
EAST YORKSHIRE SOLAR FARM

**East Yorkshire Solar Farm
EN010143**

Environmental Statement

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Executive Summary

- ES1 Aquatic ecological investigations were completed for the proposed East Yorkshire Solar Farm. Surveys included a desk study, aquatic walkover, aquatic macroinvertebrate and aquatic macrophyte surveys.
- ES2 Thirteen representative sites were selected for survey, five of which were dry at the time of survey.
- ES3 Several notable fish species were identified within 2 kilometres of the Site, including Annex II species European bullhead *Cottus gobio*, European eel *Anguilla anguilla* and brown trout *Salmo trutta* present in connected waterbodies, and Atlantic salmon *Salmo salar*, river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* listed in site designations.
- ES4 No notable species of aquatic macroinvertebrates or macrophytes were recorded in the desk study but a number are listed in local policy, i.e., the Selby Biodiversity Action Plan. Greater water-parsnip was recorded, and this is a Species of Principal Importance.
- ES5 Several invasive non-native species were identified in the desk study within 2 kilometres of the Site, such as records of the ‘demon shrimp’ *Dikerogammarus haemobaphes* in the River Derwent, Himalayan balsam *Impatiens glandulifera*, and Nuttall’s waterweed *Elodea nuttallii*.
- ES6 From field surveys, the ‘regionally notable’ leech *Dina lineata* was recorded in drain FO01 and the ‘national scarce’ beetle *Agabus melanarius* was present in drain FL19. However, these species are not statutorily designated. Biological water quality based on aquatic macroinvertebrates was ‘poor to moderate’ for surveyed sites, likely due to physical modification, nutrient input from agriculture, water treatment, flood protection structures, surface water abstraction, contaminated bed sediments, and other priority hazardous chemical substances (established from Water Framework Directive classifications).
- ES7 No notable or protected species of macrophytes were recorded during surveys.
- ES8 Invasive non-native species found during surveys included Nuttall’s waterweed in DE53. The non-native but naturalised New Zealand mud snail *Potamopyrgus antipodarum* and Amphipod *Crangonyx pseudogracilis/floridanus* were recorded in Fleet Dyke, Black Dyke and drain FL19, and Sewer Drain, Hall Dyke, Black Dyke and drains FL19 and DE28 respectively.
- ES9 No field surveys were carried out for fish species due to the availability of existing data and the generally low scale of likely impacts to water bodies.
- ES10 Due to the nature of water bodies within the Site, there are opportunities to enhance water bodies and riparian/marginal habitats, and water quality, e.g., to support Biodiversity Net Gain objectives. Reducing shading would increase light levels into the water bodies and subsequently improve macrophyte growth, supported by a reduction in nutrient enrichment from agricultural land use. Water quality could be improved through planting

selected macrophyte species, while also developing habitat complexity within the water bodies for aquatic species.

- ES11 Good industry practice biosecurity measures should be implemented for works undertaken to or near water bodies, especially those where invasive non-native species are currently present, to prevent the risk of their spread in line with national and European legislation. Mitigation measures are discussed in further detail within **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]**.

1. Introduction

1.1 Background

- 1.1.1. Several aquatic ecological investigations were completed for the East Yorkshire Solar Farm (hereafter referred to as the 'Scheme') to evaluate the ecological quality of water bodies within the 'Site' to establish potential impacts of the Scheme. This included assessment of Water Framework Directive (WFD) status for each surveyed reach in relation to biological water quality, and biological water quality impact assessment.
- 1.1.2. Surveys undertaken comprised:
 - a. Aquatic walkover surveys and habitat appraisals;
 - b. Physico-chemical variables (i.e., electrical conductivity [μS], pH, dissolved oxygen concentration [% saturation], temperature [$^{\circ}\text{C}$]);
 - c. Benthic macroinvertebrates; and
 - d. Macrophytes.
- 1.1.3. The Scheme will comprise: the installation of solar photovoltaic (PV) generating panels (the 'Solar PV Site'), associated grid connection (comprising the 'Interconnecting Cable Corridor' and 'Grid Connection Corridor'), access points ('Site Accesses') and 'Ecology Mitigation Area' – collectively referred to as the 'Site'. The boundary of the Site is referred to as the 'Order limits'.
- 1.1.4. Further information on the Scheme and Site is provided in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**.

1.2 Aims and Objectives

- 1.2.1. The purpose of this report is to present the approach and findings of the desk study and aquatic ecology field studies undertaken in June 2023 to inform the Environmental Impact Assessment (EIA) process.
- 1.2.2. This report is a technical appendix to accompany **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]**.

1.3 Scope of Aquatic Surveys

- 1.3.1. A desk study was performed to review the current WFD status of water bodies within the Site. This was to inform the results of the surveys, as well as review relevant biological survey records within the survey area.
- 1.3.2. An aquatic walkover survey of water bodies (e.g., watercourses, ditches) within the Site was completed to appraise the various habitats, hydromorphological characteristics, and the overall composition of water bodies to inform scoping of further detailed surveys.
- 1.3.3. Aquatic macroinvertebrate samples were collected to identify the conservation value of aquatic macroinvertebrate communities and record the presence of any protected, notable and Invasive Non-Native Species (INNS). This supported an assessment of overall water and habitat quality.

1.3.4. Macrophyte surveys were undertaken to characterise water and habitat quality and to record the presence of any protected or notable species, or INNS.

1.3.5. Survey locations are illustrated in **Figure 8.2.1 (Annex A)**.

1.4 Legislation, Policy and Guidance

1.4.1. This assessment has been undertaken within the context of the following relevant legislation, planning policy and guidance documents:

- a. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') (Ref 1);
- b. Council Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the 'Water Framework Directive' or WFD) (Ref 2);
- c. The Bern Convention (1979) (Ref 3), also known as the Convention on the Conservation of European Wildlife and Natural habitats;
- d. Convention on Wetlands of International Importance ('Ramsar convention') (Ref 4);
- e. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 5);
- f. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (Ref 6);
- g. Wildlife and Countryside Act 1981 (as amended) (the 'WCA') (Ref 7);
- h. Salmon and Freshwater Fisheries Act (SAFFA) 1975 (Ref 8);
- i. Section 41 of the NERC Act (2006) (Ref 9), which provides a list of habitats and species of principal importance for nature conservation in England;
- j. The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 10);
- k. Nitrate Vulnerable Zones/Nitrates Directive (The Nitrates Directive 1991) (Ref 11);
- l. The Invasive Species (Enforcement and Permitting) Order 2019 (Ref 12); and
UK Post-2010 Biodiversity Framework (Ref 13).

2. Methodology

2.1 Study Area

2.1.1. The Study Area is defined as the Site plus an appropriate search area defined below for different aquatic ecological receptors. Where water bodies extend beyond the stated study area but notable species records exist, such records may be included where there is connectivity to the Site, for example for migratory species.

2.2 Desk Study

- 2.2.1. A desk-based review of WFD information and aquatic ecology receptors was undertaken for all potentially impacted watercourses and ditches, where information was available. This included a review of:
- a. Records of relevant statutory designated sites, non-statutory designated sites, legally protected and/or notable species, as well as INNS, sourced from the North and East Yorkshire Ecological Data Centre (NEYEDC) (Ref 14);
 - b. Current WFD status using the Environment Agency's (EA) Catchment Data Explorer website (Ref 15);
 - c. EA ecological survey data from the last ten years using the EA's Ecology and Fish Data Explorer (Ref 16);
 - d. Commercially available data from NBN (National Biodiversity Network) Atlas (Ref 43);
 - e. East Riding of Yorkshire Biodiversity Action Plan (BAP) (Ref 17); and
 - f. Selby BAP (Ref 18).
- 2.2.2. Watercourses and ditches that may be impacted through the development of the Scheme were identified, based on the latest construction design with anticipated extent and cable route crossings.
- 2.2.3. Detailed lists of all waterbodies in the area and their relationship to the Scheme are presented in Tables 9.6 and 9.7 in **Chapter 9: Flood Risk, Drainage and Water Environment, ES Volume 1 [EN010143/APP/6.1]**.

2.3 Aquatic Habitat Walkover Surveys

- 2.3.1. Aquatic habitat walkover surveys (locations illustrated in **Figure 8.2.1** within **Annex A**) were undertaken between the 12 and 15 June 2023 by two suitably qualified and experienced aquatic ecologists. The walkover survey encompassed walking throughout the Site to identify suitable watercourses for habitat appraisals and subsequent detailed surveys. Weather conditions during the surveys were warm and sunny, with a light breeze. The presence of INNS was also noted as part of the habitat appraisal.
- 2.3.2. The water body naming system was based on names of the watercourses surveyed. Where watercourses or ditches did not have a name, these were identified by the first two letters of the WFD catchment name, followed by a numerical ID that could be referenced consistently across the survey team.
- 2.3.3. A targeted approach was taken to select locations for aquatic ecological surveys, informed by the identification of likely or potential impacts. This was based on connectivity to other water bodies, including WFD water bodies where potential impacts may be of greater significance. Where impacts to watercourses and ditches were avoided by the selection of auger boring or Horizontal Directional Drilling (HDD) as the proposed crossing method, specific aquatic ecological surveys were scoped out. This resulted in 15 sites being selected for survey (see **Table 1**).

Table 1. Locations of aquatic walkover surveys for habitat appraisals

Site ID	WFD Catchment	National Grid Reference (NGR)	Survey date
OU20	Ouse from R Wharfe to Upper Humber	SE 67423 28408	15/06/2023
DE52	Derwent from Elvington Beck to River Ouse	SE 69057 29128	13/06/2023
DE53	Derwent from Elvington Beck to River Ouse	SE 69240 29201	13/06/2023
DE34	Derwent from Elvington Beck to River Ouse	SE 71185 30907	13/06/2023
Black Dyke	Derwent Sherwood Sandstone Water Body	SE 72536 29841	13/06/2023
Fleet Dyke	Fleet Dike catch (tributary of Ouse)	SE 73420 32674	14/06/2023
FL13	Fleet Dike catch (tributary of Ouse)	SE 72721 33749	14/06/2023
FL19	Fleet Dike catch (tributary of Ouse)	SE 72980 33442	14/06/2023
Great Committee Drain	Foulness from Black Beck to Market Weighton Canal	SE 74309 33523	14/06/2023
Sewer Drain	Foulness from Black Beck to Market Weighton Canal	SE 75177 35753	14/06/2023
Burtles and Highfield Drain	Derwent from Elvington Beck to River Ouse	SE 73799 36155	15/06/2023
F041	Foulness from Black Beck to Market Weighton Canal	SE 77059 35190	15/06/2023
Hall Dyke	Foulness from Black Beck to Market Weighton Canal	SE 76063 32639	14/06/2023
FO01	Foulness from Black Beck to Market Weighton Canal	SE 77391 31143	15/06/2023
DE28	Derwent from Elvington Beck to River Ouse	SE70327 30382	13/06/2023

2.3.4. Access to some water bodies was limited due to steep-sided banks and consequently assessments were predominantly undertaken from the bank tops.

2.3.5. Where the water bodies were dry, no further assessment was undertaken.

2.4 Aquatic Macroinvertebrate Surveys

2.4.1. Spring aquatic macroinvertebrate surveys were undertaken between the 12 and 15 June 2023, in conjunction with habitat appraisals (locations illustrated in **Figure 8.2.1** within **Annex A**). Macroinvertebrate surveys were

undertaken (refer to **Table 2**) following habitat appraisals when surveyors deemed a water body suitable for sampling in the context of its location and potential impacts. No surveys were undertaken during or immediately following periods of high flow in accordance with best practice guidance.

Table 2. Aquatic macroinvertebrate survey locations

Site ID	NGR	Survey date*	Survey notes
OU20	SE 67423 28408	15/06/2023	Dry at time of survey.
DE52	SE 69057 29128	13/06/2023	Dry at time of survey.
DE53	SE 69240 29201	13/06/2023	Unshaded drain. Slightly turbid, still water with no perceptible flow. 4m (metre) average width, 50cm (centimetre) average depth. 100% ditch habitat. 100% silt substrate.
DE34	SE 71185 30907	13/06/2023	Dry at time of survey.
Black Dyke	SE 72536 29841	13/06/2023	Moderately shaded, shallow drain. Slightly turbid water with average flow <10 cm/s (centimetres per second). 0.8m average width, 10cm average depth. 100% ditch habitat. 100% silt substrate.
Fleet Dyke	SE 73420 32674	14/06/2023	Heavily shaded, shallow ditch. Slightly turbid water with no perceptible flow. 0.85m average width, 8cm average depth. 100% ditch habitat. 100% silt substrate.
FL13	SE 72721 33749	14/06/2023	Dry at time of survey.
FL19	SE 72980 33442	14/06/2023	Moderately shaded, shallow ditch. Slightly turbid water with average flow <10cm/s. 0.6m average width, 10cm average depth. 100% ditch habitat. 100% silt substrate.
Great Committee Drain	SE 74309 33523	14/06/2023	Dry at time of survey.
Sewer Drain	SE 75177 35753	14/06/2023	Heavily shaded, shallow ditch. Slightly turbid water with average flow <10cm/s. 0.5m average width, 10 cm average depth. 100% ditch habitat. 100% silt substrate.

Site ID	NGR	Survey date*	Survey notes
Burtles and Highfield Drain	SE 73799 36155	15/06/2023	Dry at time of survey.
FO41	SE 77059 35190	15/06/2023	Dry at time of survey
Hall Dyke	SE 76063 32639	14/06/2023	Lightly shaded, shallow ditch. Clear water with average flow <10cm/s. 0.5m average width, 10cm average depth. 100% ditch habitat. 60% clay and 40% silt substrate.
FO01	SE 77391 31143	15/06/2023	Unshaded, shallow ditch. Clear water with average flow <10cm/s. 0.5m average width, 5cm average depth. 100% ditch habitat. 100% silt substrate.
DE28	SE70327 30382	13/06/2023	Heavily shaded, shallow drain. Highly turbid water with average flow <10cm/s. 0.1m average width, 1cm average depth. 100% ditch habitat. 100% silt substrate.

**Due to land access constraints, surveys were completed outside the optimal survey window (March-May for spring (September-November for autumn); however, this is not considered a constraint to the findings.*

2.5 Aquatic Macroinvertebrate Survey Methodology

2.5.1. The macroinvertebrate survey method followed the aquatic macroinvertebrate sampling procedures standardised by the EA (Ref 19), which conforms to British Standard (BS) EN ISO 10870:2012 Water Quality – Guidelines (Ref 20) for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters. These methods allow characterisation of aquatic macroinvertebrate communities and can be used to determine whether rare or notable species or communities are present. The samples were taken using a standard Freshwater Biological Association (FBA) pattern pond net (mesh size: 1mm [millimetres]). The habitats present were sampled through a combination of kick sampling and sweep sampling for three minutes, followed by a one-minute hand search of larger substrates in accordance with the standard methods. The samples collected were subsequently preserved in Industrial Methylated Spirit (IMS) for laboratory processing.

2.5.2. Each of the samples collected was sorted and analysed in a laboratory setting by suitably trained and experienced aquatic ecologists. Lists of the aquatic macroinvertebrate taxa present were produced in line with EA guidance (Ref 21). The aquatic macroinvertebrate samples were identified to 'mixed taxon level' using a stereomicroscope. Most groups were identified to species level (where practicable), with the exception of the following:

- a. worms (*Oligochaeta*) which were identified to sub-class;
- b. marsh beetles (*Scirtidae*) which were identified to family;

- c. true-fly larvae (Diptera), which were identified to the maximum resolution possible; and
 - d. immature or damaged specimens, which were identified to the maximum resolution possible on a case-by-case basis.
- 2.5.3. The survey data was then used to calculate metrics that can be used to inform an assessment of relative nature conservation value and general degradation.

Community Conservation Index

- 2.5.4. A Community Conservation Index (CCI) (Ref 22) was calculated for each reach (as detailed in **Table 10**). The CCI classifies many groups of aquatic macroinvertebrates according to their scarcity and nature conservation value in England as understood at the time that the classification was developed. Species scores range from 1 to 10, with 1 being very common and 10 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 CCI author has provided AECOM with updated species scores to take account of this new information (Ref 23). These updated scores have been used within this assessment.

Lotic-invertebrate Index for Flow Evaluation

- 2.5.5. Lotic-invertebrate Index for Flow Evaluation (LIFE) scores were calculated (Ref 24), which 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 ecological association with different flows, as detailed in **Table 10**. The overall LIFE score for a reach is calculated as the sum of the individual scores divided by the number of scoring species/families. LIFE scores increase with current velocity, scores <6.00 generally indicating sluggish or still water conditions and score >7.5 indicate fast flows. LIFE allows the mean flow preference of invertebrates colonising a reach to be determined so that effect of habitat changes, such as sediment accumulation, can be monitored.

Proportion of Sediment-sensitive Invertebrates

- 2.5.6. Calculations were undertaken to determine the proportion of sediment sensitive macroinvertebrates present using the Proportion of Sediment-sensitive Invertebrates (PSI) index (Ref 25). Using this approach, individual taxa of aquatic macroinvertebrate are assigned a Fine Sediment Sensitivity Rating (FSSR), ranging from A to D, as detailed in **Table 10**. The PSI score for each aquatic macroinvertebrate sample was derived from individual species scores and abundances. The derived PSI score corresponds to the percentage 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 thus by inference the potential sensitivity of the associated aquatic macroinvertebrate community to changes in silt load and deposition.

Whalley, Hawkes, Paisley & Trigg

- 2.5.7. 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 (Ref 26). 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 **Table 10**). It is important to note that 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.
- 2.5.8. 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' (Ref 26).

River Invertebrate Classification Tool

- 2.5.9. Analysis using the River Invertebrate Classification Tool version 2 (RICT) web application is only suitable for freshwater (not estuarine or marine) sites on rivers or streams that are naturally permanently flowing. As such, RICT analysis was not undertaken due the nature (i.e., not naturally permanently flowing condition) of field drain ('ditch') habitats comprising the surveyed reaches.

Limitations

- 2.5.10. Aquatic macroinvertebrate surveys were completed outside the optimal survey window (March-May and September-November). However, given the relatively poor biological quality of surveyed water bodies and the low scale of potential impacts, this is not considered a constraint to the assessment.

2.6 Aquatic Macrophyte Surveys

- 2.6.1. Aquatic macrophyte (plant) surveys were undertaken between the 12 and 15 June 2023 at eight survey locations (locations illustrated in **Figure 8.2.1** within **Annex A**, and
- 2.6.2. listed in **Table 3**) during summer surveys. 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.

Table 3. Aquatic macrophyte survey locations

Water body ID	NGR	Survey notes	Survey date
OU20	SE 67423 28408	Dry at time of survey.	15/06/2023

Water body ID	NGR	Survey notes	Survey date
DE52	SE 69057 29128	Dry at time of survey.	13/06/2023
DE53	SE 69228 29251	Agricultural drainage ditch with dense macrophyte cover.	13/06/2023
DE34	SE 71185 30907	Dry at time of survey.	16/06/2023
Black Dyke	SE 72536 29840	Wet watercourse which was heavily shaded by terrestrial plants.	13/06/2023
Fleet Dyke	SE 73425 32626	Roadside field drainage ditch which was wet but dried after approximately 20m.	14/06/2023
FL13	SE 72721 33749	Dry at time of survey.	14/06/2023
FL19	SE 72995 33489	Wet ditch with dense macrophyte cover.	14/06/2023
Great Committee Drain	SE 74309 33523	Dry at time of survey.	14/06/2023
Sewer Drain	SE 75212 35232	Agricultural drainage ditch with dense macrophyte cover.	14/06/2023
Burtles and Highfield Drain	SE 73799 36155	Dry at time of survey.	15/06/2023
F041	SE 77059 35190	Dry at time of survey.	16/06/2023
Hall Dyke	SE 76063 32639	Very uniform deep sided ditch with <i>Phalaris</i> and terrestrial plants.	14/06/2023
FO01	SE 77347 31124	Shallow channel with no perceptible flow.	15/06/2023
DE28	SE70327 30382	Heavily shaded shallow drain.	13/06/2023

2.7 Aquatic Macrophyte Survey Methodology

2.7.1. Aquatic macrophyte surveys followed guidance set out in the UKTAG River Assessment Method (Macrophytes and Phytobenthos) for use with LEAFPACS2 (Ref 27), which conforms to BS EN 14184:2014 Water quality – Guidance for the surveying of aquatic macrophytes in running waters (Ref 28). The survey was accomplished by walking within the channel of each watercourse along a 100m 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), as detailed below in **Table 4**.

Table 4. TCV and their associated percentage cover

TCV	Percentage cover for the macrophyte species
C1	<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	>75%

- 2.7.2. Aquatic macrophyte data was processed through the River LEAFPACS2 calculator, available from WFD UKTAG (Ref 27). 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 (plants with exclusively or predominantly submerged or floating leaved foliage under normal flow conditions) 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 percentage cover of filamentous green algae over the whole of the surveyed section.
- 2.7.3. LEAFPACS2 predicts the RMNI, NTAXA and NFG scores for the surveyed reach based on the reach altitude, alkalinity, and slope. The predicted scores are then compared to actual scores and the output is an Ecological Quality Ratio (EQR). The EQR can be translated into a WFD classification of 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, only alkalinity was based on the average of two samples collected during the survey visits.
- 2.7.4. 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 (Ref 27).

- 2.7.5. Aquatic macrophyte species were cross referenced against the JNCC Taxon Designations list (Ref 34 and Ref 35) to identify if any protected and/or notable species were recorded during the surveys.
- 2.7.6. As for macroinvertebrate surveys, the nature of the water bodies surveyed for macrophytes is atypical for LEAFPACS methodology and data interpretation (i.e., heavily modified, or artificial agricultural drainage ditches). However, the resulting macrophyte data and indices are representative of habitat conditions and provide valuable information to inform the impact assessment, mitigation requirements, and WFD assessment.

3. Results

3.1 Desk study

WFD Status

Humber Upper Water Body

- 3.1.1. Humber Upper Water Body (WFD Water Body ID: GB530402609203) (Ref 29) is a heavily modified section of the Humber Estuary from Howden to Owston Ferry before it connects with the Humber Middle section of the estuary. The river flows south from Sutton upon Derwent to Barmby on the Marsh before feeding the Humber estuary. The closest point of the water body lies 3.2 km south of the Site.
- 3.1.2. The Humber Upper water body was classified as having Moderate ecological status in 2022. This water body does not achieve Good status due to poor nutrient management, continuous sewage discharge, flood prevention structure, surface water abstraction and hazardous chemical substances.

Derwent from Elvington Beck to River Ouse Water Body

- 3.1.3. Derwent from Elvington Beck to River Ouse Water Body (WFD Water Body ID: GB104027068311) (Ref 30) is a heavily modified river flowing south from Sutton upon Derwent to Barmby on the Marsh before feeding the Humber estuary. The Scheme crosses the water body.
- 3.1.4. The Derwent from Elvington Beck to River Ouse Body was classified as having Moderate ecological status in 2022. This water body does not achieve Good due to physical modification and hazardous chemical substances.

Fleet Dike Catch Water Body

- 3.1.5. Fleet Dike catch (tributary of Ouse) (WFD Water Body ID: GB104027063630) (Ref 31) is an artificial water body which is currently classified by the EA as having Moderate ecological status 2022. The Scheme crosses the water body.
- 3.1.6. The water body had Bad status for biological parameters, invertebrates specifically. Poor nutrient management, private sewage treatment and

hazardous chemical substances are also attributed as the reasons for this watercourse not achieving Good status.

- 3.1.7. The following designated sites lie within the water body catchment: Lower Derwent Valley Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar Site, River Derwent SAC and River Derwent Site of Special Scientific Interest (SSSI).

Foulness from Black Beck to Market Weighton Canal Water Body

- 3.1.8. Foulness from Black Beck to Market Weighton Canal (WFD Water Body ID: GB104026066690) (Ref 32) is not designated or heavily modified. It is formed of the River Foulness and the Egremont Drain, which join the Market Weighton Canal at the downstream extent of the water body, and subsequently draining into the Humber estuary. The scheme crosses the water body.
- 3.1.9. The water body is currently classified by the EA as having Poor ecological status 2022. The reasons for not achieving good (RNAG) have been linked to poor nutrient management, septic tanks, trade/industry discharge and hazardous chemical substances.

The Ouse from R Wharfe to Upper Humber Water Body

- 3.1.10. The Ouse from R Wharfe to Upper Humber (Water Body ID: GB104027064270) (Ref 33) is a heavily modified river flowing southeast from near Wistow and West Field to near Kilpin Pike, before joining the Humber estuary. The Scheme crosses the water body.
- 3.1.11. The water body is currently classified by the EA as having Moderate ecological status 2022. With contaminated water body bed sediments, poor nutrient management, sewage discharge, physical modification and hazardous chemical substances preventing the water body from achieving Good ecological status.

Statutory and Non-statutory Designated Sites

- 3.1.12. Statutory and non-statutory designated sites within 10km of the Site were provided by NEYEDC, and from data searches. A total of ten international statutory designated sites with aquatic ecology features as part of the reason for their designation were identified within 10km of the Site and are listed in **Table 5**.

Table 5. International statutory designated sites within 10km of the Site

Name	Reason for Designation (aquatic features)	NGR	Distance from Site
Humber Estuary Ramsar	The site acts as an important migration route for both river lamprey (<i>Lampræta fluviatilis</i>) and sea lamprey (<i>Petromyzon marinus</i>) between coastal waters and their spawning areas.	SE 83851 11031	3.4km south of the Order limits
Lower Derwent	The site has a rich assemblage of wetland invertebrates, including 16 species of dragonfly and damselfly, 15	SE 70213 43543	1.30km north-west of the Order limits

Name	Reason for Designation (aquatic features)	NGR	Distance from Site
Valley Ramsar	<p>British Red Data Book wetland invertebrates as well as a leafhopper (<i>Cicadula ornata</i>), for which Lower Derwent Valley is the only known site in Great Britain.</p> <p>Species currently occurring at levels of national importance:</p> <ul style="list-style-type: none"> Higher Plants; Marsh Pea (<i>Lathyrus palustris</i>), Great water-parsnip (<i>Sium latifolium</i>), Narrow-leaved water-dropwort (<i>Oenanthe silaifolia</i>), Tasteless water-pepper (<i>Persicaria laxiflora</i>), Hairlike pondweed (<i>Potamogeton trichoides</i>) 		
Humber Estuary SAC	<p>Annex II species present as a qualifying feature, but not a primary reason for site selection:</p> <ul style="list-style-type: none"> Sea lamprey and river lamprey. 	SE 83851 11031	3.42km south of the Order limits
River Derwent SAC	<p>Annex I of the Habitats Directive habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> Water courses of plain to montane levels with the River (water-crowsfoot <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation). <p>Annex II of the Habitats Directive species that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> River lamprey. The Derwent is one example of river lamprey populations which inhabit the many rivers flowing into the Humber estuary in eastern England. Only the lower reaches of the Derwent are designated, reflecting the spawning distribution of the species in the Derwent system. <p>Annex II of the Habitats Directive species present as a qualifying feature, but not a primary reason for site selection:</p> <ul style="list-style-type: none"> Sea lamprey; Bullhead (<i>Cottus gobio</i>); and 	SE704474	Grid Connection Corridor crosses this SAC

Name	Reason for Designation (aquatic features)	NGR	Distance from Site
	<ul style="list-style-type: none"> • Otter (<i>Lutra lutra</i>). 		
River Derwent SSSI	<p>The Yorkshire Derwent is considered to represent one of the best British examples of the classic river profile. This lowland section, stretching from Ryemouth to the confluence with the River Ouse, supports diverse communities of aquatic flora and fauna (e.g., a rich assemblage of invertebrates, including dragonfly, and diversity of fish species), many elements of which are nationally significant. The riverine habitat also supports an excellent breeding bird community including common sandpiper (<i>Actitis hypoleucos</i>), dipper (<i>Cinclus cinclus</i>), kingfisher (<i>Alcedo atthis</i>), and yellow and grey wagtails (<i>Motacilla flava</i> and <i>Motacilla cinerea</i>). During the winter the Lower Derwent is important in maintaining the internationally important population of Bewick's swans (<i>Cygnus columbianus</i>) association with the adjacent Derwent Ings. The Derwent is also one of the few rivers in lowland Britain which still supports a breeding population of otters.</p>	SE704474	Grid Connection Corridor crosses this SAC
Howden Marsh Local Nature Reserve (LNR)	<p>The site is an old fenland marsh much of which has never been drained. It is particularly rich in water beetles and supports water vole (<i>Arvicola amphibius</i>).</p>	SE 745282	1.70km south of the Order limits
Eastrington Ponds LNR	<p>The site is a former brickworks and railway line with borrow pits from the construction of the railway. The large pond supports birds such as ducks, geese and great crested grebe (<i>Podiceps cristatus</i>), as well as invertebrates such as water beetles, pond skaters, dragonflies and damselflies.</p>	SE 787298	1.17km south-east of the Order limits
Derwent Ings SSSI	<p>The freshwater dyke system of the Ings support a rich diversity of plant species including two nationally scarce species, greater water-parsnip (<i>Sium latifolium</i>)</p>	SE 703347	1.47km north-west of the Order limits

Name	Reason for Designation (aquatic features)	NGR	Distance from Site
	<p>and flat-stalked pondweed (<i>Potamogeton freisii</i>). The site has an outstanding assemblage of invertebrates with species associated with the dykes and the fen and swamp habitats being particularly significant. These include up to 16 species of damselflies and dragonflies, together with a variety of species of other invertebrate groups and including three nationally rare species: a snail killing fly (<i>Sciomyza dryomyzina</i>), a freshwater snail (<i>Omphiscola glabra</i>) and a Ptilid beetle (<i>Acrotrichis subcognata</i>).</p>		
Humber Estuary SSSI	<p>The site contains nationally important habitats: the estuary itself (with its component habitats of intertidal mudflats and sandflats and coastal saltmarsh) and the associated saline lagoons, sand dunes and standing waters.</p> <p>The estuary supports nationally important numbers of wintering waterfowl, passage waders, and a nationally important assemblage of breeding birds of lowland open waters and their margins. It is also nationally important for a breeding colony of grey seals (<i>Halichoerus grypus</i>), river lamprey and sea lamprey, a vascular plant assemblage and an invertebrate assemblage.</p>	SE 83851 11031	3.42km south of the Order limits
Barlow Common LNR	<p>The site has a mosaic of woodland, wetland, reedbeds and four large ponds.</p> <p>Two ponds attract wildfowl and migrating waders including shelduck, greenshank (<i>Tringa nebularia</i>) and sandpiper (<i>Actitis hypoleucos</i>). 140 species of birds have been recorded on site. The woodland also supports birds. The colonised tip supports a rich flora and diversity of invertebrates (including 21 species of butterflies). Water vole (and other small mammals) have been recorded at the site.</p>	SE 633285	3.45km north-west of the Order limits

3.1.13. A total of six non-statutory designated sites with aquatic ecology interest were identified within 2km of the Site and are listed in **Table 6**.

Table 6. Non-Statutory designated sites within 2km of the Site

Name	Reason for Designation	NGR	Distance from Site
North Howden Fish Ponds LWS	The LWS contains nutrient rich standing water, noted for its water-violet (<i>Hottonia palustris</i>). This wetland comprises two adjacent large ponds/lakes used for fishing, with two smaller ponds on the south-east side, which are surrounded by dense scrub.	SE752311	0.44km west of the Order limits
Brockholes Sites Important for Nature Conservation (SINC)	The SINC is a large fishing lake, surrounded by quite dense scrub and tree cover of a variety of species. The open water zone contains quite widespread algae and various emergent plants	SD585307	0.92km south-east of the Order limits
Eastrington Ponds LWS	Eastrington Ponds LWS contains a variety of habitats and land use features which, in total, provides considerable wildlife/natural history interest. As well as one large and several small open water zones, the latter variably colonised by swamp and tall herb-fen vegetation leading to willow-alder carr, the area also includes semi-mature broadleaved woodland running in a narrow strip along the disused railway. Dense scrub cover characterises several boundaries of the site; while one area of neutral quite species-rich grassland is found, along with areas of amenity grassland.	SE786302	1.17km south-east of the Order limits
Howden Marsh LWS	The principal habitats present within the LWS are open water (ponds); extensive swamp communities, drier tall ruderal habitats and dense scrub/carr.	SE745282	1.72km south-east of the Order limits
Ponds on W Bank of R Derwent near Woodall Farm	Old, established semi-natural neutral/calcareous grassland and nutrient-rich standing water. This site is a borrow pit excavated during flood bank construction. The resultant pond is moderately deep and steep-sided with aquatic vegetation featuring water starworts (<i>Callitriche spp.</i>) and amphibious bistort (<i>Persicaria amphibia</i>). The margins	SE697319	1.04km north-west of the Order limits

Name	Reason for Designation	NGR	Distance from Site
	of the burrow pit support a mixture of fern and neutral grassland flora, with scattered scrub.		
Hagg Lane Green SINC	Nutrient rich standing water. Fine-leaved water-dropwort (<i>Oenanthe aquatica</i>) and water violet are found here, which are noted to be very uncommon plants in North Yorkshire.	SE 6776 3103	1.93km north-west of the Order limits

Notable habitats

- 3.1.14. The River Derwent and River Ouse are crossed by the Grid Connection Corridor. Both these rivers are included in the Selby BAP (Ref 17), under the Rivers, Streams, and Ditches Habitat Action Plan (Ref 13).
- 3.1.15. There is also various standing water habitat that lies within the Site. Some of these habitats are classed as ponds, and are covered under the Lakes and pond Habitat Action Plan, also under the Selby BAP. Ponds have not been included in the aquatic ecology assessment due to the commitment to avoid them with an appropriate buffer zone, and the minimal nature of impacts around them.

Notable species

Fish

- 3.1.16. Historic records of fish, aquatic macroinvertebrate and aquatic macrophyte species are available from the EA through their routine monitoring programme (from catchment monitoring sites at Derwent Lower Yorkshire and Foulness) and from local environmental records centre NEYEDC. Records from within the last ten years are presented below.
- 3.1.17. Several notable fish species were identified within 2 km of the Site using Environment Agency open source data (Ref 16) and using information from site designations. These included Annex II species European bullhead *Cottus gobio*, European eel *Anguilla anguilla* and brown trout (*Salmo trutta*) present in connected waterbodies and Atlantic salmon *Salmo salar*, river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* are listed in designations. European eel, Atlantic salmon, river lamprey, sea lamprey, and brown trout are also listed as Species of Principal Importance (SPI) in S41 of the NERC Act. Bullhead is a UK BAP Priority species and was the most recorded species.
- 3.1.18. **Table 7.** lists the fish species identified in the desk study records.

Table 7. Notable fish species identified within 2 km of the Site, and within relevant catchment monitoring site records, within the last ten years

Fish species	Habitats Directive (Appendix)	S41 SPI?	Locations (and EA monitoring sites recorded at)	Number of records	Most recent year
Bullhead <i>Cottus gobio</i>	Annex II	No	SE7052130082, SE7031632756, SE7610044400 (The Beck, Thornton Bridge DERCORS14), SE7079536275 (Bubwith), SE7797537292 (Lincoln Flats gauging weir, River Foulness). Sea lamprey is also included in the Selby BAP.	37	2019
Brown trout <i>Salmo trutta</i>	No	Yes	SE7250047400 (Blackfoss Beck, Woodhouse Farm DERCORS13), SE7610044400 (The Beck, Thornton Bridge DERCORS14).	2	2019
European eel <i>Anguilla anguilla</i>	Annex II	Yes	SE7250047400 (Blackfoss Beck, Woodhouse Farm, SE5932840913 (Stillingfleet eel survey), SE5890331820 (Selby Dam at Meadway) and SE5436832835 (Selby Dam at Low Rest Park Farm).	14	2022
Atlantic salmon <i>Salmo salar</i>	Annex II	Yes	Atlantic salmon is included in the Selby BAP and is listed as more likely to be present on the Ouse than the Derwent, migrating through the Ouse to spawning grounds on the River Ure.	N/A*	N/A*
River lamprey <i>Lampetra fluviatilis</i>	Annex II	Yes	The Humber Estuary is a nationally important migration channel for river lamprey, as well as	N/A*	N/A*

Fish species	Habitats Directive (Appendix)	S41 SPI?	Locations (and EA monitoring sites recorded at)	Number of records	Most recent year
			the Ouse tributaries for breeding, as described in the Selby Biodiversity Action Plan Strategy (Ref 17). River lamprey is also present as a qualifying feature in the Humber Estuary SAC designation. River lamprey is also included in the Selby BAP.		
Sea lamprey <i>Petromyzon marinus</i>	Annex II	Yes	Sea lamprey is present as a qualifying feature in the Humber Estuary SAC designation. Sea lamprey is also included in the Selby BAP.	N/A*	N/A*
Allis shad <i>Alosa alosa</i>	Annex II and Annex V	Yes	Allis shad is listed under the Selby BAP, as being present in the River Ouse. The species is primarily marine yet migrates into freshwater to spawn.	N/A*	N/A*
Grayling <i>Thymallus thymallus</i>	Annex V	No	Grayling is present in the River Wharfe, which connects with the River Ouse upstream of the Site.	N/A*	N/A*

*N/A denotes no dates available as these species are referenced within the designation.

Aquatic macroinvertebrates

3.1.19. There were no specific records of notable macroinvertebrate species identified in the desk study data. Several macroinvertebrates are listed as priority species in the Selby BAP, which may be present in the Site. These include aquatic beetles *Agabus uliginosus* (nationally scarce), *Acilius canaliculatus*, *Agabus labiatus*, *Helophorus strigifrons* and *Dryops auriculatus*. The rare depressed river mussel *Pseudanodonta complanata* (a S41 SPI) is also listed in the BAP yet is more likely to be present upstream of the Site between Low Hutton and Barmby Tidal Barrage on the River Ouse.

3.1.20. White-clawed crayfish may be present within the Site. However, there are no records of the species within 2km of the Site within the last ten years. There are no records of white-clawed crayfish in the Selby BAP. There are more

recent records of American signal crayfish *Pacifastacus leniusculus* in the area (in 2017 at River Wharfe at NGR SE 524405), which being an INNS, reduces the likelihood of native white-clawed being present due to it being out-competed by the former and the spread of crayfish plague. Therefore, the likelihood of white-clawed crayfish presence within the Site is considered negligible.

Aquatic macrophytes

- 3.1.21. **Table 8** shows the only notable macrophyte species (the protected tubular water-dropwort *Oenanthe fistulosa*) identified in the desk study as specific records. The water-dropwort is listed as a S41 SPI and on the national species Red List. Several macrophyte species are included in the Selby BAP.

Table 8. Protected macrophyte species identified within 2km of the Site, within the last ten years

Species	Designation /status	Total Number of Records	Most recent record	NGR	Location of closest record
Tubular water-dropwort	UK BAP Priority species (Ref 34) & Red List (Ref 35)	2	2013	SE74262829	Marsh Drain (c. 2km from the Order limits)

Invasive Non-Native Species (INNS)

- 3.1.22. Several INNS were identified in the desk study, as shown in **Table 9**. A total of 167 records of the highly invasive ‘demon shrimp’ *Dikerogammarus haemobaphes* were noted within the last ten years. Species identified on the Wildlife and Countryside Act 1981 (Schedule 9) include Himalayan balsam *Impatiens glandulifera*. Nuttall’s waterweed *Elodea nuttallii* is no longer listed in Schedule 9 but is listed in the Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 12). There are statutory constraints regarding their potential spread, and therefore mitigation will be required during the construction and decommissioning phases to prevent their spread and where possible locally eradicate these species within the Site.
- 3.1.23. The non-native but non-invasive amphipod ‘shrimp’ *Crangonyx pseudogracilis/floridanus* and *Gammarus tigrinus*, and the New Zealand mud snail *Potamopyrgus antipodarum* were also recorded, and although these species are not listed in UK legislation, bio-security measures to prevent their spread should still be considered.

Table 9. Aquatic and riparian INNS identified within 2km of the Site within the last ten years (Environment Agency Data and commercially available NBN data)

Species	Designation/status	Total number of records	Most recent record	NGR of locations	EA monitoring site name and number (for EA records) (where applicable)
Demon shrimp <i>Dikerogammarus haemobaphes</i>	Invasive (non-designated)	163 (EA)	2019	SE7052130082	Derwent Dales 108
<i>Crangonyx pseudogracilis/floridanus</i>	Non-native but non-invasive	179 (EA)	2018	SE7052130082, SE6124637858, SE5387033910, SE6301242680, SE6112832992, SE5772831581, SE5898526999	Derwent Dales 108, Riccal Dam 507, Fox Dyke 1160, Stillingfleet Beck 286, Holmes Dike 201311, Selby Dam 201272, Temple Drain 202712
Amphipod <i>Gammarus tigrinis</i>	Non-native but non-invasive	103	Dates not given	SE6301242680, SE6550749737	Stillingfleet Beck 286 and 202713
Himalayan balsam <i>Impatiens glandulifera</i>	Schedule 9 (Ref 7)	3	2017	SE7052130082	Derwent Dales 108
Giant hogweed <i>Heracleum mantegazzianum</i>	Schedule 9 (Ref 7)	1	2015	SE760267	N/A
New Zealand mud snail <i>Potamopyrgus antipodarum</i>	Non-native but now naturalised	6,191 (EA)	Dates not given	SE7052130082	Derwent Dales 108, Riccall Dam, Stillingfleet Beck 286 and 202713, Carr Dyke 144386, Fox Dyke 1159, Holmes Dike, Bishop Dyke 206831,

Species	Designation/status	Total number of records	Most recent record	NGR of locations	EA monitoring site name and number (for EA records) (where applicable)
					Mill Dyke, Selby Dam 201272, Temple Drain 202712
Nuttall's waterweed <i>Elodea nuttallii</i>	Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 14)	22 (EA)	2013	SE7052130082, SE6301242680, SE5387033910, SE6124637858, SE5052633342, SE5396033232, SE5034433691, SE5684631741, SE7073636415, SE7090536403	Derwent Dales 108, Stillingfleet Beck 286, Fox Dyke 1160, Riccal Dam 507, Mill Dyke 1159, Upper Fox Drain 1161, Bishop Dyke 206831, Selby Dam 201272, Derwent Dales 100, Birk Lane Drain 375

3.2 Aquatic Habitat Walkover Surveys

- 3.2.1. Habitat appraisal surveys were undertaken within the summer surveying period between 12 and 15 June 2023 by two suitably experienced surveyors. All surveyed watercourses were heavily modified (straightened and adapted for land drainage) or agricultural drainage ditches.
- 3.2.2. Descriptions of surveyed water bodies within the scheme are provided below. Macrophyte species and assemblage is described in further detail in Section 3.5: Aquatic Macrophyte Survey Results.

DE53

- 3.2.3. DE53 was a large agricultural drainage ditch with steep earth banks dominated by simple vegetation. The water in the ditch was slightly turbid with an average depth of 50cm, the bed dominated by soft silt. The average width was 4 m with a flow rate of less than 10cm/s.
- 3.2.4. Clear channel realignment and deepening was recorded from agricultural modification. In-channel aquatic macrophytes covered approximately 95% of the channel comprising of six to seven species including blunt-fruited water-starwort (*Callitriche obtusangula*), Nuttall's waterweed (*Elodea nuttallii*) and common duckweed (*Lemna minor*). There was a fringe of marginal vegetation and cover of filamentous algae and/or duckweed. No fish spawning habitats were identified; however, incidental sightings of stickleback were recorded.
- 3.2.5. The reach was situated within an area of tilled land with a tall herb and rank vegetation buffer. Agricultural, industrial and residential buildings were also present in the wider environment.

DE28

- 3.2.6. This reach had steep to vertical banks comprised of uniform vegetation structure. Due to the steepness of the banks, the channel was heavily shaded. Within the channel the water had high turbidity levels, the average water depth was 1cm deep with a maximum depth of 2cm. The average width was 0.15m wide with no flow through the channel.
- 3.2.7. The channel had no obvious modifications. The channel had a fringe of marginal vegetation covering 75% of the ditch and had a macrophyte cover of 4% comprising of reed canary grass (*Phalaris arundinacea*). During the survey no fish were seen nor spawning habitat was identified. Additionally, no notable species or INNS were identified.
- 3.2.8. Around the reach the land use was dominated by tilled land.
- 3.2.9. The surveyed reach contained sufficient water and aquatic habitats to warrant macrophytes survey at the time of appraisal.

Black Dyke

- 3.2.10. This reach had steep banks on both sides with uniform vegetation structure on the right bank and simple vegetation structure on the left bank providing moderate shading. The channel had an average depth of 1.5m with an average water depth and width of 10cm and 0.5m respectively. The water in

the channel had slight turbidity and a flow rate less than 10cm/s over a soft silt substrate. Macrophytes covered 30% of the channel comprising of reed canary grass and starwort species.

- 3.2.11. No channel modifications were identified, with no fish spawning habitat nor notable species recorded.
- 3.2.12. This reach was within semi-improved grassland with a road within the wider environment.
- 3.2.13. The surveyed reach contained sufficient water and aquatic habitats to warrant macroinvertebrate and macrophyte survey at the time of appraisal.

Fleet Dyke

- 3.2.14. This reach consisted of steep banks along a roadside field drainage ditch with simple vegetation structure on the right bank and complex vegetation structure on the left. Bankside vegetation caused heavy shading of the channel. Water depth averaged 8cm, with a maximum depth of 18cm, with good water quality indicating no obvious signs of pollution across a soft silt substrate. The average channel width was 0.85m.
- 3.2.15. The reach was culverted for a farm crossing and several field drains discharged into the channel. In-channel macrophytes covered approximately 2% of the channel comprising of one species with a fringe of marginal vegetation present. No fish spawning habitat was identified within the reach; however, incidental sightings of stickleback were recorded within the channel. No notable or invasive species were recorded.
- 3.2.16. The reach was situated between a tilled field and a road with a tall herb and rank vegetation buffer strip; within the wider landscape broadleaved woodland was present.
- 3.2.17. The surveyed reach contained sufficient water and aquatic habitats to warrant macroinvertebrate and macrophyte survey at the time of appraisal.

FL19

- 3.2.18. This reach had steep banks on the right and shallower banks on the left, both with a simple vegetation structure; however, the channel was moderately shaded. The average water depth was 10cm with an average channel width of 0.6m across a soft silt substrate.
- 3.2.19. The channel had not been obviously realigned, however was culverted under an access track.
- 3.2.20. Macrophytes were present within the channel covering 95% of the channel with 2% of the macrophytes submerged. There were approximately five species present, dominated by reed canary grass and starwort species. No suitable fish spawning habitats nor notable species were identified.
- 3.2.21. The reach surveyed was dominated by tilled land with a road present in the surrounding landscape.

Sewer Drain

- 3.2.22. Sewer Drain consisted of steep banks along the agricultural drainage ditch, with simple vegetation structure on both banks. The left bank was heavily shaded by terrestrial vegetation whilst the right bank had areas of broken shading. Water depth averaged 10cm, with a maximum depth of 30cm, across a soft bed of silt substrate. The channel was less than 1m wide. The water was of good quality indicating no obvious signs of pollution, with no perceptible flow.
- 3.2.23. The channel was culverted under the road with grey bank protection either side of the culvert.
- 3.2.24. In-channel aquatic vegetation was present for approximately 95% of the channel consisting of approximately three to four species with less than 10% cover of filamentous algae and a fringe of marginal vegetation. There was also a low coverage of woody debris at <1% coverage. There was no fish spawning habitat within the ditch with no notable species present. No evidence of water quality impacts was documented however, there was slight turbidity.
- 3.2.25. The reach was situated within tilled land with tall herb and rank vegetation on the banks with a road adjacent to the channel. Areas of scrub were also present along both banks.
- 3.2.26. The surveyed reach contained sufficient water and aquatic habitats to warrant macroinvertebrate survey, with macrophyte surveys also undertaken at the time of appraisal.

Hall Dyke

- 3.2.27. This reach consisted of composite banks with a steep to vertical toe and steep banks above that along the ditch. Both banks had simple vegetation structure, providing no shading of the channel. The water depth within the channel averaged at less than 25cm deep across a soft silt bed. The width of the channel was less than 1m. There were no bank modifications along the channel.
- 3.2.28. In-channel aquatic macrophytes were present covering 70% of the channel with filamentous algae covering 35% of the channel. The channel had a marginal vegetation fringe for more than 75% of the channel. No notable species or INNS were identified.
- 3.2.29. The reach was situated within an area of tilled land.
- 3.2.30. The surveyed reach contained sufficient water and aquatic habitats to warrant macroinvertebrate survey, with macrophyte surveys also undertaken at the time of appraisal.

FO01

- 3.2.31. This reach had steep to vertical banks comprised of uniform vegetation structure, providing no shading. The water within the channel was clear with an average depth of 5cm and average channel width 0.6m. Within the channel there was no perceptible flow. The ditch was of good water quality indicating no obvious signs of pollution.

- 3.2.32. Clear channel realignment and deepening was recorded from agricultural modification. In-channel aquatic macrophytes were absent from the channel, however moss and filamentous algae were present within the channel. No suitable fish spawning habitat, notable species or INNS were present during the surveys. No evidence of pollution was documented.
- 3.2.33. The reach was situated within tilled farmland with semi-improved grassland buffer strips around field margins.
- 3.2.34. The surveyed reach contained sufficient water and aquatic habitats to warrant macroinvertebrate survey at the time of appraisal.

3.3 Aquatic Macroinvertebrate Survey Results

- 3.3.1. A total of eight macroinvertebrate samples were collected. The full aquatic macroinvertebrate taxa list is provided in **Annex F**. The biological metrics results are presented in **Table 10** along with any notable or INNS found in the samples. A description of the macroinvertebrate community at each site is also provided.

Table 10. Macroinvertebrate index scores

Index	DE53	Fleet Dyke	FO01 Crossing	DE28	FL19	Sewer Drain	Hall Dyke	Black Dyke
NTAXA (WHPT)	17	7	14	11	14	14	8	10
ASPT (WHPT)	4.22	3.79	3.68	3.42	3.43	3.53	3.48	2.98
CCI Score	4.7	1.0	9.6	5.3	13.5	4.2	3.8	7.3
CCI Score – interpretation	Low conservation value	Low conservation value	Moderate conservation value	Moderate conservation value	Fairly High conservation value	Low conservation value	Low conservation value	Moderate Conservation Value
LIFE score (species)	5.56	5.67	5.00	5.63	5.54	5.62	5.00	5.64
LIFE score (species) – interpretation	Low sensitivity to reduced flows	Low sensitivity to reduced flows	Low sensitivity to reduced flows	Low sensitivity to reduced flows	Low sensitivity to reduced flows	Low sensitivity to reduced flows	Low sensitivity to reduced flows	Low sensitive to reduced flows
PSI score (species)	2.86	0.00	6.25	0.00	0.00	3.33	0.00	0.00
PSI score (species) – interpretation	Heavily Sedimented	Heavily Sedimented	Heavily Sedimented	Heavily Sedimented	Heavily Sedimented	Heavily Sedimented	Heavily Sedimented	Heavily Sedimented
Total number of taxa	32	14	31	30	34	27	24	22

Index	DE53	Fleet Dyke	FO01 Crossing	DE28	FL19	Sewer Drain	Hall Dyke	Black Dyke
INNS/ Notable Species	N/A	The non-native but naturalised New Zealand mud snail <i>Potamopyrgus antipodarum</i>	Leech <i>Dina lineata</i> -CCI 6 'regionally Notable' conservation status	The non-native but naturalised crustacean 'shrimp' <i>Crangonyx pseudogracilis/f loridanus</i>	The non-native but naturalised New Zealand mud snail <i>Potamopyrgus antipodarum</i> , the invasive crustacean 'shrimp' <i>Crangonyx pseudogracilis/f loridanus</i> and nationally scarce <i>Agabus melanarius</i>	The non-native but naturalised crustacean 'shrimp' <i>Crangonyx pseudogracilis/f loridanus</i>	The non-native but naturalised crustacean 'shrimp' <i>Crangonyx pseudogracilis/f loridanus</i>	The non-native but naturalised New Zealand mud snail <i>Potamopyrgus antipodarum</i> , the invasive crustacean 'shrimp' <i>Crangonyx pseudogracilis/f loridanus</i>

DE53

- 3.3.2. Macroinvertebrate diversity was relatively high within the sample collected with 32 taxa recorded, dominated by snails (largely the wandering pond snail *Ampullaceana balthica*), Diptera (the non-biting midge larvae Chironomidae), and beetles (largely *Helophorus brevipalpis*). True bug diversity was high including several species of Corixidae. Dragonfly and damselfly species were also present including ruddy darter *Sympetrum sanguineum* and blue-tailed damselfly *Ischnura elegans*.
- 3.3.3. Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score 4.22) with a 'heavily sedimented' PSI score (2.86). The community at this site had 'low sensitivity' to reduced flows and was of 'low' conservation value (CCI score 4.7).
- 3.3.4. No notable taxa or INNS were present.

Fleet Dyke

- 3.3.5. This site had low macroinvertebrate diversity with 14 taxa recorded in total. The community was dominated by snails (primarily the wandering pond snail *Ampullaceana balthica*), pea mussels (*Pisidium sp.*) and Diptera (the non-biting midge larvae Chironomidae). Also present were beetles such as *Helophorus brevipalpis* and hoglouse *Asellus aquaticus*.
- 3.3.6. Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score of 3.79) 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).
- 3.3.7. The non-native New Zealand mud snail was present in this sample. This species is now considered naturalised.
- 3.3.8. No notable or protected taxa were present.

F001 Crossing

- 3.3.9. This site was relatively diverse with 31 taxa recorded. Snails (namely ramshorn snail *Planorbis planorbis*), crustaceans including hoglouse *Asellus aquaticus* and ostracoda, beetles (primarily Dytiscidae), Oligochaeta, and Diptera such as the non-biting midge larvae Chironomidae dominated the community. The flatworm *Dugesia lugubris/polychroa*, the leach *Dina lineata*, the narrow-winged damselfly Coenagrionidae and the true bug *Velia sp.* were also recorded in the sample.
- 3.3.10. Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score of 3.68) with a 'heavily sedimented' PSI score (6.25). The community at this site had 'low sensitivity' to reduced flows and was of 'moderate' conservation value (CCI score 9.6) owing to the presence of *Dina lineata*.
- 3.3.11. The leech *Dina lineata* from the family Erpobdellidae has a Conservation Score of 6 which makes it a Regionally Notable species; however, there are no statutory designations for this species.
- 3.3.12. No other notable or non-native taxa were present.

DE28

- 3.3.13. This site had moderate to high macroinvertebrate diversity, consisting of a total of 30 taxa. The macroinvertebrate community at this site was dominated by snails including *Ampullaceana balthica* and Planorbiidae, crustaceans such as hoglouse *Asellus aquaticus*, Diptera (the non-biting midge larvae Chironomidae) and pea mussels (*Pisidium sp.*). In addition, freshwater worms Oligochaeta, the leech *Erpobdella testacea*, beetles including *Anacaena globulus*, and true flies such as Psychodidae were present.
- 3.3.14. Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score of 3.42) 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) with *Erpobdella testacea* as the highest CCI scoring taxa with a Conservation Score of 4.
- 3.3.15. The non-native but naturalised crustacean *Crangonyx pseudogracilis/floridanus* was present at this site.
- 3.3.16. No other notable or non-native taxa were present.

FL19

- 3.3.17. Macroinvertebrate diversity was relatively high at this site with 34 taxa recorded. The macroinvertebrate community at this site was dominated by snails (namely *Ampullaceana balthica*), crustaceans including *Asellus aquaticus*, and Diptera (the non-biting midge larvae Chironomidae). Also present at this site was the pea mussel *Pisidium sp.*, Oligochaeta, the mayfly *Cloeon dipterum*, the dragonfly *Sympetrum sanguineum*, and several beetle taxa including *Agabus melanarius*.
- 3.3.18. Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score of 3.43) and had 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 13.5), owed to the presence of *Agabus melanarius*.
- 3.3.19. The beetle *Agabus melanarius* from the family Dytiscidae was present in this sample. This species has a Conservation Score of 7 which makes it a Regionally Notable species; however, there are no statutory designations for this species.
- 3.3.20. The non-native but naturalised crustacean *Crangonyx pseudogracilis/floridanus* and the New Zealand mud snail *Potamopyrgus antipodarum* were present in this sample.
- 3.3.21. No other notable or non-native taxa were present.

Sewer Drain

- 3.3.22. This site had moderate macroinvertebrate diversity with 27 taxa recorded in total. The community was dominated by snails (predominantly *Ampullaceana balthica* and *Anisus vortex*), crustaceans (namely *Asellus aquaticus*), and beetles such as Dytiscidae, Haliplidae and Hydrophilidae. In addition, leeches such as *Glossiphonia complanata*, Diptera including the non-biting

midge larvae Chironomidae, and true bugs including *Sigara sp.* and *Gerris lacustris* were present.

- 3.3.23. Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score of 3.53) 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 4.2).
- 3.3.24. The non-native but naturalised crustacean *Crangonyx pseudogracilis/floridanus* was present in this sample.
- 3.3.25. No other notable or non-native taxa were present.

Hall Dyke

- 3.3.26. Macroinvertebrate diversity was moderate within the sample collected from this site with 24 taxa recorded. The macroinvertebrate community at this site was dominated by snails (predominantly *Ampullaceana balthica*), crustaceans including Ostracoda and *Crangonyx floridanus/pseudogracilis*, Diptera (the non-biting midge larvae Chironomidae) and beetles, specifically taxa belonging to the families Hydrophilidae, Dytiscidae and Haliplidae. Also present at this site was the true bug *Velia sp.* and the true fly Culicidae.
- 3.3.27. Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score of 3.48) 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 3.8).
- 3.3.28. The non-native but naturalised crustacean *Crangonyx pseudogracilis/floridanus* was present in this sample.
- 3.3.29. No other notable or non-native taxa were present.

Black Dyke

- 3.3.30. Macroinvertebrate diversity was moderate within the sample collected from this site with 27 taxa recorded. The macroinvertebrate community at this site was dominated by snails (predominantly *Ampullaceana balthica*), the water hog-louse *Asellus aquaticus*, Diptera (the non-biting midge larvae Chironomidae) and beetles, specifically taxa belonging to the family Dytiscidae, typical of a drain/ditch habitat.
- 3.3.31. Biological water quality was 'poor, polluted or impacted' (ASPT-WHPT score of 2.98) 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 7.3) owing to the present of the beetle *Ilybius guadiguttatus* from the family Dytiscidae with a Conservation Score of 5 which would have elevated the CCI score at this site. There are no designations associated with this species.
- 3.3.32. The non-native mud-snail and the non-native naturalised crustacean *Crangonyx pseudogracilis/floridanus* were present in this sample.
- 3.3.33. No other notable or non-native taxa were present.

3.4 Aquatic Macrophyte Survey Results

- 3.4.1. The full aquatic macrophyte taxa list is provided in **0**. A cross-reference with the JNCC Taxon Designations list confirmed that none of the macrophyte taxa identified during the surveys were protected or notable. However, the INNS Nuttall's waterweed was identified along DE53, which is listed under The Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 12).

DE53

- 3.4.2. DE53 was the largest ditch with a water width between 1-5m and a water depth between 0.5-1 m. Along this reach the water was clear with areas of greater turbidity, dominated by slack flow habitats over a soft silt substrate. This reach had no shading from either bank. Of the seven species present, broadleaved pondweed *Potamogeton natans* was the species present with the most cover within this reach. There was also between 0.1-1% cover of aggregate blanketweed *Cladophora glomerata/ Rhizoclonium hieroglyphicum*. Within this reach the non-native invasive species Nuttall's waterweed *Elodea nuttallii* covered between 2.5-5 % of the channel.

Fleet Dyke

- 3.4.3. The watercourse at Fleet Dyke had the lowest macrophyte cover of channels with macrophyte taxa present. The wet ditch was less than 1m wide and 0.25m deep. Channel substrate was comprised of silt/clay with 100 % slack water habitats, with both banks heavily shaded. The only macrophyte present was common water plantain *Alisma plantago-aquatica*, totalling less than 0.1 % cover of the channel. Smothering of the substrate and heavy shading of the channel had likely suppressed aquatic macrophyte growth.

FO01

- 3.4.4. FO01 had the highest cover of macrophytes with 100% of the reach having macrophyte cover. Across the reach, the channel was less than 1m wide and less than 0.25m deep with no shading from either bank. The channel was dominated by slack habitat types over stable silt with some areas of soft silt. This reach had three species present with reed canary grass *Phalaris arundinacea* covering over 95% of the channel.

DE28

- 3.4.5. DE28 was a heavily modified channel causing dense shading of the channel from both banks with one macrophyte species, reed canary grass present covering between 2.5-5% of the channel. The wetted width was less than 1m wide with a water depth less than 0.25m. The channel has a soft silty substrate with the water being turbid.

FL19

- 3.4.6. Four species of macrophyte were recorded at FL19. This channel had a wetted width less than 1m and a water depth less than 0.25m. The water was clear with areas of slight turbidity, over a soft silt substrate. Both banks of the channel had broken shading. Species recorded here included reed

canary grass (with the most cover) and branched bur-reed *Sparganium erectum* (with the least cover).

Sewer Drain

- 3.4.7. Seven macrophyte species were found during surveys at Sewer Drain. Here the water depth was less than 0.25m for approximately 80% of the channel with 20% of the channel between 0.25-0.5 m deep. For the entire reach the channel width was less than 1m. The substrate of the channel was dominated by soft silt with dense shading from the left bank and broken shading from the right. Along this reach, common water starwort *Callitriche stagnalis* had the most cover.

Hall Dyke

- 3.4.8. Four species of macrophyte were present within this reach. The wet ditch was less than 1m wide with an average water depth less than 25cm. Substrate was comprised of silt/clay along the entire channel. Smothering of the substrate had likely suppressed aquatic macrophyte growth. Along this reach, reed canary grass had the most cover.

Black Dyke

- 3.4.9. This reach had two macrophyte species present dominated by reed canary grass (25-50% cover). Here the water width was less than 1m and the depth was less than 0.25m, dominated by slack habitats over stable silt.

3.5 Aquatic Macrophyte WFD Indices

- 3.5.1. Based on the criteria outlined in Section 2.7.2, 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 surveyed watercourse are detailed in Table 11. The table also includes the overall Ecological Quality Ratio (EQR) and WFD macrophyte status for each surveyed watercourse.
- 3.5.2. LEAFPACS analysis was undertaken on the two watercourses within the Site. The EQR of 1.44 and 1.28 at Black Dyke and FL19 respectively corresponds to a High WFD status; however, due to the lack of scoring macrophyte taxa this score cannot be classified as it is likely inflated.
- 3.5.3. In contrast, FO01, DE28, DE53, Fleet Dyke, Hall Dyke and Sewer Drain did not have LEAFPACS analysis as they were not flowing. Additionally, the minimum requirement for LEAFPACS2 classification is three scoring macrophyte taxa. It should therefore be noted that DE28 had no scoring macrophyte taxa, Black Dyke, FL19 only had one scoring taxa, while FO01, Hall Dyke and Sewer Drain had two scoring taxa, all lacking the base requirement. However, DE53 had seven scoring macrophyte taxa.
- 3.5.4. Alkalinity data should also be obtained from monthly analysis of samples from each over a period of at least one year, whereas the results are based on an average Alkalinity collected from two sample during both survey seasons. Therefore, macrophyte classifications presented here based on only one alkalinity measurements represent point-in-time classifications and could not be used for WFD classification. Consequently, these results should

be treated with caution, although they do provide appropriate baseline conditions to inform impact assessment, WFD assessment, and mitigation requirements.

- 3.5.5. **Table 11** provides the macrophyte metrics and WFD classification for the above reaches.

Table 11. Macrophyte metrics and WFD classification

Indices		Black Dyke	FO01	DE28	DE53	FL19	Fleet Dyke	Hall Dyke	Sewer Drain
River macrophyte nutrient index (RMNI)	Observed	7.04	6.73	7.52	7.60	7.23	7.82	7.42	7.94
	Predicted	8.44	-	-	-	8.39	-	-	-
Number of macrophyte taxa (NTAXA)	Observed	1	2	0	7	1	0	2	2
	Predicted	10.03	-	-	-	10.03	-	-	-
Number of functional groups (NFG)	Observed	1	2	0	7	1	0	2	2
	Predicted	6.30	-	-	-	6.30	-	-	-
Cover of filamentous green algae (ALG)	-	0	0	0	0	0	0	17.5	0
Overall Ecological Quality Ratio (EQR)	-	1.44	-	-	-	1.28	-	-	-
WFD Classification Category	Unclassified	High	Unclassified	Unclassified	Unclassified	High	Unclassified	Unclassified	Unclassified

4. Discussion and Evaluation

4.1.1. The desk study highlighted current issues facing the associated catchments that are physical modification, nutrient input from agriculture, water treatment, flood protection structure, surface water abstraction, contaminated bed sediments and other priority hazardous chemical substances (established from WFD classifications). The Poor to Moderate ecological quality of all water bodies suggest the Scheme is unlikely to cause lasting impacts to the wider WFD catchments compared to current impacts. However, as a result there are opportunities to seek appropriate mitigation and enhancement, e.g., through the **Biodiversity Net Gain (BNG) assessment [EN010143/APP/7.11]**, to improve habitat and water quality to meet BNG objectives for the Scheme.

Protected and notable species

Fish

4.1.2. The desk study identified the most recent fish record as European eel in 2022, which is afforded protection under the Eels (England and Wales) Regulations 2009 (Ref 36), which places a requirement upon developers and abstracters to ensure continued eel passage and to prevent eel entrainment. In addition, bullhead and brown trout were present within the same water body (Blackfoss Beck). Blackfoss Beck is outside of the scheme but is a tributary of Black Drain which enters the River Derwent at SE 69756 42544 (upstream of the scheme). Bullhead are listed under Annex II of the European Commission Habitats and Species Directive (Ref 37) whilst brown trout are listed under Section 41 of the Natural Environment and Rural Communities Act 2006 (Ref 9). Both species are relatively widespread in central and eastern England. The Humber Estuary SAC is designated for its populations of river lamprey and sea lamprey, which are listed under Annex II of the Habitats Directive and are also listed as S41 SPI. Selby BAP (Ref 17) lists Allis shad, sea lamprey, river lamprey and Atlantic salmon as being present within the River Ouse and its tributaries.

4.1.3. No field surveys were carried out for fish species due to the availability of existing data and the generally low scale of likely impacts to water bodies.

Aquatic macroinvertebrates

4.1.4. No notable species of aquatic macroinvertebrates were recorded during the desk study. However, as mentioned in Section 3.1.19, there were notable macroinvertebrates included in the Selby BAP, which may be present in the Site.

4.1.5. Notable species found in the aquatic macroinvertebrate field studies included the leech *Dina lineata* in FO01 (conservation score of 6) and the beetle *Agabus melanarius* in FL19 (conservation score of 7). However, there are no statutory designations associated with these species.

Aquatic macrophytes

4.1.6. The UK BAP Priority and Red List species, tubular water-dropwort was listed in the desk study as being present in Marsh Drain. Marsh Drain is 2km south-

east of the Site's Order limits but is hydrologically connected to waterbodies within the Site through a network of drains.

- 4.1.7. Macrophyte assemblages in the field surveys were limited in diversity, with high percentage cover most likely from the high nutrient content from the surrounding agricultural land use. Terrestrial encroachment was present across some of the watercourses, signifying prolonged periods of drying. Macrophyte assemblages were unclassifiable for WFD indices at most watercourses, except for Black Dyke and FL19 which was designated as High; however, this is unlikely to be representative.

Invasive Non-Native Species

Fish

- 4.1.8. No INNS of fish were recorded in the desk study.

Aquatic macrophytes

- 4.1.9. The macrophyte field surveys identified the INNS species Nuttall's waterweed *Elodea nuttallii* within the Site, which is listed under the Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 12). 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 (Ref 38)). The legislation also makes it 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.

Aquatic Macroinvertebrates

- 4.1.10. Several invasive aquatic macroinvertebrate species were found in the desk study. These are presented in **Table 9** in Section 3.1.22.
- 4.1.11. The field studies recorded mostly non-native but now considered naturalised species crustacean *Crangonyx pseudogracilis/floridianus* and the New Zealand mud snail *Potamopyrgus antipodarum*.

5. Conclusions and Recommendations

- 5.1.1. The water bodies within the Site are subject to high levels of habitat and water quality pressures from existing industries, especially agriculture. This is exhibited within the results of the macroinvertebrate and macrophyte surveys. Current impacts on biological communities appear to be the result of watercourse habitat and channel modification indicated by aquatic habitat walkover surveys, including adjacent land use and rural management practices, also as indicated in the WFD desk study.
- 5.1.2. It is recommended that solar PV panels and any temporary or permanent infrastructure are installed a minimum of 8m away from the banktop of any water bodies (watercourses, or ditches) on-site. This prevents any impacts of shading on these water bodies and is in accordance with EA flood risk

guidance (see **Chapter 9: Flood Risk, Drainage and Water Environment, ES Volume 1 [EN010143/APP/6.1]**).

- 5.1.3. The use of best practice construction and decommissioning methods should be implemented during construction to avoid sediment runoff into surface waters and avoid impacts to water quality.
- 5.1.4. A minimum of 8m between watercourses to any spoil heaps created during construction and decommissioning should be employed and these should be either seeded or dampened to prevent runoff. The use of silt fencing is also recommended if construction and/or decommissioning is likely to result in runoff entering water bodies.
- 5.1.5. Redistribution of rainfall precipitation from solar panel arrays could reduce the impacts of topsoil erosion and improve plant growth below. This is expected to reduce input of topsoil and nutrients into local watercourses, especially when land is no longer managed for arable agriculture. Increased surface runoff on larger solar sites could lead to higher rates of soil erosion, especially if interspace and site ground is bare, which warrants additional consideration as impacts to flow and sedimentation were present at all surveyed water bodies.
- 5.1.6. Due to the heavily modified nature of water bodies on the Site, including their management for agricultural drainage, there are opportunities to enhance water bodies and riparian/marginal habitats, and water quality, e.g., to support BNG objectives. Reducing shading would increase light levels into the water bodies and subsequently improve macrophyte growth, supported by a reduction in nutrient enrichment from agricultural land use. Water quality could also be improved through planting selected macrophyte species, while also developing habitat complexity within the water bodies for aquatic species.
- 5.1.7. Due to the presence of protected fish species recorded locally in connected water bodies (including Annex II species European bullhead and European eel, as well as the following species which are listed in designations: Atlantic salmon *Salmo salar*, river lamprey and sea lamprey), there is the potential for these species to be present within the Site in the network of watercourses and ditches. Therefore, any direct impacts to water bodies should give consideration to these, and other, fish species. Such impacts are likely to include open trenching for watercourse crossings (such as the cable connections), culverting of water bodies for access or construction roads, and the extension of existing culverts to upgrade access roads. Such impacts should ensure to maintain connectivity along water bodies to allow eel passage and longitudinal connectivity for other aquatic species and may require fish rescues during construction and decommissioning where draw-down or over-pumping is required.
- 5.1.8. Good industry practice biosecurity measures should be implemented for works undertaken to or near water bodies, especially those where INNS are currently present, to prevent the risk of their spread in line with national and European legislation.
- 5.1.9. Mitigation measures are discussed in further detail within **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]**.

5.1.10. No further aquatic ecological investigations are required to inform the assessment of impacts to water bodies present within the site. **BNG assessment [EN010143/APP/7.11]** has been undertaken to inform mitigation requirements to support BNG objectives, including assessment of watercourses and ditches. The BNG assessment provides specific recommendations for the enhancement of these watercourses, where mitigation is required for direct impacts to them.

6. References

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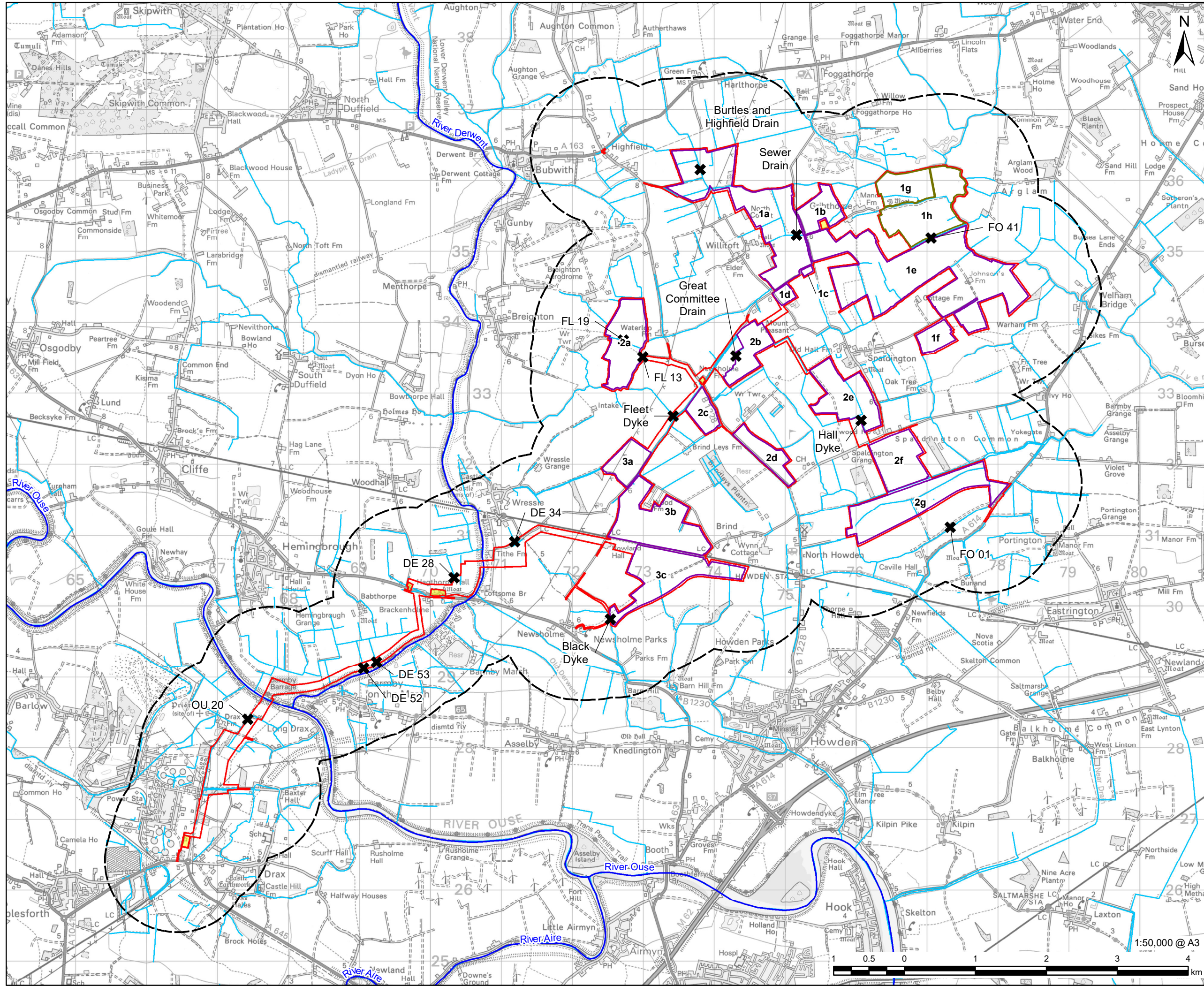
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Abbreviations

Abbreviation/Term	Definition
ALG	Cover of filamentous green algae
ASPT	Average Score Per Taxon
BAP	Biodiversity Action Plan
BNG	Biodiversity Net Gain
BS	British Standards
CCI	Community Conservation Index
EA	Environment Agency
EQR	Ecological Quality Ratio
FBA	Freshwater Biological Association
FSSR	Fine Sediment Sensitivity Rating
IMS	Industrial Methylated Spirits
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
LERC	Local Environment Records Centre
LIFE	Lotic-Index for Flow Evaluation
LNR	Local Nature Reserve
LWS	Local Wildlife Site
NFG	Number of Functional Groups
NTAXA	Number of scoring taxa
NERC	Natural Environment and Communities Act
NEYEDC	North-East Yorkshire Ecological Data Centre
NGR	National Grid Reference
NNR	National Nature Reserve
PSI	Proportion Sediment-sensitive Invertebrates
RICT	River Invertebrate Classification Tool
RMNI	River Macrophyte Nutrient Index
RNAG	Reasons for not Achieving Good status
SAC	Special Area of Conservation
SINC	Site of Important Nature Conservation

SPA	Special Protection Area
SPI	Species of Principal Importance
SSSI	Site of Special Scientific Interest
TCV	Taxon Cover Values
UK-TAG	United Kingdom-Technical Advisory Group
WHPT	Whalley, Hawkes, Paisely and Trigg score
WFD	Water Framework Directive

Annex A – Figure 8.2.1: Survey Locations



PROJECT
East Yorkshire Solar Farm

CLIENT
East Yorkshire Solar Farm Limited

CONSULTANT
AECOM Limited
Midpoint,
Alencon Link
Basingstoke, RG21 7PP
www.aecom.com

- LEGEND**
- Order limits
 - Land not included in the Order limits
 - Solar PV Site (xx = Solar PV Area)
 - Ecology Mitigation Area (xx = Ecology Mitigation Area)
 - 1km Buffer of the Order limits
 - Statutory Main River
 - Ordinary Watercourse
 - x Aquatic Survey Locations

NOTES
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ISSUE PURPOSE
Environmental Statement

PROJECT NUMBER
60683115

FIGURE TITLE
Aquatic Survey Locations

FIGURE NUMBER
Figure 8-2-1

Annex B – Community Conservation Index

The Community Conservation Index (CCI) (Ref 22) 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 (Ref 39, Ref 40, Ref 41). Conservation Scores assigned to individual species vary from 1 to 10, as detailed in Table B1. The derived CCI scores generally vary from 0 to > 20, and are detailed in Table B2 which provides a guide to interpreting CCI scores.

Table B1: Conservation Scores from the Community Conservation Index (Ref 21)

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 >10-25% of all samples from similar habitats)
2	Common (species not in categories 10-5, which occur in up to >25-50% of all samples from similar habitats)
1	Very common (species not in categories 10-5, which occur in up to >50-100% of all samples from similar habitats)

Table B2: General guide to CCI scores (Ref 21)

CCI Score	Description	Interpretation
0 to 5.0	Reaches supporting only common species and/or community of low taxon richness.	Low conservation value
>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
>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
>15.0 to 20.0	Reaches supporting several uncommon species, at least one of which may be	High conservation value

CCI Score	Description	Interpretation
	nationally rare and/or a community of high taxon richness	
>20.0	Reaches supporting several rarities, including species of national importance and/or a community of very high taxon richness	Very high conservation value

Annex C – Lotic-Invertebrate Index of Flow Evaluation

The Lotic-Invertebrate Index for Flow Evaluation (LIFE) provides an assessment of the impact of variable flows on benthic macroinvertebrate communities. Under the assessment, individual species of aquatic macroinvertebrates are assigned to a flow group varying from I to VI, as detailed in Table C1. The LIFE score for a macroinvertebrate sample is then derived (mean of individual scores) from individual species scores and abundances, as detailed in Tables C2 and C3. LIFE scores for a macroinvertebrate sample ranges from 1 to 12, where highest scores describe communities adapted to rapid flows.

Table C1. Flow groups used to derive LIFE scores (Ref 23)

LIFE score Group	Description	Mean current velocity
I	Taxa primarily associated with rapid flows.	Typically >100cm.s ⁻¹
II	Taxa primarily associated with moderate to fast flows.	Typically 20 to 100cm.s ⁻¹
III	Taxa primarily associated with slow or sluggish flows.	Typically <20cm.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.	

Table C2. Abundance categories used to derive LIFE scores (Ref 23)

Abundance category	Description
A	1 to 9
B	10 to 99
C	100 to 999
D	1000 to 9999
E	> 10000

Table C3. A guide to interpreting LIFE scores (Ref 23)

Flow groups	Abundance categories			
	A	B	C	D/E
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

Annex D – Proportion of Sediment-sensitive Invertebrates

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. This follows the method stated in Ref 25. Under this system, individual species of aquatic macroinvertebrates are assigned a Fine Sediment Sensitivity Rating (FSSR) as detailed in Table D1, and abundance rating based on LIFE scores as detailed in Table D2. The PSI score for the aquatic macroinvertebrate sample is then derived from the individual species scores and abundances, as detailed in Table D3. The PSI score corresponds to the percentage of fine sediment-sensitive taxa present in a sample and ranges from 0 to 100, with low scores corresponding to water bodies with high fine sediment cover.

Table D1. 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

Table D2. Abundance categories used to derive PSI scores

FSSR group	Abundance			
	1-9	10-99	100-999	>999
A	2	3	4	5
B	2	3	4	5
C	1	2	3	4
D	1	2	3	4

Table D3. 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

Annex E – Whalley, Hawkes, Paisley & Trigg (WHPT) 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 reach. 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 WHPT scoring system (Ref 26) is based upon the sensitivity of macroinvertebrate families to organic pollution. It replaces the Biological Monitoring Working Party (BMWP) system (Ref 42) 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: >1,000 individuals). A score (Pressure Sensitivity Scores [PS]) 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:

- a. WHPT score;
- b. NTAXA; and
- c. 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 of watercourse are dependent on the quality and diversity of habitat, natural water chemistry (associated with, e.g., geology, distance from source), altitude, gradient, time of year the sample was taken and other factors.

Annex F – Macroinvertebrate taxa list

Table F1. Macroinvertebrate taxa list

Family	Species	Conservation Score	DE53	Fleet Dyke	FO01 Crossing	DE28	FL19	Sewer Drain	Hall Dyke	Black Dyke
Flatworms										
Dugesiidae	<i>Dugesia lugubris/polychroa</i>	2	-	-	17	-	-	7	-	-
Snails										
Lymnaeidae	Lymnaeidae (juvenile / damaged)	-	-	-	-	1	40	-	-	-
Lymnaeidae	<i>Galba truncatula</i>	3	-	-	2	1	-	-	17	-
Lymnaeidae	<i>Ampullaceana balthica</i>	1	1438	86	21	8	296	286	181	290
Hydrobiidae	<i>Potamopyrgus antipodarum</i>	1	-	1	-	-	65	-	-	15
Bithyniidae	<i>Bithynia tentaculata</i>	1	-	-	-	-	2	-	-	-
Physidae	Physidae (juvenile / damaged)	-	-	-	-	-	3	-	-	-
Physidae	<i>Physella sp.</i>	-	-	-	-	1	-	-	-	-
Succineidae	<i>Succinea sp.</i>	-	-	-	1	1	1	-	-	-
Planorbidae	Planorbidae (juvenile/ damaged)	-	-	47	-	9	28	-	7	-
Planorbidae	<i>Planorbarius corneus</i>	4	19	-	-	-	-	-	-	-
Planorbidae	<i>Planorbis planorbis</i>	1	7	-	316	-	-	-	-	-

Family	Species	Conservation Score	DE53	Fleet Dyke	FO01 Crossing	DE28	FL19	Sewer Drain	Hall Dyke	Black Dyke
Planorbidae	<i>Anisus vortex</i>	1	-	61	3	8	33	222	136	2
Planorbidae	<i>Gyraulus crista</i>	2	1	-	-	-	1	3	-	-
Planorbidae	<i>Bathyomphalus contortus</i>	2	-	-	14	-	-	-	-	-
Limpets and mussels										
Sphaeriidae	<i>Pisidium sp.</i>	-	1	85	-	40	11	2	-	1
Worms										
Oligochaeta	Oligochaeta	-	-	-	59	15	10	1	-	-
Leeches										
Glossiphoniidae	Glossiphoniidae (juvenile / damaged)	-	-	-	-	-	-	2	-	-
Glossiphoniidae	<i>Theromyzon tessulatum</i>	2	1	-	-	-	-	-	-	-
Glossiphoniidae	<i>Glossiphonia complanata</i>	1	4	-	-	-	-	1	-	-
Erpobdellidae	<i>Erpobdella testacea</i>	4	-	-	-	1	-	-	-	-
Erpobdellidae	<i>Dina lineata</i>	6	-	-	2	-	-	-	-	-
Mites										
Oribatei	<i>Oribatei</i>	-	-	1	-	1	-	1	1	-
Crustaceans										
Ostracoda		-	-	-	318	8	12	3	123	4
Copepoda		-	-	-	6	19	-	-	5	-
Crangonyctidae	<i>Crangonyx sp. (floridanus/pseudogracilis)</i>	-	-	-	-	18	161	5	61	33
Asellidae	<i>Asellus aquaticus</i>	1	-	6	220	38	263	180	29	423

Family	Species	Conservation Score	DE53	Fleet Dyke	FO01 Crossing	DE28	FL19	Sewer Drain	Hall Dyke	Black Dyke
Mayflies										
Baetidae	Baetidae (juvenile / damaged)	-	-	-	-	-	1	-	-	-
Baetidae	<i>Cloeon dipterum</i>	1	-	-	-	-	1	-	-	-
Damselflies										
Coenagrionidae	Coenagrionidae (juvenile / damaged)	-	6	-	1	-	-	-	-	-
Coenagrionidae	<i>Ischnura elegans</i>	1	2	-	-	-	-	-	-	-
Dragonflies										
Libellulidae	Libellulidae (juvenile / damaged)	-	3	-	-	-	-	-	-	-
Libellulidae	<i>Sympetrum sp.</i>	-	-	-	-	-	1	-	-	-
Libellulidae	<i>Sympetrum sanguineum</i>	5	-	-	-	-	10	-	-	-
True bugs										
Gerridae	Gerridae (nymph / damaged)	-	6	-	-	-	-	-	-	-
Gerridae	<i>Gerris lacustris</i>	1	-	-	-	-	-	1	-	-
Veliidae	<i>Velia sp.</i>	-	-	-	2	2	17	-	3	1
Veliidae	<i>Velia caprai</i>	2	-	-	-	-	1	-	-	-
Naucoridae	Naucoridae (damaged)	3	3	-	-	-	-	-	-	-
Naucoridae	<i>Ilyocoris cimicoides</i>	3	1	-	-	-	-	-	-	-
Corixidae	<i>Sigara dorsalis/striata</i>	-	3	-	3	-	-	-	-	-
Corixidae	<i>Sigara sp.</i>	-	8	-	-	-	-	2	-	-

Family	Species	Conservation Score	DE53	Fleet Dyke	FO01 Crossing	DE28	FL19	Sewer Drain	Hall Dyke	Black Dyke
Corixidae	<i>Sigara dorsalis</i>	1	1	-	-	-	-	-	-	-
Notonectidae	<i>Notonecta sp.</i>	-	2	-	1	-	-	-	-	-
Beetles										
Halplidae	Halplidae (larvae / damaged)	-	-	-	9	-	-	36	-	-
Halplidae	<i>Halplus sp.</i>	-	5	-	-	-	-	-	6	1
Halplidae	<i>Halplus lineaticollis</i>	1	-	-	-	-	5	7	1	4
Dytiscidae	Dytiscidae (larvae / damaged)	-	-	-	79	3	-	14	9	1
Dytiscidae	<i>Hydroporus sp.</i>	-	-	-	-	-	-	-	1	-
Dytiscidae	<i>Hydroporus palustris</i>	1	2	-	14	5	1	1	6	19
Dytiscidae	<i>Hydroporus pubsecens</i>	2	-	-	2	1	-	-	-	2
Dytiscidae	<i>Agabus bipustulatus</i>	1	-	-	-	-	-	-	-	10
Dytiscidae	<i>Agabus didymus</i>	1	-	-	-	-	-	-	-	4
Dytiscidae	<i>Agabus guttatus</i>	4	-	-	-	-	-	1	-	-
Dytiscidae	<i>Agabus melanarius</i>	7	-	-	-	-	1	-	-	-
Dytiscidae	<i>Ilybius fuliginosus</i>	1	-	-	-	-	-	-	-	2
Dytiscidae	<i>Ilybius quadriguttatus</i>	5	-	-	-	-	-	-	-	1
Dytiscidae	<i>Dytiscus sp.</i>	-	1	-	-	-	1	-	-	-
Hydrophilidae	Hydrophilidae (larvae / damaged)	-	-	1	9	2	3	17	10	-
Hydrophilidae	<i>Helophorus aequalis</i>	1	-	1	-	-	-	1	-	-
Hydrophilidae	<i>Helophorus brevipalpis</i>	1	35	1	-	-	-	4	-	-

Family	Species	Conservation Score	DE53	Fleet Dyke	FO01 Crossing	DE28	FL19	Sewer Drain	Hall Dyke	Black Dyke
Hydrophilidae	<i>Hydrobius fuscipes</i>	1	1	-	1	-	1	1	1	-
Hydrophilidae	<i>Anacaena globulus</i>	1	-	-	-	2	-	-	1	-
Hydraenidae	<i>Ochthebius minimus</i>	1	1	-	-	-	-	-	-	-
Alderflies										
Sialidae	Sialidae (juvenile / damaged)	-	-	-	-	-	-	-	-	-
Sialidae	<i>Sialis lutaria</i>	1	1	-	-	-	-	-	-	-
Caddisflies										
Limnephilidae	<i>Limnephilus lunatus</i>	1	2	-	-	-	-	-	-	-
Trueflies										
Chironomidae	Chironomidae (damaged / pupa)	-	-	-	-	-	-	-	6	2
Chironomidae	Tanypodinae	-	3	1	48	3	33	-	8	56
Chironomidae	Orthocladiinae	-	3		18	12	-	2	2	59
Chironomidae	Chironomini	-	20	37	123	9	15	2	3	1
Chironomidae	Tanytarsini	-	2	-	184	96	2	2	38	3
Tipulidae	Tipulidae	-	1	-	11	-	-	-	-	-
Psychodidae		-	1	-	1	4	2	-	-	-
Empididae		-	-	-	7	-	1	-	-	-
Ceratopogonidae		-	-	-	-	1	-	-	-	-
Stratiomyidae	Stratiomyidae	-	-	-	-	1	-	-	-	-
Tabanidae		-	-	3	-	-	-	-	-	-
Culicidae	Culicidae	-	2		26	-	3	-	16	-

Family	Species	Conservation Score	DE53	Fleet Dyke	FO01 Crossing	DE28	FL19	Sewer Drain	Hall Dyke	Black Dyke
Sciomyzidae		-	-	1	-	-	3	5	-	-
Other Taxa										
Collembola		-	-	-	1	1	1	-	-	-
Tricladida		-	-	-	-	1		-	-	-
Terrestrial diptera		-	-	-	-	-	-	7	-	-
9 spine stickleback		-	-	-	-	-	-	1	-	-
Spider		-	-	-	-	-	-	3	-	-
Terrestrial beetle/non identifiable beetle		-	-	-	-	-	-	1	-	-

Annex G – Macrophyte taxa list

Table G1. Macrophyte taxa list for watercourses

Macrophyte taxa	Black Dyke	FO01	DE28	DE53	FL19	Fleet Dyke	Hall Dyke	Sewer Drain
<i>Alisma plantago-aquatica</i>	-	-	-	-	4	1	-	-
<i>Callitriche obtusangula</i>	-	-	-	3	-	-	-	-
<i>Callitriche stagnalis</i>	-	-	-	-	-	-	-	9
<i>Callitriche stagnalis/platycarpa</i>	4	6	-	-	6	-	6	-
<i>Cladophora glomerata/Rhizoclonium hieroglyphicum</i>	-	-	-	2	-	-	6	-
<i>Elodea nuttallii</i>	-	-	-	4	-	-	-	-
<i>Fontinalis antipyretica</i>	-	3	-	-	-	-	-	-
<i>Lemna gibba</i>	-	-	-	-	-	-	-	6
<i>Lemna minor</i>	-	-	-	3	-	-	-	-
<i>Myosotis scorpioides</i>	-	-	-	-	-	-	2	6
<i>Phalaris arundinacea</i>	7	9	4	-	9	-	9	-
<i>Potamogeton crispus</i>	-	-	-	3	-	-	-	-
<i>Potamogeton natans</i>	-	-	-	9	-	-	-	-
<i>Potamogeton pectinatus</i>	-	-	-	5	-	-	-	-
<i>Ranunculus sceleratus</i>	-	-	-	-	-	-	-	3
<i>Rorippa nasturtium-aquaticum agg.</i>	-	-	-	-	-	-	-	5
<i>Sparganium erectum</i>	-	-	-	-	1	-	-	-
<i>Veronica beccabunga</i>	-	-	-	-	-	-	-	5

Table G2. Taxon cover values (TCV)

TCV	Percentage cover for the macrophyte species
C1	<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	>75%

Table G3. WFD boundary values for macrophytes in rivers

Ecological Quality Ratio (EQR)	WFD Ecological Status for Macrophytes
≥ 0.80	High
≥ 0.60	Good
≥ 0.40	Moderate
≥ 0.20	Poor
< 0.20	Bad

Annex H – Site Photographs



Plate 1. OU20 (dry at time of survey)



Plate 2. DE52 (dry at time of survey)



Plate 3. DE53



Plate 4. DE34 (dry at time of survey)



Plate 5. Black Dyke



Plate 6. Fleet Dyke



Plate 7. FL13 (dry at time of survey)



Plate 8. FL19



Plate 9. Great Committee Drain (dry at time of survey)



Plate 10. Sewer Drain



Plate 11. Burtles and Highfield Drain



Plate 12. F041 (dry at time of survey)



Plate 13. Hall Dyke



Plate 14. FO01



Plate 15. DE28