A428 Black Cat to Caxton Gibbet improvements

TR010044

Volume 6

6.3 Environmental Statement

Appendix 8.4: Aquatic Habitats

Planning Act 2008

Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

26 February 2021

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A428 Black Cat to Caxton Gibbet improvements

Development Consent Order 202[ ]

Appendix 8.4 - Aquatic Habitats

Regulation Number	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010044
Application Document Reference	TR010044/APP/6.3
Author	A428 Black Cat to Caxton Gibbet improvements Project Team, Highways England

Version	Date	Status of Version
Rev 1	26 February 2021	DCO Application

Table of contents

Chapter **Pages**

1 Introduction 1
1.2 Background and scope of works 1

2 Legislation and policy 1
2.1 Legislation 1
2.2 Policy framework 1

3 Methods 1
3.1 Survey Area 1
3.2 Desk study 1
3.3 Field survey 2
3.4 Biodiversity value 6
3.5 Competence of surveyors 9
3.6 Limitations 9

4 Results 11
4.1 Desk study 11
4.2 Field survey 12
4.3 Biodiversity evaluation 25

5 Summary and conclusion 27

6 References 28

Annex A: Figure 1 – Aquatic habitat surveys

Annex B: Site photographs

Table of Tables

Table 2.1 Summary of relevant legislation for aquatic habitats 1
Table 3.1 Summary of ponds surveyed 5
Table 3.2 Importance of ecological features 6
Table 4.1 WFD status of watercourses near to the Scheme 11
Table 4.2 Summary PSYM and NPS results and photographs (Plates 2-17) 16

1 Introduction

1.1.1 As part of the A428 Black Cat to Caxton Gibbet improvements (the Scheme), AECOM undertook habitat surveys of aquatic habitat to inform the Biodiversity assessment reported in **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1]**. The works reported here provide the results of aquatic habitat surveys of selected habitat types as recommended in the Jacobs agreed scope of work for Stage 3 (Ref 1-1).

1.1 Background and scope of works

1.1.1 The Jacobs 'Extended Phase 1 Habitat Survey Report' can be found in **Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**. Phase 1 Habitat Surveys and a desk study exercise undertaken in March and April 2018 identified habitats of principal importance (listed under Section 41 of the *Natural Environment and Rural Communities (NERC) Act 2006* (Ref 1-2)) which could be potential constraints to the works or influence the design and implementation of the Scheme.

1.1.2 The study area lies within the southern part of National Character Area (NCA) 88: Bedfordshire and Cambridgeshire Claylands, which support a range of habitats (Ref 1-3). These include the River Great Ouse and its tributaries meandering slowly across the landscape, riparian and wetland habitats, the ditches associated with grazing marsh and lowland meadow and reedbed. Some of these include species of stonewort (submerged aquatic plants).

1.1.3 The information described in this appendix provides a complete baseline of the aquatic habitat survey results which have been used to inform the Environmental impact Assessment (EIA) for the Scheme.

1.1.4 This appendix includes:

a. Relevant legislation.

b. Methods for desk study and field-based assessments undertaken between 2017 and 2019 to determine aquatic habitats value across the Survey Area (defined in Section 3).

c. Competencies of the ecologists involved in undertaking the above surveys.

d. Limitations to the surveys undertaken and any assumptions made as a result of incomplete data.

e. Survey results.

f. The approach for determining the nature conservation importance of aquatic habitats recorded during the assessment.

1.1.5 Species associated with the aquatic habitats are described in the below appendices of the Environmental Statement **[TR010044/APP/6.3]**:

- [redacted]
- [redacted]

c. Appendix 8.15: Fish

d. Appendix 8.17: Aquatic Invertebrates

1.1.6 **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]** provides the background and a description of the Scheme. **Figure 1** in Annex A of this appendix provides an overview of the Scheme and the Survey Area

Aquatic habitat ecology

1.1.7 Aquatic habitat ecology includes the study of all aspects of the ecology of aquatic systems, including rivers, streams, lakes and ponds. Aquatic habitats provide the food, water, shelter, and space essential for the survival of aquatic animals and plants.

2 Legislation and policy

2.1 Legislation

2.1.1 The legislation in **Table 2.1** is potentially relevant to the aquatic habitats covered in this appendix.

Table 2.1 Summary of relevant legislation for aquatic habitats

Legislation	Summary of key aspects
Wildlife and Countryside Act 1981 (as amended) (WCA) (Ref 1-4)	Part 1 of the WCA affords specific protection to flora listed on Schedule 8 (flora, fungi and lichens, some of which are aquatic). In certain circumstances, licences can be granted to permit some actions prohibited under the WCA. Schedule 9 includes a list of plants and animals which it is an offence to cause to grow or estsablish in the wild. A number of the plants and animals are aquatic species.
Natural Environment and Rural Communities (NERC) Act 2006 (Ref 1-2)	Section 41 of the NERC Act provides a list of habitats and plant species of principal importance for nature conservation in England which is to be used by decision-makers to guide the implementation of their duties under Section 40 of the Act. This list includes a number of freshwater habitats and species. Decision-makers are required to have regard to the Section 41 list when fulfilling their wider responsibility under the NERC Act to have regard to the conservation of biodiversity in England.
The EU Water Framework Directive (WFD) (Directive 2000/60/EC) (**Ref 1-5**)	Proposed developments or activities that have the potential to affect the water environment require a WFD Assessment. Compliance with the WFD means attainmenwt of good ecological status, prevention of deterioration in status, and prevention of failure to achieve future attainment of good status where it is not already achieved within waterbodies. However, Article 4.7 provides legislation for exemption conditions that could allow implementation of schemes that cause deterioration in ecological status, for example for reasons of overriding public interest
The Conservation of Habitats and Species Regulations 2017 (Ref 1-6)	The Conservation of Habitats and Species Regulations (Habitats Regulations) came into force on 30 November 2017, and extends to England and Wales (including the adjacent territorial sea). These Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.

2.2 Policy framework

2.2.1 National and local planning policies relevant to biodiversity are evaluated in **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1]**.

2.2.2 Habitat Action Plans have been established and are part of the different Biodiversity Action Plans (BAPs) related to the Scheme for Cambridgeshire and Peterborough, South Cambridgeshire District Council and Bedfordshire and Luton).

2.2.3 Habitat Action Plans aim to ensure the recovery of habitats, their biodiversity value and to protect species and sites by encouraging planners and developers to incorporate habitat management into their land management.

3 Methods

3.1 Survey Area

3.1.1 The Survey Area for the assessment of aquatic habitats was informed by published guidance (Ref 1-7) and the professional judgement of suitably qualified and experienced specialists and was the area within, and 100 metres beyond the Order Limits (refer to **Figure 1** in Annex A of this appendix).

3.1.2 A scoping exercise was undertaken of all the watercourses and waterbodies within the Survey Area, the former comprising those sections within, and 500 metres upstream and 500 metres downstream of the Order Limits. Those watercourses or waterbodies which required specific assessment were surveyed using field surveys in 2018 and 2019 as described below. The scoping included walkover surveys, consulting the Phase 1 Habitat Survey map (refer to **Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**) and analysis of aerial photography. The watercourses and waterbodies which were surveyed are shown in **Figure 1** in Annex A of this appendix.

3.1.3 Watercourses and waterbodies within the Survey Area that would have no potential to be impacted, directly or indirectly, by the Scheme, e.g. those in the vicinity of the de-trunked section of the existing A428 for which there will be no associated works, were not surveyed. Within the Survey Area there were also several watercourses and waterbodies that could not be surveyed as they had dried out.

3.1.4 Any limitations to these surveys are acknowledged and explained in the Limitations section of this appendix with consideration given to any implications to the findings.

3.2 Desk study

3.2.1 A desk study was undertaken to identify the watercourses and waterbodies within, and 1 kilometre (0.6 miles) beyond the Order Limits, the Study Area, and any nature conservation and other relevant designations pertinent to aquatic habitats, notably WFD designations and status relating to watercourses. Sources of information were:

a. A search for background information for the Survey Area and wider area (refer to **Appendix 8.1** of the Environmental Statement **[TR010044/APP/6.3]**).

b. Data from the extended Phase 1 Habitat Survey report found in **Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]** which identified aquatic habitats.

c. Two environmental records centres were contacted in 2018 to obtain relevant records within 1 kilometre (0.6 miles) of the Scheme (refer to **Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**) and identified ponds and watercourses within the 100 metres of the Order Limits:

   i. Cambridgeshire and Peterborough Environmental Records Centre.

ii. Bedfordshire and Luton Biodiversity Recording and Monitoring Centre and Environment Agency databases.

3.3 Field survey

3.3.1 Aquatic habitats were identified for survey based on a review of Ordnance Survey (OS) 1:25,000 maps; the Environment Agency online catchment data explorer (**Ref 1-8**); site walkovers and Jacob's Phase 1 Habitat Survey mapping (refer to **Appendix 8.20** of the Environmental Statement **[TR010044/APP/6.3]**); a[redacted]

3.3.2 Aquatic habitats included the watercourses (rivers, streams and ditches) identified within the Study Area that could potentially be affected (refer to **Figure 1** in Annex A of this appendix). The watercourses identified were:

a. The River Great Ouse and its tributaries:
   i. Begwary Brook.
   ii. Stone Brook.
   iii. Hen Brook (known as Abbotsley Brook in its upper reaches (also known as West Brook in the 19th century)) and its tributaries (small watercourses and several ditches, including South Brook, which runs near to the village of Abbotsley).
   iv. Fox Brook and its tributaries.
   v. Wintringham Brook and its tributaries (mainly ditches).
   vi. Gallow Brook and its tributaries (mainly ditches).
   vii. Stone Brook and its tributaries (mainly ditches).
b. Gallow Brook forms part of the northern boundary of the parish of Croxton and Hen/Abbotsley Brook much of the parish's southern boundary.
c. Watercourses in the catchment of the River Cam, including several minor tributaries of Bourn Brook, including Haydean and various ditches.
d. Minor tributaries of the West Brook, in the north-east of the Study Area.

3.3.3 Additionally, several ponds and other waterbodies were identified:

a. Caxton Gibbet attenuation pond (OS grid reference TL 3007160705).
b. The Fish Pond, a lake at Croxton Park.
c. Water filled excavations at:
   i. Begwary Brook County Wildlife Site (CWS).
   ii. Wyboston Pits CWS / Wyboston Leisure Park.
   iii. Little Barford CWS.
   iv. Roxton and the existing Black Cat roundabout.
d. A number of field ponds.

Habitat walkover survey

3.3.4 Aquatic habitat walkover surveys were undertaken in July 2017 to identify those watercourses, ponds and other waterbodies (e.g. river, brooks and ditches) within 100 metres of the Order Limits that required further investigation.

3.3.5 Keys habitats and waterbody features were recorded using a standardised survey form, including the presence of habitats for fish, aquatic invertebrates and any other species of nature conservation value. In addition, [redacted]

3.3.6 These surveys informed which waterbodies would subject to detailed site surveys.

3.3.7 Subsequently, 20 ponds and Hen Brook were selected for comprehensive surveys. All other watercourses, ditches and ponds were deemed to be of very low value (mostly dry at the time of the walkover habitat walkover survey) or not within 100 metres of the Order Limits.

3.3.8 Although the River Great Ouse is recognised as having significant biodiversity value and is a CWS, it was not included in the assessment as there will be no direct or indirect impact from the crossing.

River Habitat Survey

3.3.9 Hen Brook was surveyed using River Habitat Survey (RHS), a method designed to characterise and assess the physical structure of freshwater streams and rivers, including recognition of vegetation types and basic geomorphological processes. The survey followed the Environment Agency (2003) guidance (Ref 1-9).

3.3.10 The section of Hen Brook surveyed had a start (downstream) point at National Grid Reference TL 19838 58795, a centre point at TL 20002 58597 and an end upstream point at TL 20151 58535.

3.3.11 RHS was carried out on 11 October 2018 by an accredited ecologist. The weather conditions were mild with below average flow conditions due to the long dry summer.

3.3.12 Following the RHS guidance, the survey was undertaken along a standard 500 metres stretch of the river channel, with observations made at ten equally spaced ‘spot-checks’, with additional context provided by observations of land-use and valley form in the river corridor. The 500 metre section of Hen Brook was approximately 2.7 kilometres (1.7 miles) from its confluence with the River Great Ouse, flowing from east to west under the existing A428 from the left bank.

3.3.13 RHS included the following:

a. Desk study preparatory work – maps (including historic maps) and analysis of online data provided context on landscape characteristics and river planform over time to assist in identifying historic channel management.

b. Field survey and RHS survey form completion – the presence and/or absence of features, and in some cases the number and extent thereof was recorded at ten spot checks and along the whole 500 metres stretch of river channel, including natural and artificial features, and channel measurements.

3.3.14 The RHS survey location is indicated in **Figure 1** in Annex A of this appendix.

3.3.15 Hydromorphological indices for Hen Brook were calculated using the RHS Input and Analysis Software (Ref 1-10). These include the Habitat Modification Score (HMS) and Habitat Quality Assessment (HQA).

Aquatic invertebrate surveys (watercourses)

3.3.16 In addition to the RHS undertaken on Hen Brook, the Brook was sampled for aquatic invertebrates in October 2018 following standard Environment Agency sampling methods (Ref 1-11).

3.3.17 Following this method, aquatic invertebrate samples were collected from within the watercourse on 11 January 2019, using a Freshwater Biological Association (FBA) pattern net and kick sampling from within the channel. For further details see **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]**).

Pond surveys

3.3.18 The aim of the pond surveys was to provide robust evidence for the biodiversity value of the ponds, based on their aquatic macrophyte flora (aquatic plants) and aquatic invertebrate fauna.

3.3.19 Surveys followed a tiered system, based upon the anticipated value of the biodiversity resource. An initial survey was carried out using the Predictive System for Multimetrics (PSYM) guidance (Ref 1-12). This method assessed a pond's biodiversity value based on macrophytes and aquatic invertebrates within a single survey, which was undertaken in summer 2018. The survey method involved recording macrophytes within the pond boundary, as well as physical characteristics of the ponds. In addition, aquatic invertebrate samples were collected from within the ponds, using a FBA pattern net and kick or sweep sampling from the margins or within the ponds. Aquatic invertebrates were identified to family level.

3.3.20 The PSYM was followed up using a more detailed survey method, the National Pond Survey (NPS) method (Ref 1-13), for those ponds scoped in. The NPS involved recording macrophytes within the pond boundary and aquatic invertebrate sampling from the ponds, using an FBA pattern net and kick or sweep sampling from the margins or within the ponds. Aquatic invertebrate identification was undertaken to species level for most groups, rather than family level.

3.3.21 The NPS identified a number of ponds that were assessed as having higher potential for diverse and, or notable flora and fauna during the initial PSYM survey. Further surveys were completed and species level identification undertaken in spring and summer 2019, which provided data so that the ponds could be assessed for their biodiversity value.

3.3.22 [redacted]

3.3.23 All but five of the ponds were initially surveyed between 26 – 28 September 2018. A further two ponds were initially surveyed on 11 October 2018, due to lack of access on the earlier date and three ponds were found to be inaccessible.

3.3.24 Further return visits to ponds that were selected for NPS were undertaken in spring (22 May 2019 and 30 May 2019) and summer 2019 (28 August 2019).

3.3.25 A summary of the ponds surveyed and survey methods is provided in **Table 3.1**, below

Table 3.1 Summary of ponds surveyed

Pond name	National Grid reference	Survey method	Survey dates
Pond 1	TL 16030 55734	PSYM and NPS	28/09/18, 22/05/19 and 28/08/19
Pond 2	TL 16042 55682	PSYM	28/09/18
Pond 4	TL 17355 56031	PSYM	27/09/18
Pond 9	TL15369 55191	PSYM and NPS	28/09/18, 22/05/19 and 28/08/19
Pond 11	TL 16645 55205	PSYM and NPS	28/09/18, 22/05/19 and 28/08/19.
Pond 19	TL 19009 56396	PSYM	11/10/18
Pond 20	TL 19216 56346	PSYM	11/10/18
Pond 22	TL 18363 55538	PSYM	26/09/18
Pond 23	TL 18921 55405	PSYM	26/09/18
Pond 32	TL 21889 59284	PSYM	26/09/18
Pond 53	TL 24035 60755	PSYM	27/09/18
Pond 55	TL 24302 60852	PSYM	27/09/18
Pond 67	TL 27355 55935	PSYM and NPS	27/09/18, 30/05/19 and 28/08/19
Pond 69	TL 27415 59945	PSYM	27/09/18
Pond 80	TL 30365 60655	PSYM	27/09/18
Pond 83	TL 29978 60691	PSYM and NPS	27/09/18, 22/05/19 and 29/08/19
Pond 84	TL 29637 260726	PSYM	27/09/18

3.3.26 In addition to the ponds listed in **Table 3.1**, three ponds that had been scoped in for detailed pond surveys could not be surveyed as described below:

a. [redacted]

b. Pond 75 and Pond 78 could not be surveyed as access to the ponds was not permitted by the landowner.

3.4 Biodiversity value

3.4.1 An evaluation of the relative nature conservation value of ecological features (encompassing nature conservation designations, ecosystems, habitat and species) is an essential prerequisite step to allow biodiversity assessment of the Scheme. This is necessary to set the terms of reference for the overall ecological impact assessment.

3.4.2 The method of evaluation used was developed with reference to the Chartered Institute of Ecology and Environmental Management (CIEEM) (Ref 1-14).

3.4.3 CIEEM gives advice on scoping and carrying out ecological assessments and contextualising this is terms of relevant policies. Data received through consultation, desk-based studies and field-based surveys were used to allow ecological features of nature conservation value or potential value to be identified and the main factors contributing to their value described and related to available guidance.

3.4.4 The value (importance) of aquatic habitats addressed in this appendix has been defined with reference to the geographical level at which the feature being assessed is considered to matter (refer to **Table 3.2**).

Table 3.2 Importance of ecological features

Importance of ecological features	Typical descriptors with examples of criteria
International or European	An internationally designated site or candidate site including Special Protection Areas (SPA); potential SPAs (pSPAs); Special Areas of Conservation (SAC); candidate or possible SACs (cSACs or pSACs[1]); and/ or Wetlands of International Importance (Ramsar sites). Biogenetic Reserves, World Heritage Sites and Biosphere Reserves. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Resident or regularly occurring populations of species which may be considered at an international or European level[2] where: a. The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale. b. The population forms a critical part[3] of a wider population at this scale. c. the species is at a critical phase[4] of its life cycle at this scale.

Importance of ecological features	Typical descriptors with examples of criteria
UK or National	Sites designated at national UK level e.g. Sites of Special Scientific Interest (SSSI); Marine Protection Areas (MPAs) including Marine Conservation Zones (MCZs); and National Nature Reserves (NNR). Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of key/ priority habitats identified in the UK Post-2010 Biodiversity Framework i.e. UK Biodiversity Action Plan (BAP), including those published in accordance with Section 41 of the *Natural Environment and Rural Communities Act (2006)* (Ref 1-2) and those considered to be of principal importance for the conservation of biodiversity. Areas of ancient woodland e.g. woodland listed within the Ancient Woodland Inventory. Resident or regularly occurring populations of species which may be considered at a national or UK level[5] where: a. The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale. b. The population forms a critical part of a wider population at this scale. c. The species is at a critical phase of its life cycle at this scale.
Regional	Habitats or populations of species of value at a regional level (e.g. East Anglia). Areas of key or priority habitat identified as being of Regional value in the appropriate Natural Area profile (or equivalent) now referred to as the NCA. Key or priority habitat or species listed within the Highways England / Highways Agency BAP. Resident or regularly occurring populations of species which may be considered at a regional level[6] where: a. The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale. b. The population forms a critical part of a wider population at this scale. c. The species is at a critical phase of its life cycle at this scale.
County or Unitary Authority or District	Habitats or populations of species of value at a County (i.e. Cambridgeshire) level or District (i.e. South Cambridgeshire). Designated sites, such as CWS, Local Wildlife Sites (LWS) or Sites of Importance for Nature Conservation (SINCs), and Local Nature Reserves (LNRs) designated in the county or unitary authority area i.e. District context. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of key/ priority habitats identified in the Local Biodiversity Action Plan (LBAP).

Importance of ecological features	Typical descriptors with examples of criteria
	Resident or regularly occurring populations of species which may be considered at a County (or District) level[7] where: a. The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale. b. The population forms a critical part of a wider population at this scale. c. The species is at a critical phase of its life cycle at this scale.
Local	Habitats or species populations of value in a local (i.e. within approximately 5 kilometres (3.1 miles) of the site) context. Designated sites include LNRs designated in the local context. Trees that are protected by Tree Preservation Orders (TPOs). Areas of habitat, or populations or communities of species considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of value for migration, dispersal or genetic exchange.
Site	Habitat that is of value in the context of the site only. Populations of common and widespread species. A degraded and, or impoverished example of a common or widespread habitat in the local area.

*As well as assigning importance there is also a need to identify all legally protected species that could be affected by the Scheme in order that measures can be taken to ensure that adherence to the relevant legislation is observed. This may include the adoption of mitigation and appropriate licensing which is acceptable to Natural England.

[1] pSACs are sites which have been formally advised by to UK Government but have not yet been submitted to the European Commission. These sites should be valued at an international (European) level on the basis that they meet the relevant selection criteria for a SAC but are not yet designated as such.

[2] Such species include those listed within the Directive 2009/147/EC on the Conservation of wild birds (i.e. EC Birds Directive) (codified version of Council Directive 79/409/EEC as amended) or animal/ plant species listed within Council Directive 92/43/EEC on the Conservation of natural habitats and of wild flora and fauna (i.e. Habitats Directive).

[3] Such populations include sub-populations that are essential to maintenance of metapopulation dynamics e.g. critical emigration and, or immigration links between otherwise discrete populations.

[4] Seasonal activity or behaviour upon which survival or reproduction depends.

[5] Species which may be considered at the UK or national level including animals and plants which receive legal protection on the basis of their conservation interest (those listed within the Wildlife and Countryside Act 1981 (as amended) Schedule 1, 5 and 8); species listed for their principal importance for biodiversity (in accordance with the Natural Environment and Communities Act 2006 Section 41 England); priority species listed within the UK Post 2010 Biodiversity Framework (i.e. UKBAP); or species listed within the Red Data Book.

[6] Such species include those listed in the appropriate Natural Character Area.

Importance of ecological features	Typical descriptors with examples of criteria
[7] Such species include those at county level (i.e. Bedford or Cambridge) including unitary authority area i.e. District level (i.e. Bedford Borough Council); as listed on the LBAPs; and listed as a county designated site.	

3.5 Competence of surveyors

3.5.1 All AECOM Ecologists are members of (at the appropriate level) the CIEEM and follow their code of professional conduct (Ref 1-15) when undertaking ecological work.

3.6 Limitations

3.6.1 The aim of the desk study was to help characterise the baseline context of the Scheme and provide valuable background information that would not be captured by a single survey alone. Information obtained during the course of a desk study is dependent upon people and organisations having made and submitted records for the area of interest. As such, a lack of records for a particular habitats or species does not necessarily mean that the habitats or species do not occur in the Survey Area. Likewise, the presence of records for particular habitats and species does not automatically mean that these still occur within the area of interest or are relevant in the context of the Scheme.

3.6.2 Historic aquatic ecology data covering aquatic invertebrates, fish, macrophytes, phytobenthos (algae living on the bed or bottom of a watercourse or waterbody) and River Corridor and RHS information were requested from the Environment Agency. The data provided were very limited and only available for Hen Brook where it flows through St Neots, approximately 2 kilometres (1.2 miles) downstream of the proposed crossing of the Scheme, and the River Great Ouse (Roxton to Earith) and covered aquatic invertebrates and fish.

3.6.3 A survey can only assess the Survey Area as it was found at the time of the survey and if the habitats found are subject to change, the results of this survey may no longer be representative. The Survey Area was kept under observation, but no such changes were noted.

3.6.4 RHS was carried during good weather conditions and when the watercourse was not in spate. This survey date was outside of the optimal survey window of May and June, when the presence of key diagnostic features such as flowers and fruiting bodies facilitate the identification of macrophytes but vegetation cover remains insufficient to obscure bank and channel features. Nevertheless, the conditions allowed the accurate picture to still be obtained outside the optimum window, and this has not proven to be a major limitation.

3.6.5 All but five of the ponds were surveyed between 26 and 28 September 2018. A further two ponds were surveyed on 11 October 2018, due to lack of access on the earlier date. The optimal survey period is May – August, when the presence of key diagnostic features such as flowers facilitate the identification of macrophytes. However, most macrophytes were still present and could be identified. Further surveys of the ponds were undertaken in spring and summer 2019 to allow for collection of further macrophyte data. As such, this is not a significant limitation to this assessment.

3.6.6 Three ponds were not surveyed, two (Pond 75 and Pond 78) because access was not possible, and the third (Pond 37) due to unsafe conditions. Therefore, there is no information regarding these aquatic habitats. Access to these ponds was not achieved in 2019.

4 Results

4.1 Desk study

4.1.1 None of the watercourses within the vicinity of the Scheme were designated as salmonid rivers by the Environment Agency and are therefore not likely to support species of salmonid such as salmon and trout (see also **Appendix 8.15** of the Environmental Statement **[TR010044/APP/6.3]**, which supports this conclusion).

4.1.2 Several watercourses had been assessed by the Environment Agency for different ecological elements as part of routine monitoring for the WFD (EC *Directive 2000/60/EC* (Ref 1-5)) assessment.

4.1.3 The status/potential and objectives of surface waters are defined according to inter-linked biological, hydrological, chemical and physical (morphological) quality elements, and are defined in River Basin Management Plans. Biological elements monitored for surface waters to support WFD implementation include aquatic invertebrates (macroinvertebrates), fish, macrophytes and phytobenthos. A summary of the most recent quality status of the different biological elements for the River Great Ouse (Roxton to Earith) and Hen Brook from the Environment Agency is described in **Table 4.1** .

Table 4.1 WFD status of watercourses near to the Scheme

Waterbody name	Current Ecological Status	Fish	Macro invertebrates	Macrophytes
Ouse (Roxton to Earith)	Moderate	Good (2016)	Good (2016)	Good (2014)
Hen Brook (upstream section known as Abbotsley Brook)	Moderate	Good (2014)	Moderate (2016)	Poor (2014)

4.1.4 These data indicate that the quality of habitats and communities of the sections of the River Great Ouse and the Hen Brook within the Order Limits vary from ‘poor’ to ‘good’ quality and have the potential to support diverse species.

4.1.5 No data are available for the ponds or other watercourses, for example, ditches, within the vicinity of the Scheme.

4.1.6 In summary, while survey data indicate that the aquatic invertebrate and fish communities of Hen Brook are dominated by common and largely pollution tolerant groups (with no records of rare or protected species or communities), only very limited existing data are available for the aquatic species and habitats within the vicinity of the Scheme.

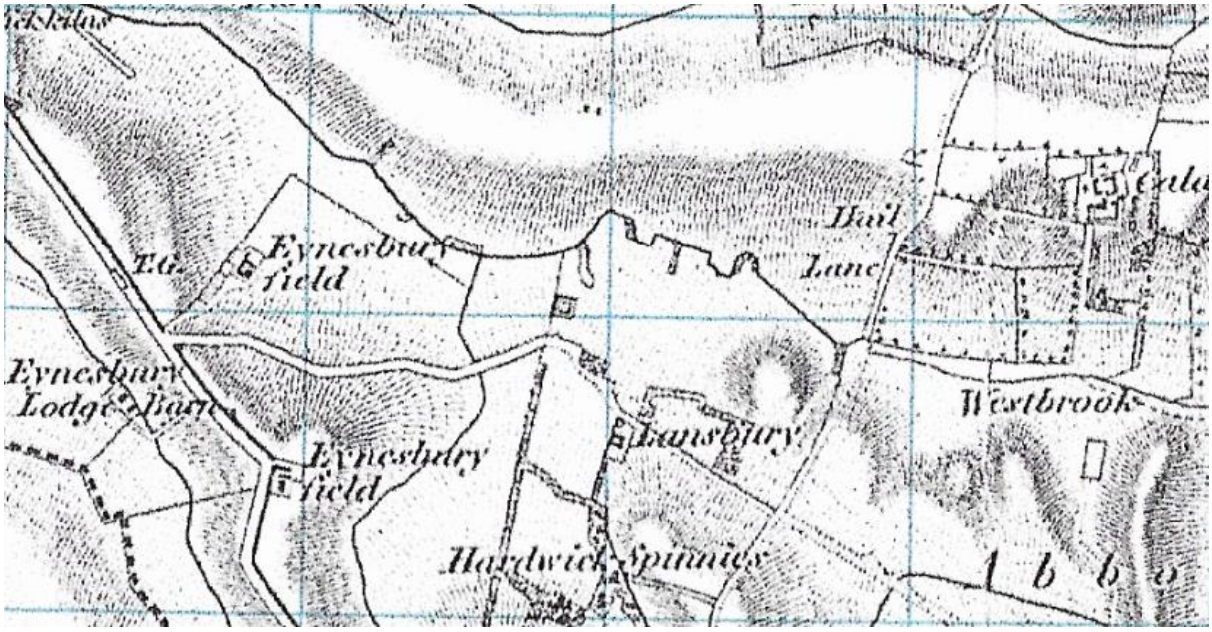
4.1.7 No information on other aquatic habitats such as ponds was received from the Environment Agency and the two environmental records centres contacted.

4.2 Field survey

River Habitat Survey

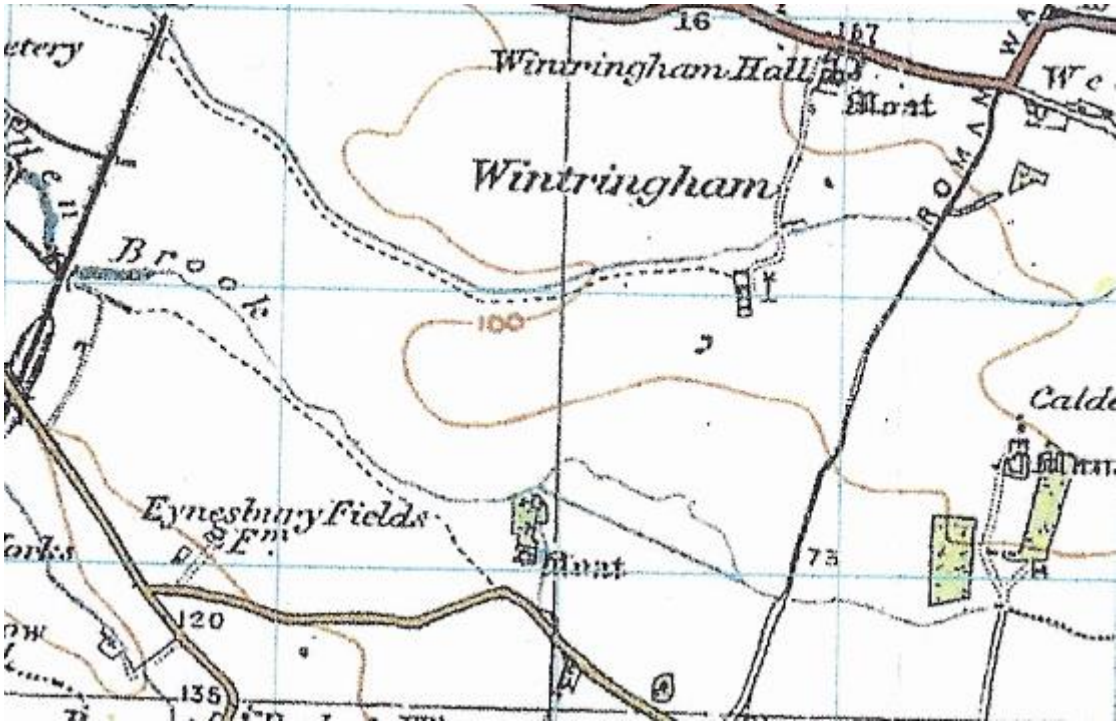
4.2.2 Hen Brook, which was surveyed using the RHS method, lies within arable land and evidence from the survey indicate that it has been diverted (realigned) and over-deepened along much (>33%) of its length based on the visual assessment and a review of OS maps, past and present (refer to **Plate 1**). This section is a very straight and deepened channel, not a natural formation given the low gradient. In addition, the brook is impounded by a weir/dam structure (affecting >33% of the survey length).

Plate 1. Changes in alignment of Hen Brook, 1805-2002



1805-1836

1898-1901



1919-1920

2002

4.2.3 On average, the watercourse was 1 metre wide and 0.3 metres deep. The section at the most downstream stretch was culverted for around 30 metres and there was also a minor bridge over the brook at the survey location. Flow throughout was fairly uniform with no pool or riffles present. The channel substrate was dominated by silt with some gravel/sandy areas. In parts, dense macrophyte growth was choking up areas of the brook with species including Common Duckweed (*Lemna minor*), Branched Bur-reed (*Sparganium erectum*) and Fool's Watercress (*Apium nodiflorum*). Himalayan Balsam (*Impatiens glandulifera*) was also present along the banks in isolated areas.

4.2.4 The HMS for Hen Brook was 3,565 indicating a severely modified watercourse in the highest HMS class (5). Most of the section has been re-sectioned and over deepened with a large culverted area reflecting this index.

4.2.5 The HQA was 41 for this site. The HQA score is allocated based on features including bars, eroding cliffs, large woody debris and waterfalls. HQA scores can only be used to compare sites of similar river type or character and not as an absolute indication of river quality. Therefore, this score is provided for reference only.

Aquatic invertebrates (watercourses)

4.2.6 The detailed findings of the aquatic invertebrate surveys undertaken on Hen Brook (refer to **Plate 1**) are provided in **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]**. While a range of aquatic invertebrates were recorded, the majority of taxa recorded are pollution tolerant, although low numbers of pollution sensitive groups (notably caddis) were recorded. No notable species were recorded (i.e. species with a specific conservation status or legal protection or conservation scores that define them as being uncommon.

Pond surveys

4.2.7 In total, 17 ponds were surveyed using the PSYM and/or NPS method. A summary of the results to date are presented in **Table 4.2**. The data include trophic ranking scores and number of uncommon plant species, average score per taxon (ASPT), number of Megaloptera (alderfly) and Odonata (dragonfly and damselfly) taxa and number of Coleoptera (beetle) taxa, as calculated by the PSYM manual. **Table 4.2** also includes a physical description of the ponds, and key aquatic invertebrate and macrophyte taxa recorded.

Table 4.2 Summary PSYM and NPS results and photographs (Plates 2-17)

Pond name	Description	Plants			Macroinvertebrates			
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number of uncommon plant species	ASPT	Odonata + Megaloptera (OM) families	Coleoptera families	PSYM quality category (Index of Biotic Integrity (%))
Pond 1 (Plate 2)	Elongated pond (250m^2) in quary/industrial area, likely former ditch. Four uncommon species of plant recorded: Common Clubrush, a charophyte (*Chara species*), and Slender-Tufted Sedge. Moderate diversity of macroinvertebrates recorded (11 Biological Monitoring Working Party (BMWP) taxa), including some pollution senstive groups.	13	8.33	3	5.1	3	1	Moderate (67%)
Pond 2 (Plate 3)	Dry pond in industrial site, in a very shallow depression. Pond completley overgrown with common macrophytes including Lesser Pond-sedge (*Carex acutiformis)*, Greater Willowherb (*Epilobium hirstum*) and Common Bulrush (*Typha latifolia*). One uncommon species of macrophyte recorded: Wood Small-reed (*Calamagrostis epigejos*). No aquatic invertebrates collected, as dry at time of survey.	6	8.5	2	N/A	N/A	N/A	N/A

Pond name	Description	Plants			Macroinvertebrates			
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number of uncommon plant species	ASPT	Odonata + Megaloptera (OM) families	Coleoptera families	PSYM quality category (Index of Biotic Integrity (%))
Pond 4 (Plate 4	Pond adjacent to broadleaf woodland and arable fields (400m^2). Pond with silt/clay base, dry at the time of the survey and overgrown with Greater Pond-sedge (*Carex riparia*).	4	0	0	N/A	N/A	N/A	Very poor (11%)
Pond 9 (Plate 5)	Marshy pond with a silt base and isolated areas of shallow water, an attentuation pond for nearby existing A428. Four uncommon species of plant recorded: Lesser Bulrush (*Typha angustifolia*), Slender-tufted Sedge, Pink-water Speedwell (*Veronica catenata*) and Horned Pondweed (*Zannichellia palustris*). The non-native invasive New Zealand Pigmyweed (*Crassula helmsii*) also recorded. Relatively high diversity of macroinvertebrates recorded (19-20 BMWP taxa), including pollution senstive groups.	12	9	4	4.1	2	3	Good (83%)

Pond name	Description	Plants			Macroinvertebrates			
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number of uncommon plant species	ASPT	Odonata + Megaloptera (OM) families	Coleoptera families	PSYM quality category (Index of Biotic Integrity (%))
Pond 11 (Plate 6)	Waterfilled excavation (20,000m^2) formed from a fomer mineral excavation site with clay and sand/gravel base. Pond with mostly open water and islands of macrophytes. Pond adjacent ot River Great Ouse and quary.One uncommon species of plant recorded: Common Clubrush (*Schoenoplectus lacustris*). Moderate diversity of macroinvertebrates recorded (15 BMWP taxa), including pollution senstive groups.	14	8.58	1	5.3	1	2	Moderate (67%)
Pond 19 (Plate 7)	Pond (110m^2) adjacent to track and arable fields, dry at the time of the survey, with a clay base. One uncommon species of plant recorded: Common Clubrush. No aquatic invertebrates collected, as dry at time of survey.	2	8.85	1	N/A	N/A	N/A	N/A
Pond 20 (Plate 8)	Pond (120m^2) adjacent to track and arable fields, mostly dry at the time of the survey, with a clay base. No macrophytes present.	0	NA	0	NA	NA	NA	NA

Pond name	Description	Plants			Macroinvertebrates			
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number of uncommon plant species	ASPT	Odonata + Megaloptera (OM) families	Coleoptera families	PSYM quality category (Index of Biotic Integrity (%))
Pond 22 (Plate 9)	Dry pond (approximately 90m^2) in woodland and adjacent to arable fields. Connected to dry field drain, but with no evidence of recent water at time of survey. Pond overhung with vegetation and with a clay/silt base. No wetland plants records and no aquatic invertebrate sample collected.	0	N/A	0	N/A	N/A	N/A	N/A
Pond 23 (Plate 10)	Dry pond (approximately 60m^2) with clay base in small woodland area. Fully shaded in arable field and connected to dry field drain. No wetland plants records. Moderate diversity of macroinvertebrates recorded (13 BMWP taxa), generally pollution tolerant.	0	N/A	0	N/A	N/A	N/A	N/A
Pond 32	Artificial pond/moat (450m^2) at Wintringham Farm adjacent to existing A428. Partially overhung with clay/silt base and abundant macrophytes, including two uncommon species of plant recorded: Common Hornwort (*Ceratophyllum demersum*) and White Water-Lily (*Nuphar lutea*). Moderate diversity of macroinvertebrates recorded (12 BMWP taxa), generally pollution tolerant.	7	8.55	2	3.83	1	1	Moderate (56%)

Pond name	Description	Plants			Macroinvertebrates			
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number of uncommon plant species	ASPT	Odonata + Megaloptera (OM) families	Coleoptera families	PSYM quality category (Index of Biotic Integrity (%))
Pond 53 (Plate 11)	Small triangular pond (approximately 200m^2) in arable field and surronded by broadleaf woodland and scrub. Pond partially overhund with clay base.	3	0	10	4	3	0	Poor (33%)
Pond 55 (Plate 12)	Dry pond (approximately 100m^2) in small broadleaf woodland area, adjacent to arable fields. Pond overhung with clay/silt base. No macrophytes present other than Hard Rush (*Juncus inflexus*), on the banks, and dry so no aquatic invertebrate sample collected.	0	N/A	N/A	N/A	N/A	N/A	N/A
Pond 67 (Plate 13)	Ornamental pond in garden (650m^2). Partially shaded with shallow water over approximately 50cm soft silt and abundant emergent macrophytes. Three uncommon species of plant recorded: Common Bulrush (*Typha angustifolia*), Slender-tufted Sedge (*Carex* acuta) and Yellow Water-lily (*Nuphar lutea*). Low diversity of macroinvertebrates recorded (8 BMWP taxa), generally pollution tolerant.	6	9.0	3	3.8	1	0	Poor (28%)

Pond name	Description	Plants			Macroinvertebrates			
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number of uncommon plant species	ASPT	Odonata + Megaloptera (OM) families	Coleoptera families	PSYM quality category (Index of Biotic Integrity (%))
Pond 69 (Plate 14)	Pond in garden (approximately 200m^2) with suspected fish presence (carp) and high turbidity. Partially overhung with vegetation and with base principally clay/silt with some cobbles. Common Reed (*Phragmites australis*) abundant. Low diversity of macroinvertebrates recorded (6 BMWP taxa), generally pollution tolerant.	6	8.2	0	4.2	1	0	Poor (39%)
Pond 80 (Plate 15)	Pond in garden (approximately 80m^2), largely ornamental but with various macrophytes. Two uncommon species of plant recorded: Common Hornwort and White Water-lily, as well as several exotic and planted species. Moderate diversity of macroinvertebrates recorded (13 BMWP taxa), including some pollution senstive groups.	9	2	7.9	4.5	2	1	Good (78%)
Pond 83 (Plate 16)	Attenuation pond for existing A428. Elongate pond (3,500m^2), with abundant macrophytes and clay/silt base including Wood Small-reed and Common Stonewort (*Chara vulgaris*). Relatively high diversity of macroinvertebrates recorded (19-23 BMWP taxa), including pollution senstive groups.	12	8.2	2	5.4	3	3	Good (89%)

Pond name	Description	Plants			Macroinvertebrates			
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number of uncommon plant species	ASPT	Odonata + Megaloptera (OM) families	Coleoptera families	PSYM quality category (Index of Biotic Integrity (%))
Pond 84 (Plate 17)	Ponded ditch adjacent to existing A428, in an area overgrown with scrub. Waterbody shaded with a silt/clay base and various emergent macrophytes, all of which are common. Relatively high diversity of macroinvertebrates recorded (19 BMWP taxa), including pollution senstive groups.	6	0	8.75	4.4	3	2	Moderate (72%)

4.2.8 The surveys undertaken recorded that six of the ponds were dry at the time of the survey (Ponds 2, 4, 19, 20, 22, 23 and 55). Four of the dry ponds did not support wetland plants and are likely to be dried out most of the time (Ponds 19, 22, 23 and 55).

4.2.9 Two of these dry ponds (Pond 2 and Pond 20) supported species of aquatic plants (refer to **Table 4.2**), indicating that these two ponds may be wet at other times of year or in 'wetter' years than 2018 when the surveys were undertaken. Despite being dry, Pond 2 supported six macrophyte species.

4.2.10 Three of the ponds surveyed were assessed as having good quality based on the PSYM assessment, Pond 83, Pond 80 and Pond 9. These three ponds are therefore rated as being priority ponds.

4.2.11 Those priority ponds of high ecological value under the UK Biodiversity Action Plan are listed below. These waterbodies are therefore sites which should be given priority for protection for their wildlife interest. The criteria for the selection of priority ponds are given by the Freshwater Habitats Trust (Ref 1-15). The ponds identified above are considered as being priority ponds under Criteria 3 – Ponds of high ecological value. The Freshwater Habitats Trust defines these ponds as being "*classified in the top category for ecological quality (a score of 75% or more), as assessed by the standardised method for assessing the biological quality of still waters in England and Wales – the Predictive System for Multimetrics (PSYM)*."

4.2.12 Pond 83 is a road attenuation pond located near to the existing Caxton Gibbet roundabout and receives road runoff from the highway. Despite its principal water source being from the road, the pond supports a relatively diverse range of macroinvertebrates (19 – 23 BMWP scoring taxa recorded across the three sampling dates), including various high-scoring ('pollution sensitive') groups, notably caddisfly larvae (Leptoceridae, Phryganeidae, Limnephilidae), dragonfly (Libellulidae, Aeshnidae), damselfly (Coenagrionidae) and mayfly nymph (Caenidae). The pond also supported several beetle families (Haliplidae, Dytiscidae and Hydrophilidae), including the water scavenger beetle (*Berosus affinis)* and the diving beetle (*Ilybius fenestratus)* (see **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]** for information on the aquatic invertebrate fauna of this pond). The pond also supported two uncommon species of macrophyte: wood small-reed and common stonewort.

4.2.13 Pond 80, also assessed as being of good quality, is an artificially constructed ornamental pond within a garden. The range of macrophyte species (nine species recorded), including exotic planted species and the two uncommon species (Common Hornwort and White Water-lily) is likely to reflect the planting regime rather than natural colonisation or habitat conditions. However, the pond also supported a moderate diversity of macroinvertebrates (13 BMWP scoring taxa), including damselfly nymphs (Coenagrionidae), diving beetles (Dytiscidae), alderfly (Sialidae) and caddis (Leptoceridae) larvae, indicating good water and habitat quality. The dominant taxa were groups that are able to colonise quickly (water bugs and water beetles), rather than groups such as snails, which take

longer to colonise. This indicates that this is a relatively recent pond, and its fauna is likely to develop with time.

4.2.14 Pond 9, which also appears to be a highway attenuation pond, was of good quality, according to the PSYM analysis. It supported a relatively high range of macroinvertebrates (19 – 20 BMWP scoring families across the three sampling dates), including various high-scoring ('pollution sensitive') groups, notably caddisfly larvae (Limnephilidae), dragonfly (Libellulidae, Aeshnidae), damselfly (Lestidae) and mayfly nymph (Caenidae). The pond supported several beetle families (Haliplidae, Dytiscidae and Hydrophilidae). Several of the species of aquatic invertebrate recorded were notable, including the water scavenger beetles (*Berosus signaticollis)* and (*Berosus affinis)* (see **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]**). The pond also supported 12 macrophyte species, four of which were uncommon species: lesser bulrush, slender-tufted sedge, pink-water speedwell and horned pondweed. However, the non-native invasive New Zealand Pigmyweed was also recorded.

4.2.15 Four of the ponds were assessed as having moderate quality. These were Pond 1, Pond 11, Pond 84 and Pond 32.

4.2.16 Although only of moderate quality, Pond 1 was notable for its relatively high macrophyte diversity recorded (13 species), including Common Clubrush and a charophyte, which are uncommon. In addition, while macroinvertebrate diversity was moderate (11 BMWP scoring taxa), several pollution sensitive groups were recorded, notably caddis larvae (Leptoceridae), dragonflies (Aeshnidae) and damselfies (Coenogriidae), indicting good water quality.

4.2.17 Similarly of moderate quality, Pond 11 was characterised by a relatively high macrophyte species diversity recorded (13 species), including common clubrush, which is considered as being uncommon in the PSYM system. A moderate number of macroinvertebrate taxa were recorded (15 BMWP scoring taxa), but these included high scoring 'pollution sensitive' groups including caddis larvae (Molanidae and Leptoceridae) and damselfies (Coenogriidae), indicting good water quality.

4.2.18 In Pond 32, while macrophyte diversity was recorded as being moderate (seven species recorded), two uncommon species were recorded: Common Hornwort and White Water-lily (the latter, which has ornamental value, may have been introduced to the site, due to the pond being a garden pond (moat)).

4.2.19 The remaining ponds (Pond 53, Pond 69, Pond 67 and Pond 4) were assessed as having poor or very poor quality. However, the following observations are made:

a. Pond 53 supported a moderate macrophyte diversity (eight species), but these included two uncommon species of macrophyte: Common Hornwort and White Water-lily, while Common Hornwort may have naturally colonised the pond, White Water-lily, which due to its ornamental value, may have been introduced, due to the waterbody being a garden pond.

b. Pond 67 supported a relatively low macrophyte diversity (six species), but uncommon species of plant recorded: Common Bulrush, Slender-tufted Sedge and Yellow Water-lily, which again may have been introduced into this garden pond.

4.3 Biodiversity evaluation

4.3.1 The Desk Study and survey data have been taken into consideration in the assessment of the biodiversity value of the aquatic habitats, based on data available at the time of the assessment.

Hen Brook

4.3.2 The section of Hen Brook that is crossed by the Scheme is heavily modified. The RHS survey found evidence that it has been over-deepened and re-aligned through >33% of the length surveyed, which limits its value as an aquatic habitat (see also **Plate 1**). In addition, the downstream stretch of the Survey Area is culverted for approximately 30 metres. However, it does potentially support a range of species, including fish (see **Appendix 8.15** of the Environmental Statement **[TR010044/APP/6.3]**), aquatic invertebrates (see **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]**) and various wetland plants in an otherwise managed agricultural landscape. Therefore, based on the data available Hen Brook is of Local value in terms of nature conservation importance.

Ponds

4.3.3 Macrophyte and macroinvertebrate diversity was variable between the different ponds. While none of the plant species present were of significant nature conservation value, a relatively high diversity of macrophytes was recorded in some of the ponds and some uncommon species (as designated in the PSYM system) were recorded.

4.3.4 The biodiversity value of the different ponds has been assessed not only based on the quality of the ponds from the site surveys, but also on geographic scale, considering the scarcity of these habitats in the local and regional contexts. The wider Cambridgeshire and Bedfordshire area is dominated by intensive agricultural land use (mostly tilled land), where good quality pond and other wetland habitats are relatively scarce.

4.3.5 For this reason, the Pond 80 and Pond 83 that were assessed as being priority ponds and were of good quality are of District importance. These ponds also support several notable aquatic invertebrates and macrophyte species.

4.3.6 Pond 9, another priority pond, is assessed as being of County importance. This is because, in addition to the justifications for District designation described above for Pond 80 and Pond 83, the pond meets the Cambridgeshire and Peterborough criteria as a CWS (Ref 1-17), as a Type 10A standing waterbody with at least 15 emergent, floating leaved and submerged plant species recorded (15 species recorded, excluding the non-native invasive New Zealand Pigmyweed present at this site).

4.3.7 The ponds that were assessed as being of moderate PSYM quality (Pond 1, Pond 11, Pond 84 and Pond 32), while having some biodiversity importance as habitats, are somewhat degraded and are therefore of Local importance.

4.3.8 All other ponds, which were dry or of poor/very poor quality according to the PSYM analysis are considered as being of Site importance.

Other habitats

4.3.9 No other aquatic habitats were identified as being potentially affected by the Scheme.

5 Summary and conclusion

5.1.1 A desk study, an extended Phase 1 Habitat survey and aquatic surveys were carried out for the Scheme to identify and assess the aquatic habitats present, including watercourses and ponds.

Hen Brook

5.1.2 Hen Brook, which is crossed by the Scheme, was surveyed using the RHS method. The survey indicated that the watercourse was largely modified throughout the stretch, although it is likely to support a range of aquatic species and is of Local importance. Further surveys of fish and aquatic invertebrates have been undertaken on this watercourse (see **Appendix 8.15** and **Appendix 8.17** of the Environmental Statement **[TR010044/APP/6.3]**).

Ponds

5.1.3 In total, 20 ponds were identified for survey, and detailed surveys were undertaken on 17 ponds (the three other ponds were not accessible). Physical characteristics, macrophytes and aquatic invertebrates were recorded. Three of these ponds were determined as having good quality and: two of these were rated as priority ponds of District importance and one pond was rated as being of County importance. A further four ponds were considered to be of Local importance, and the remaining ponds were almost dry or of poor/very poor quality and are of Site importance.

6 References

Ref 1-1. Jacobs UK Ltd. (2017) A428 Black Cat to Caxton Gibbet, Advanced Stage 3 Ecology Survey Scope.

Ref 1-2. Natural Environment and Rural Communities Act 2006. HMSO (2006). https://www.legislation.gov.uk/ukpga/2006/16/contents

Ref 1-3. Natural England, National Character Area (NCA) Profile: 88 Bedfordshire and Cambridgeshire Claylands http://publications.naturalengland.org.uk/publication/5091147672190976

Ref 1-4. Wildlife and Countryside Act 1981. HMSO (1981) https://www.legislation.gov.uk/ukpga/1981/69

Ref 1-5. The EU Water Framework Directive (Directive 2000/60/EC). European Commission (2000) https://ec.europa.eu/environment/water/water-framework/index_en.html

Ref 1-6. The Conservation of Habitats and Species Regulations 2017. HMSO (2017) https://www.legislation.gov.uk/uksi/2017/1012/contents/made

Ref 1-7. Highways England (2020) LA 108 Biodiversity. https://www.standardsforhighways.co.uk/dmrb/search/af0517ba-14d2-4a52-aa6d-1b21ba05b465

Ref 1-8. Environment Agency catchment data explorer. Environment Agency (2017) http://environment.data.gov.uk/catchment-planning

Ref 1-9. River Habitat Survey in Britain and Ireland. Field Survey Guidance Manual: 2003 Version. Environment Agency, Bristol.

Ref 1-10. Naura, M. (2017). River Habitat Survey Input and Analysis Software: Riverdene Consultancy. Version 1: March 2017.

Ref 1-11. Environment Agency (2012). Freshwater macroinvertebrate sampling in rivers. Operational instruction 018_08

Ref 1-12. Pond Action (2002). A Guide to Monitoring the Ecological Quality of Ponds and Canals using PSYM. Pond Action, Oxford.

Ref 1-13. Pond Action (1998). A Guide to the Methods of the National Pond Survey. Pond Action, Oxford.

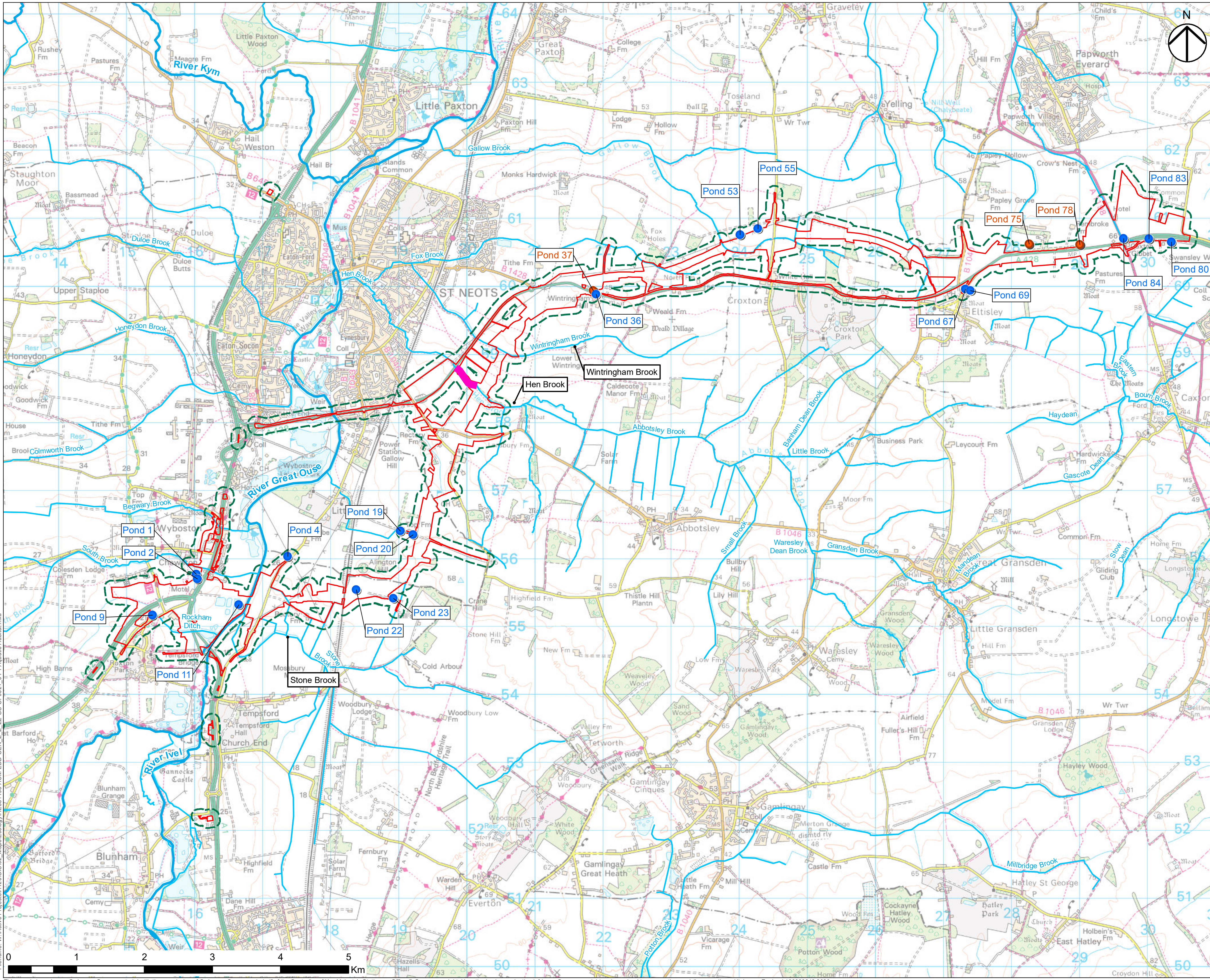
Ref 1-14. Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018.

Ref 1-15. CIEEM. (2019). Professional Code of Conduct. Chartered Institute of Ecology and Environmental Management, January 2019.

Ref 1-16. Priority Pond Criteria. Freshwater Habitats Trust [Accessed February 2021] https://freshwaterhabitats.org.uk/research/priority-ponds/priority-pond-criteria/

Ref 1-17. Cambridgeshire and Peterborough Wildlife Panel (2014) Cambridgeshire and Peterborough County Wildlife Sites Selection Guidance.

Annex A: Figure 1 – Aquatic habitat surveys



NOTES

LEGEND

- Order limits
- The Scheme
- Survey Area (100m)
- Aquatic habitat sample location - sample collected
- Aquatic habitat sample location - no access
- River Habitat Survey location

Revision Details	By / Check	Date	Suffix
FIRST ISSUE	BF / JG	26/02/21	P01

Purpose of Issue

DCO APPLICATION

Client

Highways England
Woodlands
Manton Lane
Manton Industrial Estate
Bedford
MK41 7LW

highways england

Development Consent Order Number

TR010044

Project Title

A428 BLACK CAT TO CAXTON GIBBET IMPROVEMENTS

Drawing Title

FIGURE 1
AQUATIC HABITAT SURVEYS

Designed	Drawn	Checked	Approved	Date
GE	BF	LH	JG	26/02/21

Internal Project No	Suitability
60541541	D7
Scale @ A3	**Zone**
1:50,000	

Drawing Number: Highways England Pin | Originator | Volume | Location | Type | Role | Number

HE551495 -ACM -EBD-GEN_Z_Z_ZZ -GS-GI-0021

Rev: P01

Annex B: Site photographs

Plate 1: Hen Brook

Plate 2: Pond 1

Plate 3: Pond 2

Plate 4: Pond 4

Plate 5: Pond 9

Plate 6 Pond 11

Plate 7: Pond 19

Plate 8: Pond 20

Plate 9: Pond 22

Plate 10: Pond 23

Plate 11: Pond 53

Plate 12: Pond 55

Plate 13: Pond 67

Plate 14: Pond 69

Plate 15: Pond 80

Plate 16: Pond 83

Plate 17: Pond 84