culverted under Newmarket Road.
- 5.4.12 The River Cam CWS were considered potentially able to support white-clawed crayfish throughout the surveyed reach, though the dominant silt and clay substrate are regarded as sub-optimal.
- 5.4.13 Four of the ponds/lakes surveyed were also considered as potentially able to support white-clawed crayfish. Four of the ponds are located within the aquatic Zol, and eight are located outside the aquatic Zol, as detailed in Table 9 (see Appendix H for full results).

Table 9: Pond/lake survey sites with the potential to support white clawed crayfish

Survey ID	Pond ID	NGR	Within aquatic Zol	Location details
345	PD010	TL 47779 62091	No	Within Milton Country Park Approx. 150m from waste water transfer tunnel
348	PD011	TL 47857 62089	No	Within Milton Country Park Approx. 150m from waste water transfer tunnel
349	PD009	TL 47938 62161	No	Within Milton County Park Approx. 150m from site waste water transfer tunnel
350	NA	TL 48031 62304	No	Within Milton Country Park Approx. 400m from waste water transfer tunnel

Aquatic Macrophytes

- 5.4.14 Most of the waterbodies within the study area, except for permanently dry ditches, have the potential to support aquatic macrophytes.
- 5.4.15 The diversity and conservation value of aquatic macrophyte assemblages across much of the drainage ditch network appeared to be low, with most ditches being colonised by a limited number of common species, tolerant to eutrophic conditions, management activity, and intermittent presence of water.
- 5.4.16 One notable macrophyte species recorded within the ditch network was opposite-leaved pondweed (recorded at survey site 139; waterbody WB141). This site is within the Waterbeach transfer pipeline. Opposite-leaved pondweed is categorised as Vulnerable according to IUCN criteria (2001), and locally uncommon. It is listed as endangered on the Cambridgeshire rare plant register (BSBI 2019). The species is understood to have declined across its range due to poor water quality, and its presence within this ditch suggests that it may be influenced by a relatively clean water source.
- 5.4.17 Another locally uncommon aquatic plant species – soft hornwort, was recorded in pond 53, which falls within the 100m Zol for the Waterbeach transfer pipeline. It is listed as rare on the Cambridgeshire rare plant register (BSBI 2019), but of Least Concern on the IUCN and Great British red list (Lansdown, 2017). This species is typically associated with relatively clean-water ponds and lakes, suggesting that this pond is of good quality.
- 5.4.18 Unidentified stonewort's (*Charophytes*) were observed at two locations. Pond 50/PD050 contained a prolific growth of probable *Chara* sp., being located in the north-east of the survey area, approximately 200m beyond the Waterbeach transfer pipeline and therefore outside of the aquatic Zol. A small amount of *Chara* sp. was also found at survey site 342 (Pond 37/PD037), a pond of approximately 8m diameter within the Waterbeach Barracks site. This site was approximately 140m beyond the Waterbeach transfer pipeline and, therefore also outside of the aquatic Zol. Stonewort's are typical of either low nutrient or disturbed conditions and are, therefore uncommon in lowland waterbodies in a highly agricultural setting.

6 Ecological Constraints and Recommendations

6.1 Key Constraints

6.1.1 The following sections present an assessment of the likely effects during the construction and operational phases on ecological features within the Proposed Development. A list of likely significant effects (LSE) to statutory and non-statutory designated sites are available in Appendix I.

Statutory Designated Sites

6.1.2 The Proposed Development and its associated infrastructure is within 10km of three statutory designated sites of international importance (Wicken Fen Ramsar and Fenland SAC and Devils Dyke SAC). Wicken Fen Ramsar and Fenland SAC share the same site boundary and are also designated as a SSSI and NNR (under the name Wicken Fen). The following potential impact pathways have been identified and will be subject to a Stage 1 Screening Habitat Regulations Assessment (HRA) for the Ramsar and SAC to determine LSE:

- Discharge⁷: no discharge risk is anticipated from the site area during operation as there will be no waste water discharged to ground or surface water; it will be treated and transferred to the discharge point on the river. Potential impacts during operation of the proposed scheme, for example due to excessive variations in discharge, or discharge of effluent of an unacceptable quality to the River Cam, will be controlled by engineering features and operational practices included in the design and management of the scheme. An improvement in the quality of the effluent discharge is foreseen as a consequence of operating the new WWTP, although inclusion of the effluent discharge from the WWTP at Waterbeach would increase the proportion of effluent in the river upstream of Waterbeach. Overall, however, an improvement in water quality is anticipated throughout the River Cam downstream of the outfall from the existing WWTP. As a result, no special mitigation measures are likely to be needed for these downstream sites.
- The Waterbeach transfer pipeline will also cross the River Cam. Although there are unlikely to be any LSE on the qualifying features, the development proposals will also be subject to a Stage 1 Screening HRA to determine LSE. The crossing of the River Cam by the proposed Waterbeach transfer pipeline is approximately 4.7km south from Wicken Fen Ramsar and Fenland SAC.
- All general combustion processes⁸: potential for air quality impact on designated site qualifying features. The proposed scheme will include Combined Heat and Power (CHP) engines, standby boilers and backup generators, in case of emergencies. Energy

⁷ Includes discharge of treated effluent and waste of more than 20m³/day to surface water of the River Cam. Any discharge of water or liquid waste that is discharged to ground (i.e. to seep away) or to surface water, such as a beck or stream (NB This does not include discharges to mains sewer which are unlikely to pose a risk at this location) - Description may vary to specify volume thresholds for discharges or to include discharges to main sewer. Most foul water is removed from a development site by a mains sewer. Where this is not the case, foul water is usually treated on site and then discharged either to ground to filter away from the site, or into a nearby watercourse. If the treated water flows towards a SSSI, it has the potential to impact on water quality sensitive features.

⁸ Includes: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/combustion - Description may vary to specify thresholds for energy input. Emissions from combustion can cause air pollution affecting the habitats and species on SSSIs. More than 500m away from a SSSI, only combustion processes over a certain minimum size are likely to have an impact. A very large project and could cause air pollution on SSSIs up to 10km away.

plant emits pollutant emissions, which may have adverse impacts on air quality and significant effects on nearby ecological receptors. The WWTP will comply with environmental permitting regulations, as required, and emissions will be regulated and mitigated accordingly. Therefore, it is highly unlikely to result in an adverse significant effect.

- Consideration was given to the SSSIs downstream of the potential discharge locations. For example, the Cam Washes SSSI, which is approximately 6.2km from the Proposed Development. Cam Washes SSSI is highly dependent on surface water and is subject to winter flooding. During construction, there is potential for pollution or discharge of sediment-laden water to the River Cam, which could affect downstream sites. During operation, treated water that flows towards the SSSI has the potential to impact on water quality sensitive features. However, any significant adverse impacts will be avoided either by standard mitigation measures included in the Construction Environmental Management Plan (CEMP) or in the scheme design. Potential impacts during operation of the scheme, for example due to excessive variations in discharge, or discharge of effluent of an unacceptable quality, will be controlled by engineering features and operational practices included in the design and management of the scheme. An improvement in the quality of the effluent discharge is foreseen as a consequence of operating the new WWTP, although inclusion of the effluent discharge from the WWTP at Waterbeach would increase the proportion of effluent in the river upstream of Waterbeach. Overall, however, an improvement in water quality is anticipated throughout the River Cam downstream of the outfall from the existing WWTP. Comparison of existing river quality with the prediction of quality resulting from operation of the new WWTP will be the subject of a separate assessment. As a result, no special mitigation measures are likely to be needed for this downstream site. Furthermore, the effluent outfall and any watercourse crossings will be designed to maintain flows at current levels and have no significant impact on flooding.
- The Proposed Development is within 10km of Devils Dyke SAC with a potential air quality impact pathway. This will be subject to a Stage 1 Screening HRA to determine LSE.
- The Proposed Development falls within eight SSSI impact risk zones. Stow-cum-Quy Fen SSSI and Wilbraham Fens SSSI are within 1.4km of the Proposed Development and further assessment is required for these two SSSIs.
- Stow-cum-Quy Fen is the closest SSSI at approximately 1.1km north-east of the proposed WWTP site (1.5km from the indicative WWTP footprint). Black Ditch is connected to one of the water bodies at Stow-cum-Quy Fen SSSI. Standard mitigation measures included within the CEMP will reduce any potential surface water and groundwater impact at Stow-cum-Quy Fen SSSI to a negligible level. The permanent site drainage will be designed to avoid any discharge of pollutants to Black Ditch during operation of the scheme. As a result, Stow-cum-Quy Fen SSSI should not be adversely affected by surface water discharge from the site. Consideration has also been given to the potential impacts during operation of the WWTP, due to leakage of waste water from the treatment plant, leading to contamination of groundwater in the chalk aquifer, which could adversely affect Stow-cum-Quy Fen SSSI. However, these risks would be taken into account fully in the robust design, protection measures and operational procedures for the WWTP. In addition, monitoring of groundwater and drainage in the area within and surrounding the WWTP could be implemented prior to and during the construction of the works. A water quality sampling programme to monitor for potential contaminants would then be agreed with the Environment Agency and implemented during the operation of the site. The sampling programme may be reviewed during the early years of monitoring in connection with the operation of the plant. However, any subsequent changes to the monitoring programme would only be made with the

agreement of the Environment Agency. If any significant contamination of groundwater was detected, an immediate clean-up programme would be implemented. A Hydrogeological Impact Assessment (Mott MacDonald, 2021) (HIA)⁹ has been undertaken to further assess the potential impacts on the groundwater-dependent environment including on Stow-cum-Quy Fen SSSI. The HIA modelled the potential migration of contamination in shallow groundwater to the Black Ditch in the unlikely event of a release of contaminants during construction or operation of a WWTP. The HIA concluded that with appropriate construction design, management and operational management, including protection measures, it is unlikely that significant concentrations of potential contaminants will reach Black Ditch within 1,000 years and therefore, it is unlikely that there will be an adverse impact on Stow-cum-Quy Fen SSSI.

- Wilbraham Fens SSSI is approximately 1.3km south-east from the proposed WWTP site. Operational traffic may require further assessment as the vehicle movements exceed the assessment thresholds within the Environmental Protection UK and Institute of Air Quality Management guidance 'Land-Use Planning and Development Control: Planning for Air Quality' (2017). Wilbraham Fens SSSI, is within 200m of the A1303, which may be used by operational traffic and therefore further assessment may be needed to determine likely effects from vehicle emissions at this site. However, although further assessment is recommended it is considered that the change in pollutant concentration as a percentage of the relevant critical level or load is likely to be less than 1%. According to the Institute of Air Quality Management (IAQM) guidance *A guide to the assessment of air quality impacts on designated nature conservation sites*¹⁰, where the change in concentration is less than 1%, the effects can be deemed to be insignificant.
- There are no anticipated LSE from either construction of the WWTP or associated infrastructure and this is detailed in Appendix I for the SSSIs. Potential impacts from discharge and combustion are detailed with Appendix C. Consideration was given to the SSSIs downstream of the potential discharge location for the proposed WWTP site. For example, Cam Washes SSSI, which is approximately 7.2km from the potential discharge location.

Non-statutory Designated Sites

- There is potential for impact on four CWSs. There is potential for habitat loss to Low Fen Drove Way Grasslands and Hedges CWS as the CWS falls partially within the proposed WWTP site and the site access areas. There is potential for habitat loss on Milton Road CWS and River Cam CWS due to the waste water transfer tunnel and treated effluent tunnel or pipeline/discharge location. Furthermore, the Waterbeach transfer pipeline will also cross the River Cam CWS.
- Impacts have also been considered on Allicky Farm Pond CWS, which is 0.6km north-east of the proposed WWTP site. Like Stow-cum-Quy Fen SSSI, Black Ditch could be connected to the pond within Allicky Farm Pond CWS. A HIA has been undertaken to further assess the potential impacts on the water environment including on Allicky Farm Pond CWS. The preliminary conclusions of the HIA indicate that with appropriate construction design, management and operational management, including protection measures, it is unlikely that significant concentrations of potential contaminants will reach Black Ditch within 1,000 years and therefore, it is unlikely that there will be an

⁹ Further assessment of the potential impacts on the groundwater and the groundwater-dependent environment has been undertaken in a Hydrogeological Impact Assessment (HIA) as requested by the Environment Agency in their response to consultation. The HIA will be made available once it has been reviewed the Environment Agency

¹⁰ Holman *et al* (2019) A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.0, Institute of Air Quality Management, London. Available online at: www.iaqm.co.uk/text/guidance/airquality-impacts-on-nature-sites-2019.pdf

adverse impact on Allicky Farm Pond CWS. Standard mitigation measures included within the CEMP will reduce any potential surface water and groundwater impact to a negligible level.

Habitats

- 6.1.3 It is assumed that all habitats within the indicative WWTP footprint will be lost.
- 6.1.4 The proposed works for all options would result in the permanent loss of a range of habitats. Several of these habitats, such as poor semi-improved grassland, broadleaved woodland, hedgerows and arable field margins are priority habitats listed on the Cambridgeshire and Peterborough LBAP.
- 6.1.5 Works in close proximity to trees have the potential to adversely affect them through ground compaction, thereby causing damage to the root system.
- 6.1.6 There is potential for the increase in levels of airborne pollutants during the construction phase of the scheme, which has the potential to adversely affect sensitive habitats, specifically in the site access areas.
- 6.1.7 There are no HPI within the indicative WWTP footprint or within the proposed WWTP site. However, there are HPI within the infrastructure corridors and access areas associated with the proposed WWTP site. These include deciduous woodland (11.7ha) within the site access areas and waste water transfer tunnel and floodplain grazing marsh (20.6ha), which falls within the waste water transfer tunnel and Waterbeach transfer pipeline.
- 6.1.8 There is 4.4km species-rich hedgerow (the majority of which is a hedge with trees) within site area 3 (2.3km is present within the site area, of which 0.6km is within the indicative WWTP footprint) and 12.9km species-poor hedgerow within the proposed WWTP site area (3.6km within the site area, of which 1.3km is within the indicative WWTP footprint).
- 6.1.9 Habitats recorded from the extended Phase 1 habitat survey were dominated by arable land within the proposed WWTP site (128.3ha). However, habitats also included 0.7ha of broadleaved semi-natural woodland, 1.2ha poor semi-improved grassland, 0.2ha semi-improved neutral grassland, 0.2ha improved grassland, 0.6ha amenity grassland, 4.3km of dry ditch, as well as small areas of scattered scrub, ephemeral short perennial vegetation, hardstanding, and buildings. Within the indicative WWTP footprint there is 22ha of arable land, 24m² of broadleaved semi-natural woodland, 0.1ha of amenity grassland, 0.02ha hardstanding and 1.3km length of dry ditch.
- 6.1.10 Two veteran trees were found east of Horningsea Road, within the Waterbeach transfer pipeline. Works inside Root Protection Zones of veteran trees have the potential to adversely affect them through ground compaction, thereby causing damage to the root system of these irreplaceable ecological features. The proposed WWTP site contains larger areas of low ecological valuable habitats such as arable land. Although there is Low Fen Drove Way Grasslands and Hedges CWS within the Proposed Development, which supports habitats of value, the indicative WWTP footprint should avoid this CWS.
- 6.1.11 There is likely to be a loss of hedgerows due to construction. However, hedgerows can be translocated and or re-planted to ensure there is no net loss in length and maintain habitat connectivity around the site areas. Whereas, the loss of mature trees and woodlands would result in the loss of a valuable ecological resource, which cannot be as readily replaced.
- 6.1.12 The treated effluent tunnel or pipeline does not fall within HPI, whereas its associated waste water transfer tunnel does. However, loss to the floodplain grazing marsh should be avoided via tunnelling and locating the shafts in habitat of negligible ecological value.

- 6.1.13 Waterbeach transfer pipeline has the potential to result in the temporary loss of floodplain grazing marsh HPI.
- 6.1.14 To achieve a biodiversity net gain (BNG), habitats lost within the site areas and associated infrastructure corridors would need to be compensated for by the creation and enhancement of new and existing habitats.

Aquatic habitats

- 6.1.15 There is a network of drainage ditches and small patches of swamp habitat north of the River Cam CWS, within the Waterbeach transfer pipeline for the Proposed Development. There is potential for hydrological impact to these waterbodies from pipeline construction works. Therefore, ground investigation and assessment are required to determine the source of water and the point at which water levels impact ecological habitats.
- 6.1.16 The waste water transfer tunnel will tunnel beneath the River Cam CWS. No direct impacts are anticipated, however, development or works which directly impact the river or its corridor could have deleterious ecological impacts.
- 6.1.17 The Waterbeach transfer pipeline passes through a ditch (WB 141) which contained the locally rare aquatic plant species opposite-leaved pondweed. The presence of this species indicates potential localised clean water source, which may support other species of conservation importance. Its presence appears to be highly localised within the ditch and drain network and would be highly susceptible to disturbance.
- 6.1.18 There is a small patch of swamp habitat north of the River Cam CWS, within the Waterbeach transfer pipeline. Without suitable avoidance and or mitigation measures, there is potential for the pipeline construction works to result in the direct loss of swamp habitat.

Protected and notable species

Bats

- 6.1.19 The Proposed Development and associated infrastructure corridors has the potential to support commuting and foraging bats largely due to the presence of hedgerows. Habitats within the indicative WWTP footprint are likely to be lost due to the scheme, resulting in severance of commuting routes and fragmentation of trees lines and woodland. Severance of hedgerows is also likely to occur within the Waterbeach transfer pipeline and treated effluent transfer tunnel or pipeline.
- 6.1.20 There are trees within the associated infrastructure corridors, which also have the potential to support roosting bats and could be lost due to the scheme.

Nesting Birds

- 6.1.21 The Proposed Development and associated infrastructure have habitats with potential to support nesting birds. Disused bird nests were observed during the extended Phase 1 habitat surveys. Therefore, an impact on nesting birds is anticipated during the works without mitigation.

Schedule 1 birds

- 6.1.22 There is potential for the presence of nesting Schedule 1 bird species throughout the Proposed Development.

- 6.1.23 The Waterbeach transfer pipelines has the potential to cause disturbance to barn owl nesting and roosting sites as there are barn owl boxes and suitable buildings for barn owl roosts within the 100m ZOI and footprint of the works.

European Otter

- 6.1.24 The network of ditches at the Proposed Development are unlikely to support otter due to the limited extent of suitable terrestrial habitat.
- 6.1.25 The treated effluent transfer tunnel or pipeline and the Waterbeach transfer pipeline could result in the temporary loss of potential habitat suitable for otters as well as disturb habitat otters may be using. This is because the ditches connect to the River Cam and there is suitable terrestrial habitat for holt creation adjacent to the River Cam.
- 6.1.26 The River Cam CWS may also be affected by the scope of works due to the treated effluent transfer tunnel and pipeline and discharge locations, which could negatively impact otter.

Water Vole

- 6.1.27 The network of ditches within the Proposed Development are unlikely to support water vole due to the limited extent of suitable habitat.
- 6.1.28 There are ditches within the Waterbeach transfer pipeline that are likely to support water vole. These ditches could be directly and indirectly impacted during construction activities of the pipeline (e.g. removal, severance, installation of culverts), which could affect water voles.
- 6.1.29 The River Cam CWS may also be affected by the scope of works due to the treated effluent transfer tunnel and pipeline and discharge locations, which could negatively impact water vole.

Eurasian Badger

- 6.1.30 There are badger setts recorded within the Proposed Development and associated infrastructure. Therefore, the works are likely to impact badger setts and their territories. Further surveys are required to recommend mitigation and compensation measures.

Hazel Dormouse

- 6.1.31 Although habitats such as hedgerows and broadleaved woodland are present within the Proposed Development no records were returned within 5km of the Proposed Development. Hazel dormice are known to only be present in two introduced populations in Cambridgeshire, and these are over 50km away from the site. Dormice have therefore been scoped out of further assessment.

Widespread Reptiles

- 6.1.32 The Proposed Development has one narrow strip of suitable reptile habitat along Low Fen Drove Way Grasslands and Hedges CWS, these habitats could be directly impacted due to the site access area.
- 6.1.33 The Waterbeach transfer pipeline and treated effluent transfer tunnel or pipeline have areas of suitable habitat for reptiles and these habitats are potentially affected by construction works.
- 6.1.34 There is suitable habitat for reptiles within the existing WWTP.

Great Crested Newts

- 6.1.35 The Proposed Development has the potential to support GCN due to the presence of suitable terrestrial habitat. There are records of GCN 0.3km north of the Waterbeach transfer pipeline.

The proposed WWTP site and Waterbeach transfer pipeline may affect suitable terrestrial newt habitat and are within 0.3km of suitable waterbodies. Therefore, the scheme has the potential to impact great crested newts via the loss of potentially suitable habitat and disrupting dispersal corridors.

Terrestrial Invertebrates

- 6.1.36 The Proposed Development and associated infrastructure have areas of high-quality habitat for terrestrial invertebrates within hedgerows and broadleaved woodlands. These habitats are likely to be impacted by the works and require further surveys to assess the value of habitats for invertebrates.
- 6.1.37 Further surveys will be required within the hedgerows which form part of the dismantled railway and Low Fen Drove Way Grassland and Hedges CWS within the proposed site area and access areas and the small copse and improved grassland in the south-eastern corner of the site area and access areas. Further surveys will also be required along within three areas of the Waterbeach transfer pipeline, that includes a section of hedge with standing dead elms, a small elm copse, and swamp habitat.
- 6.1.38 Further terrestrial invertebrate surveys will also be required within the existing WWTP.

Invasive Species

- 6.1.39 There are stands of Indian balsam *Impatiens glandulifera* on the banks of the River Cam CWS and floating pennywort within the River Cam CWS. Both Indian balsam and floating pennywort are highly invasive plants and it is an offence under Section 14(2) of the Wildlife and Countryside Act 1981, as amended to “plant or otherwise cause to grow in the wild” any plant listed in Schedule 9, Part II of the Wildlife Countryside Act 1981, as amended.
- 6.1.40 There are patches of buddleia identified within the existing WWTP and waste water transfer tunnel north of the A14. Although buddleia can spread rapidly, it is not listed in Schedule 9 of the Wildlife and Countryside Act 1981, as amended.
- 6.1.41 There is a risk that works along the exiting WWTP, waste water transfer tunnel, treated effluent transfer tunnel or pipeline and Waterbeach transfer pipeline could cause invasive plants to spread into the wider area and potentially off site.

Notable Plants

- 6.1.42 There are incidental records of dwarf spurge and round-leaved fluellen, within the arable fields of the proposed WWTP site. These arable fields supporting the notable plant species are likely to be impacted by the works and, therefore requires suitable mitigation measures.
- 6.1.43 The locally uncommon aquatic plants opposite-leaved pondweed and soft hornwort were observed in a ditch and pond respectively, within the aquatic Zol of the Waterbeach transfer pipeline. Both species are typical of relatively clean water. The habitats in which they were found would be highly susceptible to any physical disturbance or alteration or the local hydrological conditions caused by the scheme.

Other Notable Fauna

- 6.1.44 There are rabbit warrens within the Proposed Development, which are likely to be impacted during construction. Therefore, suitable humane mitigation measures should be considered during excavation and habitat clearance works.

European eel

- 6.1.45 The River Cam is likely to support European eel. Any works affecting the river could have a localised impact on the species. The greatest threat to the species is the potential loss of connectivity within the local network of rivers, drains, and ditches, as its migration routes could be affected.

Spined loach

- 6.1.46 The River Cam in the vicinity of the scheme is likely to support spined loach, therefore any works affecting the river could have a localised impact on the species.

White-clawed crayfish

- 6.1.47 The River Cam in the vicinity of the scheme may be physically able to support white-clawed crayfish, though the likelihood of its presence is unknown. If present, any works affecting the river could have a localised impact on the species

6.2 Further Surveys and Avoidance, Mitigation and Compensation Recommendations

- 6.2.1 Good practice is to apply the mitigation hierarchy. That is to first avoid, mitigate and finally as the last option compensate for biodiversity losses. If compensating for losses within the development footprint is not possible or does not generate the most benefits for nature conservation, then biodiversity losses can be offset by providing gains elsewhere. This is the first principle in the Biodiversity Net Gain Good Practice Principles for Development¹¹.
- 6.2.2 The avoidance, mitigation, and compensation measures will include the following:

Statutory Designated Sites

- Wicken Fen Ramsar, Fenland SAC, and Devils Dyke SAC are within 10km of the Proposed Development. No hydrological or air quality impacts are anticipated during construction or operation. Construction activities will be controlled under a CEMP.
- The operation of the WWTP would be subject to emission controls to meet the requirements of the Industrial Emissions Directive and an environmental permit to meet the requirements of the Urban Waste Water Treatment Directive. Therefore, following mitigation in the CEMP and permits, the WWTP is highly unlikely to result in an adverse significant effect. However, a Stage 1 Screening HRA will be completed to determine LSE. If no effect is likely, a no significant effect can be reported. If effects are likely, a Stage 2 Appropriate Assessment will be required. This will include additional scoping work including the collation of further information and mitigation measures. The scope and methods should be agreed with Natural England, and development proposals should be considered in combination with other plans and programmes. The effect on the integrity of the site will be considered and whether effects can be avoided by

¹¹ CIEEM, CIRIA, IEMA (2016) *Biodiversity Net Gain: Good Practice Principles for Development*. Available online: <https://cieem.net/wp-content/uploads/2019/02/Biodiversity-Net-Gain-Principles.pdf>

changes to the development, including development of mitigation measures (as required).

- Black Ditch is connected to the drainage system at Stow-cum-Quy Fen SSSI. A HIA was undertaken to determine the likely impact on Stow-cum-Quy Fen SSSI. The HIA modelled the potential migration of contamination in shallow groundwater to the Black Ditch in the unlikely event of a release of contaminants during construction or operation of a WWTP. The HIA concluded that with appropriate construction design, management and operational management, including protection measures, it is unlikely that significant concentrations of potential contaminants will reach Black Ditch within 1,000 years and therefore, it is unlikely that there will be an adverse impact on Stow-cum-Quy Fen SSSI.
- Consideration has also been given to the potential impacts during operation of the WWTP, due to leakage of waste water from the treatment plant, leading to contamination of groundwater in the chalk aquifer at the proposed WWTP site, which could adversely affect Stow-cum-Quy Fen SSSI. However, these risks would be taken into account fully in the robust design, protection measures and operational procedures for the WWTP. In addition, monitoring of groundwater and drainage in the area within and surrounding the WWTP could be implemented prior to and during the construction of the works. A water quality sampling programme to monitor for potential contaminants would then be agreed with the Environment Agency (EA) and implemented during the operation of the site. The sampling programme may be reviewed during the early years of monitoring in connection with the operation of the plant. However, any subsequent changes to the monitoring programme would only be made with the agreement of the EA. If any significant contamination of groundwater was detected, an immediate clean up programme would be implemented. However, the risk of such contamination moving towards the boundary, or away from any of the sites, is considered to be low.
- Wilbraham Fens SSSI is approximately 1.3km from the proposed WWTP site. Operational traffic may require further assessment as the vehicle movements exceed the assessment thresholds. However, although further assessment is recommended it is considered that the change in pollutant concentration as a percentage of the relevant critical level or load is likely to be less than 1%. Where the change in concentration is less than 1%, the effects can be deemed to be insignificant.
- Construction activities will be controlled under a CEMP to ensure there are no impacts on SSSIs, NNR, and LNRs.

Non-statutory Designated Sites

- Avoid direct impact (i.e. habitat loss) on Milton Road Hedgerows CWS during construction by ensuring that the waste water transfer tunnel works, including the shaft positioning, are not within the CWS as well as being outside the hedgerow root protection area (RPA). If this is not possible, translocate the length of hedgerow that will be lost as a result of construction (if suitable), replant, enhance existing hedgerows and or create/plant new hedgerows.
- Avoid direct impact (i.e. habitat loss) to the habitats on the banks of the River Cam CWS due to the treated effluent transfer tunnel or pipeline and discharge location and Waterbeach transfer pipeline. Direct impact to the River Cam CWS could be avoided from the Waterbeach transfer pipeline by tunnelling underneath the River Cam and ensuring a sufficient buffer is proposed to avoid loss of trees. If this is not possible ensure the area lost is replaced through re-planting.
- Avoid direct (i.e. habitat loss and severance) and indirect impacts to Low Fen Drove Way Grasslands and Hedges CWS by ensuring that:

- A sufficient habitat buffer (e.g. woodland and species-rich grassland habitat creation) is created between the WWTP footprint and CWS, and that construction works areas avoid the CWS.
- The site access area is moved to avoid the loss of the CWS. If this is not possible, the section of hedge and grassland should be translocated and connected to the existing stretch of the CWS and or compensated for through the creation of new habitat. The access road should be positioned to run through existing gaps in the hedge and avoid trees and their RPAs to minimise the loss of trees within the hedgerow.
- Black Ditch is connected to the pond within Allicky Farm Pond CWS. A HIA was undertaken to further assess the potential impacts outlined in the Water Resources Statement and above. The HIA modelled the potential migration of contamination in shallow groundwater to the Black Ditch in the unlikely event of a release of contaminants during construction or operation of a WWTP. The HIA concluded that with appropriate construction design, management and operational management, including protection measures, it is unlikely that significant concentrations of potential contaminants will reach Black Ditch within 1,000 years and therefore, it is unlikely that there will be an adverse impact on Stow-cum-Quy Fen SSSI and Allicky Farm Pond CWS.

Habitats

- The Proposed Development has patches of woodland, scattered trees and semi-improved grassland habitats. These habitats should be avoided during construction works. However, additional best practice measures would also be included within and implemented through a CEMP to manage and minimise adverse construction stage effects to habitats.
- Hedgerows are present and there will likely be a loss in hedgerows. Additional hedgerow surveys are required to identify important hedgerows and assess the impact of the works to these hedgerows. To mitigate against the loss of hedgerows, they can be translocated and or re-planted to ensure there is no net loss in length and maintain habitat connectivity around the site areas. Avoid severance and fragmentation of hedgerows and habitats. Habitat translocation should be the last resort and habitats should be maintained *in situ* as evidence shows the condition of habitats is often not retained after translocation. Translocation should not be seen as a mitigation for loss through development and may only offer partial compensation¹².
- Enhance and improve existing hedgerows by increasing species diversity through planting and 'planting up' defunct/gappy hedgerows.
- The indicative WWTP footprint for the Proposed Development generally falls within land of low ecological value including arable land (22ha), amenity grassland and hardstanding. However, the footprint could be re-configured to avoid and reduce the loss of 1.9km hedgerows (1.3km species-poor and 0.6km species-rich, which includes hedge with trees). If this is not possible, translocate the length of hedgerow (targeting species-rich) that will be lost as a result of construction, replant, enhance existing hedgerows and or create/plant new hedgerows.
- Re-configure the indicative WWTP footprint to avoid a small copse (24m²) of semi-natural broadleaved woodland in the east of the footprint. The woodland should be replanted as the last resort.
- Propose a tunnel rather than a pipeline for the treated effluent transfer to avoid and reduce the loss of hedgerows and scattered broadleaved trees. Ensure shafts are

¹² JNCC (2003) *A habitats Translocation Policy for Britain*.

located in areas of negligible or low ecological value (i.e. avoid woodland, good quality semi-improved grassland, waterbodies).

- Ensure that the waste water transfer tunnel works including shaft positioning are located in areas of negligible or low ecological value (i.e. avoid HPI woodland, HPI floodplain grazing marsh, good quality semi-improved grassland, waterbodies).
- Translocate floodplain grazing marsh habitat and good quality semi-improved grassland in the Waterbeach transfer pipeline and re-plant post construction in the original footprint, if possible.
- Locate pipelines to avoid loss of trees within hedgerows.
- Ensure the Waterbeach transfer pipeline avoids loss of small patches of swamp habitat north of the River Cam CWS. However, if avoidance of swamp habitats is not possible than the swamp habitats should be re-planted post-construction in the original footprint.
- Avoid direct impacts (i. e. tree felling) of two veteran trees within the Waterbeach transfer pipeline route. The RPA of these trees should be protected by a sufficient buffer from all construction works to avoid the loss of these trees, which are irreplaceable ecological features.
- Ensure planting proposals provide a biodiversity net gain (BNG) by setting aside space for habitat creation within the red line boundary and associated infrastructure corridors. Undertake biodiversity net gain calculations following baseline habitat information collected to determine the area required for BNG. Explore further opportunities for offsite planting with landowners to strengthen mitigation, if required.

Aquatic habitats

- Physical disturbance to the River Cam CWS and its corridor should be avoided or minimised during construction and operation. Connectivity of the river and corridor habitats should be maintained during all phases. Mitigation may be possible by replacing some of the hard bank reinforcement along the west bank with softer options.
- The Proposed Development includes a drain (WB 141), which is suspected to be influenced by a clean water source. Any disturbance to this area should be avoided if possible. Where disturbance is unavoidable, the localised environmental conditions should be fully studied and understood, and the scheme designed so that there is no net loss of the associated aquatic habitat. This may involve creation of a new drain, and translocation of opposite-leaved pondweed plants, so that this locally important habitat and species are not lost.
- The Proposed Development also includes a pond that supports the locally uncommon plant species soft hornwort, indicating that it may of relatively high quality. This pond should be retained if possible. However, if this is not feasible, then this loss should be compensated by the creation of one or more ponds in the vicinity, into which soft hornwort plants could be translocated.

Protected and Notable Species

- 6.2.3 Ecological toolbox talks should be given to contractors prior to the works commencing to make them aware of the legalisation afforded to protected species, and the working practices implemented to minimise impacts on the sensitive habitats within the designated sites.

Bats

- The hedgerows and woodland provide commuting and foraging habitat for bats. Bat activity transect surveys and static bat detector surveys will be required to determine bat activity levels, species present, how bats may be using the site, temporal

distribution, and how habitats used on site are connected to habitats in the surrounding area. There will be a requirement for the provision of additional hedgerows and woodland to replace the loss of those within the footprint and ensure that connectivity with the surrounding network of hedgerows and woodland is maintained.

- There are trees within the hedgerows and woodland and buildings that have potential roosting features (PRFs), which could support roosting bats. Preliminary bat roost assessments of the trees and buildings will be required to identify PRFs and to determine the actual or potential presence of bats, and the need for further survey and/or mitigation. Mitigation and compensation will include the provision of alternative roosting habitat for bats, such as bat boxes on trees and or bat boxes on posts (dependent on roost type recorded).
- If bat roosts are identified, a Natural England European Protected Species mitigation (ESMP) licence would be required and the provision of new bat roosting alternatives.

Nesting birds

- The Proposed Development has the potential to support common species of breeding birds. Breeding bird surveys will be required. Mitigation can be provided by planting new habitats as part of the landscape and ecology planting proposals.
- The removal of scrub, hedgerows and trees to allow for the construction of the route options should be avoided where possible. To mitigate against adverse impacts on nesting birds, it is recommended that all clearance activities are undertaken outside of the breeding season (March – August inclusive). If works need to be undertaken during this period supervision would be required by a suitably experienced Ecologist. Where nests are identified, works would be curtailed, and a no work zone erected to ensure all legal obligations are met. This would remain in place until all young have fledged.

Wintering birds

- A detailed British Trust for Ornithology (BTO) data search for local tetrads will be completed to scope out the requirement for further wintering bird surveys. It is unlikely that wintering bird surveys are required as the site is outside the core distribution of golden plover *Pluvialis apricaria*, corn bunting, grey partridge *Perdix perdix*, as well as being outside areas where there are higher densities of lapwing.

Schedule 1 birds

- Schedule 1 bird species if present should be identified during the breeding bird surveys.
- Targeted barn owl surveys will be required as part of the breeding bird surveys to identify their presence or absence across the Proposed Development.
- If nesting barn owls are recorded in trees, buildings, bird boxes, suitable avoidance measures will be required to retain and avoid disturbing the roosts or nest sites. If this is not possible, mitigation and compensation measures will be required such as a Natural England licence and the provision of new barn owl boxes. Habitat creation will need to consider these species habitat requirements should there be a loss to foraging habitat, which can be partly compensated for by the planting of rough grasslands for foraging.

European Otter

- Complete detailed otter surveys along the River Cam CWS to identify the requirement for mitigation.
- Complete detailed otter surveys along two drains within the existing WWTP and identify the requirement for mitigation.

- A Natural England development licence will be required for works in areas where otters have been recorded and if there is a holt or couch. Licences are likely to require the implementation of mitigation measures to compensate for the loss of habitat, sensitive timing of works and supervision by a licensed ecologist.

Water vole

- Complete detailed water vole surveys along the River Cam CWS to identify the requirement for mitigation.
- The Waterbeach transfer pipeline and treated effluent transfer tunnel or pipeline corridor works should avoid water vole habitats. If this is not possible detailed surveys are required to determine the presence of water voles to inform mitigation and compensation measures.
- Complete detailed water vole surveys along two drains within the existing WWTP and identify the requirement for mitigation.
- A Natural England development licence will be required for works in areas where water voles have been recorded. Licences are likely to require the implementation of mitigation measures to compensate for the loss of habitat, sensitive timing of works and supervision by a licensed ecologist.

Badgers

- Further detailed badger surveys will be required to survey for additional setts and determine the overall activity for all sites.
- Works that directly affect active badger setts will require a Natural England development licence which will only be granted outside the breeding season (November – June). The sett will need to be closed under licence and badgers permanently excluded from their setts to prevent them re-entering.
- Compensation for the loss of foraging habitat (grassland) may be required if large areas are affected by the proposal and movement around the site will need to be maintained so that badgers can disperse and continue to use setts within their territory.
- Within the proposed WWTP site, but outside of the indicative WWTP footprint are two active badger setts that are likely to be a subsidiary and outlier sett. Providing the indicative WWTP footprint and access roads avoids these setts and ensures there is a sufficient buffer (e.g. 30m between the development works and setts) a Natural England badger development licence is unlikely to be required. If the two badger setts cannot be avoided a Natural England badger development licence will be required to legally close and destroy the setts. Further surveys will be required to locate the main sett to help inform whether the creation of an artificial badger sett is likely to be required if the subsidiary sett is closed and destroyed. Bait marking surveys may be required.
- During construction any open trenches should be covered overnight to prevent badgers from becoming trapped. If this is not possible than mammal ladders/ramps should be installed to allow any trapped mammals to escape safely.

Reptiles

- The Proposed Development area has the potential to support common species of reptiles and these habitats are likely to be lost from the scheme. Therefore, it is recommended that further surveys in the form of presence-absence surveys of suitable habitat will identify the requirement for mitigation and compensation (e.g. sensitive timing of the works, terrestrial habitat creation, trapping, relocation and exclusion of reptile populations).

- Reptile surveys will be required where there will be a significant loss of suitable habitat. If a reptile population is recorded, the translocation of reptiles may be required in areas where habitat loss cannot be avoided to sustain and protect the population. Translocation and mitigation would need to be covered under a method statement and agreed with the local planning authority ecologist. An on-site receptor area would be required to accommodate reptiles, otherwise, an off-site receptor site would be required.
- If only small areas of suitable reptile habitat will be affected, it may be possible to complete the early works using habitat manipulation by progressively making the habitat unsuitable and encouraging reptiles to disperse out of the proposed works area. The creation of new species-rich grassland, ponds, mixed patchy vegetation (coarse grasses and scrub) and the provision of refuge such as log piles and hibernaculum in the new landscape and ecology proposals will provide compensation and enhancement for loss of habitat and features within the site area.

Great Crested Newts

- Complete presence-absence surveys for GCN of suitable waterbodies and ponds within 0.25km of the scheme to determine the requirement for mitigation and compensation.
- It is considered that the risks to GCN can be mitigated by avoiding the loss of waterbodies and terrestrial habitat. Where this is not possible, apply for a Natural England EPSM licence for GCN if confirmed breeding ponds and suitable terrestrial habitat will be lost due to construction. Mitigate through the creation of new ecological ponds and terrestrial habitat creation, and the trapping, relocation and exclusion of GCN, where required to maintain the favourable conservation status (FCS) of the affected population.
- Where ponds supporting GCN are lost they will need to be compensated for by the creation of two ponds for each pond lost. This approach can also be used even when GCN are not recorded as biodiversity enhancement measures.

Terrestrial Invertebrates

- Avoid loss of habitats such as woodland, hedgerows, species-rich grasslands that are likely to support invertebrate communities.
- If avoidance of hedgerows is not possible, the scheme should retain and translocate key hedgerows, deadwood and mature tree stumps into new areas of woodland habitat creation to provide habitat for terrestrial invertebrates.
- Replant woodland.
- Ensure the habitat creation also includes new pond creation, and a combination of a tree, shrub and wildflower plant-mix to benefit invertebrates with areas of bare ground and low-fertile soil to create a species-rich sward, and open mosaic habitat.

Invasive Species

- It is recommended that all works at the existing WWTP, waste water transfer tunnel, treated effluent transfer tunnel or pipeline and Waterbeach transfer pipeline, implement an invasive species strategy and control the spread of; Indian balsam, floating pennywort, cotoneaster *spp.* and rhododendron *spp.* Schedule 9, Part II of the Wildlife Countryside Act 1981, as amended invasive species. This could comprise of a combination of exclusion zones, appropriate removal of plants using herbicide treatments and disposal of invasive species

Notable Plants

- It is recommended that works within the proposed WWTP should avoid field margins where known patches of round-leaved fluellen and dwarf spurge are recorded. If

avoidance of field margins at this site is not possible, then suitable habitats should be created using arable plant mixes with areas of bare ground and low-fertile soil to allow re-colonisation of these species to new habitats.

- Avoid disturbance or loss of the habitats which support the locally uncommon aquatic plant species opposite-leaved pondweed and soft hornwort. If this is unavoidable, then these habitats should be compensated with alternative aquatic habitats of at least equivalent quality and extent, such as new clean water drains and ponds.

Other Notable Fauna

- Works at the site areas should avoid rabbit warrens. If avoidance of rabbit warrens is not possible, the warrens should be sensitively dismantled and rabbits humanely managed, if required.

European Eel

- All habitats considered to be potentially able to support European eel should be surveyed for the species. This could be undertaken alongside surveys to assess fish community structure using a combination of physical and eDNA survey techniques, as considered appropriate for the waterbody.
- Any new structures added to potential migratory routes would need to be compliant with The Eels (England and Wales) Regulations 2009, in that the EA would need to be informed, and eel passage structures likely added.
- Any loss of migratory route could potentially be mitigated by investment in an eel passage on another structure, preferably within the catchment, where the length of migratory route gained exceeds that which is lost.

Spined Loach

- All habitats considered to be potentially suitable for supporting spined loach should be surveyed for the species. This could be undertaken alongside surveys to assess fish community structure using a combination of physical and eDNA survey techniques, as considered appropriate for the waterbody.
- Any potential loss of aquatic habitat area or connectivity within the site areas 1 and 2 option B treated effluent transfer tunnel or pipeline should be appropriately mitigated or compensated, such that there is no net loss of habitat to support spined loach.

White-clawed Crayfish

- All habitats considered to be potentially suitable for supporting white-clawed crayfish should be subject to a crayfish survey. This could be undertaken using a combination of physical and eDNA survey techniques, as considered appropriate for the waterbody. Surveys should also target invasive crayfish species, particularly signal crayfish *Pacifastacus leniusculus*, as they typically replace native crayfish, and positive records would therefore mean that white-clawed crayfish are unlikely to be present.

Fish, Macrophytes and Macroinvertebrates

- A programme of surveys should be undertaken to establish a baseline of aquatic ecological communities, including fish, macrophytes, and macroinvertebrates, within the aquatic Zol.
- Conservation of aquatic species requires landscape-scale consideration, whereby a suitable network of diverse aquatic habitats is maintained in an area, providing conditions for niche species, and allowing species to disperse. Ensuring that the scheme does not result in damage to fish, macrophyte, and macroinvertebrate communities therefore requires this network of habitats to be considered.

- In this context, loss or damage to any aquatic habitats should be avoided wherever possible.
- Where this is not possible, new aquatic habitats, such as new ponds or wetland areas, should be created such that there is no net loss of aquatic habitat area in terms of extent and quality. Any new habitats created should ideally be located where the impact of pollution, including from diffuse agricultural sources, is minimal, and where landowners are willing to maintain such habitats in a condition amenable to aquatic species.
- This landscape-scale approach offers the best chance of protecting aquatic communities, as well as individual species of conservation importance.

6.3 Recommended Phase 2 Surveys

6.3.1 A summary of the recommended Phase 2 surveys is presented in Table 10: Summary of Recommended Phase 2 Surveys¹⁰ which includes the methods, survey period, and likely duration (for one shortlisted site) of the surveys and licensing process if required.

Table 10: Summary of Recommended Phase 2 Surveys

Ecological Feature	Specific area (if required)	Biodiversity Value/Legal Protection	Survey Methods	Optimal Survey Period	Duration of Survey	Time required for licence application
Bats		Protected under the Habitats Regulations 2017, as amended, and Wildlife and Countryside Act (W&CA) (1981, as amended). Priority species and LBAP species.	Preliminary bat roost assessment of buildings, structures and trees (ground inspection/tree climbing) to identify potential roosting features (PRF).	Any time of year ¹³	1 survey per feature (mature tree/building)	16 working days to write licence application + 30 working days for NE to process licence
			Dusk emergence and dawn re-entry surveys of PRF to identify the presence or absence of bats.	May to September (key months June to August)	1 to 3 surveys per feature (mature tree/building), dependent on the level of potential assigned. If a bat roost is confirmed, additional survey work may be required to support an EPS licence application.	
			Activity surveys. Transect surveys to identify commuting and foraging routes.	April to October inclusive	Up to two surveys per month	
Great crested newts		Protected under the Habitats Regulations 2017, as amended, W&CA (1981, as amended). Priority species and LBAP species.	Environmental DNA (eDNA) surveys to confirm presence or absence of GCN in suitable ponds or waterbodies within 250m of the scheme. Traditional presence-absence surveys.	Between 15th April and 30th June for eDNA surveys. March to June	1 visit of all suitable ponds, within 250m. 6 surveys of GCN confirmed ponds between mid-March to mid-June to carry out a population size class assessment.	16 working days to write licence application + 30 working days for NE to process licence.

¹³ If a building, structure or tree has bat hibernation potential, surveys are then constrained to the months of November to February to ascertain the presence or absence of hibernating bats.

Ecological Feature	Specific area (if required)	Biodiversity Value/Legal Protection	Survey Methods	Optimal Survey Period	Duration of Survey	Time required for licence application
			Population size class assessment surveys using at least 3 of the following techniques; bottle trapping, torch lighting, egg search and netting.			
Badgers		Protection of Badgers Act (1992).	Initial assessment to identify sett locations to inform bait marking surveys, if required. Bait marking and territorial analysis to identify badger territories.	Any time of year February to April or September to October	1 survey per sett location. 3 weeks of bait marking and at least 1 week of searching for pelleted latrines and within 3 weeks per location.	16 working days to write licence application + 30 working days for NE to process licence.
Otter		Protected under the Habitats Regulations 2017, as amended, W&CA (1981, as amended). Priority species and LBAP species.	Visual search for evidence along bankside to confirm presence or likely absence.	1 survey from mid-April to end June. 1 survey from July to September. Visits should be undertaken two months apart.	4 surveys per watercourse.	16 working days to write licence application + 30 working days for NE to process licence.
Water vole		Protected under the W&CA (1981). Priority species and LBAP species.	Visual search for evidence along bankside to confirm presence or likely absence.	1 survey from mid-April to end June. 1 survey from July to September. Visits should be undertaken two months apart.	2 surveys per watercourse.	16 working days to write licence application + 30 working days for NE to process licence.
Reptiles		Protected under the W&CA (1981).	Presence-absence surveys to confirm if populations of reptiles are present within the site areas.	7 surveys of site and potential receptor sites, during suitable weather conditions between mid-	7 days presence/absence	N/A

Ecological Feature	Specific area (if required)	Biodiversity Value/Legal Protection	Survey Methods	Optimal Survey Period	Duration of Survey	Time required for licence application
				March to June and September. Population size will be assumed.		
Breeding Birds		Protected under the W&CA (1981) and some species are listed under Schedule 1 (WCA).	Recording of bird calls using BTO standard survey guidelines. To identify bird territories within the site areas.	3 visits per site area, between April and June.	3 surveys per location.	N/A
Barn Owls		Protected under the W&CA (1981).	If potential nest sites are impacted, a visual search to assess nest sites internally. Targeted barn owl surveys may be included within the breeding bird surveys.	2 visits per nest site	2 surveys per nest site (building/tree)	N/A
Terrestrial Invertebrates	Survey hedgerows along Low Fen Drove Way Grasslands and Hedges CWS at sampling sites; '3B', '3C' and '3D'. Waterbeach transfer Pipeline Survey copses at sampling sites 'P2' and 'P9', east of Horningsea Road and Clayhithe Road. Existing WWTP Survey old settling pools, with good wetland habitat.	Varied. Protected under the W&CA (1981). Priority species and LBAP species.	Butterfly surveys, moth surveys and deadwood invertebrate surveys to identify rare or notable invertebrate species.	Minimum of 3 surveys between April and August	3 visits per site.	N/A

Ecological Feature	Specific area (if required)	Biodiversity Value/Legal Protection	Survey Methods	Optimal Survey Period	Duration of Survey	Time required for licence application
River physical habitat	River Cam only	EU WFD (2000)	River Habitat Surveys (RHS) centred on potential discharge locations	1 survey in the summer	1 visit per survey site	
River fish	River Cam	Community structure protected under The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Some species protected by, or listed under Habitats Regulations 2017, as amended, NERC S.41 priority species, W&CA 1981 (as amended), Near-Threatened or above according to IUCN criteria, Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), Bern Convention	WFD-compliant fish survey, coupled with eDNA for at least European eel and spined loach	1 physical survey from June-October, eDNA sampling in spring and autumn	3 visits per survey site	
River macro-invertebrates	River Cam	Community structure protected under The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Some species protected by, or listed under NERC S.41 priority species, W&CA 1981 (as amended), Near-Threatened or above according to IUCN criteria.	WFD-compliant sampling of upstream and downstream of potential discharge locations	2 surveys, 1 in Spring and 1 in autumn	2 visits per survey site	N/A
River macrophytes	River Cam	Some species protected by, or listed under NERC S.41 priority species, W&CA 1981 (as amended), Near-	WFD-compliant surveys upstream and downstream of potential discharge locations	1 survey in summer	1 visit per survey site	

Ecological Feature	Specific area (if required)	Biodiversity Value/Legal Protection	Survey Methods	Optimal Survey Period	Duration of Survey	Time required for licence application
		Threatened or above according to IUCN criteria.				
White-clawed crayfish		Combination of trapping and eDNA sampling as appropriate for the waterbody .	1 eDNA sample in spring, 1 combined eDNA sample/physical survey from July to September	2 visits per waterbody	15 working days to write licence application + 30 working days for NE to process licence.	
Hedgerow		Important hedgerows protected under the Hedgerow Regulations (1997). Priority habitat LBAPs	Visual assessment of hedgerows to determine the condition of species-rich hedgerows and whether they fall under 'important' categorisation.	1 survey visit from June to August.	TBC. Dependant on preferred route option.	N/A
Notable habitats	Semi-improved grasslands. Woodland. CWSs.	Priority habitats LBAPs	National vegetation class (NVC) assessment. Visual assessment of notable grassland and woodlands to identify the vegetation community and condition.	1 survey visit from April to June (grassland) and April to September (optimal)	1 survey per location.	N/A
Stage 1 Habitat Regulations Assessment		Required under the EC Habitats Directive.	An assessment of all impact pathways to the Fenland SAC, Wicken Fen Ramsar Site, and Devil's Dyke SAC	N/A	N/A	N/A

7 Opportunities for Enhancement

- 7.1.1 In accordance with the NPPF, works should not only avoid, mitigate or compensate for ecological impacts, but also seek to enhance biodiversity within the area. Therefore, enhancement measures for the proposed site option should be implemented.
- 7.1.2 To achieve a BNG, habitats lost within the site areas (both permanent and temporary) would need to be compensated for by the creation, restoration and enhancement of new and existing habitats. Generally, the loss of broadleaved woodland and trees, will require larger areas of land for new habitat creation to achieve BNG.
- 7.1.3 Potential opportunities for enhancement include:
- The Proposed Development falls within the Cambridgeshire Strategic Green Infrastructure Network (strategic network area 6 Cambridge and Surrounding Areas). Explore opportunities to follow and engage with this landscape-scale initiative.
 - Stakeholder engagement for the Wicken Fen Vision area to link habitat creation proposals. Potential measures could include improving landscape connectivity recommended by the National Trust's Wicken Fen Vision area and the Cambridgeshire Strategic Green Infrastructure Network (strategic network area 6 Cambridge and Surrounding Areas). The Strategic Green Infrastructure Network objectives includes planting native species-rich hedgerows and trees and linear belts of native broadleaved woodland with connectivity to existing woodland patches, creation of species-rich calcareous grassland (lowland calcareous grassland) and enhancement of existing poor semi- improved grasslands at the Low Fen Drove Way Grasslands and Hedges CWS. New planting should be connected to existing habitat within the landscape to enhance existing wildlife corridors. The species and habitat planting should take into account the soil type, hydrology, and topography within the surrounding area.
 - The Natural England Network Enhancement Zone falls within the waste water transfer tunnel. Therefore, there are opportunities to incorporate the network enhancement zone into the landscape and ecology post-construction enhancement/habitat creation and restoration proposals. However, because the waste water transfer tunnel will be underground, there will be limited impact on land above ground, except for where the shafts will be constructed, which may result in areas of habitat loss.
 - A Network Enhancement Zone is also adjacent to the north-eastern boundary of the Proposed Development. The zone is associated with Stow-cum-Quy Fen SSSI and its lowland calcareous grassland habitats. There is an opportunity for the post-construction habitat creation proposals to create habitats, which support the National Trust's Wicken Fen Vision and creating a green corridor through the development proposals to link with existing habitats outside of the proposed construction boundary.
 - Installation of a range of boxes to provide a self-contained space for roosting bats, some of which may be attached to trees. These bat boxes can provide additional roosting features to those already available on-site or provide new roosting space to encourage a wide range of bat species to utilise the surrounding area.
 - Increase the number of secure nesting sites for birds by installing a wide range of bird boxes if they are positioned out of reach of predators.
 - Installation of both standing deadwood and woodpiles would benefit invertebrates, amphibians and reptiles. Logs should be stood vertically, partially buried to create standing deadwood habitat. Increase the number of secure nesting sites for birds by installing a wide range of bird boxes within residential and rural areas if they are positioned out of reach of predators. The nesting holes in the hide have already been occupied and providing additional boxes for a range of species will benefit nesting birds.

- One potential opportunity for enhancing aquatic biodiversity within the scheme extent would be the creation of new ponds and ditches. For maximum benefit, these would be located in areas where they can be well buffered (at least 50m) from worked agricultural land.
- Pond 2 (PD002) approximately 150m north-east of the proposed WWTP site was found to be heavily shaded. Aquatic communities may benefit from reduced tree coverage, though this would need to be balanced against the conservation value of the trees themselves.
- Where works are to affect the River Cam, there may be an opportunity to replace hard bank reinforcements along the west bank with softer options, improving the marginal vegetation structure.

8 Conclusions

- 8.1.1 A PEA was undertaken to identify the broad habitat types present within the Proposed Development and the associated infrastructure corridors Zol, as well as assessing the suitability of the habitats and their potential to support protected and notable species. The PEA also included a background data search, which collected information on designated sites, existing habitats, and protected and notable species records within the Proposed Development Zol.
- 8.1.2 The Proposed Development is within 10km of Wicken Fen Ramsar, Fenland SAC and Devils Dyke SAC. The production of the CEMP, the design, and the use of controls and permits should prevent any LSE on these statutory designated sites. However, a Stage 1 Screening HRA for the Ramsar and SAC to determine LSE will be undertaken to assess the potential impacts from combustion and discharge.
- 8.1.3 There is a requirement for a further assessment relating to Stow-cum-Quy Fen SSSI. The proposed WWTP site is approximately 1.1km from Stow-cum-Quy Fen SSSI and 1.3km of Wilbraham Fens SSSI. Black Ditch is connected to one of the water bodies at Stow-cum-Quy Fen SSSI and therefore, there is potential for groundwater and surface water impacts. The HIA concluded that with appropriate construction design, management and operational management, including protection measures, it is unlikely that significant concentrations of potential contaminants will reach Black Ditch within 1,000 years and therefore, it is unlikely that there will be an adverse impact on Stow-cum-Quy Fen SSSI.
- 8.1.4 There is one CWS (Low Fen Drove Way Grasslands and Hedges CWS) partially within the proposed WWTP site and its associated access areas, therefore, there could be direct loss of the CWS hedgerow and grassland habitats if it is not avoided. Where possible the CWS must be avoided by ensuring the WWTP indicative footprint is outside of the CWS boundary. Indirect impacts can be avoided or reduced by the provision of a habitat buffer between the indicative WWTP footprint and the CWS. If this is not possible, the section of hedge and grassland should be translocated and connected to the existing stretch of the CWS and / or compensated for through the creation of new habitat.
- 8.1.5 Milton Road Hedgerow CWS and the River Cam CWS fall within the treated effluent tunnel or pipeline, potential discharge location, waste water transfer tunnel, and Waterbeach transfer pipeline associated with the Proposed Development. Without avoidance measures there is potential for direct loss of the two CWSs.
- 8.1.6 The Proposed Development falls within Green infrastructure initiatives including the Wicken Fen vision area, which is specific and has a well-established plan and, therefore would likely require more extensive stakeholder consultation.
- 8.1.7 Habitats of value affected by the Proposed Development include woodland, hedgerows, grassland, scrub, standing water and running water, which form a mosaic of habitats likely to support a variety of protected species such as nesting birds, badgers, bats, GCN, water vole, otters, schedule 1 listed birds, reptiles and white-clawed crayfish.
- 8.1.8 Hedgerows are present within the Proposed Development and there will likely be a loss in hedgerows due to construction. Hedgerow surveys are required to determine which ones would be classified as important species-rich hedgerows. Hedgerows can be translocated and or re-planted to ensure there is no net loss in length and maintain habitat connectivity around the site

areas. Whereas, the loss of mature trees and woodlands are valuable ecological features that cannot be as readily replaced.

- 8.1.9 The treated effluent tunnel or pipeline for the Proposed Development does not fall within HPI, whereas its associated waste water transfer tunnel does. The loss to the floodplain grazing marsh HPI should be avoided via tunnelling and locating the shafts in habitat of negligible ecological value. Waterbeach transfer pipeline has the potential to result in the temporary loss of floodplain grazing marsh HPI. Additionally, due to the time of year of the initial assessment, further botanical (NVC) surveys will be required to ascertain the presence of floodplain grazing marsh.
- 8.1.10 The Proposed Development has the potential to support common and notable breeding birds assemblages in the hedgerows and woodland lines such as SPI farmland bird species in summer and winter such as yellowhammer, reed bunting, corn bunting.
- 8.1.11 There are two setts within the proposed WWTP site (likely outlier or subsidiary), but these are outside the indicative WWTP footprint. Provided these setts are avoided by access roads, construction compounds, the indicative WWTP footprint, tunnels, pipelines, and will not be disturbed by construction, the setts are unlikely to pose a constraint.
- 8.1.12 The indicative WWTP footprint has limited and low-quality habitats to support reptile populations. However, the semi-improved grassland along the dismantled railway (Low Fen Drove Grasslands and Hedges CWS) which intersects the proposed WWTP site and the rough grassland road verges that border Low Fen Drove Way and the proposed WWTP site, provide high-quality habitat for reptiles. There is also suitable habitat for reptiles in the existing WWTP site.
- 8.1.13 The Proposed Development has the potential to support common and notable terrestrial invertebrate assemblages in the hedgerows and woodland. The Low Fen Drove Grasslands and Hedges CWS is known to support notable terrestrial invertebrates (rare and vulnerable Hymenoptera) and this was highlighted during the stakeholder consultation.
- 8.1.14 There are suitable commuting and foraging habitats for bats within the Proposed Development and the potential for bat roosts, breeding birds, schedule 1 listed birds including barn owls, water vole, otters, badgers, GCN, reptiles and terrestrial invertebrates. Further detailed ecological surveys for the above-protected species are required to determine their presence, likely absence or population size class to enable a detailed assessment of the likely impacts of the proposals to be undertaken and appropriate mitigation and compensation measures to be developed.
- 8.1.15 WFD-compliant fish, macrophyte, and macroinvertebrate surveys should be undertaken on the River Cam at locations upstream and downstream of potential works. A RHS and should also be conducted within the vicinity of such works.
- 8.1.16 Ditches that are fully or partially located within 100m of the proposed scheme extent should be surveyed for macrophytes and macroinvertebrates in accordance with the grazing marsh ditch survey methodology published by Buglife (Palmer *et al*, 2013). Surveys to detect spined loach should also be undertaken in drainage channels where these have been identified as potentially suitable. Drains that are fully or partially located within 100m of the proposed scheme extent and have been identified as capable of supporting white-clawed crayfish or spined loach should be surveyed for these species. White-clawed crayfish surveys should be undertaken in all waterbodies which have been identified as potentially able to support the species, which are fully or partly located within 100m of the proposed scheme.

- 8.1.17 With the implementation of mitigation and compensation measures, such as the reinstatement of habitat following construction, habitat creation and the planting of replacement species-rich grassland, hedgerows and woodlands to compensate for the loss of wildlife corridors, minimising surface runoff, discharge, sensitive timing of works and ecological enhancements, the impact from construction and operation would be reduced.

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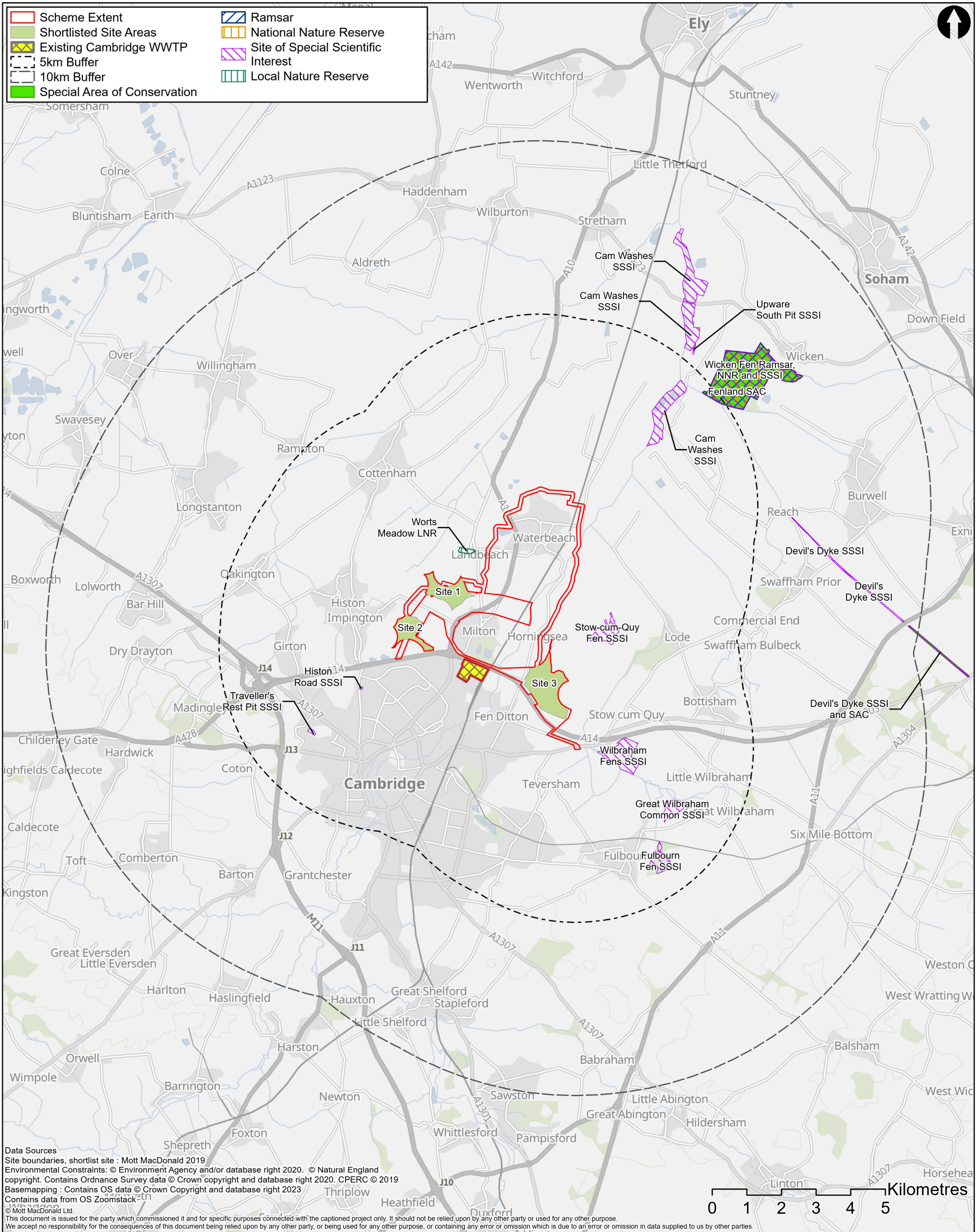
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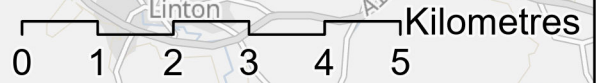
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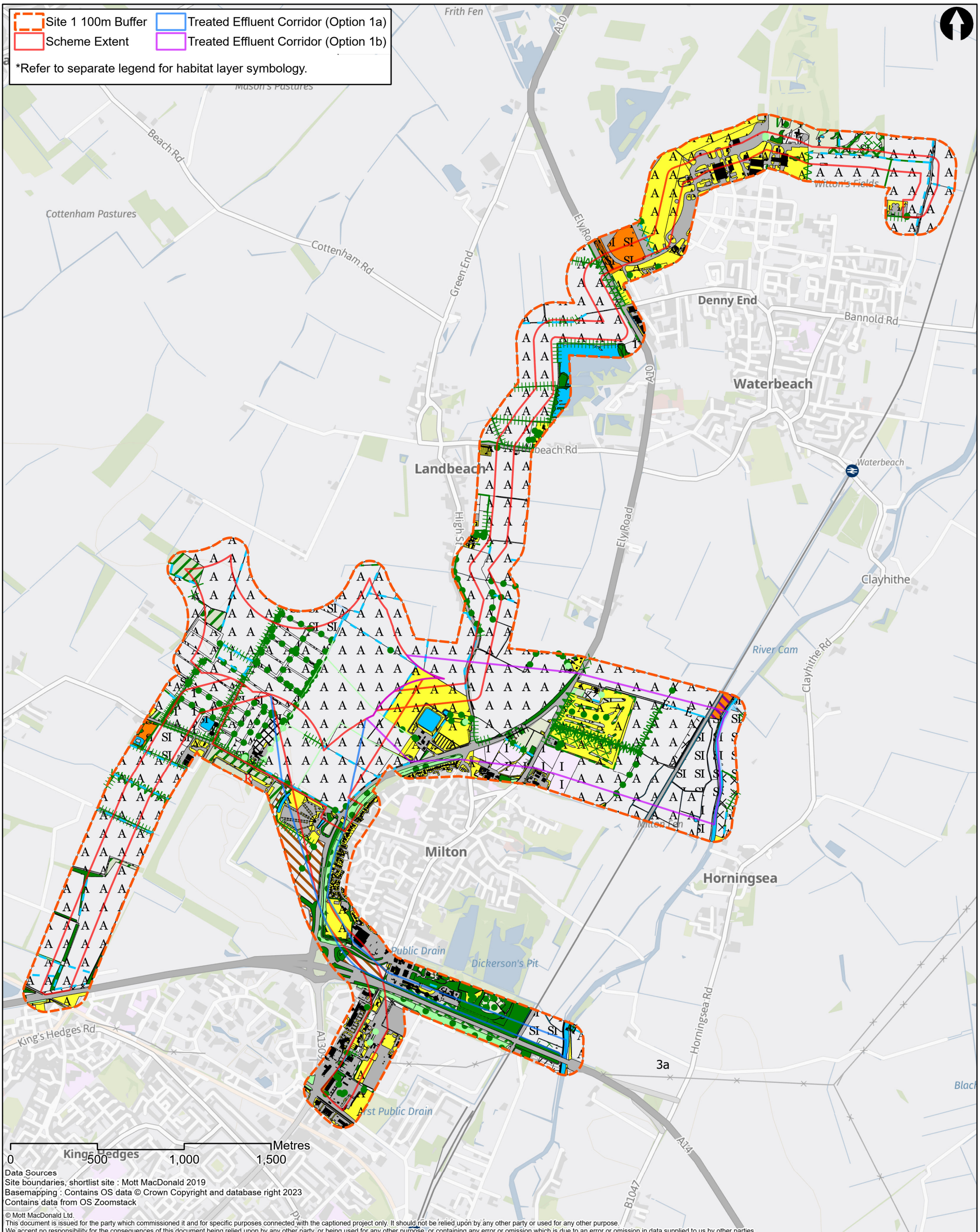
Data Sources
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Site 1 100m Buffer Treated Effluent Corridor (Option 1a)
 Scheme Extent Treated Effluent Corridor (Option 1b)

*Refer to separate legend for habitat layer symbology.



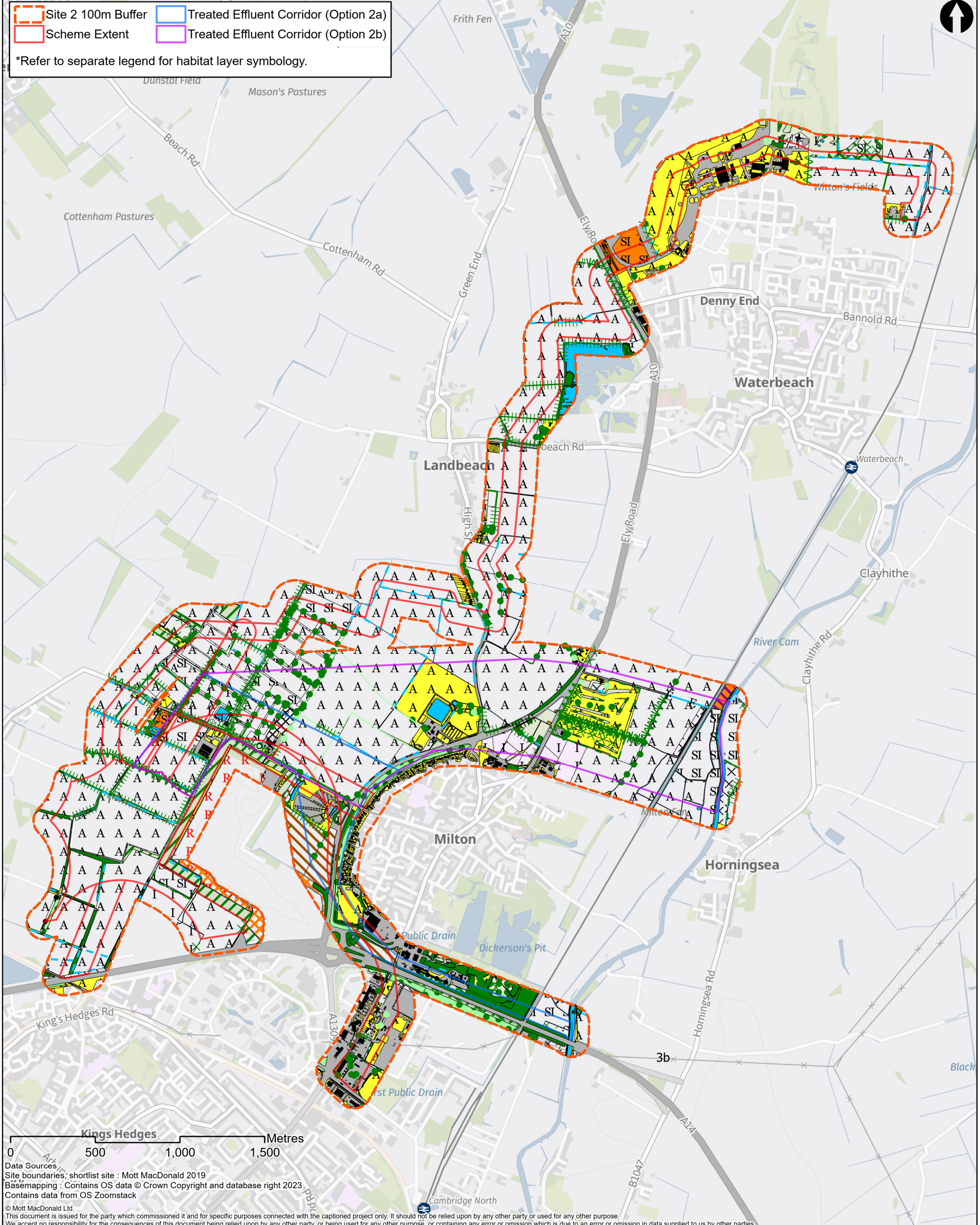
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	Client 		Title CWWTPR Project Figure A.3a Phase 1 Habitat Survey Site 1			Drawn N Critten																			
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	<table border="1"> <thead> <tr> <th>Rev</th> <th>Date</th> <th>Drawn</th> <th>Description</th> <th>Ch'k'd</th> <th>App'd</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>01/12/20</td> <td>NC</td> <td>Final</td> <td>SW</td> <td>TC</td> </tr> <tr> <td>D</td> <td>28/09/23</td> <td>SLG</td> <td>Title update</td> <td>AW</td> <td>CS</td> </tr> </tbody> </table>		Rev	Date	Drawn	Description	Ch'k'd	App'd	C	01/12/20	NC	Final	SW	TC	D	28/09/23	SLG	Title update	AW	CS	Scale at A3 1:20,000			Security STD	Status PRE
Rev	Date	Drawn	Description	Ch'k'd	App'd																				
C	01/12/20	NC	Final	SW	TC																				
D	28/09/23	SLG	Title update	AW	CS																				

Site 2 100m Buffer Treated Effluent Corridor (Option 2a)
 Scheme Extent Treated Effluent Corridor (Option 2b)

*Refer to separate legend for habitat layer symbology.

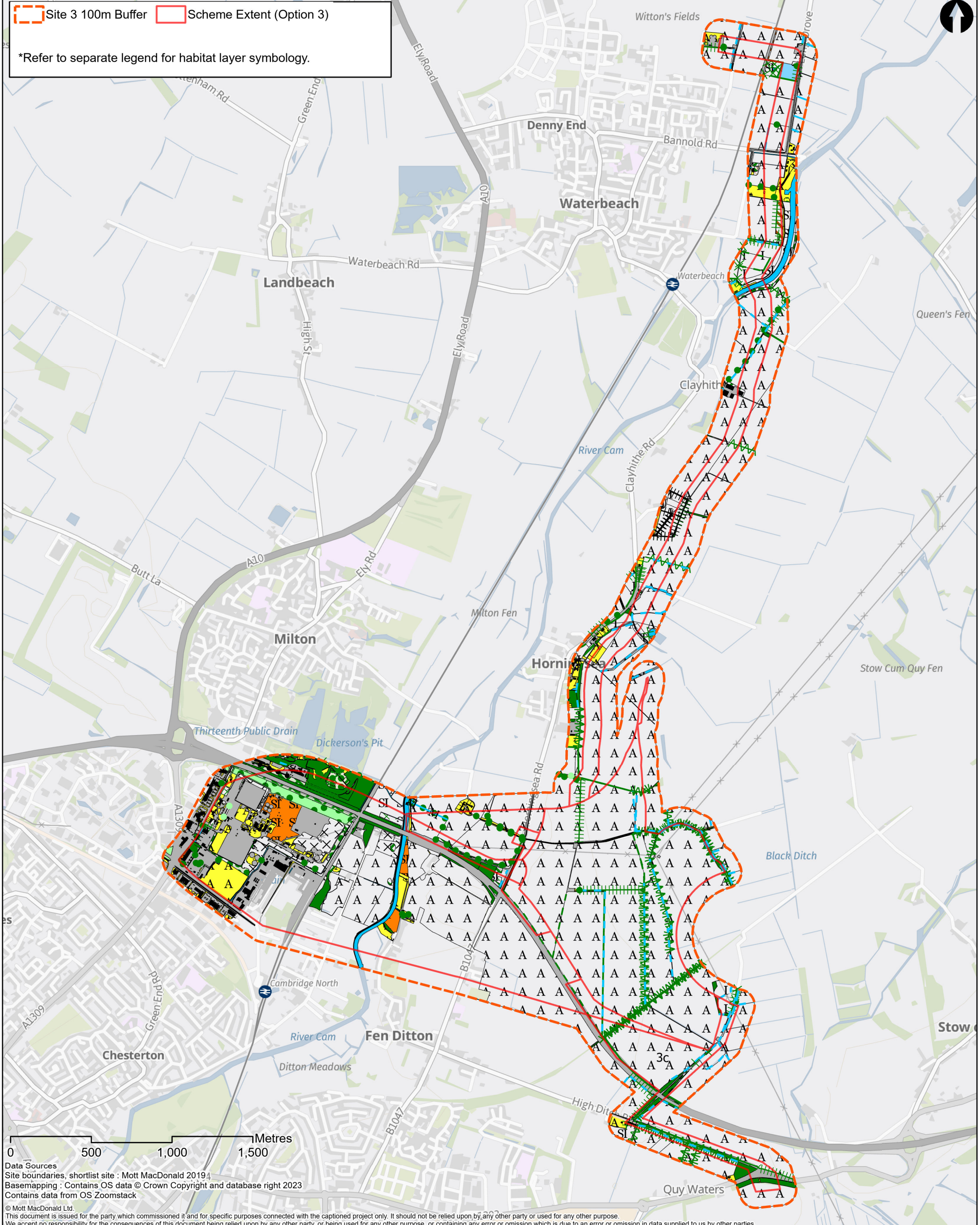


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	22 Station Road Cambridge CB1 2JD United Kingdom					Title CWWTPR Project Figure A.3b Phase 1 Habitat Survey Site 2		Drawn N Critten																		
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	Rev	Date	Drawn	Description	Ch'k'd	App'd																				
C	01/12/20	NC	Final	SW	TC																					
D	28/09/23	SLG	Title update	AW	CS																					
		Drawing Number 409071-MMD-00-XX-GIS-Y-0704			Scale at A3 1:20,500		Security STD	Status PRE	Rev D																	

Site 3 100m Buffer
 Scheme Extent (Option 3)

*Refer to separate legend for habitat layer symbology.



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						Checked S White			Approved T Cook																			
						Drawing Number 409071-MMD-00-XX-GIS-Y-0705			Scale at A3 1:21,500																			
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C	01/12/20	NC	Final	SW	TC																							
D	28/09/23	SLG	Title update	AW	CS																							
Security	Status	Rev																										
STD	PRE	D																										

Habitat point

- ✕ A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- A3.2 - Coniferous parkland/scattered trees



Habitat line

- ✕✕ A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- A3.2 - Coniferous parkland/scattered trees
- A3.3 - Mixed parkland/scattered trees
- F2.1 - Marginal and inundation - marginal vegetation
- G1 - Standing water
- G2 - Running water
- E— G2.1 - Running water - eutrophic
- M— G2.2 - Running water - mesotrophic
- ∩∩∩ J2.1.1 - Intact hedge - native species-rich
- J2.1.2 - Intact hedge - species-poor
- ∩∩∩ J2.2.1 - Defunct hedge - native species-rich
- - J2.2.2 - Defunct hedge - species-poor
- ∩∩∩ J2.3.1 - Hedge with trees - native species-rich
- |||| J2.3.2 - Hedge with trees - species-poor
- |||| J2.4 - Fence
- - J2.6 - Dry ditch
- J2.8 - Earth bank

Habitat polygon

- A1.1.1 - Broadleaved woodland - semi-natural
- ▨ A1.1.2 - Broadleaved woodland - plantation
- A1.2.1 - Coniferous woodland - semi-natural
- ▨ A1.2.2 - Coniferous woodland - plantation
- A1.3.1 - Mixed woodland - semi-natural

- ▨ A1.3.2 - Mixed woodland - plantation
- ▨ A2.1 - Scrub - dense/continuous
- ✕✕ A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- A3.3 - Mixed parkland/scattered trees
- SI S B2.2 - Neutral grassland - semi-improved
- SI S B3.2 - Calcareous grassland - semi-improved
- I B4 - Improved grassland
- B5 - Marsh/marshy grassland
- SI SI B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F1 - Swamp
- ▨ F2.2 - Marginal and inundation - inundation vegetation
- G1 - Standing water
- G2 - Running water
- I2.4 - Refuse-tip
- A J1.1 - Cultivated/disturbed land - arable
- A J1.2 - Cultivated/disturbed land - amenity grassland
- ▨ J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- ▨ J1.4 - Introduced shrub
- ▨ J2.1.2 - Intact hedge - species-poor
- J2.6 - Dry ditch
- J2.8 - Earth bank
- ▨ J3.4 - Caravan site
- J3.6 - Buildings
- J4 - Bare ground
- J5 - Other habitat
- J5 - Hardstanding

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						CWWTPR Project Figure A.3 Phase 1 Habitat Survey Legend			Checked	S White				
									Approved	T Cook				
						Scale at A3			N/A					
					Rev	Date	Drawn	Description	Ch'k'd	App'd	Drawing Number	Security	Status	Rev
					C	01/12/20	NC	Final	SW	TC	409071-MMD-00-XX-GIS-Y-0702	STD	PRE	D
					D	28/09/23	SLG	Title update	AW	CS				

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Habitat point

- ✕ A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- A3.2 - Coniferous parkland/scattered trees

Habitat line



- ✕✕ A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- A3.2 - Coniferous parkland/scattered trees
- A3.3 - Mixed parkland/scattered trees
- F2.1 - Marginal and inundation - marginal vegetation
- G1 - Standing water
- G2 - Running water
- E— G2.1 - Running water - eutrophic
- M— G2.2 - Running water - mesotrophic
- ∩∩∩ J2.1.1 - Intact hedge - native species-rich
- J2.1.2 - Intact hedge - species-poor
- ∩∩∩ J2.2.1 - Defunct hedge - native species-rich
- - J2.2.2 - Defunct hedge - species-poor
- ∩∩∩ J2.3.1 - Hedge with trees - native species-rich
- |||| J2.3.2 - Hedge with trees - species-poor
- |||| J2.4 - Fence
- - J2.6 - Dry ditch
- J2.8 - Earth bank

Habitat polygon

- A1.1.1 - Broadleaved woodland - semi-natural
- ▨ A1.1.2 - Broadleaved woodland - plantation
- A1.2.1 - Coniferous woodland - semi-natural
- ▨ A1.2.2 - Coniferous woodland - plantation
- A1.3.1 - Mixed woodland - semi-natural

- ▨ A1.3.2 - Mixed woodland - plantation
- ▨ A2.1 - Scrub - dense/continuous
- ✕✕ A2.2 - Scrub - scattered
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- SI S B3.2 - Calcareous grassland - semi-improved
- I B4 - Improved grassland
- B5 - Marsh/marshy grassland
- SI SI B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F1 - Swamp
- ▨ F2.2 - Marginal and inundation - inundation vegetation
- G1 - Standing water
- G2 - Running water
- I2.4 - Refuse-tip
- A J1.1 - Cultivated/disturbed land - arable
- A J1.2 - Cultivated/disturbed land - amenity grassland
- ▨ J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- ▨ J1.4 - Introduced shrub
- ▨ J2.1.2 - Intact hedge - species-poor
- J2.6 - Dry ditch
- J2.8 - Earth bank
- ▨ J3.4 - Caravan site
- J3.6 - Buildings
- J4 - Bare ground
- J5 - Other habitat
- J5 - Hardstanding

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						CWWTPR Project Figure A.3 Phase 1 Habitat Survey Legend			Checked	S White				
									Approved	T Cook				
						Scale at A3			N/A					
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					C	01/12/20	NC	Final	SW	TC	409071-MMD-00-XX-GIS-Y-0702	STD	PRE	D
					D	28/09/23	SLG	Title update	AW	CS				

Habitat point

- A3.1 - Broadleaved parkland/scattered trees

Habitat line



- A3.1 - Broadleaved parkland/scattered trees
- A3.2 - Coniferous parkland/scattered trees
- A3.3 - Mixed parkland/scattered trees
- M— G2.2 - Running water - mesotrophic
- ∩∩∩ J2.1.1 - Intact hedge - native species-rich
- J2.1.2 - Intact hedge - species-poor
- |||| J2.3.2 - Hedge with trees - species-poor
- |||| J2.4 - Fence
- - J2.6 - Dry ditch
- J2.8 - Earth bank

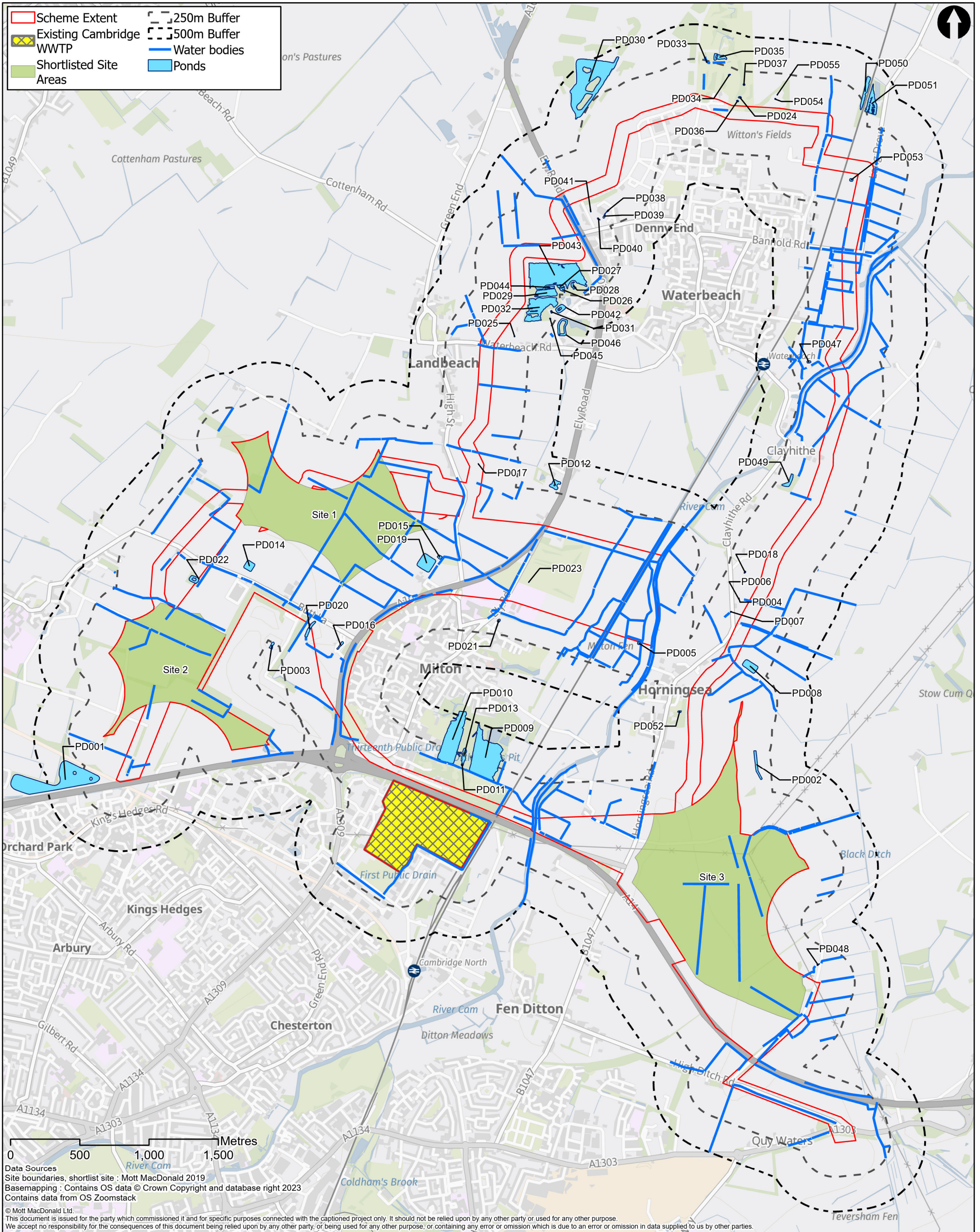
Habitat polygon

- A1.1.1 - Broadleaved woodland - semi-natural
- ▨ A1.1.2 - Broadleaved woodland - plantation
- A1.2.1 - Coniferous woodland - semi-natural
- ▨ A1.2.2 - Coniferous woodland - plantation

- A1.3.1 - Mixed woodland - semi-natural
- ▨ A2.1 - Scrub - dense/continuous
- ▨ A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- ST SI B2.2 - Neutral grassland - semi-improved
- SI SI B6 - Poor semi-improved grassland
- ▨ F2.2 - Marginal and inundation - inundation vegetation
- G1 - Standing water
- G2 - Running water
- A J1.1 - Cultivated/disturbed land - arable
- A J1.2 - Cultivated/disturbed land - amenity grassland
- ▨ J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- ▨ J1.4 - Introduced shrub
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Rev	Date	Drawn	Description	Ch'k'd	App'd						
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D	28/09/23	SLG	Title update	AW	CS						



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		<table border="1"> <thead> <tr> <th>Rev</th> <th>Date</th> <th>Drawn</th> <th>Description</th> <th>Ch'k'd</th> <th>App'd</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>09/11/20</td> <td>NC</td> <td>Final</td> <td>SW</td> <td>TC</td> </tr> <tr> <td>D</td> <td>28/09/23</td> <td>SLG</td> <td>Title update</td> <td>AW</td> <td>CS</td> </tr> </tbody> </table>					Rev	Date	Drawn	Description	Ch'k'd	App'd	C	09/11/20	NC	Final	SW	TC	D	28/09/23	SLG	Title update	AW	CS	Checked S White Approved T Cook
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You can contact us by:



Emailing at info@cwwtpr.com



Calling our Freephone information line on **0808 196 1661**



Writing to us at **Freepost: CWWTPR**

You can view all our DCO application documents and updates on the application on The Planning Inspectorate website:

<https://infrastructure.planninginspectorate.gov.uk/projects/eastern/cambridge-waste-water-treatment-plant-relocation/>