The Great Grid Upgrade

North Humber to High Marnham

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North Humber to High Marnham

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1. Aquatic Ecology Report

1.1 Introduction

1.1.1 This appendix to **Application Document 6.8 Chapter 8 Ecology** details the scope, methods and findings of aquatic ecology desk study and field surveys which were carried out to inform the Environmental Statement (ES) and any mitigation and licensing requirements for the Project.

1.1.2 This appendix identifies relevant legislation relating to aquatic ecology and baseline information obtained through desk-based assessments and field surveys undertaken in 2024 and 2025, the purpose being to understand the freshwater aquatic macrophyte, macroinvertebrate, and fish species present.

1.1.3 This appendix is supported by the following three figures located in Annex A:

- **Figure A8.10.1 Aquatic Survey Locations - Macroinvertebrates**;
- **Figure A8.10.2 Aquatic Survey Locations – Macrophytes**; and
- **Figure A8.10.3 Aquatic Survey Locations – Fish**.

1.1.4 There are eight annexes to this appendix:

- Annex A Figures;
- Annex B Aquatic macroinvertebrate taxa list;
- Annex C Community Conservation Index (CCI);
- Annex D Lotic-Invertebrate Index of Flow Evaluation (LIFE);
- Annex E Proportion of Sediment-sensitive Invertebrates (PSI);
- Annex F Whalley, Hawkes, Paisley & Trigg (WHPT) Metric;
- Annex G Aquatic macrophyte taxa list;
- Annex H Watercourse site descriptions; and
- Annex I Statutory Designated Sites and Non-Statutory Designated Sites relating to aquatic ecology'

1.1.5 The following documents and figures should be read in conjunction with this appendix to provide a more detailed assessment of the baseline in relation to aquatic ecology:

- **Application Document 6.1.F1 Figure 1.1 Project Location and Route Sections**;
- **Application Document 6.2 Chapter 2 Legislation and Policy Context**;
- **Application Document 6.4.A2 Appendix 4.2 Indicative Bridge and Culvert Schedule**;
- **Application Document 6.8 Chapter 8 Ecology**;

- **Application Document 6.8.A1 Appendix 8.1 Local Planning Policy**;
- **Application Document 6.8.A2 Appendix 8.2 Designated Sites Information**; and
- **Application Document 7.3 Register of Environmental Actions and Commitments**.

1.2 Defining the Study and Survey Areas

1.2.1 In this appendix, the following terminology is used to describe the geographic areas in which aquatic ecology work has been conducted:

- Study area: This area was subject to the collection of background information, such as the identification of waterbodies, designated sites, and habitats. The study area typically comprises the Order Limits plus a 2 kilometre (km) buffer; however, in the case of migratory fish species[1] an extended 5 km buffer was used to reflect the greater mobility of these species. Furthermore, a buffer of 10 km from the Order Limits was used for the identification of international statutory designated sites, and a buffer of 5 km was used for national/local statutory designated sites.
- Survey Area: This area is the focus of the aquatic ecology field survey work and is shown in **Figure A8.10.1**. The survey area included selected watercourses inside the Order Limits that would be crossed by the Project. A total of 49 watercourses were identified for survey based on desk-based assessments and hydrological connectivity.

1.2.2 The Project has been sub-divided into six geographical Route Sections for reader accessibility. These are shown on **Application Document 6.1.F1 Figure 1.1 Project Location and Route Sections** and comprise:

- Route Section A – between the proposed Birkhill Wood Substation and the River Ouse;
- Route Section B – between the River Ouse and Crowle;
- Route Section C – between Crowle and North Moor (M180);
- Route Section D – between North Moor (M180) and the River Idle;
- Route Section E – between the River Idle and Darlton; and
- Route Section F – between Darlton to the proposed High Marnham Substation.

1.2.3 The results reported in this appendix reference the Route Section that the habitat and/or species is located within where appropriate.

1.3 Aims and Objectives

1.3.1 The aims and objectives of the aquatic ecology work and report are presented in the following sections.

[1] Fish that migrate between, and spend distinct portions of their life cycle in, fresh and saltwater environments; also known as diadromous fish.

Aims

1.3.2 Aims of the desk based and field surveys are to:

- Determine the presence and species of freshwater aquatic macrophyte, macroinvertebrate, and fish within the survey area where possible; and
- Inform the ES for the Project and any subsequent mitigation or licensing that may be required to enable the Project to proceed lawfully with respect to freshwater aquatic ecology.

Objectives

1.3.3 The objectives of the appendix are to:

- Outline the legislation relevant to freshwater aquatic ecology;
- Identify the presence of watercourses within the study area which could be impacted by the Project, and which have the potential to support freshwater aquatic macrophyte, macroinvertebrate, and fish, using Ordnance Survey (OS) MasterMap, aerial photography, and Project information such as **Application Document 6.4.A2 Appendix 4.2 Indicative Bridge and Culvert Schedule**;
- Present the methods and results of freshwater aquatic macrophyte, macroinvertebrate, and fish surveys carried out within the survey area in 2024 and 2025;
- Provide baseline evidence and evaluate the ecological receptor to inform the ecological assessment presented in **Application Document 6.8 Chapter 8 Ecology**; and
- Present any mitigation, including compensation and enhancements requirements in relation to freshwater aquatic ecology across the Project.

2. Legislation

2.1 Introduction

2.1.1 This section lists the legislation that is relevant to freshwater aquatic ecology. More detailed information can be found in **Application Document 6.8 Chapter 8 Ecology** and **Application Document 6.2 Chapter 2 Legislation and Policy Context**.

2.1.2 Policy matters are specifically referenced in **Application Document 6.8 Chapter 8 Ecology** and **Application Document 6.8.A1 Appendix 8.1 Local Planning Policy** and are not discussed further.

2.2 Legislation

Regulation (EU) 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species

2.2.1 Following the United Kingdom's (UK) exit from the European Union (EU), the provisions of Regulation (EU) 1143/2014 (The European Parliament and the Council of the European Union, 2014) were retained as UK law and amended to function independently of the EU. The Secretary of State (SoS) may amend the (UK) list of species of invasive non-native species (INNS) whose adverse impact is such that concerted action in required across Great Britain.

2.2.2 The Regulation (The European Parliament and the Council of the European Union, 2014) sets out requirements for risk assessments, the prohibition of specified activities in respect of INNS, arrangements for the taking of necessary steps to prevent the unintentional introduction or spread of INNS, the requirement for permits, authorisations and emergency measures and the management by the appropriate authority of widely spread INNS.

Environment Act 2021

2.2.3 The Environment Act 2021 (HM Government, 2021) provides a post-Brexit legal framework for environmental governance and makes provision for improvements to the natural environment. It requires the SoS to set long-term targets (15-year minimum) for biodiversity.

Wildlife and Countryside Act 1981

2.2.4 The Wildlife and Countryside Act 1981 (WCA) (HM Government, 1981) is a primary piece of UK wildlife legislation, protecting birds, other animals, and plants (including vascular plants, bryophytes, lichens and fungi) and providing for the designation of protected areas, including Sites of Special Scientific Interest (SSSI).

2.2.5 Schedule 9 of the WCA (HM Government, 1981) lists non-native species that are already established in the wild, which continue to pose a conservation threat to native biodiversity and habitats, whilst Section 14 makes it an offence to cause the spread in the wild of any species listed under Schedule 9.

Natural Environment and Rural Communities Act 2006

2.2.6 Section 40 of the Natural Environment and Rural Communities Act 2006 (NERC) (HM Government, 2006) sets out the "general biodiversity objective" the furtherance of which a public authority must consider. The general biodiversity objective is the conservation and enhancement of biodiversity in England through the exercise of functions in England. In respect of the general biodiversity objective, the Secretary of State must in particular have regard to the United Nations Environmental Programme Convention on Biological Diversity of 1992 (Secretariat of the Convention on Biological Diversity, 1992). Section 41 requires the SoS to publish and maintain a list of habitats and species that are of Principal Importance for the purpose of conserving biodiversity, and are regarded as conservation priorities under the UK Biodiversity Framework 2024 (Joint Nature Conservation Committee on behalf of the Four Countries' Biodiversity Group, 2024). See also paragraph 2.2.16.

Salmon and Freshwater Fisheries Act 1975

2.2.7 The Salmon and Freshwater Fisheries Act 1975 (SAFFA) (HM Government, 1975) relates to the protection of freshwater fish, with a focus on salmon and trout species. It considers mortality, migration barriers, pollution and the degradation of habitats.

Environmental Protection Act 1990

2.2.8 The Environmental Protection Act 1990 (HM Government, 1990) makes provision for the control of pollution to the air, water and land by regulating the management of waste, the control of emissions and the identification and remediation of land posing unacceptable risks to human health and the environment.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

2.2.9 In England, the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (‘the WFD Regulations’) (HM Government, 2017) place a general duty on the SoS and the Environment Agency to exercise their relevant functions to secure compliance with Regulation 3 of Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 (the ‘Water Framework Directive’ (WFD)) (The European Parliament and the Council of the European Union, 2000) which seeks to avoid long-term deterioration of freshwater quality, and ensure the sustainable management and protection of freshwater resources.

The Eels (England and Wales) Regulations 2009

2.2.10 The Eels (England and Wales) Regulations 2009 (the Eels Regulations) (HM Government, 2009) came into force on 15 January 2010, aiming to halt and reverse the decline in the European eel (*Anguilla anguilla*) stock and meet mature adult eel biomass escapement targets to sea of 40 per cent relative to that expected in the

absence of anthropogenic impacts. The Eel Regulations make provisions for the safe and unobstructed passage for eel, channel alterations, river crossings and culverting.

The Conservation of Habitats and Species Regulations (Habitats Regulations) 2017

2.2.11 The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) (HM Government, 2017) transposed the requirements of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) (The Council of the European Communities, 1992) and Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds ('Birds Directive') (The European Parliament and the Council of the European Union, 2009) into UK law. They provide for the designation and protection of European Sites (and adapt planning and other controls for the protection of these sites; this includes Annex I (habitats) and Annex II (species) for which such European Sites can be designated.

2.2.12 The Habitats Regulations (HM Government, 2017) also provide protection for certain European Protected Species that are listed on Schedule 2 (animals) or Schedule 5 (plants). Provision is made for the granting of licences that permit certain acts as lawful, providing the appropriate authority is satisfied that the permitted activities will be carried out for specified reasons or purposes, that there is no satisfactory alternative, and that the activities will not be detrimental to the maintenance of the species concerned at the favourable conservation status in their natural range.

2.2.13 Special Areas of Conservation (SAC) and Special Protection Areas (SPA) in the UK no longer form part of the EU's Natura 2000 ecological network[2], following the UK's exit from the EU. The Habitats Regulations ensure that the network of sites in the UK, that prior to EU Exit formed part of Natura 2000, now form part of the 'national site network' on land and at sea, including both the inshore and offshore marine areas in the UK. The national site network includes existing SACs and SPAs and proposed, or new SACs and SPAs ('Habitats sites') designated under these Regulations.

The Invasive Alien Species (Enforcement and Permitting) Order 2019

2.2.14 The Invasive Alien Species (Enforcement and Permitting) Order 2019 (HM Goverment, 2019) came into effect on 1 December 2019. This gives effect to certain provisions of EU Regulation No 1143/2014 (The European Parliament and the Council of the European Union, 2014), in particular in respect of offences and the relevant licences, permits and rules in connection with INNS of special concern.

2.2.15 Invasive non-native species that are of special concern are subject to provisions of the WCA (HM Government, 1981), see paragraph 2.2.4.

[2] Natura 2000 is a network of protected areas of land and sea in Europe. The sites within Natura 2000 are designated under the Birds Directive (The European Parliament and the Council of the European Union, 2009) and the Habitats Directive (The Council of the European Communities, 1992).

UK Biodiversity Framework 2024

2.2.16 The UK Biodiversity Framework 2024 (Joint Nature Conservation Committee on behalf of the Four Countries' Biodiversity Group, 2024) is the UK's overarching structure for coordinating biodiversity policy and action, providing a shared framework for collaboration, governance, and reporting across England, Scotland, Wales, and Northern Ireland. A central feature of the Framework is alignment with the Kunming-Montreal Global Biodiversity Framework agreed at the United Nations Environment Programme's Convention on Biological Diversity in December 2022 (United Nations Environment Programme, 2022).

3. Methodology

3.1 Desk Study

3.1.1 A desk study was conducted to identify waterbodies, designated sites, and habitats within and up to 2 km outside of the Order Limits. For migratory fish species this was extended to 5 km outside of the Order Limits to reflect the greater mobility of these species.

3.1.2 The desk study focused on data collected within ten years of the data being provided, to provide an accurate representation of the current ecological conditions within the study area. By concentrating on recent data, the assessment better reflects the present baseline conditions, rather than relying on potentially outdated information which is unlikely to still be representative.

Local Records Centres

3.1.3 As part of the desk study, the following Local Record Centres (LRCs) were contacted to request records of relevant statutory designated sites, non-statutory designated sites, legally protected and/or notable species, and INNS within the study area:

- North & East Yorkshire Ecological Data Centre (data received in December 2025);
- Lincolnshire Environmental Records Centre (data received in January 2026); and,
- Nottinghamshire Biological and Geological Record Centre (data received in October 2025).

Environment Agency's Catchment Data Explorer

3.1.4 The Environment Agency's Catchment Data Explorer website (Environment Agency, 2023) was used to determine the current WFD status of the waterbodies in the study area and inform the assessment of their conservation value. Ecological status can be classed as high, good, moderate, poor, or bad (Environment Agency , 2022):

- High – near natural conditions, no restriction on the beneficial uses of the water body and no impacts on amenity, wildlife or fisheries;
- Good – slight change from natural conditions because of human activity, no restriction on the beneficial uses of the waterbody, no impact on amenity, wildlife, or fisheries;
- Moderate – moderate change from natural conditions because of human activity. some restriction on the beneficial uses of the water body, no impact on amenity, some impact on wildlife and fisheries;
- Poor – major change from natural conditions because of human activity, some restrictions on the beneficial uses of the water body, some impact on amenity and moderate impact on wildlife and fisheries; and

- Bad – severe change from natural conditions because of human activity, significant restriction on the beneficial uses of the water body, major impact on amenity and major impact on wildlife and fisheries with many species not present.

Environment Agency Ecology and Fish Data Explorer

3.1.5 Environment Agency ecological monitoring data for the ten-year period 2017-2026 for fish, aquatic invertebrates, macrophytes, and INNS was collated using the Environment Agency's Ecology and Fish Data Explorer (Environment Agency, 2026).

National Biodiversity Network Atlas

3.1.6 Commercially available crayfish records for the ten years prior to download of data were obtained from the National Biodiversity Network (NBN) Atlas (National Biodiversity Network Trust, 2026). These included records for the native white-clawed crayfish (*Austropotamobius pallipes*), and the non-native invasive signal crayfish (*Pacifastacus leniusculus*).

Migratory Fish

3.1.7 An additional migratory fish desk study was completed in January 2026 using fish data from the Environment Agency (Environment Agency, 2026), LRCs, and the NBN Atlas (National Biodiversity Network Trust, 2026), using a study area of 5 km from the Order Limits as discussed in paragraph 1.2.1.

3.2 Field Surveys

3.2.1 Watercourses were selected for survey based on the design of the Project and hydrological connectivity. **Figure A8.10.1 Aquatic Survey Locations – Macroinvertebrates** in Annex A shows the aquatic ecology survey locations. Each survey location was assigned a unique identifier code (as shown on **Figure A8.10.1**) based on crossing identifications (prefix C if a culvert and prefix B if a bridged crossing), and the watercourse identifier (based on the catchment).

3.2.2 Macrophyte and macroinvertebrate species data were cross referenced against the JNCC Taxon Designations list (Joint Nature Conservation Committee, 2026) to identify if any protected and/or notable species were recorded during the surveys.

Aquatic Macroinvertebrate Surveys

3.2.3 A total of 49 watercourses were selected for macroinvertebrate sampling based on the Project design and hydrological connectivity. Following design changes introduced after the surveys were completed, seven of the 49 sample locations were no longer within the Order Limits, and consequently these data are not presented in this appendix as they are not required to inform the baseline for the ES.

3.2.4 The survey seasons for aquatic macroinvertebrates are Spring and Autumn. Surveys at each location were conducted over two consecutive survey seasons in line with standard methodology (Environment Agency, 2017), with surveys being carried out in Spring and Autumn 2024 with additional surveys in Spring and Autumn 2025 to incorporate locations brought into the Order Limits through design changes. Some watercourses were dry or inaccessible at the time of the surveys, as reported in

Table 3.3. The specific locations and dates of the surveys are also shown in Table 3.3.

3.2.5 No surveys were undertaken during or immediately following periods of high flow in accordance with best practice guidance (British Standards Institution, 2012) (Environment Agency, 2014).

Aquatic Macroinvertebrate Survey Methodology

3.2.6 The aquatic macroinvertebrate survey method followed aquatic macroinvertebrate sampling procedures standardised by the Environment Agency (Environment Agency, 2017), which conforms to BS EN ISO 10870:2012 Water Quality – Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters (British Standards Institution, 2012). These methods allow characterisation of aquatic macroinvertebrate communities and can be used to determine whether rare or notable species or communities are present.

3.2.7 Samples were collected using a standard Freshwater Biological Association pattern pond net, with a mesh size of 1 millimetre (mm). Habitats were surveyed in proportion to their presence through a combination of kick sampling and sweep sampling[3] for three minutes, followed by a one-minute active search of larger substrates and emergent macrophytes, in accordance with standard methods. Samples collected were subsequently preserved in Industrial Methylated Spirit prior to laboratory processing.

3.2.8 Each of the samples collected was sorted and analysed in a laboratory by suitably trained and experienced aquatic ecologists. Lists of the aquatic macroinvertebrate taxa present were produced in line with Environment Agency guidance (Environment Agency, 2014). Aquatic macroinvertebrate samples were identified to mixed-taxon level using a stereo-microscope. Most groups were identified to species level (where practicable), with the exception of the following:

- Worms (Oligochaeta) which were identified to sub-class;
- Pea mussels (*Pisidium*/*Odhneripisidium*/*Euglesa*) which were identified to the genus-group;
- Marsh beetles (Scirtidae) which were identified to family;
- True-fly larvae, which were identified to the maximum resolution possible; and
- Immature or damaged specimens, which were identified to the maximum resolution possible on a case-by-case basis.

3.2.9 Macroinvertebrate taxa and abundances were then used to calculate the following metrics that can be used to inform an assessment of relative nature conservation value and general degradation.

Community Conservation Index

3.2.10 A Community Conservation Index (CCI) (Chadd & Extence, 2004) was calculated for each location, as detailed in Annex C. The CCI classifies many groups of aquatic macroinvertebrates according to their scarcity and nature conservation value in

[3] Kick-sampling is undertaken by positioning a net downstream while agitating (kicking at) the streambed to dislodge organisms into the net, and sweep sampling is undertaken by sweeping a net through habitats, dislodging organisms from plants, roots, and submerged debris.

England as understood at the time that the classification was developed. Species scores range from one to ten, with one being very common and ten being endangered. Since its initial publication, in some cases the references used in the CCI classification to define scarcity and value have been superseded by more recent assessments. Due to this, the authors of the CCI have provided updated species scores to take account of this new information (Environment Agency, pers. comm., 2022). These updated scores have been used within this assessment.

Lotic-invertebrate Index for Flow Evaluation

3.2.11 Lotic-invertebrate Index for Flow Evaluation (LIFE) scores were calculated (Extence, et al., 1999). This is an index that links benthic macroinvertebrate data to flow regimes prevailing in UK waters. Flow scores have been allocated to various macroinvertebrates based on species/family abundance and their ecological association with different flows, as detailed in Annex D. The overall LIFE score for a site is calculated as the sum of the individual scores divided by the number of scoring species/families. These scores increase with current velocity: scores less than 6.0 generally indicate sluggish or still water conditions; and scores greater than 7.5 indicate fast flows. Lotic-invertebrate Index for Flow Evaluation allows the mean flow preference of aquatic macroinvertebrates colonising a reach to be determined so that effect of habitat changes such as sediment accumulation can be monitored.

Proportion of Sediment-sensitive Invertebrates

3.2.12 Calculations were undertaken to determine the proportion of sediment sensitive macroinvertebrates present using the Proportion of Sediment-sensitive Invertebrates (PSI) index (Extence, et al., 2013). Using this approach, individual taxa of aquatic macroinvertebrate are assigned a Fine Sediment Sensitivity Rating (FSSR) ranging from A to D, as detailed in Annex E. The PSI score for each aquatic macroinvertebrate sample was derived from individual species scores and abundances. The derived PSI score corresponds to the per centage of fine sediment-sensitive taxa present in a sample and ranges from 0 to 100, where low scores correspond to watercourses with high fine sediment cover. The PSI score therefore provides an indication of the extent to which watercourses are influenced by fine sediments, and therefore by inference the potential sensitivity of the associated aquatic macroinvertebrate community to changes in silt load and deposition.

Whalley, Hawkes, Paisley & Trigg

3.2.13 The aquatic macroinvertebrate data were analysed to generate the Whalley, Hawkes, Paisley & Trigg (WHPT) score Average Score Per Taxon (ASPT), and Number of scoring taxa (NTAXA) values, which provides an indication of the ecological quality in the watercourse (Water Framework Directive UK Technical Advisory Group, 2023). This assigns numerical value to taxa according to their sensitivity to organic pollution. The average of the values for each taxon in a sample, known as ASPT is a stable and reliable index of organic pollution. Therefore, these assessments can indicate to what extent an aquatic macroinvertebrate community is exposed to organic pollution (further information is provided in Annex F). These indices can vary between geological regions and habitat types. Ditches, for example, are unable to support many of the high-scoring taxa associated with fast flowing habitats. Therefore, the resultant metrics should be reviewed with an awareness of their potential limitations, and the reach-specific context, as described in this report.

3.2.14 The WHPT method has been primarily designed to respond to organic pollution; however, it is suitable for monitoring other types of impact and is used for assessing the WFD classification parameter “General degradation” (Water Framework Directive UK Technical Advisory Group, 2023).

Aquatic Macrophyte Surveys

3.2.15 Aquatic macrophyte (plant) surveys were undertaken in August 2025. The recommended time period for aquatic macrophyte surveys is between 1 June and 30 September and should not be undertaken during or immediately after periods of high flow. Of the 33 survey locations scoped in for macrophyte assessment, 22 were surveyed, with dry watercourses and those with accessibility issues omitted from assessment (see Table 3.3).

3.2.16 The aquatic macrophyte surveys followed guidance set out in the Water Framework Directive UK Technical Advisory Group (WFD UKTAG) River Assessment Method (Macrophytes and Phytobenthos) for use with LEAFPACS2[4] (Water Framework Directive UK Technical Advisory Group, 2014) which conforms to BS EN 14184:2014 Water quality - Guidance for the surveying of aquatic macrophytes in running waters (British Standards Instiution, 2014). The survey was carried out by walking within the channel of each watercourse along a 100 metre (m) transect, where safely accessible. Any inaccessible areas were bypassed as necessary before re-entering the channel at the next available access point. A list of all macrophytes encountered was collated and their relative abundance was recorded using Taxon Cover Values (TCV), detailed in Table 3.1.

Table 3.1 – Taxon Cover Values and their associated per centage cover

TCV	Per centage cover for the macrophyte taxon
R	Riparian record only
C1	less than 0.1%
C2	0.1 to 1%
C3	1 to 2.5%
C4	2.5 to 5%
C5	5 to 10%
C6	10 to 25%
C7	25 to 50%
C8	50 to 75%
C9	greater than 75%

[4] LEAFPACS stands for Lakes Ecological Assessment From Phyto-benthos And Community Structure.

3.2.17 For five of the surveyed watercourses in the Order Limits, the aquatic macrophyte survey data was processed through the River LEAFPACS2 calculator (Water Framework Directive UK Technical Advisory Group, 2026). Noting that the River LEAFPACS2 analysis was not suitable to apply to the other watercourse types/conditions surveyed (see section 3.3 Limitations). Four metrics were calculated using macrophyte species and groups data:

- **River macrophyte nutrient index (RMNI)** – Macrophyte taxa are allocated a score based on their relative tolerance of nutrients. The overall observed RMNI score for a survey is the cover weighted average of the individual scores of the different taxa found.
- **Number of macrophyte taxa (NTAXA)** – The number of scoring taxa recorded in the field survey. Only true hydrophytes are included.
- **Number of functional groups (NFG)** – Hydrophytes are allocated to one of 24 "functional groups". These are groups of organisms which exploit a resource in a similar way.
- **Cover of filamentous green algae (ALG)** – The per centage cover of filamentous green algae over the whole of the surveyed reach.

3.2.18 The LEAFPACS2 programme predicts the RMNI, NTAXA and NFG scores for the surveyed site based on altitude, alkalinity, and slope. The predicted reference scores are then compared to observed scores resulting from surveys, and the output is an Ecological Quality Ratio (EQR) which can be translated into a WFD classification (High, Good, Moderate, Poor, or Bad). Alkalinity data should be obtained from monthly analysis of samples from each over a period of at least one year, whereas here, alkalinity was based on the one sample collected during the survey visits, as is typical for this type of assessment and is unlikely to have influenced results.

3.2.19 River LEAFPACS2 analysis was designed to reflect the impact of nutrient enrichment on macrophyte communities, with High status indicating there is no impact and Bad status indicating there is a severe impact. The method may also be sensitive to alterations in river flow and/or modifications to morphological conditions which may impact macrophyte communities (Water Framework Directive UK Technical Advisory Group, 2014).

Table 3.2 – LEAFPACS2 compliant macrophyte survey locations

Survey location	Route Section	National Grid Reference (NGR)	Survey date
C-075	A	SE9326129667	30 July 2025
B-09	A	SE9084928629	20 July 2025
B-16	E	SK7787885941	8 July 2025
B-12	E	SK7783974293	8 May 2025
B-13	F	SK7882972330	8 May 2025

Fish Surveys

3.2.20 Field surveys were completed over Summer 2024 and Summer 2025 at eight sites listed in Table 3.3**.**These sites were deemed to be of sufficient water depth and

habitat quality to provide suitable conditions for fish. Sites where fish surveys were not completed were either scoped out during the Spring macroinvertebrate surveys due to poor habitat/ephemeral conditions, or because desk study data was present and proficient to provide baseline data, and/or because the nature if the impact of the Project was not deemed to pose a significant impact to fish. Electric fishing surveys were undertaken at four sites, with Environmental DNA (eDNA) surveys completed at the four sites where electric fishing was deemed unsuitable (see section 3.3 Limitations)

Electric fishing surveys

3.2.21 Four electric fishing surveys were undertaken throughout September in both 2024 and 2025. These dates allow for optimal survey completion in the period between the close season for coarse fish which runs from 15 March to 15 June inclusive, and the close season for salmonids which varies both geographically and by species with the longest duration running from early-October to mid-March. See Table 3.3 and **Figure A8.10.1 Aquatic Survey Locations – Macroinvertebrates** in Figures for fish survey locations.

3.2.22 Electric fishing surveys were undertaken following a derivation of the standard electric fishing practice for operators and equipment, as detailed in the Environment Agency Code of Practice and Electric Fishing Equipment Annex A and B, Issue II regulations revision (Environment Agency, 2002). Electric fishing was conducted by fully trained fisheries scientists following the Environment Agency's Operational Instruction 993_08, Electric fishing operations (Environment Agency, 2019), and British Standards BS EN 14011:2003 Water quality - Sampling of fish with electricity (British Standards Institution, 2003) and BS EN 14962:2006 Water quality - Guidance on the scope and selection of fish sampling methods (British Standards Institution, 2006).

3.2.23 Two survey types (quantitative and semi-quantitative) were completed within the survey period and were chosen based onsite conditions and limitations.

3.2.24 Quantitative surveys require at least three depletive runs of a watercourse, sectioned off with stop nets. This survey method allows for the estimate of stock within the survey site. Where suitable, these surveys were undertaken by assessing the fish population within a 100 m reach isolated using cross channel stop nets where possible, fishing in an upstream direction.

3.2.25 As site conditions did not allow quantitative surveys at all sites, semi quantitative surveys were undertaken where possible. Semi-quantitative surveys require one run of depletive electric fishing to give an indication of population densities of species present. This survey method was completed in an upstream direction and completed over a 100 m reach where suitable. Semi-quantitative surveys were considered sub-optimal due to electric fishing conditions which caused some fish to avoid capture.

3.2.26 As most watercourses typically assessed were less than 3 m wide and less than 0.5 m deep, the equipment used for electric fishing surveys consisted of a Smith-Root LR-24 electric fishing backpack with a single anode, a cathode and hand nets to capture fish.

3.2.27 Prior to survey commencement, various physiochemical parameters of the water were recorded. This informed the surveyors of the appropriate electric fishing settings to use, based on current conductivity levels. Surveyors' electric fished the

watercourse in an upstream direction, following methods set out in the above protocols.

3.2.28 Following capture, the fish were placed in aerated fish holding tanks before being identified, measured to the nearest millimetre for fork length[5], and safely released immediately downstream of stop nets. Any European eel caught were kept in a separate tank to other fish species to prevent harm, as the mucus secreted by eels can clog the gills of other fish. Holding tank dissolved oxygen (DO) levels were continuously monitored and maintained at optimal conditions using an aerator.

Environmental DNA surveys

Sampling

3.2.29 One of the best-developed applications of eDNA is surveying fish communities. Fish are particularly well suited to eDNA monitoring because they are fully aquatic and consistently release DNA into the water, making them detectable year-round. Most UK freshwater fish can be identified to species using the 12S gene, for which well-validated metabarcoding assays exist. This enables all fish DNA in a water sample to be amplified and sequenced in parallel, efficiently yielding whole community data (Bruce, 2018). Additionally, research has shown eDNA metabarcoding to be an effective tool for detecting and monitoring fish communities from rivers (Hänfling, et al., 2016) (Pont, et al., 2018).

3.2.30 eDNA surveys were completed at the four survey locations that were not suitable for electric fishing surveys, based on site scoping or aborted surveys. The samples collected were analysed using vertebrate specific eDNA metabarcoding approaches to provide an overall assessment of the fish community.

3.2.31 Water samples were collected in Summer and Autumn 2025 from all surveyed watercourses. For survey locations where eDNA surveys were adopted, repeat sampling with two kits helped to improve detection of taxa presence within the watercourse.

3.2.32 Up to ten water subsamples were collected from each watercourse, per eDNA kit, with each individual sample containing a total sample volume of 2 litres (l). As recommended by the manufacturer, two eDNA kits were used at each survey location (as all watercourses were less than 5 m wide). Samples were collected from the bank or in channel, working in an upstream direction. Sampling was attempted at equidistant locations along the watercourse to ensure adequate spatial coverage and comprised sub-samples taken over 5 m intervals. The left side, centre and right side of the channel were sampled to ensure full channel coverage and various mesohabitats were sampled. This was repeated for each site until ten samples were collected.

3.2.33 All sub-samples were pooled together, thoroughly mixed and immediately filtered using a manual filtration kit to extract eDNA. The filtered sample was then preserved with a lysis solution *in-situ* to maintain DNA integrity at ambient temperatures until the DNA could be abstracted for laboratory analysis. Samples were sent to the laboratory within seven days of collection, well within the holding time period.

[5] Fork length is the straight-line measurement of a fish from the tip of its snout (or closed mouth) to the centre of the fork in its caudal (tail) fin.

3.2.34 Prior to sampling at each site, all sampling kit was sterilised to ensure no introduction of foreign DNA could occur and to prevent cross contamination between sites. During sampling, particular care was taken to avoid areas of significant inflow and to not disturb the watercourse beds to prevent DNA cross contamination from sediments.

Laboratory analysis

3.2.35 Laboratory analysis of the eDNA samples was completed by NatureMetrics Ltd, using metabarcoding analysis by utilising the 12S gene to characterise fish species.

Table 3.3 – Aquatic Survey Locations

Crossing Point ID	National Grid Reference (NGR)	Route Section	Watercourse ID	Watercourse	Spring macroinvertebrates	Autumn macroinvertebrates	Macrophytes	Fish
C-100	TA 03615 35561	A	HL_8	Unnamed Watercourse	Dry	Dry	Not surveyed	Not surveyed
C-143	TA 02922 35170	A	HL_18	Unnamed Watercourse	No Access	Dry	Not surveyed	Not surveyed
C-005	SE 93554 29890	A	FO_25	Unnamed Watercourse	30 May 2024	Dry	Dry	Not surveyed
C-075	SE 93342 29671	A	FO_50	Ellerker Beck	24 May 2024	19 September 2024	30 July 2025	Not surveyed
C-102	SE 92143 28954	A	FO_88	Unnamed Watercourse	Dry	No Access	Not surveyed	Not surveyed
C-006	SE 91958 29002	A	FO_85	Unnamed Watercourse	24 May 2024	Dry	30 July 2025	Not surveyed
BC-15	SE 91599 28765	A	FO_112	Unnamed Watercourse	24 May 2024	18 September 2024	Not suitable for survey	Not surveyed
C-008	SE 91194 29001	A	FO_84	Unnamed Watercourse	23 May 2024	18 September 2024	29 July 2025	Not surveyed

Crossing Point ID	National Grid Reference (NGR)	Route Section	Watercourse ID	Watercourse	Spring macroinvertebrates	Autumn macroinvertebrates	Macrophytes	Fish
C-149	SE 91349 28740	A	FO_91	Ings Drain	23 May 2024	19 September 2024	30 July 2025	Not surveyed
C-009	SE90768 29054	A	FO_97	Unnamed Watercourse	Dry	Dry	Dry	Not surveyed
B-09	SE 90873 28662	A	FO_54	Mill Beck	23 May 2024	19 September 2024	30 July 2025	02 October 2025 (electric fishing)
C-010	SE 90373 28596	A	FO_132	Unnamed Watercourse	23 May 2024	18 September 2024	29 July 2025	Not surveyed
C-011	SE 90340 28595	A	FO_129	Unnamed Watercourse	23 May 2024	18 September 2024	Dry	Not surveyed
C-013	SE 89382 28143	A	FO_153	Unnamed Watercourse	No Access	Dry	Dry	Not surveyed
BC-06	SE 87303 27348	A	FO_162	Broomfleet Beck	23 May 2024	Dry	Dry	Not surveyed
C-021	SE 85213 26214	A	FO_244	Scalby Warping Drain	No Access	Dry	Dry	Not surveyed

Crossing Point ID	National Grid Reference (NGR)	Route Section	Watercourse ID	Watercourse	Spring macroinvertebrates	Autumn macroinvertebrates	Macrophytes	Fish
BC-03	SE 84905 25987	A	FO_194	Bishopsoil Drain	22 May 2024	Dry	29 July 2025	Not surveyed
C-167	SE 83770 25369	A	FO_254	Blacktoft Warping Drain	No access	17 November 2025	28 July 2025	Not surveyed
C-168	SE 83426 25198	A	FO_264	Bellasize Drain	No access	17 November 2025	28 July 2025	Not surveyed
C-172	SE 82910 21712	B	TT_38	Unnamed Watercourse	13 May 2025	17 November 2025	Dry	Not surveyed
BC-37	SE 83475 20347	B	TT_100	Adlington Fleet Drain	22 May 2024	25 September 2024	28 July 2025	17 November 2025 (eDNA)
B-11	SE 81326 14491	B	TT_28	Paupers Drain	13 May 2025	19 November 2025	19 August 2025	Not surveyed
BC-12	SE 80856 14260	B	TT_190	Eastoft Boundary Dike	13 May 2025	19 November 2025	19 August 2025	Not surveyed
B-10	SE 79789 12798	C	TT_226	Bewcarrs Drain	22 May 2024	25 September 2024	20 August 2025	Not surveyed

Crossing Point ID	National Grid Reference (NGR)	Route Section	Watercourse ID	Watercourse	Spring macroinvertebrates	Autumn macroinvertebrates	Macrophytes	Fish
C-062	SE 79451 12201	C	TT_263	Ealand Carr Drain	22 May 2024	Dry	Dry	Not surveyed
C-054	SE79464 12151	C	IATT_7	Unnamed Watercourse	Dry/culverted	Dry/culverted	Dry	Not surveyed
B-14	SE 80883 09821	C	IA_85	Folly Drain	No Access	19 November 2025	21 August 2025	19 November 2025 (eDNA)
BC-29	SE 79951 08460	D	IA_112	North Moor Drain	No access	26 September 2024	21 August 2025	Not surveyed
BC-05	SK 78640 98180	D	IA_305	Unnamed Watercourse	No access	19 November 2025	06 August 2025	01 October 2025 (electric fishing)
C-051	SK 75754 96804	D	IRTT_1	Unnamed Watercourse	21 May 2024	24 September 2024	06 August 2025	Not surveyed
C-194	SK 74953 95106	E	IR_27	Carr Ings Drain	No access	20 November 2025	Not surveyed	Not surveyed
C-162	SK 74417 93130	E	IR_48	Unnamed Watercourse	No Access	No Access	06 August 2025	Not surveyed

Crossing Point ID	National Grid Reference (NGR)	Route Section	Watercourse ID	Watercourse	Spring macroinvertebrates	Autumn macroinvertebrates	Macrophytes	Fish
B-08	SK 74444 92199	E	IRTT_5	Chesterfield Canal	14/05/20255	20 November 2025	06 August 2025	Not surveyed
C-091	SK7720986768	E	TT_326	Unnamed Watercourse	No access	20 November 2025	Dry	Not surveyed
B-16	SK 77892 85935	E	TT_328	Wheatley Beck	21 May 2024	23 September 2024	07 August 2025	26 September 2024 (electric fishing)
C-139	SK 76973 82932	E	TT_348	Unnamed Watercourse	21 May 2024	23 September 2024	Dry	01 October 2025 (eDNA)
C-140	SK 77282 79566	E	TT_379	Lee Beck	No access	23 September 2024	Dry	Not surveyed
C-141	SK 76703 77280	E	TT_398	Unnamed Watercourse	No access	23 September 2024	No access	Not surveyed
C-160	SK 76769 76173	E	TT_402	Unnamed Watercourse	Dry	No access	No access	Not surveyed

Crossing Point ID	National Grid Reference (NGR)	Route Section	Watercourse ID	Watercourse	Spring macroinvertebrates	Autumn macroinvertebrates	Macrophytes	Fish
B-12	SK 77626 74202	E	TT_410	East Drayton	14 May 2025	20 November 2025	05 August 2025	01 October 2025 (electric fishing)
B-13	SK 78778 72185	F	TT_433	Fledborough Beck	14 May 2024	25 September 2024	05 August 2025	01 October 2025 (eDNA)
C-161	SK 78981 72066	F	TT_437	Unnamed Watercourse	No access	No access	Dry	Not surveyed

3.3 Limitations

Desk Study

3.3.1 The aim of a desk study was to help characterise the baseline context of the study area and provide valuable background information that would not be captured by surveys alone. However, a lack of records for a particular species does not necessarily mean that the species does not occur in the study area. Likewise, the presence of records for particular species does not automatically mean that these still occur within the area of interest or are relevant in the context of the Project.

3.3.2 A proportion of the records returned during the desk study were associated with broad or coarse grid references (e.g. tetrad or kilometre-scale resolution), rather than precise point locations. As a result, it was not possible to reliably attribute all records to specific habitat features, or to determine exact proximity to the Order Limits. The desk study information has been used to provide contextual evidence of species presence and assemblage composition within the wider landscape, with Project level evaluation and conclusions based primarily on the field surveys.

Site specific limitations

3.3.3 Some watercourses within the Order Limits had limited visibility and access due to steep banks and dense vegetation. While this limited the ability to survey, that the watercourses were adequately accessed for the results of these surveys to be valid and sufficient to inform the baseline for assessment**.**

Macroinvertebrate survey specific limitations

3.3.4 Sweep sampling for macroinvertebrates was undertaken at several survey locations. This is generally considered to be suboptimal compared to ‘kick sampling’; however, this is still a recognised sample collection method (Environment Agency, 2017) and therefore the results are considered to be valid and sufficient to inform the baseline for the assessment.

Macrophyte survey specific limitations

3.3.5 Beyond the access issues and dry conditions recounted in Table 3.3, no further limitations were encountered during the macrophyte surveys.

3.3.6 Whilst data analysis using LEAFPACS2 is appropriate for all rivers in the UK, it should not be used to assess canals, marsh ditch systems, or strongly seasonal watercourses (Water Framework Directive UK Technical Advisory Group, 2014).

3.3.7 Sixteen of the 22 crossing points surveyed for macrophytes are noted to be ditches, for which LEAFPACS2 assessment is not applicable. Additionally, survey location B-08 is located on Chesterfield Canal (in Route Section E), and as such is also unsuitable for LEAFPACS2 assessment. Consequently, LEAFPACS2 assessment was only undertaken for the five permanently flowing watercourses in the survey area, as detailed in Table 3.2.

Fish survey specific limitations

3.3.8 At survey location B-12 (Route Section E), there were three main factors limiting the survey, which was completed as a semi-quantitative, single run survey. At the start of the first run the weather was overcast, which over the duration of the run, slowly transitioned into rain. This prevented further runs with the electric backpack due to health and safety considerations. Secondly, due to the flow of the watercourse, the thick silt sediment was not settling within a suitable period, which would have reduced visibility on successive runs. Thirdly, the bankside morphology and vegetation also limited the use of stop nets. The banks were very steep through much of the survey reach, with only one safe entry point identified. The bankside vegetation was overgrown with thorn and bramble, which prevented hold points from being found for the stop nets too.

3.3.9 Crossing location B-09 (Route Section A) was completed as a semi-quantitative survey, across a single run. This allowed for understanding fish species presence and completing the site within a limited timeframe due to land access constraints.

3.3.10 Four sites were completed utilising eDNA to assess fish assemblages crossing locations BC-37 (Route Section B), B-14 (Route Section C), B-13 (Route Section F) and C-139 (Route Section E). At survey locations BC-37 and B-14, current substrates were deemed unsafe for wading due to the soft, sinking nature of the silt present within the drains. The lack of additional suitable access for boats was also noted as a limitation, with eDNA surveys being preferred for surveyor safety. Due to weather conditions during the Summer survey season, B-13 and C-139 were not suitable for electric fishing, with water depths along these watercourses being insufficient to allow for surveys.

3.3.11 Similar to qualitative electric fishing surveys, eDNA sampling has the potential to not capture all fish species within a survey reach due to the nature of eDNA and the risk of false positives and/or false negatives from eDNA. False positives involve the detection of DNA from a target species when it is absent from the sampling location. One of the main causes of false positive results is contamination which can occur at any stage during the testing process from the collection of samples in the field to DNA extraction and analysis in the lab. False negatives occur when a species is present at a site but goes undetected. These can arise because of poor study design (too few samples collected or too little water per sample). However, the sample collection methodology has been designed to minimise the risk of false positives/negatives occurring, and the results are therefore robust and are considered to be valid and sufficient to inform the baseline for the assessment.

3.3.12 The absence of certain species in survey results does not indicate their absence from any of the sites surveyed.

4. Results

4.1 Desk Study

WFD Status

Beverley and Barmston Drain (Route Section A)

4.1.1 Beverley and Barmston Drain (WFD Water Body ID: GB104026067211) (Environment Agency, 2023) is monitored by the EA for the purpose of the WFD and is an artificial water body. The Beverley and Barmston Drain water body is classified as having Moderate ecological potential, with Moderate potential for invertebrates and High potential for macrophytes. The factors contributing to the water body not achieving Good potential include poor nutrient management, land drainage, physical modifications, and channel/riparian activities including bankside erosion.

Mill Beck 2 (Ellerker Area) (Route Section A)

4.1.2 Mill Beck 2 (Ellerker Area) Water Body (WFD Water Body ID: GB104026066660) (Environment Agency, 2023) is heavily modified and is monitored by the EA for the purpose of the WFD. Mill Beck 2 is classified as having Moderate ecological potential, with Good potential for fish, High potential for invertebrates, and Moderate potential for macrophytes. The water body has not reached Good ecological potential due to physical modifications, and currently unknown sources of several priority hazardous substances such as Polybrominated diphenyl ethers (PBDE) and Benzo(g-h-i)perylene.

Fleet Drain (Route Section A)

4.1.3 Fleet Drain Water Body (WFD Water Body ID: GB104026066750) (Environment Agency, 2023) is an artificial water body monitored by the EA for the purpose of the WFD. This water body has Moderate ecological potential, with Bad status for macroinvertebrates and Poor status for macrophytes. Physical modifications (urbanisation) and natural conditions (saline/other intrusion) are currently preventing the water body from achieving Good ecological status.

Humber Upper (Route Section A/B/C/D)

4.1.4 The Humber Upper Water Body (WFD Water Body ID: GB530402609203) (Environment Agency, 2023) is a heavily modified, transitional water body monitored by the EA for the purpose of the WFD. This water body has Moderate ecological potential overall, with Good potential for fish, and is not monitored for macroinvertebrates or macrophytes. Physical modifications (e.g., flood protection), natural conditions, sewage discharges, surface water abstraction, and agricultural land use (poor nutrient management) are listed as the reasons for not achieving Good ecological potential.

Adlingfleet Drain Upper Catchment (tributary of Trent) (Route Section B)

4.1.5 Adlingfleet Drain Upper Catchment (trib of Trent) Water Body (WFD Water Body ID: GB104028064310) (Environment Agency, 2023a) is an artificial water body monitored by the EA for the purpose of the WFD. This water body has Moderate ecological potential overall, with Poor potential for invertebrates and High potential for macrophytes. Natural mineralisation, poor soil management, and physical modifications are currently preventing the water body from achieving Good ecological potential.

Paupers Drain Catchment (trib of Trent) (Route Section B/C)

4.1.6 The Paupers Drain Catchment (trib of Trent) Water Body (WFD Water Body ID: GB104028064300) (Environment Agency, 2023e) is an artificial water body which is currently classified by the EA as having Moderate ecological potential. Although this water body has Bad potential for fish, Good potential for invertebrates and High potential for macrophytes was achieved in 2022. The Reasons for Not Achieving Good Status (RNAGS) have been linked to poor nutrient management, continuous sewage discharges, land drainage, poor soil management, and barriers which result in ecological discontinuity.

North Soak Drain Catchment (tributary of Torne/Three Rivers) (Route Section B/C)

4.1.7 The North Soak Drain Catchment Water Body (WFD Water Body ID: GB104028064350) (Environment Agency, 2023m) is an artificial water body monitored by the EA for the purpose of the WFD. This water body has Moderate ecological potential overall, with Moderate potential for macroinvertebrates and High potential for macrophytes. Land drainage associated with agricultural and rural land management currently prevents the water body from achieving Good ecological status.

Hatfield Waste Drain Catchment (tributary of Torne/Three Rivers) (Route Section C/D)

4.1.8 The Hatfield Waste Drain Catchment Water Body (WFD Water Body ID: GB104028064330) (Environment Agency, 2023n) is an artificial water body monitored by the EA for the purpose of the WFD. This water body has Moderate ecological potential overall, with Poor potential for fish, Good potential for macroinvertebrates, and Moderate potential for macrophytes. Several factors are currently preventing the water body from achieving Good ecological potential, including diffuse pollution sources associated with poor soil management and urban drainage, physical modifications, surface and groundwater abstraction, and continuous sewage discharges.

Torne/Three Rivers from Mother Drain to Trent (Route Section C/D)

4.1.9 The Torne/Three Rivers (Mother Drain to River Trent) Water Body (WFD Water Body ID: GB104028064340) (Environment Agency, 2023o) is an artificial water body monitored by the EA for the purpose of the WFD. This water body has Moderate ecological potential overall, with Moderate potential for fish, Good potential for macroinvertebrates, and Moderate potential for macrophytes. Poor nutrient management and land drainage associated with agricultural and rural land management, continuous sewage discharges, and land drainage associated with

urban land use and transport are listed as the reasons for this water body not achieving Good ecological potential.

Ferry Drain Catchment (tributary of Trent) (Route Section D)

4.1.10 The Ferry Drain Catchment Water Body (WFD Water Body ID: GB104028058241) (Environment Agency, 2023p) is a heavily modified water body monitored by the EA for the purpose of the WFD. This water body has Moderate ecological status overall, with Moderate potential for macroinvertebrates, and Good potential for macrophytes. The water body not achieving Good ecological potential is attributed to land drainage and poor nutrient management associated with agricultural land use, and continuous sewage discharges associated with the water industry.

Tuxford Beck Catchment (tributary of North Beck) (Route Section E/F)

4.1.11 The Tuxford Beck Catchment (tributary of North Beck) Water Body (WFD Water Body ID: GB104028058320) (Environment Agency, 2023q) is monitored by the EA for the purpose of the WFD and is not designated as artificial or heavily modified. This water body has Moderate ecological status overall, with Good status for macroinvertebrates, and Moderate status for macrophytes. Poor nutrient management associated with agricultural and rural land use and continuous sewage discharges currently prevent the water body from achieving Good ecological status.

Fledborough Beck Catchment (trib of Trent) (Route Section E/F)

4.1.12 The Fledborough Beck Catchment (tributary of River Trent) Water Body (WFD Water Body ID: GB104028058290) (Environment Agency, 2023r) is monitored by the EA for the purpose of the WFD and is not designated as artificial or heavily modified. This water body has Moderate ecological status overall, with Moderate status for macroinvertebrates, and High status for macrophytes. Poor nutrient management and land drainage associated with agricultural and rural land use, as well as natural drought conditions, prevent this water body from achieving Good ecological status.

Idle from Ryton to Trent (Route Section D/E)

4.1.13 The Idle from Ryton to Trent Water Body (WFD Water Body ID: GB104028058110) (Environment Agency, 2023f) is an artificial water body which is currently classified by the EA as having Moderate ecological potential. The Idle from Ryton to Trent is classified as having High status for fish, Good potential for invertebrates, and Good potential for macrophytes. However, the water body does not achieve Good potential due to factors such as transport drainage, poor soil management, continuous sewage discharges, ground and surface water abstraction, and physical modifications.

Trent from Carlton-on-Trent to Laughton (Route Section D/E/F)

4.1.14 The Trent from Carlton-on-Trent to Laughton Drain Water Body (WFD Water Body ID: GB104028058480) (Environment Agency, 2023g) is designated as an artificial water body and is of Moderate ecological potential. The water body is classified as being of Bad ecological potential for invertebrates, but High potential for macrophytes. The factors contributing to the water body not achieving Good potential include transport drainage, continuous sewage discharges, poor soil management, and natural conditions.

Catchwater Drain Catchment (tributary of Trent) (Route Section E)

4.1.15 The Catchwater Drain Catchment (trib of Trent) Water Body (WFD Water Body ID: GB104028058350) (Environment Agency, 2023h) is a heavily modified water body which is currently classified by the EA as having Moderate ecological potential. The biological quality elements of invertebrates and macrophytes are classified as being Good potential. Physical modifications, poor soil management, and transport drainage are currently preventing the water body from achieving Good ecological potential.

North Beck Catchment (tributary of Trent) (Route Section E)

4.1.16 The North Beck Catchment (trib of Trent) Water Body (WFD Water Body ID: GB104028058311) (Environment Agency, 2023i) is monitored by the EA for the purpose of the WFD and is not designated as artificial or heavily modified. The North Beck Catchment water body is of Moderate ecological potential with High potential for the biological quality elements fish and invertebrates, and Moderate potential for macrophytes. The RNAGS have been linked to continuous sewage discharges, poor nutrient management, and poor livestock management.

Wheatley Beck Catchment (tributary of Trent) (Route Section E)

4.1.17 Wheatley Beck Catchment (trib of Trent) Water Body (WFD Water Body ID: GB104028058360) (Environment Agency, 2023b) is monitored by the EA for the purpose of the WFD and is not designated as artificial or heavily modified. The water body was classified as having Moderate ecological status overall, with Good status achieved for invertebrates and Moderate status for macrophytes. The RNAGS include poor nutrient management, continuous sewage discharges, and poor livestock management.

Statutory and Non-statutory Designated Sites

4.1.18 International statutory designated sites within 10 km of the Order Limits, national/local statutory designated sites within 5 km, and non-statutory designated sites within 2 km of the Order Limits, were provided by relevant LRCs, and from data searches. Those designated for aquatic features are listed in Annex I. A full list of designated sites within the Order Limits, and their potential impact pathways, are presented in section 8.6 of **Application Document 6.8 Chapter 8 Ecology** and are also discussed in **Application Document 6.8.A2 Appendix 8.2 Designated Sites Information**.

Statutory Designated Sites

4.1.19 A total of four international statutory designated sites with aquatic ecology features as part of the reason for their designation were identified within 10 km of the Order Limits. these are listed in Table I. (Annex I) and are shown in **Application Document 6.8.F1 Figure 8.1 International Sites Designated for Nature Conservation within 10 km and National and Local Statutory Designated Sites within 5 km**.

4.1.20 A total of 23 national and one local statutory designated sites with aquatic ecology interest were identified within 5 km of the Order Limits, as listed in Table I. (Annex I) and are shown in **Application Document 6.8.F1 Figure 8.1 International Sites Designated for Nature Conservation within 10 km and National and Local Statutory Designated Sites within 5 km**.

Non-Statutory Designated Sites

4.1.21 A total of 65 non-statutory designated sites with aquatic ecology interest were identified within 2 km of the Order Limits. These are listed in Table I. (Annex I) and shown in **Application Document 6.8.F2 Figure 8.2 Nature Conservation Non-Statutory Designated Sites and Priority Habitat within 2 km**. All the non-statutory designated sites with aquatic ecology interest compromise Local Wildlife Sites (LWSs).

Notable species from desk study

4.1.22 Historic records of fish, aquatic macroinvertebrate and aquatic macrophyte species were obtained from the Environment Agency and LRCs.

Fish

4.1.23 Several notable fish species were identified within 5 km of the Order Limits using Environment Agency open-source data (Environment Agency, 2026), Table 4.1. These included Annex II species European bullhead (*Cottus gobio*), and Species of Principal Importance (SPI) under Section 41 of the NERC Act (HM Government, 2006), and brown/sea trout (*Salmo trutta*). Also recorded was the European eel which is listed as an SPI under Section 41 of the NERC Act (HM Government, 2006), is classified as 'Critically Endangered' on the International Union for Conservation of Nature (IUCN) red list (Pike, et al., 2020), and is protected under The Eels Regulations (HM Government, 2009) and by Appendix II of CITES (European Commission, 2015).

4.1.24 The Environment Agency open-source data search also found records of barbel (*Barbus barbus*) which is protected under Annex V of the Habitats Directive (The Council of the European Communities, 1992) and Schedule 4 of the Habitats Regulations (HM Government, 2017); as well as spined loach (*Cobitis taenia*), which is protected by Annex III of the Bern Convention (The Council of Europe, 1979) and Annex II of the Habitats Directive (The Council of the European Communities, 1992), and is an SPI under Section 41 of the NERC Act (HM Government, 2006).

4.1.25 Data from the relevant LRCs for the Project found records of additional SPIs under Section 41 of the NERC Act (HM Government, 2006), including herring (*Clupea harengus*) and European smelt (*Osmerus eperlanus*), as well as additional records of brown/sea trout and European eel.

4.1.26 The Humber Estuary is a SAC, SPA, SSSI, and Ramsar site. River lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*) are listed as qualifying features (but not the primary reason) for the Humber Estuary SAC designation, and reasons for notification for its SSSI status.

4.1.27 Several fish are listed as priority species in the East Riding of Yorkshire Biodiversity Action Plan (BAP) (East Riding of Yorkshire Council, 2010). These include sea lamprey, river lamprey, Atlantic salmon (*Salmo salar*), European smelt, and spined

loach, with the Humber Estuary representing a significant habitat and migration route for these species.

4.1.28 The Lincolnshire Biodiversity Action Plan (3rd Edition) also lists European eel, spined loach, sea and river lamprey, European smelt, brown/sea trout and Atlantic salmon (Lincolnshire Biodiversity Partnership, 2011).

4.1.29 The Nottinghamshire Local Biodiversity Action Plan (LBAP) (Nottinghamshire Biodiversity Action Group, 2020) lists several fish species of conservation concern which include allis shad (*Alosa alosa*) and twaite shad (*Alosa fallax*), although the locations of these records are not listed and therefore their proximity to the Project cannot be determined. The full list of species within the Nottinghamshire LBAP can be retrieved from (Nottinghamshire Biodiversity Action Group, 2020).

4.1.30 Records of fish from hydrologically connected waterbodies within 5 km of the Order Limits within ten years of data receipt are presented in Table 4.1 .

Table 4.1 – Notable fish species identified on hydrologically connected watercourses within 5 km of the Order Limits, and within relevant catchment monitoring site records

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
European bullhead (*Cottus gobio*)	Habitats Directive Annex II	22	2025	SE8905531544 Mires beck at Beckside Farm	North Cave Beck	A	FO_54	Hydrologically connected 3.05 km from Order Limits, 3.35 km from B-09 (Mill Beck)
				SE8911331418 Beckside Farm, Mill Beck FOULNES3	North Cave Beck	A	FO_54	Hydrologically connected 3.2 km from Order Limits, 3.5 km from B-09 (Mill Beck)
				SE9154627941 Sand Bridge, Mires Beck, nr Ellerker FOULNES4	Sands Drain	A	FO_54	Hydrologically connected 680 m from Order Limits, 900 m from C-149 (Ings Drain)
				SE9159327922 Sand Bridge, Mires Beck, nr Ellerker FOULNES4	Sands Drain	A	FO_54	Hydrologically connected 630 m from Order Limits, 850 m from C-149 (Ings Drain)
				TA0009935753 Cowbridge	-	A	NA	Hydrological connectivity uncertain, 2.9 km

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
								northwest from C-143 (Field Drain)
				SK7881586543 (NBN Atlas OGL)	Wheatley Beck	E	TT_328	Hydrologically connected 1.27 km from Order Limits, 1.3 km from B-16 (Wheatley Beck), 1.8 km from C-091 (Field Drain)
				SE8884832326 (NBN Atlas OGL)	North Cave Beck	A	FO_54	Hydrologically connected 4.1 km from Order Limits, 4.4 km from B-09 (Mill Beck)
				SE9154627941 (NBN Atlas OGL)	Sands Drain	A	FO_54	Hydrologically connected 1.1 km from Order Limits, 1.2 km from B-09 (Mill Beck)
				SK7776471762 (Nottinghamshire LERC)	Fledborough Beck	F	TT_433	Hydrologically connected 1.7 km from Order Limits and B-13 (Fledborough Beck), 2.3 km from C-161 (Field Drain)

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
European eel (*Anguilla anguilla*)	IUCN Red List Critically Endangered The Eels Regulations SPI under Section 41 of the NERC Act	30	2025	SE8913631369, SE8911331418, Beckside Farm, Mill Beck FOULNES3 (7554)	North Cave Beck	A	FO_54	Connected to B-09 by 3.4 km and the Order Limits by 2.8 km
				SE9159127918 Sand Bridge, Mires Beck, nr Ellerker FOULNES4 (7555)	Sands Drain/Ellerker Drain	A	FO_54	0.85 km from C-149, also connected to B-09 within 5 km, 0.8 km from Order Limits
				SE8081822928 (NBN EA OGL)	River Ouse	B	HE_1	1.9 km from Order Limits, 2.5 km from BC-01, 2.7 km from C-189
				SE8643723759	River Humber	A	NA – closest watercourse ID River Ouse HE_1	3.7 km from Order Limits, 3.9 km from B-15, also connected to C-104, C-105, C-106, BC-01, C-189, BC-03, C-021, C-022, C-108, C-167, C-168 within 5 km

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
				SE82	Unnamed Drain	B	NA – closest watercourse ID Unnamed Draun TT_116	Hydrologically connected to C-025, 1.5 km from Order Limits and crossing point, also connected to BC-37 within 5 km
				SE813127	Unnamed Drain	C	NA – closest watercourse ID Warping Drain TT_226	600 m from Order Limits, 0.53 km from crossing C-073, also connected to C-058, C-059, C-060, C-062, C-054, C-055, C-096, B-10, C-144 and several other crossings within 5 km
				SE8328108649 Burringham (66991)	Unnamed Drain	C	NA – closest watercourse ID Warping Drain IA_102 and Folly Drain IA_85	3.1 km from crossing point C-215, 3 km from B-14. 3.1 km from Order Limits
				SK76449772	Ferry Drain	D	IA_333	1.8 km from Order Limits, 2.5 km from BC-05

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
				SK785986	Unnamed Drain	D	IA_305	130 m from Order Limits, 400 m from BC-05, also connected to C-097, C-203 and C-204 within 5 km
				SK786981 and SK786980	Unnamed Drain	D	IA_305	Within Order Limits, connected to BC-05, C-097, C-203 and C-204 within 5 km
				SK801991	Ferry Drain	D	IA_265	1.9 km to Order Limits, connected to BC-05, C-097, C-203 and C-204, C-179, C-156, C-089 within 5 km
				SK787973	Unnamed Drain	D	NA – closest crossing ID Unnamed Drain IA_343 and IA_342	Hydrologically connected to C-080 & C-131, 770m, 550 m from Order Limits
				SK7646696231 (NBN EA OGL)	River Idle	E	IR_4	970 m from Order Limits, connected to C-052, C-051, C-198 within 5 km

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
				SK77649462	Weir Dike	E	NA – closest watercourse ID Chesterfield Canal IRTT_5	5 km from Order Limits, no connectivity to crossing point within 5 km
				SK79057956	Catchwater Drain	E	NA – closest watercourse ID Lee Beck TT_379	2.8 km from Order Limits and C-140
				SK78787583	North Beck	E	TT_401	2.05 km from crossing C-160 and 1.5 km from Order Limits
				SK 77000 74210	Unnamed Drain	E	NA – closest watercourse ID Unnamed Drain TT_410	830 m from Order Limits and B-12
				SK79557191	Unnamed Drain	F	TT_441	Within Order Limits, 0.59 km from crossing C-161
				SK79297044	Unnamed Drain	F	NA – closest watercourse ID Unnamed Drain TT_447	580 m to Order Limits, hydrological connectivity to crossing points uncertain

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
				SK78057169	Fledborough Beck	F	TT_433	1.4 km from Order Limits and B-13, also connected to C-161 and C-142 within 5 km
Brown/sea trout (*Salmo trutta*)	SPI under Section 41 of the NERC Act 2006 UK BAP priority species	36	2025	SE8913631369 Beckside Farm, Mill Beck FOULNES3	North Cave Beck	A	FO_54	Connected to B-09 by 3.4 km and the Order Limits by 2.8 km
				SE9159327922 Sand Bridge, Mires Beck, nr Ellerker FOULNES4	Sands Drain/Ellerker Drain	A	FO_54	0.85 km from C-149, also connected to B-09 within 5 km, 0.8 km from Order Limits
				SE8643723759 (NBN EA OGL)	River Humber	A	NA – closest watercourse ID River Ouse HE_1	3.7 km from Order Limits, 3.9 km from B-15, also connected to C-104, C-105, C-106, BC-01, C-189, BC-03, C-021, C-022, C-108, C-167, C-168 within 5 km
Barbel	Habitats Directive Annex V	1	2017	SK8167872697 North Clifton Net	River Trent	F	NA – closest watercourse ID	3.75 km from crossing B-13,

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
(*Barbus barbus*)	The Habitats Regulations 2017 Schedule 4						Fledborough Beck TT_433	1.5 km from Order Limits. Hydrologically connected to Fledborough Beck.
Spined loach (*Cobitis taenia*)	Bern Convention Annex III Habitats Directive Annex II SPI under Section 41 of the NERC Act UK BAP priority species	5	2025	SK8167872697 North Clifton Net	River Trent	F	NA – closest watercourse ID Fledborough Beck TT_433	3.75 km from crossing B-13, 1.5 km from Order Limits. Hydrologically connected to Fledborough Beck.
				SE8633728544 Highham Grange Marr Lane	Market Weighton Canal	A	FO_170	1.57 km from crossing B-15, 1.54 km from Order Limits. Hydrologically connected to Market Weighton Canal.
				SK8182974344 (NBN Atlas OGL EA)	Old Trent	F	NA – closest watercourse ID Fledborough Beck TT_433	Hydrologically connected 4.8 km from B-13 and C-161, 5 km from C-142

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
				SK8179774330 (NBN Atlas OGL EA)	Old Trent	F	NA – closest watercourse ID Fledborough Beck TT_433	Hydrologically connected 4.75 km from B-13 and C-161, 4.95 km from C-142
Herring (*Clupea harengus*)	SPI under Section 41 of the NERC Act	4	2017	SE 86400 23700 (NBN Atlas OGL EA)	River Humber	A	NA – closest watercourse ID River Ouse HE_1	4.1 km from B-15, 4 km from Order Limits. Hydrologically connected to Market Weighton Canal.
				SE8643723759 (NBN Atlas OGL EA)	River Humber	A	NA – closest watercourse ID River Ouse HE_1	Hydrologically connected 3.2 km from BC-03, also connected to C-022, C-108, C-021, B-15, BC-01, C-189, C-167, C-168, C-076, C-092 within 5 km
				SE8081822928 (NBN Atlas OGL EA)	River Ouse	B	HE_1	Hydrologically connected 2.3 km from BC-01, also connected to C-189, C-092,

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
								C-076, C-168, C-167 within 5 km
				SE8668220772 (NBN Atlas OGL EA)	River Trent	B	NA – closest watercourse ID Adlingfleet Drain TT_41	Hydrologically connected 4.9 km from BC-37, also connected to C-111, C-112, C-113, BC-18 within 5 km
European smelt (*Osmerus eperlanus*)	SPI under Section 41 of the NERC Act	5	2018	SE 80800 22900 (NBN Atlas OGL EA)	River Ouse	B	HE_1	4.5 km from C-167, 1.9 km from Order Limits (River Ouse). Hydrologically connected to River Ouse and Blacktoft Warping Drain.
				SE 86400 23700 (NBN Atlas OGL EA)	River Humber	A	NA – closest watercourse ID River Ouse HE_1	4.1 km from B-15, 4 km from Order Limits. Hydrologically connected to Market Weighton Canal.
				SE8643723759 (NBN Atlas OGL EA)	River Humber	A	NA – closest watercourse ID River Ouse HE_1	Hydrologically connected 3.2 km from BC-03, also

Fish species	Designation/status	Total number of records	Most recent record	NGR/EA monitoring site(s)	Watercourse	Route Section	Watercourse ID	Hydrological connectivity
								connected to C-022, C-108, C-021, B-15, BC-01, C-189, C-167, C-168, C-076, C-092 within 5 km
				SE8081822928 (NBN Atlas OGL EA)	River Ouse	B	HE_1	Hydrologically connected 2.3 km from BC-01, also connected to C-189, C-092, C-076, C-168, C-167 within 5 km
				SE8668220772 (NBN Atlas OGL EA)	River Trent	B	NA – closest watercourse ID Adlingfleet Drain TT_41	Hydrologically connected 4.9 km from BC-37, also connected to C-111, C-112, C-113, BC-18 within 5 km
Data sources: Environment Agency data 2015-2026, LRC data 2015-2025, NBN Atlas 2015-2026								

Aquatic macroinvertebrates

4.1.31 The desk study found several records of notable macroinvertebrate species on connected watercourses within 5 km of the Order Limits within the last ten years (Table 4.2). These include the 'Nationally Scarce' stonefly (*Amphinemura standfussi*) (Macadam, 2014), beetles (*Riolus subviolaceus)* and *Hygrotus quinquelineatus*) (Foster, 2010), true bug (*Corixa affinis;* Cook, 2015), caddisfly (*Limnephilus politus*; Wallace, 2016), mollusc (*Viviparus contectus;* Seddon, 2014), soldier-fly (*Oxycera pardalina*; Drake, 2017), and the bivalve molluscs (*Sphaerium rivicola* and *Unio tumidus*; Seddon, 2014). See Table 4.2 for the locations of these species.

4.1.32 One record of the protected, white-clawed crayfish was found on North Soak Drain in2021, 1.5 km upstream of the Order Limits, and 3.25 km upstream of crossing B-05 in Route Section C. There are several statutory designations associated with this species, as detailed in Table 4.2. This record is from an unknown source (provided through LRC data), and this species did not appear on Environment Agency or NBN data searches. The validity of this record is thus, unconfirmed. With this in mind, an extended catchment wide desk study search was conducted. No records of white-clawed crayfish were found, but the invasive signal crayfish species was recorded in a small tributary connected to the River Trent. As signal crayfish outcompetes native species, it is therefore assumed that white-clawed crayfish are unlikely to be present in this catchment.

4.1.33 The East Riding of Yorkshire BAP (East Riding of Yorkshire Council, 2010), the Nottinghamshire LBAP (Nottinghamshire Biodiversity Action Group, 2020), the Lincolnshire BAP (Lincolnshire Biodiversity Partnership, 2011), and The Ouse and Humber Strategic Sub-catchment Area BAP (Yorkshire Humber Drainage , 2020) also reference white-clawed crayfish as a priority species recorded within the respective areas of consideration.

4.1.34 The East Riding of Yorkshire BAP (East Riding of Yorkshire Council, 2010), the Nottinghamshire LBAP (Nottinghamshire Biodiversity Action Group, 2020), and the Ouse and Humber Strategic Sub-catchment Area BAP (Yorkshire Humber Drainage , 2020) further list the small red-eyed damselfly (*Erythromma viridulum*) as a local priority species within the respective areas of consideration.

Table 4.2 – Notable macroinvertebrate species identified on hydrologically connected watercourses within 5 km of the Order Limits

Taxon group	Invertebrate species	Designation/ status	Total number of records	Most recent record	NGR/ Environment Agency monitoring site(s)	Watercourse	Watercourse ID	Route Section	Hydrological connectivity
Plecoptera – stonefly	*Amphinemura standfussi*	Nationally Scarce - Occurring in 16-100 hectads in Great Britain.	2	2024	SE8884832326	North Cave Beck	FO_54	A	4.5 km from crossing B-09, 4.3 km from Order Limits. Hydrologically connected to Mill Beck.
					SE9084029160	Mill Beck	FO_54	A	600 m from crossing B-09, 45 m from Order Limits. Hydrologically connected to Mill Beck.
Hemiptera – true bug	*Corixa affinis*	Nationally Scarce - Occurring in 16-100 hectads in Great Britain.	1	2022	SE8884832326	North Cave Beck	FO_54	A	4.5 km from crossing B-09, 4.3 km from Order Limits. Hydrologically connected to Mill Beck.
Diptera – true fly	Hill soldier (*Oxycera pardalina)*	Nationally Scarce - Occurring in 16-100 hectads in Great Britain.	1	2017	SE9038729746	Mill Beck	FO_54	A	1.3 km from crossing B-09, 675 m from Order Limits. Hydrologically connected to Mill Beck.

Taxon group	Invertebrate species	Designation/ status	Total number of records	Most recent record	NGR/ Environment Agency monitoring site(s)	Watercourse	Watercourse ID	Route Section	Hydrological connectivity
Coleoptera - beetle	*Riolus subviolaceus*	Nationally Scarce - Occurring in 16-100 hectads in Great Britain.	24	2024	SE8884832326	North Cave Beck	FO_54	A	4.5 km from crossing B-09, 4.3 km from Order Limits. Hydrologically connected to Mill Beck.
					SE9038729746	Mill Beck	FO_54	A	1.3 km from crossing B-09, 675 m from Order Limits. Hydrologically connected to Mill Beck.
					SE8890232390	North Cave Beck	FO_54	A	4.6 km from crossing B-09, 4.4 km from Order Limits. Hydrologically connected to Mill Beck.
					SE9158127924	Sands Drain	FO_54	A	850 m from crossing C-149, 800 m from Order Limits. Hydrologically connected to Ellerker Beck.

Taxon group	Invertebrate species	Designation/ status	Total number of records	Most recent record	NGR/ Environment Agency monitoring site(s)	Watercourse	Watercourse ID	Route Section	Hydrological connectivity
Bivalvia - bivalve	*River orb mussel* (*Sphaerium rivicola*)	Nationally Scarce - Occurring in 16-100 hectads in Great Britain.	2	2019	SE9038729746	Mill Beck	FO_54	A	1.3 km from crossing B-09, 675 m from Order Limits. Hydrologically connected to Mill Beck.
					SE7822110517	Hatfield Waste Drain	IA_50	C	2.5 km from crossing BC-26, 1.4 km from Order Limits. Hydrologically connected to 'Field Drain'.
Decapoda - crustacean	*White-clawed crayfish* (*Austropotamobius pallipes)*	The Bern Convention Appendix 3. Habitats Directive Annex II and Annex V. Endangered on the IUCN red list. UK BAP 2007 priority species. NERC Act, Section 41. WCA 1981.	1	2021	SE7811	North Soak Drain, Stainforth and Keadby Canal, or South Soak Drain (geographical uncertainty due to low resolution)	IA_8, IA_32, or IA_2 (geographical uncertainty due to low resolution)	C	3.25 km from crossing B-05, 1.5 km from Order Limits. Hydrologically connected to North Soak Drain.
Coleoptera - beetle	*Hygrotus quinquelineatus*	Nationally Scarce - Occurring in 16-100	2	2020	SE7809911037	North Soak Drain	IA_8	C	3.2 km from crossing B-05,

Taxon group	Invertebrate species	Designation/ status	Total number of records	Most recent record	NGR/ Environment Agency monitoring site(s)	Watercourse	Watercourse ID	Route Section	Hydrological connectivity
		hectads in Great Britain.							1.45 km from Order Limits. Hydrologically connected to North Soak Drain.
Trichoptera - Caddisfly	Limnephilus politus	Nationally Scarce - Occurring in 16-100 hectads in Great Britain.	1	2016	SE7830010500	North Engine Drain	IA_41	C	1.3 km from Order Limits, with no hydrological connections to crossing points.
Bivalvia - bivalve	Swollen river mussel (*Unio tumidus*)	Nationally Scarce - Occurring in 16-100 hectads in Great Britain.	2	2025	SE7818809850	River Torne	IA_52	C	40 m from Order Limits, with no hydrological connections to crossing points.
					SE8252511536	North Soak Drain	IA_8	C	1.4 km from Order Limits, with no hydrological connections to crossing points.
Gastropoda - snail	Lister's river snail (*Viviparus contectus*)	Nationally Scarce - Occurring in 16-100 hectads in Great Britain.	12	2024	SE7822110517	Hatfield Waste Drain	IA_50	C	2.5 km from crossing BC-26 1.4 km from Order Limits. Hydrologically connected to ‘Field Drain’.

Taxon group	Invertebrate species	Designation/ status	Total number of records	Most recent record	NGR/ Environment Agency monitoring site(s)	Watercourse	Watercourse ID	Route Section	Hydrological connectivity
					SE7818809850	River Torne	IA_52	C	40 m from Order Limits, with no hydrological connections to crossing points.
					SE8233011456	South Soak Drain	IA_2	C	2.7 km from crossing BC-26, 1.2 km from Order Limits. Hydrologically connected to 'Field Drain'
Odonata	Variable damselfly *Coenagrion pulchellum*	IUCN Red List 'Near Threatened'	34	2024	Various near to SE86862818	Various including Market Weighton Canal and several unnamed drains and ponds	NA	A	34 record locations around ponds and watercourses near to SE86862818 at a maximum distance of 1.5 km from Order Limits at Section A (near to B-15)
Odonata	Willow Emerald Damselfly *Chalcolestes viridis*	Vagrant species (British Dragonfly Society, n.d)	6	2023	SE863274	Unnamed Drain	NA	A	Hydrologically connected 800 m from C-105, 1.1 km from C-106, 1.2 km from C-104

Taxon group	Invertebrate species	Designation/ status	Total number of records	Most recent record	NGR/ Environment Agency monitoring site(s)	Watercourse	Watercourse ID	Route Section	Hydrological connectivity
					SE8732	Skelfleet Drain		A	Hydrologically connected 5 km from C-083
					SE91622793	Ellerker Drain	FO_110	A	Hydrologically connected 900 m from C-149, 1.3 km from B-09
Odonata	Small Red-eyed Damselfly *Erythromma viridulum*	Recent colonist (British Dragonfly Society, n.d)	1	2021	SE94032958	Unnamed Pond	NA	A	600 m southeast of C-005

Aquatic macrophytes

4.1.35 The desk study returned no records of protected and/or notable macrophyte taxa within the Order Limits, but notable and/or protected species desk study records were recorded within the 2 km study area.

4.1.36 Desk study records of white water-lily (*Nymphaea alba*) were found on Mill Beck in Route Section A.

4.1.37 Paupers Drain within the Order Limits (Route Section B), forms part of Paupers Drain LWS which is known to support a rich diversity of wetland macrophytes (**Application Document 6.8.A2 Appendix 8.2 Designated Sites Information**). None of the species listed on the LWS citation are notable except for the mention of stoneworts, some of which are endangered, but the citation didn't not include any specific species.

4.1.38 Desk study records from Nottinghamshire Biological and Geological Record Centre of the opposite-leaved pondweed (*Groenlandia densa)* and water violet (*Hottonia palustris*) were identified on Tindale Bank Drain, 300 m east of the Order Limits in Route Section D. Both species are listed as Endangered and Vulnerable, respectively on the GB red list (Stroh, 2025) .

4.1.39 Chesterfield Canal SSSI is within the Order Limits (Route Section E), the citation for the Chesterfield Canal SSSI (Natural England, 1998) references the canal supporting a nationally uncommon aquatic plant community, including nationally scarce species. The desk study identified white water-lily and water soldier (*Stratiotes aloides*) at Chesterfield Canal, 2 km east of the Order Limits (Route Section E). These species are designated Least Concern in the IUCN GB Red List (Stroh, 2025), but are included in the Nottingham Rare Plant Species list (Wood & Woods, 2021). White water-lily is considered rare for Nottinghamshire and water soldier is listed as extinct as a native plant in Nottinghamshire and restricted in distribution in Nottinghamshire (Wood & Woods, 2021). Desk study records of the round-fruited rush (*Juncus compressus*) were also found in Chesterfield Canal, this species is GB Red List designated Vulnerable (Stroh, 2025).

4.1.40 Desk study records of large-flowered hemp-nettle (*Galeopsis speciosa*) were recorded in Misterton Carr Drain 1.8 km west of the Order Limits in Route Section E. The species is GB Red List designated Endangered (Stroh, 2025).

4.1.41 Mother Drain flows through the Order Limits in Route Section E and is connected to the Mother Drain, Misterton SSSI 0.65 km east of the Order Limits. The Mother Drain SSSI supports a diverse abundance of macrophyte species, which includes sand leek (*Allium scorodoprasum*) which, although is of Least Concern on the GB Red List (Stroh, 2025) , this is its only location within Nottinghamshire, according to the Mother Drain SSSI citation (dated 1993) (Natural England, 1993). No recent records of this species were recorded in the desk study.

4.1.42 The East Riding of Yorkshire BAP (East Riding of Yorkshire Council, 2010) lists UK BAP species which could be associated with aquatic habitats within the Order Limits. These include narrow small reed (Calamagrostis stricta), divided sedge (*Carex divisa),* greater water parsnip (*Sium latifolium*), marsh stitchwort (*Stellaria palustris*), and tubular water dropwort (*Oenanthe fistulosa*). However, the locations of these records are not listed and therefore their proximity to the Project cannot be determined.

4.1.43 The Nottinghamshire LBAP (Nottinghamshire Biodiversity Action Group, 2020) lists several vascular plant species of conservation concern which could be associated with aquatic habitats within the Order Limits, including the Section 41 of the NERC Act 2006 (HM Government, 2006) and IUCN GB Red list designated Vulnerable (Stroh, 2025) marsh stitchwort, although the locations of these records are not listed, and therefore their proximity to the Project cannot be determined. The Lincolnshire BAP (Lincolnshire Biodiversity Partnership, 2011) also lists greater water parsnip as a priority species for the Lincolnshire area, with plans to aid its recovery through replanting. The locations are unspecified and therefore proximity to the Project cannot be determined.

4.1.44 The Order Limits also cross the Humber Estuary SSSI, which has a notable vascular plant assemblage being part of its designation, which includes:

- Divided sedge; a Species of Principal Importance under Section 41 of the NERC Act (HM Government, 2006), IUCN GB Red list designated Vulnerable (Stroh, 2025) and a UK BAP priority vascular plant species (Joint Nature Conservation Committee, 2007);
- Slender hare's-ear (*Bupleurum tenuissimum*) a Species of Principal Importance under Section 41 of the NERC Act (HM Government, 2006), IUCN GB Red list designated Vulnerable (Stroh, 2025) and a UK BAP priority vascular plant species (Joint Nature Conservation Committee, 2007); and
- Spiral tasselweed (*Ruppia cirrhosa*) - IUCN GB Red list designated Vulnerable (Stroh, 2025).

Invasive non-native species (INNS) and Non-Native but Non-Invasive species

4.1.45 Records of 23 INNS and non-native but non-invasive species within 5 km of the Order Limits within ten years of the provision of data were identified in the desk study, as shown in Table 4.3.

4.1.46 A total of ten INNS and 13 non-native but non-invasive species were recorded on/near to hydrologically connected waterbodies within 5 km of the Order Limits.

4.1.47 Of these 23 species, records of a total of two INNS (Canadian waterweed *Elodea canadensis* and Nuttall's waterweed *Elodea nuttallii*) were identified within the Order Limits, as well as three non-native but non-invasive species (the freshwater amphipod 'shrimp' *Crangonyx pseudogracilis/floridanus* and *Crangonyx pseudogracilis*, the amphipod 'shrimp' *Gammarus tigrinus*, and the New Zealand mud snail *Potamopyrgus antipodarum*).

4.1.48 Species listed in Schedule 9 of the WCA (HM Government, 1981) include Canadian waterweed, Himalayan balsam (*Impatiens glandulifera),* water fern (*Azolla filiculoides),* Chinese mitten crab (*Eriocheir sinensis),* New Zealand pigmyweed (*Crassula helmsii),* parrot's feather (*Myriophyllum aquaticum)*, Japanese knotweed (*Reynoutria japonica)*, and giant hogweed (*Heracleum mantegazzianum).* Chinese mitten crab and Nuttall's waterweed are also listed in The Invasive Alien Species (Enforcement and Permitting) Order 2019 (HM Goverment, 2019). There are statutory constraints regarding their potential spread, and therefore mitigation will be required during the construction phase to prevent their spread and where possible locally eradicate these species within the Order Limits.

4.1.49 Three non-native invasive (non-legislated) species were recorded including records of the highly invasive demon shrimp (*Dikerogammarus haemobaphes)*, Zebra mussel *(Dreissena polymorpha),* and Quagga mussel (*Dreissena rostriformis bugensis*). These species are considered invasive species but are not yet listed on any legislation. Although these species are not listed in UK legislation, the legislation referenced earlier also makes in an offence to release, or allow to escape, listed species (or species not ordinarily resident in and is not a regular visitor to Great Britain in a wild state) into the wild. As such bio-security measures to prevent the spread of these species should still be considered.

4.1.50 Ten other non-native but non-invasive species were recorded, which were the amphipod 'shrimp' species *Crangonyx pseudogracilis/floridanus* and *Gammarus tigrinus,* the New Zealand mud snail*,* the freshwater polychaete worm (*Hypania invalida),* bloody-red mysid (*Hemimysis anomala), Caspian mud shrimp (Chelicorophium curvispinum),* the Asiatic clam (*Corbicula fluminea),* bladder snail species *Physella acuta* and *Physella gyrina,* least duckweed (*Lemna minuta),* and hemlock (*Conium maculatum)*. Although these species are not listed in UK legislation, the legislation referenced earlier in section 2.2 also makes in an offence to release, or allow to escape, listed species (or species not ordinarily resident in and is not a regular visitor to Great Britain in a wild state) into the wild. As such bio-security measures to prevent the spread of these species should still be considered.

Table 4.3 – Aquatic and riparian INNS, invasive non-designated taxa, and non-native but non-invasive taxa

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
Demon shrimp (*Dikerogammarus haemobaphes*)	Invasive (non-designated)	15	2025	SK7646696231	River Idle	E	Hydrologically connected 1 km from Order Limits 'River Idle'
				SE7586611848	South Soak Drain	C	Hydrologically connected 4 km from Order Limits 'South Soak Drain'
				SK8170072155	River Trent	F	Hydrologically connected 600 m from Order Limits, 3.6 km from crossing B-13 'Fledborough Beck'
Freshwater amphipod (*Crangonyx pseudogracilis/floridanus*) and (*Crangonyx pseudogracilis*)	Non-native but non-invasive	148	2025	SE7570706746 SE7634207783 SE7606707375 SE7818809850 SE781098	River Torne	C/D	Five record locations identified on the River Torn; closest record hydrologically connected 20 m from the Order Limits
				SE7822110517 SE782105	Hatfield Waste Drain	C	Two record locations identified on Hatfield Waste Drain; closest record hydrologically connected 1.35 km from the Order Limits
				SK7992198991 SK7560098100	Ferry Drain	D	Two record locations identified on Ferry Drain; closest record hydrologically connected 1.8 km from the Order Limits
				SE7809911037 SE8252511536	North Soak Drain	C	Two record locations identified on North Soak Drain; closest record hydrologically connected 1.39 km from Order Limits and crossing B-05

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SE8884832326 SE8890232390	North Cave Beck	A	Two record locations identified on North Cave Beck; closest record hydrologically connected 3.9 km from Order Limits, 4.5 km from crossing B-09
				SK7990098900 SE8356212130	Warping Drain	C/D	Two record locations identified on Warping Drain; closest record hydrologically connected 1.8 km from Order Limits
				SK7646696231 SK7517496583	River Idle	D/E	Two record locations identified on the River Idle; closest record hydrologically connected 300 m from Order Limits
				SE9038729746 SE9084029160	Mill Beck	A	Two record locations identified on Mill Beck; closest record hydrologically connected 50 m from Order Limits, 600 m from crossing B-09
				SE8318119586 SE8500021900 SE831195	Adlingfleet Drain	B	Three record locations identified on Adlingfleet Drain; closest record within Order Limits, hydrologically connected 800 m from crossing BC-37
				SE7830010500	North Engine Drain	C	Hydrologically connected 1.25 km from Order Limits 'North Engine Drain'
				SE7586611848 SE8233011456	South Soak Drain	C	Two record locations identified on South Soak Drain; closest record hydrologically connected 1.2 km from Order Limits and crossing B-04
				SE8050514412	Paupers Drain	B	Hydrologically connected 490 m from Order Limits, 500 m from crossing B-11 'Paupers Drain'

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SE7902909759	Folly Drain	C	Within Order Limits, hydrologically connected to crossing B-14
				SE8385829470	Bishopsoil Drain	A	Hydrologically connected 3.7 km from Order Limits. Hydrologically connected to crossing C-107 ‘Bishopsoil Drain’
				SK8170072155	River Trent	F	Hydrologically connected 600 m from Order Limits, 3.6 km from crossing B-13 'Fledborough Beck'
				SE780110	Stainforth and Keadby Canal	C	Hydrologically connected 1.6 km from Order Limits ‘Stainforth and Keadby Canal’
Amphipod (*Gammarus tigrinus*)	Non-native but non-invasive	24	2025	SE7818809850 SE781098	River Torne	C	Two record locations identified on the River Torne; closest record hydrologically connected 20 m from Order Limits
				SE7809911037 SE8252511536	North Soak Drain	C	Two record locations identified on North Soak Drain; closest record hydrologically connected 1.39 km from Order Limits and crossing B-05
				SK7646696231	River Idle	E	Hydrologically connected 1 km from Order Limits ‘River Idle’
				SK8190174476	River Trent	E	Hydrologically connected 4.77 km from Order Limits, 4.8 km from crossing B-13 'Fledborough Beck'
				SK7640589344	Trib of Saundby Beck	E	Within Order Limits, 250 m from crossing C-159 'Field Drain'
				SE8233011456	South Soak Drain	C	Hydrologically connected 1.2 km from Order Limits and crossing B-04 ‘South Soak Drain’

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SE8500021900	Adlingfleet Drain	B	Hydrologically connected 2.55 km from Order Limits, 2.6 km from crossing BC-37 'Adlingfleet Drain'
				SE9158127924	Sands Drain	A	Hydrologically connected 800 m from Order Limits, 850 m from crossing C-149 ‘Ings Drain’
				SE9084029160	Mill Beck	A	Hydrologically connected 50 m from Order Limits, 600 m from crossing B-09 'Mill Beck'
				SE780110	Stainforth and Keadby Canal	C	Hydrologically connected 1.6 km from Order Limits ‘Stainforth and Keadby Canal’
Water fern (*Azolla filiculoides*)	WCA Schedule 9	20	2019	SK7646696231 SK783949 SK785950 SK7517496583	River Idle	D/E	Four record locations identified on the River Idle; closest record hydrologically connected 300 m from Order Limits
				SK7990098900	Warping Drain	D	Hydrologically connected 1.8 km from Order Limits ‘Warping Drain’
				TA0713235114	Beverley and Barmston Drain	A	Hydrologically connected 3.5 km from Order Limits. Hydrologically connected to crossing C-100 and C-124 ‘Field Drains’
				SK777951	Mother Drain	E	Hydrologically connected 2.5 km from Order Limits ‘Mother Drain’
				SK785946	Chesterfield Canal	E	Hydrologically connected 5 km from Order Limits ‘Chesterfield Canal’ and crossing B-08 ‘Chesterfield Canal’
				SK821717 SK821727	Sewer Dike	F	Two record locations identified on Sewer Dike; closest record hydrologically

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
							connected 2.2 km from Order Limits via the River Trent
				SK81637133 SK81597121 SK81617126 SK81627130	Unnamed Watercourse	F	Four record locations identified on an Unnamed Watercourse; closest record hydrologically connected 800 m from Order Limits via the River Trent
				SE835114	Stainforth and Keadby Canal	C	Hydrologically connected 2.4 km from crossing B-03
Least duckweed (*Lemna minuta*)	Non-native but non-invasive.	7	2024	TA0713235114	Beverley and Barmston Drain	A	Hydrologically connected 3.5 km from Order Limits. Hydrologically connected to crossing C-100 and C-124 ‘Field Drains’
				SE8385829470	Bishopsoil Drain	A	Hydrologically connected 3.7 km from Order Limits. Hydrologically connected to crossing C-107 ‘Bishopsoil Drain’
				SE7586611848	South Soak Drain	C	Hydrologically connected 4 km from Order Limits ‘South Soak Drain’
				SE7809911037	North Soak Drain	C	Hydrologically connected 1.4 km from Order Limits, 3.1 km from crossing B-05 ‘North Soak Drain’
				SK7992198991	Ferry Drain	D	Hydrologically connected 1.8 km from Order Limits ‘Ferry Drain’
				SK7517496583 SK7646696231	River Idle	D/E	Two record locations identified on the River Idle; closest record hydrologically connected 300 m from Order Limits

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
Himalayan balsam (*Impatiens glandulifera*)	WCA Schedule 9	15	2024	SK7680073700	Unnamed Watercourse	E	1 km southwest of Order Limits. Hydrologically connected to crossing B-12 (East Drayton)
				SK8043876021	North Beck	E	3.5 km east of Order Limits. Hydrologically connected to crossing B-12 (East Drayton)
				SK79019619 SK79399606	Tindale Bank Drain	D	Two record locations identified on Tindale Bank Drain; closest record hydrologically connected 2.3 km from Order Limits
				SK77399587	Unnamed Drain	D	900 m east of Order Limits
				SK799871	Unnamed Drain	E	2.5 km east of Order Limits, near to Wheatley Beck
				SK87	N/A	F	Accurate proximity to Order Limits cannot be determined due to resolution of the record.
				SK7598	N/A	D	0.95 km north of Order Limits
				SK7995	N/A	D	1.51 km north of Order Limits
				SE8165024350	N/A	A	1 km west of C-189
				SE9034430741	N/A	A	2 km north of C-188
				SE9378026970	N/A	A/B	2.8 km south of C-075

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
New Zealand mud snail (*Potamopyrgus antipodarum*)	Non-native but now naturalised	94	2025	SK7960084500	Catchwater Drain	E	Hydrologically connected 1.15 km from Order Limits, 1.65 km from crossing C-056 'Field Drain'
				SE7634207783 SE7818809850	River Torne	C/D	Two record locations identified on the River Torne; closest record hydrologically connected 30 m from Order Limits
				SE7822110517	Hatfield Waste Drain	C	Hydrologically connected 1.35 km from Order Limits 'Hatfield Waste Drain'
				SE8884832326 SE8890232390	North Cave Beck	A	Two record locations identified on North Cave Beck; closest record hydrologically connected 3.9 km from Order Limits, 4.5 km from crossing B-09
				SK7680073700	Tuxford Beck	E	Hydrologically connected 1.2 km from Order Limits, 1.22 km from crossing B-12 'East Drayton'
				SK8022076001	North Beck	E	Hydrologically connected 3.4 km from Order Limits, 3.5 km from crossing B-12 'East Drayton'
				SK7881586543	Wheatley Beck	E	Hydrologically connected 1.55 km from Order Limits, 1.65 km from crossing C-091 'Field Drain'
				SE9038729746 SE9084029160	Mill Beck	A	Two record locations identified on Mill Beck; closest record hydrologically connected 50 m from Order Limits, 600 m from crossing B-09

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SK7646696231 SK7517496583	River Idle	D/E	Two record locations identified on the River Idle; closest record hydrologically connected 300 m from Order Limits
				SE8500021900 SE8380921193	Adlingfleet Drain	B	Two record locations identified on Adlingfleet Drain; closest record hydrologically connected 900 m from Order Limits, 920 m from crossing BC-37
				SK7640589344	Trib of Saundby Beck	E	Within Order Limits, 250 m from crossing C-159 'Field Drain'
				SE7586611848 SE8233011456	South Soak Drain	C	Two record locations identified on South Soak Drain; closest record hydrologically connected 1.2 km from Order Limits and crossing B-04
				SK7776471762	Fledborough Beck	F	Hydrologically connected 1.65 km from Order Limits, 1.75 km from crossing B-13 'Fledborough Beck'
				SE8050514412	Paupers Drain	B	Hydrologically connected 490 m from Order Limits, 500 m from crossing B-11 'Paupers Drain'
				SE7902909759	Folly Drain	C	Within Order Limits, hydrologically connected to crossing B-14
				SE8385829470	Bishopsoil Drain	A	Hydrologically connected 3.7 km from Order Limits. Hydrologically connected to crossing C-107 ‘Bishopsoil Drain’
				SE9158127924	Sands Drain	A	Hydrologically connected 800 m from Order Limits, 850 m from crossing C-149 ‘Ings Drain’

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SK8170072155	River Trent	F	Hydrologically connected 600 m from Order Limits, 3.6 km from crossing B-13 'Fledborough Beck'
Canadian waterweed (*Elodea canadensis*)	WCA Schedule 9	4	2023	SK8170072155	Folly Drain	F	Within Order Limits, hydrologically connected to crossing B-14 'Folly Drain'
				TA0231	N/A	A	Hydrological connectivity unclear. 3.5 km south of Order Limits
				SE785104 SE777107	Hatfield Waste Drain	C	Two record locations identified on Hatfield Waste Drain; closest record hydrologically connected 1 km from Order Limits, 1.9 km from crossing B-02
Nuttall's waterweed (*Elodea nuttallii*)	The Invasive Alien Species (Enforcement and Permitting) Order 2019	18	2024	SK7646696231 SK7517496583	River Idle	D/E	Two record locations identified on the River Idle; closest record hydrologically connected 300 m from Order Limits
				SE7809911037	North Soak Drain	C	Hydrologically connected 1.4 km from Order Limits, 3.1 km from crossing B-05 'North Soak Drain'
				SE7586611848 SE8233011456	South Soak Drain	C	Two record locations identified on South Soak Drain; closest record hydrologically connected 1.2 km from Order Limits and crossing B-04
				SK7990098900	Warping Drain	D	Hydrologically connected 1.8 km from Order Limits 'Warping Drain'
				SE7902909759	Folly Drain	C	Within Order Limits, hydrologically connected to crossing B-14 'Folly Drain'
				SE8112	N/A	C	100 m north of Order Limits

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SE785104 SE777107	Hatfield Waste Drain	C	Two record locations identified on Hatfield Waste Drain; closest record hydrologically connected 1 km from Order Limits, 1.9 km from crossing B-02
				SE8414	Unnamed Drain	B	Hydrologically connected 2.8 km from C-034
				SE775094 SE8311	South Engine Drain	C	Two record locations identified on South Engine Drain; closest record hydrologically connected 2.3 km from Order Limits, 2.5 km from B-14
				SE772091	River Torne	C	Hydrologically connected 4.5 km from B-14 'Folly Drain' and C-215
Freshwater polychaete (*Hypania invalida*)	Non-native but non-invasive	3	2025	SK8190174476 SK8170072155	River Trent	E/F	Two record locations identified on the River Trent; closest record hydrologically connected 600 m from Order Limits, 3.6 km from crossing B-13
				SK7646696231	River Idle	E	Hydrologically connected 1 km from Order Limits 'River Idle'
Caspian mud shrimp (*Chelicorophium curvispinum*)	Non-native but non-invasive	16	2025	SK7646696231 SK7517496583	River Idle	D/E	Two record locations identified on the River Idle; closest record hydrologically connected 300 m from Order Limits
				SK8190174476 SK8170072155	River Trent	E/F	Two record locations identified on the River Trent; closest record hydrologically connected 600 m from Order Limits, 3.6 km from crossing B-13

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SE7818809850 SE781098	River Torne	C	Two record locations identified on the River Torne; closest record hydrologically connected 20 m from Order Limits
Asiatic clam (*Corbicula fluminea*)	Non-native but non-invasive	14	2025	SK7646696231	River Idle	E	Hydrologically connected 1 km from Order Limits 'River Idle'
				SK8190174476 SK8170072155	River Trent	E/F	Two record locations identified on the River Trent; closest record hydrologically connected 600 m from Order Limits, 3.6 km from crossing B-13
Bladder snail (*Physella acuta*)	Non-native but non-invasive	5	2024	SE7818809850	River Torne	C	Hydrologically connected 30 m from Order Limits 'River Torne'
				SK7646696231	River Idle	E	Hydrologically connected 1 km from Order Limits 'River Idle'
				SE8385829470	Bishopsoil Drain	A	Hydrologically connected 3.7 km from Order Limits. Hydrologically connected to crossing C-107 'Bishopsoil Drain'
Bladder snail (*Physella gyrina*)	Non-native but non-invasive	2	2021	SE7818809850	River Torne	C	Hydrologically connected 30 m from Order Limits 'River Torne'
				SE7586611848	South Soak Drain	C	Hydrologically connected 4 km from Order Limits 'South Soak Drain'
Bloody-red mysid (*Hemimysis anomala*)	Non-native but non-invasive	1	2024	SE7586611848	South Soak Drain	C	Hydrologically connected 4 km from Order Limits 'South Soak Drain'
Chinese mitten crab	WCA Schedule 9	28	2025	SK79057965 SK80528566	Catchwater Drain	E	Five record locations identified on Catchwater Drain; closest record

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
(*Eriocheir sinensis*)	The Invasive Alien Species (Enforcement and Permitting) Order 2019			SK80518565 SK80478562 SK80558570			hydrologically connected 2.3 km from Order Limits and crossing C-140
				SK782992	Field Drain	D	Hydrologically connected 650 m from Order Limits 'Field Drain'
				SE864177	Unnamed Watercourse	B	Hydrologically connected via River Trent 2.3 km from Order Limits, 2.4 km from crossing C-213 'Field Drain'
				SK787949 SK76679608 SK73779668	River Idle	E	Three record locations identified on the River Idle; closest record hydrologically connected 1.2 km from Order Limits and 1.35 km from crossing C-052
				SK78408832	N/A	E	200 m north of Order Limits, record near to Saundby Beck
				SK79257622	Unnamed Pond	E	Pond location near to watercourses hydrologically connected 4 km from Order Limits, 4.5 km from crossing C-141 via North Beck
				SK737966	Mother Drain	E	Hydrologically connected 1.7 km from crossing BC-30
				SK8096 SK813999	River Trent	D	Two record locations identified on the River Trent; closest record hydrologically connected 2.9 km from Order Limits, 3 km from crossing C-179 and C-156
				SE833114	Stainforth and Keadby Canal	C	Hydrologically connected 2.2 km from crossing B-03

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SE863178	Pond adjacent to River Trent	B	Potential hydrologically connected 2.5 – 2.6 km from crossings C-213, C-214, BC-21 and 3 – 4 km from C-094, C-031, bc-14, BC-02, BC-09
				SK815734	Old Trent	F	Hydrologically connected 3.5 km from B-13 and C-161
New Zealand pigmyweed (*Crassula helmsii*)	WCA Schedule 9	6	2021	SK794791	N/A	E	2 km east of Order Limits
				SK87	N/A	F	Accurate proximity to Order Limits cannot be determined
				SK8071	N/A	F	Within Order Limits, located near field drains with hydrological connectivity to Fledborough Beck
				SK80997144	N/A	F	Pond 1.1 km east of Order Limits
Parrots feather (*Myriophyllum aquaticum*)	WCA Schedule 9	1	2016	SK87	N/A	F	Accurate proximity to Order Limits cannot be determined
Japanese knotweed (*Reynoutria japonica*)	WCA Schedule 9	12	2023	SE82	N/A	B	Accurate proximity to Order Limits cannot be determined
				TA0232	N/A	A	2.5 km south-east of Order Limits
				SK753926 SK752925	Chesterfield Canal	E	Two record locations identified on the Chesterfield Canal; closest record hydrologically connected 750 m from Order Limits
				SK77589415	N/A	E	500 m south of Chesterfield Canal, 2.8 km east of Order Limits

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SK77599416	N/A	E	500 m south of Chesterfield Canal, 2.8 km east of Order Limits
				SE8616	N/A	B	600 m east of River Trent, 1.6 km east of Order Limits
				SE817003	River Trent	D	Hydrologically connected 4.5 km from BC-05 via Ferry Drain
				SE8674427548 SE8676327552	Market Weighton Canal	A	Two record locations identified on the Market Weighton Canal; closest record hydrologically connected 500 m from the Order Limits and B-15
				SE9439028580	N/A	A	1.5 km south east of C-005 and C-075
				TA0601033840	N/A	A	2.5 km south east of C-114
Giant hogweed (*Heracleum mantegazzianum*)	WCA Schedule 9	4	2022	SE94832842	N/A	A	1.5 km south east of Order Limits
				SK813995	N/A	D	50 m north of Ferry Drain, 1.8 km east of Order Limits
				SE8212024140	N/A	B	0.5 km west of BC-01
				SE8213024200	N/A	B	0.5 km west of BC-01
Hemlock (*Conium maculatum*)	Non-native but not legislated	6		SK793996	N/A	D	50 m west of Order Limits
				SK7999	N/A	D	50 m west of Order Limits
				SE8414	N/A	B	2 km south of Order Limits
				SK7598	N/A	D	1.5 km northwest of Order Limits

Species	Designation/status	Total number of records	Most recent record	NGR of records	Watercourse	Route Section	Proximity to Order Limits/hydrological connectivity
				SE81M	N/A	C	Accurate proximity to Order Limits cannot be determined
				SE81G	N/A	C	Accurate proximity to Order Limits cannot be determined
Zebra mussel *(Dreissena polymorpha)*	Non-native but not legislated	21	2025	SK782976	Unnamed Drain	D	Hydrologically connected 5 m from Order Limits, 75 m from C-080
				SE8844031150	Great Acre Lake	A	20 records around Great Acre Lake, hydrologically isolated, 2.7 km from C-071
				SK8167872697	River Trent	F	Hydrologically connected 4 km from B-13 and C-161
Quagga mussel (*Dreissena rostriformis bugensis*)	Non-native but not legislated	1	2020	SK87	-	F	Hydrological connectivity uncertain, 2.3 km south east of C-161

4.2 Field Survey Results

Aquatic Macroinvertebrate Surveys

4.2.1 The full aquatic macroinvertebrate taxa list can be found in in Annex B. A description of the macroinvertebrate community at each survey location is provided below. Survey locations are illustrated in **Figure A8.10.1 Aquatic Survey Locations - Macroinvertebrates** in Annex A. Descriptions of the physical characteristics of the survey locations is provided in Annex H.

C-005 (Route Section A)

Spring 2024

4.2.2 Macroinvertebrate diversity was low to moderate at this site with 22 taxa recorded. The community was dominated by the dwarf pond snail (*Galba truncatula)* and juvenile Lymnaeidae pond snails, crustaceans including *Gammarus pulex*, and true fly larvae and pupae (particularly the non-biting midge Chironomidae). Also present at this site were beetle species of the Dytiscidae family including *Hydroporus discretus* and *Agabus guttatus*, and various genus of pea mussel *Pisidium/Euglesa/Odhneripisidium*.

4.2.3 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 4.01) with a ‘sedimented’ PSI score (37.50). The community at this site had ‘moderate sensitivity’ to reduced flows and was of ‘moderate’ conservation value (CCI score 7.2).

4.2.4 No notable or non-native taxa were present.

4.2.5 No survey was conducted in Autumn 2024 due to the watercourse being dry (Table 3.3).

C-075 (Route Section A)

Spring 2024

4.2.6 Macroinvertebrate diversity in this sample was moderate, consisting of 26 taxa in total. The sample was dominated by the crustacean *G. pulex* and several true-fly including the non-biting midge Chironomidae and the black fly larvae *Simulium costatum*. Also present at this site were the pea mussel *Pisidium*/*Euglesa*/*Odhneripisidium*, the mayfly *Baetis rhodani/atlanticus*, the riffle beetle *Elmis aenea*, and several caddisfly species including *Plectrocnemia conspersa*, *Micropterna sequax*, and *Sericostoma personatum*.

4.2.7 Biological water quality was ‘good, clean but slightly impacted’ (ASPT-WHPT score 5.55) with a ‘slightly sedimented’ PSI score (63.64). The sample recorded ‘high sensitivity’ to reduced flows in the LIFE index and was of ‘moderate’ conservation value (CCI score 8.1), owing in part to the presence of the black fly larvae *S. costatum* with a Conservation Score of 5 which shows the species has been assigned as ‘local – locally notable’ in the CCI metric. There are no statutory designations associated with this species.

4.2.8 The non-native freshwater shrimp *C. psuedogracilis/floridanus* was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2024

4.2.9 In Autumn, macroinvertebrate diversity at this site was moderate to high, increasing from Spring and consisting of 30 taxa in total. The community was dominated by freshwater shrimp *Gammarus* sp. which accounted for 74 per cent of the community. Several caddisfly species were recorded including *Agapetus fuscipes* and *Stenophylax vibex*. True fly larvae were also abundant, including the meniscus midge *Dixa* sp., which accounted for 13 per cent of the individuals recorded.

4.2.10 Biological water quality was 'good, clean but slightly impacted' (ASPT-WHPT score 5.29) with a 'slightly sedimented' PSI score (66.67). The community at this site had 'high sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 9.3).

4.2.11 No notable or non-native taxa were present.

C-006 (Route Section A)

Spring 2024

4.2.12 This site had moderate macroinvertebrate diversity with 25 taxa recorded. Crustaceans including the water hoglouse (*Asellus aquaticus*), and true fly specimens (particularly the non-biting midge Chironomidae) dominated the community. Also present at this site were the caddisfly *Limnephilus lunatus*, snails including juvenile pond snail Lymnaeidae and the amber snail *Succinea* sp., and beetles such as the diving beetle *Hydroporus tesselatus* and the water scavenger beetle *Anacaena globulus*.

4.2.13 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.70) with a 'heavily sedimented' PSI score (11.11). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 1.3).

4.2.14 The non-native freshwater shrimp *C. pseudogracilis/floridanus* was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

4.2.15 No survey was conducted in Autumn 2024 due to the watercourse being dry (Table 3.3).

BC-15 (Route Section A)

Spring 2024

4.2.16 Macroinvertebrate diversity was moderate at this site, with 27 taxa recorded. The community at this site was dominated by snails including the amber snail *Succinea* sp., margined ramshorn (*Planorbis planorbis*) and whirlpool ramshorn (*Anisus vortex*), crustaceans such as the water hoglouse (*A. aquaticus*), and the caddisfly *L. lunatus*. Also present at this site were the flatworm *Polycelis* sp., the leeches *Glossiphonia complanata* and *Erpobdella octoculata*, the alderfly *Sialis lutaria*, and several species of the diving beetle family Dytiscidae (e.g., *Hydroporus planus* and

Agabus didymus) and the water scavenger beetle family Hydrophilidae (e.g., *A. globulus* and *Anacaena limbata*).

4.2.17 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.84) with a 'heavily sedimented' PSI score (3.33). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 1.1).

4.2.18 The non-native but non-invasive freshwater shrimp *C. pseudogracilis/floridanus* was present in this sample. No other notable or non-native taxa were present.

Autumn 2024

4.2.19 Macroinvertebrate diversity was low to moderate, with 21 taxa recorded. True-fly larvae, predominantly Chironomidae, accounted for almost half of the individuals recorded (48 per cent)., with flatworms (e.g., *Polycelis felina*), leeches (e.g., *E. octoculata*), and beetles (e.g., *Gyrinus substriatus*) also present.

4.2.20 Biological water quality was 'moderate, moderately impacted' (ASPT-WHPT score 4.39) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 4.6).

4.2.21 The non-native but non-invasive freshwater shrimp *C. pseudogracilis/floridanus* was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

C-008 (Route Section A)

Spring 2024

4.2.22 Relatively high macroinvertebrate diversity was recorded at this site, with 31 taxa in total. The community at this site was dominated by snails (particularly the New Zealand mud snail), crustaceans such as *G. pulex*, the caddisfly *L. lunatus*, and true-fly larvae and pupae (particularly the non-biting midge Chironomidae). The sample also consisted of taxa such as several species of the diving beetle Dytiscidae and the water scavenger beetle Hydrophilidae, and true bugs including riffle bug (*Velia* sp.) and water scorpion (*Nepa cinerea*).

4.2.23 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 4.15) with a 'heavily sedimented' PSI score (11.90). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 3.9).

4.2.24 The non-native New Zealand mud snail was present in this sample. This species is not considered invasive, and is not listed in English legislation. No other notable or non-native taxa were present.

Autumn 2024

4.2.25 Macroinvertebrate diversity was moderate with 26 taxa recorded. The community was dominated by snails, namely New Zealand mud snail, which accounted for 50 per cent of the community. True-fly larvae were also abundant, comprising 20 per cent of the community. Also present were several beetle species including *H. tesselatus* and *Haliplus lineatocollis*.

4.2.26 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 4.09) with a 'heavily sedimented' PSI score (12.50). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 4.6).

4.2.27 The non-native New Zealand mud snail was present in this sample. This species is not considered invasive and is not listed in English legislation. No other notable or non-native taxa were present.

C-149 (Route Section A)

Spring 2024

4.2.28 Macroinvertebrate diversity was moderate at this sample, consisting of 27 taxa. The dominant taxa at this site were crustaceans (particularly *Gammarus sp*.), with the riffle beetle Elmidae, the caddisfly *S. personatum*, and true-fly taxa including the non-biting midge Chironomidae also abundant. Also present at this site were the flatworms *Dendrocoelum lacteum* and *Polycelis* sp., leeches such as *E. octoculata*, several mayfly species including *Caenis* sp. and *Serratella ignita*, and the caddisfly *L. lunatus*.

4.2.29 Biological water quality was 'good, clean but slightly impacted' (ASPT-WHPT score 4.99) with a 'moderately sedimented' PSI score (50.00). The community at this site had 'high sensitivity' to reduced flows and was of 'low' conservation value (CCI score 3.3).

4.2.30 The non-native New Zealand mud snail was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2024

4.2.31 In Autumn, macroinvertebrate diversity showed an increase from Spring with 41 taxa recorded. The sample was largely dominated by freshwater shrimp *Gammarus* sp., which accounted for almost half of the specimens recorded (49 per cent). A relatively diverse caddisfly assemblage was recorded, which included *Rhyacophila dorsalis*, *M. sequax*, and *S. personatum*. Several mayfly larvae species such as *Centroptilum luteolum* were noted, as well as flatworms (e.g., *D. lacteum*) and leeches (e.g., *Helobdella stagnalis*).

4.2.32 Biological water quality was 'good, clean but slightly impacted' (ASPT-WHPT score 5.04) with a 'moderately sedimented' PSI score (46.67). The community at this site had 'high sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 7.5).

4.2.33 The non-native New Zealand mud snail was still present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

B-09 (Route Section A)

Spring 2024

4.2.34 Macroinvertebrate diversity was relatively high for this sample, with 32 taxa recorded in total. The community at this site was dominated by the crustacean *Gammarus* sp., and true-fly taxa (particularly the non-biting midge Chironomidae and the black fly larvae Simuliidae). Also present at this site were snails including the pond snail *Stagnicola* sp., leeches including *E. octoculata*, crustaceans *G. pulex* and *A. aquaticus*, mayflies including *S. ignita*, the damselfly *Calopteryx* sp., caddisflies such

as *Hydroptila* sp., and several beetle species including the riffle beetle *R. subviolaceus* and diving beetle *Nebrioporus elegans*.

4.2.35 Biological water quality was 'good, clean but slightly impacted' (ASPT-WHPT score 4.96) with a 'sedimented' PSI score (30.00). The community at this site had 'moderate sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 6.9), owing in part to the presence of the riffle beetle *R. subviolaceus*, which is a Nationally Scarce species (Foster, 2010).

4.2.36 The non-native New Zealand mud snail was present in this sample. These species are not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2024

4.2.37 The Autumn sample was relatively diverse, with 33 taxa recorded. It was dominated by freshwater shrimp *Gammarus sp*., which accounted for almost half (47 per cent) of the individuals recorded. Several beetle taxa were noted, including the whirligig beetle *Orectochilus villosus*, as well as mayfly larvae (e.g., *Baetis vernus*), one stonefly larvae Nemouridae, and various caddisfly larvae (e.g., *S. personatum*).

4.2.38 Biological water quality was 'good, clean but slightly impacted' (ASPT-WHPT score 5.27) with a 'moderately sedimented' PSI score (47.37). The community at this site had 'high sensitivity' to reduced flows and was of 'low' conservation value (CCI score 3.9).

4.2.39 The non-native New Zealand mud snail was present in this sample. This species is not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

C-010 (Route Section A)

Spring 2024

4.2.40 Macroinvertebrate diversity was low to moderate at this site with 21 taxa recorded. The community was dominated by pea mussels (Sphaeriidae and *Pisidium*/*Eugl*esa/*Odhneripisidium*), earthworms (Oligochaeta sp.), water hoglouse (*A. aquaticus*), and the non-biting midge Chironomidae. Also present in this sample were the bladder snail *Physella sp*., pond snails *G. truncatula* and wandering pond snail (*Ampullaceana balthica*), the caddisfly *L. lunatus*, and the diving beetle *H. planus*.

4.2.41 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.11) with a 'heavily sedimented' PSI score (11.11). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 4.8).

4.2.42 No notable or non-native taxa were present.

Autumn 2024

4.2.43 In Autumn, macroinvertebrate diversity was relatively low with 19 taxa recorded. Water hoglouse (*A. aquaticus*) accounted for almost half of the community (49 per cent), with pea mussels Sphaeriidae also abundant (29 per cent). Also present were beetles (e.g., *A. limbata*) and snails (e.g., moss bladder snail (*Aplexa hypnorum*)).

4.2.44 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.08) with a ‘heavily sedimented’ PSI score (0.00). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘fairly high’ conservation value (CCI score 11.7).

4.2.45 No notable or non-native taxa were present.

C-011 (Route Section A)

Spring 2024

4.2.46 This site had relatively low macroinvertebrate diversity with a total of 19 taxa recorded. The community at this site was dominated by true-fly taxa (particularly the non-biting midge Chironomidae). Also present were the wandering pond snail, nautilus ramshorn (*Gyraulus crista)*, blue-tailed damselfly (*Ischnura elegans)* and azure damselfly (*Coenagrion puella)*, backswimmer Notonectidae, the leech *H. stagnalis*, and several true-fly taxa including mosquito larvae *Culicidae*.

4.2.47 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.71) with a ‘heavily sedimented’ PSI score (14.29). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 1.3).

4.2.48 No notable or non-native taxa were present.

Autumn 2024

4.2.49 The Autumn community at C-011 was limited, with only eight taxa recorded in total. The community was dominated by true fly larvae, namely mosquito larvae (Culicidae), which accounted for 99 per cent of the individuals recorded. Also present was the damselfly larvae Coenagrionidae.

4.2.50 Taxa within this sample could only be identified to family level. Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.65). Considering family scores alone, the community indicates ‘sedimented’ conditions (PSI score 20.00) and ‘low sensitivity’ to reduced flows. Due to the lack of species-level data, the conservation value of this community could not be determined.

4.2.51 No notable or non-native taxa were present.

BC-06 (Route Section A)

Spring 2024

4.2.52 This site had relatively low macroinvertebrate diversity with 18 taxa recorded in total. The community was dominated by snails such as New Zealand mud snail and common bithynia (*Bithynia tentaculata*), and crustaceans including *A. aquaticus* and *Proasellus meridianus*. Also recorded at this site were several true-fly taxa such as black fly larvae Simuliidae and the non-biting midge Chironomidae, the diving beetle *Graptodytes pictus*, and the pea mussel genera *Pisidium/Euglesa/Odhneripisidium*.

4.2.53 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 4.07) with a ‘heavily sedimented’ PSI score (0.00). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘moderate’ conservation value (CCI score 5.4).

4.2.54 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both present in this sample. These species are not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

4.2.55 No survey was conducted in Autumn 2024 due to the watercourse being dry (Table 3.3).

BC-03 (Route Section A)

Spring 2024

4.2.56 This site had relatively low macroinvertebrate diversity with 17 taxa recorded in total. The macroinvertebrate community at this site was dominated by snails including the wandering pond snail and juvenile specimens of the pond snail family Lymnaeidae and bladder snail family Physidae, as well as true-fly taxa (particularly the non-biting midge Chironomidae). Also recorded at this site were the riffle bug *Velia* sp., several beetle taxa including the diving beetle *Hydroporus palustris* and water scavenger beetle *A. limbata*, and the water mite Hydracarina.

4.2.57 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.10) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 1.0).

4.2.58 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both present in this sample. These species are not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

4.2.59 No survey was conducted in Autumn 2024 due to the watercourse being dry (Table 3.3).

C-167 (Route Section A)

Autumn 2025

4.2.60 Autumn macroinvertebrate sample was low to moderate, with 21 taxa recorded. The sample was dominated by true-fly larvae, particularly the non-biting midge Chironomidae, which accounted for 61 per cent of identified specimens. Six snail taxa were present, as well as several beetle taxa (e.g., *H. planus*) and the caddisfly Limnephilidae.

4.2.61 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.30) with a 'heavily sedimented' PSI score 0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 1.2).

4.2.62 The non-native New Zealand mud snail was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

C-168 (Route Section A)

Autumn 2025

4.2.63 Macroinvertebrate diversity was low to moderate at this site in Autumn, comprising a total of 18 taxa. The non-biting midge Chironomidae was abundant within the community, accounting for 25 per cent of identified specimens, with pea mussels Sphaeriidae, worms Oligochaeta, and snails including the nautilus ramshorn also recorded in high numbers. Also present was the leech *Trocheta subviridis* and water boatman *Hesperocorixa sahlbergi*.

4.2.64 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.32) with a 'heavily sedimented' PSI score 0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 4.9).

4.2.65 The non-native New Zealand mud snail was present in this sample. The species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

4.2.66 The survey location could not be accessed to undertake a Spring sample.

C-172 (Route Section B)

Spring 2025

4.2.67 Macroinvertebrate diversity was relatively low in this sample, with 18 taxa recorded. The sample was dominated by true fly larvae Chironomidae which accounted for 78 per cent of individuals recorded. Also present were several beetle taxa including *Ochthebius minimus*, and the water boatman *Sigara* sp.

4.2.68 Biological water quality was 'moderate, moderately impacted' (ASPT-WHPT score 4.64) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 5.3).

4.2.69 No notable or non-native taxa were present.

Autumn 2025

4.2.70 The Autumn sample was less diverse than in Spring, with just ten taxa recorded. The sample comprised low abundances of crustaceans such as *P. meridianus*, the caddisfly Limnephilidae, and two true-fly taxa.

4.2.71 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 4.36) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 9.0).

4.2.72 No notable or non-native taxa were present.

BC-37 (Route Section B)

Spring 2024

4.2.73 This sample had relatively low macroinvertebrate diversity with 18 taxa recorded in total. The sample was dominated by snails (predominantly *B. tentaculata*),

crustaceans including *Crangonyx* sp., and true-fly taxa (particularly the non-biting midge Chironomidae). Also present were beetles such as *H. tesselatus*, the water boatman *Sigara* sp., and larvae of the brown hawker (*Aeshna grandis*).

4.2.74 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.78) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 1.3).

4.2.75 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both present in this sample. These species are not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2024

4.2.76 In Autumn, diversity increased and was relatively high with 32 taxa recorded. The sample was dominated by snails, namely New Zealand mud snail, which accounted for 73 per cent of the individuals recorded. Larvae of the dragonfly *Anax* sp., and blue-tailed damselfly were also recorded.

4.2.77 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.70) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 8.8), a slight increase from the Spring sample.

4.2.78 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both still present in this sample. These species are not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

B-11 (Route Section B)

Spring 2025

4.2.79 The sample was relatively diverse, consisting of 35 taxa. The most abundant taxa recorded were worms Oligochaeta and snails, including the valve snail (*Valvata piscinalis*) and Leach's bithynia (*Bithynia leachii*), which accounted for 37 per cent and 27 per cent respectively of the individuals recorded. Larvae of the willow emerald damselfly (*Chalcolestes viridis*) were recorded in low abundances, as well as several beetle taxa such as *Hygrotus versicolor*.

4.2.80 Biological water quality was 'very poor, heavily polluted' (ASPT-WHPT score 2.73) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'fairly high' conservation value (CCI score 13.1).

4.2.81 The non-native freshwater shrimp *C. psuedogracilis/floridanus* was present in this sample. The species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2025

4.2.82 Slightly lower diversity was recorded in Autumn, with a total of 29 taxa recorded. The most abundant groups were snails, such as the great ramshorn snail, which accounted for 53 per cent of individuals recorded. Also abundant were crustaceans

(22 per cent) and mussels (10 per cent), with beetles such as *H. versicolor* present in lower numbers.

4.2.83 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.24) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 9.4).

4.2.84 The non-native freshwater shrimp *C. psuedogracilis/floridanus* was present in this sample. The species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

BC-12 (Route Section B)

Spring 2025

4.2.85 Spring diversity was recorded as high in this sample, consisting of 41 taxa. The most abundant group recorded was snails, including species such as the flat ramshorn (*Hippeutis complanatus*), which accounted for more than half of the individuals recorded (55 per cent). A relative diverse beetle assemblage was noted with species such as *H. versicolor* recorded, as well as true bugs including the pygmy backswimmer (*Plea minutissima*).

4.2.86 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.35) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'fairly high' conservation value (CCI score 11.3).

4.2.87 The non-native freshwater shrimp *C. psuedogracilis/floridanus* was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2025

4.2.88 The Autumn sample was less diverse than in Spring, with 27 taxa recorded. The community was still dominated by snails such as the great ramshorn which accounted for 40 per cent of all identified specimens. Several leech species were present including the horse leech (*Haemopis sanguisuga*) and duck leech (*Theromyzon tessulatum)*.

4.2.89 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.41) with a 'heavily sedimented' PSI score (6.98). The community at this site had 'low sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 5.1).

4.2.90 The non-native freshwater shrimp *C. psuedogracilis/floridanus* was again present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

B-10 (Route Section C)

Spring 2024

4.2.91 This sample was relatively diverse, with a total of 36 taxa recorded. The macroinvertebrate community was dominated by snails (particularly the New Zealand

mud snail, the pond snail family Lymnaeidae, and ramshorn snails including *A. leucostoma*), the pea mussel *Pisidium*/*Euglesa*/*Odhneripisidium*, and crustaceans including *Gammarus* sp. and the water hoglouse (*A. aquaticus)*. The sample also contained several species of beetle including the screech beetle (*Hygrobia hermanni*) and the diving beetles *H. versicolor* and *H. palustris*, the caddisfly *Athripsodes bilineatus*, true-fly taxa including black fly larvae Simuliidae, and leeches such as *G. complanata*.

4.2.92 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 4.14) with a 'heavily sedimented' PSI score (13.95). The community at this site had 'low sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 9.1), owing in part to the presence of the diving beetle *H. versicolor* and the caddisfly *A. bilineatus* from the family Leptoceridae. These taxa each have a Conservation Score of five which shows these species have been assigned as 'local – locally notable' in the CCI metric. There are no statutory designations associated with these species.

4.2.93 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both present in this sample. These species are not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2024

4.2.94 The Autumn sample was relatively diverse with 34 taxa recorded. The community was dominated by snails such as the common bladder snail (*Physa fontinalis)* and crustaceans including the water hoglouse (*A. aquaticus*) which accounted for 37 per cent and 42 per cent of the number of specimens recorded, respectively. A relatively diverse beetle assemblage comprising six species was recorded, as well as two caddisfly species *Limnephilus extricatus* and *Athripsodes aterrimus.*

4.2.95 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.72) with a 'heavily sedimented' PSI score (6.52). The community at this site had 'low sensitivity' to reduced flows and was of 'high' conservation value (CCI score 17.8) owing to the presence the diving beetle *Stictonectes lepidus*, a species designated as IUCN Near Threatened (Foster, 2010).

4.2.96 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were again both present in this sample. These species are not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

C-062 (Route Section C)

Spring 2024

4.2.97 High macroinvertebrate diversity was recorded in this sample, consisting of 43 taxa. The community at this site was dominated by snails (particularly the pond snail family Lymnaeidae, the New Zealand mud snail, and the ramshorn snail *Anisus* sp.), crustaceans including *P. meridianus*, and true-fly taxa (particularly the non-biting midge Chironomidae). This site also had a diverse beetle community which included several species of Dytiscidae (e.g., *H. discretus*), the water scavenger beetle *A. globulus*, the whirligig beetle Gyrinidae, *Noterus clavicornis*, and *H. lineaticollis*. Also recorded were the flatworm *Polycelis* sp. and the dragonfly larvae Libuellidae.

4.2.98 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.96) with a ‘heavily sedimented’ PSI score (4.00). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘moderate’ conservation value (CCI score 7.9) owing in part to the presence of the moss bladder snail from the family Physidae with a Conservation Score of five which shows the species has been assigned as ‘local – locally notable’ in the CCI metric. There are no statutory designations associated with this species.

4.2.99 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both present in this sample. These species are not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

4.2.100 No survey was conducted in Autumn 2024 due to the watercourse being dry (Table 3.3).

B-14 (Route Section C)

Autumn 2025

4.2.101 Moderate macroinvertebrate diversity was recorded in Autumn, with a total of 24 taxa identified. The community was dominated by crustaceans which accounted for 71 per cent of specimens recorded. Several species of caddisfly larvae (for example, *Agrypnia pagetana* and *Glyphotaelius pellucidus*) were recorded, as well as various snail taxa including white-lipped ramshorn (*Anisus leucostoma*).

4.2.102 Biological water quality was ‘moderate, moderately impacted’ (ASPT-WHPT score 4.02) with a ‘heavily sedimented’ PSI score (2.94). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘fairly high’ conservation value (CCI score 10.8).

4.2.103 The non-native freshwater shrimp *C. psuedogracilis/floridanus* was present in this sample. These species are not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

BC-29 (Route Section D)

Autumn 2024

4.2.104 Macroinvertebrate diversity was relatively high at C-041, with 32 taxa recorded. The sample was largely dominated by one mayfly species *Cloeon dipterum* which accounted for 48 per cent of the number of specimens recorded. Also abundant were crustaceans including the water hoglouse species *Proasellus meridianus* (17 per cent) and true fly Chironomidae larvae (16 per cent). Two true bug species *H. sahlbergi* and *Notonecta maculata* were noted as well as several beetle taxa such as *A. didymus*.

4.2.105 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.45) with a ‘heavily sedimented’ PSI score (0.00). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘moderate’ conservation value (CCI score 8.3).

4.2.106 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both present in this sample. The species are not a legally listed

invasive non-native species in England. No other notable or non-native taxa were present.

4.2.107 The survey location could not be accessed to undertake a Spring sample (Table 3.3).

BC-05 (Route Section D)

Autumn 2025

4.2.108 The Autumn macroinvertebrate sample was moderately diverse, consisting of 27 taxa. Crustaceans including the water hoglouse species *A. aquaticus* accounted for over half (64 per cent) of identified taxa. A relatively diverse snail assemblage was also recorded including species such as the flat valve snail (*Valvata cristata*), as well as true bugs including the backswimmer *N. maculata*.

4.2.109 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.65) with a 'heavily sedimented' PSI score (5.71). The community at this site had 'low sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 7.9).

4.2.110 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both present in this sample. These species are not listed invasive non-native species in England. No other notable or non-native taxa were present.

4.2.111 The survey location could not be accessed to undertake a Spring sample (Table 3.3).

C-051 (Route Section D)

Spring 2024

4.2.112 Low to moderate macroinvertebrate diversity was recorded in this sample, consisting of 24 taxa. The sample was dominated by snails (particularly juvenile specimens of the pond snail family Lymnaeidae), beetles including species of the families Haliplidae, Dytiscidae, and Hydrophilidae, and true-fly taxa (particularly the non-biting midge Chironomidae). Pea mussel *Pisidium*/*Euglesa*/*Odhneripisidium*, the leech *G. complanata*, the water boatman Corixidae, and the water hoglouse *A. aquaticus* were also present at this site.

4.2.113 Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 3.83) with a 'heavily sedimented' PSI score (0.00). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 1.0).

4.2.114 The non-native freshwater shrimp *C. psuedogracilis/floridanus* was present in this sample. The species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2024

4.2.115 Lower diversity was recorded in Autumn, with a total of 12 taxa recorded - low macroinvertebrate diversity. The sample was dominated by snails, notably the wandering pond snail *A. balthica*, and Chironomidae, which accounted for 35 per cent and 46 per cent of the individuals recorded, respectively. The mayfly larvae *C. dipterum* and true bugs *Sigara dorsalis* and *Notonecta viridis* were also present.

4.2.116 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.52) with a ‘heavily sedimented’ PSI score (0.00). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 3.7).

4.2.117 No notable or non-native taxa were present.

C-194 (Route Section E)

Autumn 2025

4.2.118 The Autumn sample at this site was diverse in Autumn, with 38 taxa recorded. The sample comprised a high proportion of crustaceans which accounted for 42 per cent of all identified specimens, with worms Oligochaeta (20 per cent) and several species of lesser water boatmen Corixidae (14 per cent) also abundant. A relatively diverse beetle assemblage including the whirligig beetle *G. substriatus* and diving beetle *A. didymus* was recorded.

4.2.119 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.85) with a ‘heavily sedimented’ PSI score (12.00). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 3.0).

4.2.120 No notable or non-native taxa were present.

4.2.121 The survey location could not be accessed to undertake a Spring sample (Table 3.3).

B-08 (Route Section E)

Spring 2025

4.2.122 Very high macroinvertebrate diversity was recorded in this sample, with 52 taxa noted. The community was dominated by true fly Chironomidae larvae which accounted for almost half of the community (48 per cent). A diverse snail assemblage was recorded consisting of 11 species including *B. leachii* and *H. complanatus*. Also present were true bugs such as *Micronecta scholzi* and beetle taxa including *Helophorus brevipalpis*.

4.2.123 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.81) with a ‘heavily sedimented’ PSI score (1.82). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘fairly high’ conservation value (CCI score 10.4).

4.2.124 The non-native freshwater shrimp *C. psuedogracilis/floridanus* was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2025

4.2.125 Macroinvertebrate was also high in Autumn, with 42 taxa recorded. The most abundant group were snails, with several taxa present such as *B. leachii*, which accounted for 32 per cent of the number of individuals recorded. Mussels were also abundant (18 per cent) and crustaceans including the Caspian mud shrimp (31 per cent). The caddisfly *A. aterrimus* and several true-fly larvae taxa were recorded in lower abundances.

4.2.126 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.85) with a ‘heavily sedimented’ PSI score (0.00). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘moderate’ conservation value (CCI score 8.8).

4.2.127 The non-native freshwater crustaceans *C. pseudogracilis/floridanus* and Caspian mud shrimp were both present in this sample. These species are not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

C-091 (Route Section E)

Autumn 2025

4.2.128 Macroinvertebrate diversity was low at this site in Autumn, with ten taxa recorded. Worms (Oligochaeta) accounted for 49 per cent of the individuals recorded, with pea mussels Sphaeriidae, diving beetles Dytiscidae, and the caddisfly Limnephilidae also present.

4.2.129 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 4.40) with a ‘sedimented’ PSI score 28.57). The community at this site had ‘moderate sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 1.0).

4.2.130 No notable or non-native taxa were present.

4.2.131 The survey location could not be accessed to undertake a Spring sample (Table 3.3).

B-16 (Route Section E)

Spring 2024

4.2.132 Macroinvertebrate diversity was low to moderate in this sample, with a total of 22 taxa recorded. The community at this site was dominated by the non-native New Zealand mud snail, the crustacean *G. pulex*, and true-fly taxa (particularly the non-biting midge Chironomidae). Beetle taxa such as the riffle beetle *E. aenea* and predaceous diving beetle *Nebrioporus* sp. were also present as well as the mayfly *B. rhodani/atlanticus* and the leech *G. complanata*.

4.2.133 Biological water quality was ‘moderate, moderately impacted’ (ASPT-WHPT score 4.27) with a ‘moderately sedimented’ PSI score (44.44). The community at this site had ‘high sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 1.0).

4.2.134 The non-native New Zealand mud snail was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2024

4.2.135 The Autumn sample at B-16 was moderately more diverse than the Spring sample, with a total of 38 taxa recorded. Several beetle species were recorded, including *A. globulus* and *H. lineatocollis*, and the caddisfly assemblage was relatively diverse, consisting of species such as *Hydropsyche angustipennis* and *L. extricatus*. The sample also comprised a high proportion of true-fly larvae (26 per cent).

4.2.136 Biological water quality was ‘moderate, moderately impacted’ (ASPT-WHPT score 4.70) with a ‘moderately sedimented’ PSI score (43.75). The community at this site had ‘moderate sensitivity’ to reduced flows (LIFE score 7.2) and was of ‘low’ conservation value (CCI score 3.2).

4.2.137 The non-native New Zealand mud snail was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

C-139 (Route Section E)

Spring 2024

4.2.138 Low to moderate macroinvertebrate diversity was recorded in this sample, consisting of 24 taxa. The community at this site was dominated by snails (particularly the New Zealand mud snail), the crustacean *Gammarus* sp., and the riffle beetle *E. aenea*. This sample also contained several caddisfly species including *A. fuscipes* and *H. angustipennis*, the mayfly *B. rhodani/atlanticus*, the leech *E. octoculata*, and several species of Diptera including the phantom crane fly *Ptychoptera* sp.

4.2.139 Biological water quality was ‘good, clean but slightly impacted’ (ASPT-WHPT score 5.29) with a ‘moderately sedimented’ PSI score (55.56). The community at this site had ‘high sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 3.4).

4.2.140 The non-native New Zealand mud snail was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2024

4.2.141 In Autumn, macroinvertebrate diversity increased to moderate with 29 taxa recorded. A relatively diverse caddisfly larvae assemblage was noted, which included *Beraeodes minutus* and *L. extricatus*. Also present were several beetle taxa (e.g., *Platambus maculatus*), the mayfly larvae *B. rhodani/atlanticus*, and various true-fly larvae such as *Dicranota* sp.

4.2.142 Biological water quality was ‘moderate, moderately impacted’ (ASPT-WHPT score 4.47) with a ‘moderately sedimented’ PSI score (42.86). The community at this site had ‘high sensitivity’ to reduced flows and was of ‘moderate’ conservation value (CCI score 8.6).

4.2.143 No notable or non-native taxa were present.

C-140 (Route Section E)

Autumn 2024

4.2.144 The sample at C-140 was relatively diverse with 35 taxa recorded. The community was dominated by freshwater shrimp *Gammarus* sp. (69 per cent), with true-fly larvae Chironomidae also abundant (16 per cent). Several caddisfly species were recorded (e.g., *Cyrnus trimaculatus*) as well as various beetle taxa (e.g., *H. tesselatus*).

4.2.145 Biological water quality was ‘moderate, moderately impacted’ (ASPT-WHPT score 4.61) with a ‘moderately sedimented’ PSI score (41.18). The community at this site

had ‘moderate sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 4.8).

4.2.146 The non-native New Zealand mud snail was present in this sample. The species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

4.2.147 The survey location could not be accessed to undertake a Spring sample (Table 3.3).

C-141 (Route Section E)

Autumn 2024

4.2.148 Macroinvertebrate diversity was low at C-141 with just 11 taxa recorded. The sample was dominated by freshwater shrimp (Gammaridae family) and water hoglouse (Asellidae family) which accounted for 96 per cent of the specimens recorded. Several beetle taxa were also present in low abundances including *Agabus bipustulatus* and *A. globulus*.

4.2.149 Biological water quality was ‘moderate, moderately impacted’ (ASPT-WHPT score 4.36) with a ‘sedimented’ PSI score (35.71). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 4.0).

4.2.150 No notable or non-native taxa were present.

4.2.151 The survey location could not be accessed to undertake a Spring sample (Table 3.3).

B-12 (Route Section E)

Spring 2025

4.2.152 Macroinvertebrate diversity was low to moderate with 24 taxa recorded. True fly larvae Chironomidae dominated the sample accounting for 57 per cent of the individuals recorded, with riffle beetle *E. aenea* also present in high abundance (18 per cent). Various mayfly larvae including *B. vernus* were also present, as well as caddisfly larvae including *Hydroptila* sp.

4.2.153 Biological water quality was ‘moderate, moderately impacted’ (ASPT-WHPT score 4.76) with a ‘moderately sedimented’ PSI score (44.00). The community at this site had ‘high sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 4.5).

4.2.154 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both present in this sample. These species are not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Autumn 2025

4.2.155 The sample was similarly diverse in Autumn, consisting of 23 taxa. Snails such as the nautilus ramshorn dominated the community, accounting for more than half of identified specimens (52 per cent). The mayfly larvae *Caenis luctuosa/macrura* was also abundant (10 per cent), with caddisfly larvae (e.g., *Hydropsyche siltalai*), and the riffle beetle *E. aenea* also recorded in smaller numbers.

4.2.156 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 4.23) with a ‘heavily sedimented’ PSI score (25.93). The community at this site had ‘moderate sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 3.3).

4.2.157 The non-native New Zealand mud snail was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

B-13 (Route Section F)

Autumn 2024

4.2.158 The Autumn sample was moderately diverse with 29 taxa recorded. The most abundant group recorded was snails, namely the New Zealand mud snail, which accounted for 75 per cent of the individuals recorded. Larvae of the blue-tailed damselfly were recorded in low abundances, as well as several beetle taxa (e.g., *G. substriatus*), and two species of water boatman *H. sahlbergi* and *Sigara semistriata*.

4.2.159 Biological water quality was ‘poor, polluted or impacted’ (ASPT-WHPT score 3.98) with a ‘heavily sedimented’ PSI score (3.13). The community at this site had ‘low sensitivity’ to reduced flows and was of ‘moderate’ conservation value (CCI score 8.0).

4.2.160 The non-native freshwater shrimp *C. psuedogracilis/floridanus* and the New Zealand mud snail were both present in this sample. These species are not legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Spring 2025

4.2.161 In Spring, macroinvertebrate diversity increased to high with 41 taxa recorded. One third of the individuals recorded were truefly larvae, notably Chironomidae (33 per cent), with mayfly larvae, particularly *Caenis* sp., also abundant (25 per cent). Also present were several beetle taxa such as *Nebrioporus depressus/elegans* and various caddisfly including *Halesus digitatus*.

4.2.162 Biological water quality was ‘moderate, moderately impacted’ (ASPT-WHPT score 4.60) with a ‘sedimented’ PSI score (28.95). The community at this site had ‘moderate sensitivity’ to reduced flows and was of ‘low’ conservation value (CCI score 4.9).

4.2.163 The non-native New Zealand mud snail was present in this sample. This species is not a legally listed invasive non-native species in England. No other notable or non-native taxa were present.

Macrophyte surveys

4.2.164 Macrophyte surveys were successfully completed at 22 of the 33 planned survey locations. Table 4.4 provides a list of all planned sites and their survey completion or reason for the aborted survey. A total of nine surveys were not undertaken as the waterbody was dry at the time of survey. Two sites were not surveyed due to access restrictions presented by overgrown bankside vegetation. Survey locations are shown on **Figure 8.10.2 Aquatic Survey Locations – Macrophytes** in Annex A.

Table 4.4 – Macrophyte survey completion

Survey location	Route Section	Date	Survey completed	Reason for incompletion
C-005	A	30/09/2025	X	Dry. Insufficient wetted area for survey
C-075	A	30/07/2025	✓	Not applicable
C-006	A	30/07/2025	✓	Not applicable
C-008	A	29/07/2025	✓	Not applicable
C-149	A	30/07/2025	✓	Not applicable
C-009	A	29/07/2025	X	Dry. Covered by hedgerow. Insufficient wetted area for survey
B-09	A	30/07/2025	✓	Not applicable
C-010	A	29/07/2025	✓	Not applicable
C-011	A	29/07/2025	X	Dry. Covered by hedgerow. Insufficient wetted area for survey
C-013	A	29/07/2025	X	Dry. Insufficient wetted area for survey
C-021	A	29/07/2025	X	Dry. Insufficient wetted area for survey
BC-03	A	29/07/2025	✓	Not applicable
C-167	A	28/07/2025	✓	Not applicable
C-168	A	28/07/2025	✓	Not applicable
BC-37	B	28/07/2025	✓	Not applicable
B-11	B	19/08/2025	✓	Not applicable
C-172	B	28/07/2025	X	Dry. Insufficient wetted area for survey
BC-12	B	19/08/2025	✓	Not applicable
B-10	C	20/08/2025	✓	Not applicable
C-062	C	20/08/2025	X	Dry. Insufficient wetted area for survey
B-14	C	21/08/2025	✓	Not applicable
BC-29	D	21/08/2025	✓	Not applicable

Survey location	Route Section	Date	Survey completed	Reason for incompletion
BC-05	D	06/08/2025	✓	Not applicable
C-051	D	06/08/2025	✓	Not applicable
C-162	E	06/08/2025	✓	Not applicable
B-08	E	06/08/2025	✓	Not applicable
C-091	E	07/08/2025	X	Dry. Insufficient wetted area for survey
B-16	E	07/08/2025	✓	Not applicable
C-139	E	07/08/2025	X	Inaccessible due to overgrowth
C-140	E	05/08/2025	X	Inaccessible
B-12	E	05/08/2025	✓	Not applicable
B-13	F	05/08/2025	✓	Not applicable
C-161	F	05/08/2025	X	Dry. Insufficient wetted area for survey

4.2.165 The full macrophyte taxa list can be found in in Annex G. A description of the macrophyte community at each site is provided below.

Survey location descriptions

C-075 (Route Section A)

4.2.166 Survey was located on Ellerker Beck, at a densely shaded running stretch measuring less than 1 m in width at some places, and with a silty (60 per cent) and sandy (40 per cent) substrate. A quarter of the surveyed wetted area was covered by macrophytes of three different species, namely fool's water cress (*Helosciadium nodiflorum*), common reed (*Phragmites australis*), and hairy willowherb (*Epilobium hirsutum*).

C-006 (Route Section A)

4.2.167 Survey location C-006 was located on a very narrow, moderately shaded ditch which was dry in some patches. A quarter of the surveyed wetted area was occupied by macrophytes of four different species; fool's water cress, hairy willowherb, reed canary-grass (*Phalaris arundinacea*), and common duckweed (*Lemna minor*).

C-008 (Route Section A)

4.2.168 The survey location was on an unnamed ditch with some shaded sections, less than 1 m in width and 0.25 m in depth, with a silty substrate. Ninety per cent of the surveyed wetted area was covered by macrophytes of ten different species, most abundantly by duckweed species, and fool's water cress.

C-149 (Route Section A)

4.2.169 The survey was located on an unshaded, unnamed ditch which was 1 to 5 m in width, less than 0.25 m in depth, and hosting a silty substrate. Five per cent of surveyed wetted area was covered by blanketweed, and the entirety was covered by macrophytes of primarily emergent species, such as common reed and water cress (*Nasturtium officinale*).

B-09 (Route Section A)

4.2.170 Survey was located on Mill Beck, 1 to 5 m in width, with a silty (80 per cent) and sandy (20 per cent) substrate. Thirty per cent of the surveyed wetted area was covered by macrophytes of twelve different species, including high abundance of branched bur-reed (*Sparganium erectum*) and common reedmace (*Typha latifolia*), alongside smaller quantities of two INNS, namely Nuttall's waterweed and Himalayan balsam (*Impatiens glandulifera*).

C-010 (Route Section A)

4.2.171 Survey location C-010 was located on a very narrow and shallow (less than 5 cm) unnamed ditch with a silty substrate and dense shading from the right bank. Ten per cent of the surveyed wetted area was covered by blanketweed, and 20 per cent by macrophytes of three different species, namely water-starwort *(Callitriche sp.*), common duckweed, and hairy willowherb.

BC-03 (Route Section A)

4.2.172 Survey location was on an unshaded, Bishopsoil Drain, measuring 1 to 5 m in width and 0.25 to 0.5 m in depth, with a silty substrate. Eight different macrophyte taxa covered 75 per cent of surveyed wetted area, including common reedmace, common duckweed, and broad-leaved water plantain (*Alisma plantago-aquatica*).

C-167 (Route Section A)

4.2.173 The survey was located on Blacktoft Warping Drain, an unshaded, channel of 1 to 5 m in width and less than 0.25 m in depth, with a silty substrate. Ninety-five per cent of the surveyed wetted area was occupied by macrophytes, primarily common reed, alongside smaller quantities of water-starwort, common duckweed, and floating sweetgrass (*Glyceria fluitans* agg.).

C-168 (Route Section A)

4.2.174 Survey location C-168 was located on Bellasize Drain, an unshaded channel of 1 to 5 m in width and less than 0.25 m in depth, with a silty substrate. Ninety-five per cent of the surveyed wetted area was occupied, primarily by common reed, alongside smaller quantities of common duckweed.

BC-37 (Route Section B)

4.2.175 The survey was located on Aldington Fleet Drain, an unshaded ditch 1 to 5 m in width, and less than 1 m in depth with a sinking, silty substrate. Eighty-five per cent of the surveyed wetted width was covered by macrophytes, of which broad-leaved pondweed (*Potamogeton natans*) and floating sweetgrass were most abundant.

Seven other species were present, including the broad-leaved water plantain and the INNS Nuttall's waterweed.

B-11 (Route Section B)

4.2.176 Survey location B-11 was located on Paupers Drain, an unshaded ditch of mostly 0.5 to 1.0 m in depth with a silty (90 per cent) and sandy (10 per cent) substrate. Half of the surveyed wetted area was covered by filamentous algae such as blanketweed and intestine weed *Enteromorpha flexuosa*. Macrophytes of 14 different species covered 95 per cent of wetted area, including water-starwort, common hornwort (*Ceratophyllum demersum*), fennel pondweed (*Stuckenia pectinata*), and the INNS Nuttall's waterweed.

BC-12 (Route Section B)

4.2.177 Survey location BC-12 was located on an unshaded, unnamed ditch 1 to 5 m in width, mostly 0.25 to 0.5 m in depth (80 per cent) and hosting a silty substrate. Ten per cent of surveyed wetted area was covered by blanketweed and intestine weed and 88 per cent was covered by macrophytes of 14 different species, including common reed, spiked water milfoil (*Myriophyllum spicatum*), and the INNS Nuttall's waterweed.

B-10 (Route Section C)

4.2.178 Survey location B-10 was located on Bewcarrs Drain, an unshaded watercourse of to 5 m in width and less than 0.25 m in depth, with a substrate composed of silt (80 per cent) with quantities of sand (15 per cent) and gravel/pebble (5 per cent). Twenty-one per cent of the surveyed wetted area was occupied by macrophytes of five different species, including fat duckweed (*Lemna gibba*), water-starwort, and common reed. The drain had been dredged shortly before the survey was undertaken.

B-14 (Route Section C)

4.2.179 Survey location B-14 was located on Folly Drain, a largely unshaded ditch mostly 0.5 to 1.0 m in depth and hosting a largely silty substrate (90 per cent) with smaller quantities of sand and boulder/cobbles. Eighty per cent of the surveyed wetted area was covered by green filamentous algae of the blanketweed species *Cladophora glomerata/Rhizoclonium hieroglyphicum,* and 55 per cent by macrophytes of ten different species. Most abundant macrophyte species included branched bur-reed (*Sparganium erectum*), fat duckweed, and the INNS Nuttall's waterweed.

BC-29 (Route Section D)

4.2.180 Survey location BC-29 was located on North Moor Drain, 1 to 5 m in width and less than 0.25 m in depth, with a silty (90 per cent) and sandy (10 per cent) substrate. Five per cent of the surveyed wetted area was covered by blanketweed, and 17 per cent by macrophytes of ten different species, including water-starwort and common club-rush (*Schoenoplectus lacustris*).

BC-05 (Route Section D)

4.2.181 The survey was located on a lightly shaded, unnamed ditch of 1 to 5 m in width and less than 1 m in depth, with a silty substrate. Two per cent of surveyed wetted area

was covered by intestine weed, and 27 per cent was covered by macrophytes of ten species, including fat duckweed, great yellow cress (*Rorippa amphibia*) and reed canary-grass, and the non-native but not legislated INNS least duckweed.

C-051 (Route Section D)

4.2.182 Survey location C-051 was located on an unnamed ditch subject to varying levels of shade, being unshaded for 77 per cent of the stretch and covered by broken shade for 23 per cent. It measured 1 to 5 m in width, had variable depth ranging from more than a metre (65 per cent) to less than 0.25 m (10 per cent), and hosted a silty substrate. The entire surveyed wetted area was covered by macrophytes of nine different species. The site was occupied by the INNS Nuttall's waterweed, and abundant native species included fennel pondweed and common reed.

C-162 (Route Section E)

4.2.183 This survey location was located on a heavily shaded, unnamed watercourse at a stretch measuring less than 0.5 m in width and 0.25 in depth, with a substrate composed of silt (50 per cent), sand (40 per cent), and gravel/pebbles (10 per cent). Five per cent of the surveyed wetted area was covered by macrophytes of five different species, including fool's water cress and hairy willowherb.

B-08 (Route Section E)

4.2.184 The survey was located on a stretch of the Chesterfield Canal that was largely unshaded save for small patches of dense shading. Sixty per cent of surveyed wetted area was covered by blanketweed, and 38 per cent by macrophytes of twelve different species. Most common of these species included branched bur-reed, lesser water parsnip (*Berula erecta*), and reed sweet-grass (*Glyceria maxima*).

B-16 (Route Section E)

4.2.185 The survey was located on a shallow running stretch (less than 0.25 m) of Wheatly Beck, which was subject to variable low and dense shading. The site measured 1 to 5 m in width, with a sandy (60 per cent) and pebbly/gravelly (30 per cent) substrate. Forty per cent of the surveyed wetted area was covered by blanketweed and only 3 per cent by macrophytes of six different species. Macrophyte species included fool's water cress, and the INNS Himalayan balsam.

B-12 (Route Section E)

4.2.186 This survey location was located on an East Drayton watercourse, a moderately shaded flowing watercourse 1 to 5 m in width, largely 0.25 – 0.5 m in depth and hosting a substrate of silt/clay (75 per cent), sand (5 per cent), and gravel/pebbles (20 per cent). Eight per cent of the surveyed wetted area was covered by filamentous algae, namely blanketweed and intestine weed, and 22 per cent by macrophytes of six different species, including branched bur-reed, common reedmace, and two INNS Nuttall's waterweed and Himalayan balsam.

B-13 (Route Section F)

4.2.187 Survey location B-13 was located on Fledborough Beck, a shallow (less than 0.25 m in depth), flowing watercourse 1 to 5 m in width with a silty (60 per cent) and gravelly/pebbly (35 per cent) substrate. The surveyed wetted area was largely

unshaded with small patches of dense shade on the left bank and only 1 per cent was covered by macrophytes of four species. There was evidence of recent dredging. Species present included the liverwort endive pelia (*Pellia endiviifolia*), and fool's water cress.

Notable macrophyte species

4.2.188 56 of the 59 macrophyte taxa recorded during the macrophyte surveys were common and undesignated. The remaining three taxa were the INNS Nuttall's waterweed, Himalayan balsam, and the non-native, non-legislated least duckweed. Nuttall's waterweed is listed in The Invasive Alien Species (Enforcement and Permitting) Order 2019 (HM Goverment, 2019) and Himalayan balsam is listed in Schedule 9 of the WCA (HM Government, 1981). There is no legislation covering least duckweed. Table 4.5 summarises the survey locations where these INNS were recorded.

4.2.189 An incidental record of water violet was recorded during other ecological surveys within a ditch located inside the Order Limits, as reported in **Application Document A6.8.3 Appendix 8.3 Habitat Survey Report**. The Project will not involve any crossing of this ditch. Construction Exclusion Zones (CEZ) will be established prior to the commencement of works to clearly define working areas and safeguard retained habitats. No temporary or permanent construction activities will take place within 5 m of the ditch. The Project will not involve any crossing of this ditch.

Table 4.5 – Invasive non-native macrophyte species records from field surveys

Survey location	Route Section	Himalayan balsam (*Impatiens glandulifera*)	Nuttall's waterweed (*Elodea nuttallii*)	Least duckweed (*Lemna minuta*)
B-09	A	✓	✓	
B-11	B		✓	
B-14	C		✓	
BC-05	D			✓
C-051	D		✓	
B-16	E	✓		
B-12	E	✓		

Macrophyte indices and WFD classification

4.2.190 River Macrophyte Nutrient Index (RMNI), number of macrophyte taxa (NTAXA), Number of Functional Groups (NFG), and cover of filamentous green algae (ALG), observed and predicted scores for each survey reach are detailed in Table 4.6. The table also includes the overall Ecological Quality Ratio (EQR) and WFD macrophyte status for the survey reach. For the five permanently flowing sites (shown on **Figure A8.10.2 Aquatic Survey Locations – Macrophytes** in Annex A) that were suitable for LEAFPACS2 (Water Framework Directive UK Technical Advisory Group, 2014), the aquatic macrophyte survey data was processed though the LEAFPACS2 calculator (Water Framework Directive UK Technical Advisory Group, 2026).

Table 4.6 – Macrophyte metrics observed and predicted scores, ecological quality ratio and WFD classification

Metric		C-075	B-09	B-16	B-12	B-13
River macrophyte nutrient index (RMNI)	Observed	8.404	8.491	8.653	8.65	7.823
	Predicted	5.857	6.725	7.143	6.8	6.738
Number of macrophyte taxa (NTAXA)	Observed	1	5	2	5	1
	Predicted	6.73	7.1	8.85	7.74	7.17
Number of functional groups (NFG)	Observed	1	5	2	4	1
	Predicted	4.43	4.65	5.64	5.02	4.68
Cover of filamentous green algae (ALG)	-	0	0	37.5	18	0
Overall Ecological Quality Ratio (EQR)	-	0.166	0.334	0.23	0.291	0.372
WFD macrophyte classification	-	Bad	Poor	Poor	Poor	Poor

4.2.191 The EQR of 0.230 to 0.372 obtained at B-09, B-12, B-13 and B-16 equates to Poor WFD status, indicating that the surveyed reaches are notably impacted by eutrophication and/or modification to morphological conditions. The EQR of 0.166 attained at C-075 equates to a Bad WFD status indicating that the surveyed reaches are substantially impacted by eutrophication and/or modification to morphological conditions.

4.2.192 Only B-09 and B-12 recorded four or more scoring taxa. As such, the results for the other sites may not necessarily accurately reflect the true conditions. Furthermore, alkalinity data used with the LEAFPACS2 calculator should be obtained from monthly analysis of samples from each over a period of at least one year, whereas (as is typical for this type of assessment) alkalinity was taken from single samples collected at the time of survey and are considered likely to be representative of the monthly annual average Consequently, these results should be treated with caution.

Fish surveys

4.2.193 Field surveys were completed over Summer 2024 and Summer 2025 at a total of eight sites (Table 3.3) which met the survey suitability criteria. Electric fishing surveys were undertaken at four sites, while eDNA surveys were completed at a further four sites, where electric fishing was deemed unsuitable (see section 3.3 Limitations, and Table 3.3). Survey locations are shown on **Figure A8.10.3 Aquatic Survey Locations – Fish** in Annex A.

Electric fishing surveys

B-09 (Route Section A)

4.2.194 Mill Beck at B-09 was a located within a relatively steep sided ditch flowing between arable and grazed pasture fields, with likely input from the adjacent water treatment works. The channel bed was flat and the average wetted width of the was approximately 2 m, with an average depth of 0.15 m. The water level was normal, with a flow of approximately 0.25 m/s. Run was the only recorded flow type across the extent of the survey. Mild brackish conditions were noted on the beck, with salinity measured at 0.32 ppt.

4.2.195 The water was clear and allowed for substrate assessment. The channel bed was soft, with some sinking areas, primarily due to the higher composition of silt (55 per cent) and sand (20 per cent) substrates throughout the channel. Sporadic patches of gravel (15 per cent) and clay (10 per cent) were also found throughout the survey reach, although these were usually found near areas of deposition either in slower flowing centre channel or near marginal vegetation.

4.2.196 Channel shading was light (less than 30 per cent) and was limited to marginal macrophyte stands along sections of the banks. Both common reed and bulrush *Typha* sp. provided coverage up to 10 per cent of the channel, with marginal stands up to 0.2 m into the channel. Bankside vegetation was simple, and cover was provided by terrestrial grasses, herb and rank vegetation.

4.2.197 A semi-quantitative, single anode, wading electric fishing survey was conducted over a 100 m reach with an electric fishing backpack. The conductivity was recorded at 521 µS/cm, with an appropriate output of 140V DC, 30 Hz, 1 amp.

4.2.198 A total of 82 fish were caught during the survey, over one run (see Table 4.7).

Table 4.7 – Fish caught at crossing B-09

Fish species	Number of fish caught	Fork length (mm)
	Run 1 (total, n)	
European eel (*Anguilla anguilla*)	21	53 - 130
Three-spined stickleback (*Gasterosteus aculaeatus*)	17	19 – 40

Fish species	Number of fish caught	Fork length (mm)
	Run 1 (total, n)	
Stone loach (*Barbatula barbatula*)	19	46 - 102
Flounder (*Platichthys flesus*)	24	43 - 89
Roach (*Rutilus rutilus*)	1	46
TOTAL	82	N/A

4.2.199 A total of five species were present at this survey location (Table 4.7). The migratory and protected European eel (n=21) were caught along the survey reach, with most individuals recorded as elvers and young yellow eels.

4.2.200 The presence of flounder (*Platichthys flesus*) (n=24), the most abundant species at this survey location, is indicative of the brackish conditions of the watercourse at this site. They were found partially buried within the silt and sand bed, which is typical refuge for this benthic species. One individual of roach (*Rutilus rutilus*) was recorded near to the upstream extent of the survey, hidden amongst a macrophyte stand. Additional minor species, found at B-09, included stone loach (*Barbatula barbatula*) and three-spined stickleback (*Gasterosteus aculaeatus*), both of which were primarily found in marginal habitats, where more in channel refuge was present.

BC-05 (Route Section D)

4.2.201 The watercourse at BC-05 was a steep sided and deep drain set among arable fields. This ditch showed signs of historic deepening and straightening. The V-shaped channel was 1.5 m wide at its base, with water that was approximately 0.2 m along the reach. Habitat throughout the ditch was homogenous with it being a ditch, with no visible flow and deep, sinking silt (100 per cent) substrate. Mild brackish conditions were also noted at this survey location, with a salinity value of 0.39 parts per thousand (ppt).

4.2.202 Shading was heavy along the channel (greater than 70 per cent) from the blackthorn and deciduous trees forming hedgerows on the bank tops. Some macrophytes were also recorded throughout the channel, totalling cover up to 30 per cent in total. These macrophytes included water-starwort, reed canary-grass, duck weed, brooklime (*Veronica beccabunga*), and filamentous algae.

4.2.203 A semi-quantitative, single anode, wading electric fishing survey was conducted over a 100 m reach with an electric fishing backpack. The conductivity was recorded at 2074 microSiemens per centimetre (µS/cm), with an appropriate output of 170 V DC, 30 Hz, 1 amp used for backpack.

4.2.204 No fish were caught during this survey, with no signs of movement found at any point within the survey reach.

B-16 (Route Section E)

4.2.205 Wheatley Beck, at B-16 was a small ditch, flowing through arable fields. The average wetted width of the watercourse was 2 m, with an average depth of 0.25 m. The

water level at the time of surveys were within the normal range, with a flow of approximately 0.25 m/s. Flow type habitats available were run, pool and glide, which were of relatively equal proportions across the survey reach.

4.2.206 The water was clear and allowed for substrate assessment. Silt attributed to 55 per cent of the substrate composition, with areas of cobble (24 per cent) and pebble (15 per cent) throughout. Smaller patches of gravel (5 per cent) were found among the stoney substrate, with sporadic and minimal boulder cover (1 per cent). Throughout the watercourse, a moderate layer of silt overlay was also present, with both domestic and agricultural waste littered throughout.

4.2.207 Shading across the channel was moderate (less than 70 per cent), primarily from the complex hedgerow vegetation provided by along the right-hand bank. Hawthorn (*Crataegus monogyna)* bushes and deciduous trees were dense along this bank, while on the left-hand bank, simple vegetation cover was provided by terrestrial grasses and nettles. Some macrophytes were also recorded in channel, providing minimal additional in channel refuge, from small sporadic patches of water-starwort, moss, and filamentous algae.

4.2.208 A fully quantitative, single anode, wading electric fishing survey was conducted over a 100 m reach with an electric fishing backpack. The conductivity was recorded at 1956 µS/cm, with an appropriate setting of 40 V DC, 40 Hz, and an output of 2 amps.

4.2.209 A total of 246 fish were caught during the survey, over three runs (see Table 4.8).

Table 4.8 – Fish caught at crossing B-16

Fish species	Number of fish caught				Fork length (mm)
	Run 1	Run 2	Run 3	Total (n)	
European eel (*Anguilla anguilla*)	3	1	1	5	205 - 450
Three-spined stickleback (*Gasterosteus aculaeatus*)	3	87	13	103	12 - 80
Dace (*Leuciscus leuciscus*)	0	2	1	3	80 - 175
European bullhead (*Cottus gobio*)	57	45	32	134	20 - 107
Ninespine stickleback (*Pungitius pungitius*)	0	1	0	1	44
TOTAL	63	136	47	246	N/A

4.2.210 A total of five species were present at this survey location. The most abundant species were three-spined stickleback (n=103), and the protected European bullhead (n=134) (listed in Habitats Directive Annex II (The Council of the European Communities, 1992)) which together accounted for 96 per cent of caught individuals. One species of migratory fish was also caught during the surveys; this was the protected European eel (n=5).

4.2.211 Additional species caught, include dace (*Leuciscus leuciscus*) (n=3), which were caught in low numbers in a pool near the upstream extent of the survey, and the minor species ninespine stickleback *(Pungitius pungitius)* (n=1).

B-12 (Route Section E)

4.2.212 B-12 was located within a steep sided ditch flowing between arable and pasture fields. The upstream extent of the survey ended just before a bridge over the watercourse (Darlton Road). The average wetted width of the watercourse was approximately 1.5 m with an average depth of 0.40 m. The water level was within the normal range at the time of the survey, with a flow of approximately 0.10 m/s. Riffle (40 per cent) was the dominant flow type habitat, with areas of run (30 per cent) sporadic throughout the reach, while pool (30 per cent) was primarily limited to the upstream extent of the survey.

4.2.213 The water was clear and allowed for substrate assessment. Silt (35 per cent) and sand (30 per cent) were the dominant substrates throughout the channel, creating many areas of soft substrate where flows were pooled or slowed around submerged bankside vegetation. Stony material was more prevalent within the riffle sections where pebbles (10 per cent), gravel (10 per cent) and cobbles (5 per cent) influenced flow types and provided refuge for benthic fish. An area of clay (10 per cent) was also found at the upstream extent of the survey, which lined a pool.

4.2.214 Shading across the channel was heavy (greater than 70 per cent), due to the dense deciduous tree cover above the watercourse. Trees lined the bank tops with additional shading provided by hawthorn, other scrub species, and hedgerow vegetation. This vegetation attributed to complex bank structure observed across both banks. Some small patches of sporadic macrophyte growth were also recorded in channel, including water-starwort, duckweed *Lemna* sp., and fool's watercress.

4.2.215 A semi-quantitative, single anode, wading electric fishing survey was conducted over a 100 m reach with an electric fishing backpack. The conductivity was recorded at 1804 µS/cm, with an appropriate output of 185 V DC, 60 Hz and 1 amp.

4.2.216 A total of 224 fish were caught during the survey, over one run (see Table 4.9).

Table 4.9 – Fish caught at crossing B-12

Fish species	Number of fish caught	Fork length (mm)
	Run 1 (total, n)	
Dace (*Leuciscus leuciscus*)	52	50 - 141
Three-spined stickleback (*Gasterosteus aculaeatus*)	72	17 - 46

Fish species	Number of fish caught	Fork length (mm)
	Run 1 (total, n)	
Stone loach (*Barbatula barbatula*)	36	31 - 94
Minnow (*Phoxinus phoxinus*)	3	60 - 70
European bullhead (*Cottus gobio*)	61	20 - 91
TOTAL	224	N/A

4.2.217 Of the five species caught at this site, dace (n=52), three-spined stickleback (n=72), stone loach (n=36), and the protected European bullhead (n=61) were abundant. The minor species minnow (*Phoxinus phoxinus*) was also present in low abundance (n=3).

4.2.218 No species of migratory fish were caught during electric fish surveys at this survey location. However, an incidental record of European eel was made outside of the survey area, just upstream from the of the survey reach, where an individual climbed out of the water into nearby vegetation, outside of the influence area of the electric backpack.

eDNA surveys

4.2.219 For eDNA surveys, two kits were collected per watercourse with up to ten subsamples taken pre eDNA kit. Four locations were sampled for eDNA due to their unsuitability for electric fish surveys during the survey period (see section 3.2 and Table 3.3 for locations)

4.2.220 Habitat appraisals for each of the four eDNA sampling sites are presented below, with the eDNA results presented in Table 4.10.

BC-37 (Route Section B)

4.2.221 Adlingfleet Drain, at BC-37 was within a large ditch that flowed through arable and tilled land. The ditch showed signs of historic realignment and had been recently dredged. The wetted width was approximately 4.5 m and average depth of 0.5 m. The channel itself was over 2.5 m in height down steep banks. Homogenous ditch habitat dominated the survey reach, with minimal flow (less than 0.1 m/s) and soft, sinking silt (100 per cent) substrate.

4.2.222 There was no recorded shading along the survey reach, with bank tops dominated by terrestrial rank and herb vegetation, with some secondary scrub cover. The moderately turbid water obscured the view of the submerged macrophytes; however, total cover was estimated to be around 10 per cent.

B-14 (Route Section C)

4.2.223 Folly Drain at B-14, was a drainage ditch which flowed through tilled and arable land. The ditch was 5.0 m wide, with an average water depth of 0.5 m, within a channel that was approximately 2.5 m deep. Homogenous ditch habitat was the only noted

habitat type, with minimal flow (less than 0.1 m/s) and a mostly soft, sinking silt (75 per cent) substrate, with areas of clay (25 per cent).

4.2.224 Shading was light within the channel, provided by its own morphology and the sporadic deciduous tree cover with terrestrial rank and herb vegetation above. Total aquatic macrophyte cover within the channel was approximately 40 per cent, with bur reed, *Sparganium* sp., and duckweed recorded. An additional 5 per cent cover was also attributed to filamentous algae cover.

C-139 (Route Section E)

4.2.225 The watercourse at C-139, flowed among tilled and arable land. The wetted width was approximately 2 m, with an average depth of 0.2 m, within a channel that measured at 1.5 m high. Run (95 per cent) flow habitat was dominant along the watercourse, with a small proportion of riffle (5 per cent) flow, where the watercourse was shallower. Flow velocity was low, with an average of 0.10 to 0.25 m/s. The water was clear and allowed for an accurate substrate assessment. Silt (50 per cent) comprised the largest proportion of the substrate, with gravel (25 per cent) and pebbles (20 per cent) through much of the unstable riverbed. Some sporadic boulders (5 per cent) were also present.

4.2.226 Shade was heavy (greater than 70 per cent) along the watercourse, due to the deciduous tree cover lining the bank tops. Woody debris (10 per cent) and submerged tree roots (10 per cent) provided further refuge, alongside the undercut banks. No aquatic macrophytes were recorded during surveys, noting that C-139 was not surveyed during the aquatic macrophyte surveys in August 2025 owing to there being insufficient wetted area for survey.

B-13 (Route Section F)

4.2.227 The watercourse, Fledborough Beck, at B-13 flowed through tilled and arable land on either side of the channel. The wetted width was 1 m, with an average water depth of 0.15 m, within a channel that was approximately 2 m deep. Run flow habitat was dominant along the survey reach, with an average flow of 0.25 to 0.5 m/s. The water was clear and substrate was assessed along the solid channel bed. Gravel (45 per cent), sand (30 per cent) and pebbles (19 per cent) were compacted down, with some sporadic cobbles (1 per cent) and patches of silt (5 per cent).

4.2.228 No shade was recorded within the survey reach. Minor refuge cover was identified, with woody debris (1 per cent), submerged tree roots (3 per cent) and some macrophyte growth (5 per cent) including submerged fool’s watercress, and lesser water-parsnip.

4.2.229 During the Autumn macroinvertebrate sampling season, one individual of three-spined stickleback was caught and returned to the watercourse, from the kick sample.

eDNA analysis

4.2.230 The results for the eDNA for the above sites can be found in Table 4.10.

Table 4.10 – eDNA survey results for crossings BC-37, B-14, C-139 and B-13

Species	BC-37		B-14		C-139		B-13	
	Total DNA reads	Relative abundance (% composition)	Total DNA reads	Relative abundance (% composition)	Total DNA reads	Relative abundance (% composition)	Total DNA reads	Relative abundance (% composition)
European Eel (*Anguilla anguilla*)	-	-	-	-	-	-	2,169	2.53
Dace (*Leuciscus leuciscus*)	-	-	-	-	1,027	0.93	6,615	7.72
Minnow (*Phoxinus phoxinus*)	292	0.27	-	-	2,740	2.49	19,817	23.14
Chub (*Squalius cephalus*)	-	-	-	-	-	-	3,279	3.83
Stone Loach (*Barbatula barbatula*)	1,159	1.05	-	-	-	-	15,410	17.99
Pike (*Esox lucius*)	31,388	28.54	32,867	100	-	-	-	-
Three-Spined Stickleback	19,187	17.45	-	-	106,482	96.58	29,861	34.87

Species	BC-37		B-14		C-139		B-13	
	Total DNA reads	Relative abundance (% composition)	Total DNA reads	Relative abundance (% composition)	Total DNA reads	Relative abundance (% composition)	Total DNA reads	Relative abundance (% composition)
(*Gasterosteus aculeatus*)								
Ninespine Stickleback (*Pungitius pungitius*)	57,008	51.84	-	-	-	-	-	-
Stickleback (Gasterosteidae sp.)	943	0.86	-	-	-	-	-	-
Brown/Sea Trout (*Salmo trutta*)	-	-	-	-	-	-	1885	2.20
European Bullhead (*Cottus gobio*)	-	-	-	-			6,601	7.71

4.2.231 The most diverse fish taxa community was recorded at B-13, with eight species reported in the eDNA analysis. The only migratory fish identified during eDNA sampling were found at B-13. These species included the European eel and brown/sea trout, with both recorded as having less than 3 per cent of the total reads. The more abundant species, based on total reads, include minnow, stone loach, and three-spined stickleback at 23.14 per cent, 17.99 per cent, and 34.87 per cent respectively.

4.2.232 Fish taxa community at BC-37 was the second most diverse of the eDNA surveyed sites, with six taxa identified. Pike (*Esox lucius*) and ninespine stickleback were recorded as having the most abundant reads, with 28.54 per cent and 51.84 per cent respectively.

4.2.233 The only recorded fish species within the watercourse at survey location B-14 was pike, a larger coarse fish that is typical of the habitat recorded. However, this result is unlikely reflective of the whole fish assemblage of the drain. Pike are piscivorous therefore would require a prey species to survive. It is most likely that other coarse fish species are present in B-14 such as those detected in BC-37 however were not detected in the samples analysed.

4.2.234 Only three species were recorded at C-139, with the minor species three-spined stickleback (96.58 per cent) attributing to the dominant number of reads, alongside a minor read total attributed to minnow (2.49 per cent). Dace eDNA reads totalled a small fraction of those identified from the site at only 0.93 per cent.

5. Summary and Evaluation

5.1 Desk Study

Watercourses and Drains

5.1.1 The desk study highlighted current factors impacting the catchments within the Order Limits including physical modification, nutrient input from agriculture, water treatment, transport drainage, barriers leading to ecological discontinuity, and the presence of priority hazardous chemical substances (established from WFD classifications).

5.1.2 The Moderate ecological quality, based on the Environment Agency WFD desk study, of all waterbodies suggests the Project is unlikely to cause lasting impacts to the wider WFD catchments. However, as a result there are opportunities to seek appropriate mitigation and enhancement, for example through reinstatement, to improve habitat and water quality.

Aquatic Macroinvertebrates

5.1.3 The desk study found several records of notable macroinvertebrate species on connected watercourses within 5 km of the Order Limits within ten years from the time of data provision. These include the following 'Nationally Scarce' taxa: the riffle beetle *R. subviolaceus* (Foster, 2010), stonefly (Macadam, 2014), true bug *C. affinis* (Cook, 2015), soldierfly *O. pardalina* (Drake, 2017), and river orb mussel (Seddon, 2014).

Aquatic Macrophytes

5.1.4 The East Riding of Yorkshire BAP (East Riding of Yorkshire Council, 2010) lists the following UK BAP species which could be associated with aquatic habitats within the Order Limits; narrow small reed, divided sedge, greater water parsnip, marsh stitchwort, and tubular water dropwort.

5.1.5 Further, the Nottinghamshire LBAP (Nottinghamshire Biodiversity Action Group, 2020) lists several vascular plant species of conservation concern which include the priority species marsh stitchwort, although the locations of these records are not listed and therefore their proximity to the Project cannot be determined.

5.1.6 The Lincolnshire LBAP also lists greater water parsnip as a priority species (Lincolnshire Biodiversity Partnership, 2011).

Fish

5.1.7 The desk study identified multiple records of the protected species European eel within 5 km of the Order Limits within ten years of the data of data provision, with the most recent record being from 2025. This species is afforded protection under The Eels Regulations 2009 (HM Government, 2009) and named on the Oslo Paris Commission (OSPAR) list of threatened and/or declining species and habitats (Oslo

Paris Commission, 2026), which places a requirement upon developers and abstracters to ensure continued eel passage and to prevent eel entrainment.

5.1.8 European bullhead was also identified, with the most recent record also in 2025. This species is a Habitats Directive Annex II species (The Council of the European Communities, 1992).

5.1.9 The most recent record of brown/sea trout within 5 km of the Order Limits was in 2025. Brown/sea trout are listed as an SPI under Section 41 of the NERC Act (HM Government, 2006).

5.1.10 In addition, herring was recorded in 2015 on the River Humber, approximately 3.2 km downstream of the point at which the Order Limits boundary crosses the River Ouse. Herring is an SPI under Section 41 of the NERC Act (HM Government, 2006), with the most recent record within 5 km of the Order Limits in 2017.

5.1.11 European smelt was recorded in 2015 on the River Ouse, approximately 1.5 km upstream of the point at which the River Ouse crosses the Order Limits. This species is an SPI under Section 41 of the NERC Act (HM Government, 2006). The most recent record for this species within 5 km of the Order Limits is in 2018.

5.1.12 The relevant local biodiversity action plans also list several priority species within their respective areas of consideration. East Riding of Yorkshire BAP (East Riding of Yorkshire Council, 2010) lists sea lamprey and river lamprey, with the Humber Estuary representing a significant migration route. Spined loach is also listed, with recordings at Pool Beck, Welton Ings. The Nottinghamshire LBAP (Nottinghamshire Biodiversity Action Group, 2020) lists several fish species of conservation concern which include allis shad and twaite shad, although the locations of these records are not listed, and therefore their proximity to the Order Limits cannot be determined. The Lincolnshire BAP (Lincolnshire Biodiversity Partnership, 2011) also lists European eel, spined loach, sea and river lamprey, European smelt, brown/sea trout, and Atlantic salmon.

Invasive non-native species

5.1.13 Through the desk study, several invasive non-native macroinvertebrate and macrophyte species were identified on connected waterbodies within 5 km of the Order Limits which included WCA Schedule 9 species (HM Government, 1981) and The Invasive Alien Species and (Enforcement and Permitting) Order 2019 (HM Goverment, 2019) species. These species and their associated designations are presented in Table 4.3.

5.2 Field Surveys

Aquatic Macroinvertebrates

5.2.1 Field studies revealed that macroinvertebrate communities were typical of man-made drainage ditches in this area, with most ditch communities including freshwater snails, water beetles, and Odonata (dragonflies and damselflies). Field studies recorded the following notable species:

- Beetle *R. subviolaceus* a Nationally Scarce species (Foster, 2010), recorded in Bz09; and

- Beetle *S. lepidus* in B-10. This species is designated as IUCN Near Threatened (Foster, 2010).

5.2.2 Through ASPT (WHPT) scores, the macroinvertebrate survey results indicate that the vast majority of watercourses surveyed watercourses suffer from either being of 'Poor, Polluted or Impacted' water quality or 'moderate, moderately impacted' water quality with the exception of the following survey locations C-075 (both seasons), C-149 (both seasons), B-09 (both seasons), C-139 (Spring only) which were 'good, clean but slightly impacted'.

Aquatic Macrophytes

5.2.3 Field surveys found that all macrophyte species were common and undesignated. This is consistent with the macroinvertebrate data and the WFD desk study information.

5.2.4 An incidental record of water violet was recorded during other ecological surveys within a ditch located inside the Order Limits. The Project will not involve any crossing of this ditch. Construction Exclusion Zones (CEZ) will be established prior to the commencement of works to clearly define working areas and safeguard retained habitats. No temporary or permanent construction activities will take place within 5 m of the ditch.

5.2.5 The LEAFPACS2 assessment obtained at B-09, B-12, B-13 and B-16 equates to Poor WFD status, indicating that the surveyed reaches are notably impacted by eutrophication and/or modification to morphological conditions. The LEAFPACS2 assessment attained at C-075 equates to a Bad WFD status indicating that the surveyed reaches are substantially impacted by eutrophication and/or modification to morphological conditions.

5.2.6 Three non-native species were recorded in the field surveys, the legislated INNS Nuttall's waterweed and Himalayan balsam, and the non-native but not legislated least duckweed was also recorded.

5.2.7 Nuttall's waterweed is listed in The Invasive Alien Species (Enforcement and Permitting) Order 2019 (HM Goverment, 2019), and Himalayan Balsam is listed in Schedule 9 of the WCA (HM Government, 1981).The legislation referenced makes it an offence to plant or otherwise cause to grow (including allowing to spread), listed plant species in the wild. If transported off site, there is a duty of care with regards to the disposal of any part of the plant that may facilitate establishment in the wild and cause environmental harm (as per the Environmental Protection Act 1990 (HM Government, 1990)). The legislation also makes in an offense to release, or allow to escape, listed species (or species not ordinarily resident in and is not a regular visitor to Great Britain in a wild state) into the wild.

Fish

5.2.8 The presence of migratory species was limited during field surveys. During electric fishing surveys the presence of European eel was confirmed at two sites, B-09 and B-16. An incidental observation of European eel was made outside of the survey area of survey location B-12, just upstream from the of the survey reach, where an individual climbed out of the water into nearby vegetation, outside of the influence area of the electric backpack. Additional eDNA surveys confirmed further detections of European eel at B-13 alongside brown/sea trout. Fish surveys at the other field

sites, confirmed absence of migratory species. This is likely due to the nature of the smaller watercourses and proximity to main rivers. The watercourses were typically very shallow agricultural ditches with minimal habitat that are unlikely suitable for migratory fish except European eel for refuge or spawning. Coarse fish are most likely to be present throughout these sites and their spawning habitats and close season (15 March – 16 June) must be avoided for any instream works such as culvert installation.

Invasive non-native species

5.2.9 Aquatic macroinvertebrate field studies recorded two non-native species which are now considered naturalised, crustacean *Crangonyx pseudogracilis/floridianus* and the New Zealand mud snail.

5.2.10 Aquatic macrophyte field surveys found that all macrophyte species were common and undesignated, except for the INNS Nuttall's waterweed and Himalayan balsam, and the non-native, non-legislated least duckweed. Nuttall's waterweed is listed in the Nuttall's waterweed is listed in The Invasive Alien Species (Enforcement and Permitting) Order 2019 (HM Goverment, 2019) and Himalayan balsam is listed in Schedule 9 of the WCA (HM Government, 1981).There is no legislation covering least duckweed. Table 4.5 summarises the survey locations where these INNS were recorded.

5.3 Nature Conservation Evaluation

Aquatic macroinvertebrates

5.3.1 The desk study found several records of notable macroinvertebrate species on connected watercourses within 5 km of the Order Limits. Field studies found two notable beetle species; *R. subviolaceus* a Nationally Scarce species (Foster, 2010), recorded in B-09; and *S. lepidus* in B-10. This species is designated as IUCN Near Threatened (Foster, 2010).

5.3.2 From the results of the field surveys, macroinvertebrate communities sampled had moderate to relatively high diversity, with most species recorded being relatively common. This resulted in the macroinvertebrate communities of most sites being of low to moderate conservation value, based on the Community Conservation Index (Chadd & Extence, 2004). Five survey locations had 'fairly high' conservation value in one of the surveyed seasons. These were C-010 in Route Section A, BC-12 and B-11 in Route Section B, B-14 in Route Section C, and B-08 in Route Section E.

5.3.3 Through ASPT (WHPT) scores, the macroinvertebrate survey results indicate that the vast majority of watercourses surveyed watercourses suffer from either being of 'Poor, Polluted or Impacted' water quality or 'moderate, moderately impacted' water quality with the exception of the following survey locations C-075 (both seasons), C-149 (both seasons), B-09 (both seasons), C-139 (Spring only) which were 'good, clean but slightly impacted'.

5.3.4 No aquatic macroinvertebrates that receive specific legal protection via Schedule 5 of the WCA (HM Government, 1981), or that are listed on Section 41 of the NERC Act (HM Government, 2006) as being of principal importance for nature conservation in England were recorded.

5.3.5 Due to the presence of notable species within the Order Limits, aquatic macroinvertebrates are considered of **County importance**.

Aquatic macrophytes

5.3.6 The desk study returned no records of protected and/or notable macrophyte taxa within the Order Limits, but notable and/or protected species desk study records were recorded within the 2 km study area.

5.3.7 No notable or rare species were recorded during the aquatic macrophyte field surveys. Most of the watercourses do not a support a notably diverse aquatic plant assemblage, with the majority being common. An incidental record of water violet listed as Vulnerable on the GB red list (Stroh, 2025), was recorded during other ecological surveys within a ditch located inside the Order Limits. No temporary or permanent construction activities will take place within 5 m of the ditch.

5.3.8 Due to the presence of IUCN GB Red List species designated Vulnerable within the Order Limits and desk study records of IUCN GB Red List species designated Vulnerable or Near Threatened, macrophytes are considered of **County importance**.

Fish

5.3.9 Due to the presence of many protected fish species, including the potential for migratory fish species in watercourses hydrologically connected to those within the Order Limits and the presence of species of Principal importance, fish are considered of **Regional importance**.

6. Potential Interactions with the Project and Mitigation

6.1 Aquatic macroinvertebrates

Potential interactions with the Project

6.1.1 The desk study found several records of notable macroinvertebrate species on connected watercourses within 5 km of the Order Limits. These include the following 'Nationally Scarce' taxa: stonefly (*A. standfussi*) (Macadam, 2014), beetles (*R. subviolaceus)* and *H. quinquelineatus*) (Foster, 2010), true bug (*C. affinis;* Cook, 2015), caddisfly (*L. politus*; Wallace, 2016), mollusc (*V. contectus;* Seddon, 2014), soldier-fly (*O. pardalina*; Drake, 2017), and the bivalve molluscs (*S. rivicola* and *U. tumidus*; Seddon, 2014).

6.1.2 Field studies recorded the following notable species of aquatic beetles; *R. subviolaceus* a Nationally Scarce species (Foster, 2010), recorded in B-09; and *S. lepidus* in B-10. This species is designated as IUCN Near Threatened (Foster, 2010).

6.1.3 There are no statutory designations associated with these species.

Mitigation

6.1.4 The Project will use existing watercourse crossing points as far as practicable. Where required, sensitive watercourses, for example, those designated as main rivers, those with WFD status, or those that are inhabited by protected species, would be crossed using clear span bridges or suitably assessed and approved alternatives. The undergrounding of third-party assets would be carried out using non-opencut/trenchless methodologies such as Horizontal Directional Drill (HDD) or similar when crossing sensitive watercourses.

6.1.5 Pollution and habitat degradation prevention measures will also be in place (as per **Application Document 7.3 Register of Environmental Actions and Commitments**).

6.1.6 Riverbank and in-channel vegetation will be retained where not directly affected by installation works.

6.1.7 For open cut watercourse crossings and installation of vehicle crossing points, riparian vegetation and natural bed of the watercourse will be reinstated using appropriately sized material of similar composition to that removed.

6.1.8 Further detailed mitigation for aquatic macroinvertebrates is outlined in the following documents:

- **Application Document 6.8 Chapter 8 Ecology**; and
- **Application Document 7.3 Register of Environmental Actions and Commitments**.

6.2 Aquatic macrophytes

Potential interactions with the Project

6.2.1 No notable species of macrophytes were recorded during the desk study with the Order Limits, but notable and/or protected species desk study records were recorded within the 2 km study area.

6.2.2 No notable species were recorded during the aquatic macrophyte field studies. However, an incidental record of water violet listed as Vulnerable on the GB red list. (Stroh, 2025), was recorded during other ecological surveys within a ditch located inside the Order Limits.

Mitigation

6.2.3 Riverbank and in-channel vegetation will be retained where not directly affected by installation works. New culverts will be as short as practicable and sized to avoid narrowing of natural channel widths.

6.2.4 The Project will use existing watercourse crossing points as far as practicable. Where required, sensitive watercourses, for example, those designated as main rivers, those with WFD status, or those that are inhabited by protected species, would be crossed using clear span bridges or suitably assessed and approved alternatives. The undergrounding of third-party assets would be carried out using HDD or similar when crossing sensitive watercourses.

6.2.5 Pollution and habitat degradation prevention measures will also be in place (as per **Application Document 7.3 Register of Environmental Actions and Commitments**).

6.2.6 The Project will not involve any crossing of the ditch where the field record of water violet was recorded. Construction Exclusion Zones will be established prior to the commencement of works to clearly define working areas and safeguard retained habitats.

6.2.7 Riverbank and in-channel vegetation will be retained where not directly affected by installation works.

6.2.8 For open cut watercourse crossings and installation of vehicle crossing points, riparian vegetation and natural bed of the watercourse will be reinstated using appropriately sized material of similar composition to that removed.

6.2.9 Further detailed mitigation for aquatic macrophytes is outlined in the following documents:

- **Application Document 6.8 Chapter 8 Ecology**; and
- **Application Document 7.3 Register of Environmental Actions and Commitments**.

6.3 Fish

Potential interactions with the Project

Coarse Fish

6.3.1 Coarse fish are afforded protective legislation mainly through the Salmon and Freshwater Fisheries Act 1975 (HM Government, 1975) and it is an offence to reduce fish passage for migratory fish species at a permanent structure (new or existing) without providing a fish passage.

6.3.2 Various coarse fish species have been recorded through the desk study through the Project boundary within a 5 km buffer and site surveys and are assumed to be present or have the potential to be present on all permanently wet watercourses impacted by the Project through permanent or temporary culverting works.

6.3.3 Specific coarse fish species which have been identified in the desk study and site surveys that are afforded additional protection are:

- Barbel is listed under Appendix V of the Habitats (The Council of the European Communities, 1992),and awarded further protections under Schedule 4 of the Habitats Regulations (HM Government, 2017).
- European bullhead receive protection under Appendix II of the Habitats Directive (The Council of the European Communities, 1992).
- Spined loach is awarded a greater number of protections than the previous species. They are listed under Appendix III of the Bern Convention (The Council of Europe, 1979), Appendix II of the Habitats Directive (The Council of the European Communities, 1992), and within Section 41 of the NERC Act (HM Government, 2006). They are also a BAP UK list of priority species, which are also named as a priority species within the East Riding of Yorkshire BAP (East Riding of Yorkshire Council, 2010).

European eel

6.3.4 Both desk study and field survey has identified the critically endangered European eel to be present or potentially present throughout the Order Limits within all permanently wet watercourses connected within the catchment with free access to the Humber Estuary due to their ability to migrate over long distances. They could potentially be impacted by work associated with temporary/permanent culverts across the Project.

6.3.5 Multiple desk study records of European eel were found in watercourses hydrologically connected to those within the Order Limits. They were also found during field surveys on Mill Beck, East Drayton, Wheatley Beck, and Fledborough Beck.

6.3.6 European eel can be found in a variety of habitats such as drains and can migrate between these throughout river catchments where they spend much of their adult life before returning to the sea to spawn. They are unlikely to be present in agricultural field drains.

6.3.7 The European eel is a UK BAP species and named on the Oslo Paris Commission (OSPAR) list of threatened and/or declining species and habitats (Oslo Paris

Commission, 2026) with protections attained under Eels Regulations 2009 (HM Government, 2009) and Section 41 of NERC (HM Government, 2006).

6.3.8 Under The Eels Regulations 2009 (HM Government, 2009), it is an offense to impede the passage of eels.

Brown/sea Trout

6.3.9 Desk study records have identified of brown/sea trout in watercourses connected to the Order Limits within a catchment wide buffer. The only record of brown/sea trout from the field surveys was from the eDNA sampling at B-13 where it was recorded as having less than three per cent of the total reads.

6.3.10 Brown/sea trout is a UK BAP species which is awarded protection under Section 41 of the NERC Act (HM Government, 2006).

Mitigation

6.3.11 None of the identified fish species require licencing, unless in-stream works where it is deemed necessary to remove fish via electric fishing or netting (such as dewatering/diverting of a section of watercourse for culvert installation) are required. If fish removal/relocation is required, an FR2 licence from the Environment Agency for the use of 'fishing instruments other than rod and line' would need to be in place prior to fish movement by trained specialists.

6.3.12 The Project will use existing watercourse crossing points as far as practicable. Where required, sensitive watercourses, for example, those designated as main rivers, those with WFD status, or those that are inhabited by protected species, would be crossed using clear span bridges (or suitably assessed and approved alternatives) which are set back on the banks, contributing little to no impact on notable fish species.

6.3.13 Pollution and habitat degradation prevention measures will also be in place (as per **Application Document 7.3 Register of Environmental Actions and Commitments**).

6.3.14 The results of desk study and field surveys indicate that it is likely coarse fish are present in all permanently wet watercourses within the Order Limits. Therefore, no in-stream works (for example the installation of temporary or permanent culverts, or foundations of non-clear span bridges) will be undertaken during the annual close season for coarse fish which runs from 15 March to 15 June inclusive; restricting in-stream works to the period 16 June to 14 March inclusive. For watercourses where brown/sea trout are also present the annual close season is extended due to the migratory habit of this species, covering the period 1 October to 15 June; restricting in-stream works to these watercourses to the period 16 June to 30 September.

6.3.15 The annual close season for coarse fish (15 March to 15 June inclusive) discussed above also excludes in-stream works during the Spring (April to June) upstream migration for juvenile European eel (glass eels/elvers). An exclusionary period for in-stream works during the downstream migration for adults (silver eels) (September to December) may be applicable throughout the catchment where eel migration is likely owing to no impassable barriers between the tidal limit to 30 km upstream, however this will be discussed on a case-by-case basis with the Environment Agency prior to construction.

6.3.16 Riverbank and in-channel vegetation will be retained where not directly affected by installation works.

6.3.17 For open cut watercourse crossings and installation of vehicle crossing points, riparian vegetation and natural bed of the watercourse will be reinstated using appropriately sized material of similar composition to that removed.

6.3.18 Further detailed mitigation for fish is outlined in the following documents:

- **Application Document 6.8 Chapter 8 Ecology**; and
- **Application Document 7.3 Register of Environmental Actions and Commitments**.

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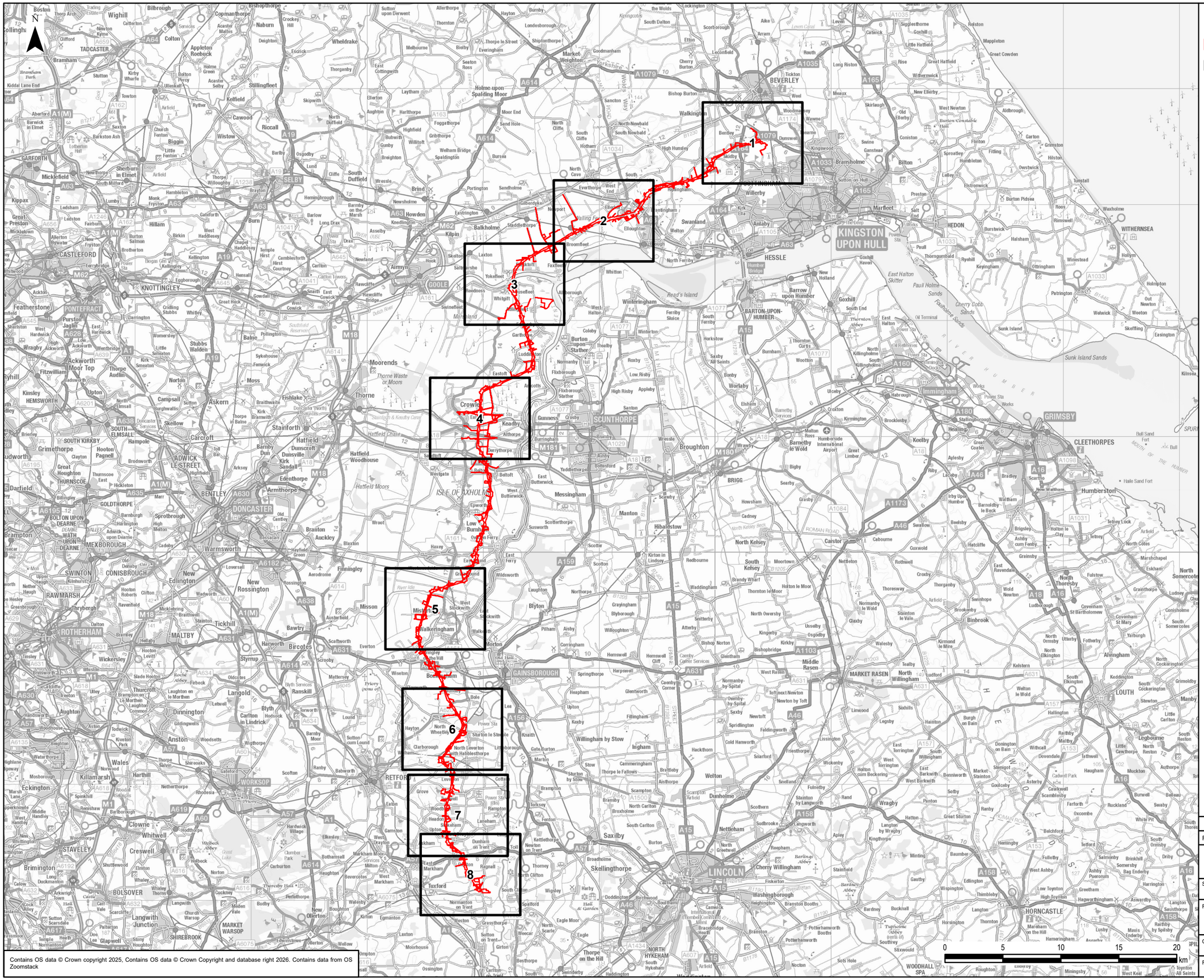
Annex A
Figures

nationalgrid

Annex A
Figures

Annex A contains the following figures:

- **Figure A8.10.1 Aquatic Survey Locations - Macroinvertebrates**;
- **Figure A8.10.2 Aquatic Survey Locations – Macrophytes; and**
- **Figure A8.10.3 Aquatic Survey Locations – Fish.**



Legend

- Order Limits
- Map Sheet

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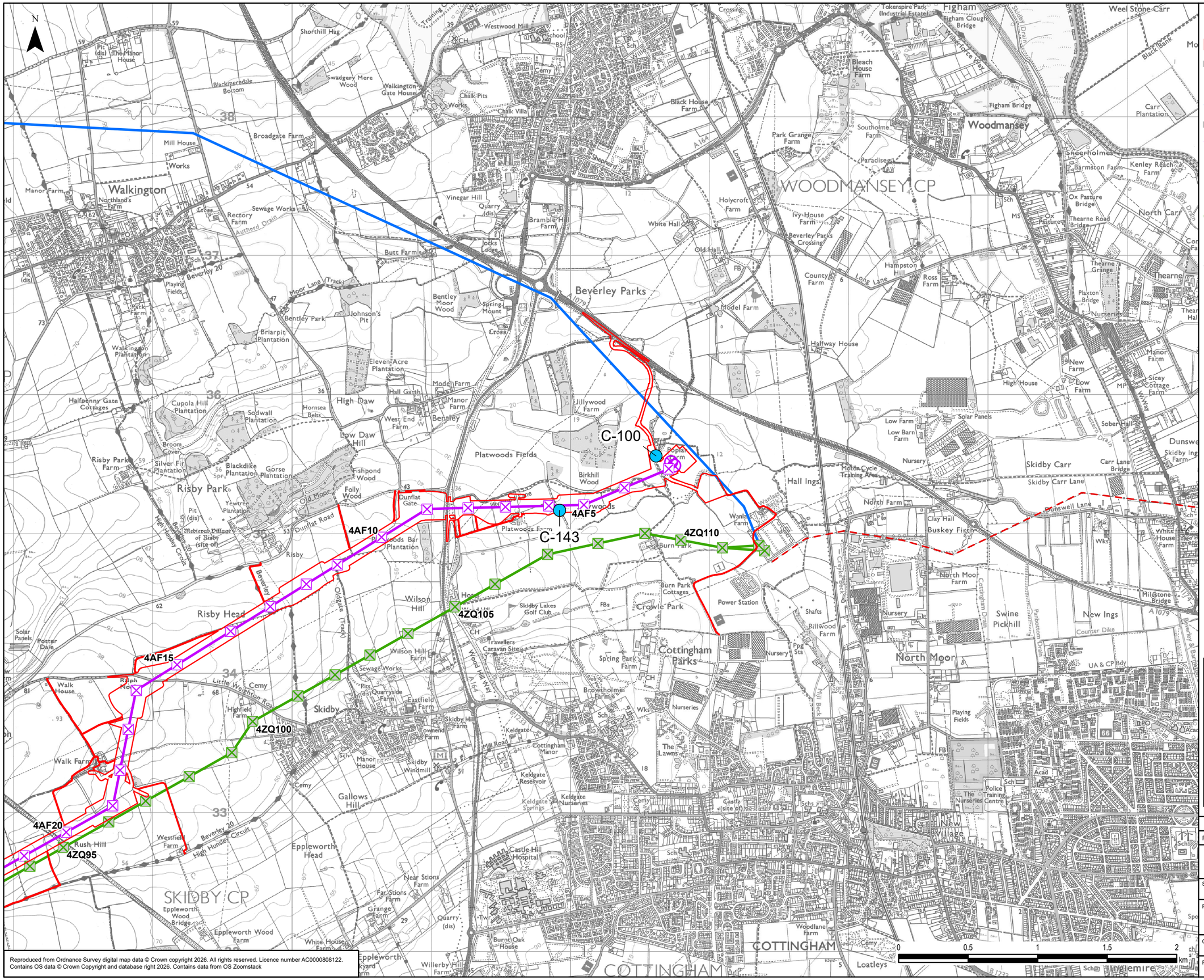
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Figure Title: FIGURE 1 - AQUATIC SURVEY LOCATIONS MACROINVERTEBRATES KEY PLAN

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Legend

- Order Limits

Existing Overhead Line

- 275 kV
- 400 kV

Project Design Details

- Indicative New Overhead Line
- Indicative New Gantry
- Indicative New Lattice Pylon
- Existing Overhead Line Not Affected
- Existing Lattice Pylon Not Affected

Aquatic Survey Data

- Macroinvertebrate

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Scheme: NORTH HUMBER TO HIGH MARNHAM

Figure Title: FIGURE 1 - AQUATIC SURVEY LOCATIONS - MACROINVERTEBRATES

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ID	25/09/2026	JG	25/09/2026	NL	25/09/2026

Figure Ref:	Scale:	Format:	Sheets:	Rev:
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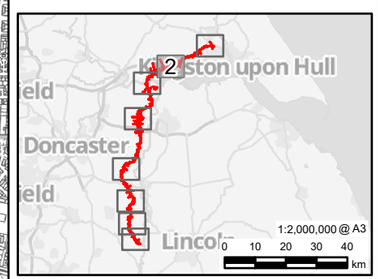
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- Existing Overhead Line to be Dismantled
- Existing Lattice Pylon Not Affected
- Existing Lattice Pylon To Be Modified
- Existing Lattice Pylon To Be Removed

Aquatic Survey Data

- Macroinvertebrate



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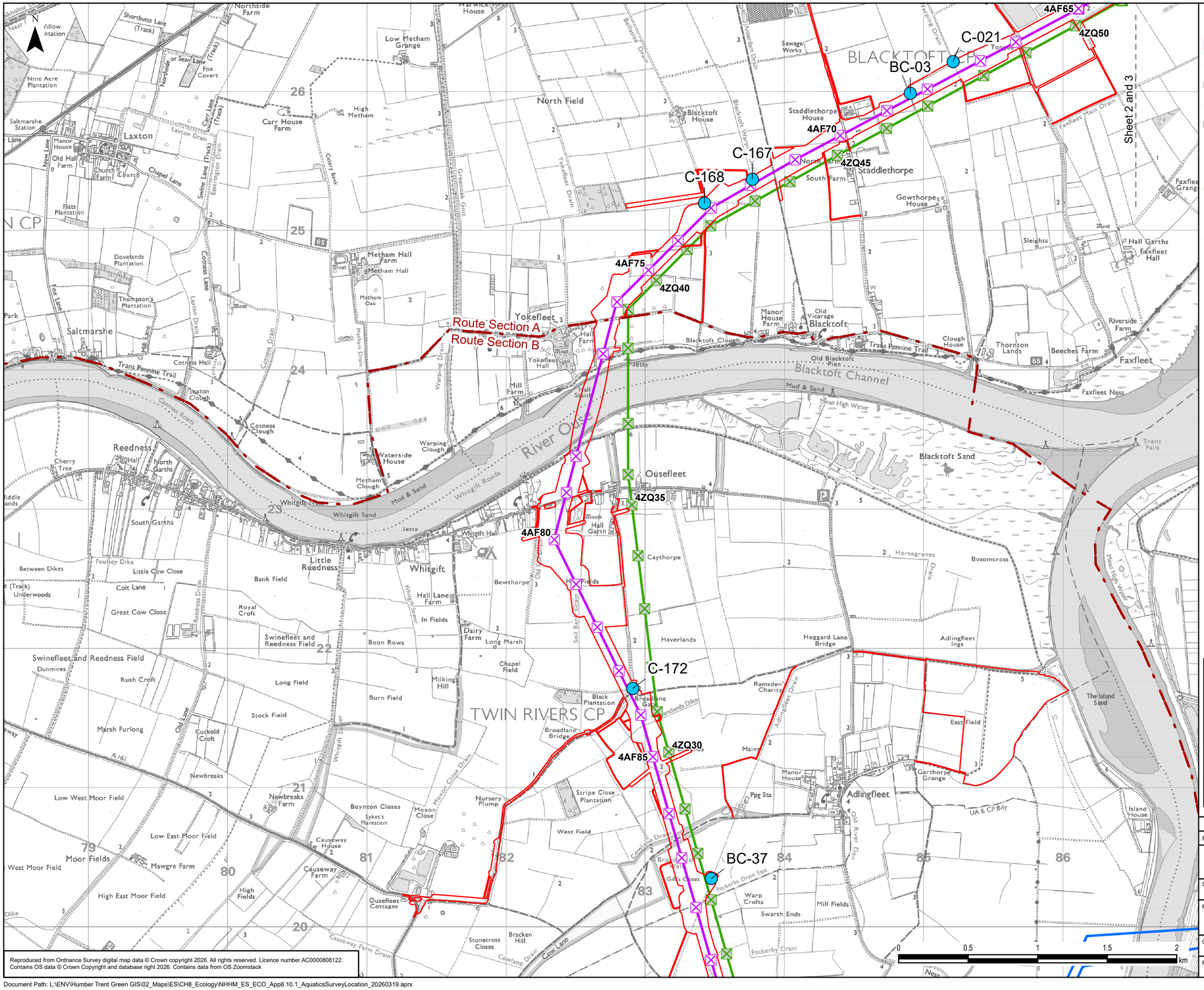
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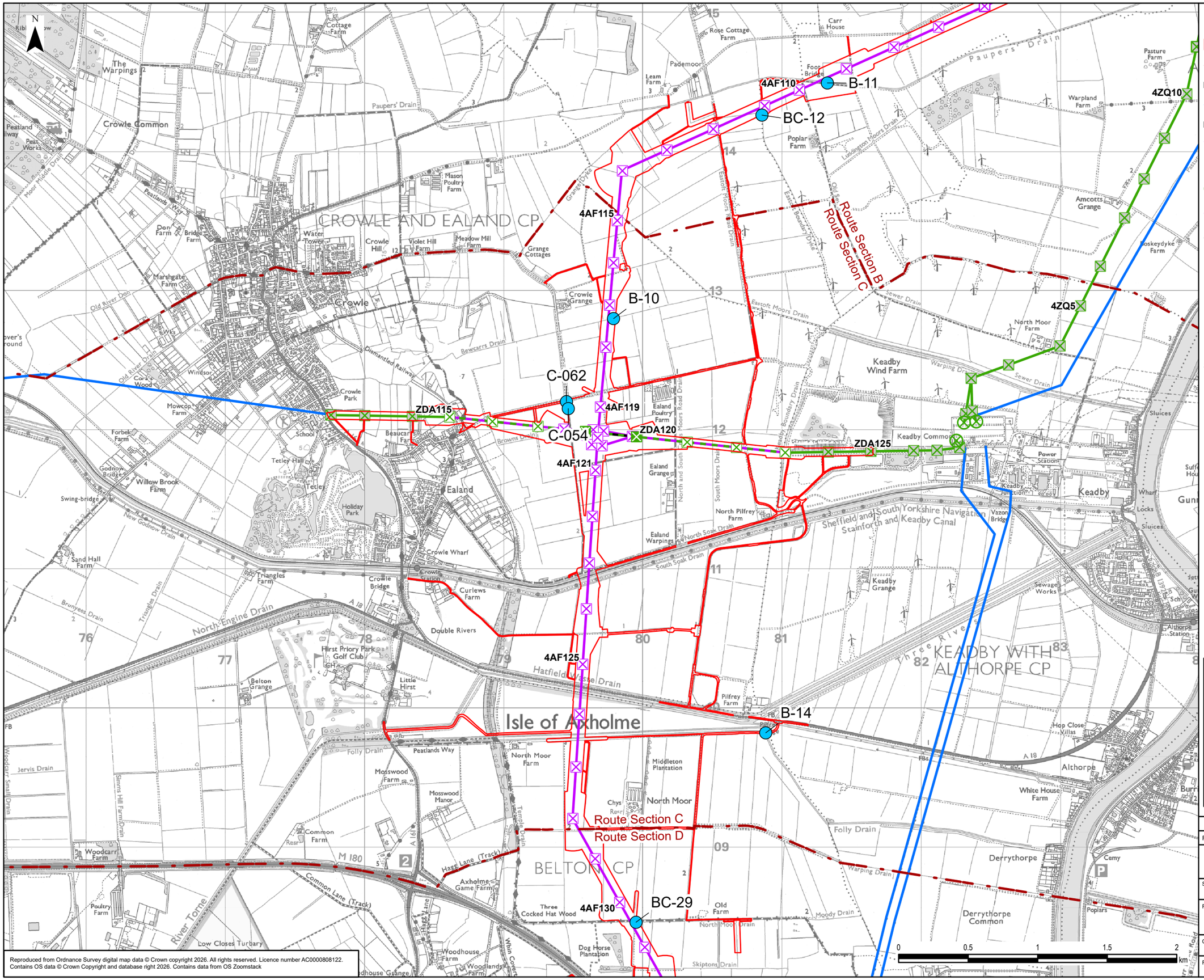
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Legend

- Order Limits
- Route Section

Existing Overhead Line
- 400 kV

Project Design Details
- Indicative New Overhead Line
- Indicative New Lattice Pylon
- Existing Overhead Line Not Affected
- Existing Overhead Line to be Reconductored
- Existing Overhead Line to be Dismantled
- Existing Lattice Pylon Not Affected
- Existing Lattice Pylon To Be Modified
- Existing Gantry Not Affected
- Existing Lattice Pylon To Be Removed

Aquatic Survey Data
- Macroinvertebrate

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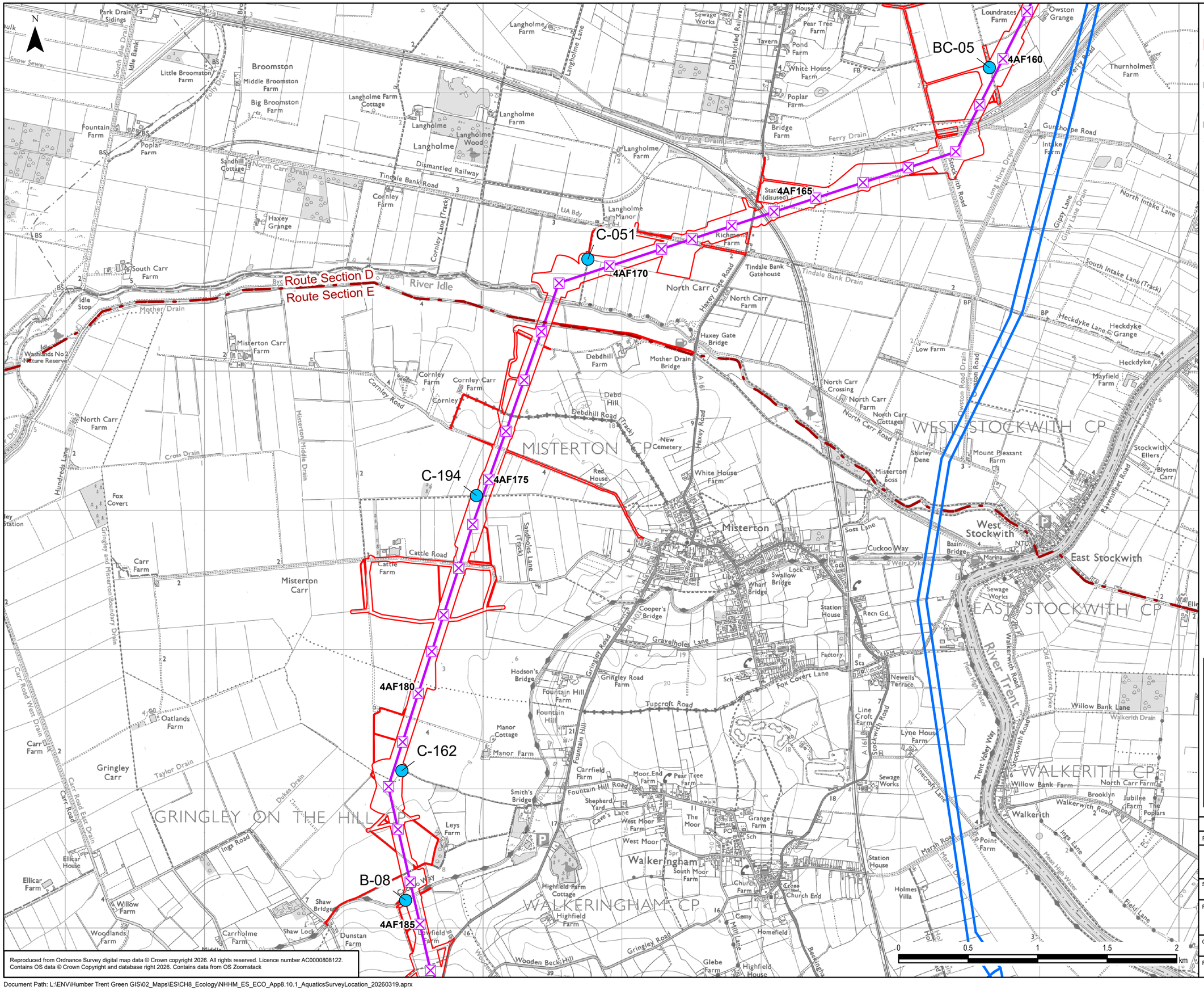
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Legend

- Order Limits
- Route Section
- Existing Overhead Line
  - 400 kV
- Project Design Details
  - Indicative New Overhead Line
  - Indicative New Lattice Pylon
- Aquatic Survey Data
  - Macroinvertebrate

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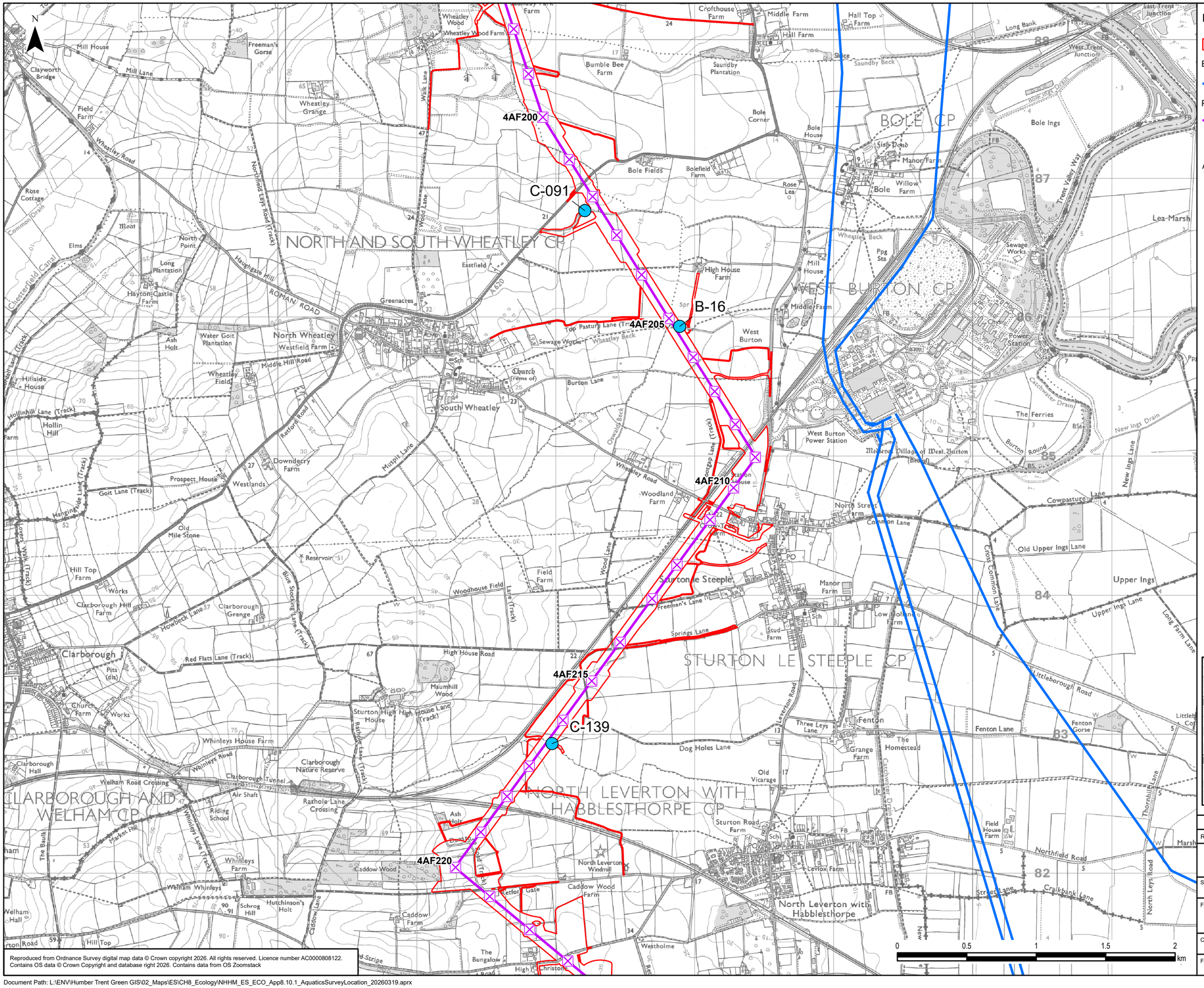
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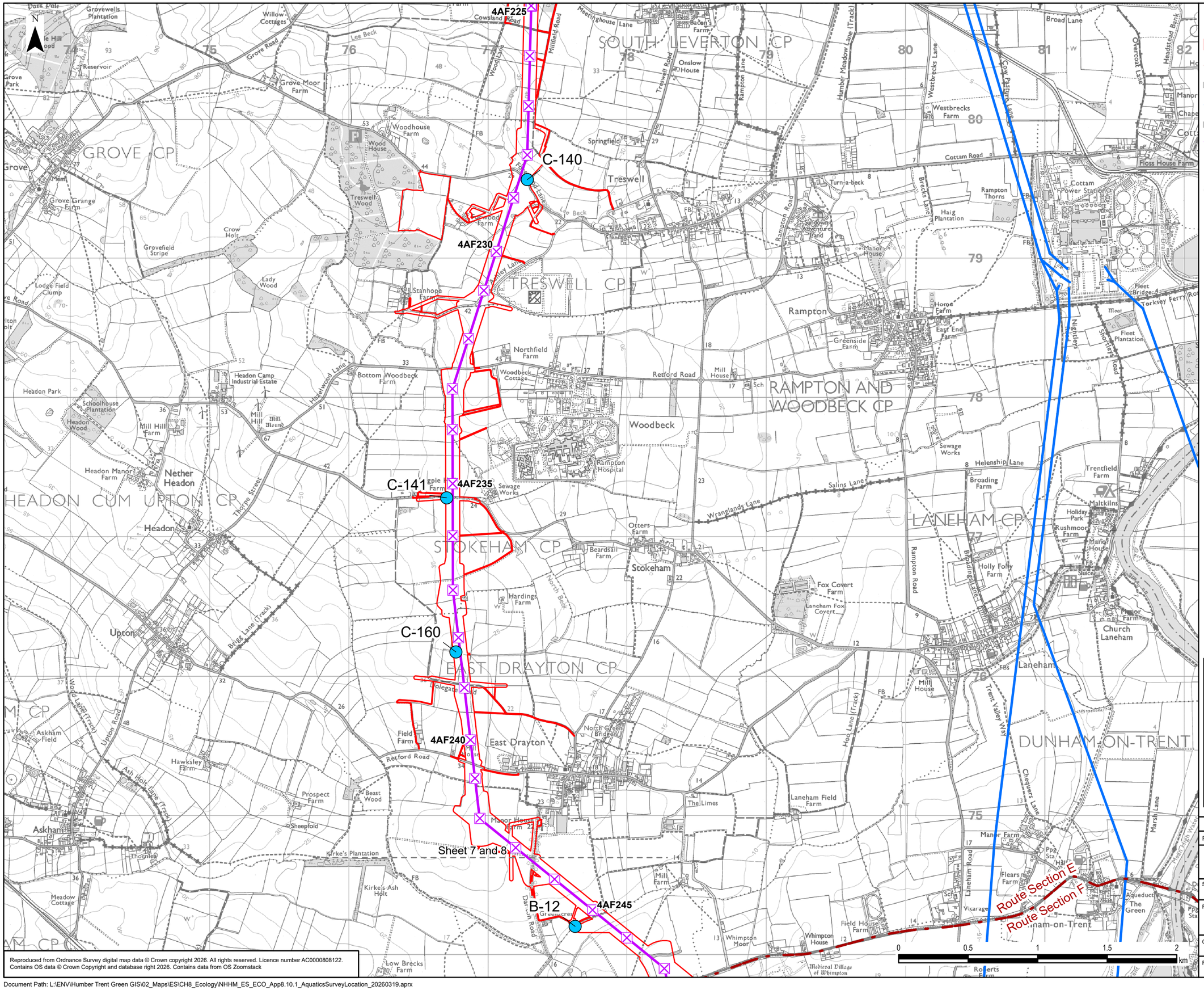
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Legend

- Order Limits
- Route Section
- Existing Overhead Line
- 400 kV
- Project Design Details
- Indicative New Overhead Line
- Indicative New Lattice Pylon
- Aquatic Survey Data
- Macroinvertebrate

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Scheme: NORTH HUMBER TO HIGH MARNHAM

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N

4AF240

Sheet 7 and 8

B-12

4AF245

4AF250

B-13

C-161

4AF255

4AF260

Route Section E

Route Section F

RAGNALL CP

DARLTON CP

FLEDBOROUGH CP

MARNHAM CP

DUNHAM-ON-TRENT CP

NEWTON

NORTH CLIFTON

SOUTH CLIFTON

East Drayton

Darlton

Ragnall

Dunham-on-Trent

Fledborough

High Marnham

Low Marnham

Normanton on Trent

Skegby

Ruddingwood

Retford Road

Darlton Road

Marnham Road

Polly Taylor's Road

Broad Gate

Farhill Lane

Hollowgate Lane

Flowerofts Lane

Chesters Lane

Laneham Road

Marsh Lane

Trent Lane

Church Lane

Trent Valley Way

River Trent

Old Trent

Fledborough Beck

Crabtree Lane

Green Lane

Far Road

Woodcoates Road

Dunham Bridge (Toll)

Aqueduct

Roman Fort

Reservoir

Amblerod Plantation

Kirke's Plantation

Kirke's Ash Holt

Beast Wood

Prospect Farm

Sheepfold

Hornsley Farm

Field Farm

North Green Bridge

Manor House Farm

The Limes

Laneham Field Farm

Mill Farm

Whimpton Moor

Whimpton House

Field House Farm

Medieval Village of Whimpton (site of)

Manor Farm

Flears Farm

Vicarage

Roberts Farm

Chestnut Farm

Farhill Farm

Vicarage Farm

Grange Farm

Low Farm

Kingshaugh Farm

High Brecks Farm

High Brecks Plantation

Low Brecks Farm

Brecks Plantation

Old Moorgate (Track)

Earthworks

Sewage Works

Airstrip

Darlton Field

Highfields Farm

America Farm

Lodge Farm

Darlton Gaps

Eastfield Farm

Eastfield House

Goodhouses Farm

Woodcoates

Medieval Village of Woodcoates (site of)

Station Cottages

Merryfields Farm

Parks Cottage

Babbington Springs Farm

Peter Barn

Lodge Farm

Skegby Manor

Power Station

Egmanton Crossing

Stone Road End Farm

Harvest Cottage

The Ruddings Farm

Thurber

Stonehill Farm

Mount Pleasant

Mount Pleasant Farm

Scarthingmoor

Majors Farm

Gibraltar Farm

Wells Farm

North Farm

Top Farm

Fledborough Farm

The Gables

Manor House

Fledborough Holme

Trent Viaduct

Sewage Works

School

Church Farm

Clifton Plantation

Manor Farm

Solar Panels

Oaklands Farm

Marshgate Farm

Caravan Park

Ferry Holme

Marnham Hall

The Grange

Holme Farm

Church Farm

Marnham Holme

Marshgate 23 Farm

Clifton Hill

Bubble Dyke

Sewer Dyke (Drain)

Trentholme Farm

Pureland

Hall Farm

North Clifton

Mill Hill House

The Hall

Ppg Sta

Sch

Hall Farm

Holy Trinity Church

Dunham Rack

Mean High Water

Cheq Drain

Scotchman's Hole

Dubble Dyke

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- Route Section

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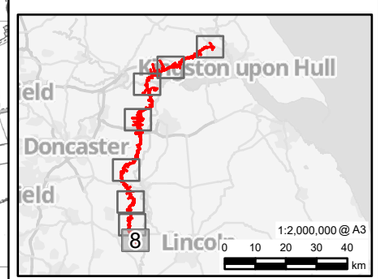
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- 400 kV

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- Indicative New Gantry
- Indicative New Lattice Pylon

Aquatic Survey Data

- Macroinvertebrate



Rev	Date	Description	ID	JG	NL
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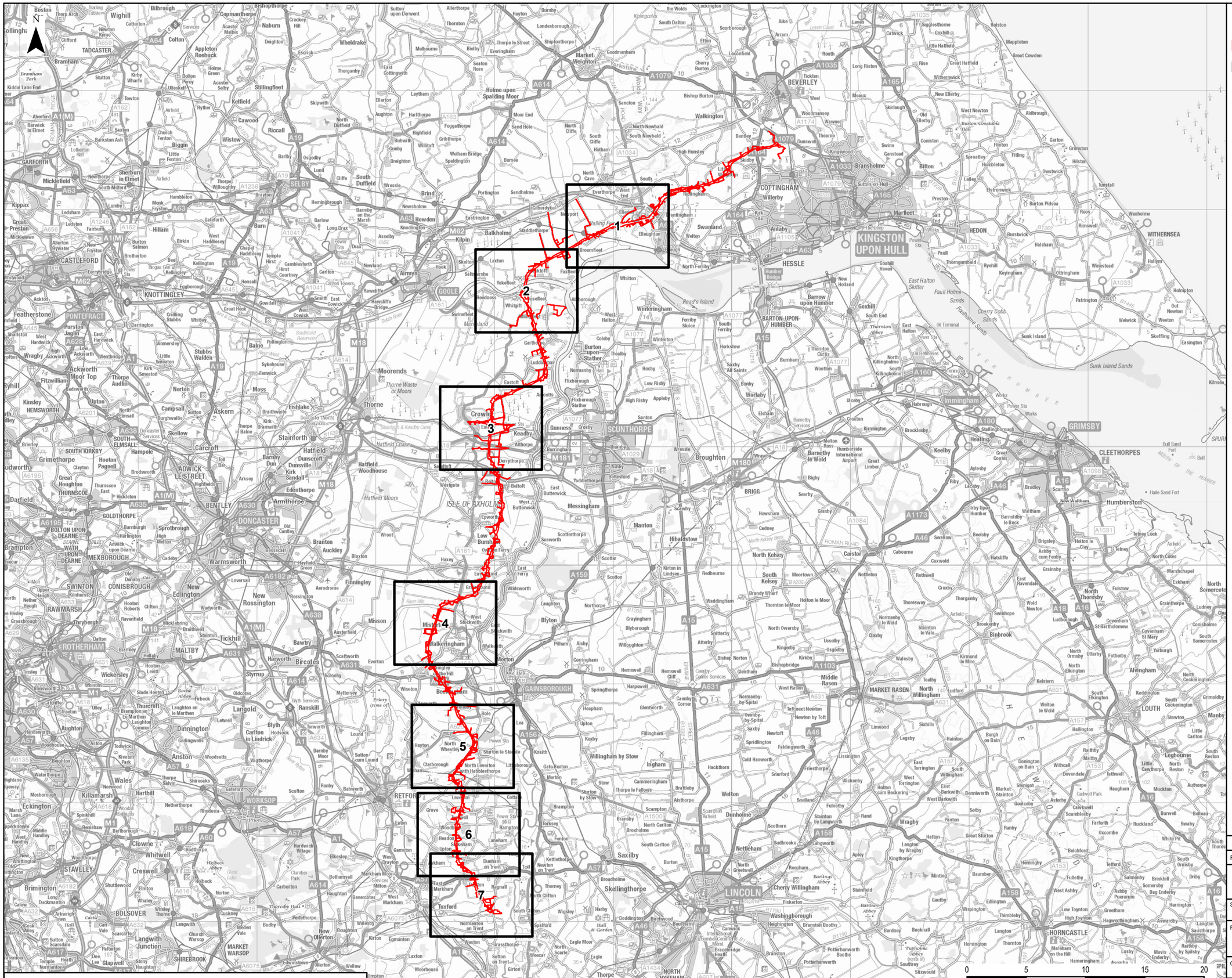
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Scheme: NORTH HUMBER TO HIGH MARNHAM

Figure Title: FIGURE 2 - AQUATIC SURVEY LOCATIONS - MACROPHYTES KEY PLAN

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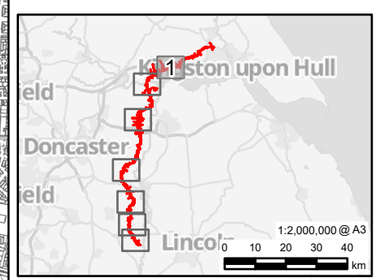
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- Existing Lattice Pylon To Be Removed

Aquatic Survey Data

- Macrophyte



Rev	Date	Description	GIS	Chk	App
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Scheme: NORTH HUMBER TO HIGH MARNHAM

Figure Title: FIGURE 2 - AQUATIC SURVEY LOCATIONS - MACROPHYTES

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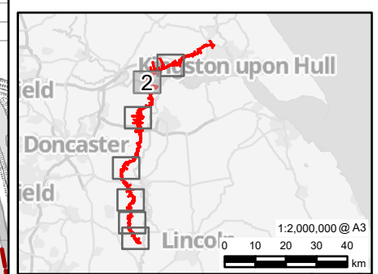
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Legend

- Order Limits
- Route Section
- Existing Overhead Line
  - 400 kV
- Project Design Details
  - Indicative New Overhead Line
  - Indicative New Lattice Pylon
  - Existing Overhead Line Not Affected
  - Existing Lattice Pylon Not Affected
- Aquatic Survey Data
  - Macrophyte

Sheet 1 and 2



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Rev	Date	Description	GIS	Chk	App

nationalgrid

Scheme: NORTH HUMBER TO HIGH MARNHAM

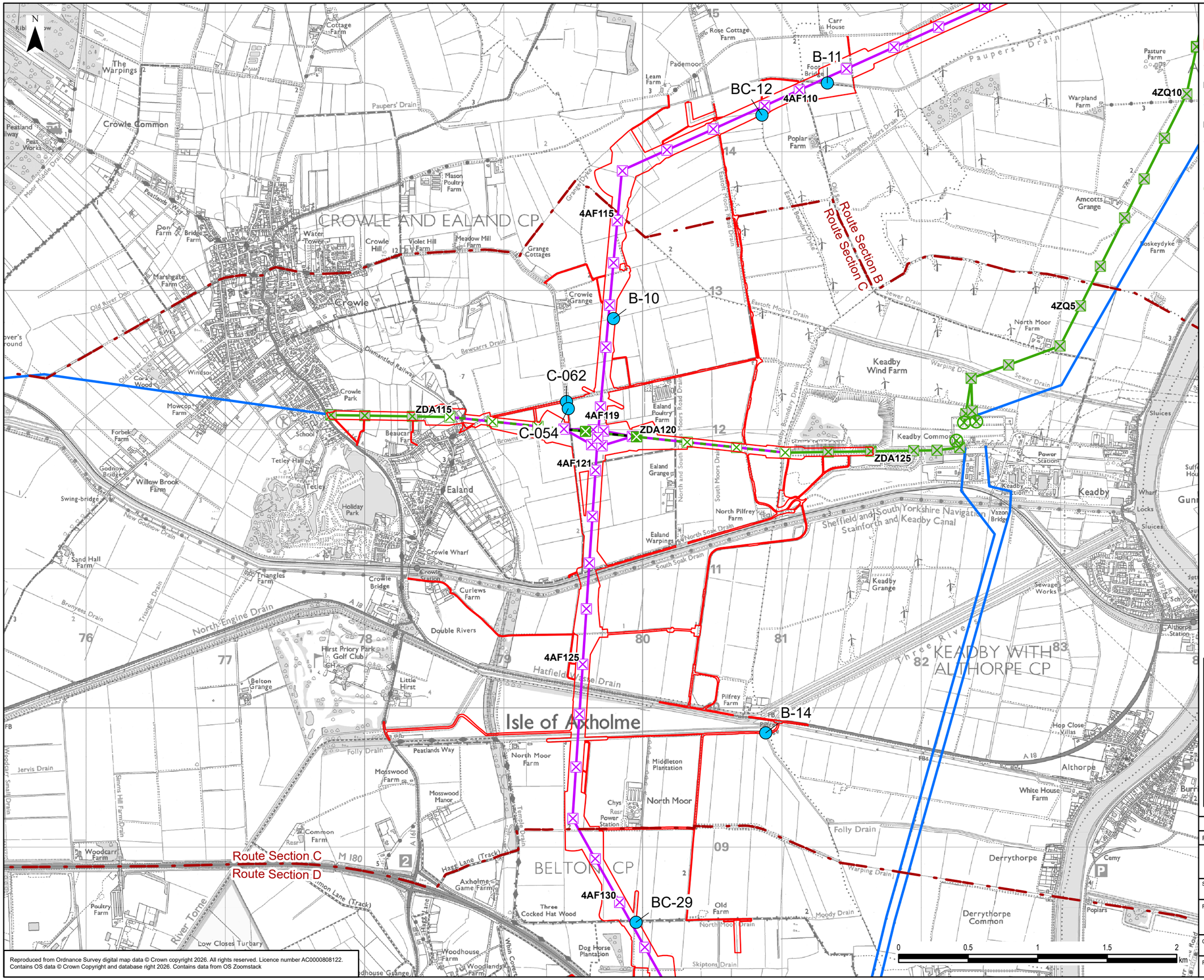
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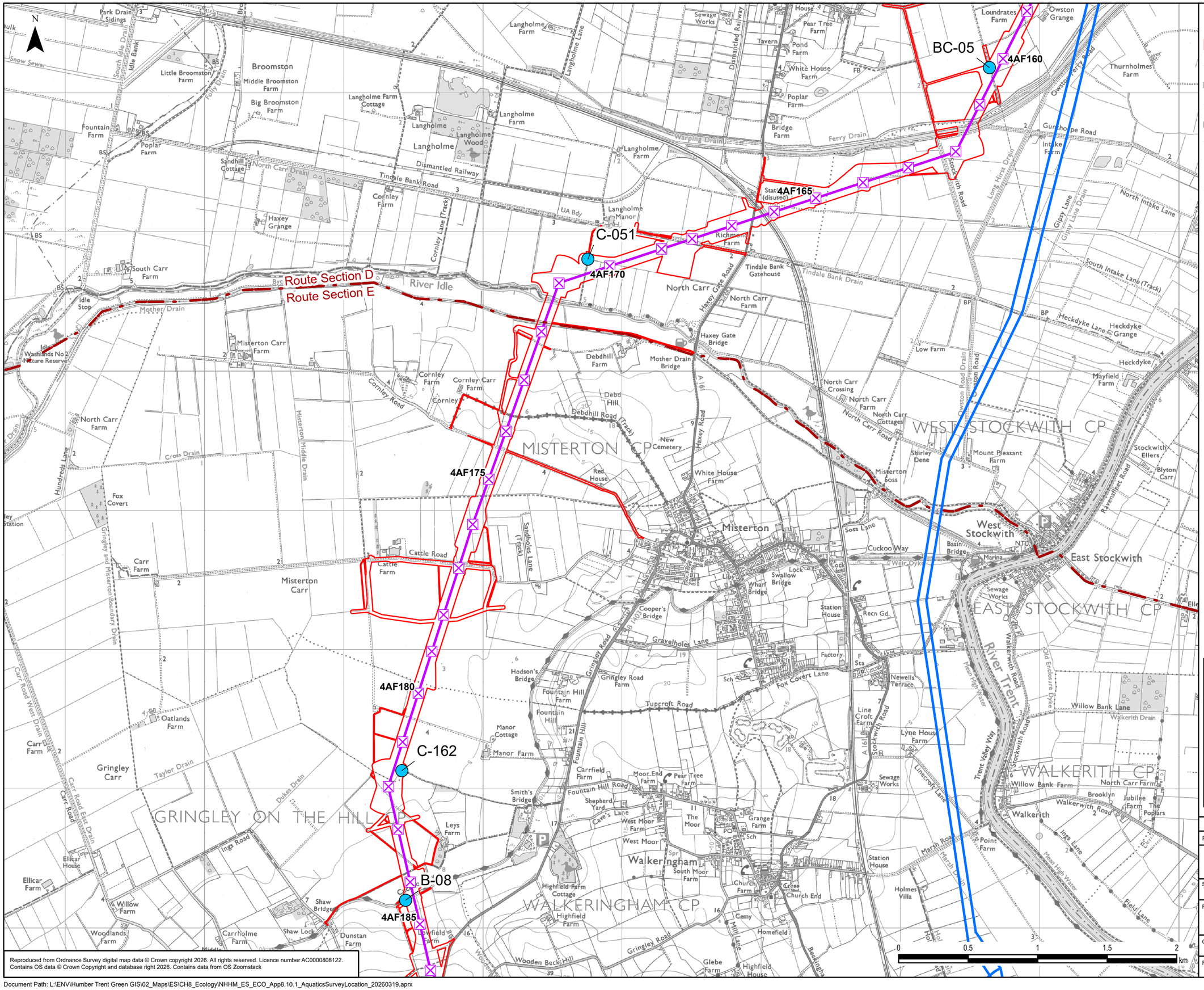
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B-11
BC-12
4AF110
4AF115
B-10
C-062
4AF119
C-054
ZDA115
ZDA120
4AF121
4AF125
B-14
4AF130
BC-29
4ZQ10
4ZQ5
ZDA125
Route Section B
Route Section C
Route Section C
Route Section D
CROWLE AND EALAND CP
KEADBY WITH ALTHORPE CP
BELTON CP
Isle of Axholme
Crowle
Ealand
Keadby
Althorpe
Keadby Wind Farm
Keadby Common
Power Station
Crowle Common
Crowle Park
Crowle Wharf
Crowle Station
Ealand Warpings
Keadby Junction
Keadby Lock
Keadby Sluices
Derrythorpe
Derrythorpe Common
Cemy
Poplars
Althorpe Station
Sewage Works
Vazon Bridge
Sheffield and South Yorkshire Navigation
Stainforth and Keadby Canal
Paupers Drain
Paupers' Drain
Eastoft Moors Drain
Eastoft Moors Road Drain
Sewer Drain
Warping Drain
Folly Drain
Bewcarrs Drain
Dismantled Railway
Hatfield Chase Drain
North Engine Drain
New Godnow Drain
Triangles Drain
Brunyess Drain
Peatlands Way
Old River Don
Moor Bottom Drain
Moor Middle Drain
Grange Dykes
Ludlington Moors Drain
Old Boundary Dyke
Keadby Boundary Drain
North and South Moors Road Drain
South Moors Drain
North Soak Drain
South Soak Drain
Browns Drain
Templar Drain
Moody Drain
North Moor Drain
Skiptons Drain
Whin Covert Drain
Simms Hill Farm Drain
Woodcarr Small Drain
Jervis Drain
Folly Drain
Hagg Lane (Track)
Common Lane (Track)
Hagg Lane
Three Rivers
River Torne
Low Closes Turbary
Dog Horse Plantation
Three Cocked Hat Wood
North Moor
Middleton Plantation
Chys Resr
Power Station
Pilfrey Farm
North Pilfrey Farm
Old Farm
Ealand Grange
Ealand Poultry Farm
Ealand Grange
Keadby Grange
Crowle Grange
Grange Cottages
Crowle Hill
Violet Hill Farm
Meadow Mill Farm
Mason Poultry Farm
Water Tower
Marshgate Farm
Don Farm
Bridge Farm
Cora's Wood
Windsor
Mowcop Farm
Forbek Farm
Godnow Bridge
Willow Brook Farm
Swing-bridge
Sand Hall Farm
Triangles Farm
Curlews Farm
Crowle Bridge
Double Rivers
Hirst Priory Park Golf Club
Little Hirst
Belton Grange
Mosswood Farm
Mosswood Manor
Common Farm
Woodcarr Farm
Poultry Farm
Woodhouse Farm
Woodlands Farm
Axholme Game Farm
Three Cocked Hat Wood
Dog Horse Plantation
North Pilfrey Farm
Pilfrey Farm
Old Farm
Ealand Grange
Ealand Warpings
Ealand Poultry Farm
Crowle Grange
Keadby Grange
Sewage Works
Hop Close Villas
White House Farm
Althorpe
Amcotts Grange
Foskeydyke Farm
Warpland Farm
Pasture Farm
Poplar Farm
Carr House
Rose Cottage Farm
Cottage Farm
Pademoor
Leam Farm
The Warpings
Peatland Way
Peat Works
Holiday Park
Tetley Hall
Tetley
School
Beaucarr Farm
Crowle Hill
Crowle Station
Keadby Junction
Keadby Lock
Keadby Sluices
Vazon Bridge
Sewage Works
Althorpe Station
Hop Close Villas
White House Farm
Derrythorpe
Derrythorpe Common
Cemy
Poplars
Power Station
Keadby Common
Keadby Wind Farm



Legend

- Order Limits
- Route Section

Existing Overhead Line

- 400 kV

Project Design Details

- Indicative New Overhead Line
- Indicative New Lattice Pylon

Aquatic Survey Data

- Macrophyte

Rev	Date	Description	ID	JG	NL
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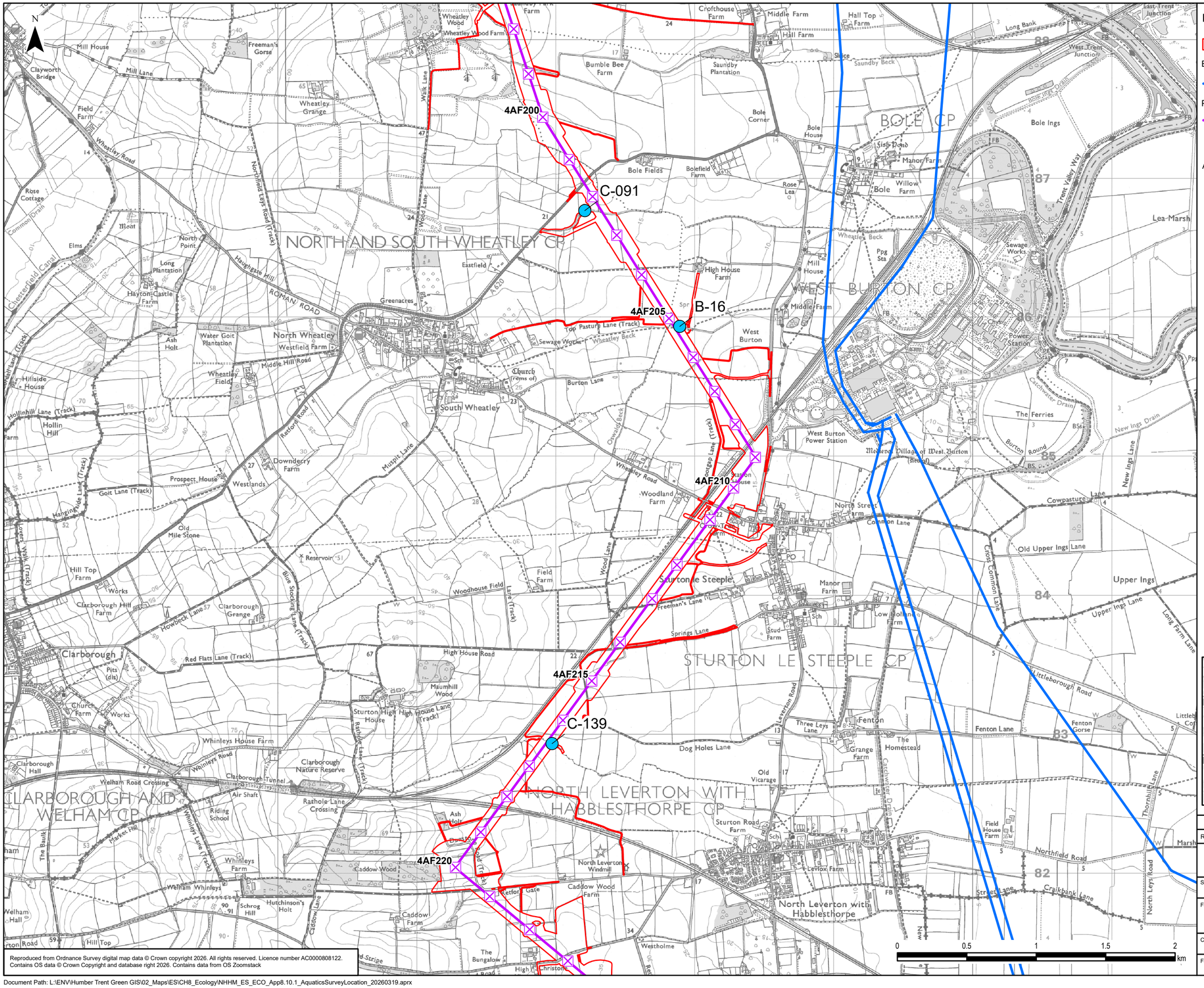
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Legend

- Order Limits
- Existing Overhead Line
  - 400 kV
- Project Design Details
  - Indicative New Overhead Line
  - Indicative New Lattice Pylon
- Aquatic Survey Data
  - Macrophyte

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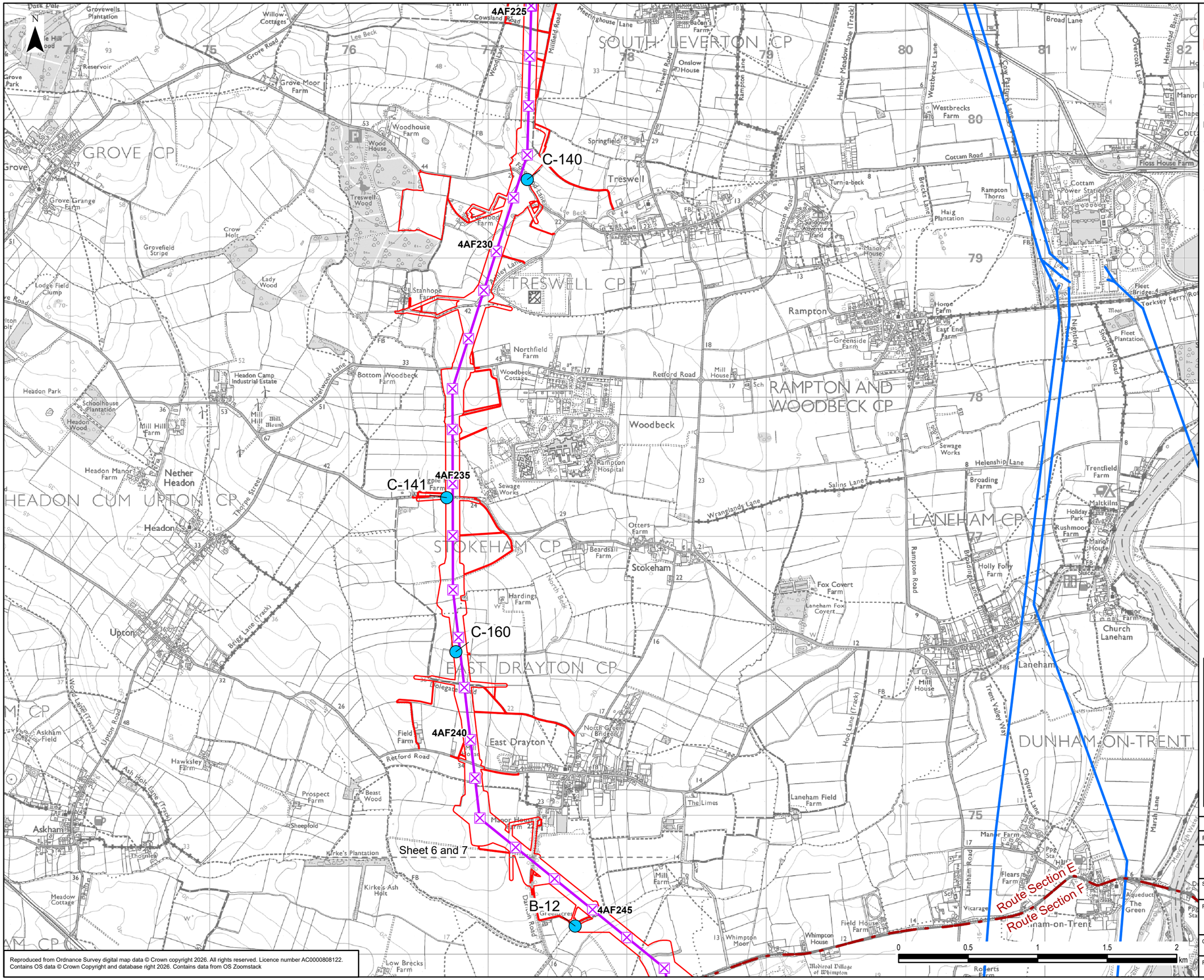
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Legend

- Order Limits
- Route Section
- Existing Overhead Line
- 400 kV
- Project Design Details
- Indicative New Overhead Line
- Indicative New Lattice Pylon
- Aquatic Survey Data
- Macrophyte

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N

4AF240

4AF245

4AF250

4AF255

4AF260

B-12

B-13

C-161

Sheet 6 and 7

Route Section E

Route Section F

DUNHAM-ON-TRENT CP

RAGNALL CP

DARLTON CP

FLEDBOROUGH CP

MARNHAM CP

NEWTON

NORTH CLIFTON

SOUTH CLIFTON

East Drayton

Darlton

Ragnall

Dunham-on-Trent

Fledborough

High Marnham

Low Marnham

Normanton on Trent

Skegby

Ruddingwood

North Clifton

Kingston upon Hull

Doncaster

Lincoln

ROMAN FORT

Reservoir

Medieval Village of Whimpton (site of)

Medieval Village of Woodcoates (site of)

Legend

- Order Limits
- Route Section

Existing Overhead Line

- 275 kV
- 400 kV

Project Design Details

- Indicative New Overhead Line
- Indicative New Gantry
- Indicative New Lattice Pylon

Aquatic Survey Data

- Macrophyte

0 0.5 1 1.5 2 km

1:2,000,000 @ A3

0 10 20 30 40 km

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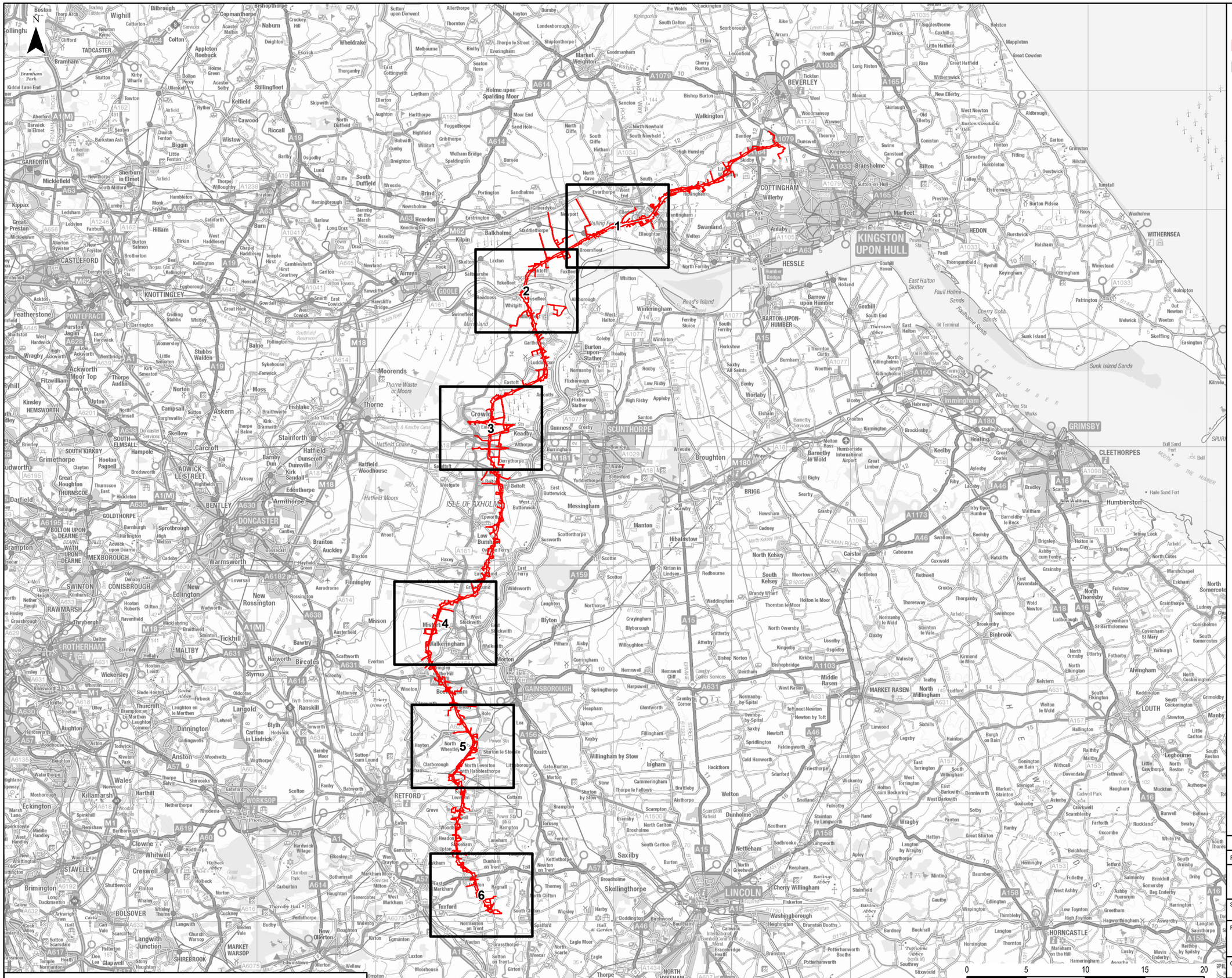
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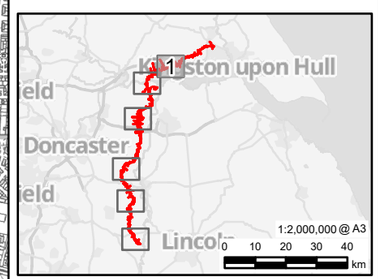
- Order Limits

Project Design Details

- Indicative New Overhead Line
- Indicative New Lattice Pylon
- Existing Overhead Line Not Affected
- Existing Overhead Line to be Reconductored
- Existing Overhead Line to be Dismantled
- Existing Lattice Pylon Not Affected
- Existing Lattice Pylon To Be Modified
- Existing Lattice Pylon To Be Removed

Aquatic Survey Data

- Fish



Rev	Date	Description	GIS	Chk	App
0	25/09/2026	ENVIRONMENTAL STATEMENT	ID	JG	NL

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Scheme: NORTH HUMBER TO HIGH MARNHAM

Figure Title: FIGURE 3 - AQUATIC SURVEY LOCATIONS - FISH

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ID	25/09/2026	JG	25/09/2026	NL	25/09/2026

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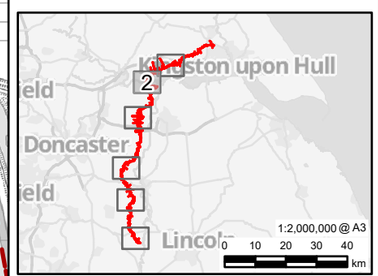
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Legend

- Order Limits
- Route Section
- Existing Overhead Line
  - 400 kV
- Project Design Details
  - Indicative New Overhead Line
  - Indicative New Lattice Pylon
  - Existing Overhead Line Not Affected
  - Existing Lattice Pylon Not Affected
- Aquatic Survey Data
  - Fish

Sheet 1 and 2



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Rev	Date	Description	GIS	Chk	App

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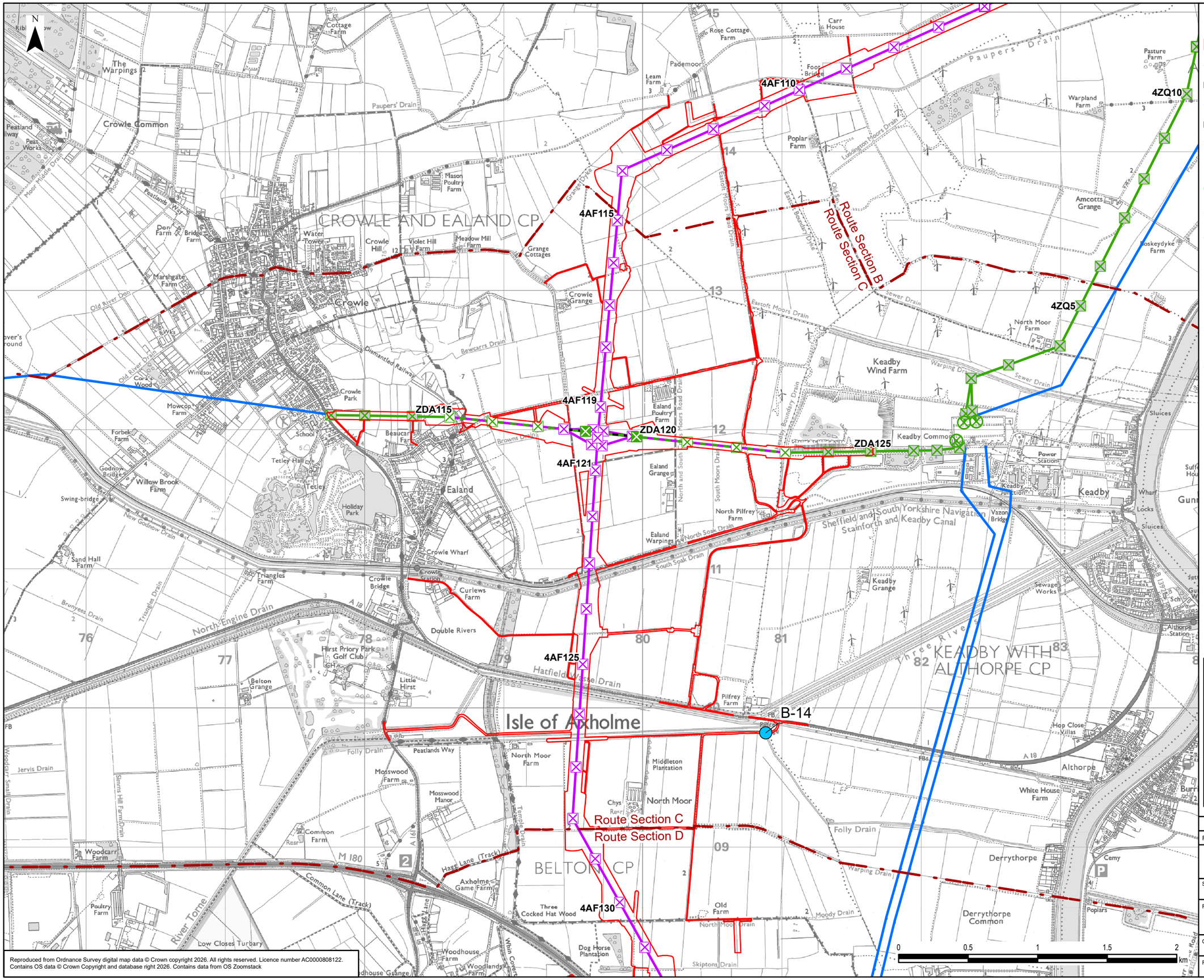
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Legend

- Order Limits
- Route Section

Existing Overhead Line
- 400 kV

Project Design Details
- Indicative New Overhead Line
- Indicative New Lattice Pylon
- Existing Overhead Line Not Affected
- Existing Overhead Line to be Reconductored
- Existing Overhead Line to be Dismantled
- Existing Lattice Pylon Not Affected
- Existing Lattice Pylon To Be Modified
- Existing Gantry Not Affected
- Existing Lattice Pylon To Be Removed

Aquatic Survey Data
- Fish

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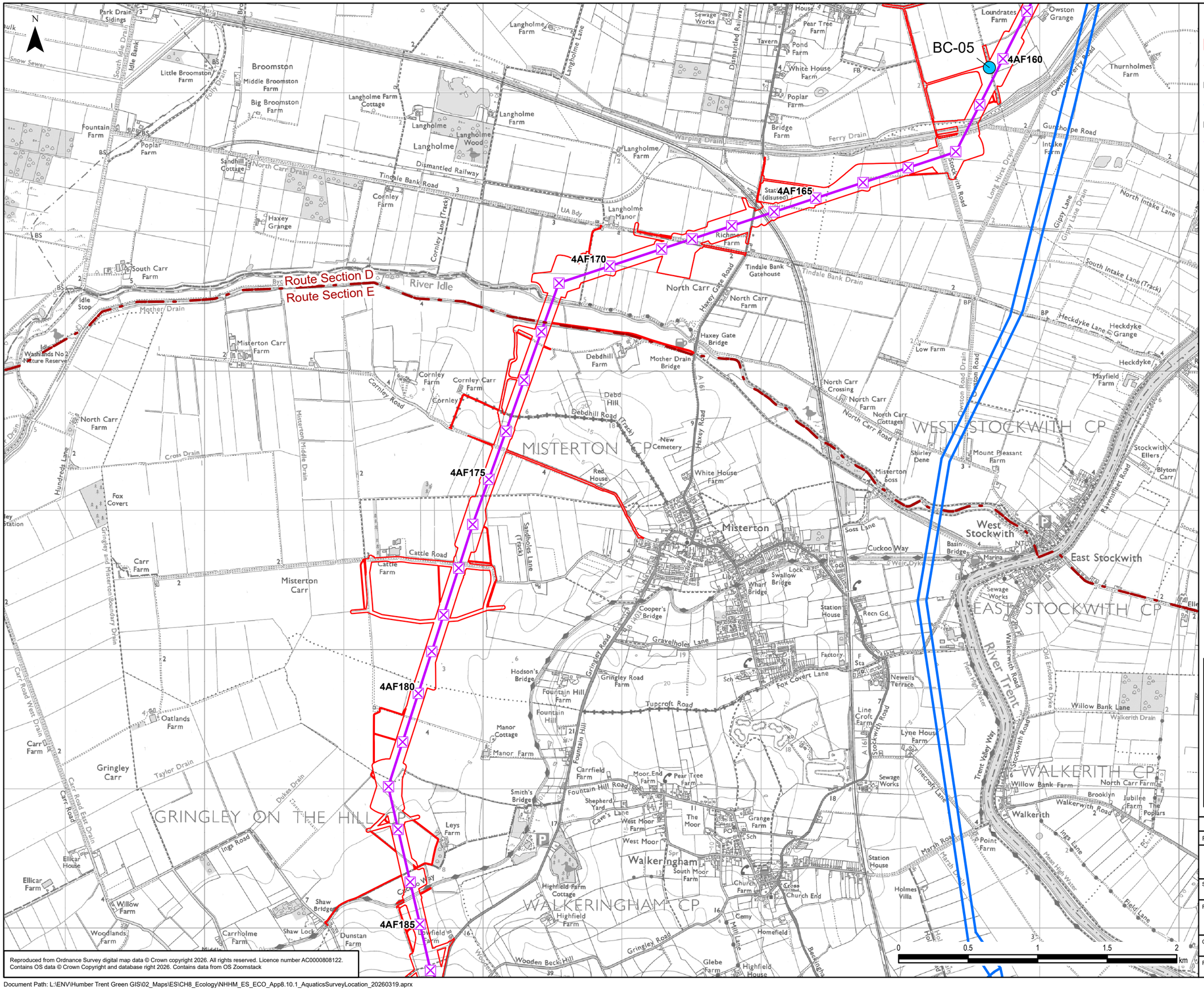
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Legend

- Order Limits
- Route Section

Existing Overhead Line

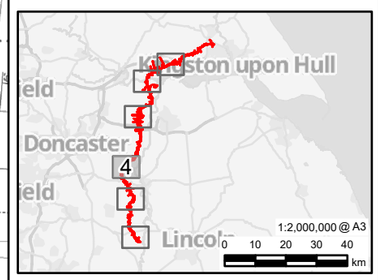
- 400 kV

Project Design Details

- Indicative New Overhead Line
- Indicative New Lattice Pylon

Aquatic Survey Data

- Fish



Rev	Date	Description	ID	JG	NL
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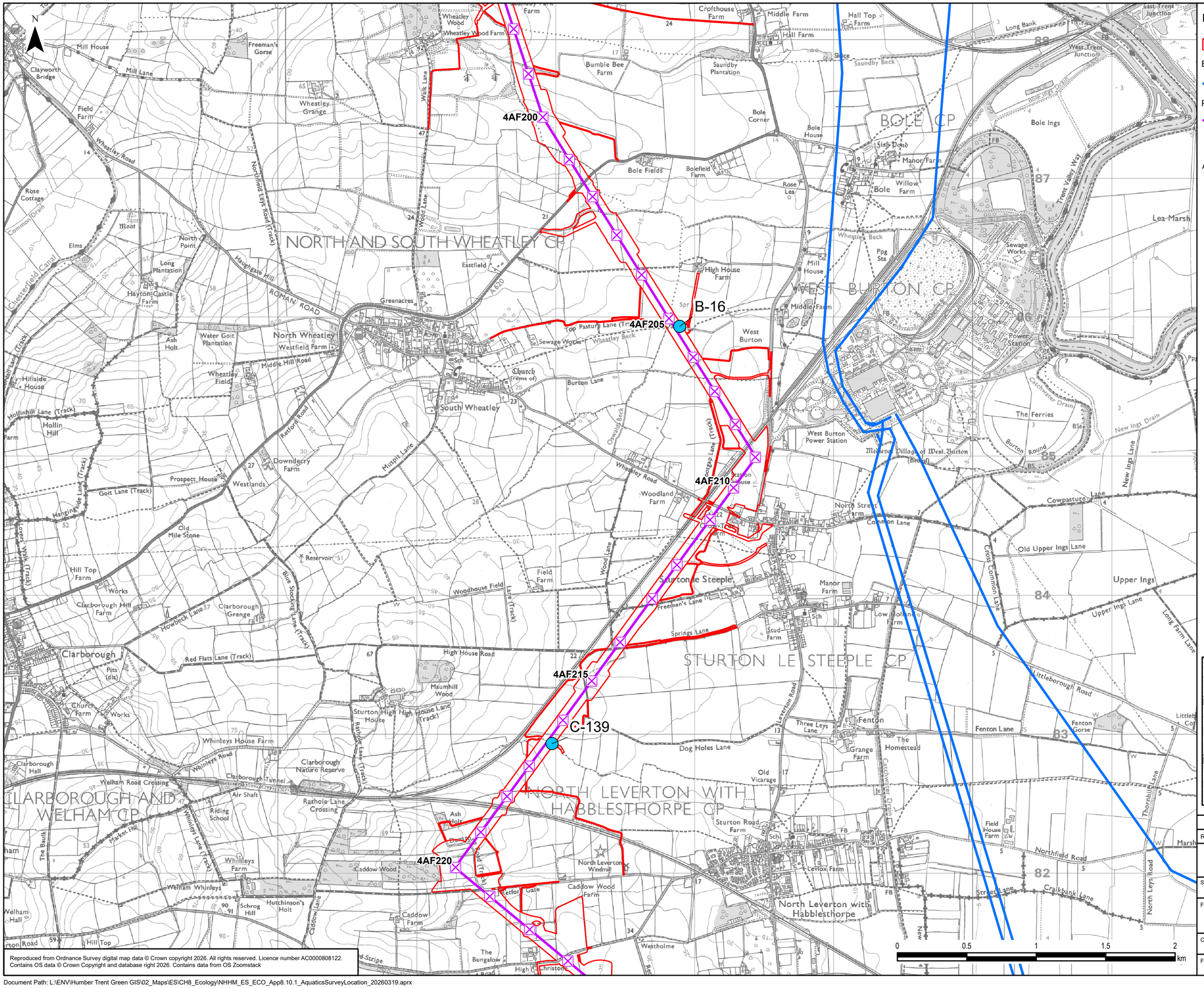
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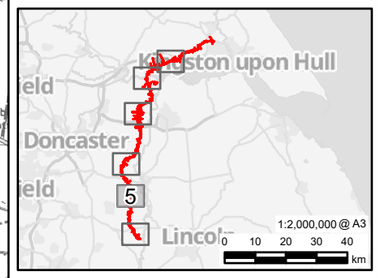
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Legend

- Order Limits
- Existing Overhead Line
  - 400 kV
- Project Design Details
  - Indicative New Overhead Line
  - Indicative New Lattice Pylon
- Aquatic Survey Data
  - Fish



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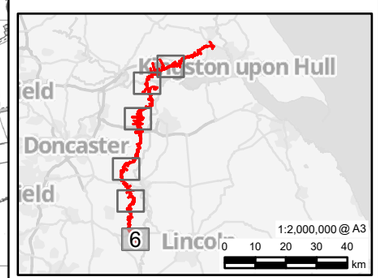
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Legend

- Order Limits
- Route Section
- Existing Overhead Line
  - 275 kV
  - 400 kV
- Project Design Details
  - Indicative New Overhead Line
  - Indicative New Gantry
  - Indicative New Lattice Pylon
- Aquatic Survey Data
  - Fish



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Annex B Aquatic macroinvertebrate taxa list

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Annex B
Aquatic macroinvertebrate taxa list

This Annex contains a full list of the aquatic macroinvertebrate taxa recorded during the field surveys. Survey locations are illustrated in **Figure A8.10.1**, **Aquatic Survey Locations – Macroinvertebrates** in Annex A.

Table B.1 – Macroinvertebrate taxa list for Spring 2024 surveys

Family	Species	Conservation score	Crossing ID															
			BC-37	B-16	C-005	C-006	BC-15	C-008	C-010	C-011	BC-06	BC-03	C-051	C-062	B-09	C-149	C-075	B-10
Flatworms																		
Dendrocoelidae	*Dendrocoelum lacteum*	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Planariidae	*Polycelis sp.*		-	-	-	-	6	5	-	-	-	-	-	-	-	1	-	-
Planariidae	*Polycelis nigra/tenuis*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Snails																		
Lymnaeidae	Lymnaeidae (juvenile/damaged)		-	-	42	2	1	2	4	1	-	350	160	-	-	-	-	20
Lymnaeidae	*Galba truncatula*	3	-	-	17	-	-	-	3	-	-	-	-	-	-	-	-	-
Lymnaeidae	*Stagnicola sp.*		-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-
Lymnaeidae	*Lymnaea stagnalis*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Lymnaeidae	*Ampullaceana balthica*	1	-	-	-	-	-	-	18	1	-	4	2	-	-	-	-	-
Valvatidae	*Valvata sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Valvatidae	*Valvata cristata*	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Valvatidae	*Valvata piscinalis*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
Hydrobiidae	*Potamopyrgus antipodarum*	1	40	40	-	-	-	880	-	-	35	10	-	83	5	2	-	50
Bithyniidae	*Bithynia sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bithyniidae	*Bithynia tentaculata*	1	190	-	-	-	-	-	-	-	1	-	4	-	-	-	-	15
Physidae	Physidae (juvenile/damaged)		-	-	-	-	-	-	1	-	-	25	-	-	-	-	-	1
Physidae	*Aplexa hypnorum*	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physidae	*Physella sp.*		-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-
Succineidae	*Succinea sp.*		-	-	-	3	18	-	-	-	2	3	1	-	-	-	-	-

Family	Species	Conservation score	Crossing ID															
			BC-37	B-16	C-005	C-006	BC-15	C-008	C-010	C-011	BC-06	BC-03	C-051	C-062	B-09	C-149	C-075	B-10
Planorbidae	Planorbidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planorbidae	*Planorbarius corneus*	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planorbidae	*Planorbis sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planorbidae	*Planorbis planorbis*	1	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	10
Planorbidae	*Anisus sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planorbidae	*Anisus vortex*	1	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	15
Planorbidae	*Anisus leucostoma*	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Planorbidae	*Gyraulus crista*	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Limpets and mussels																		
Sphaeriidae	Sphaeriidae (juvenile/damaged)		-	-	-	-	-	-	51	-	-	-	-	-	-	7	-	-
Sphaeriidae	*Sphaerium corneum*	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Sphaeriidae	*Pisidium/Euglesa/Odhneripisidium*		40	-	11	-	-	25	44	-	6	-	1	2	2	-	5	60
Worms																		
Oligochaeta	Oligochaeta		4	1	5	4	1	35	70	-	5	15	1	5	29	2	5	15
Leeches																		
Glossiphoniidae	Glossiphoniidae (juvenile/damaged)		-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-
Glossiphoniidae	*Glossiphonia complanata*	1	-	10	-	-	1	1	-	-	-	-	1	-	1	8	1	1
Glossiphoniidae	Helobdella stagnalis	1	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Erpobdellidae	Erpobdellidae (juvenile/damaged)		-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
Erpobdellidae	*Erpobdella sp.*		-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Erpobdellidae	*Erbodella octoculata*	1	-	-	-	-	16	1	-	-	-	-	-	1	1	7	-	2

Family	Species	Conservation score	Crossing ID															
			BC-37	B-16	C-005	C-006	BC-15	C-008	C-010	C-011	BC-06	BC-03	C-051	C-062	B-09	C-149	C-075	B-10
Mites																		
Hydracarina	Hydracarina		-	3	1	3	1	1	1	-	-	1	-	1	4	8	-	-
Oribatei	Oribatei		-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	7
Crustaceans																		
Ostracoda			-	-	1	1	-	1	1	-	1	-	-	-	-	-	-	7
Copepoda			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammaridae	*Gammarus sp.*		-	-	77	-	1	70	12	-	-	-	-	127	-	53	-	80
Gammaridae	*Gammarus pulex/fossarum agg.*	1	-	-	129	-	-	-	2	-	-	-	-	-	58	32	-	-
Gammaridae	*Gammarus pulex*	1	-	390	52	-	-	70	-	-	-	-	-	6	4	93	350	20
Crangonyctidae	*Crangonyx sp. (floridanus/pseudogracilis)*		47	-	-	3	25	-	-	-	23	1	5	-	-	-	1	6
Asellidae	Asellidae		-	-	-	-	-	-	273	1	-	-	-	2	1	-	-	-
Asellidae	*Asellus sp./Proasellus sp.*		2	7	-	14	-	-	252	-	-	-	-	-	-	-	-	-
Asellidae	*Asellus aquaticus*	1	3	3	-	9	20	18	-	1	60	-	2	-	2	12	-	70
Asellidae	*Proasellus meridianus*	3	-	-	-	-	-	-	-	-	30	-	-	-	-	-	-	-
Asellidae	*Proasellus coaxalis*		-	-	-	15	-	-	22	-	-	-	-	-	-	-	-	-
Mayflies																		
Baetidae	*Baetis sp.*		-	-	-	-	-	-	-	-	-	-	-	6	-	3	-	-
Baetidae	*Baetis rhodani/atlanticus*		-	1	-	-	-	-	-	-	-	-	-	6	-	1	15	-
Baetidae	*Cloeon dipterum*	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ephemerellidae	*Serratella ignita*	1	-	-	-	-	-	-	-	-	-	-	-	-	10	2	-	-
Caenidae	*Caenis sp.*		-	-	-	-	-	2	-	-	-	-	-	-	23	7	-	-

Family	Species	Conservation score	Crossing ID															
			BC-37	B-16	C-005	C-006	BC-15	C-008	C-010	C-011	BC-06	BC-03	C-051	C-062	B-09	C-149	C-075	B-10
Damselfies																		
Coenagrionidae	Coenagrionidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coenagrionidae	*Ischnura elegans*	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Coenagrionidae	*Coenagrion puella*	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Calopterygidae	*Calopteryx sp.*		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Dragonflies																		
Aeshnidae	*Aeshna grandis*	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Libellulidae	Libellulidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
True bugs																		
Veliidae	Veliidae (nymph/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Veliidae	*Velia sp.*		-	-	-	-	-	2	-	-	-	1	-	-	1	-	1	-
Nepidae	*Nepa cinerea*	3	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Corixidae	Corixidae (nymph/damaged)		-	-	-	-	-	-	-	7	-	-	10	-	-	-	-	-
Corixidae	*Sigara sp.*		1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notonectidae	Notonectidae (nymph/damaged)		-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-
Beetles																		
Haliplidae	Haliplidae (larvae/damaged)		15	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-
Haliplidae	*Haliplus sp.*		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Haliplidae	*Haliplus confinis*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haliplidae	*Haliplus lineaticollis*	1	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	15
Haliplidae	*Haliplus ruficollis group*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hygrobiidae	*Hygrobia hermanni*	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3

Family	Species	Conservation score	Crossing ID															
			BC-37	B-16	C-005	C-006	BC-15	C-008	C-010	C-011	BC-06	BC-03	C-051	C-062	B-09	C-149	C-075	B-10
Gyrinidae	Gyrinidae (larvae/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Gyrinidae	*Gyrinus sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	Dytiscidae (larvae/damaged)		2	-	5	12	1	-	6	-	3	-	30	-	1	-	-	1
Dytiscidae	*Hygrotus inaequalis*	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Hygrotus versicolor*	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Dytiscidae	*Hydroporus sp.*		-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Hydroporus discretus*	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Hydroporus palustris*	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Dytiscidae	*Hydroporus planus*	2	-	-	-	-	2	7	1	-	-	-	-	-	-	-	-	-
Dytiscidae	*Hydroporus tesselatus*	2	1	-	-	2	-	5	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Graptodytes pictus*	3	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Dytiscidae	*Nebrioporus sp.*		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Dytiscidae	*Nebrioporus elegans*	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Dytiscidae	*Agabus bipustulatus*	1	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Agabus didymus*	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Agabus guttatus*	4	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Agabus paludosus*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Noteridae	*Noterus clavicornis*	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydrophilidae	Hydrophilidae (larvae/damaged)		-	-	-	3	3	-	-	1	-	1	2	-	-	-	1	-
Hydrophilidae	*Helophorus sp.*		-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-
Hydrophilidae	*Helophorus aequalis*	1	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Hydrophilidae	*Helophorus brevipalpis*	1	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-

Family	Species	Conservation score	Crossing ID															
			BC-37	B-16	C-005	C-006	BC-15	C-008	C-010	C-011	BC-06	BC-03	C-051	C-062	B-09	C-149	C-075	B-10
Hydrophilidae	*Helophorus minutus*	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydrophilidae	*Anacaena globulus*	1	-	-	-	2	1	2	-	-	-	-	1	-	-	-	-	-
Hydrophilidae	*Anacaena limbata*	1	-	-	-	-	2	2	-	-	-	1	-	-	-	-	-	-
Hydrophilidae	*Laccobius sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydraenidae	*Limnebius sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dryopidae	Dryopidae (larvae/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scirtidae	Scirtidae (larvae/damaged)		-	-	-	-	-	-	-	-	-	-	-	6	-	-	27	-
Elmidae	*Elmis aena*	1	-	25	-	-	-	-	-	-	-	-	-	51	7	28	10	-
Elmidae	*Limnius volckmari*	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Elmidae	*Oulimnius sp.*		-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Elmidae	*Riolus subviolaceus*	6	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Curculionidae	Curculionidae		-	2	-	1	-	-	1	-	-	-	4	-	-	1	-	-
Alderflies																		
Sialidae	Sialidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sialidae	*Sialis lutaria*	1	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-
Caddisflies																		
Glossosomatidae	Glossosomatidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	-	-	2	-	1	1	-
Glossosomatidae	*Agapetus fuscipes*	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Polycentropodidae	Polycentropodidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycentropodidae	*Plectrocnemia sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycentropodidae	*Plectrocnemia conspersa*	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-

Family	Species	Conservation score	Crossing ID															
			BC-37	B-16	C-005	C-006	BC-15	C-008	C-010	C-011	BC-06	BC-03	C-051	C-062	B-09	C-149	C-075	B-10
Psychomyiidae	*Lype sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Hydropsychidae	*Hydropsyche angustipennis*	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Hydropsychidae	*Hydropsyche siltatai*	1	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-
Hydroptilidae	*Hydroptila sp.*		-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Limnephilidae	Limnephilidae (juvenile/damaged)		-	-	-	-	8	-	-	1	-	-	-	-	1	-	-	-
Limnephilidae	*Limnephilus lunatus*	1	-	5	-	5	47	42	1	-	-	-	-	-	-	4	4	2
Limnephilidae	*Micropterna sequax*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Leptoceridae	*Athripsodes sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Leptoceridae	*Atripsodes bilineatus*	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sericostomatidae	*Sericostoma personatum*	1	-	-	-	-	-	-	-	-	-	-	-	-	1	20	18	-
Trueflies																		
Chironomidae	Chironomidae (damaged/pupea)		-	-	-	-	-	-	-	-	1	-	-	-	-	6	-	-
Chironomidae	Tanypodinae		6	63	121	15	2	23	-	-	-	12	38	-	1	-	-	-
Chironomidae	Orthocladiinae		18	336	40	298	-	15	29	6	6	12	29	16	36	12	10	5
Chironomidae	Chironomini		18	-	-	104	9	-	13	155	-	290	12	-	-	-	-	-
Chironomidae	Tanytarsini		20	294	342	358	76	60	49	-	1	12	5	-	36	-	4	3
Chironomidae	Prodiamesinae		-	-	30	15	-	3	-	-	-	-	2	-	-	-	5	-
Tipulidae	*Tipula sp.*		-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Pediciidae	*Dicranota sp.*		-	9	-	-	-	4	-	-	-	-	-	16	4	4	1	-
Limoniidae	*Limoniidae*		-	1	1	2	-	-	-	6	-	-	-	-	-	-	-	1
Limoniidae	*Eleophila sp.*		-	3	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Simuliidae	Simuliidae (damaged/juvenile)		-	2	2	-	-	-	-	-	1	-	-	1	221	1	15	1

Family	Species	Conservation score	Crossing ID														
			BC-37	B-16	C-005	C-006	BC-15	C-008	C-010	C-011	BC-06	BC-03	C-051	C-062	B-09	C-149	C-075	B-10
Simuliidae	*Simulium sp.*		-	4	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Simuliidae	*Simulium costatum*	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
Dixidae	*Dixa sp.*		-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-
Dixidae	*Dixella sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psychodidae			-	-	14	7	-	-	-	-	1	-	-	-	1	-	2	-
Empididae			-	-	2	-	-	-	-	-	1	-	-	2	-	-	-	1
Ceratopogonidae			1	4	2	-	-	2	-	-	-	-	-	-	4	1	-	5
Syrphidae			-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Stratiomyidae	Stratiomyidae		-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	6
Stratiomyidae	*Odontomyia sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ptychopteridae	*Ptychoptera sp.*		-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-
Culicidae	Culicidae		-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Chaoboridae			-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Dolichopodidae			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Muscidae			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sciomyzidae			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Taxa																		
Lepidoptera			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nematoda			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Collembola			-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Diptera			-	-	-	1	-	-	6	-	1	-	-	-	-	-	-	-

Family	Species	Conservation score	Crossing ID														
			BC-37	B-16	C-005	C-006	BC-15	C-008	C-010	C-011	BC-06	BC-03	C-051	C-062	B-09	C-149	C-075	B-10
European bullhead Cottus gobio			-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tricladida			-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Anisoptera sp.			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table B.2 – Macroinvertebrate taxa list for Autumn 2024 surveys

Family	Species	Conservation score	Crossing ID														
			BC-15	C-008	C-010	C-011	B-09	C-149	C-075	BC-37	B-10	C-051	B-16	C-139	BC-29	C-141	C-140	B-13
Flatworms																		
Dendrocoelidae	*Dendrocoelum lacteum*	**2**	2	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Planariidae	*Polycelis sp.*		-	-	-	-	-	7	5	-	-	-	-	-	-	-	-	-
Planariidae	*Polycelis nigra/tenuis*	**1**	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planariidae	*Polycelis felina*	**3**	4	-	-	-	-	-	25	-	-	-	-	-	-	-	-	1
Dugesiidae	*Schmidtea lugubris/polychroa*	**2**	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3	-
Snails																		
Lymnaeidae	Lymnaeidae (juvenile/damaged)		-	8	7	-	-	-	-	-	-	-	9	-	-	-	-	-
Lymnaeidae	*Stagnicola sp.*		-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
Lymnaeidae	*Lymnaea stagnalis*	**1**	-	-	-	-	-	-	-	-	17	1	-	-	1	-	-	-
Lymnaeidae	*Ampullaceana balthica*	**1**	-	-	-	-	-	-	-	-	3	15	4	-	4	-	-	21
Valvatidae	*Valvata sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Valvatidae	*Valvata cristata*	**2**	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Valvatidae	*Valvata piscinalis*	**1**	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Hydrobiidae	*Potamopyrgus antipodarum*	**1**	-	200	-	-	44	10	-	556	5	-	77	-	3	-	34	100
Bithyniidae	*Bithynia sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bithyniidae	*Bithynia tentaculata*	**1**	-	-	-	-	-	-	-	69	8	-	-	-	18	-	-	50
Physidae	Physidae (juvenile/damaged)		-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	2
Physidae	*Aplexa hypnorum*	**5**	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Physidae	*Physa fontinalis*	**1**	-	-	-	-	-	-	-	-	22	-	-	-	70	-	-	-
Physidae	*Physella sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8

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Succineidae	*Succinea sp.*		1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Planorbidae	Planorbidae (juvenile/damaged)		-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Planorbidae	*Planorbarius corneus*	**4**	-	-	-	-	-	-	-	-	4	-	-	-	1	-	-	-
Planorbidae	*Planorbis sp.*		-	-	-	-	-	-	-	18	33	1	-	-	-	-	-	-
Planorbidae	*Planorbis planorbis*	**1**	-	-	-	-	-	-	-	5	2	1	-	-	-	-	-	-
Planorbidae	*Anisus sp.*		-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	18
Planorbidae	*Anisus vortex*	**1**	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-
Planorbidae	*Gyraulus crista*	**2**	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Limpets and Mussels																		
Sphaeriidae	Sphaeriidae (juvenile/damaged)		-	-	141	-	-	-	-	1	5	-	1	-	1	-	-	-
Sphaeriidae	*Sphaerium sp.*		-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Sphaeriidae	*Pisidium/Euglesa/Odhneripisidium*		8	80	94	-	6	30	47	18	-	-	15	3	7	-	4	2
Worms																		
Oligochaeta	Oligochaeta		-	8	12	-	10	10	39	2	2	-	10	12	3	-	37	-
Leeches																		
Glossiphoniidae	Glossiphoniidae (juvenile/damaged)		-	4	-	-	-	-	7	-	-	-	-	-	-	-	-	-
Glossiphoniidae	*Theromyzon tessulatum*	**2**	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Glossiphoniidae	*Glossiphonia complanata*	**1**	1	-	-	-	1	8	-	-	3	-	12	6	-	2	21	1
Glossiphoniidae	*Helobdella stagnalis*	**1**	-	-	-	-	-	2	-	-	-	-	-	-	-	-	5	-
Erpobdellidae	Erpobdellidae (juvenile/damaged)		1	1	-	-	1	55	-	-	3	-	-	1	-	-	-	-
Erpobdellidae	*Erbodella octoculata*	**1**	1	-	-	-	-	1	-	-	7	-	1	5	-	-	-	-
Piscicolidae	*Piscicola geometra*	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Mites																		
Hydracarina	Hydracarina		4	1	-	-	1	-	2	-	-	-	21	-	1	-	1	-
Oribatei	*Oribatei*		-	-	4	-	-	2	14	-	-	-	-	-	-	-	6	-
Crustaceans																		
Ostracoda			-	-	-	-	-	-	-	9	15	-	1	2	1	-	-	-
Copepoda			-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-
Cladocera			-	-	-	-	-	-	-	28	-	-	-	-	4	-	-	-
Gammaridae	*Gammarus sp.*		-	10	-	-	-	-	153	-	1	-	-	50	-	60	245	-
Gammaridae	*Gammarus pulex/fossarum agg.*	**1**	1	9	-	-	155	90	153	-	-	-	42	-	-	-	258	-
Gammaridae	*Gammarus pulex*	**1**	-	4	-	-	17	479	969	-	19	-	98	20	-	50	207	-
Crangonyctidae	*Crangonyx sp. (floridanus/pseudogracilis)*		4	-	-	-	-	-	-	39	3	-	-	-	20	-	-	4
Asellidae	Asellidae		-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asellidae	*Asellus sp./Proasellus sp.*		-	-	144	-	-	-	-	3	-	-	-	5	-	-	-	-
Asellidae	*Asellus aquaticus*	**1**	4	1	36	-	1	22	-	14	90	2	1	-	67	2	1	4
Asellidae	*Proasellus meridianus*	**3**	-	-	-	-	-	-	-	-	10	-	-	6	40	60	1	4
Asellidae	*Proasellus coaxalis*				216													
Mayflies																		
Baetidae	Baetidae (juvenile/damaged)		-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-
Baetidae	*Baetis sp.*		-	-	-	-	20	20	5	-	-	-	3	-	-	-	8	-
Baetidae	*Baetis rhodani/atlanticus*		-	-	-	-	37	90	1	-	-	-	142	8	-	-	3	-
Baetidae	*Baetis vernus*	**3**	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-
Baetidae	*Centroptilum luteolum*	**4**	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-

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Baetidae	*Cloeon dipterum*	**1**	-	-	-	-	-	-	-	1	-	3	-	-	350	-	-	2
Ephemerellidae	*Serratella ignita*	**1**	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Caenidae	*Caenis sp.*		-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Stoneflies																		
Nemouridae	Nemouridae (juvenile/damaged)		-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Damselflies																		
Coenagrionidae	Coenagrionidae (juvenile/damaged)		-	-	-	1	-	-	-	16	7	-	-	-	-	-	-	3
Coenagrionidae	*Ischnura elegans*	**1**	-	-	-	-	-	-	-	30	-	-	-	-	-	-	-	2
Dragonflies																		
Aeshnidae	*Anax sp.*		-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
Libellulidae	Libellulidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
True bugs																		
Nepidae	*Nepa cinerea*	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corixidae	*Callicorixa praeusta*	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corixidae	*Hesperocorixa sahlbergi*	**2**	-	-	-	-	1	1	-	1	-	-	-	-	2	-	-	6
Corixidae	*Sigara dorsalis/striata*		-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
Corixidae	*Sigara dorsalis*	**1**	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-
Corixidae	*Sigara semistriata*	**5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Corixidae	*Sigara stagnalis*	**5**	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Notonectidae	*Notonecta glauca*	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notonectidae	*Notonecta viridis*	**3**	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Notonectidae	*Notonecta maculata*	**5**	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-

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Beetles																		
Haliplidae	Haliplidae (larvae/damaged)		-	-	-	-	-	-	-	-	1	-	1	-	7	-	-	1
Haliplidae	*Haliplus lineaticollis*	**1**	1	1	-	-	1	-	-	3	4	-	3	-	2	-	-	6
Haliplidae	*Haliplus ruficollis* group		-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2
Hygrobiidae	*Hygrobia hermanni*	**4**	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Gyrinidae	*Gyrinus substriatus*	**1**	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
Gyrinidae	*Orectochilus villosus*	**2**	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	Dytiscidae (larvae/damaged)		1	1	1	-	-	-	-	-	-	-	2	-	3	-	5	2
Dytiscidae	*Laccophilus hyalinus*	**3**	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Dytiscidae	*Laccophilus minutus*	**2**	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Dytiscidae	*Hyphydrus ovatus*	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Hydroporus angustatus*	**2**	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Dytiscidae	*Hydroporus palustris*	**1**	-	-	-	-	-	-	-	-	2	-	-	-	1	-	-	1
Dytiscidae	*Hydroporus planus*	**2**	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Hydroporus tesselatus*	**2**	-	2	-	-	-	-	-	-	1	-	-	-	-	-	1	-
Dytiscidae	*Stictonectes lepidus*	**8**	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Dytiscidae	*Graptodytes pictus*	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Nebrioporus sp.*		-	-	-	-	6	-	-	-	-	-	-	-	-	-	1	-
Dytiscidae	*Nebrioporus assimilis*	**5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dytiscidae	*Platambus maculatus*	**1**	-	-	-	-	-	-	-	-	-	-	-	2	-	-	3	-
Dytiscidae	*Agabus bipustulatus*	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Dytiscidae	*Agabus didymus*	**1**	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-

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Noteridae	*Noterus clavicornis*	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydrophilidae	Hydrophilidae (larvae/damaged)		-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-
Hydrophilidae	*Helophorus brevipalpis*	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydrophilidae	*Anacaena globulus*	**1**	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-
Hydrophilidae	*Anacaena limbata*	**1**	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	2
Hydrophilidae	*Laccobius sp.*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydraenidae	Hydraenidae		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydraenidae	*Ochthebius minimus*	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydraenidae	*Hydraena sp.*		-	-	-	-	-1	-	-	-	-	-	-	-	-	1	-	-
Scirtidae	Scirtidae (larvae/damaged)		-	-	-	-	-	1	1	-	-	-	1	-	-	1	3	-
Elmidae	*Elmis aena*	**1**	-	-	-	-	11	67	20	-	-	-	100	17	-	-	-	-
Elmidae	*Limnius volckmari*	**1**	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Elmidae	*Oulimnius sp.*		-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-
Curculionidae	Curculionidae		-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Alderflies																		
Sialidae	Sialidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sialidae	*Sialis lutaria*	**1**	10	1	-	-	-	1	-	-	-	2	-	3	2	-	-	-
Caddisflies																		
Rhyacophilidae	*Rhyacophila sp.*		-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Rhyacophilidae	*Rhyacophila dorsalis*	**1**	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Glossosomatidae	Glossosomatidae (juvenile/damaged)		-	-	-	-	-	3	-	-	-	-	108	-	-	-	-	-
Glossosomatidae	*Agapetus sp.*		-	-	-	-	-	-	42	-	-	-	-	-	-	-	-	-

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Glossosomatidae	*Agapetus fuscipes*	**1**	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Polycentropodidae	*Plectrocnemia sp.*		-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Polycentropodidae	*Cyrnus trimaculatus*	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Psychomyiidae	Psychomyiidae (juvenile/damaged)		-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Psychomyiidae	*Lype sp.*		-	-	-	-	-	-	1	-	-	-	-	2	-	-	4	-
Hydropsychidae	Hydropsychidae (juvenile/damaged)		-	-	-	-	3	-	-	-	-	-	-	1	-	-	-	-
Hydropsychidae	*Hydropsyche sp.*		-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-
Hydropsychidae	*Hydropsyche angustipennis*	**1**	-	-	-	-	1	-	-	-	-	-	8	-	-	-	-	-
Hydropsychidae	*Hydropsyche siltatai*	**1**	-	-	-	-	-	-	-	-	-	-	90	1	-	-	-	-
Hydroptilidae	*Hydroptila sp.*		-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-
Limnephilidae	Limnephilidae (juvenile/damaged)		-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-
Limnephilidae	*Limnephilus lunatus*	**1**	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Limnephilidae	*Limnephilus extricatus*	**2**	-	-	-	-	-	1	-	-	2	-	4	2	-	-	1	-
Limnephilidae	*Stenophylax vibex*	**5**	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Limnephilidae	*Micropterna sp.*		-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-
Limnephilidae	*Micropterna lateralis*	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
Limnephilidae	*Micropterna sequax*	**1**	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Beraeidae	*Beraeodes minutus*	**5**	-	-	-	-	-	-	-	-	-	-	-	90	-	-	-	-
Leptoceridae	*Athripsodes aterrimus*	**1**	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
Sericostomatidae	Sericostomatidae (juvenile/damaged)		-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Sericostomatidae	*Sericostoma personatum*	**1**	-	-	-	-	1	48	9	-	-	-	-	-	-	-	-	-

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Trueflies																		
Chironomidae	Chironomidae (damaged/pupea)		-	-	-	-	-	22	-	6	-	-	13	-	-	-	9	-
Chironomidae	Tanypodinae		2	6	-	1	-	16	4	2	-	3	12	2	9	-	21	6
Chironomidae	Orthocladiinae		2	48	3	-	8	113	22	14	-	-	97	4	9	-	45	5
Chironomidae	Chironomini		2	-	18	20	-	-	-	7	1	21	-	25	77	1	33	4
Chironomidae	Tanytarsini		35	26	-	-	-	22	179	28	-	-	97	15	25	-	42	-
Chironomidae	Prodiamesinae		-	-	-	-	4	6	7	-	-	-	4	-	-	-	9	-
Tipulidae	*Tipula sp.*		-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	2
Pediciidae	*Dicranota* sp.		-	-	-	-	14	5	9	-	-	-	1	2	-	-	2	-
Limoniidae	Limoniidae		-	-	-	1	-	-	-	-	-	-	1	1	-	-	2	-
Simuliidae	Simuliidae (damaged/juvenile)		-	-	-	-	1	-	2	-	-	-	20	1	-	-	-	-
Simuliidae	*Simulium* sp.		-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Dixidae	*Dixa* sp.		-	-	-	-	2	-	1	-	-	-	-	-	-	-	1	-
Dixidae	*Dixa nebulosa*	**4**	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Dixidae	*Dixella* sp.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psychodidae			-	-	4	-	-	1	-	-	-	-	2	-	-	-	-	-
Empididae			-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae			-	-	-	1	1	-	3	-	-	-	-	-	-	-	-	-
Stratiomyidae	Stratiomyidae		-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Culicidae	Culicidae		-	-	79	110	-	-	-	-	-	-	-	-	-	1	-	-
Chaoboridae			-	-	-	13	-	-	-	-	-	-	-	-	2	-	-	-

Family	Species	Conservation score	Crossing ID														
			BC-15	C-008	C-010	C-011	B-09	C-149	C-075	BC-37	B-10	C-051	B-16	C-139	BC-29	C-141	C-140	B-13
Muscidae			-	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-
Sciomyzidae			-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Other taxa																		
Lepidoptera			-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1
Diptera			-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coleoptera			-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Tricladida			-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-

Table B.3 – Macroinvertebrate taxa list for Spring 2025 surveys

Family	Species	Crossing ID						
		Conservation Score	C-172	BC-12	B-11	B-08	B-12	B-13
Flatworms								
Dendrocoelidae	*Dendrocoelum lacteum*	**2**	-	-	-	1	-	-
Planariidae	*Polycelis sp.*	**-**	4	-	-	-	-	-
Dugesiidae	*Schmidtea lugubris/polychroa*	**2**	2	-	-	-	-	-
Snails								
Viviparidae	*Viviparus sp.*	**-**	-	-	-	6	-	-
Lymnaeidae	Lymnaeidae (juvenile/damaged)	**-**	-	15	24	7	-	-
Lymnaeidae	*Stagnicola sp.*	**-**	-	-	-	1	-	-
Lymnaeidae	*Ampullaceana balthica*	**1**	-	-	-	-	-	1
Valvatidae	*Valvata piscinalis*	**1**	-	12	120	2	-	-
Hydrobiidae	*Potamopyrgus antipodarum*	**1**	-	-	-	-	160	61
Bithyniidae	*Bithynia tentaculata*	**1**	-	32	34	65	-	-
Bithyniidae	*Bithynia leachii*	**5**	-	22	25	26	-	-
Physidae	Physidae (juvenile/damaged)	**-**	-	80	14	5	-	-
Physidae	*Physella sp.*	**-**	-	-	-	1	-	-
Succineidae	*Succinea sp.*	**-**	1	-	-	1	-	-
Planorbidae	Planorbidae (juvenile/damaged)	**-**	-	18	40	-	-	-
Planorbidae	*Planorbarius corneus*	**4**	-	-	25	-	-	-
Planorbidae	*Planorbis sp.*	**-**	-	60	-	-	-	-
Planorbidae	*Planorbis planorbis*	**1**	-	4	1	-	-	-

Family	Species	Crossing ID						
		Conservation Score	C-172	BC-12	B-11	B-08	B-12	B-13
Planorbidae	*Anisus sp.*	-	-	148	43	3	-	-
Planorbidae	*Anisus vortex*	1	-	5	-	3	-	-
Planorbidae	*Gyraulus crista*	2	-	-	-	-	-	1
Planorbidae	*Bathyomphalus contortus*	2	-	-	-	4	-	-
Planorbidae	*Hippeutis complanatus*	3	-	2	-	25	-	-
Limpets and mussels								
Acroloxidae	*Acroloxus lacustris*	2	-	-	-	2	-	-
Sphaeriidae	Sphaeriidae (juvenile/damaged)	-	-	-	6	-	-	-
Sphaeriidae	*Sphaerium sp.*	-	-	-	-	16	-	-
Sphaeriidae	*Sphaerium corneum*	1	-	-	-	3	-	-
Sphaeriidae	*Pisidium/Euglesa/Odhneripisidium*	-	-	-	13	36	5	3
Sphaeriidae	*Musculium lacustre*	3	-	-	7	-	-	-
Worms								
Oligochaeta	Oligochaeta	-	-	91	452	10	50	179
Leeches								
Glossiphoniidae	*Glossiphonia sp.*	-	-	-	-	-	-	5
Glossiphoniidae	*Glossiphonia heteroclita*	4	-	-	1	6	-	-
Glossiphoniidae	*Glossiphonia complanata*	1	-	-	1	-	5	-
Glossiphoniidae	*Beoerobdella verrucata*	6	-	-	-	1	-	-
Glossiphoniidae	*Helobdella stagnalis*	1	-	1	8	10	-	-
Erpobdellidae	Erpobdellidae (juvenile/damaged)	-	-	1	-	1	-	3
Erpobdellidae	*Erpobdella testacea*	4	-	-	-	3	-	-

Family	Species	Crossing ID						
		Conservation Score	C-172	BC-12	B-11	B-08	B-12	B-13
Erpobdellidae	*Erpobdella octoculata*	**1**	-	-	9	-	1	5
Erpobdellidae	*Trocheta pseudodina*	**5**	-	1	-	-	-	-
Mites								
Hydracarina	Hydracarina	**-**	1	7	4	1	6	1
Crustaceans								
Ostracoda		**-**	-	3	2	-	-	-
Copepoda		**-**	1	15	-	-	-	-
Cladocera		**-**	-	27	26	30	-	-
Gammaridae	Gammaridae	**-**	-	-	-	-	-	28
Gammaridae	*Gammarus sp.*	**-**	-	-	-	-	7	-
Gammaridae	*Gammarus pulex/fossarum agg.*	**1**	-	-	-	-	-	77
Gammaridae	*Gammarus pulex*	**1**	-	-	-	-	1	12
Crangonyctidae	*Crangonyx sp. (floridanus/pseudogracilis)*	**-**	-	26	11	100	1	-
Asellidae	Asellidae	**-**	-	27	10	-	-	1
Asellidae	*Asellus sp./Proasellus sp.*	**-**	18	-	-	-	-	1
Asellidae	*Asellus aquaticus*	**1**	1	10	105	25	-	-
Asellidae	*Proasellus meridianus*	**3**	7	-	-	-	-	2
Mayflies								
Baetidae	Baetidae (juvenile/damaged)	**-**	-	2	-	-	-	-
Baetidae	*Baetis sp.*	**-**	-	-	-	-	7	2
Baetidae	*Baetis rhodani/atlanticus*	**-**	-	-	-	-	15	5
Baetidae	*Baetis vernus*	**3**	-	-	-	-	8	-

Family	Species	Crossing ID						
		Conservation Score	C-172	BC-12	B-11	B-08	B-12	B-13
Baetidae	*Centroptilum luteolum*	**4**	-	-	-	-	-	1
Baetidae	*Cloeon dipterum*	**1**	-	4	-	2	-	-
Caenidae	*Caenis luctuosa/macrura.*	**-**	-	-	-	-	15	270
Damselflies								
Coenagrionidae	Coenagrionidae (juvenile/damaged)	**-**	-	-	-	11	-	-
Coenagrionidae	*Ischnura elegans*	**1**	-	-	-	23	-	-
Lestidae	*Lestes viridis*	**6**	-	-	2	-	-	-
Dragonflies								
Aeshnidae	Aeshnidae (juvenile/damaged)	**-**	-	-	-	2	-	-
True bugs								
Veliidae	Veliidae (nymph/damaged)	**-**	-	-	-	-	-	1
Pleidae	*Plea minutissima*	**4**	-	2	-	-	-	-
Corixidae	Corixidae (nymph/damaged)	**-**	12	1	1	1	-	-
Corixidae	*Micronecta scholzi*	**5**	-	-	-	1	-	-
Corixidae	*Sigara sp.*	**-**	2	-	-	-	-	-
Corixidae	*Sigara falleni*	**1**	-	-	-	1	-	-
Notonectidae	Notonectidae (nymph/damaged)	**-**	-	20	6	-	-	-
Notonectidae	*Notonecta sp.*	**-**	-	-	-	10	-	-
Beetles								
Haliplidae	Haliplidae (larvae/damaged)	**-**	-	11	7	-	-	1
Haliplidae	*Haliplus flavicollis*	**3**	-	-	-	-	1	-
Haliplidae	*Haliplus lineaticollis*	**1**	-	5	-	-	-	-

Family	Species	Crossing ID						
		Conservation Score	C-172	BC-12	B-11	B-08	B-12	B-13
Haliplidae	*Haliplus ruficollis* group	-	-	-	-	2	-	-
Dytiscidae	Dytiscidae (larvae/damaged)	-	15	24	8	-	-	6
Dytiscidae	*Hyphydrus ovatus*	2	-	1	-	-	-	-
Dytiscidae	*Hygrotus sp.*	-	-	3	-	-	-	-
Dytiscidae	*Hygrotus versicolor*	5	-	1	1	-	-	-
Dytiscidae	*Nebrioporus depressus/elegans.*	-	-	-	-	-	-	16
Noteridae	*Noterus clavicornis*	2	-	-	-	1	-	-
Hydrophilidae	Hydrophilidae (larvae/damaged)	-	4	-	-	-	-	1
Hydrophilidae	*Helophorus sp.*	-	10	-	-	-	-	1
Hydrophilidae	*Helophorus brevipalpis*	1	-	-	-	2	-	-
Hydrophilidae	*Anacaena limbata*	1	-	-	-	1	-	-
Hydraenidae	*Ochthebius minimus*	1	2	-	-	-	-	-
Scirtidae	Scirtidae (larvae/damaged)	-	3	-	-	-	-	3
Elmidae	*Elmis aena*	1	-	-	-	-	290	40
Curculionidae	Curculionidae	-	-	2	-	-	-	-
Chrysomelidae	Chrysomelidae	-	-	-	-	1	-	-
Caddisflies								
Hydropsychidae	*Hydropsyche sp.*	-	-	-	-	-	-	8
Hydropsychidae	*Hydropsyche pellucidula*	1	-	-	-	-	-	7
Hydropsychidae	*Hydropsyche siltatai*	1	-	-	-	-	1	-
Hydroptilidae	*Hydroptila sp.*	-	-	-	-	-	6	1
Limnephilidae	Limnephilidae (juvenile/damaged)	-	-	-	-	11	-	-

Family	Species	Crossing ID						
		Conservation Score	C-172	BC-12	B-11	B-08	B-12	B-13
Limnephilidae	*Limnephilus lunatus*	**1**	-	-	-	23	-	-
Limnephilidae	*Halesus digitatus*	**2**	-	-	-	-	-	1
Leptoceridae	*Athripsodes aterrimus*	**1**	-	-	-	1	-	-
Leptoceridae	*Triaenodes bicolor*	**2**	-	1	-	-	-	-
Trueflies								
Chironomidae	Chironomidae (damaged/pupea)	**-**	-	-	11	30	-	-
Chironomidae	Tanypodinae	**-**	10	3	-	30	20	1
Chironomidae	Orthocladiinae	**-**	-	30	147	30	820	169
Chironomidae	Chironomini	**-**	287	6	48	340	60	-
Chironomidae	Tanytarsini	**-**	-	2	4	30	-	168
Tipulidae	*Tipula sp.*	**-**	-	-	-	-	-	1
Pediciidae	*Dicranota* sp.	**-**	-	-	-	-	5	24
Limoniidae	Limoniidae	**-**	-	-	-	-	-	1
Simuliidae	Simuliidae (damaged/juvenile)	**-**	-	-	-	-	15	-
Psychodidae		**-**	-	-	-	-	-	2
Empididae		**-**	-	-	-	1	1	-
Ceratopogonidae		**-**	-	-	-	1	90	5
Stratiomyidae	Stratiomyidae	**-**	-	1	1	-	-	-
Culicidae	Culicidae	**-**	-	-	1	-	-	-
Ephydridae		**-**	-	-	-	-	-	1
Sciomyzidae		**-**	-	-	-	1	-	-

Family	Species	Crossing ID						
		Conservation Score	C-172	BC-12	B-11	B-08	B-12	B-13
Other Taxa								
Diptera		-	2	-	-	-	-	1
Coleoptera		-	-	1	-	-	-	-

Table B.4 – Macroinvertebrate taxa list for Autumn 2025 surveys

Family	Species	Conservation Score	Crossing ID										
			C-172	C-167	C-194	B-14	B-12	B-08	C-091	BC-05	C-168	BC-12	B-11
Flatworms													
Dendrocoelidae	*Dendrocoelum lacteum*	**2**	-	-	-	1	-	1	-	-	-	3	-
Planariidae	*Polycelis sp.*		-	-	1	-	-	-	-	7	-	1	1
Planariidae	*Polycelis nigra/tenuis*	**1**	-	-	-	-	-	-	-	9	-	-	-
Planariidae	*Polycelis felina*	**3**	-	-	-	-	-	-	-	-	-	-	1
Dugesiidae	Dugesiidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	1	-
Snails													
Lymnaeidae	Lymnaeidae (juvenile/damaged)		-	-	7	-	47	1	-	-	1	-	-
Lymnaeidae	*Stagnicola sp.*		-	-	1	-	-	1	-	-	-	-	-
Lymnaeidae	*Lymnaea stagnalis*	**1**	-	-	2	2	-	-	-	-	-	1	-
Lymnaeidae	*Ampullaceana balthica*	**1**	-	1	10	-	47	-	-	-	1	-	-
Valvatidae	*Valvata sp.*		-	-	-	-	-	-	-	3	-	-	-
Valvatidae	*Valvata cristata*	**2**	-	-	-	-	-	15	-	14	-	-	-
Valvatidae	*Valvata piscinalis*	**1**	-	-	-	-	-	1	-	-	-	50	80
Hydrobiidae	*Potamopyrgus antipodarum*	**1**	-	60	-	-	253	-	-	1	42	-	-
Bithyniidae	Bithyniidae (juvenile/damaged)		-	-	-	2	-	-	-	-	-	-	-
Bithyniidae	*Bithynia sp.*		-	-	-	-	-	6	-	-	-	-	-
Bithyniidae	*Bithynia tentaculata*	**1**	-	-	2	25	-	30	-	4	-	25	70
Bithyniidae	*Bithynia leachii*	**5**	-	-	-	-	-	42	-	-	-	-	-
Physidae	Physidae (juvenile/damaged)		-	11	-	-	-	-	-	-	-	-	-
Physidae	*Physa fontinalis*	**1**	-	-	-	-	-	1	-	1	-	-	6
Physidae	*Physella sp.*		-	13	-	5	-	-	-	-	1	35	7

Family	Species	Conservation Score	Crossing ID										
			C-172	C-167	C-194	B-14	B-12	B-08	C-091	BC-05	C-168	BC-12	B-11
Planorbidae	*Planorbarius corneus*	**4**	-	-	-	-	-	-	-	-	-	6	20
Planorbidae	*Planorbis sp.*		-	2	-	3	-	1	-	-	-	50	-
Planorbidae	*Planorbis planorbis*	**1**	-	-	7	-	-	-	-	-	-	-	50
Planorbidae	*Anisus sp.*		-	5	-	-	-	1	-	-	-	-	-
Planorbidae	*Anisus vortex*	**1**	-	-	-	-	-	12	-	-	-	-	50
Planorbidae	*Anisus leucostoma*	**4**	-	-	-	3	-	-	-	-	-	-	-
Planorbidae	*Gyraulus crista*	**2**	-	-	-	-	7	-	-	-	1	-	-
Planorbidae	*Bathyomphalus contortus*	**2**	-	-	-	-	-	5	-	-	-	-	-
Planorbidae	*Hippeutis complanatus*	**3**	-	-	-	-	-	24	-	-	-	1	70
Limpets and mussels													
Acroloxidae	*Acroloxus lacustris*	**2**	-	-	-	-	-	2	-	-	-	-	-
Sphaeriidae	Sphaeriidae (juvenile/damaged)		-	-	-	-	40	4	1	-	59	-	20
Sphaeriidae	*Sphaerium sp.*		-	-	-	-	-	24	-	-	-	-	-
Sphaeriidae	*Sphaerium corneum*	**1**	-	-	-	15	-	28	-	-	-	-	-
Sphaeriidae	*Pisidium/Euglesa/Odhneripisidium*		-	30	39	-	-	24	-	8	-	60	50
Worms													
Oligochaeta	Oligochaeta		1	40	198	2	100	7	18	43	54	40	60
Leeches													
Glossiphoniidae	Glossiphoniidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	1	-
Glossiphoniidae	*Theromyzon tessulatum*	**2**	-	-	-	-	-	-	-	-	-	1	1
Glossiphoniidae	*Glossiphonia complanata*	**1**	-	-	2	-	4	-	-	-	-	-	1
Glossiphoniidae	*Helobdella stagnalis*	**1**	-	-	-	-	-	1	-	-	-	1	2
Erpobdellidae	Erpobdellidae (juvenile/damaged)		-	-	3	-	2	1	-	-	3	-	1

Family	Species	Conservation Score	Crossing ID										
			C-172	C-167	C-194	B-14	B-12	B-08	C-091	BC-05	C-168	BC-12	B-11
Erpobdellidae	*Erpobdella octoculata*	**1**	-	-	2	-	-	-	-	2	-	-	5
Erpobdellidae	*Trocheta subviridis*	**4**	-	-	-	-	-	-	-	-	3	-	-
Hirudinidae	*Haemopis sanguisuga*	**4**	-	-	-	-	-	-	-	-	-	1	-
Piscicolidae	*Piscicola sp.*		-	-	-	4	-	-	-	-	-	-	-
Mites													
Hydracarina	Hydracarina		1	-	-	-	-	-	-	-	-	-	-
Oribatei	*Oribatei*		3	-	8	-	-	-	-	-	-	-	-
Crustaceans													
Ostracoda			-	-	29	-	-	1	-	1	63	-	1
Cladocera			-	-	-	-	-	1	-	-	-	-	-
Gammaridae	*Gammarus sp.*		-	-	123	-	20	-	-	5	-	5	-
Gammaridae	*Gammarus pulex*	**1**	-	-	182	-	2	-	2	3	-	20	-
Crangonyctidae	*Crangonyx sp. (floridanus/pseudogracilis)*		-	-	-	300	-	106	-	20	-	30	30
Corophidae	*Corophium curvispinum*	**3**	-	-	-	-	-	1	-	-	-	-	-
Asellidae	Asellidae		1	-	-	-	-	14	-	-	-	-	-
Asellidae	*Asellus sp./Proasellus sp.*		3	-	-	-	-	-	-	7	-	-	-
Asellidae	*Asellus aquaticus*	**1**	-	14	116	35	4	14	-	343	19	45	120
Asellidae	*Proasellus meridianus*	**3**	6	-	-	-	-	-	-	-	-	-	-
Mayflies													
Baetidae	Baetidae (juvenile/damaged)		-	-	-	-	-	-	-	15	-	-	-
Baetidae	*Cloeon dipterum*	**1**	-	-	-	25	-	-	-	55	-	25	7
Caenidae	*Caenis sp.*		-	-	-	-	68	-	-	-	-	-	-

Family	Species	Conservation Score	Crossing ID										
			C-172	C-167	C-194	B-14	B-12	B-08	C-091	BC-05	C-168	BC-12	B-11
Damselflies													
Coenagrionidae	Coenagrionidae (juvenile/damaged)		-	-	2	2	-	5	-	1	-	6	-
Coenagrionidae	*Ischnura elegans*	**1**	-	-	2	-	-	-	-	-	-	-	-
True bugs													
Pleidae	*Plea minutissima*	**4**	-	-	-	-	-	-	-	-	-	-	1
Corixidae	*Callicorixa praeusta*	**3**	-	-	-	1	-	-	-	1	-	-	-
Corixidae	*Corixa sp.*		-	-	1	-	-	-	-	-	-	-	-
Corixidae	*Hesperocorixa sahlbergi*	**2**	-	-	-	-	-	-	-	-	1	-	-
Corixidae	*Sigara sp.*		-	-	113	-	-	-	-	-	-	1	-
Corixidae	*Sigara dorsalis*	**1**	-	-	29	18	-	-	-	-	-	-	-
Notonectidae	*Notonecta sp.*		-	-	-	-	1	-	-	-	-	-	-
Notonectidae	*Notonecta glauca*	**1**	-	-	-	-	-	-	-	-	-	1	1
Notonectidae	*Notonecta maculata*	**5**	-	-	-	-	-	-	-	1	-	-	-
Beetles													
Haliplidae	Haliplidae (larvae/damaged)		-	1	2	1	-	-	-	3	-	-	2
Haliplidae	*Haliplus lineaticollis*	**1**	-	-	20	-	-	-	-	-	2	-	-
Gyrinidae	*Gyrinus substriatus*	**1**	-	-	11	-	-	-	-	-	-	-	-
Dytiscidae	Dytiscidae (larvae/damaged)		-	1	-	-	-	-	1	-	13	-	-
Dytiscidae	*Hygrotus versicolor*	**5**	-	-	-	-	-	-	-	-	-	-	3
Dytiscidae	*Hydroporus palustris*	**1**	-	-	12	-	-	-	-	-	1	-	-
Dytiscidae	*Hydroporus planus*	**2**	-	1	-	-	-	-	-	-	-	-	-
Dytiscidae	*Nebrioporus sp.*		-	-	-	-	-	-	-	4	-	-	-
Dytiscidae	*Platambus maculatus*	**1**	-	-	-	-	-	-	-	-	-	-	-

Family	Species	Conservation Score	Crossing ID										
			C-172	C-167	C-194	B-14	B-12	B-08	C-091	BC-05	C-168	BC-12	B-11
Dytiscidae	*Agabus bipustulatus*	**1**	-	-	1	-	-	-	-	-	-	-	-
Dytiscidae	*Agabus didymus*	**1**	-	-	4	-	-	-	-	-	-	-	-
Dytiscidae	*Agabus sturmii*	**1**	-	-	2	-	-	-	-	-	-	-	-
Hydrophilidae	*Helophorus sp.*		-	-	-	-	-	-	1	-	-	-	-
Scirtidae	Scirtidae (larvae/damaged)		-	-	-	-	-	-	-	-	-	-	-
Elmidae	*Elmis aenea*	**1**	-	-	-	-	44	-	-	-	-	-	-
Elmidae	*Oulimnius sp.*		-	-	-	-	1	-	-	-	-	-	-
Alderflies													
Sialidae	Sialidae (juvenile/damaged)		-	-	-	-	-	-	-	-	-	-	-
Sialidae	*Sialis lutaria*	**1**	-	2	7	3	1	3	-	15	-	2	-
Caddisflies													
Polycentropodidae	*Holocentropus dubius*	**4**	-	-	-	4	-	-	-	-	-	-	-
Hydropsychidae	*Hydropsyche sp.*		-	-	-	-	-	-	-	-	-	-	-
Hydropsychidae	*Hydropsyche angustipennis*	**1**	-	-	-	-	-	-	-	-	-	-	-
Hydropsychidae	*Hydropsyche siltalai*	**1**	-	-	-	-	2	-	-	-	-	-	-
Phryganeidae	*Agrypnia pagetana*	**5**	-	-	-	1	-	-	-	-	-	-	-
Limnephilidae	Limnephilidae (juvenile/damaged)		13	1	4	4	-	10	1	-	-	1	-
Limnephilidae	*Limnephilus sp.*		-	-	-	-	-	5	-	-	-	-	-
Limnephilidae	*Glyphotaelius pellucidus*	**3**	-	-	-	2	-	-	-	-	-	-	-
Leptoceridae	*Athripsodes aterrimus*	**1**	-	-	-	-	-	1	-	-	-	-	-
Trueflies													
Chironomidae	Chironomidae (damaged/pupea)		-	10	5	-	-	-	-	-	-	-	-
Chironomidae	Tanypodinae		-	24	8	-	3	6	-	16	2	-	-

Family	Species	Conservation Score	Crossing ID										
			C-172	C-167	C-194	B-14	B-12	B-08	C-091	BC-05	C-168	BC-12	B-11
Chironomidae	Orthocladiinae		-	15	26	8	-	1	2	-	-	-	-
Chironomidae	Chironomini		-	227	-	8	23	6	-	-	84	-	-
Chironomidae	Tanytarsini		-	10	12	-	-	2	-	-	-	-	-
Chironomidae	Prodiamesinae		-	-	-	-	8	7	-	-	-	-	-
Tipulidae	*Tipula sp.*		-	-	-	-	-	-	8	-	-	-	-
Pediciidae	Pediciidae		-	-	-	-	-	-	-	-	-	-	-
Pediciidae	Dicranota sp.		-	-	-	-	-	-	-	-	-	-	-
Limoniidae	Limoniidae		3	-	-	-	-	1	2	-	-	-	-
Limoniidae	Eleophila sp.		-	-	-	-	-	-	-	-	-	-	-
Psychodidae			-	1	4	-	2	5	-	3	-	-	-
Empididae			-	-	-	-	1	-	-	-	-	-	-
Ceratopogonidae			-	-	1	-	1	-	-	-	-	-	-
Stratiomyidae	*Beris sp.*		3	-	-	-	-	-	-	-	-	-	-
Chaoboridae			-	-	-	-	-	-	-	-	-	-	6
Ephydridae			-	-	-	-	-	-	-	-	1	-	-
Other Taxa													
Lepidoptera			-	-	-	-	-	-	1	-	-	2	2
Collembola			3	-	1	-	-	1	-	-	-	-	-
Diptera			-	2	-	-	-	12	-	10	-	-	-
Tricladida			-	-	-	-	-	-	-	-	-	-	1

Annex C Community Conservation Index (CCI)

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Annex C
Community Conservation Index (CCI)

The Community Conservation Index (CCI) (Chadd & Extence, 2004) allows a classification of the nature conservation value associated with a macroinvertebrate community. The CCI score for one sample is derived from individual Conservation Scores (CS), assigned to some species of aquatic macroinvertebrates and relating closely to the available published Red Data Books and subsequently updated Red Lists.

Conservation Scores assigned to individual species vary from 1 to 10, as detailed in Table C.1. The derived CCI scores generally vary from 0 to more than 20, as detailed in Table C.2, which provides a guide to interpreting CCI scores.

Table C.1 – Conservation Scores from the Community Conservation Index

Conservation score	Relation to Red Data Books
10	RDB1 (Endangered)
9	RDB2 (Vulnerable)
8	RDB3 (Rare)
7	Notable (but not RDB status)
6	Regionally notable
5	Local
4	Occasional (species not in categories 10-5, which occur in up to 10% of all samples from similar habitats)
3	Frequent (species not in categories 10-5, which occur in up to greater than 10-25% of all samples from similar habitats)
2	Common (species not in categories 10-5, which occur in up to greater than 25-50% of all samples from similar habitats)
1	Very common (species not in categories 10-5, which occur in up to greater than 50-100% of all samples from similar habitats)
Taken from (Chadd & Extence, 2004)	

Table C.2 – General guide to Community Conservation Index scores

CCI Score	Description	Interpretation
0 to 5.0	Reaches supporting only common species and/or community of low taxon richness	Low conservation value
greater than 5.0 to 10.0	Reaches supporting at least one species of restricted distribution and/or a community of moderate taxon richness	Moderate conservation value
greater than 10.0 to 15.0	Reaches supporting at least one uncommon species, or several species of restricted distribution and/or a community of high taxon richness	Fairly high conservation value
greater than 15.0 to 20.0	Reaches supporting several uncommon species, at least one of which may be nationally rare and/or a community of high taxon richness	High conservation value
greater than 20.0	Reaches supporting several rarities, including species of national importance and/or a community of very high taxon richness	Very high conservation value
Taken from (Chadd & Extence, 2004)		

Annex D Lotic-Invertebrate Index of Flow Evaluation (LIFE)

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Annex D
Lotic-Invertebrate Index of Flow Evaluation (LIFE)

The Lotic-Invertebrate Index for Flow Evaluation (LIFE) provides an assessment of the impact of variable flows on benthic macroinvertebrate communities (Extence, et al., 1999). Under the assessment, individual species of aquatic macroinvertebrates are assigned to a flow group varying from I to VI, as detailed in Table D..

The LIFE score for a macroinvertebrate sample is then derived (mean of individual scores) from individual taxon scores and abundances, as detailed in Table D.. The LIFE scores for a macroinvertebrate sample range from 1 to 12, where highest scores describe communities adapted to rapid flows.

Table D.1 – Flow groups used to derive LIFE scores

LIFE score group	Description	Mean current velocity
I	Taxa primarily associated with rapid flows	Typically greater than 100 $cm.s^{-1}$
II	Taxa primarily associated with moderate to fast flows	Typically 20 to 100 $cm.s^{-1}$
III	Taxa primarily associated with slow or sluggish flows	Typically less than 20 $cm.s^{-1}$
IV	Taxa primarily associated with (usually slow) and standing waters	
V	Taxa primarily associated with standing waters	
VI	Taxa frequently associated with drying or drought impacted sites	
Taken from (Extence, et al., 1999)		

Table D.2 – LIFE scoring matrix combining flow groups and abundance categories

Flow groups	Abundance categories			
	A (1 to 9)	B (10 to 99)	C (100 to 999)	D/E (greater than 1000)
I	9	10	11	12
II	8	9	10	11
III	7	7	7	7
IV	6	5	4	3
V	5	4	3	2
VI	4	3	2	1
Taken from (Extence, et al., 1999)				

Annex E
Portion of Sediment-sensitive Invertebrates

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Annex E
Proportion of Sediment-sensitive Invertebrates

6.3.19 The Proportion of Sediment-sensitive Invertebrates (PSI) index allows an assessment of the extent to which a water body is composed of, or covered by, fine sediments (Extence, et al., 2013).

6.3.20 Under this system, individual species of aquatic macroinvertebrates are assigned a Fine Sediment Sensitivity Rating (FSSR) as detailed in Table E., and abundance rating based on LIFE scores as detailed in Table E.. The PSI score for the aquatic macroinvertebrate sample is then derived from the individual species scores and abundances, as detailed in Table E.. The PSI score corresponds to the per centage of fine sediment-sensitive taxa present in a sample and ranges from 0 to 100, with low scores corresponding to waterbodies with high fine sediment cover.

Table E.1 – Fine Sediment Sensitivity Rating (FSSR) groups used to derive PSI scores

FSSR group	Description
A	Highly sensitive
B	Moderately insensitive
C	Moderately insensitive
D	Highly insensitive
Taken from (Extence, et al., 2013)	

Table E.2 – Abundance categories and scoring matrix used to derive PSI scores

FSSR group	Abundance categories			
	A (1 to 9)	B (10 to 99)	C (100 to 999)	D/E (greater than 1000)
A	2	3	4	5
B	2	3	4	5
C	1	2	3	4
D	1	2	3	4
Taken from (Extence, et al., 2013)				

Table E.3 – Interpretation of PSI scores

PSI	Description
81-100	Minimally sedimented
61-80	Slightly sedimented
41-60	Moderately sedimented
21-40	Sedimented
0-20	Heavily sedimented
Taken from (Extence, et al., 2013)	

Annex F
Whalley, Hawkes, Paisley & Trigg Metric

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Annex F
Whalley, Hawkes, Paisley & Trigg Metric

There are approximately 4,000 species of aquatic macroinvertebrates in the British Isles. To simplify the analysis of the samples and the data we do not identify individual species but only the major types (taxa), mostly at the family taxonomic level. A key piece of information is the number of different taxa at a site. A fall in the number of taxa indicates ecological damage, including pollution (organic, toxic and physical pollution such as siltation, and damage to habitats or the river channel).

The Whalley, Hawkes, Paisley & Trigg (WHPT) scoring system (Water Framework Directive UK Technical Advisory Group, 2023) is based upon the sensitivity of macroinvertebrate families to organic pollution. It replaces the Biological Monitoring Working Party (BMWP) system (Hawkes, 1997) previously used in the UK.

The WHPT system assigns a numerical value to about 100 different taxa (known as the WHPT-scoring taxa) according to their sensitivity to organic pollution. In addition to the presence of macroinvertebrate taxa at a sampling Reach, as in the BMWP scoring system, the WHPT system also uses another type of information, this being the abundances of different scoring taxa.

Taxa abundances are classified in four categories (Class 1: 1 to 10 individuals, Class 2: 11 to 100 individuals, Class 3: 101 to 1,000 individuals, and Class 4: greater than 1,000 individuals). A score (Pressure Sensitivity Scores (PSs) is then assigned to each taxa, depending on the taxa sensitivity and abundances recorded.

The total WHPT score for a sample corresponds to the sum of PSs of scoring taxa recorded. The Average Score Per Taxon (ASPT) values are calculated as the Sum PSs divided by the number of scoring taxa (NTAXA). As such, three metrics are calculated:

- WHPT score;
- NTAXA; and
- ASPT.

Some animals are more susceptible to organic pollution than others, and the presence of sensitive species indicates good water quality. This fact is taken into account by the WHPT metrics.

The most useful way of summarising the biological data was found to be one that combined the number of taxa and the ASPT. The best quality is indicated by a diverse variety of taxa, especially those that are sensitive to pollution. Poorer quality is indicated by a smaller than expected number of taxa, particularly those that are sensitive to pollution. Organic pollution sometimes encourages an increased abundance of the few taxa that can tolerate it. However, maximum achievable values will vary between geological regions. For example, pristine lowland streams in East Anglia will always score lower than pristine Welsh mountain streams because they are unable to support many of the high-scoring taxa associated with fast flowing habitat. WHPT scores and ASPT for different types watercourse are dependent on the quality and diversity of habitat, natural water chemistry (associated with geology, distance from source etc.), altitude, gradient, time of year the sample was taken and other factors.

Annex G
Aquatic macrophyte taxa list

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Annex G
Aquatic macrophyte taxa list

This Annex contains a full list of the aquatic macrophyte taxa recorded during the field surveys. Survey locations are illustrated in **Figure A8.10.2 Aquatic Survey Locations – Macrophytes** in Annex A.

Table G.1 – Aquatic macrophyte taxa list

		Crossing ID																				
Scientific name	**Common name**	**B-06**	**B-14**	**B-09**	**B-10**	**B-11**	**B-12**	**B-13**	**B-08**	**C-006**	**C-008**	**BC-29**	**C-075**	**C-010**	**B-16**	**BC-03**	**BC-05**	**C-051**	**C-149**	**C-167**	**C-168**	**C-162**	**BC-12**
Alisma plantago-aquatica	Common water-plantain	3														4							
Apium nodiflorum	Fool's watercress						3	2		2	7	1	6		4		2		5			4	
Berula erecta	Lesser water parsnip								4														
Callitriche spp.	Starwort					6						5		1			2	3	2	2			5
Caltha palustris	Marsh pennywort																						
Carex acutiformis	Lesser pond-sedge		3						1														
Ceratophyllum demersum	Rigid hornwort					6																	4
Chara vulgaris	Common stonewort		3																				
Cirisium sp.	Thistle																						
Cladophora glomerata/ Rhizoclonium hieroglyphicum	Blanketweed		9			7	6		8			4		2	7				3				6
Elodea nuttallii	Nuttall's waterweed	3	6	1		1												1					3
Epilobium hirsutum	Hairy willowherb		1						4	6	2		7	3	1							1	
Epilobium spp.	Willowherb						1	1									1						
Equisetum arvense	Field horsetail																						
Equisetum palustre	Marsh horsetail																					1	
Fontinalis antipyretica	Willow moss			1																			
Glyceria fluitans agg	Floating sweet-grass	4				1	1											5		1			1
Glyceria maxima	Reed sweet-grass			2		5			4														3
Impatiens glandulifera	Himalayan balsam			2			Bank								1								
Iris pseudacorus	Yellow flag		2						4														
Juncus effusus	Soft rush	2				Bank																	
Juncus inflexus	Hard rush					Bank						Bank											Bank
Lemna gibba	Fat duckweed		6			5					5						6						
Lemna minor	Lesser duckweed									1	8			1		7			7	1	1		
Lemna minuta	Minute duckweed																3						
Lemna sp.	Duckweed						3																
Lemna trisulca	Ivy-leaved duckweed		1																				

		Crossing ID																				
Scientific name	**Common name**	**B-06**	**B-14**	**B-09**	**B-10**	**B-11**	**B-12**	**B-13**	**B-08**	**C-006**	**C-008**	**BC-29**	**C-075**	**C-010**	**B-16**	**BC-03**	**BC-05**	**C-051**	**C-149**	**C-167**	**C-168**	**C-162**	**BC-12**
Leptodictyum fluviatile	Stringy moss														1								
Lycopus europaeus	Gypsywort								1														
Mentha aquatica	Water mint								4			2											
Myosotis sp(p).	Forget-me-not																						1
Myriophyllum spicatum	Spiked water-milfoil											2											5
Nasturtium officinale agg.	Water-cress			3		2					4	2						2	9				1
Pellia endiviifolia	Endive pellia							1															
Persicaria amphibia	Amphibious bistort			1			2										1						1
Persicaria hydropiper	Water pepper								1														
Phalaris arundinacea	Reed canary grass	1	4	4		3		1	4	2	3					6	4	3	4				
Phragmites australis	Common reed	2	2			4					2		2			4		6	9	9	9		7
Potamogeton natans	Broad-leaved pondweed	9				3												2					2
Potamogeton pusillus	Lesser pondweed															8							
Ranunculus (Batrachian) sp	Water crowfoot			1								2											
Ranunculus repens	Creeping buttercup										1												
Ranunculus sceleratus	Celery-leaved crowfoot															1							
Ranunculus spp.				1																			
Rorippa amphibia	Great yellow-cress																2						
Rumex hydrolapathum	Water dock								3														
Sagittaria sagittifolia	Arrowhead					3																	
Schoenoplectus lacustris	Common club-rush											3											
Scrophularia spp.	Figwort					1	Bank								1							1	
Solanum dulcamara	Woody nightshade						1		4						1							2	
Sparganium emersum	Unbranched bur-reed																						
Sparganium erectum	Branched bur-reed	3	6	6		4			5		1							1					2
Stuckenia pectinata	Fennel pondweed			4		6						1						8					4
Typha latifolia	Bulrush	2		5												5							
Ulva flexuosa	Gutweed					1	2										4						1
Urtica dioica	Nettle																						

		Crossing ID																					
Scientific name	**Common name**	**B-06**	**B-14**	**B-09**	**B-10**	**B-11**	**B-12**	**B-13**	**B-08**	**C-006**	**C-008**	**BC-29**	**C-075**	**C-010**	**B-16**	**BC-03**	**BC-05**	**C-051**	**C-149**	**C-167**	**C-168**	**C-162**	**BC-12**
Veronica beccabunga	Brooklime															2							
Veronica catenata	Pink water-speedwell											2					1						
Veronica catenata x anagallis-aquatica	Hybrid water-speedwell										2						2		5				
Veronica spp.	Speedwell																						1
Zannichellia palustris	Horned pondweed																		4				

Annex H Watercourse Site Descriptions

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Annex H
Watercourse Site Descriptions

Table H.1 – Watercourse site description for each crossing point surveyed

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
BC-03	100% silt substrate, average water depth 30 cm, wetted width 1 m and less than 10 cm/sec flow	Woody debris (5%), macrophytes (50%)	Channel realigned, culverting, water moderately turbid, no channel shading	Ditch	None	Uniform vegetation structure in both banks, surrounding land use of tilled/arable land, tall herb/rank vegetation, buildings
B-08	100% silt substrate, average water depth 1 m, wetted width 8 m and less than 10 cm/sec flow	Woody debris (1%), macrophytes (20%)	Channel realigned, water slightly turbid, no channel shading	Canal	None	Uniform vegetation structure on both banks, surrounding land use of tilled/arable land, broadleaf woodland, scrub, tall herb/rank vegetation, footpath
B-09	Fine substrate dominant (90% silt, 10% sand), average water depth 40 cm, wetted width 3.5 m and 10 to 25 cm/sec flow	Woody debris (10%), macrophytes (20%), filamentous algae (5%)	Culverting, water clear, no channel shading	Run	None	Uniform vegetation structure on both banks, surrounding land use of tilled/arable land, broadleaf woodland, tall herb/rank vegetation, road, pasture

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
B-10	Fine substrate dominant (90% silt, 10% sand), average water depth 40 cm, wetted width 1.5 m and less than 10 cm/sec flow	Woody debris (10%), macrophytes (10%)	Channel realigned, water slightly turbid, light channel shading	Ponded reach	None	Simple vegetation structure on both banks, surrounding land use of tilled/arable land, scrub, tall herb/rank vegetation, buildings, road
B-11	100% silt substrate, average water depth 1 m, wetted width 5 m and less than 10 cm/sec flow	Macrophytes (70%), filamentous algae (90%	Channel realigned, evidence of recent dredging, water clear, no channel shading	Ditch	None	Uniform vegetation structure on both banks, surrounding land use of tilled/arable land, tall herb/rank vegetation, road
B-12	Mixed substrate composition (5% cobble, 55% pebble, 20% gravel, 20% silt), average water depth 15 cm, wetted width 2.5 m and 25 to 50 cm/sec flow	Woody debris (5%), tree roots (2%), filamentous algae (70%)	Water clear, channel heavily shaded	Run	None	Complex vegetation structure on left bank, uniform on right bank, surrounding land use of broadleaf woodland, tilled/arable land, tall herb/rank vegetation
B-13	Mixed substrate composition (20% cobble, 30% pebble, 30% gravel, 10% silt, 10% clay), average water depth 10 cm,	Woody debris (20%), tree roots (5%), filamentous algae (30%)	Channel realigned, water clear, moderately shaded channel	Run	Trace overlay silt	Complex vegetation structure on left bank, uniform on right bank, surrounding land use of broadleaf

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
	wetted width 1.5 m and 10 to 25 cm/sec flow					woodland, tilled/arable land, tall herb/rank vegetation, scrub
B-14	Fine substrate dominant (75% silt, 25% clay), water depth 50 cm, wetted width 5 m and less than 10 cm/sec flow	Macrophytes (40%), filamentous algae (5%)	Channel realigned, evidence of recent dredging, macrophyte cut back, water slightly turbid, light channel shading	Ditch	None	Uniform vegetation structure on both banks, surrounding land use of tilled/arable land, tall herb/rank vegetation, scrub, broadleaf woodland, buildings
B-16	Mixed substrate composition (10% boulder, 5% cobble, 20% pebble, 20% gravel, 40%sand, 5% silt), average water depth 20 cm, wetted width 2 m and 10 to 25 cm/sec flow	Woody debris (30%), tree roots (5%), filamentous algae (50%)	Culverting, water clear, moderately shaded channel	Riffle, run, pool	None	Uniform vegetation structure on left bank, complex on right bank, surrounding land use of broadleaf woodland, tilled/arable land, tall herb/rank vegetation
BC-05	Fine substrate dominant (75% silt, 25% clay), water depth 40 cm, wetted width 3 m and less than 10 cm/sec flow	Woody debris (1%), tree roots (1%), macrophytes (10%)	Channel realigned, culverting, water clear, light channel shading	Ditch	Odour (anoxic substrate)	Complex vegetation structure on left bank, uniform on right bank, surrounding land use broadleaf woodland,

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
						tilled/arable land, scrub, tall herb/rank vegetation
BC-06	100%silt substrate, average water depth 10 cm, wetted width 0.5 m and 10 to 25 cm/sec flow	Woody debris (35%)	Channel realigned, culverting, water clear, light channel shading	Ditch	None	Complex vegetation structure on left bank, uniform on right bank, surrounding land use tilled/arable land, tall herb/rank vegetation, buildings, road
BC-12	100% silt substrate, average water depth 70 cm, wetted width 5 m and less than 10 cm/sec flow	Macrophytes (70%), filamentous algae (90%)	Channel realigned, water clear, no channel shading	Ditch	Thin overlay silt	Uniform vegetation structure on both banks, surrounding land use of tilled/arable land, tall herb/rank vegetation, road
BC-15	100% silt substrate, average water depth 10cm, wetted width 0.5 m and less than 10 cm/sec flow	Woody debris (5%), macrophytes (80%)	Channel realigned, water clear, moderate channel shading	Ditch	None	Uniform vegetation structure on both banks, surrounding land use of pasture, scrub, tall herb/rank vegetation

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
BC-29	100% silt substrate, average water depth 70 cm, wetted width 1.75 m and less than 10 cm/sec flow	Woody debris (5%), macrophytes (10%)	Channel realigned, evidence of recent dredging, culverting, water clear, no channel shading	Ditch	None	Simple vegetation structure on both banks, surrounding land use of broadleaf woodland, tilled/arable land, scrub, tall herb/rank vegetation
BC-37	100% silt substrate, average water depth 40 cm, wetted width 4 m and less than 10 cm/sec flow	Woody debris (5%), macrophytes (90%), filamentous algae (50%)	Channel realigned, culverting	Ditch	Thin ochre	Simple vegetation structure on left bank, uniform on right bank, surrounding land use of tilled/arable land, tall herb/rank vegetation, farm track
C-005	Fine substrate dominant (5% gravel, 15% sand, 80% silt), average water depth 3 cm, wetted width 0.4 m, and less than 10 cm/sec flow	Woody debris (40%), macrophytes (5%), filamentous algae (10%)	Channel realigned, pipe crossing, water clear, moderate channel shading, sections of channel dry	Ditch	None	Complex vegetation structure on let bank, uniform on right bank, surrounding land use broadleaf woodland, tall herb/rank vegetation, road, pasture

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
C-006	100% silt substrate, average water depth 10 cm, wetted width 0.4 m and no perceptible flow	Woody debris (30%)	Channel realigned, water clear, moderate channel shading	Ditch	None	Complex vegetation structure on let bank, uniform on right bank, surrounding land use of tilled/arable land, tall herb/rank vegetation, road, pasture
C-008	Fine substrate dominant (30% gravel, 50%t sand, 20% silt), average water depth 15 cm, wetted width 1 m and less than 10 cm/sec flow	Macrophytes (90%)	Channel realigned, culverting, water clear, light channel shading	Ditch	None	Uniform vegetation structure on both banks, surrounding land use of broadleaf woodland, tilled/arable land, tall herb/rank vegetation, farm track
C-010	Fine substrate dominant (80% sand, 20% silt), average water depth 15 cm, wetted width 0.5 m and no perceptible flow	Woody debris (20%, tree roots (5%)	Channel realigned, water clear, moderate channel shading	Ditch	None	Complex vegetation structure on left bank, uniform on right bank, surrounding land use of tilled/arable land, hedgerows, road

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
C-011	Fine substrate dominant (5% boulder, 95 5 silt), average water depth 50 cm, ponded dimensions 50 m x 20 m, no perceptible flow	Woody debris (20%), macrophytes (70%)	Slight turbidity, moderate shading	Ponded reach	None	Mixture of uniform, simple and complex vegetation structure on banks, surrounding land use of tilled/arable land, hedgerow, tall herb/rank vegetation, road
C-051	100% silt substrate, average water depth 20 cm, wetted width 2 m and less than 10 cm/sec flow	Woody debris (5%), macrophytes (80%), filamentous algae (15%)	Channel realigned, sluice gate, water slightly turbid, no channel shading	Ditch	Ochre, oil film	Uniform vegetation structure on both banks, surrounding land use of broadleaf woodland, tilled/arable land, tall herb/rank vegetation
C-062	Mixed substrate composition (10%boulder, 20% gravel, 5% sand, 65%silt), average water depth 10 cm, wetted width 0.5 m and less than 10 cm/sec flow	Woody debris (5%), macrophytes (60%)	Channel realigned, culverting, water clear, no channel shading	Ditch	None	Uniform vegetation structure on both banks, surrounding land use of tilled/arable land, tall herb/rank vegetation, road

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
C-075	Fine substrate dominant (5% pebble, 75% gravel, 20%silt), average depth 10 cm, wetted width 0.9 m and 10 to 25 cm/sec flow	Woody debris (20%), tree roots (10%)	Culverting, water clear, heavily shaded channel	Run	None	Complex vegetation structure on left bank, uniform on right bank, surrounding land use of broadleaf woodland, tall herb/rank vegetation, pasture, road
C-091	Fine substrate dominant (50% silt, 50% clay), average depth 7 cm, wetted width 0.75 m and 10 to 25 cm/sec flow	None	Culverting, water clear, light channel shading	Ditch	None	Uniform vegetation structure on left bank, simple on right bank, surrounding land use of broadleaf woodland, tilled/arable land, scrub, tall herb/rank vegetation
C-139	Mixed substrate composition (2% boulder, 5% cobble, 43% pebble, 30% gravel, 20% sand), average water depth 15cm, wetted width 1.5 m and 10 to 25 cm/sec flow	Woody debris (50%), tree roots (30%), filamentous algae (10%)	Water clear, channel heavily shaded	Riffle, run, pool, glide	None	Complex vegetation structure on both banks, surrounding land sue of broadleaf woodland, tilled/arable land, semi-improved grassland, scrub, tall herb/rank vegetation, buildings

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
C-140	Mixed substrate composition (10% pebble, 20% gravel, 50% sand, 20% silt), average depth 10 cm, wetted width 1.25 m, less than 10 cm/sec flow	Woody debris (50%), tree roots (10%)	Channel realigned, water clear, channel heavily shaded	Run, pool	None	Complex vegetation structure on both banks, surrounding land use of broadleaf woodland, tilled/arable land, scrub, tall herb/rank vegetation, buildings
C-141	100% silt substrate, average water depth 10 cm, wetted width 1 m and less than 10 cm/sec flow	Woody debris (40%), tree roots (10%)	Channel realigned, water clear, channel moderately shaded	Pool	Thin sewage fungus (30%)	Complex vegetation structure on both banks, surrounding land use of broadleaf woodland, tilled/arable land, scrub, tall herb/rank vegetation, road, semi-improved grassland
C-149	100% silt substrate, average water depth 20 cm, wetted width 1 m and less than 10 cm/sec flow	Woody debris (1%), macrophytes (10%)	Channel realigned, water clear, no channel shading	Ditch	None	Uniform vegetation structure on both banks, surrounding land use of tilled/arable land, tall herb/rank vegetation, scrub, broadleaf woodland
C-162	Finer substrate dominant (40% sand, 50% silt/clay and 10% sand), average water	Macrophytes (5%)	Channel realigned, water clear, heavy channel shading	Ditch	None	Complex vegetation structure on both banks, surrounding land use tall

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
	depth 5 cm, wetted width 0.7 m and less than 10 cm/sec flow					herb/rank vegetation, broadleaf woodland, scrub, and tilled/arable farmland.
C-167	Mixed substrate dominant (50% clay and 50% silt), average water depth 5 cm, wetted width 1 m and 10 - 25 cm/sec flow	Macrophytes (15%)	Channel realigned, water slightly turbid, no channel shading	Ditch	None	Uniform vegetation structure in left bank and complex vegetation structure on the right bank, surrounding land use tall herb/rank vegetation, broadleaf woodland, scrub, and tilled/arable farmland.
C-168	Mixed substrate dominant (50% clay and 50% silt), average water depth 5 cm, wetted width 1 m and less than 10 cm/sec flow	Macrophytes (60%)	Channel realigned, water clear, no channel shading	Ditch	None	Uniform vegetation structure in both banks, surrounding land use tall herb/rank vegetation, road and tilled/arable farmland.
C-172	Compact substrate dominant (80% clay and 20% silt), average water depth 20 cm,	Woody debris (2%), macrophytes (1%)	Channel realigned, water clear, no channel shading	Ditch	Trace ochre	Uniform vegetation structure in both banks, surrounding land use tall

Crossing Point ID	Channel details	Plant & other cover	Influences	Morphology	Contamination	Banks/land use
	wetted width 0.4 m and less than 10 cm/sec flow					herb/rank vegetation, broadleaf woodland, road, public footpath and tilled/arable farmland.
C-194	Finer substrate dominant (20% sand, 30% silt and 20% clay), average water depth 20 cm, wetted width 1.5 m and less than 10 cm/sec flow	Macrophyte cover (20%)	Dredging and channel realignment, clear water and light shading	Ditch	None	Uniform vegetation structure in both banks, weed cutting, surrounding land use tall herb/rank vegetation and tilled/arable farmland.

Annex I Statutory Designated Sites and Non-Statutory Designated Sites relating to aquatic ecology

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Annex I
Statutory Designated Sites and Non-Statutory Designated Sites relating to aquatic ecology.

Table I.1 – Statutory designated sites

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
Internationally designated sites within 10 km of the Order Limits			
Humber Estuary SAC	The Humber Estuary acts as an important migration route for Annex II species of the Habitats Directive (The Council of the European Communities, 1992) (sea lamprey *Petromyzon marinus* and river lamprey *Lampetra fluviatilis*) between coastal waters and their spawning areas. These species present as a qualifying feature, but not a primary reason for selection of this site.	Partly within the Order Limits	B
Humber Estuary Ramsar	The Humber Estuary acts as an important migration route for Annex II species of the Habitats Directive (sea lamprey and river lamprey) between coastal waters and their spawning areas (United Nations Educational, Scientific, and Cultural Organization, 1971) These species present as a qualifying feature, but not a primary reason for selection of this site.	Partly within the Order Limits	B
Thorne Moor SAC	The Habitats Directive Annex I habitat (The Council of the European Communities, 1992) that is a primary reason for selection of this site is degraded raised bogs still capable of natural regeneration (Joint Nature Conservation Committee, 2026), with restored secondary surfaces supporting taxa such as bog-mosses *Sphagnum spp*. and round-leaved sundew (*Drosera rotundifolia*).	2.69 km	C
Hatfield Moor SAC	The Habitats Directive Annex I habitat that is a primary reason for selection of this site is degraded raised bogs still capable of natural regeneration (Joint Nature Conservation Committee, 2026), with refugia supporting taxa such as bog-mosses (*Sphagnum spp.*), and bog-rosemary (*Andromeda polifolia*). The system of drainage ditches within the site represents the most diverse running water habitat in South Yorkshire and exhibits an unusual combination of acid and base rich aquatic plant communities. An unusually rich collection of Potamogeton pondweeds occur, 12 species having been recorded including, for example, longstalked pondweed (*P. praelongus*), reddish pondweed (*P. alpinus*) and shining pondweed (*P. lucens*) which are scarce in the county. Associated submerged species include greater bladderwort (*Utricularia vulgaris*), arrowhead (*Sagittaria*	5.73 km	D

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
	sagittifolia) and the nationally rare short-leaved water starwort (*Callitriche truncata*). There is also a diverse emergent and marginal vegetation including *Eleocharis acicularis*, brown sedge (*Carex disticha*) and cyperus sedge (*Carex pseudocyperus*).		
Nationally designated sites within 5 km of the Order Limits			
Humber Estuary SSSI	The Humber Estuary SSSI is designated for a series of nationally important habitats. It is nationally important for river lamprey and sea lamprey, a vascular plant assemblage (e.g., divided sedge *Carex divisa*), and an invertebrate assemblage. The Estuary acts as an important migration route for both river lamprey and sea lamprey between coastal waters and their spawning areas. Aquatic invertebrate assemblages are also well represented, including water beetles such as the spattered diver (*Agabus conspersus*) and *Helophorus fulgidicollis* (Natural England, 2004).	Partly within the Order Limits	B
Chesterfield Canal SSSI	This site, a 20 km stretch of canal between Retford and Misterton in north Nottinghamshire, supports a nationally uncommon aquatic plant community characteristic of the brackish, eutrophic (nutrient-rich) water. The flora includes several nationally scarce species. The presence of this brackish water community, over 50 km inland, is of particular interest. The canal's water plant community comprises species such as water milfoil (*Myriophyllum spicatum*), fennel pondweed (*Stuckenia pectinata*), perfoliate pondweed (*Potamogeton perfoliatus),* brackish water crowfoot (*Ranunculus baudotii*), short-leaved water starwort (*Callitriche truncata*), and algae of the genus Cladophora. There is a local abundance of the rare hybrid Linton's pondweed (*Potamogeton x lintonii*), and the pointed stonewort (*Nitella mucronata*). The invasive non-native species Canadian water weed (*Elodea canadensis*), and Nuttall's waterweed (*Elodea nuttallii*) are also recorded. The rich marginal vegetation is locally dominated by reed sweet grass (*Glyceria maxima*), branched bur-reed (*Sparganium erectum*), common reed (*Phragmites australis*), and greater pond sedge (*Carex riparia*). Great water dock (*Rumex hydrolapathum*), yellow iris (*Iris pseudacorus*), skullcap (*Scutellaria galericulata*) and greater tussock-sedge (*Carex paniculata*) also occur (Natural England, 1988).	Partly within the Order Limits	E

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
Crowle Borrow Pits SSSI	Contains several small ponds with marginal species such as common water-plantain (*Alisma plantago-aquatica*), common spike-rush (*Eleocharis palustris*), yellow iris (*Iris pseudacorus*), gypsywort (*Lycopus europaeus*), lesser spearwort (*Ranunculus flammula*), marsh yellowcress (*Rorippa islandica*) and brookweed (*Samolus valerandi*) (Natural England, 1986).	Adjacent to the Order Limits	C
Treswell Wood SSSI	Treswell Wood SSSI comprises one of the best examples of an ash-oak-maple wood in Nottinghamshire and is representative of ancient semi-natural woodland on heavy clay soils in Eastern and Central England. Additional interest is provided by the presence of woodland rides, watercourses and ponds. North Beck crosses the site (Natural England, 1981).	Partly within Order Limits	E
Hatfield Chase Ditches SSSI	The site comprises three main ditch sections, the North Idle Drain, North Level Engine Drain, and South Engine Drain, and some of their feeder ditches. These ditches hold water throughout the year and have a range of water depths. They contain a rich assemblage of aquatic and emergent plants, typical of nutrient rich systems. These include broad-leaved pondweed (*Potamogeton natans*), fennel pondweed, common duckweed (*Lemna minor*), ivy-leaved duckweed (*Lemna trisulca*), various-leaved pondweed (*Potamogeton gramineus*), intermediate water-starwort (*Callitriche hamulata*), and floating clubrush (*Eleogiton fluitans*). Also present are common reed, reed canary-grass (*Phalaris arundinacea*), branched bur-reed, and several sedge species. *Donacia clavipes* and *Donacia simplex* are nationally scarce reed beetles that have been recorded at the site. The ditches also support a population of water vole (*Arvicola amphibius*) (Natural England, 1999).	0.28 km	C
Mother Drain, Misterton SSSI	A drainage channel running parallel to the River Idle on the edge of the North Nottinghamshire Carr Lands. Due to its good water quality and the botanical and structural diversity of its open water, emergent and bankside communities, the site supports an exceptionally rich invertebrate fauna. The site supports a large assemblage of dragonflies and damselflies. Fourteen species have been recorded as breeding, with a fifteenth regularly noted at the site. Three of these (variable damselfly (*Coenagrion pulchellum*), hairy dragonfly	0.65 km	E

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
	(*Brachytron pratense*), and black darter (*Sympetrum danae*)) are of nationally notable status, and a further three (banded agrion (*Calopteryx splendens*), brown hawker (*Aeschna grandis),* and four-spotted chaser (Libellula quadrimaculata)) are at the northern edge of their normal UK range. The site includes seven nationally scarce species of water beetle, *Rhantus grapii, Dytiscus circumcinctus, Cercyon convexiusculus, Cercyon ustulatus, Chaetarthria seminulum, Hydraena testacea* and *Limnebius nitidus.* The site also supports the rare marsh carpet moth (*Gagitodes sagittata)*. Open water communities of common aquatic plants occupy the central bed of the channel. These are flanked by stands of robust emergent species. Sand leek (*Allium scorodoprasum*) occurs here in its only Nottinghamshire locality (Natural England, 1993).		
Haxey Grange Fen SSSI	The site lies on the flat carr land of the River Idle valley and is divided by a system of internal ditches. The mosaic of vegetation types is determined by local variations in the water level. The site contains shallow temporary pools with stands of hare's tail cottongrass (*Eriophorum vaginatum*) and bittersweet (*Solanum dulcamara*). The bare peat at the pool margins supports nationally notable ground beetles such as *Blethisa multipunctata*. North Carr Drain supports pond water crowfoot (*Ranunculus peltatus*), branched bur-reed (*Sparganium erectum*) and curled pondweed (*Potamogeton crispus*) (Natural England, 1988).	1.37 km	D
Castle Hill Wood SSSI	The watercourse flowing along the northern boundary of the wood supports a population of opposite-leaved golden saxifrage (*Chrysosplenium oppositifolium*) (Natural England, 1983).	2.41 km	E
River Idle Washlands SSSI	Good wet grassland plant communities and includes internal drains with stands of reed sweet-grass (*Glyceria maxima*) and common reed (*Phragmites australis*) (Natural England, 1983).	2.49 km	E
Drewton Lane Pits SSSI	This site is notified for its nationally important populations of great crested newt (*Triturus cristatus),* and outstanding assemblage of breeding amphibians including	2.55 km	A

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
	breeding toads (*Bufo bufo*), smooth newts (*Triturus vulgaris*) and common frogs (*Rana temporaria*) (Natural England, 1993a).		
Thorne, Crowle and Goole Moors SSSI	Wet peat cuttings are typically dominated by common cotton-grass (*Eriophorum angustifolium*) and occasionally soft rush (*Juncus effusus*) but locally there are carpets of bog mosses (*Sphagnum spp.*) (Natural England, 2023).	2.69 km	C
Humberhead Peatlands NNR	The Humberhead Peatlands comprise Thorne, Goole, and Crowle Moors, as well as Hatfield Moors. Please see designations in relation to aquatic ecology for these statutory designated sites.	2.70 km	C
Misson Line Bank SSSI	The site contains some of the best remaining examples of eutrophic open water, marsh, and base-poor fen communities in Nottinghamshire. Wetter soils support species such as lesser spearwort (*Ranunculus flammula*) and slender tufted sedge (*Carex acuta*). Water-filled borrow pits are characterised by common spike rush (*Eleocharis palustris*), grey club rush (*Scirpus tabernaemontani*) and soft rush (*J. effusus*) in marginal areas, and contain such plants as tufted forget-me-not (*Myosotis caespitosa*), tubular water dropwort (*Oenanthe fistulosa*), and lesser water plantain (*Baldellia ranunculoides*). In deeper water the marsh is replaced, locally, by reed swamp dominated by common reed (*Phragmites australis*), lesser bulrush (*Typha angustifoliai)* or bulrush (*T. latifolia*). The aquatic community of the larger pools contain abundant broad-leaved pondweed (*Potamogeton natans*), fennel pondweed (*P. pectinatus*), Canadian water weed (*Elodea canadensis*), alternate water milfoil (*Myriophyllum alterniflorum*), lesser marshwort (*Apium inundatum*), and the liverwort (*Ricciocarpus natans*), while a plant of less frequent occurrence is the various-leaved pondweed (*P. gramineus*) (Natural England, 1983).	2.80 km	E
Misson Training Area SSSI	The interior and boundary drains hold areas of standing water and support interesting aquatic plant communities. Typical species include blunt-fruited water-starwort (*Callitriche obtusangula*), opposite-leaved pondweed (*Groenlandia densa*) and thread-leaved water crowfoot (*Ranunculus trichophyllus*). A number of regionally uncommon plants are associated with these ditches such as lesser water-plantain (*Baldellia ranunculoides*) and floating club-rush (*Eleogiton fluitans*),	2.89 km	E

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
	which is found here at its only current Nottinghamshire locality (Natural England, 1997).		
Lea Marsh SSSI	The SSSI is an important area of unimproved floodplain meadow and wet pasture adjacent to the River Trent in the northwest of Lincolnshire. The SSSI is the only known locality in Lincolnshire supporting populations of narrow-leaved water-dropwort (*Oenanthe silaifolia*), a nationally scarce plant of very restricted distribution in the East Midlands, and the nationally scarce mousetail (*Myosurus minimus*). Water vole has been recorded from the perimeter ditches (Natural England, 1998). Drains at the perimeter of the site support species such as common duckweed (*Lemna minor*), water forget-me-not (*Myosotis scorpioides*), water mint (*Mentha aquatica*), amphibious bistort (*Polygonum amphibium*), lesser pond sedge (*Carex acutiformis*), common reed (*Phragmites communis*), common reedmace (*Typha latifolia*), reed sweet-grass (*Glyceria maxima*) and branched bur-reed (*Sparganium erectum*) (Natural England, 1998).	3.13 km	E
South Cliffe Common SSSI	The Hotham Carr area within this site is a mixture of wet acid grassland, poor fen, and birch woodland, with limited areas of basin mire and bog pools. The area contains rushes *Juncus acutiflorus, J. effuses, J. inflexus* and *J. conglomeratus* in the wetter areas and a variety of poor-fen species such as marsh cinquefoil (*Potentilla palustris*), marsh pennywort (*Hydrocotyle vulgaris*), and marsh violet (*Viola palustris*). The two bog pools in the centre of the site are surrounded by a floating carpet of common cottongrass (*Eriophorum angustifolium*) and jointed rush (*Juncus articulates*) (Natural England, 1988).	3.25 km	A
Epworth Turbary SSSI	Wet heath includes species such as Bog rosemary (*Andromeda polifolia*) (an uncommon plant of northern wet heathlands) with the fen characterised by reed *Phragmites australis* and saw-sedge (*Cladium mariscus*). Small areas of bog-moss (*Sphagnum spp.*), still occur (Natural England, 1984).	3.41 km	D
Laughton Common SSSI	A notable component of the acid grassland and heath communities is *Cornicularia aculeata,* a lichen of limited occurrence in the county. A number of plants	3.65 km	D

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
	associated with wetland communities such as marsh pennywort (*Hydrocoytle vulgaris*), white sedge (*Carex curta*), marsh cinquefoil (*Potentilla palustris*), common cotton-grass, and several species of bog-moss (*Sphagna spp.*), are scarce in the county. Pools support species such as bulbous rush (*Juncus bulbosus*), and fen/swamp habitat supports bottle sedge (*Carex rostrata*), reed sweet-grass (*Glyceria maxima*), greater pond sedge (*Carex riparia*), reed canary-grass (*Phalaris arundinacea*) and purple small-reed (*Calamagrostis canaescens*) (Natural England, 1999).		
Haxey Turbary SSSI	The site is particularly valued for the occurrence of saw-sedge (*Cladium mariscus*) and royal fern (*Osmunda regalis*) with other fen species such as common reed (*Phragmites australis)* and yellow loosestrife (*Lysimachia vulgaris*) also present (Natural England, 1985).	3.81 km	D
Sutton and Lound Gravel Pits SSSI	The former gravel pits support a variety of aquatic plants of interest within the lagoons including broad-leaved pondweed (*Potamogeton natans*), fennel pondweed (*P. pectinatus*), and lesser bearded stonewort (*Chara curta*), a charophyte with a restricted distribution across England (Natural England, 2002).	4.52 km	A
Scotton and Laughton Forest Ponds SSSI	The site contains base-poor fen/mire with a characteristic suite of plant species, which has formed on permanently wet acid soils. It represents the county's largest resource of this nationally scarce plant community, one which is uncommon in lowland England through drainage and agricultural improvement. Species such as the water starworts (*Callitriche stagnalis*) and (*C. hamulate*), and amphibious bistort (*Polygonum amphibium*), are recorded within the ponds (Natural England, 1987).	4.94 km	D
Hotham Meadow SSSI	This SSSI contains a small chalk stream which contributes towards the site's diversity (Natural England, 1989).	4.96 km	A

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
Locally designated sites within 5 km of the Order Limits			
Conesby Quarry LNR	The site supports a variety of flora and fauna, including orchids, acid loving flowers and plants, butterflies, dragonflies, amphibians and a variety of birds and mammals (Natural England, 2012).	4.22 km	B

Table I.2 – Non-statutory designated sites

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
East Riding of Yorkshire			
Broomfleet Pits LWS	Good quality rich-fen and nutrient-rich standing water site.	Adjacent to the Order Limits	A
Risby Park with Fishpond Wood LWS	Mosaic of semi-natural habitats including grassland, woodland and wetland that also supports field evidence of features of ancient or long-standing neutral grassland and neutral-calcareous woodland.	10 m	A
Broomfleet Washlands LWS	Mosaic of semi-natural habitats including lowland fen, grassland and wetland.	0.30 km	A
Oxmardyke Washlands LWS	Mosaic of semi-natural habitats including lowland fen, grassland and wetland.	0.33 km	A
Newport Pond LWS	Nutrient-rich standing water.	0.96 km	A
Newport Brick Ponds Historic LWS	No information available.	1.19 km	A

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
Watery Plump LWS	Mosaic of semi-natural habitats including woodland, marshy grassland, swamp and standing water with features of structural importance for invertebrates.	1.37 km	A
Lincolnshire			
Sedge Hole Close LWS and Wildlife Trust Reserve	The main habitats present are wet woodland/carr and neutral grassland (unimproved). This LWS comprises three distinct habitats: a small, botanically rich, ridge-and-furrow hay meadow in the north (unimproved neutral grassland); unmanaged wet woodland and shallow water in the south (former flax retting pits); and unmanaged scrub and other coarse vegetation in the southwest.	Partly inside the Order Limits	D
Folly Drain North LWS	The main habitats present are a drain, coarse grassland and reedbed. This is a major part of a long drain, extending 9.5 km upstream in a south-south-westerly direction from Pilfrey Bridge. The channel varies in width from 8 m wide near Pilfrey Bridge to around 3 m wide at the opposite end of the site. Much adjoining land is of value for its drain flora and fauna, including part of Hatfield Chase Ditches SSSI. Recorded species include ivy-leaved duckweed, water-*plantain* (*Alisma spp*.) amphibious bistort, watercress, yellow iris, horned pondweed (*Zannichellia palustris*), fool's watercress and blue water-speedwell (*Veronica anagallis-aquatica*). The invasive non-native species Nuttall's waterweed is also present.	Partly inside the Order Limits	C
Hatfield Waste Drain LWS	This is 10 km of botanically rich canalised drain and its banks, parts of which are very close to, or adjacent to, Hatfield Chase Ditches SSSI. The site supports a very rich aquatic, emergent and marginal flora. A wide range of fauna is present, including many butterflies, damselflies and dragonflies. Aquatic flora include yellow water-lily, unbranched bur-reed (*Sparganium emersum*), blue water-speedwell, yellow iris, meadowsweet (*Filipendula ulmaria*), water figwort, water mint and common reed.	Partly inside the Order Limits	C
North Engine Drain, Belton LWS	The main habitats present are semi-improved neutral grassland, scattered and dense scrub and running water. This is a 5-10 m wide and 2 km long stretch of canalised watercourse, plus bank habitat, between Hatfield Waste Drain and the A18 to the north, and the River Torne to the south. The site supports a very rich	Partly inside the Order Limits	C

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
	aquatic, emergent and marginal flora, as well as interesting grassland and scrub on both banks.		
Paupers' Drain LWS	The main habitats present are a drain and coarse grassland. This is a west-east orientated 7 km stretch of canalised watercourse, with steep banks almost throughout. All parts are rich in wetland plants. Aquatic species include fennel pondweed, lesser pondweed (*Potamogeton pusillus*), pond water crowfoot, common stonewort (*Chara vulgaris*) and pink water-speedwell. The invasive non-native Nuttall's waterweed is also present.	Partly inside the Order Limits	B
River Torne LWS	This is over 15 km of botanically rich canalised watercourse and its banks, crossing a major part of the Isle of Axholme from the Doncaster Metropolitan Borough boundary to the Three Rivers complex. A substantial length is adjacent to Hatfield Chase Ditches SSSI, although most neighbouring land is arable or agriculturally improved grassland. The river and other water features support a rich aquatic, emergent and marginal flora. Supports a rich aquatic, emergent and marginal flora including yellow water-lily, flat-stalked pondweed (*Potamogeton friesii*), unbranched bur-reed, yellow iris and water dock. Also supports some damselfly and dragonfly species	Partly inside the Order Limits	C
South Engine Drain, Belton LWS	The main habitats present are semi-improved neutral grassland, running water and reedbed. This is a botanically rich canalised watercourse and its banks, extending eastwards for more than 3 km, from the point where South Engine Drain ceases to be part of Hatfield Chase Ditches SSSI, to the Three Rivers complex. The site supports a rich aquatic, emergent and marginal flora. Flora recorded include fennel pondweed, curled pondweed, unbranched bur-reed and common meadow-rue (*Thalictrum flavum*).	Partly inside the Order Limits	C
Stainforth and Keadby Canal Corridor LWS	Stainforth and Keadby Canal is the major feature of the site, but other important elements are South Soak Drain, part of North Soak Drain, and all connecting banks. Whilst there is wildlife interest in each of these elements, their combined value is even greater. These watercourses together support a rich aquatic flora including species such as greater duckweed (*Spirodela polyrhiza*), perfoliate	Partly inside the Order Limits	C

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
	pondweed, amphibious bistort, flowering-rush (*Butomus umbellatus*) and gypsywort. Also present are the non-native invasive species Nuttall's waterweed and curly waterweed (*Lagarosiphon major).* The variety of dry, damp and wet habitats in this large site has encouraged development of a diverse fauna, including dragonflies, damselflies, butterflies and birds.		
Warping Drain Corridor LWS	is an exceptionally important continuous strip of wildlife habitats, extending for almost 10 km from Idle Bank Road in the west to the River Trent in the east. Warping Drain flows through all except the western end of the site and increases in size as it progresses eastwards. All but the short upstream end of the much smaller Ferry Drain follows a parallel course to the north of Warping Drain, in the middle and eastern sections of the corridor. The mixture of rich habitats within the corridor supports locally important populations of birds, butterflies, dragonflies and damselflies, with the likelihood that other faunal groups are also well represented. Warping Drain has a very rich flora of aquatic and emergent species, including the locally uncommon whorled water-milfoil, as well as several other species including shining pondweed (*Potamogeton lucens*), fennel pondweed, fan-leaved water crowfoot and rigid hornwort. Dense marginal vegetation includes species such as water mint, water forget-me-not and branched bur-reed. Ferry Drain, also included in the LWS, holds some of the same species, plus other species such as such as water-violet.	Partly inside the Order Limits	D
South Moor Covert and Fishpond Plantation LWS	Located to the west of the road, northern and central parts of the semi-natural woodland are characterised by many artificial depressions that are water-filled except in times of drought. Further south, the woodland floor is much more level. The small, triangular site east of the road comprises an elongate pond surrounded by sparse woodland that is actively managed as a wooded garden. Although there has been planting of both wetland and woodland species. This site contains a pond which supports native flora such as fat duckweed (*Lemna gibba*), fool's watercress, water-starwort and common reed.	Partly inside the Order Limits	D
Three Rivers LWS	This is a very important corridor of wildlife habitats, extending northeastwards for 3 km from Pilfrey Bridge to Keadby Pumping Station. It comprises three parallel	Partly inside the Order Limits	C

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
	canalised watercourses, plus surrounding and intervening banks. The watercourses support a rich aquatic, emergent and marginal flora. A wide range of fauna is supported, including grass snake and turtle doves (*Streptopelia turtur*), as well as many butterflies, damselflies, dragonflies and other birds. The watercourses together support rich aquatic, emergent and marginal flora. Plants in the drains include hairlike pondweed (*Potamogeton trichoides*), flat-stalked pondweed, rigid hornwort and yellow water-lily. Recorded wetland species include greater pond sedge and common meadow-rue.		
Keadby Boundary Drain LWS	This site comprises two connected parts, the first being nearly 0.5 km of Keadby Boundary Drain between its junction with Warping Drain at the northern end and with an unnamed tributary drain at the southern end. Aquatic vegetation is abundant throughout, including water-starwort, the invasive non-native Nuttall's waterweed, and common and ivy-leaved duckweed, as well as the locally uncommon whorled water-milfoil (*Myriophyllum verticillatum*), water-violet (*Hottonia palustris*), and needle spike-rush (*Eleocharis acicularis*).	0.32 km	C
Crowle Brick Pits LWS	Contains six lakes with good marginal and aquatic vegetation, including stands of common reed. Also present are locally uncommon Cyperus sedge (*Carex pseudocyperus*), grey club-rush (*Schoenoplectus tabernaemontani*), brookweed, whorled water-milfoil, and lesser water-plantain (*Baldellia ranunculoides*). The formerly Nationally Scarce fen pondweed (*Potamogeton coloratus*) is found in two of the lakes. The lakes also support populations of dragonflies and damselflies.	0.46 km	C
River Idle LWS	The main habitats present are semi-improved neutral grassland and running water. This is a west-east flowing 2.9 km stretch of the River Idle and some contiguous land on the north bank. Main habitats are occasionally mown neutral grassland, marshy areas, many trees and shrubs, a partly shaded small boundary drain and a substantial woodland pond. The river is approximately 20 m wide here and is not far from its confluence with the River Trent at West Stockwith. There is a good wetland flora that is richest in the west, where River Idle Washlands SSSI is adjacent to the south, and the eastern end of Mission Line Bank SSSI adjacent to the north. Aquatic vegetation includes fennel pondweed, watercress, water	0.47 km	D

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	forget-me-not, amphibious bistort, water chickweed (*Stellaria aquatica*) and common duckweed. Also present is the invasive non-native species Nuttall's waterweed.		
Keadby Warping Drain LWS	This is a botanically rich 15 m wide drain extending west-north-west for more than 2 km from the west bank of the River Trent. Aquatic vegetation includes ivy-leaved duckweed, water mint, pink water-speedwell, whorled water-milfoil and broad-leaved pondweed. The invasive non-native species Nuttall's waterweed is also present.	0.51 km	C
Warping Drain, Derrythorpe LWS	This is a 1.5 km stretch of steeply banked and canalised drain extending westwards from the west bank of the River Trent at Derrythorpe. It is adjacent to arable land throughout and varies in width from 5m in the east to 4 m in the west; more noticeably, the bank height declines from 4 m to 2 m over the same distance. The watercourse flora is diverse and interesting, whereas the banks are covered in un-managed, coarse and botanically poor grassland, with no scrub. Amongst the many water plants present are shining and fennel pondweed (*Potamogeton lucens* and *Stuckenia pectinata*), water-starwort (type of *Callitriche*), watercress (*Rorippa nasturtium-aquaticum*), fan-leaved water-crowfoot (*Ranunculus circinatus*) and the locally scarce water-violet.	1.01 km	C
South Soak Drain, Keadby LWS	This is a 550 m stretch of drain that flows southeastwards into the Three Rivers complex; it is adjacent to Keadby Wet Grassland. Approximately 10 m wide, the drain supports a rich aquatic, emergent and marginal flora. The strip of land west of the drain and track is fairly damp and supports unmanaged coarse vegetation that includes some scrub and much common reed. Taxa recorded include fennel pondweed, curled pondweed, yellow water-lily, watercress and reed sweet-grass.	1.05 km	C
Keadby Wetland LWS	This is an unmanaged strip of mostly waterlogged ground between South Soak Drain to the west and Stainforth to Keadby Canal to the north. Keadby wetland comprises a dense mixture of willow scrub, other scrub and trees, tall wetland vegetation with much common reed, as well as reedmace (*Typha latifolia)*, hairy willowherb (*Epilobium hirsutum*), reed canary-grass (*Phalaris arundinacea)*, and ruderal species such as nettles and thistles. Of additional note is the presence of	1.17 km	C

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	an endemic hybrid, the non-native parents being hairy and large bindweed; this plant has large pink flowers and is very scarce nationally. Drains also support duckweed and water-starwort.		
Keadby Wet Grassland LWS	This site is adjacent to South Soak Drain, Keadby. It is an area of neutral grassland, marsh and swamp, with several internal drains that are shallow and unfenced. The wetter parts of the site support large populations of robust wetland plants such as common reed, reed canary-grass, reed sweet-grass (*Glyceria maxima*), reedmace, yellow iris, hard rush (*Juncus inflexus*) and false fox-sedge (*Carex otrubae)*. Associated species include meadowsweet (*Filipendula ulmaria*), water figwort (*Scrophularia umbrosa)*, amphibious bistort *(Persicaria amphibia)*, common fleabane (*Pulicaria dysenterica),* angelica *(Angelica archangelica)*, gypsywort *(Lycopus europaeus)*, cuckooflower and marsh foxtail (*Alopecurus geniculatus*). A few specimens of southern marsh-orchid (*Dactylorhiza praetermissa)* were discovered, and the comparatively small areas of open water support common species such as water-starwort and common duckweed (*Lemna minor*).	1.18 km	C
Belton Former Landfill LWS	The main habitat present is open mosaic habitats on previously developed land. This capped landfill site is dominated by coarse grassland, the western part also supporting some established and recently planted trees and shrubs. In contrast, towards the northeast is a substantial area of shorter, sparser and richer sward, as well as a pond.	1.48 km	D
Burton upon Stather Brick Pit LWS	The main habitats present are scrub, standing water and reedbed A large water-filled former brick pit immediately east of the embankment that follows the eastern shore of the River Trent. Virtually all of the pit margins support dense reed, with some gaps where anglers maintain access. Limited aquatic macrophyte diversity. Species recorded include spiked water milfoil, white water-lily (*Nymphaea alba*), amphibious bistort (*Persicaria amphibia*), and yellow iris.	1.54 km	B
New Godnow Drain West LWS	The main habitats present are a drain, reedbed and coarse grassland. A 1 to 3 m wide drain extending northwest for almost 1 km from near Godnow Bridge. It is adjacent to a minor road throughout. Common reed is abundant,	1.70 km	C

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	forming dense beds in many places, obscuring the water's surface entirely. However, the more open patches between the reeds support a diverse flora, with aquatic species such as broad-leaved pondweed (*Potamogeton natans)* and fennel pondweed, water-starwort, common duckweed, Nuttall's waterweed and stonewort. Other wetland plants include water-cress, branched bur-reed (*Sparganium erectum*), gypsywort,yellow loosestrife (*Lysimachia vulgaris)*, water-plantain (*Alisma plantago-aquatica*), mare's-tail (*Equisetum arvense)*, bulrush (*Scirpoides holoschoenus*), reed canary-grass and greater pond-sedge.		
Old Dun Drain LWS	The main habitats present are a drain, reedbed and coarse grassland. A watercourse supports species, including dominant common reed and the locally uncommon floating club-rush. A rich wetland flora is present in sections. In the southern half of the watercourse, a good range of aquatic plants are present, such as broad-leaved, fennel and lesser pondweed (*Potamogeton pusillus*), mare's-tail, unbranched bur-reed (*Sparganium emersum*), arrowhead (*Syngonium podophyllum*), water-starwort and common duckweed. Amongst the many waterside species are water-cress, water-plantain, pink water-speedwell (*Veronica catenata*), water figwort, reed sweet-grass, branched bur-reed and reed canary-grass.	1.93 km	C
Nottinghamshire			
Chesterfield Canal (Welham to Misterton) LWS	This section of the Chesterfield Canal runs from Misterton in the north down to Welham in the south. Its banks support a rich diversity of marginal plant species. The abundance of aquatic plant species is limited as the canal is used recreationally by narrow boats. Recorded at this site are stands of reed sweet-grass, common reed, and greater pond sedge. Also abundant are lesser water-parsnip (*Berula erecta*), water dock, and water figwort. Aquatic plant species include spiked water milfoil, fennel pondweed, and arrowhead (*Sagittaria sagittifolia*), as well as the invasive non-native Nuttall's waterweed.	Partly inside the Order Limits	E
Retford Gate Green Lane LWS	This long stretch of green lane is situated close to Local Wildlife Sites Hutchinson's Holt and Caddow Wood. It is bordered by ditches and species-rich hedgerows with plants indicative of ancient woodland, such as primrose and greater stitchwort	Partly inside the Order Limits	E

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	(*Stellaria holostea*) growing in the hedge bottoms. The hedgerows contain many woody species, including hawthorn, hazel, field maple, dogwood (*Cornus sanguinea*) and wych elm (*Ulmus glabra)*.		
Tongs and Dogholes Woods LWS	These two small deciduous broadleaved woodlands are situated in an arable landscape surrounded by fields. They are dissected by a ditch with Tongs Wood to the north and Dogholes Wood to the south.	14 m	E
Mother Drain, Misterton LWS	This section of the Mother Drain runs from Haxey Gate Bridge in a southeasterly direction to West Stockwith on the River Trent. The site is of importance for invertebrates, notably moths and water beetles. The drain also supports common reed, branched bur-reed, greater pond sedge and watercress.	14 m	E
High House Road Verge, Sturton le Steeple LWS	The verges of this track/bridleway are backed by shallow ditches and well-maintained hedgerows with pedunculate oak and ash trees. The ditches support water figwort and water mint.	21 m	E
Beckingham Wood LWS	A pond at the southwest edge of the site, with a developing marginal flora, increases wildlife habitats, whilst dead wood left on the woodland floor supports invertebrate fauna. The woodland as a whole provides a good habitat for birds and mammals in a predominantly arable landscape. The wood is dissected by an access road to a nearby farm but is otherwise undisturbed.	68 m	E
Treswell Wood LWS and Wildlife Trust Reserve	Two ponds in the woodland are are support breeding great crested and smooth newts as well as more than 12 species of water beetle. Plants recorded include greater pond sedge, yellow iris and marsh marigold (*Caltha palustris).*	The LWS is adjacent to the Order Limits. The Wildlife Trust Site is partly within the Order Limits	E
Shaw Ponds LWS	This site was once part of a brick works and comprises a series of old extraction pits, long abandoned and now flooded. The water level in the ponds varies seasonally, often drying out in Summer. Wet marshy areas at the margins and in-between ponds support a rich marginal and emergent vegetation. The ponds are fringed by mature willow (*Salix* spp.) with fallen trees being left in situ to continue	0.20 km	E

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	growing, creating a dense cover of vegetation. The undisturbed nature of the site and density of the vegetation provide habitat for birds and mammals whilst the ponds present breeding opportunities for amphibians. The pits support cyperus sedge, mare's-tail (*Hippuris vulgaris*), tufted forget-me-not and golden dock. Abundant woody debris provides good habitat for invertebrates.		
River Idle and Banks, West Stockwith LWS	This stretch of the River Idle runs from Haxey Gate Bridge to West Stockwith where it joins the River Trent. The often-steep banks support abundant tall ruderal vegetation with large areas dominated by Butterbur (*Petasites hybridus*), the food plant of the Butterbur Moth (*Hydraecia petasitis*) which occurs on this site. Elsewhere, the banks are wooded. Supports marginal species such as reed sweet-grass, branched bur-reed, and greater pond sedge, and aquatic species including rigid hornwort (*Ceratophyllum demersum*) and spiked water milfoil. The invasive non-native Nuttall's waterweed is also present	0.32 km	E
Tindale Drain LWS	This long length of drain is set in an intensively managed arable landscape, which was once fenland. Much of the western part of the site is dry. Sites such as this provide a refuge for fenland plants which would have once been common in the landscape and now survive as relict populations. Aquatic flora comprises fennel pondweed, common water-starwort, branched bur-reed, common reed, reed canary-grass, broad-leaved pondweed, mare's-tail, opposite-leaved pondweed (*Groenlandia densa*) and water-violet.	0.34 km	E
North Wheatley Beck LWS	A stream of interest for water beetles.	0.36 km	E
Chesterfield Canal (Misterton to West Stockwith) LWS	A stretch of the Chesterfield Canal with a well-developed marginal flora, unmanaged grassland, scrub and mature willow trees. Good macrophyte diversity with species such as fennel pondweed, yellow water-lily (*Nuphar lutea*) and several marginal species including common reed.	0.38 km	E
Clarborough Tunnel LWS and	A small pond supports great crested and smooth newts.	0.62 km	E

Designated site	Reason for designation (of interest to aquatic ecology)	Approximate distance from the Order Limits	Route Section
Wildlife Trust Reserve			
Old Trent, Marnham LWS	This site comprises the old course of the River Trent with associated wetland habitats and an interesting selection of marginal and aquatic plant species. The channel varies from being steep sided with well vegetated banks, to wider stretches with lower banks supporting a variety of willow. The site provides valuable habitat for amphibians and dragonflies and damselflies in an intensively farmed landscape. Supports several marginal and aquatic macrophytes including common reedmace, reed canary-grass, common water-starwort and spiked water milfoil.	0.69 km	F
Clayworth Woodhouse Pond LWS	This old farm pond with a small central vegetated island has an interesting marginal and emergent flora. Its edges support large stands of yellow iris with locally abundant water mint (*Mentha aquatica*), tufted forget-me-not *(Myosotis laxa*), golden dock (*Rumex maritimus*), and common spike-rush (*Eleocharis palustris*) growing in a marshy area at the southern end. The site supports breeding common frog (*Rana temporaria*) and provides habitat for dragonflies and damselflies including the broad-bodied chaser (*Libellula depressa)*.	0.73 km	E
Walkeringham Claypits LWS	A pond near the car park is fenced off but appears to be dominated by bulrush and hairy willowherb.	0.79 km	E
Kingshaugh Farm Earthwork LWS	This historically important site is a Scheduled Ancient Monument containing ring earthworks and the site of Darlton Castle. A stream which flows around the boundary of the earthwork has mature crack willow (*Salix fragilis*) growing along its banks.	0.90 km	
Fledborough Holme LWS	This site comprises pastureland encircled by a ditch with an oxbow pond and the River Trent to the east. The banks of the river are steep with an emergent flora at the base supporting species such as creeping yellow-cress (*Rorippa sylvestris*) and celery-leaved buttercup (*Ranunculus sceleratus*). The oxbow pond is dominated by reed sweet-grass the edges being fringed by hawthorn and willow (*Salix* sp.). To the south of the pond the ditch is mostly dry and filled with common nettle, while to the north the ditch is variously filled with reed sweet-grass or reed canary-grass.	1.11 km	F

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West Burton Power Station LWS	An area of mature habitats within the power station. The LWS is designated for its insect interest, including moths and water beetles.	1.17 km	E
Bole Ings Drains LWS	These drains have a notable aquatic flora including water horsetail (*Equisetum fluviatile*). The county-rare opposite-leaved pondweed (*Groenlandia densa*) and pink water-speedwell (*Veronica catenata*) grow at the margins. Other species present include silverweed (*Potentilla anserina*), floating sweet-grass (*Glyceria fluitans*), celery-leaved buttercup (*Ranunculus sceleratus*), and meadowsweet.	1.33 km	E
Saundby Marsh Drains Candidate LWS	No information available.	1.34 km	E
Walkeringham Pasture LWS	This noteworthy damp grassland is situated between Walkeringham and Misterton. It has a sward comprising grasses such as red fescue (*Festuca rubra*), meadow foxtail, Yorkshire-fog, common bent and in wet areas floating sweet-grass (*Glyceria fluitans*) and tufted hair-grass (*Deschampsia caespitosa)*. Glaucous sedge (*Carex flacca*), hard rush and field wood-rush, add further botanical interest.	1.35 km	E
Beckingham Marshes LWS and RSPB Reserve	This site comprises a series of cattle-grazed fields divided by drains which are owned and managed by the RSPB. Although the grasslands are generally improved, the drains with their varying water depths hold a great deal of botanical interest with species including fine-leaved water-dropwort (*Oenanthe aquatica*), water dock, water starwort, and common reed. In addition, a number of scrapes have been created in the fields to encourage wading birds such as curlew and lapwing. All are fringed by soft rush (*Juncus effusus*) with areas of mud at the margins supporting marsh foxtail, common bent, floating sweet-grass, celery-leaved buttercup (*Ranunculus sceleratus)*, marsh cudweed (*Gnaphalium uliginosum*), and the county-rare water purslane (*Lythrum portula*). The site is managed to provide ideal conditions for breeding wading birds, such as lapwing and redshank, also skylark, dragonflies and damselflies, amphibians (Royal Society for the Protection of Birds, n.d.).	1.36 km	E

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Misterton Soss Ponds LWS	A fishing lake created on the site of old borrow pits. The lake has extensive beds of common reed at the margins and a small island dominated by the county-rare great fen-sedge (*Cladium mariscus*). The site is set in an arable landscape and is bordered by hawthorn and blackthorn hedgerows.	1.38 km	E
Old Trent Oxbow Spalford LWS	This site comprises the remnants of an ox-bow lake, associated drains and a pond.	1.49 km	F
Mother Drain East, Gringley LWS	This section of the Mother Drain runs in a northeasterly direction from Gringley Pumping Station. The drain supports notable aquatic flora, it also provides breeding opportunities for amphibians, dragonflies and damselflies, and is known to support grass snake. This site supports notable flora with aquatic species including blunt-fruited water-starwort, broad-leaved pondweed, whorled water-milfoil, and small pondweed (*Potamogeton berchtoldii*), as well as several marginal plant species.	1.51 km	E
West Burton Reedbed LWS	This site is situated between West Burton Power Station and the River Trent and comprises a central wet area dominated by an extensive reed bed bounded by a developing woodland of willow and hawthorn. Willow carr characterises the western end of the site with numerous shaded pools amongst the trees whilst the more open eastern end of the site supports a range of marshland plants. These include locally abundant purple-loosestrife (*Lythrum salicaria*) with wild angelica (*Angelica sylvestris*), meadowsweet and yellow loosestrife. Lower growing plants include marsh bedstraw and creeping Jenny (*Lysimachia nummularia*). An area of open water within the reed bed is dominated by water fern (*Azolla filiculoides*); however, earth bunds running across the site seem to have contained this invasive plant and stopped it from colonising further.	1.52 km	E
Burton Round Ditch LWS	A shallow ditch with reed grass (*Glyceria* spp.), grasses and algal mats. Sixteen water beetle species have been recorded in the ditch including the near threatened water beetle *Agabus uliginosus* and *Ilybius chalconatus*.	1.54 km	E
Bole Ings LWS	An old Trent oxbow with a mosaic of semi-natural habitats including willow scrub, woodland, marshy grassland and associated drains. It is known to be of importance for mammals such as water shrew (*Neomys fodiens*) and invertebrates such as	1.55 km	E

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	water beetles. Open water within the site supports aquatic flora such as common reed, reed sweet-grass, and greater pond sedge.		
Carr Road Drains Complex LWS	This site comprises a series of deep, straight, steep sided drains in Gringley Carr including Carr Road West Drain and numerous shorter drains situated to the east. The channels of the drains support a good selection of aquatic plants. The drains represent a refuge for the plant species associated with the old fenland landscape and provide breeding sites for amphibians and Odonata. Drain network supporting good aquatic macrophyte diversity with species such as whorled water-milfoil (*Myriophyllum verticillatum*), fennel pondweed, fan-leaved water crowfoot (*Ranunculus circinatus*) and watercress (*Nasturtium officinale*), as well as several marginal species.	1.66 km	E
Dunham Oxbow LWS	This site comprises an oxbow lake near the River Trent with associated marsh and wet woodland which support an interesting variety of characteristic plant species. Supports pink water-speedwell (*Veronica catenata*), water forget-me-not (*Myosotis scorpioides*) and blunt-fruited water-starwort (*Callitriche obtusangula*).	1.79 km	F
Marsh Road Pond Walkeringham Candidate LWS	This large pond, situated in an arable field, is surrounded by scrub and tall ruderal vegetation with an earth bank along its western and southern sides vegetated by bramble, common nettle, hemlock (*Conium maculatum*), and patches of creeping thistle. The margins of the pond are dominated by yellow iris with bulrush and grey club-rush (*Schoenoplectus tabernaemontani*) growing alongside water mint and creeping-jenny. The pond is dominated in part by a large patch of white water-lily (*Nymphaea alba*) while spiked water-milfoil prevails in the submerged flora. This site provides a source of water for wildlife and breeding opportunities for birds, mammals, dragonflies and damselflies, and amphibians.	1.86 km	E
Dunham Dubs LWS	This site, situated next to the River Trent, comprises two lakes, the riverbank and a small area of marsh on the opposite bank. The lakes support aquatic species including yellow iris, water mint, and amphibious bistort, fennel pondweed, water crowfoot (*Ranunculus aquatilis*) and the invasive	1.90 km	F

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	non-native species Nuttall's waterweed. Marsh yellow-cress *(Rorippa palustris*) and water pepper (*Persicaria hydropiper*) are recorded on the riverbank		
Fox Covert Drain, Misterton LWS	This deep drain junction has large stands of common reed dominating in places. Other species recorded include reed sweet-grass, false fox-sedge and on the banks valerian (*Valeriana officinalis*), common nettle, wild angelica, and meadowsweet.	1.94 km	E
River Trent, West Stockwith LWS	This representative stretch of the River Trent is tidal and includes both bankside and associated rough vegetation. This section of the River Trent supports several marginal and aquatic plant species including common reed, reed canary-grass, purple-loosestrife (*Lythrum salicaria*), brooklime (*Veronica beccabunga)*, Marsh yellow-cress and gypsywort.	2.00 km	D

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