

# H2Teesside Project

## Environmental Statement

Volume III – Appendices

Appendix 12G: Aquatic Ecology Survey Report

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The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended)

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(a) and 5(2)(l)



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## 12G.0 AQUATIC ECOLOGY SURVEY REPORT

### 12G.1 Introduction

#### Background

12G.1.1 This report has been prepared by AECOM Ltd (AECOM) on behalf of the Applicant to accompany an application (the Application) being made to the Secretary of State (SoS) for the Department for Energy Security and Net Zero (DESNZ). The Applicant is H2 Teesside Limited, a bp company. H2 Teesside Limited will be the lead developer of the Proposed Development and bp will be appointed as the operator of the Proposed Development. The Applicant is seeking a Development Consent Order (DCO) for the construction, operation (including maintenance where relevant) and decommissioning of the H2Teesside Project (the Proposed Development).

#### Aims and Objectives

12G.1.2 The purpose of this report is a technical appendix to accompany Chapter 12: Ecology and Nature Conservation (including aquatic ecology) of the Environmental Statement (ES) for the Proposed Development (ES Volume I, EN070009/APP/6.2).

12G.1.3 This report presents the approach and findings of the desk study and field surveys undertaken in autumn 2022, spring 2023, summer 2023 and autumn 2023 to inform the ES.

12G.1.4 It describes the approach and findings of the aquatic ecology desk study and aquatic macroinvertebrate, aquatic macrophyte species and fish surveys of freshwater habitats undertaken in spring and summer 2023 in support of the Environmental Impact Assessment (EIA) for the Proposed Development.

12G.1.5 Aquatic macroinvertebrates are defined by the British Standards Institution (2012) as those invertebrate species that are easily visible without magnification i.e. species and life stages greater than 0.5 mm in size.

12G.1.6 Macrophytes are defined by the British Standards Institution (2014) as larger plants of fresh water which are easily seen with the naked eye, or which usually form colonies, including all aquatic vascular plants, bryophytes, stoneworts (Characeae) and macro-algal growths.

12G.1.7 This report does not seek to include recommendations, specify mitigation, or make an ecological impact assessment of the Proposed Development.

#### Site Location and Development Proposals

12G.1.8 The Proposed Development is located within the administrative boundary of Redcar and Cleveland Borough Council in Teesside, North Yorkshire, England. The Proposed Development comprises a Hydrogen Production Facility along with the required electricity and water connections as well as a hydrogen pipeline to deliver hydrogen to off-takers who may potentially use the hydrogen in the future. Full details of the Proposed Development are provided in Chapter 1: Introduction (ES Volume I, EN070009/APP/6.2), Chapter 3: Description of the Existing Environment (ES Volume I, EN070009/APP/6.2) and Chapter 4: Proposed Development (ES Volume I,

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EN070009/APP/6.2). The Site location is shown in Figure 12-1: Study Area (ES Volume II, EN070009/APP/6.3).

#### Relevant Legislation and Policy

12G.1.9 This assessment has been undertaken within the context of some or all of the following relevant legislative instruments, planning policies and guidance documents:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive');
- Council Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the 'Water Framework Directive' or WFD);
- The Bern Convention (1979) also known as the Convention on the Conservation of European Wildlife and Natural habitats;
- Convention on Wetlands of International Importance ('Ramsar convention');
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015;
- Wildlife and Countryside Act 1981 (as amended) (the 'WCA');
- Salmon and Freshwater Fisheries Act (SAFFA) 1975;
- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Conservation of Habitats and Species Regulations 2010 (as amended);
- Nitrate Vulnerable Zones/Nitrates Directive (The Nitrates Directive 1991);
- The Invasive Alien Species (Enforcement and Permitting) Order 2019; and
- UK Post-2010 Biodiversity Framework.

12G.2 Methodology

#### Desk Study

12G.2.1 An initial desk study was undertaken in November 2022. Data relevant to the aquatic environment was requested including information on statutory and non-statutory nature conservation designations and records of any protected, notable, or invasive species.

12G.2.2 The desk study included a review of:

- Current WFD status using the Environment Agency's (EA) Catchment Data Explorer website ;
- Environment Agency ecological survey data using the Environment Agency Ecology and Fish Data Explorer (Environment Agency, 2023);

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- Environmental Records and Information Centre (ERIC) Northeast for non-statutory designations, priority habitats and protected and notable species;
  - historical crayfish (White-clawed, *Austropotamobius pallipes* and American signal crayfish *Pacifastacus leniusculus*) records freely available on NBN atlas (National Biodiversity Network, 2022)
  - Relevant information detailed within the Tees Valley Biodiversity Action Plan (BAP) (Tees Valley Nature Partnership (2004); and
  - Previous ecological survey information covering the Proposed Development Site and adjacent land contained within reports to Net Zero Teesside (bp, 2021).

12G.2.3 Records were restricted to those collated over the last 10 years, as these are most likely to reflect the current (rather than historic) baseline conditions associated with the study area.

#### Field Surveys

12G.2.4 Field surveys were undertaken on selected water bodies within the Proposed Development Site, fifteen running watercourses and five ponds. Further site details are provided below in Table 12G-1 and on Figure 12-1: Study Area (ES Volume II, EN070009/APP/6.3).

12G.2.5 Initially these surveys were focussed on aquatic areas that had potential to be directly impacted by buried (open-cut) hydrogen pipeline crossings. Due to changes in the Scheme Design and Study area, not all of the surveyed water bodies will be impacted, or are within the area for the Proposed Development anymore, but have been included in this baseline as they provide context for conditions within the wider area.

Table 12G-1: Aquatic Sampling Locations, Survey Information and Site Descriptions

SITE ID	CONTEXT TO STUDY AREA	NGR	SURVEY DATES	AQUATIC SURVEYS UNDERTAKEN	SITE DESCRIPTION
Belassis Beck	Above ground Hydrogen Pipeline crossing	NZ 48485 23302	30/03/2023	Spring Macroinvertebrate Survey	Moderately shallow and slightly turbid watercourse without shade. Very slow flowing, with average flow <10 cm/s. 3 m average width, 20 cm average depth. 100% ponded reach habitat and 100% silt substrate
			19/09/2023	Aquatic Macrophyte Survey	
Knitting Wife Beck	Now outside the Proposed Development Site	NZ 55104 22407	29/03/2023	Macroinvertebrate Survey	Moderately shallow and slightly turbid ditch without shade. Average flow 10-25 cm/s. 3 m average width, >100 cm average depth. 50% run and 50% ponded reach habitat. 10% gravel, 40% sand and 50% silt substrate
The Fleet	Above ground Hydrogen Pipeline crossing , inside electrical connection corridor, other gases connection corridor and water connection corridor	NZ 57347 24488	29/03/2023	Macroinvertebrate Survey	Moderately shallow and slightly turbid ditch without shade. Average flow <10 cm/s. 2 m average width, 80 cm average depth. 100% ditch habitat. 20% gravel, 50% sand and 30% silt substrate
Mill Race	Above ground Hydrogen Pipeline crossing	NZ 57705 23342	18/04/2023	Macroinvertebrate Survey	Shallow and lightly shaded ditch without turbidity. Average flow 10 -25 cm/s. 1.5 m average width, 20 cm average depth. 100% run habitat and 100% silt substrate
			09/06/2023	Aquatic Macrophyte Survey	

SITE ID	CONTEXT TO STUDY AREA	NGR	SURVEY DATES	AQUATIC SURVEYS UNDERTAKEN	SITE DESCRIPTION
Mains Dike	Straddles the boundary of the Proposed Development Site	NZ 58189 22930	18/04/2023  06/06/2023	Macroinvertebrate Survey  Aquatic Macrophyte Survey	Moderately shallow and slightly turbid ditch without shade. Average flow 10 -25 cm/s. 3 m average width, 60 cm average depth. 100% run habitat and 100% silt substrate
Kinkerdale Beck	Inside the Proposed Development Site	NZ 55891 21233	18/04/2023  06/06/2023	Macroinvertebrate Survey  Aquatic Macrophyte Survey	Shallow and slightly turbid ditch with heavy shade. Average flow 10-25 cm/s. 1 m average width, 15 cm average depth. 100% riffle habitat. 5% boulders, 5% pebbles, 5% gravel, 10% sand and 75% silt substrate
Holme Fleet	Buried (open cut) Hydrogen pipeline crossing	NZ 49387 23931	10/11/2022  27/03/2023  07/06/23	Autumn Macroinvertebrate Survey  Spring Macroinvertebrate Survey  Aquatic Macrophyte Survey	Moderately shallow drainage ditch without shade and without turbidity. Very slow flowing, with average flow <10 cm/s. 4 m average width, 60 cm average depth. 100% ponded reach habitat and 100% silt substrate.
Site 2 WBID 2	Outside the Proposed Development Site but	NZ 49376 24076	15/11/2022	Autumn Macroinvertebrate Survey	Moderately shallow and slightly turbid drainage ditch without shade. Very slow flowing, with average flow <10 cm/s. 3 m average width, 60



SITE ID	CONTEXT TO STUDY AREA	NGR	SURVEY DATES	AQUATIC SURVEYS UNDERTAKEN	SITE DESCRIPTION
	hydrologically connected to Holme Fleet		27/03/2023  07/06/23	Spring Macroinvertebrate Survey  Aquatic Macrophyte Survey	cm average depth. 100% ponded reach habitat and substrate consists of 95% silt and 5% boulders.
Site 3 WB ID280	Outside the Proposed Development Site	NZ 49735 24400	15/11/2022  27/03/2023	Autumn Macroinvertebrate Survey  Spring Macroinvertebrate Survey	Moderately shallow and moderately turbid drainage ditch without shade. Very slow flowing, with average flow <10 cm/s. 2 m average width, 80 cm average depth. 100% ponded reach habitat. Substrate consists of 100% silt.
Site 4 WBID 4	Adjacent to Greatham Creek. Outside the Proposed Development Site	NZ 49599 26038	10/11/2022	Autumn Macroinvertebrate Survey	Moderately shallow and highly turbid drainage ditch without shade. Little to no flow. 3 m average width, 40 cm average depth. 100% ponded reach habitat. Substrate consists of 100% silt.
Site 6 WBID 6	150 m outside the Proposed Development Site	NZ 51182 26412	17/11/2022	Autumn Macroinvertebrate Survey	Shallow and slightly turbid man-made drain without shade. Very slow flowing, with average flow <10 cm/s. 1 m average width, 60 cm average depth. 100% ponded reach habitat.

SITE ID	CONTEXT TO STUDY AREA	NGR	SURVEY DATES	AQUATIC SURVEYS UNDERTAKEN	SITE DESCRIPTION
			28/03/2023	Spring Macroinvertebrate Survey	Substrate consists of 10% gravel and 90% concrete.
			06/07/2023	Aquatic Macrophyte Survey	
Site 8 WBID 8	Buried (open cut) Hydrogen pipeline crossing	NZ 51331 26139	30/03/2023	Spring Macroinvertebrate Survey	Shallow ditch with heavy shade and without turbidity. Average flow <10 cm/s. 1 m average width, 40 cm average depth. 100% ponded reach and 100% silt substrate. Watercourse likely to dry up.
Site 10 WBID 10	Buried (open cut) Hydrogen pipeline crossing	NZ 51111 24820	30/03/2023	Spring Macroinvertebrate Survey	Shallow drain with no shade and without turbidity. Very slow flowing, average flow <10 cm/s. 1 m average width, 40 cm average depth. 100% ponded reach and 100% silt substrate. Watercourse likely to dry up.
Site 14 WBID 14	Outside the Proposed Development Site (2 m)	NZ 51453 25943	30/03/2023	Spring Macroinvertebrate Survey	Shallow pond drain with moderate shade and without turbidity. Little to no flow, average flow <10 cm/s. 2 m average width, 10 cm average depth. 100% ponded reach and 100% silt substrate. Watercourse likely to dry up.

SITE ID	CONTEXT TO STUDY AREA	NGR	SURVEY DATES	AQUATIC SURVEYS UNDERTAKEN	SITE DESCRIPTION
Site 15 WBID 15	Outside the Proposed Development Site (10 m)	NZ 51476 25946	30/03/2023	Spring Macroinvertebrate Survey	Shallow pond drain with heavy shade and without turbidity. Little to no flow, average flow <10 cm/s. 1 m average width, 10 cm average depth. 100% ponded reach and 100% silt substrate. Watercourse likely to dry up.
Dabholm Cut	Inside the Proposed Development Site, inside the areas for the electrical connection works and natural gas connection works	NZ 56677 23710	18/04/2023  09/06/2023	Spring Macroinvertebrate Survey  Aquatic Macrophyte Survey	Moderately shallow and slightly turbid ditch with heavy shade. Average flow 10-25 cm/s. 1.5 m average width, 60 cm average depth. 100% run habitat and 100% silt substrate
Pond B-WBID 1	Inside the Proposed Development Sites Natural Gas Connection Works area	NZ 57045 24483	20/04/2023	Fish eDNA Survey only. No access in summer for PSYM survey	This pond is approximately 0.2ha in size. At the time of the survey, the majority of it was dry and supported marginal and wetland vegetation. The wetted area represented < 5% of the total area of the pond.
Pond L WB 46	Now outside the Proposed Development Site	NZ 56730 22410	09/06/2023	Macroinvertebrate and Aquatic Macrophyte Survey-PSYM	This pond is approximately 0.5 ha in size with half this area supporting a reed bed while the other is open water.
Pond M -Mill Race pond WB ID 34	Inside the Proposed Development Site	NZ 57093 23681	20/04/2023 09/06/2023	Fish eDNA Survey Macroinvertebrate and Aquatic Macrophyte Survey-PSYM	Moderately sized pond with moderate shading. 60 m wide by 20 m, 20 cm deep. 100% silt substrate. Pond likely dry at certain times of the year.

SITE ID	CONTEXT TO STUDY AREA	NGR	SURVEY DATES	AQUATIC SURVEYS UNDERTAKEN	SITE DESCRIPTION
Pond N	150 m outside the Proposed Development Site	NZ 55295 21133	06/07/2023	Aquatic Macrophyte Survey	Moderately sized pond with moderate shading. 60 m wide by 20 m, dry pond.
Pond P-adjacent to Greatham Creek.	Outside the Proposed Development Site	NZ 50103 26692	07/06/2023  19/09/2023	Macroinvertebrate and Aquatic Macrophyte Survey  Fish eDNA survey	This site is located within semi-improved grassland which forms part of a wider brownfield site. The pond is approximately 0.6 ha and is dominated by open water with marginal vegetation along its perimeter.

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## Aquatic Macroinvertebrate Surveys

### Watercourses

12G.2.6 The macroinvertebrate survey method followed the aquatic macroinvertebrate sampling procedures standardised by the EA (Environment Agency, 2017), which conforms to BS EN ISO 10870:2012 Water Quality – Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters. The method allowed characterisation of aquatic macroinvertebrate communities and were used to determine whether rare or notable species or communities were present. The samples were taken using a standard Freshwater Biological Association (FBA) pattern pond net (mesh size: 1mm). 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.

### Ponds

12G.2.7 The ponds were surveyed using the PSYM (Predictive System for Multimetrics) method (Pond Action, 2002), which was developed to permit an assessment of relative ecological quality of ponds in England and Wales. Consistent with this method, an aggregate aquatic macroinvertebrate sample was taken within each pond, with sampling effort divided between the number of mesohabitats (e.g., open water, reed bed etc) present within each pond.

12G.2.8 The samples were taken using a standard Freshwater Biological Association (FBA) pattern pond net (mesh size: 1mm). The habitats present were sampled by 'kick' and/or 'sweep' sampling for three minutes, followed by a one-minute hand search of larger substrates in accordance with the standard methods.

12G.2.9 The samples collected were subsequently preserved in Industrial Methylated Spirits (IMS) for laboratory processing and further data interpretation by AECOM (see below).

### Laboratory Analysis and Data Interpretation

12G.2.10 The samples collected was sorted and analysed in a laboratory by suitably trained and experienced aquatic ecologists. In accordance with Environment Agency guidance (Environment Agency, 2014), the aquatic macroinvertebrate samples were identified to 'mixed taxon level' using a stereo-microscope to generate a species list for each waterbody. While the PSYM method dictates that specimens only be identified to 'Family Level', these further analyses were undertaken to allow calculations of the relative nature conservation value of the aquatic macroinvertebrate community using the Community Conservation Index (CCI), detailed below.

12G.2.11 Lists of the aquatic macroinvertebrate taxa present were produced in line with Environment Agency guidance (Environment Agency, 2014). The aquatic macroinvertebrate samples were identified to 'mixed taxon level' using

stereomicroscopes. Most groups were identified to species level (where practicable), with the exception of the following:

- seed shrimps (Ostracoda) which were identified to order;
- water mites (Hydracarina) which were identified to sub-order;
- worms (Oligochaeta) which were identified to sub-class;
- marsh beetles (Scirtidae) which were identified to family;
- pea mussels (Pisidium), which were identified to genus;
- bladder snails (Physella), which were identified to genus;
- truefly larvae, which were identified to the maximum resolution possible; and
- immature or damaged specimens, which were identified to the maximum resolution possible on a case-by-case basis.

12G.2.12 To provide an indication of the conservation value and sensitivity of macroinvertebrate communities and species, the macroinvertebrate data was analysed using the following pressure-specific biotic indices (more information on these is provided in Appendices D to G):

- Whalley, Hawkes, Paisley and Trigg (WHPT) Average Score Per Taxon (ASPT) and Number of Taxa (NTAXA) metrics - used as indicators of organic pollution/ general degradation in rivers;
- Proportion of Sediment-sensitive Invertebrates (PSI) scores – used to indicate the level of sedimentation at a site (watercourses only);
- Lotic Invertebrate index for Flow Evaluation (LIFE) scores – used to evaluate the flow regime at a site (watercourses only); and
- Community Conservation Index (CCI) – used to indicate the conservation value of macroinvertebrate communities at a site.

#### Aquatic Macrophyte Survey

12G.2.13 The survey methodology undertaken varied depending on the type of watercourse. Survey of flowing watercourses followed the method outline in UKTAG River Assessment Method Macrophytes and Phytobenthos (WFD-UKTAG, 2014) while surveys of standing watercourses were completed following the PSYM (Predictive System for Multimetrics) method (Pond Action, 2002).

#### Watercourses

12G.2.14 Survey of flowing watercourses followed the Environment Agency's Operational Instruction for surveying freshwater macrophytes in rivers (Environment Agency, 2007). The survey was made by walking within the channel of each watercourse along a 100 m transect, where safely accessible. Any inaccessible areas were bypassed as necessary before re-entering the channel at the next available access point. A list of all macrophytes encountered was made and their relative abundance was recorded using Taxon Cover Values (TCV), detailed below (Table 12G-2).

Table 12G-2: Taxon Cover Values (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%

### Ponds

12G.2.15 The survey was undertaken by walking the perimeter of each pond and recording all wetland plants present within the outer edge (defined as the upper level where water stands in winter) using the standard plant list provided with the method. Deeper water areas were sampled by grapnel, thrown from the perimeter.

12G.2.16 The data gathered was combined with the aquatic macroinvertebrate data for each pond and sent to the Freshwater Habitats Trust for analysis to determine a PSYM score (see below).

### PSYM Analysis

12G.2.17 PSYM provides an assessment of the biological quality of a pond, based on a range of environmental data and metrics derived from its macrophyte and macroinvertebrate assemblages. It allows the categorisation of the quality and 'biotic integrity' of a pond in a national context, by using environmental data to generate a range of 'expected' metrics for macrophyte and macroinvertebrate assemblages, which are then compared to the metrics calculated based on the results of a site survey.

12G.2.18 Each pond is given a PSYM score to give an overall quality index which is presented as a percentage of the maximum score (i.e., no deviation from what would be expected for a high quality pond of the priority habitat type). These percentage categories are as follows:

- > 75% = Good
- 51-75% = Moderate
- 25-50% = Poor
- < 25% = Very Poor

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### Fish eDNA

- 12G.2.19 Environmental DNA (eDNA) surveys were completed for fish on 20 April 2023 at two ponds (Ponds B and M) using commercial eDNA extraction kits.
- 12G.2.20 Fish eDNA survey is a technique for establishing presence/ absence of fish species within a waterbody without having to undertake a traditional fish survey. It is a highly-validated and widely-used analysis that has been shown to outperform electrofishing for fish community assessment. eDNA derives from fish faeces, mucous, gametes, shed skin and carcasses and becomes diluted and distributed in the waterbody such that it can be detected through the collection and laboratory analysis of water samples. Therefore, the eDNA survey involved the collection of water samples from around the perimeter of the pond. The survey was undertaken in accordance with the standardised method detailed by NatureMetrics, the laboratory who provided the sampling kit and undertook the sample analysis. In line, with this method there are no seasonal restrictions to when these water samples can be collected.

### Limitations

- 12G.2.21 There are no significant limitations to the work undertaken. All surveys were undertaken in appropriate favourable weather conditions, and in the appropriate seasons for the species and habitats being assessed.
- 12G.2.22 The aim of a desk study is to help characterise the baseline context of the Proposed Development and provide valuable background information that would not be captured by a single site survey alone. Information obtained during the course of a desk study is dependent upon people and organisations having made and submitted records for the area of interest. As such, a lack of records for a particular habitat or species does not necessarily mean that the habitats or species do not occur in the desk study area. Likewise, the presence of records for particular habitats and species does not automatically mean that these still occur within the area of interest or are relevant in the context of the Proposed Development.
- 12G.2.23 Given the nature of aquatic macroinvertebrate surveys it is not possible to be certain that all the species present in a waterbody have been detected. Where juvenile or damaged specimens were collected, species level identification is not always possible. Not all macroinvertebrate species that use water bodies are present at all times of year and therefore some may be overlooked when surveying. Other species that may be present at other times of year, sporadically and/ or in low numbers may not have been recorded. This is not considered a significant limitation as standard methods were applied, and the data collected is considered representative of the conditions present and therefore appropriate for assessment of value.
- 12G.2.24 Sweep sampling was undertaken on most watercourses due to safety considerations. This is generally considered to be suboptimal compared to 'kick sampling', however this is still a recognised collection method, as such it is not considered a significant limitation.



12G.2.25 All macrophyte species found were identified to species level, where technically feasible based on the material available and the season of survey. Certain macrophyte species cannot always be identified reliably if they lack the features necessary to allow identification, for example mature fruit are typically required to allow certain identification of water-starwort species (*Callitriche agg.*) and watercress (*Nasturtium officinale agg.*).

12G.2.26 It was noted during the time of the survey that Ponds WBID 1 and N are likely not permanent and may dry up at certain times of the year. Given that PSYM analysis is not appropriate for highly seasonal ponds the results for pond N may not be reliable.

12G.2.27 No aquatic macrophyte data could be collected on the Fleet and on Knitting Wife Beck due to access constraints during the time of the surveys. Although these sites could be accessed in spring, by summer these sites were deemed not safe to access for the macrophyte surveys. Likewise, it was not deemed suitable for aquatic macrophyte data to be collected at sites WBID 8, WBID 10, WBID 14 and WBID 15 due to unsafe conditions resulting from marshy ground and steep banks.

### 12G.3 Results

#### Desk Study

#### Designated Sites of Interest for Freshwater Ecology

#### *Statutory Designated Sites*

12G.3.1 A single Site of Special Scientific Interest (SSSI) designated in part for freshwater interest was identified through the desk study, Lovell Hill Pools SSSI. However, this site is located approximately 2.6 km from the Proposed Development Site with no hydrological connection. As such, there is no pathway for impact upon this site and it requires no further consideration.

12G.3.2 Three Local Nature Reserves (LNR) designated in part for freshwater interest were identified, as detailed in Table 12G-3 below.

Table 12G-3: Local Nature Reserves of Freshwater Interest within the Zol of the Proposed Development Site

SITE NAME	REASON FOR DESIGNATION	PROXIMITY TO MAIN SITE (APPROX.)	PROXIMITY TO CONNECTION CORRIDORS (APPROX.)
Cowpen Bewley Woodland Country Park LNR	Reclaimed from former brickworks, landfill and ex-agricultural land there are now large variety of habitats including a lake, ponds and a watercourse	Over 2 km	Overlapping

SITE NAME	REASON FOR DESIGNATION	PROXIMITY TO MAIN SITE (APPROX.)	PROXIMITY TO CONNECTION CORRIDORS (APPROX.)
Charlton's Pond LNR	The site supports a wetland, amenity grassland and woodland habitats.	Over 2 km	490 m west
Billingham Beck Valley LNR	The site comprises of meadows, ponds, marsh and a woodland. The wetland provides a home for flora and fauna.	Over 2 km	1.4 km west

### *Non-statutory Designated Sites*

12G.3.3 Table 12G-4 details the four Local Wildlife Sites (LWS) of freshwater interest identified by the desk study. The proximity of these to the Proposed Development is also identified in the table and their potential relevance for further assessment. These sites do not appear to be hydrologically connected to any watercourses surveyed and as such, require no further consideration.

Table 12G-4: Non-statutory Designated Sites within 2 km of the Proposed Development Site

SITE NAME	REASON FOR DESIGNATION	PROXIMITY TO MAIN SITE (APPROX.)	PROXIMITY TO CONNECTION CORRIDORS (APPROX.)
Tot Fenny's Meadow LWS	The site supports neutral grassland, fen and/or flushes. The neutral grassland supports at least three grass and three herb species required for Tees Valley LWS selection. There is also an area of marsh habitat.	1.1 km south	Overlapping
Billingham Norton Bottoms Reedbed Treatment System LWS	The site is a large reedbed.	Over 2 km	720 m south-west
Portrack Meadows LWS	The site is a former industrial site on the north bank of the river Tees. The site comprises a middle area of urban grassland with surrounding	Over 2 km	1.7 km south-west

SITE NAME	REASON FOR DESIGNATION	PROXIMITY TO MAIN SITE (APPROX.)	PROXIMITY TO CONNECTION CORRIDORS (APPROX.)
	scrub, an area of reedbed, and a brackish pool with remnant saltmarsh.		
Billingham Beck Valley Country Park LWS	The site is a large area of neutral grassland, wetland, scrub and woodland in the valley of Billingham Beck, which forms the country park. The site supports dingy skipper, has areas of reedbed.	Over 2 km	1.4 km west

### Water Framework Directive Status

#### *Tees Estuary (S Bank) Water Body*

12G.3.4 Tees Estuary (S Bank) Water Body (WFD Water Body ID GB103025072320) is a heavily modified river flowing into the Tees Estuary from Yearby, flowing Northwest into the Tee estuary. The closest point of the water body lies within the Eastern section of the Proposed Development Site. The Tees Estuary (S Bank) Water Body is currently classified as having Moderate Ecological Status and has not been assessed since 2019.

#### Aquatic Macroinvertebrates

12G.3.5 There were no recent records of protected aquatic macroinvertebrate species identified in the desk study. Surveys of water bodies in the Study Area for other Proposed Developments likewise did not record any notable or protected species.

12G.3.6 Records of notable aquatic macroinvertebrates are presented in Table 12G-5 below. These records are outside the Proposed Development Site.

Table 12G-5: Notable Aquatic Macroinvertebrate Species within 2 km of the Site

SPECIES	TAXONOMIC GROUP	DATE AND DISTANCE OF RECORD	NATURE CONSERVATION STATUS (ENGLAND)
<i>Agabus conspersus</i>	Beetle	2015 record in Cowpen Marsh	Notable (Conservation Score 7)
<i>Noterus crassicornis</i>	Beetle	2015 record from pond in Seal Sands approximately 1 km away from the Site in Cowpen Marsh.	Notable (Conservation Score 7)

SPECIES	TAXONOMIC GROUP	DATE AND DISTANCE OF RECORD	NATURE CONSERVATION STATUS (ENGLAND)
<i>Dolichopus arbustorum</i> *	Truefly	2015 record approximately 1 km away from the Site in Cowpen Marsh	Rare (Conservation Score 8).
<i>Hydrobia acuta subsp. Neglecta</i>	Snail	2015 record approximately 1 km away from the Site in Greenabella	Regionally notable (Conservation Score 6).
<i>Rhaphium lanceolatum</i> *	Truefly	2015 record about a 1 km away from Proposed Development Site, in Cowpen Marsh	Notable (Conservation Score 7)
* These taxa are present within the family Dolichopodidae whose species can have an aquatic larvae stage. At present it is not possible to identify this family using routine laboratory identification techniques and as such, these records are likely to have originated from adult flies. Given this, this assessment would not be able to distinguish the presence of these species.			

12G.3.7 There were no records of the white-clawed crayfish *Austropotamobius pallipes* within 2 km of the Proposed Development within the last ten years, nor within 10 km of the study area.

#### Macrophytes

12G.3.8 Historical data from record centres and the Environment Agency has revealed no protected or notable macrophyte species recorded within 2 km of the Proposed Development.

12G.3.9 Surveys undertaken for Net Zero Teesside (bp, 2021) recorded ragged robin *Lychnis flos-cuculi*, which is designated as 'Near Threatened' in England Red List (Stroh *et al.*, 2014) in a pond in Foundry North, within the Study Area of the Proposed Development (NGR NZ 56506 25742). This is also present on the list of wetland species used for the selection of LWS in the Tees Valley (Tees Valley Biodiversity Partnership, 2010).

#### Invasive Non-Native Species

12G.3.10 From a review of field survey reports for other Proposed Developments in the area (bp, 2021), floating pennywort *Hydrocotyle ranunculoides*, a schedule 9 species of the Wildlife and Countryside Act (1981) was recorded in The Fleet waterbody. The Fleet is within the proposed Study Area.

12G.3.11 Himalayan balsam, *Impatiens glandulifera*, was recorded by the EA in Greatham Beck, which is 2km north west of the Proposed Development Site.

12G.3.12 A range of historic aquatic Invasive Non-Native Species (INNS) records were identified in the wider area (bp, 2021) including water fern *Azolla filiculoides*, New

Zealand pigmyweed *Crassula helmsii*, parrot's feather *Myriophyllum aquaticum*, floating pennywort *Hydrocotyle ranunculoides*, Canadian waterweed *Elodea canadensis*, and Nuttall's waterweed *Elodea nuttallii*. In addition to species that are commonly found within riparian habitats including Himalayan balsam *Impatiens glandulifera*, Japanese knotweed *Reynoutria japonica*, and giant hogweed *Heracleum mantegazzianum*. These records were outside the Study Area and some records are older than ten years, however it is likely that the species remain present locally.

### Fish

12G.3.13 Several notable fish species were identified within 2 km of the study area using data from the Environment Agency routine monitoring programme and published material. These included Annex II species bullhead *Cottus gobio*, European eel *Anguilla anguilla*, and UK BAP Priority species brown/sea trout *Salmo trutta*. European eel and brown/sea trout are also included in the Tees Valley Local Biodiversity Action Plan (LBAP). The LBAP also includes the following fish species; Atlantic salmon *Salmo salar*, brook lamprey *Lampetra planeri*, sea lamprey *Petromyzon marinus*, and river lamprey *Petromyzon fluviatilis*, although no records of these were returned in the desk study.

12G.3.14 Eight fish species were recorded in the Tees Barrage by the EA (records from 2016-2019): bream *Abramis brama*, chub *Leuciscus cephalus*, dace *Leuciscus leuciscus*, gudgeon *Gobio gobio*, perch *Perca fluviatilis*, pike *Esox lucius*, roach *Rutilus rutilus*, and roach x bream hybrid *Rutilus rutilus x Abramis brama*. The Tees Barrage is outside of the Study Area but these species have the potential to be present in water bodies within the Proposed Development Site, namely through Greatham Creek and Dabholm Cut.

12G.3.15 Several water bodies that are within the Study Area for the Proposed Development have been surveyed previously for fish species as part of the surveys for Net Zero Teesside (bp, 2021). In those surveys European eel and three-spined stickleback were present in Dabholm Cut. European eel was also present (based on eDNA) in a pond within Foundry North and three-spined stickleback was the only fish species present in Mill Race.

12G.3.16 Table 12G-6 shows the fish species identified in the desk study records.

Table 12G-6: Notable Fish Species Identified within 2 km of the Proposed Development Site

FISH SPECIES	LEGISLATIVE DESIGNATION	LOCATIONS (AND EA MONITORING SITES RECORDED AT IF APPLICABLE)	MOST RECENT RECORD
Bullhead <i>Cottus gobio</i>	Habitats Directive Annex II	Claxton Beck (Sun et al, 2021)	2019
Brown/sea trout <i>Salmo trutta</i>	NERC SPI	20271 (EA Location) Claxton Beck (Sun et al 2021)	2015 2019

FISH SPECIES	LEGISLATIVE DESIGNATION	LOCATIONS (AND EA MONITORING SITES RECORDED AT IF APPLICABLE)	MOST RECENT RECORD
European eel <i>Anguilla anguilla</i>	Eel Regulations 2009 NERC SPI	1350 (EA) Claxton Beck (Sun et al 2021) Nzt Pond 3 Foundry (eDNA), North (bp, 2021), Dabholm Cut (bp, 2021)	2019  2020

### Field Survey Results

12G.3.17 The aquatic macroinvertebrate species recorded are detailed in Annex 1 and the aquatic macrophyte species recorded are detailed in Annex 10. Further detail on the results obtained in Autumn 2022 and Spring 2023 for each of the surveyed water bodies is provided below. A summary of the biological metrics calculated are present in Annex 4-7.

#### Belassis Beck

##### *Aquatic Macroinvertebrates*

12G.3.18 A moderate diversity of aquatic macroinvertebrates was recorded (27 taxa, 11 identified to species) and the community is considered a fairly poor example of taxa typically found within a minor watercourse. The assemblage included snails, caddisfly larvae, truefly larvae, beetle, and crustacean taxa. The CCI score calculated was 5.5 indicating the sites is of 'moderate' conservation value. All of the species present are of 'very common' to 'occasional' status. No notable species were recorded.

12G.3.19 A single non-native but non-invasive species was recorded, the crustacean shrimp *Crangonyx pseudogracilis/floridanus*.

12G.3.20 All of the aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 0). The biological quality of the drain is poor (WHPT: 69.9, ASPT: 3.9). No pollution tolerant taxa were recorded.

##### *Aquatic Macrophytes*

12G.3.21 Belassis Beck supported six aquatic macrophyte species, limited to emergent and floating species. No rare or notable species were present.

#### Knitting Wife Beck

##### *Aquatic Macroinvertebrates*

12G.3.22 A low diversity of aquatic macroinvertebrates was recorded (13 taxa, five identified to species) and the community is considered a fairly poor example of a community typically found within a minor watercourse. The assemblage included snails, truefly larvae, beetle, and crustacean taxa. The CCI score calculated was 1.0, indicating that the watercourse is of 'low' conservation value and all of the species present are of

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Very Common Status within the CCI index (conservation score 1). No notable species were recorded.

12G.3.23 The non-native New Zealand mud snail *Potamopyrgus antipodarum* and bladder snail *Physella* sp. were present in this sample.

12G.3.24 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 6.7). The biological quality of the drain is poor (WHPT: 40.4, ASPT: 3.7). Only a single pollution-sensitive taxon was recorded, the beetle *Octhebius minimus* from the family Hydraenidae.

### The Fleet

#### *Aquatic Macroinvertebrates*

12G.3.25 A low diversity of aquatic macroinvertebrates was recorded (18 taxa, five identified to species) and the community is considered a fairly poor example of a community typically found within a minor watercourse. The assemblage included snails, caddisfly larvae, truefly larvae, beetle, and crustacean taxa. The CCI score calculated was 1.4 indicating that the sites are of 'low' conservation value and all the species detected are of 'very common' to 'common' status within the CCI index (conservation scores 1 and 2 respectively). No notable species were recorded.

12G.3.26 The non-native amphipod *Crangonyx pseudogracillis/floridanus* was recorded in this sample.

12G.3.27 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 0). The biological quality of the drain is poor (WHPT: 47.6, ASPT: 4.0). Only two pollution-sensitive taxa were recorded, the truefly larvae *Dixella* sp. and beetle *Gyrinus substriatus* from the family Gyrinidae, with the watercourse supporting a range of taxa defined as having a moderate tolerance to pollution.

### Mill Race

#### *Aquatic Macroinvertebrates*

12G.3.28 A low diversity of aquatic macroinvertebrates was recorded (19 taxa, eight identified to species) and the community is considered a fairly poor example of communities typically found within a minor watercourse. The assemblage included snails, caddisfly larvae, truefly larvae, beetle, and crustacean taxa. The CCI score calculated was 3.0 indicating that the site is of 'low' conservation value and all the species detected are of 'very common' status within the CCI index (conservation score 1). No notable species were recorded.

12G.3.29 The non-native but not-invasive species New Zealand mud snail was present at this site.

12G.3.30 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 17.6). The biological quality of the drain is moderate (WHPT: 63.1, ASPT: 4.5) and no pollution tolerant taxa were recorded.

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### *Aquatic Macrophytes*

12G.3.31 The survey found two aquatic macrophyte species within this watercourse, both of which were marginal emergent species. No rare or notable species were present.

### Mains Dike

### *Aquatic Macroinvertebrates*

12G.3.32 A low diversity of aquatic macroinvertebrates was recorded (21 taxa, nine identified to species) and the community is considered a fairly poor example of taxa typically found within a minor watercourse. The assemblage included snails, caddisfly larvae, truefly larvae, beetle and crustacean taxa. The CCI score calculated was 3.0 indicating that the site is of 'low' conservation value and all the species detected are of 'very common' status within the CCI index (conservation score 1).

12G.3.33 The non-native, New Zealand mud snail *Potamopyrgus antipodarum* was recorded.

12G.3.34 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 5.3). The biological quality of the drain is poor (WHPT: 56.0, ASPT: 4.0). No pollution tolerant taxa were recorded.

### *Aquatic Macrophytes*

12G.3.35 Mains Dike supported two aquatic macrophyte species (excluding algae), the emergent branched bur-reed *Sparganium erectum* and lesser pondweed *Potamogeton pusillus*; neither is rare nor notable.

### Kinkerdale Beck

### *Aquatic Macroinvertebrates*

12G.3.36 A low diversity of aquatic macroinvertebrates was recorded (14 taxa, five identified to species) and the community is considered a fairly poor example of a community typically found within a minor watercourse. The assemblage included snails, mayfly larvae, leeches, truefly larvae and crustacean taxa. The CCI score calculated was 1.2 indicating it is of 'low' conservation value and all the species detected are of 'very common' to 'common' status within the CCI index (conservation scores 1 and 2 respectively). No notable species were recorded.

12G.3.37 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 27.3) and the biological quality of the drain is very poor (WHPT: 20.4, ASPT: 2.9). No pollution tolerant taxa were recorded.

### *Aquatic Macrophytes*

12G.3.38 No macrophyte species were recorded. Diversity was restricted by the shading of the channel by the surrounding scrub and trees.

12G.3.39 The INNS Himalayan balsam *Impatiens glandulifera* was recorded along the margins of the watercourse. This is not an aquatic species but is routinely found along waterways. This is a controlled weed species listed under Schedule 9 of the WCA, as such it is an offence to cause it to spread in the wild.



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## Holme Fleet

### *Aquatic Macroinvertebrates*

- 12G.3.40 While a moderate diversity of aquatic macroinvertebrates was recorded in autumn 2022 (38 taxa, 14 identified to species) a slightly lower diversity was recorded in spring 2023 (28 taxa, 13 identified to species). During both surveys the community recorded were considered typical within minor watercourses. The assemblages included snails, worms, caddisfly larvae, beetles, damselfly larvae, mayfly larvae, truefly larvae and crustacean taxa. The CCI score calculated was 10.4 in spring and 9.3 in autumn indicating it is of 'moderate' to 'fairly high' conservation value. All the species detected are of 'very common' to 'local' conservation status within the CCI index (conservation score  $\leq 5$ ).
- 12G.3.41 Moss bladder snail *Aplexa hypnorum*, which has a CCI score of five and is of 'Local' conservation status, was recorded at this site.
- 12G.3.42 No INNS species listed on the relevant legislation were recorded, the non-native New Zealand mud snail was present but is widespread and is considered naturalised.
- 12G.3.43 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 0). The biological quality of the drain was noted as being poor in autumn 2022 (WHPT: 72, ASPT: 3.6) and poor in spring 2023 (WHPT: 74.8, ASPT: 4.2). Only a single pollution-sensitive taxon was recorded, the truefly *Dixella* sp.

### *Aquatic Macrophytes*

- 12G.3.44 Holme Fleet supported six aquatic macrophyte species, limited to emergent, marginal and floating species. No rare or notable species were present.

## WBID 2

### *Aquatic Macroinvertebrates*

- 12G.3.45 While a moderate diversity of aquatic macroinvertebrates was recorded in autumn 2022 (24 taxa, 11 identified to species) a slightly lower diversity was recorded in spring 2023 (21 taxa, nine identified to species) and the communities were considered a fairly poor example of taxa typically found within a minor watercourse. During both surveys the assemblages included snails, worms, caddisfly larvae, beetles, damselfly larvae, truefly larvae, true bug larvae, and crustacean taxa. The CCI score calculated was 1.1-4.8 indicating it is of 'low' conservation value and all the species detected are of 'very common' to 'occasional' conservation status within the CCI index (conservation score  $\leq 4$ ).
- 12G.3.46 No notable species were recorded.
- 12G.3.47 The non-native but not invasive snail; New Zealand mud snail was also present in this sample.
- 12G.3.48 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 6.3). The biological quality of the drain was noted as being poor in autumn 2022

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(WHPT: 63.7, ASPT: 4.0) and moderate in spring 2023 (WHPT: 62.6, ASPT: 4.5). A single pollution-sensitive taxon was recorded; the truefly *Dixella* sp.

#### *Aquatic Macrophytes*

12G.3.49 WBID 2 supported six aquatic macrophyte species, with green filamentous algae also present. These were limited to emergent, marginal, and floating species. No rare or notable species were present.

#### WBID 280

#### *Aquatic Macroinvertebrates*

12G.3.50 The site supported a low diversity of aquatic macroinvertebrates in autumn 2022 (11 taxa, six identified to species) and a slightly lower diversity in spring 2023 (eight taxa, four identified to species) and the communities are considered a fairly poor example of taxa typically found within a minor watercourse. The assemblages included caddisfly larvae, beetles, damselfly larvae, true bug larvae, truefly larvae, and crustacean taxa. The CCI score calculated was 12.0-12.5 indicating it is of 'fairly high' conservation value and all the species detected are of 'very common' to 'local' conservation status within the CCI index (conservation scores  $\leq 5$ ).

12G.3.51 Most of the species present are of Very Common to Frequent Status, although water boatman *Sigara stagnalis* and beetle *Hygrotus confluens* from the family Dytiscidae were recorded in spring and autumn respectively, both of which have a CCI score of five and are of 'local' conservation status.

12G.3.52 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 0). The biological quality of the drain was noted as being poor in autumn 2022 (WHPT: 33.5, ASPT: 3.4) and poor in spring 2023 (WHPT: 20, ASPT: 3.3). No pollution tolerant taxa were recorded at this site.

#### WBID 4

#### *Aquatic Macroinvertebrates*

12G.3.53 The site supported a low diversity of aquatic macroinvertebrates (three total taxa) and the community is considered a very poor example of taxa typically found within a minor watercourse. The assemblage included only the true bug larvae, *Sigara lateralis* from the family Corixidae. Furthermore, *S. lateralis* is a commonly recorded species, no notable species were recorded and the CCI score calculated was two, indicating that WBID 4 is of 'low' conservation value.

12G.3.54 The aquatic macroinvertebrate species present was tolerant of fine sediments (PSI: 0) and no pollution tolerant taxon were recorded.

#### WBID 6

#### *Aquatic Macroinvertebrates*

12G.3.55 A moderate diversity of aquatic macroinvertebrates was recorded in autumn 2022 (24 taxa, five identified to species) while a slightly lower diversity was recorded in spring 2023 (15 taxa, three identified to species) and the community is considered a fairly poor example of taxa typically found within a minor watercourse. The

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assemblage included snails, worms, beetles, mayfly larvae, dragonfly larvae, truefly larvae and crustacean taxa. The CCI score calculated was 1.3-3.0 indicating it is of 'low' conservation value. Most of the species present are of 'very common' to 'common' conservation status within the CCI index (conservation score  $\leq 2$ ).

12G.3.56 The non-native but not invasive, New Zealand mud snail, crustacean shrimp *Crangonyx pseudogracillis/floridanus*, and bladder snail *Physella acuta* were present in this sample. All species are now considered naturalised.

12G.3.57 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 4.3). Only a single pollution-sensitive taxon was recorded, truefly family Tabanidae.

#### *Aquatic Macrophytes*

12G.3.58 The aquatic flora in this concrete drain was limited to fragile stonewort *Chara globularis*, sea club rush *Bolboschoenus maritimus* and green algae. None of these species are rare or notable.

#### **WBID 8**

#### *Aquatic Macroinvertebrate*

12G.3.59 A low diversity was recorded at WBID 8 (14 taxa, seven identified to species) and the community is considered a poor example of taxa typically found within a small watercourse. The assemblage consisted of snails, caddisfly larvae, beetles, truefly larvae and crustacean taxa. The CCI score calculated was 15.0 indicating it is of 'high' conservation value.

12G.3.60 Although most of the species present are of 'very common to 'frequent' status, the water beetle *Hydraena rufipes* was also recorded at this site, which has a conservation score of seven and a 'Notable (but not RDB status)' conservation status, and is Nationally Scarce (neither Red List nor Near Threatened) according to a review of the scarce and threatened Coleoptera of Great Britain Part (Foster, 2010).

12G.3.61 Also recorded in the sample were the non-native but not invasive New Zealand mud snail and the crustacean shrimp *Crangonyx pseudogracillis/floridanus*.

12G.3.62 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 7.1). The biological quality of the drain is moderate (WHPT: 65.0, ASPT: 4.6). Two pollution-sensitive taxa were recorded; the truefly *Dixella* sp. and the previously mentioned red-legged moss beetle *Hydraena rufipes*.

#### **WBID 10**

#### *Aquatic Macroinvertebrate*

12G.3.63 A low diversity community was recorded at WBID 10 (12 taxa in total) and the community is considered a poor example of taxa typically found within a small watercourse. The assemblage was composed of worms, caddisfly larvae, beetles, truefly larvae and crustacean taxa. The CCI score calculated was 9.0 indicating it is of 'moderate' conservation value. Most of the species present are of Very Common to Frequent Status.

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12G.3.64 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 0). The biological quality of the drain is poor (WHPT: 31.1, ASPT: 3.9). No pollution tolerant taxa were recorded at this site.

12G.3.65 During the time of the survey, it was noted that the watercourse is likely not permanent and may dry up at certain times of the year.

#### WBID 14

##### *Aquatic Macroinvertebrate*

12G.3.66 A low diversity was recorded at WBID 14 (19 taxa, six identified to species) and the community is considered a poor example of taxa typically found within a small watercourse. The assemblage included snails, worms, caddisfly larvae, beetles, truefly larvae and crustacean taxa. The CCI score calculated was 10.8 indicating it is of 'fairly high' conservation value.

12G.3.67 Most of the species present are of 'very common' to 'frequent' status (conservation score  $\leq 3$ ). Moss bladder snail *Aplexa hypnorum*, which has a CCI score of five and is of 'Local' conservation status was also recorded at this site.

12G.3.68 The non-native but not invasive snail; New Zealand mud snail *Potamopyrgus antipodarum* was also present in this sample.

12G.3.69 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 0). The biological quality of the drain is poor (WHPT: 46.0, ASPT: 4.2). The watercourse supports a range of taxa defined as having a moderate tolerance to pollution and no pollution tolerant taxa were recorded at this site.

12G.3.70 At the time of the survey, it was noted that the watercourse is likely not permanent and may dry up at certain times of the year.

#### WBID 15

##### *Aquatic Macroinvertebrate*

12G.3.71 A low diversity was recorded at Site 15 (12 taxa, three identified to species) and the community is considered a poor example of taxa typically found within a small watercourse. The assemblage included snails, worms, caddisfly larvae, beetles, truefly larvae and crustacean taxa. The CCI score calculated was 5.0 indicating it is of 'moderate' conservation value. Most of the species present are of 'very common' to 'frequent' status (conservation score  $\leq 3$ ). No notable species were recorded at this site.

12G.3.72 The non-native but not invasive New Zealand mud snail and crustacean shrimp *Crangonyx pseudogracilis/floridanus*.

12G.3.73 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 0). The biological quality of the drain is moderate (WHPT: 45.3, ASPT: 4.5). The watercourse supports a range of taxa defined as having a moderate tolerance to pollution. A single pollution-sensitive taxon was recorded; the truefly *Dixella* sp.

12G.3.74 At the time of the survey, it was noted that the watercourse is likely not permanent and may dry up at certain times of the year.

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## Dabholm Cut

### *Aquatic Macroinvertebrates*

- 12G.3.75 A low diversity of aquatic macroinvertebrates was recorded (12 taxa, three identified to species) and the community is considered a fairly poor example of taxa typically found within a minor watercourse. The assemblage included snails, caddisfly larvae, truefly larvae, beetle, and crustacean taxa. The CCI score calculated was 1.0 indicating it is of 'low' conservation value. All species present were of 'very common' status. No notable species were recorded.
- 12G.3.76 The non-native but not invasive, New Zealand mud snail was also present. This species is now considered naturalised.
- 12G.3.77 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 0). The biological quality of the drain is moderate (WHPT: 38.5, ASPT: 4.3). The watercourse supports a range of taxa defined as having a moderate tolerance to pollution.

### *Aquatic Macrophytes*

- 12G.3.78 The survey found four aquatic macrophyte species within this watercourse, of which all were marginal emergent species. No rare or notable species were present.
- 12G.3.79 Giant hogweed *Heracleum mantegazzianum* was observed along the banks of the watercourse (approximately ten plants). Although this is not an aquatic species it is routinely recorded in riparian habitats. This is a controlled weed species listed under Schedule 9 of the WCA, as such it is an offence to cause it to spread in the wild.

## Pond WBID 1

### *Aquatic Macroinvertebrates*

- 12G.3.80 A moderate diversity of aquatic macroinvertebrates was recorded (13 taxa in total). The assemblage included snails, true bug larvae, beetles, truefly larvae, and crustacean taxa. The CCI score calculated was 4.2 indicating it is of low conservation value and all the species detected are of 'very common' to 'frequent' status within the CCI index (conservation scores  $\leq 3$ ). No notable species were recorded.
- 12G.3.81 The non-native amphipod *Crangonyx pseudogracillis/floridanus* was recorded.
- 12G.3.82 All aquatic macroinvertebrate species present are tolerant of fine sediments (PSI: 0). The biological quality of the drain is poor (WHPT: 35.6, ASPT: 3.7). Two pollution-sensitive taxa were recorded, truefly *Dixella autumnalis* from the family Dixidae and a beetle from the family Gyrinidae.

### *Aquatic Macrophytes*

- 12G.3.83 Pond WBID 1 supported 14 aquatic macrophyte species, dominated by marginal species. No rare or notable or species were present. No non-native macrophyte species were found.

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### *PSYM Analysis*

12G.3.84 The analysis undertaken by the Freshwater Habitats Trust concluded that Pond WBID 1 is of moderate ecological quality (56%).

#### *Pond WBID 46*

### *Aquatic Macroinvertebrates*

12G.3.85 A moderate diversity of aquatic macroinvertebrates was recorded (20 taxa, eight identified to species) and the community is considered typical of a small pond. The assemblage included snails, mayfly larvae, dragonfly larvae, damselfly larvae, true bug larvae, beetles, truefly larvae, and crustacean taxa. The CCI score calculated was 5.6 indicating it is of Moderate conservation value and all the species detected are of Very Common to Frequent status within the CCI index (conservation scores  $\leq 3$ ). All of the species present are of Very Common to Frequent Status. No notable species were recorded.

12G.3.86 **No INNS species were recorded**, however the non-native species New Zealand mud snail, bladder snail *Physella* sp., and amphipod *Crangonyx pseudogracillis/floridanus* were recorded.

12G.3.87 No pollution sensitive taxa were recorded.

### *Aquatic Macrophytes*

12G.3.88 Pond WBID 46 supported 14 aquatic macrophyte species which mainly consisted of marginal and emergent species present with submerged taxa limited to stonewort *Chara* sp., alternate water-milfoil *Myriophyllum alterniflorum*, and an aquatic buttercup species *Ranunculus* sp. No rare or notable or species were present. No non-native macrophyte species were found.

### *PSYM Analysis*

12G.3.89 The analysis undertaken by the Freshwater Habitats Trust concluded that Pond WBID 46 is of good ecological quality (83%). As such Pond WBID 46 is categorised as a priority pond, which makes it a habitat of principal importance under the NERC Act 2006.

#### *Pond WBID 34*

### *Aquatic Macroinvertebrates*

12G.3.90 Pond WBID 34 was a highly diverse site (30 taxa, 13 identified to species) and the community is considered a good example of a community typically found within a small pond. The assemblage included snails, mayfly larvae, dragonfly larvae, damselfly larvae, true bug larvae, beetles, truefly larvae, and crustacean taxa. The CCI score calculated was 11.5 indicating it is of Fairly High conservation value.

12G.3.91 The species present ranged from Very Common to Local Status within the CCI index (conservation scores  $\leq 5$ ). Both the caddisfly *Leptocerus tineiformis* and mayfly *Caenis robusta*, have a conservation score of five ('Local' conservation status) were recorded. However, neither is considered to be rare or notable.

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12G.3.92 Only two pollution-sensitive taxa were recorded, the truefly larvae *Dixella* sp. and beetle *Gyrinus substriatus* from the family Gyrinidae.

12G.3.93 The non-native species New Zealand mud snail, bladder snail *Physella* sp. and amphipod *Crangonyx pseudogracillis/floridanus* were recorded.

#### *Aquatic Macrophytes*

12G.3.94 Pond WBID 34 supported 12 aquatic macrophytes species, which mainly consisted of marginal and emergent species around the perimeter of the pond, with submerged taxa limited to two species spiked water-milfoil *Myriophyllum spicatum* and blunt-leaved pondweed *Potamogeton obtusifolius*. No rare or notable species were present and no non-native macrophyte species were found.

#### *PSYM Analysis*

12G.3.95 The analysis undertaken by the Freshwater Habitats Trust concluded that Pond WBID 34 is of good ecological quality (78%). As such it is categorised as a priority pond, which makes it a habitat of principal importance under the NERC Act 2006.

#### **Pond N**

#### *Aquatic Macroinvertebrates*

12G.3.96 Aquatic macroinvertebrates were not collected at this pond as the pond was dry at the time of survey.

#### *Aquatic Macrophytes*

12G.3.97 Pond N supported 17 aquatic macrophytes species, which consisted of marginal and emergent species. No rare or notable or were present and no non-native macrophyte species were found.

#### *PSYM Analysis*

12G.3.98 The analysis undertaken by the Freshwater Habitats Trust concluded that Pond N is of poor ecological quality (44%).

#### **Pond P**

#### *Aquatic Macroinvertebrates*

12G.3.99 Pond P was a highly diverse site (51 taxa in total) and the community is considered a good example of taxa typically found within a relatively large pond. The assemblage included snails, leeches, worms, caddisfly larvae, mayfly larvae, dragonfly larvae, damselfly larvae, true bug larvae, beetles, truefly larvae and crustacean taxa. The CCI score calculated was 10.4 indicating it is of 'fairly high' conservation value.

12G.3.100 Most of the species present are of Very Common to Frequent Status (conservation score  $\leq 4$ ). The dragonfly larvae *Anax imperator* from the family Aeshnidae, which has a conservation score of five and a 'Local' conservation status was also recorded at this site.

12G.3.101 The non-native but not invasive snails; New Zealand mud snail and bladder snail *Physella* sp. were also present in this sample.

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12G.3.102 A single pollution-sensitive taxon was recorded; the truefly Dixidae.

#### *Aquatic Macrophytes*

12G.3.103 Pond P supported 18 aquatic macrophytes species, with the pond supporting both marginal species and five submerged species; spiked water milfoil *Myriophyllum spicatum*, curly pondweed *Potamogeton crispus*, fennel pondweed *Stuckenia pectinata*, lesser pondweed *Potamogeton pusillus*, and common water-crowfoot *Ranunculus aquatilis*.

12G.3.104 The marginal ragged robin was recorded which is designated as 'Near Threatened' in England Red List (Stroh et al., 2014). Although this species has seen a marked decline due to a number of factors including agricultural improvements it is still very widely distributed in England, found across the country with its distribution appearing to stabilise since 2000. As such it is not notable outside of a site context.

#### *PSYM Analysis*

12G.3.105 The analysis undertaken by the Freshwater Habitats Trust concluded that Pond P is of good ecological quality (89%). As such this was categorised as a priority pond, which makes it a habitat of principal importance' under the NERC Act 2006.

#### Fish eDNA

12G.3.106 Three ponds were selected for fish eDNA (environmental DNA) survey due to proposed impacts to these water bodies. Fish eDNA results can be found in Annex 9.

#### *Pond WBID 1*

12G.3.107 The eDNA did not demonstrate any fish species present within Pond WBID 1.

#### *Pond WBID 34*

12G.3.108 Three-spined stickleback *Gasterosteus aculeatus* was the only species recorded within Pond WBID 34. This is a common and widespread species that does not receive any specific legal protection.

#### *Pond P*

12G.3.109 Three-spined stickleback was the only species recorded within Pond P.

### 12G.4 Discussion and Recommendations

#### Aquatic Macroinvertebrates

12G.4.1 No protected species were found during the desk study. However, some notable taxa were identified within the 10 km buffer, which included the beetle *Helochares obscurus* (Vulnerable), the beetle *Ilybius subaeneus* (nationally scarce), the beetle *Noterus crassicornis* (nationally scarce), and the caddisfly *Oxyethira simplex* (nationally scarce). They were not encountered during the surveys within any of the water bodies surveyed.



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- 12G.4.2 No aquatic macroinvertebrate or macrophyte species were recorded that receive specific legal protection via Schedule 5 of the WCA, or that are listed on Section 41 of the NERC Act as being of principal importance for nature conservation in England.
- 12G.4.3 From the results of the field surveys, macroinvertebrate communities sampled had moderate to relatively high diversity, with most species recorded being relatively common. This resulted in the macroinvertebrate communities of most sites being of low to moderate conservation value, based on the Community Conservation Index.
- 12G.4.4 A 'fairly high' conservation value was recorded at Holme Fleet, WBID 280, WBID 14 and in Ponds WBID 34 and Pond WBID 46, based on the Community Conservation Index. The moss bladder snail *Aplexa hypnorum*, which has a CCI score of 5 and is of 'Local' conservation status was recorded in Holme Fleet and WBID 14, and is likely elevating the CCI score and has resulted in both sites being assigned a 'fairly high' conservation value. The same can be said for the water boatman *Sigara stagnalis*, which has a conservation score of 5 and is of 'Local' conservation status and was recorded at WBID 280. The elevated CCI score in Pond WBID 34 can be attribute to the presence of the mayfly larvae *Caenis robusta* from the family Caenidae and the caddisfly larvae *Leptocerus tineiformis* from the family Leptoceridae, which both have a conservation score of five and a 'Local' conservation status. A fairly high conservation value at Pond P is due to the recording of dragonfly larvae *Anax imperator* from the family Aeshnidae, which has a conservation score of 5 and a 'Local' conservation status.
- 12G.4.5 WBID 8, where the beetle *Hydraena rufipes* was recorded, was deemed to be of high conservation value. *H. rufipes* has a conservation score of seven and a 'Notable (but not RDB status)' conservation status. Although there are no protections associated with this species, *H. rufipes* is Nationally Scarce (neither Red List nor Near Threatened) according to a review of the scarce and threatened Coleoptera of Great Britain Part (Foster, 2010).

#### Aquatic Macrophytes

- 12G.4.6 No notable or rare species were recorded. Most of the watercourses and ponds present do not support a notably diverse aquatic macrophyte assemblage, with the majority being fairly species poor. Although the ponds support a moderate number of aquatic macrophyte species (16 - 18 species), these are comprised of common species typical of many standing and/ or slow flowing water bodies. It is considered highly likely that similar aquatic macrophyte communities occur within suitable habitats across the wider landscape.

#### Fish

- 12G.4.7 Several notable fish species were identified within the study area and within 2 km of the Study Area, from EA data and Net Zero Teesside assessments. These included Annex II species bullhead *Cottus gobio*, and NERC Act (2006) species of principal importance brown/sea trout *Salmo trutta*. In addition, the European eel *Anguilla anguilla*, which is present within the Study Area in Dabholm Cut. European eel is categorised as critically endangered (Jacoby and Gollock, 2014) after a decline in

stocks since the 1980s (Wirth and Bernatchez, 2003) and is protected under the Eels (England and Wales) Regulations 2009 (The Regulations). European eel is a SPI under S41 of the NERC Act 2006.

12G.4.8 Fish species and their habitats are afforded protection under the Salmon and Freshwater Fisheries Act (1975) which aims to protect all migratory and freshwater fish stocks from activities that could result in direct mortality, barriers to migration and degradation of habitats.

#### Non-Native Species

12G.4.9 Three plant species listed on Schedule 9 of the Wildlife and Countryside Act were recorded. Although two of them are not true aquatic species, they are associated with the watercourses - giant hogweed and Himalayan balsam which were associated adjacent to Dabholm Cut and Kinderdale Beck respectively. There were desk study records of floating pennyworth in The Fleet. It is an offence to cause these species to spread in the wild.

12G.4.10 In addition to the legal risks associated with these species, giant hogweed represents a health and safety risk as its sap can cause burns to skin. As such these risks should be considered as part of any mitigation assessment.

#### Priority Habitat Evaluation

12G.4.11 The preceding data can be used to understand if any of the aquatic habitats present qualify under the relevant priority habitat criteria. The qualifying aquatic habitats are detailed below including which criteria have been met. Accordingly, the following priority pond habitats are identified:

- Pond WBID 46;
- Pond WBID 34; and
- Pond P.

12G.4.12 These ponds qualify as a priority pond habitat as they are classified in the top PSYM category i.e., 'good ecological quality'. None of the other ponds surveyed support any features or species that would allow them to qualify under any of the selection criteria measured within this assessment.

12G.4.13 The flowing waters habitats do not support any features or species that would allow them to qualify under priority river habitat criteria.

#### Conclusion

12G.4.14 A number of protected fish species are either within water bodies in the Study Area or are in water bodies that are hydrologically linked to water bodies within the Study Area. Recommendations are made that due care and caution is taken during works within these areas with a suitable buffer from the watercourses in place, otherwise it is recommended to avoid the migratory and spawning seasons of these species.

12G.4.15 For invasive species, biosecurity measures should be implemented for all works taking place to prevent the spread of invasive species and water-borne diseases.

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## 12G.5 References

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12G.6 ANNEX 1: Macroinvertebrate Taxa List

Table 12G-7: Autumn 2022 Macroinvertebrate Taxa List

FAMILY	SPECIES	CONSERVATION SCORE	HOLME FLEET	WBID 2-DITCH	WBID 280-DITCH	WBID 4 - DRAIN	WBID 6-DITCH
Flatworms							
Dendrocoelidae	<i>Dendrocoelum lacteum</i>	2	4	1			
Planariidae	<i>Polycelis sp.</i>						2
Snails							
Lymnaeidae	Lymnaeidae (juvenile / damaged)		10				
Lymnaeidae	<i>Radix balthica</i>	1	6	3			42
Hydrobiidae	<i>Potamopyrgus antipodarum</i>	1	331	121			74
Physidae	Physidae (juvenile / damaged)		4				3
Physidae	<i>Aplexa hypnorum</i>	5	10				
Physidae	<i>Physella acuta</i>						2
Planorbidae	<i>Planorbis sp.</i>		120				
Planorbidae	<i>Planorbis planorbis</i>	1	34				
Planorbidae	<i>Anisus sp.</i>		1				
Planorbidae	<i>Armiger crista</i>	2	3	2			

FAMILY	SPECIES	CONSERVATION SCORE	HOLME FLEET	WBID 2-DITCH	WBID 280-DITCH	WBID 4 - DRAIN	WBID 6-DITCH
Limpets and mussels							
Sphaeriidae	<i>Pisidium sp.</i>						239
Worms							
Oligochaeta	Oligochaeta		6				131
Mites							
Hydracarina	Hydracarina						1
Crustaceans							
Copepoda			1				
Crangonyctidae	<i>Crangonyx sp.</i> <i>(floridanus/pseudogracilis)</i>						11
Asellidae	<i>Asellus aquaticus</i>	1	98	7			58
Mayflies							
Baetidae	Baetidae (juvenile / damaged)			6			
Baetidae	<i>Cloeon dipterum</i>	1					2
Damsel flies							
Coenagrionidae	Coenagrionidae (juvenile / damaged)		2	3			
Coenagrionidae	<i>Ischnura elegans</i>	1	1	4	2		

FAMILY	SPECIES	CONSERVATION SCORE	HOLME FLEET	WBID 2-DITCH	WBID 280-DITCH	WBID 4 - DRAIN	WBID 6-DITCH
Dragonflies							
Libellulidae	Libellulidae (juvenile / damaged)						2
True bugs							
Corixidae	Corixidae (nymph / damaged)			1			
Corixidae	<i>Callicorixa praeusta</i>	3			4		
Corixidae	<i>Hexperocorixa linnei</i>	4		2			
Corixidae	<i>Sigara lateralis</i>	2			185	1	
Hydrometridae	<i>Hydrometra stagnorum</i>	2	1				
Notonectidae	<i>Notonecta glauca</i>	1			1		
Beetles							
Haliplidae	Haliplidae (larvae / damaged)			7			2
Haliplidae	<i>Halipus lineaticollis</i>	1		1			
Haliplidae	<i>Halipus ruficollis</i> group			1	1		
Dytiscidae	Dytiscidae (larvae / damaged)		9	1			
Dytiscidae	<i>Hygrotus sp.</i>		2				
Dytiscidae	<i>Hygrotus inaequalis</i>	2	2	1			
Dytiscidae	<i>Hygrotus confluens</i>	5			1		

FAMILY	SPECIES	CONSERVATION SCORE	HOLME FLEET	WBID 2-DITCH	WBID 280-DITCH	WBID 4 - DRAIN	WBID 6-DITCH
Dytiscidae	<i>Hydroporus angustatus</i>	2	1				
Dytiscidae	<i>Hydroporus palustris</i>	1	1				
Noteridae	<i>Noterus clavicornis</i>	2	2				
Hydrophilidae	Hydrophilidae (larvae / damaged)		1				1
Hydrophilidae	<i>Helophorus sp.</i>		2				
Hydrophilidae	<i>Helophorus brevipalpis</i>	1		1			
Hydrophilidae	<i>Enochrus testaceus</i>	3	1				
Caddisflies							
Limnephilidae	Limnephilidae (juvenile / damaged)		3	4	3		
Trueflies							
Chironomidae	Tanypodinae		4				13
Chironomidae	Orthocladiinae		4	1			
Chironomidae	Chironomini		12	19	104		1
Chironomidae	Tanytarsini						1
Tipulidae	<i>Tipula sp.</i>			1			6
Limoniidae	Limoniidae		8	2			1
Dixidae	<i>Dixella sp.</i>		4				



FAMILY	SPECIES	CONSERVATION SCORE	HOLME FLEET	WBID 2-DITCH	WBID 280-DITCH	WBID 4 - DRAIN	WBID 6-DITCH
Psychodidae			18	3			7
Syrphidae			3				
Stratiomyidae	Stratiomyidae		19	2	2		
Tabanidae							3
Culicidae	Culicidae		7		37		
Ephydriidae					5		
Other Taxa							
Lepidoptera			2	9			1
Collembola			1			5	1
Unidentified Diptera			2			1	3

Table 12G-8: Spring 2023 (Running Watercourses) and Summer 2023 (Ponds) Aquatic Macroinvertebrate Results

FAMILY	SPECIES	CONSER- VATION SCORE	BELASSIS BECK	KNITTING WIFE BECK	THE FLEET	MILL RACE	MAINS DIKE	KINKERDALE BECK	HOLME FLEET	WBID 2	WBID 280	WBID 6	WBID 8	WBID 10	WBID 14	WBID 15	DABHOLM CUT	POND WB 1	POND WBID 46	POND WBID 34	POND P
Flatworms																					
Dendrocoelidae	<i>Dendrocoelum lacteum</i>	2			1				1												
Planariidae	<i>Polycelis nigra / tenuis</i>	1	2																		
Snails																					
Lymnaeidae	<i>Lymnaeidae (juvenile / damaged)</i>		1						20			10				1			13	11	9
Lymnaeidae	<i>Stagnicola sp.</i>		2																		
Lymnaeidae	<i>Lymnaea stagnalis</i>	1																1		6	
Lymnaeidae	<i>Radix auricularia</i>	2						1				10									
Lymnaeidae	<i>Radix balthica</i>	1		4	1	1	5		10	2			1					1	14		
Hydrobiidae	<i>Potamopyrgus antipodarum</i>	1		2		18	1		10	1		15	25		1	10	5		1	13	252
Physidae	<i>Physidae (juvenile / damaged)</i>																		54		7
Physidae	<i>Aplexa hypnorum</i>	5							1						2						
Physidae	<i>Physella sp.</i>			1															11	1	11
Planorbidae	<i>Planorbidae (juvenile / damaged)</i>								3											1	2
Planorbidae	<i>Planorbis sp.</i>				2				2												
Planorbidae	<i>Armiger crista</i>	2							4												
Planorbidae	<i>Bathyomphalus contortus</i>	2	10																		
Limpets and mussels																					
Sphaeriidae	<i>Sphaeriidae (juvenile / damaged)</i>			1																	26
Sphaeriidae	<i>Sphaerium sp.</i>				6																
Sphaeriidae	<i>Pisidium sp.</i>				10	30	70					400					15			90	60
Sphaeriidae	<i>Musculium lacustre</i>	3																		6	
Worms																					
Oligochaeta	<i>Oligochaeta</i>		73	10	1		10	20	3	2		200		40	8	8			4	65	3
Leeches																					
Glossiphoniidae	<i>Theromyzon tessulatum</i>	2																			2
Glossiphoniidae	<i>Glossiphonia complanata</i>	1						1													

FAMILY	SPECIES	CONSER- VATION SCORE	BELASSIS BECK	KNITTING WIFE BECK	THE FLEET	MILL RACE	MAINS DIKE	KINKERDALE BECK	HOLME FLEET	WBID 2	WBID 280	WBID 6	WBID 8	WBID 10	WBID 14	WBID 15	DABHOLM CUT	POND WB 1	POND WBID 46	POND WBID 34	POND P
Glossiphoniidae	<i>Helobdella stagnalis</i>	1						8													
Erpobdellidae	Erpobdellidae (juvenile / damaged)				1			9													
Erpobdellidae	<i>Erbodella octoculata</i>	1						2													
Erpobdellidae	<i>Trocheta subviridis</i>	4	1																		
Mites																					
Hydracarina	Hydracarina														2						
Crustaceans																					
Ostracoda			2					4						10	1				27		3
Gammaridae	Gammaridae						4														
Gammaridae	<i>Gammarus sp.</i>			2		5											1				
Gammaridae	<i>Gammarus pulex</i>	1				2		1													
Crangonyctidae	<i>Crangonyx sp. (floridanus/pseudogracilis)</i>		2		30								4			1		3	62	3	
Asellidae	Asellidae					1														3	
Asellidae	<i>Asellus aquaticus</i>	1	1	12	100	2			5	5		4	15		9	4	18	20		55	36
Mayflies																					
Baetidae	Baetidae (juvenile / damaged)																				2
Baetidae	<i>Baetis sp.</i>							6													
Baetidae	<i>Cloeon dipterum</i>	1	5																		41
Caenidae	Caenidae (juvenile / damaged)																		1		
Caenidae	<i>Caenis horaria</i>	1																			8
Caenidae	<i>Caenis robusta</i>	5																		3	
Damselflies																					
Coenagrionidae	Coenagrionidae (juvenile / damaged)			3		2			5	5							1				39
Coenagrionidae	<i>Ischnura elegans</i>	1							2		3									1	6
Coenagrionidae	<i>Erythromma najas</i>	3																			1
Lestidae	Lestidae (juvenile / damaged)																				3
Lestidae	<i>Lestes sponsa</i>	2																	1		

FAMILY	SPECIES	CONSER- VATION SCORE	BELASSIS BECK	KNITTING WIFE BECK	THE FLEET	MILL RACE	MAINS DIKE	KINKERDALE BECK	HOLME FLEET	WBID 2	WBID 280	WBID 6	WBID 8	WBID 10	WBID 14	WBID 15	DABHOLM CUT	POND WB 1	POND WBID 46	POND WBID 34	POND P
Dragonflies																					
Aeshnidae	<i>Aeshna mixta</i>	3																	4		
Aeshnidae	<i>Anax imperator</i>	5																			1
Libellulidae	<i>Libellula quadrimaculata</i>	3																			1
Libellulidae	<i>Sympetrum striolatum</i>	1																	1		
True bugs																					
Naucoridae	Naucoridae (damaged)	3																			1
Pleidae	<i>Plea minutissima</i>	4																	8	15	20
Corixidae	Corixidae (nymph / damaged)																		8	6	29
Corixidae	<i>Callicorixa praeusta</i>	3																			1
Corixidae	<i>Hexperocorixa linnei</i>	4						1													
Corixidae	<i>Sigara sp.</i>									3										1	7
Corixidae	<i>Sigara dorsalis</i>	1								10									1	1	
Corixidae	<i>Sigara fossarum</i>	4																			6
Corixidae	<i>Sigara stagnalis</i>	5								2											
Hydrometridae	Hydrometridae (damaged)		1																		
Notonectidae	Notonectidae (nymph / damaged)																		5		4
Notonectidae	<i>Notonecta glauca</i>	1							1												1
Beetles																					
Haliplidae	Haliplidae (larvae / damaged)			5					2	6								2			1
Haliplidae	<i>Haliplus confinis</i>	1																			3
Haliplidae	<i>Haliplus immaculatus</i>	1							1												
Haliplidae	<i>Haliplus lineaticollis</i>	1		1			1			1											
Haliplidae	<i>Haliplus ruficollis</i>	1					1			1											
Haliplidae	<i>Haliplus ruficollis group</i>																				2
Gyrinidae	Gyrinidae (larvae / damaged)																	1		1	
Gyrinidae	<i>Gyrinus substriatus</i>	1				3															

FAMILY	SPECIES	CONSER- VATION SCORE	BELASSIS BECK	KNITTING WIFE BECK	THE FLEET	MILL RACE	MAINS DIKE	KINKERDALE BECK	HOLME FLEET	WBID 2	WBID 280	WBID 6	WBID 8	WBID 10	WBID 14	WBID 15	DABHOLM CUT	POND WB 1	POND WBID 46	POND WBID 34	POND P
Dytiscidae	Dytiscidae (larvae / damaged)		3			1								20	2	1					1
Dytiscidae	<i>Laccophilus minutus</i>	2	1																		1
Dytiscidae	<i>Hygrotus inaequalis</i>	2																	1		2
Dytiscidae	<i>Hydroporus angustatus</i>	2	1																		
Dytiscidae	<i>Hydroporus palustris</i>	1	1						1												
Dytiscidae	<i>Hydroporus pubsecens</i>	2												1							1
Dytiscidae	<i>Agabus paludosus</i>	1					2														
Dytiscidae	<i>Agabus sturmii</i>	1	1						1												
Dytiscidae	<i>Dytiscus sp.</i>												2	1							
Noteridae	Noteridae (larvae / damaged)																				1
Noteridae	<i>Noterus clavicornis</i>	2																		3	2
Hydrophilidae	Hydrophilidae (larvae / damaged)																				1
Hydrophilidae	<i>Hydrochus sp.</i>										2										
Hydrophilidae	<i>Helophorus sp.</i>								2	1				2	2						
Hydrophilidae	<i>Cercyon marinus</i>	3							1												
Hydrophilidae	<i>Hydrobius fuscipes</i>	1												1							
Hydrophilidae	<i>Anacaena globulus</i>	1											3								
Hydrophilidae	<i>Laccobius sp.</i>		6																	1	1
Hydrophilidae	<i>Laccobius bipunctatus</i>	2	1																		
Hydrophilidae	<i>Enochrus testaceus</i>	3																		1	
Hydraenidae	<i>Ochthebius sp.</i>								1												
Hydraenidae	<i>Ochthebius minimus</i>	1		1																	
Hydraenidae	<i>Hydraena rufipes</i>	7											2								
Scirtidae	Scirtidae (larvae / damaged)					1				3					30	30					
Elmidae	<i>Elmis aena</i>	1				2	2														
Elmidae	<i>Oulimnius sp.</i>												1								
Curculionidae	Curculionidae											2								8	

FAMILY	SPECIES	CONSER- VATION SCORE	BELASSIS BECK	KNITTING WIFE BECK	THE FLEET	MILL RACE	MAINS DIKE	KINKERDALE BECK	HOLME FLEET	WBID 2	WBID 280	WBID 6	WBID 8	WBID 10	WBID 14	WBID 15	DABHOLM CUT	POND WB 1	POND WBID 46	POND WBID 34	POND P
Alderflies																					
Sialidae	Sialidae (juvenile / damaged)																				3
Sialidae	<i>Sialis lutaria</i>	1				1	2														
Caddisflies																					
Psychomyiidae	<i>Lype sp.</i>																5				
Limnephilidae	Limnephilidae (juvenile / damaged)		1		3	2	1			3			8			1	8			2	
Limnephilidae	Limnephilus sp.				3					1											
Limnephilidae	<i>Limnephilus flavicornis</i>	2							1	1											
Limnephilidae	<i>Limnephilus marmoratus</i>	2			1															2	
Limnephilidae	<i>Limnephilus lunatus</i>	1				2	1		1				2				4	1			2
Limnephilidae	<i>Limnephilus affinis</i>	3	1						2		3		3	3	1	1					
Leptoceridae	<i>Athripsodes aterrimus</i>	1				3	7													1	4
Leptoceridae	<i>Mystacides sp.</i>																				10
Leptoceridae	<i>Mystacides azurea</i>	2																			3
Leptoceridae	<i>Mystacides longicornis</i>	1																			24
Leptoceridae	<i>Adicella reducta</i>	3																			4
Leptoceridae	<i>Leptocerus tineiformis</i>	5																			13
Trueflies																					
Chironomidae	Chironomidae (damaged / pupae)				4		10					1		2	2			1			
Chironomidae	Tanypodinae			15	8	10	20	15	2			20					12	2			4
Chironomidae	Orthocladiinae		73	2		5	60	10	12	2		2	3	3	1		25		28		12
Chironomidae	Chironomini				50		150	15	2	2	1	1		7				30	2	82	10
Chironomidae	Tanytarsini				4		10	10	1						1			8	3		
Chironomidae	Prodiamesinae					5	10	6									25				
Limoniidae	Limoniidae		1			2						1	1		1						2
Limoniidae	<i>Helius sp.</i>									2											
Dixidae	Dixidae (damaged / juvenile)																				2
Dixidae	<i>Dixella sp.</i>				1				3	3			6			3				6	
Dixidae	<i>Dixella autumnalis</i>	3																4			

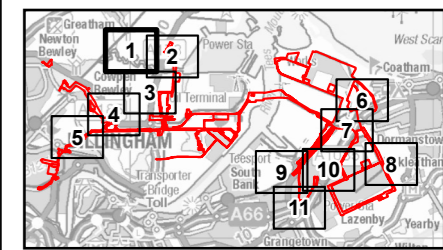
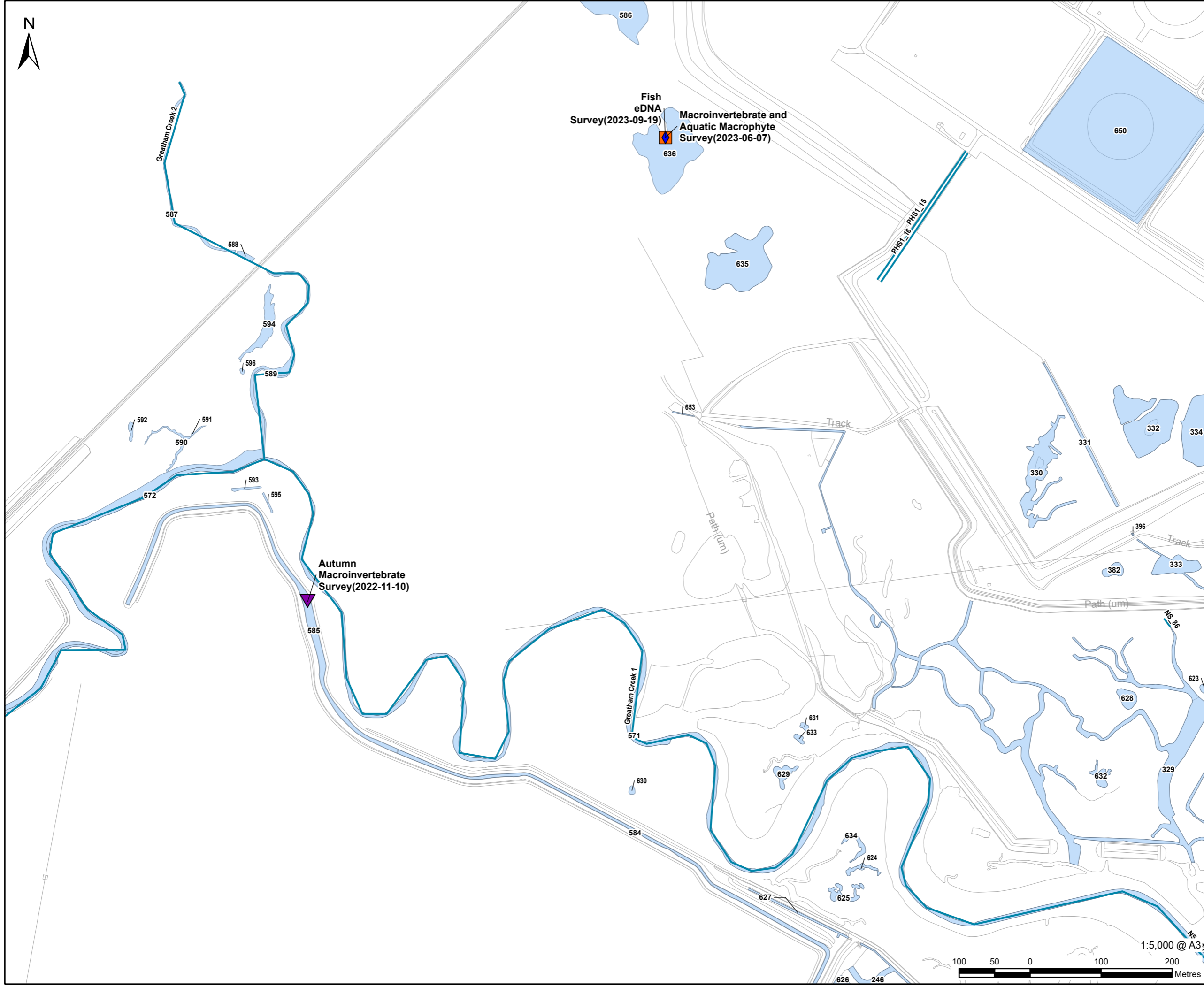
FAMILY	SPECIES	CONSER- VATION SCORE	BELASSIS BECK	KNITTING WIFE BECK	THE FLEET	MILL RACE	MAINS DIKE	KINKERDALE BECK	HOLME FLEET	WBID 2	WBID 280	WBID 6	WBID 8	WBID 10	WBID 14	WBID 15	DABHOLM CUT	POND WB 1	POND WBID 46	POND WBID 34	POND P
Psychodidae			38									4	1							1	1
Empididae																	1				
Ceratopogonidae			26				1		3					8							
Stratiomyidae	Stratiomyidae		2						1	4	3										
Stratiomyidae	<i>Oxycera sp.</i>						1														
Stratiomyidae	<i>Nemotelus notatus</i>													6							
Culicidae	Culicidae		1								5		1	4	1	15					
Dolichopodidae												1									
Other Taxa																					
Collembola			17												1	1					
Unidentified Anisoptera															1						

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12G.7 ANNEX 2: Figures - Sample Site Locations

Figure 12-G-1: Aquatic Surveys





**NOTES**

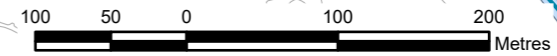
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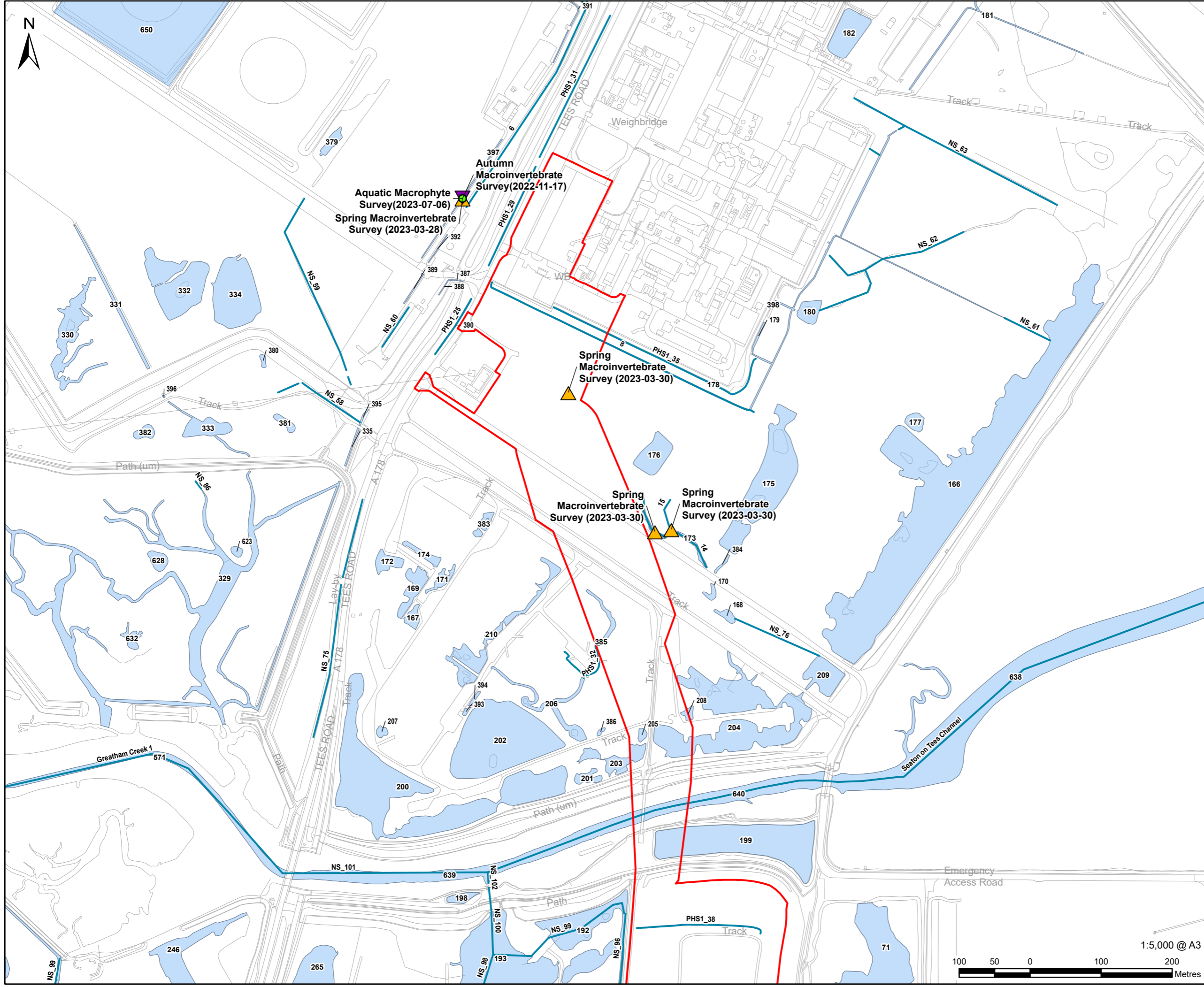
**PROJECT NUMBER**  
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**FIGURE TITLE**  
Aquatic Surveys

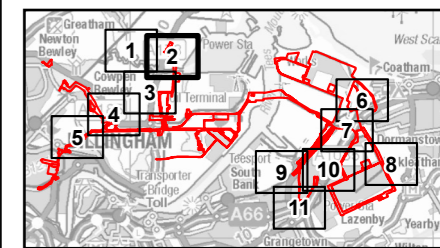
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Figure 12-G-1 (Sheet 1 of 11)



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- LEGEND**
- Proposed Development Site
  - Aquatic Macrophyte Survey
  - ▲ Autumn Macroinvertebrate Survey
  - ▲ Spring Macroinvertebrate Survey
  - Waterbody Area
  - Waterbody



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Environmental Statement

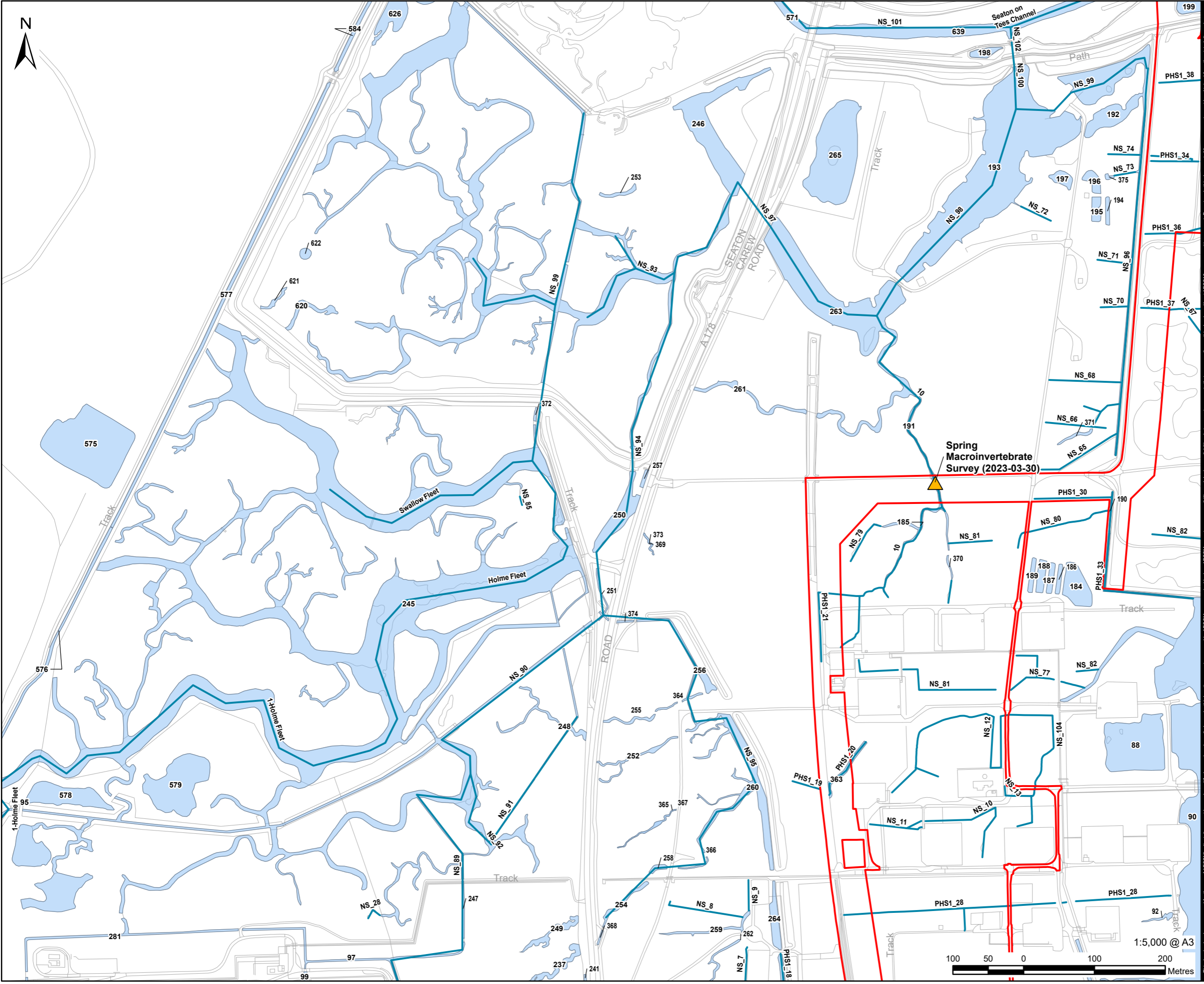
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Aquatic Surveys

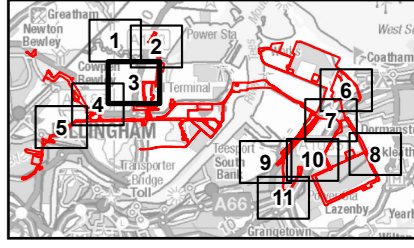
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- LEGEND**
- Proposed Development Site
  - ▲ Spring Macroinvertebrate Survey
  - Waterbody Area
  - Waterbody



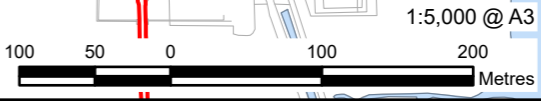
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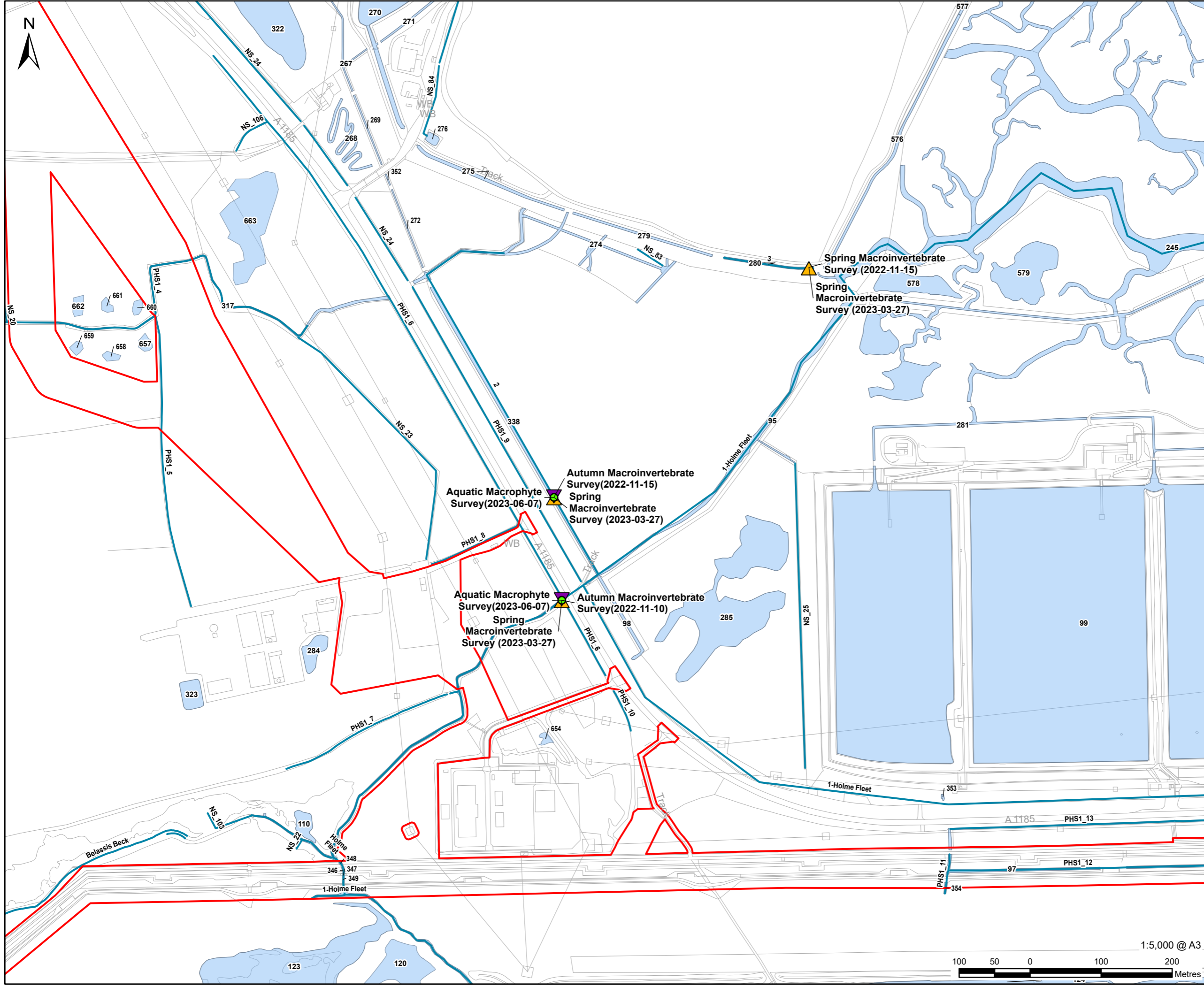
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**FIGURE TITLE**  
Aquatic Surveys

**FIGURE NUMBER**  
Figure 12-G-1 (Sheet 3 of 11)

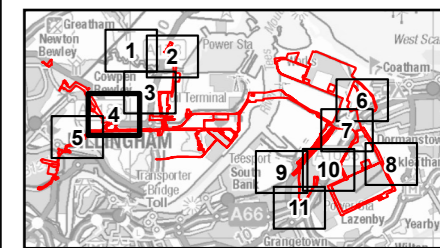


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**LEGEND**

	Proposed Development Site
	Aquatic Macrophyte Survey
	Autumn Macroinvertebrate Survey
	Spring Macroinvertebrate Survey
	Waterbody Area
	Waterbody



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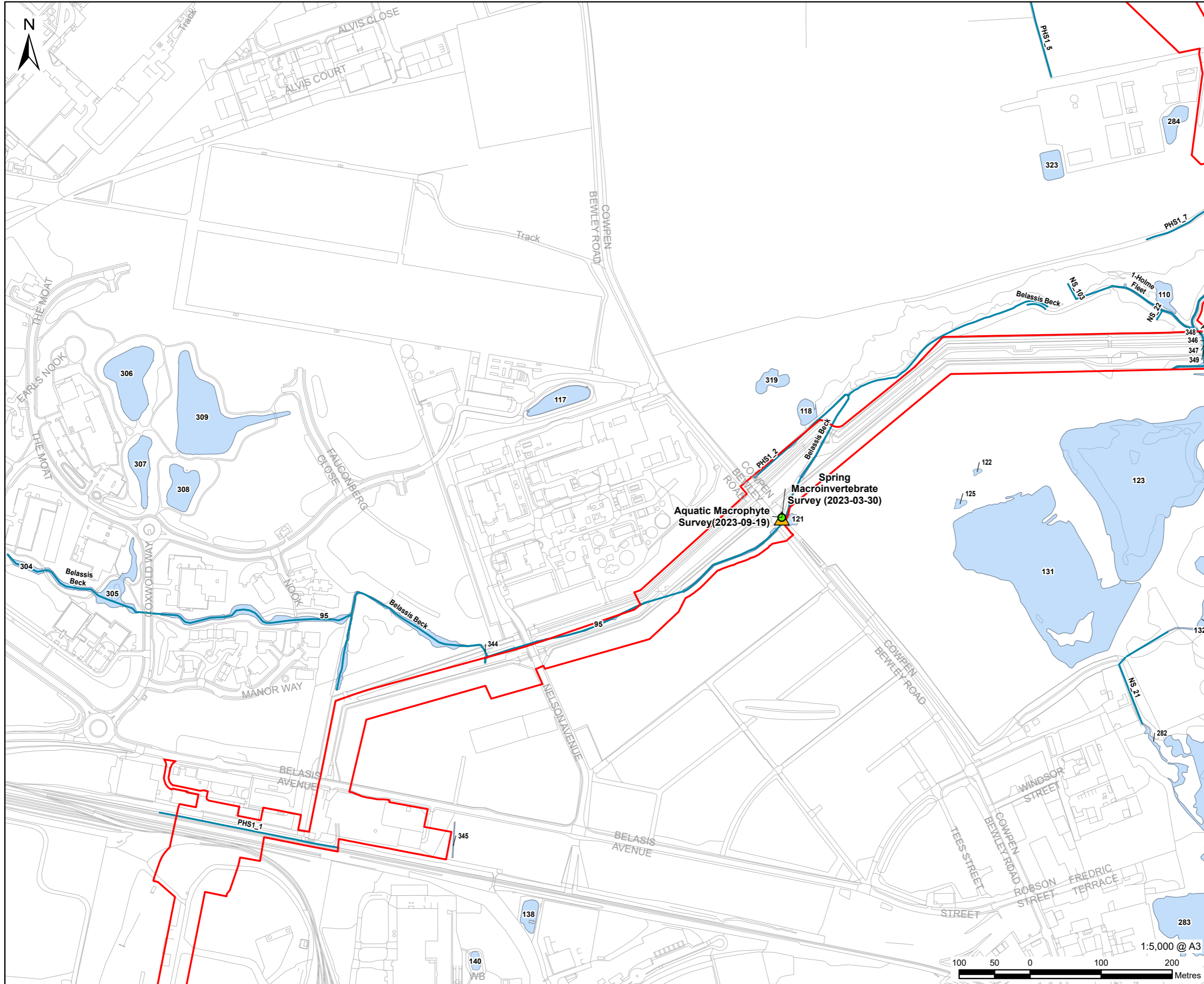
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**PROJECT NUMBER**  
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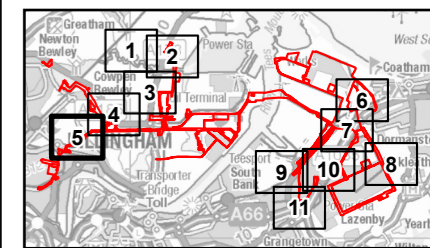
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- LEGEND**
- Proposed Development Site
  - Aquatic Macrophyte Survey
  - ▲ Spring Macroinvertebrate Survey
  - Waterbody Area
  - Waterbody



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**PROJECT NUMBER**  
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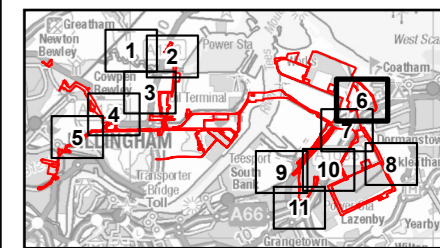
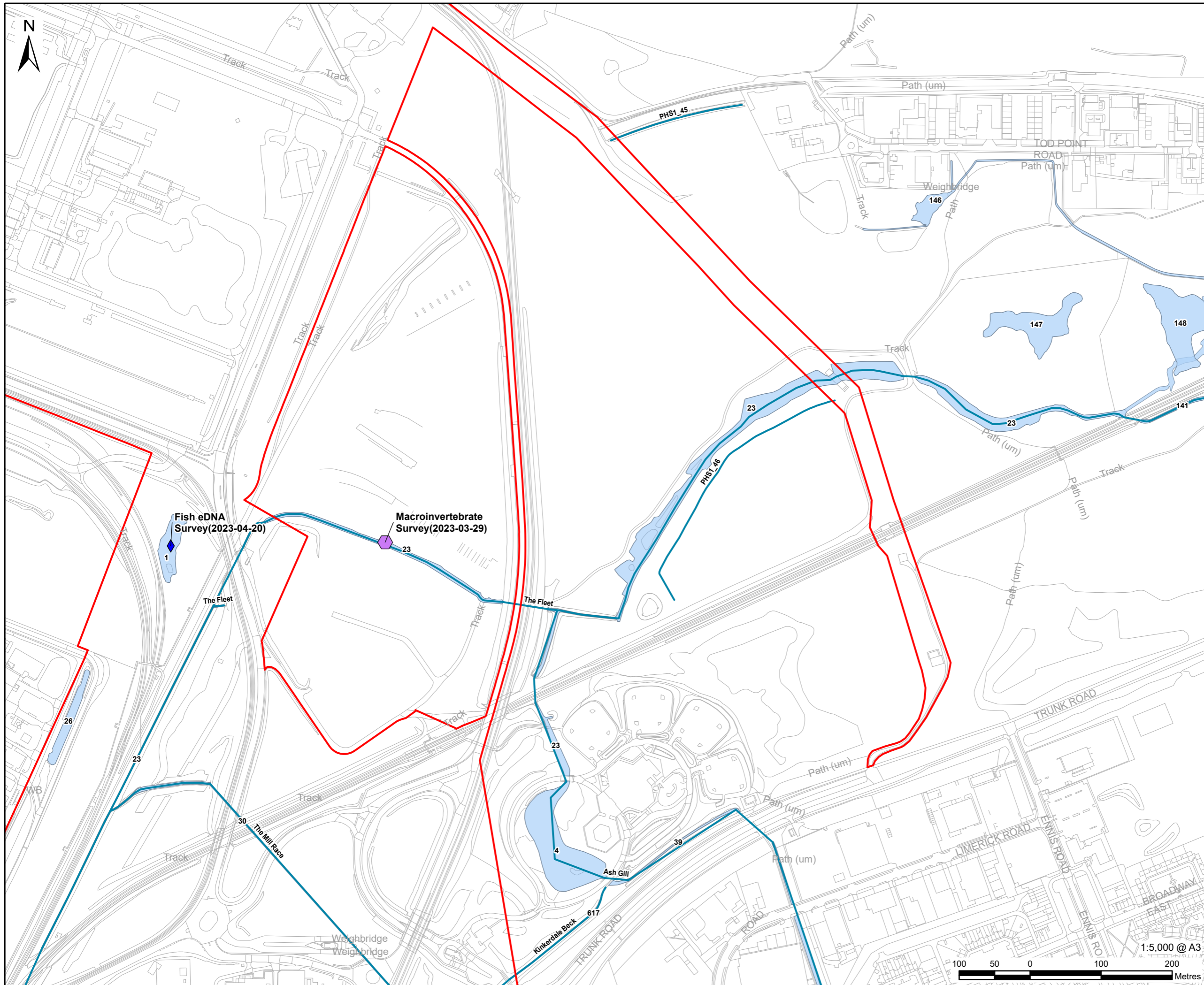
**FIGURE TITLE**  
Aquatic Surveys

**FIGURE NUMBER**  
Figure 12-G-1 (Sheet 5 of 11)



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- LEGEND**
- Proposed Development Site
  - ◆ Fish eDNA Survey
  - ◆ Macroinvertebrate Survey
  - Waterbody Area
  - Waterbody



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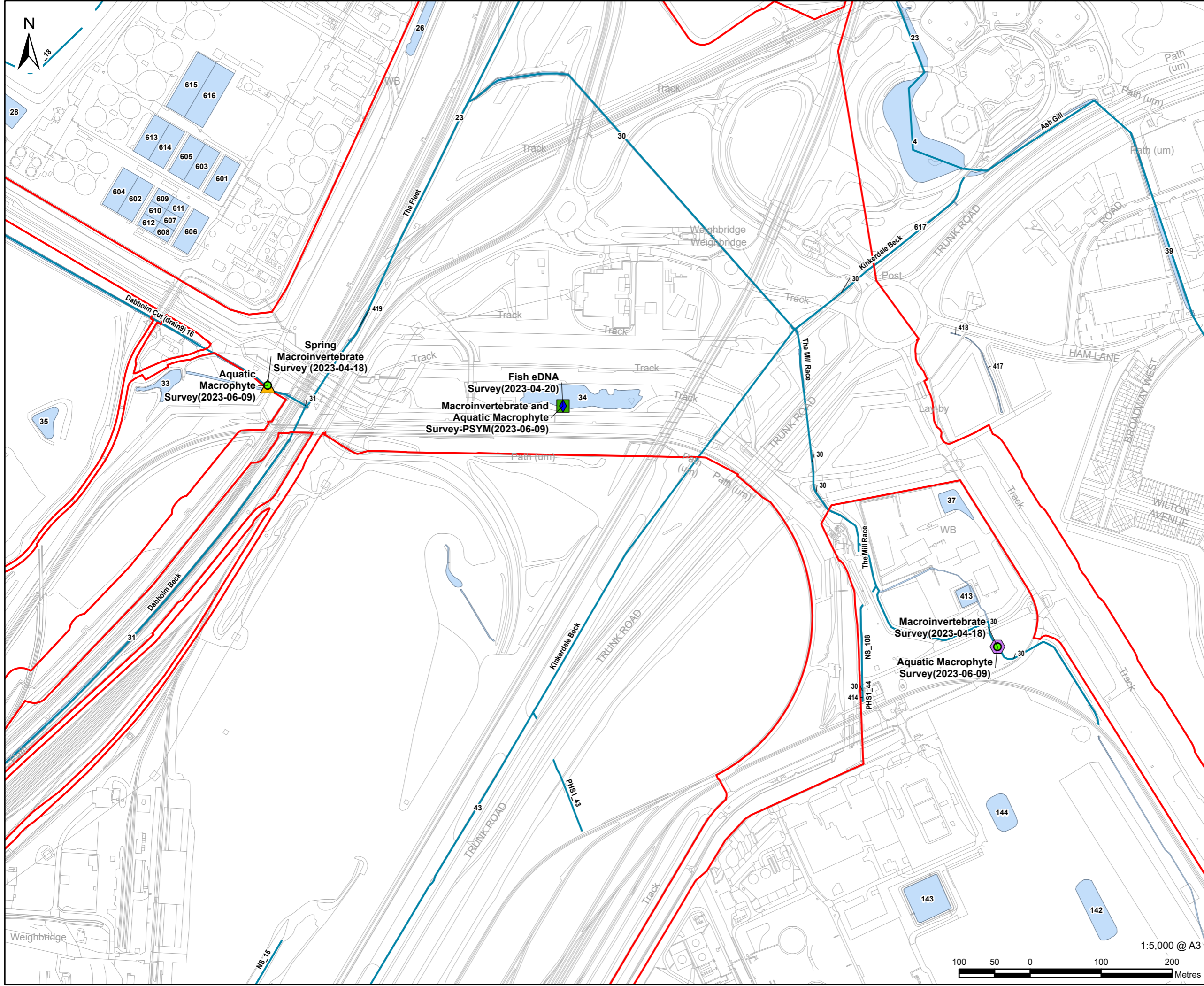
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Aquatic Surveys

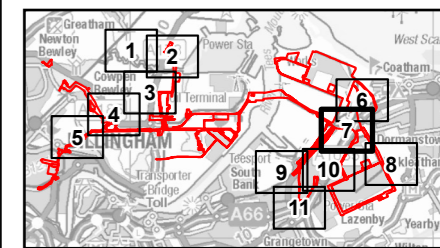
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- LEGEND**
- Proposed Development Site
  - Aquatic Macrophyte Survey
  - ◆ Fish eDNA Survey
  - ◆ Macroinvertebrate Survey
  - Macroinvertebrate and Aquatic Macrophyte Survey-PSYM
  - ▲ Spring Macroinvertebrate Survey
  - Waterbody Area
  - Waterbody



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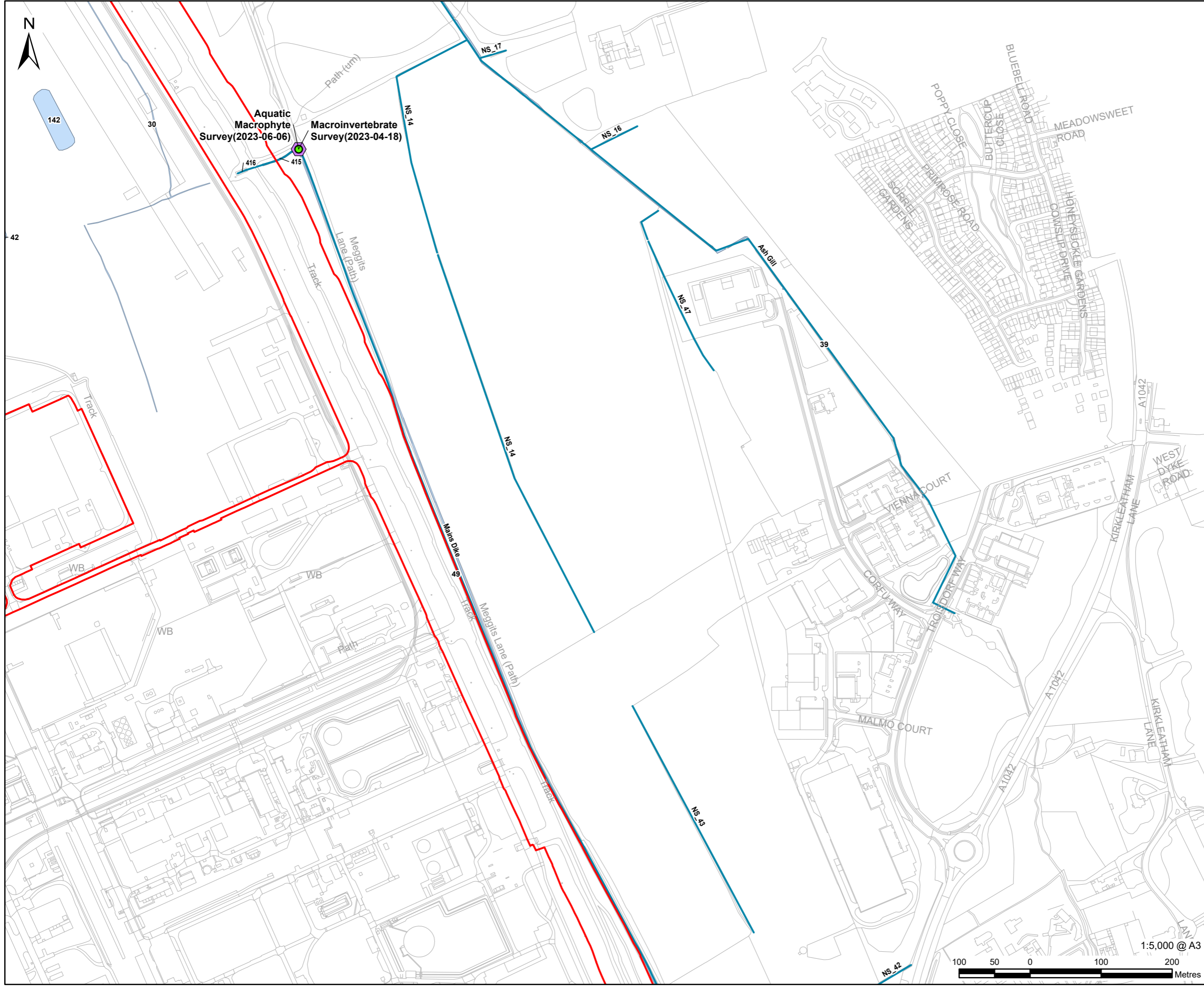
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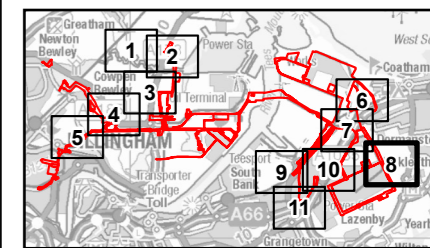
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- LEGEND**
- ▭ Proposed Development Site
  - Aquatic Macrophyte Survey
  - ▭ Macroinvertebrate Survey
  - ▭ Waterbody Area
  - Waterbody



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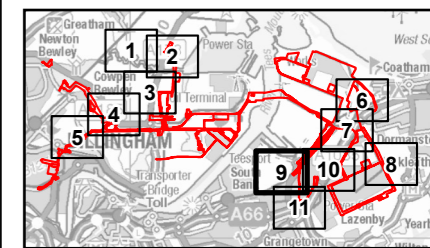
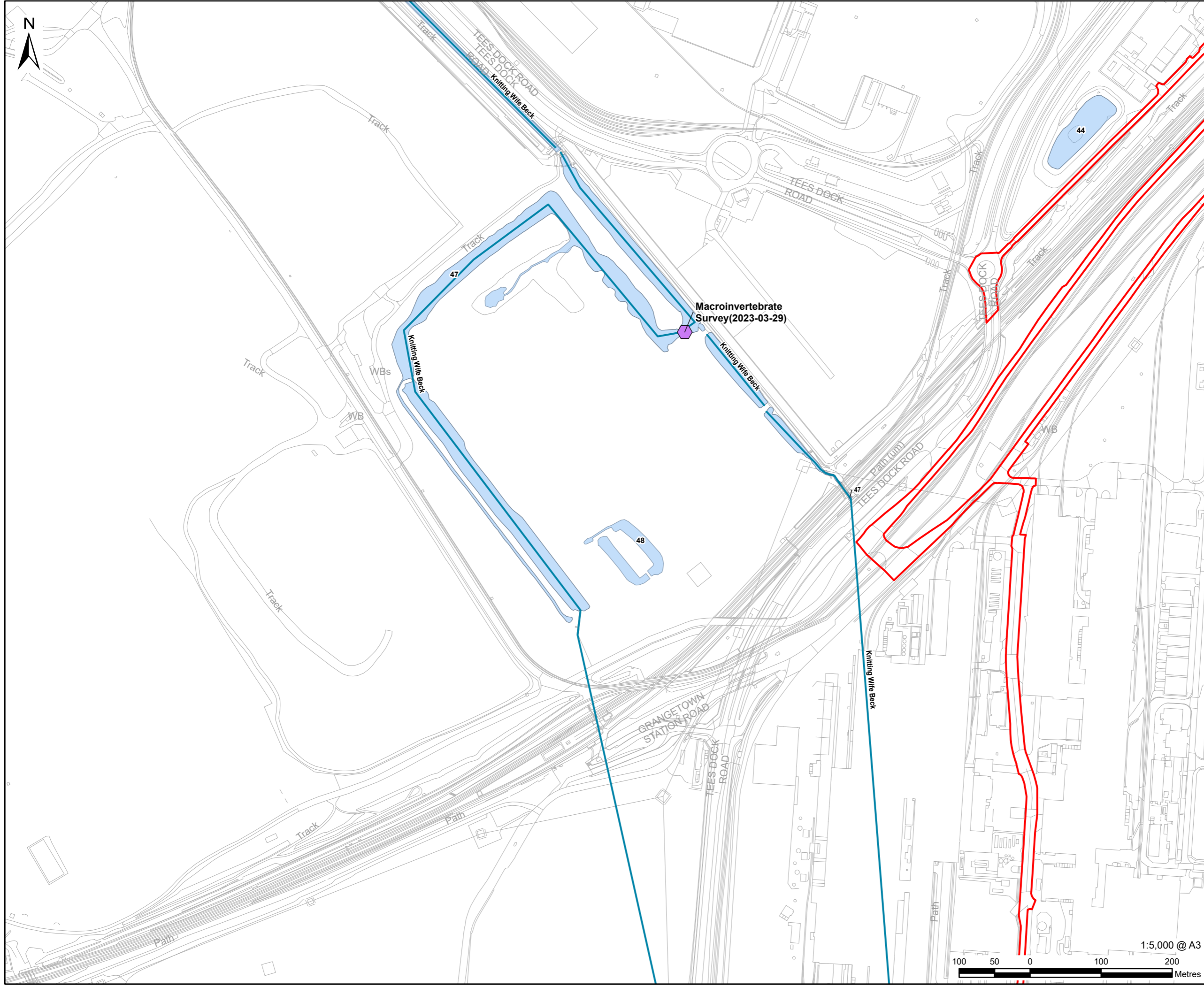
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**FIGURE TITLE**  
Aquatic Surveys

**FIGURE NUMBER**  
Figure 12-G-1 (Sheet 8 of 11)

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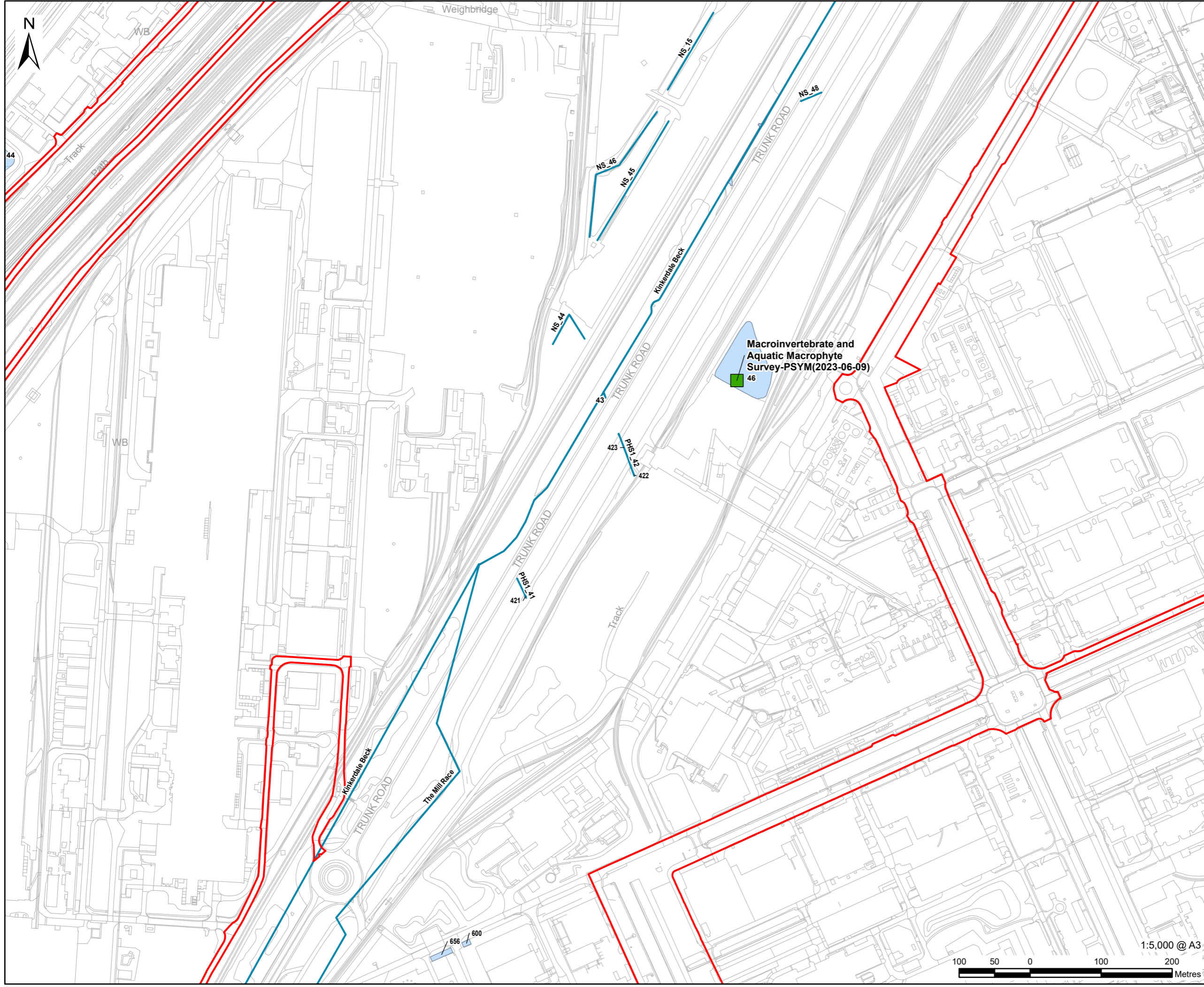
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Aquatic Surveys

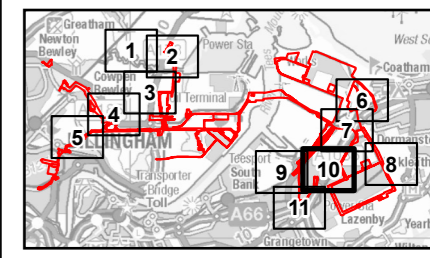
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**LEGEND**

- Proposed Development Site
- Macroinvertebrate and Aquatic Macrophyte Survey-PSYM
- Waterbody Area
- Waterbody



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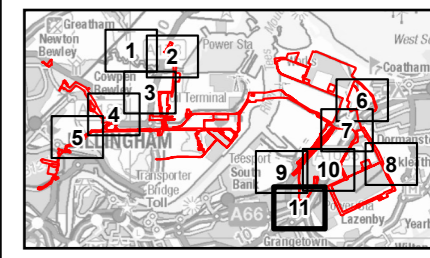
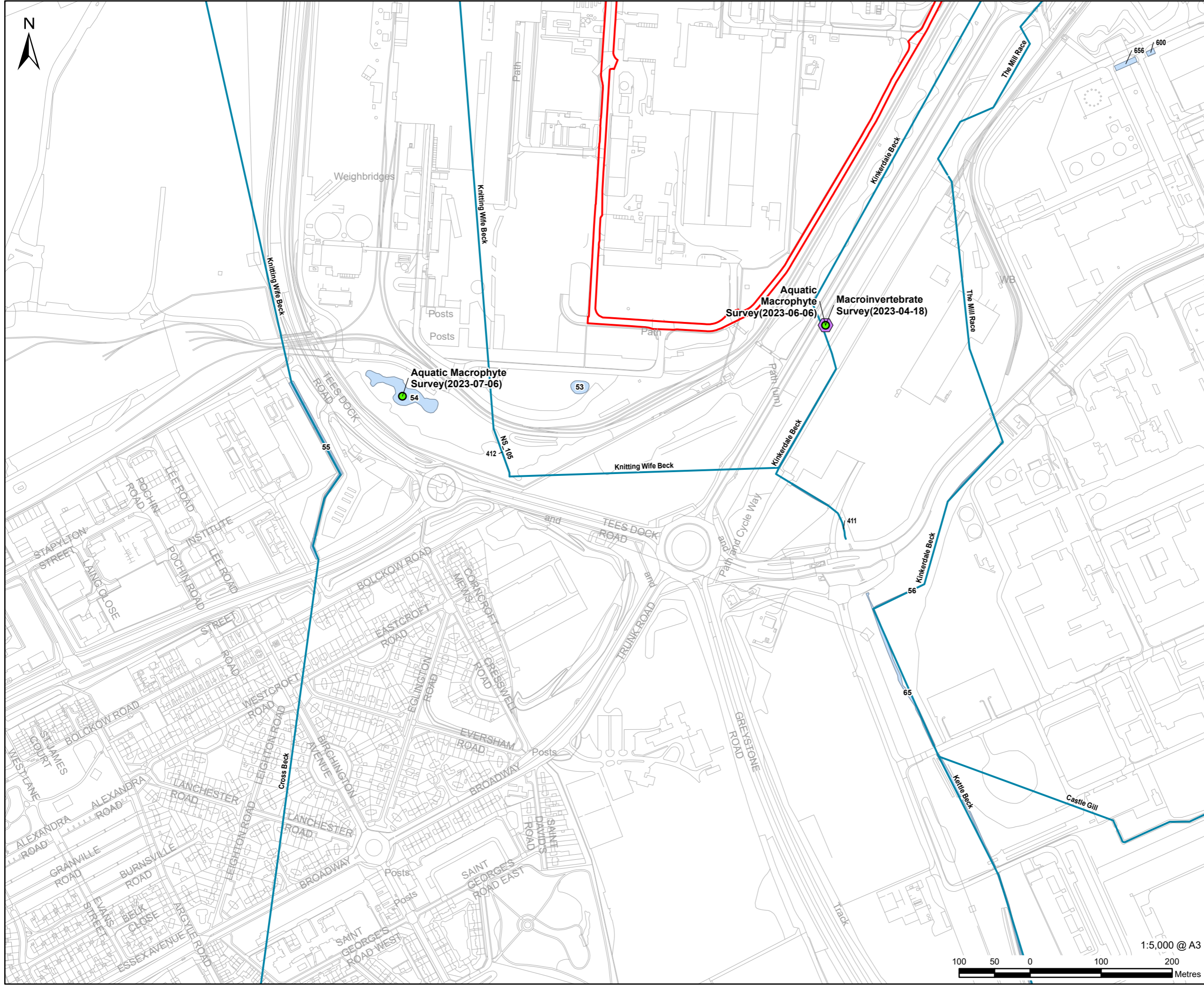
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**FIGURE TITLE**  
Aquatic Surveys

**FIGURE NUMBER**  
Figure 12-G-1 (Sheet 10 of 11)



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12G.8 ANNEX 3: Site Photographs



Plate 12G-1 Belassis Beck



Plate 12G-2 Knitting Wife Beck



Plate 12G-3 The Fleet



Plate 12G-4 Dabholm Cut



Plate 12G-5 Mill Race



Plate 12G-6 Mains Dike



Plate 12G-7 Kinkerdale Beck



Plate 12G-8 Holme Fleet



Plate 12G-9 WBID 1



Plate 12G-10 Pond WBID 34



Plate 12G-11 WBID 14



Plate 12G-12 WBID 15



Plate 12G-13 WBID 2



Plate 12G-14 WBID 280



Plate 12G-15 WBID 4



Plate 12G-16 WBID 6

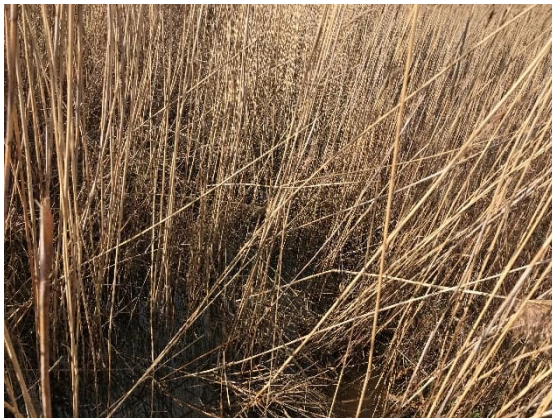


Plate 12G-17 WBID 8



Plate 12G-18 Pond WBID 46



Plate 12G-19 Pond N

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12G.9 ANNEX 4: Whalley, Hawkes, Paisley & Trigg (WHPT) Metric

12G.9.1 There are approximately 4,000 species of aquatic macroinvertebrates in the British Isles. To simplify the analysis of the samples and the data we do not identify individual species but only the major types (taxa), mostly at the family taxonomic level. A key piece of information is the number of different taxa at a site. A fall in the number of taxa indicates ecological damage, including pollution (organic, toxic and physical pollution such as siltation, and damage to habitats or the river channel).

12G.9.2 The WHPT scoring system (WFD-UKTAG, 2014) is based upon the sensitivity of macroinvertebrate families to organic pollution. It replaces the Biological Monitoring Working Party (BMWP) system (Hawkes, 1997) previously used in the UK.

12G.9.3 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 site, as in the BMWP scoring system, the WHPT system also uses another type of information, this being the abundances of different scoring taxa.

12G.9.4 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 (PSs) is then assigned to each taxa, depending of the taxa sensitivity and abundances recorded.

12G.9.5 The total WHPT score for a sample corresponds to the sum of PSs of scoring taxa recorded. The Average Score Per Taxon (ASPT) values are calculated as the Sum PSs divided by the number of scoring taxa (NTAXA). As such, three metrics are calculated:

- WHPT score;
- NTAXA; and
- ASPT.

12G.9.6 Some animals are more susceptible to organic pollution than others, and the presence of sensitive species indicates good water quality. This fact is taken into account by the WHPT metrics. The most useful way of summarising the biological data was found to be one that combined the number of taxa and the ASPT. The best quality is indicated by a diverse variety of taxa, especially those that are sensitive to pollution. Poorer quality is indicated by a smaller than expected number of taxa, particularly those that are sensitive to pollution. Organic pollution sometimes encourages an increased abundance of the few taxa that can tolerate it. However, maximum achievable values will vary between geological regions. For example, pristine lowland streams in East Anglia will always score lower than pristine Welsh mountain streams because they are unable to support many of the high-scoring taxa associated with fast flowing habitat. WHPT scores and ASPT for different types watercourse are dependent on the quality and diversity of habitat, natural water chemistry (associated with geology, distance from source etc.), altitude, gradient, time of year the sample was taken and other factors.



## 12G.10 ANNEX 5: Community Conservation Index (CCI)

12G.10.1 The Community Conservation Index (Chadd & Extence, 2004) allows a classification of the nature conservation value associated with a macroinvertebrate community. The CCI score for one sample is derived from individual Conservation Scores (CS), assigned to some species of aquatic macroinvertebrates and relating closely to the available published Red Data Books (Bratton, 1991a, 1991b; Shirt, 1987). Conservation Scores assigned to individual species vary from 1 to 10, as detailed on the Table 12G-9 below. The derived CCI scores generally vary from 0 to > 20, as detailed in the Table 12G-10 below. The Table 12G-10 below provides a guide to interpreting CCI scores.

Table 12G-9: Conservation Scores from the Community Conservation Index (from Chadd & Extence, 2004)

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 12G-10: General Guide to CCI Scores (from Chadd & Extence, 2004)

CCI SCORE	DESCRIPTION	INTERPRETATION
0 to 5.0	Sites supporting only common species and/or community of low taxon richness	Low conservation value

CCI SCORE	DESCRIPTION	INTERPRETATION
> 5.0 to 10.0	Sites supporting at least one species of restricted distribution and/or a community of moderate taxon richness	Moderate conservation value
> 10.0 to 15.0	Sites 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	Sites supporting several uncommon species, at least one of which may be nationally rare and/or a community of high taxon richness	High conservation value
> 20.0	Sites supporting several rarities, including species of national importance and/or a community of very high taxon richness	Very high conservation value

12G.10.2 However, in some cases, the references used in the CCI classification to define scarcity and value have since been superseded by more recent assessments. To account for this, updated species scores have been used. These have been provided by the author of the initial assessment allowing current information on status and distribution to be accounted for (R Chadd, pers. comm., 2018). This has resulted in updates for three species. Details of these changes are provided in below in Table 12G-11 and where applicable, specific changes are referred to within the results section.

Table 12G-11: General Guide to CCI Scores (from Chadd & Extence, 2004)

INVERTEBRATE GROUP	FAMILY	SPECIES	AMENDED CCI SCORES*	ORIGINAL CCI SCORES**
Damselflies	Lestidae	<i>Lestes sponsa</i>	2	4
Damselflies	Coenagrionidae	<i>Erythromma najas</i>	3	4
Dragonflies	Libellulidae	<i>Libellula quadrimaculata</i>	3	4
Truebug	Naucoridae	<i>Naucoridae</i>	3	4
Truebug	Corixidae	<i>Sigara fossarum</i>	4	3
Beetles	Dytiscidae	<i>Hygrotus confluens</i>	5	7
Beetles	Haliplidae	<i>Haliplus confinis</i>	1	2
Beetles	Haliplidae	<i>Haliplus immaculatus</i>	1	4

INVERTEBRATE GROUP	FAMILY	SPECIES	AMENDED CCI SCORES*	ORIGINAL CCI SCORES**
Caddisflies	Limnephilidae	<i>Limnephilus marmoratus</i>	2	3
* Amended species scores to account for current information on status and distribution of macroinvertebrate taxa (R Chadd, pers. comm., 2018)				
** CCI species scores used in the original assessment, taken from Chadd, R. 7 Extence, C. (2004) The conservation of freshwater macro-invertebrate populations: a community-based classification scheme. Aquatic Conservation: Marine & Freshwater Ecosystems 14: 597-624				

12G.11 ANNEX 6: Lotic-Invertebrate Index for Flow Evaluation (LIFE)

12G.11.1 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 on the Table 12G-12 below. The LIFE score for a macroinvertebrate sample is then derived (mean of individual scores) from individual species scores and abundances, as detailed on the Table 12G-14 below. LIFE scores for a macroinvertebrate sample ranges from 1 to 12, where highest scores describe communities adapted to rapid flows.

Table 12G-12: Flow Groups used to Derive LIFE Scores (from Extence, Balbi and Chadd, 1999)

LIFE SCORE GROUP	DESCRIPTION	MEAN CURRENT VELOCITY
I	Taxa primarily associated with rapid flows	Typically > 100 cm.s <sup>-1</sup>
II	Taxa primarily associated with moderate to fast flows	Typically 20 to 100 cm.s <sup>-1</sup>
III	Taxa primarily associated with slow or sluggish flows	Typically < 20 cm.s <sup>-1</sup>
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 12G-13: Abundance Categories used to Derive LIFE Scores (from Extence, Balbi and Chadd, 1999)

ABUNDANCE CATEGORY	DESCRIPTION
A	1 to 9
B	10 to 99
C	100 to 999
D	1000 to 9999
E	> 10000

Table 12G-14: Abundance Categories and Associated Scores used to Derive LIFE Scores (from Extence, Balbi and Chadd, 1999)

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

Table 12G-15: A Guide to Interpreting LIFE Scores (Environment Agency, 2017)

LIFE SCORE	GUIDE TO INTERPRETATION OF COMMUNITY TYPE	GUIDE TO INTERPRETATION OF FLOW SENSITIVITY
> 7.25	Communities adapted to fast flows	High sensitivity to reduced flows
6.5 to 7.25	Communities adapted with moderate flow velocities	Moderate sensitivity to reduced flows
< 6.5	Communities adapted slow or sluggish flows	Low sensitivity to reduced flows

12G.12 ANNEX 7: Proportion of Sediment-Sensitive Invertebrates (PSI)

12G.12.1 The Proportion of Sediment-sensitive Invertebrates (PSI) index provides an assessment of the extent to which the river bed is composed of, or covered by, fine sediments.

12G.12.2 Under the assessment, individual species of aquatic macroinvertebrates are assigned a Fine Sediment Sensitivity Rating (FSSR) ranging from A to D, as detailed in the Table 12G-16 below. The PSI score for a macroinvertebrate sample is then derived from individual species scores and abundances, as detailed on the Table 12G-17 below. The PSI score corresponds to the percentage of fine sediment-sensitive taxa present in a sample. PSI score for a sample ranges from 0 to 100 where lowest scores correspond to watercourses with high fine sediment cover.

Table 12G-16: Fine Sediment Sensitivity Rating (FSSR) Groups used to Derive PSI Scores (from Extence et al., 2013)

FSSR GROUP	DESCRIPTION
A	Highly sensitive
B	Moderately insensitive
C	Moderately insensitive
D	Highly insensitive

Table 12G-17: Abundance Categories and Associated Scores used to Derive LIFE Scores (from Extence, et al., 2013)

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

Table 12G-18: Interpretation of PSI Scores (from Extence et al., 2013)

PSI	DESCRIPTION
81-100	Minimally sedimented
61-80	Slightly sedimented
41-60	Moderately sedimented

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PSI	DESCRIPTION
21-40	Sedimented
0-20	Heavily sedimented

12G.13 ANNEX 8: Results of the PSYM Analyses and Classification

Table 12G-19: Results of the PSYM Analyses and Classification for Pond B, L, M, N and P

SITE NAME	POND B	POND L	POND M	POND N	POND P
Survey date	28/06/2023	09/06/2023	09/06/2023	06/07/2023	07/06/2023
Grid reference	NZ 57045 24483	NZ 56730 22410	NZ 57093 23681	NZ 55295 21133	NZ 50103 26692
Plant metrics					
No. of submerged + marginal plant species (not including floating leaved)	14	14	15	17	18
Number of uncommon plant species	2	3	5	0	5
Trophic Ranking Score (TRS)	8.6	8.125	8.9	8.73	9.2
Invertebrates metrics					
ASPT	4.4	4.9	4.6	0	4.6
Odonata + Megaloptera (OM) families	0	3	1	0	5
Coleoptera families	2	1	3	0	3
Environmental variables					
Altitude (m)	20	8	5	30	10
Easting	4570	4567	4570	455295	450103
Northing	5244	5224	5236	521133	526692
Shade (%)	0	0	10	10	0
Inflow (0/1)	0	0	0	0	0
Grazing (%)	0	0	0	0	0
pH	7.5	7.89	7.59	N/A	7.82
Emergent plant cover (%)	100	5	60	95	10
Base clay (1-3)	3	1	3	3	3
Base sand, gravel, pebbles (1-3)	1	3	1	0	0
Base peat (1-3)	1	1	1	0	0
Base rock (1-3)	1	1	1	0	0
Area (m <sup>2</sup> )	3500	3500	1000	1800	7000



SITE NAME	POND B	POND L	POND M	POND N	POND P
Submerged + marginal plant species					
Predicted (SM)	21.2	24.0	19.9	21.0	23.9
Actual (SM)	14.0	14.0	15.0	17.0	18
EQI (SM)	0.7	0.6	0.8	0.8	0.8
IBI (SM)	2	2	3	3	3
Uncommon plant species					
Predicted (U)	4.0	3.9	3.6	3.8	4.3
Actual (U)	2.0	3.0	5.0	0.0	5.0
EQI (U)	0.5	0.8	1.4	0.0	1.2
IBI (U)	2	3	3	0	3
Trophic Ranking Score (TRS)					
Predicted (TRS)	7.36	8.20	7.71	7.67	7.78
Actual (TRS)	8.60	8.13	8.90	8.73	9.2
EQI (TRS)	1.17	0.99	1.15	1.14	1.18
IBI (TRS)	1	3	1	1	1
ASPT					
Predicted (ASPT)	5.16	5.15	5.15	-	5.18
Actual (ASPT)	4.4	4.9	4.6	-	4.6
EQI (ASPT)	0.85	0.95	0.89	-	0.89
IBI (ASPT)	3	3	3	-	3
Odonata + Megaloptera (OM) families					
Predicted (OM)	3.25	3.18	3.26	-	3.27
Actual (OM)	0	3	1	-	5
EQI (OM)	0.00	0.94	0.31	-	1.53
IBI (OM)	0	3	1	-	3
Coleoptera families					
Predicted (CO)	3.82	3.80	3.80	-	3.83
Actual (CO)	2	1	3	-	3
EQI (CO)	0.52	0.26	0.79	-	0.78
IBI (CO)	2	1	3	-	3
Sum of Individual Metrics	10	15	14	-	16
Index of Biotic Integrity (%)	56%	83%	78%	-	89%
PSYM quality category (IBI >75%=Good, 51-	Moderate	Good	Good	Poor	Good

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SITE NAME	POND B	POND L	POND M	POND N	POND P
75%= Moderate, 25-50%=Poor, <25%=V Poor)					
Is this a Priority Pond? (Good quality category)	No	Yes	Yes	No	Yes

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12G.14 ANNEX 9: Results from the Fish eDNA Surveys

Table 12G-20: Fisheries eDNA Results Showing the Proportion of Sequencing Output Allocated to the Different Species at Pond B, Pond M and Pond P

SPECIES	POND B	POND M	POND P
Three-spined stickleback ( <i>Gasterosteus aculeatus</i> )	-	100	100

*\* Care should be taken when interpreting the numbers in terms of relative abundance, these numbers represent the proportion of the total DNA detected and do not represent the number or percentage abundance of each species present and should not be used to compare between sites.*

12G.15 ANNEX 10: Aquatic Macrophyte Data

Table 12G-21: Watercourse Macrophyte Data

COMMON NAME	LATIN NAME	BELASSIS BECK	MILL RACE	MAIN DIKE	KINDERDALE BECK	SITE 1 – HOLME FLEET	WBID 2	WBID 6	SITE 16 - DABHOLM CUT
Algae									
Green algae	<i>Chara globularis</i>							C2	
Green Algae	<i>Enteromorpha intestinalis</i>			C4					
Green Filamentous Algae	<i>Algae sp.</i>			C4			C5	C6	
Flowering Plants									
Marsh Foxtail	<i>Alopecurus geniculatus</i>	C1							
Creeping Bent	<i>Agrostis stolonifera</i>					C1			
Sea clubrush	<i>Bolboschoenus maritimus</i>	C1						C1	C4
False-fox sedge	<i>Carex otrubae</i>						C3		
Water starwort	<i>Callitriche sp.</i>					C4			
Tufted hair grass	<i>Deschampsia cespitosa</i>	C1							
Great willowherb	<i>Epilobium hirsutum</i>					C1			
Reed sweet-grass	<i>Glyceria maxima</i>	C9				C9			
Soft rush	<i>Juncus effusus</i>					C1	C5		

COMMON NAME	LATIN NAME	BELASSIS BECK	MILL RACE	MAIN DIKE	KINDERDALE BECK	SITE 1 – HOLME FLEET	WBID 2	WBID 6	SITE 16 - DABHOLM CUT
Hard rush	<i>Juncus influxus</i>						C1		
Common Duckweed	<i>Lemna minor</i>	C5				C1	C1		
Least Duckweed	<i>Lemna minuta</i>	C5							
Bittersweet	<i>Solanum dulcamara</i>	C4							
Branched bur-reed	<i>Sparganium erectum</i>		C3	C3					C1
Reed canary grass	<i>Phalaris arundinacea</i>								C1
Common reed	<i>Phragmites australis</i>	C1							
Lesser pondweed	<i>Potamogeton pusillus</i>			C2					
Common reed	<i>Phragmites australis</i>	C1							C5
Celery-leaved buttercup	<i>Ranunculus sceleratus</i>	C1				C1	C1		
Watercress	<i>Rorippa nasturtium-aquaticum</i>					C1			
Grey club-rush	<i>Schoenoplectus tabernaemontani</i>						C3		
Branched Bur-reed	<i>Sparganium erectum</i>						C1		
Bulrush	<i>Typha latifolia</i>	C1	C1			C2	C6		

COMMON NAME	LATIN NAME	BELASSIS BECK	MILL RACE	MAIN DIKE	KINDERDALE BECK	SITE 1 – HOLME FLEET	WBID 2	WBID 6	SITE 16 - DABHOLM CUT
Total Number of Aquatic Species		11	2	4	0	9	9	3	4
Other Notable Species									
Giant Hogweed	<i>Heracleum mantegazzianum</i>								Present
Himalayan balsam	<i>Impatiens glandulifera</i>				Present				

Table 12G-22: Pond Macrophyte Data

LATIN NAME	COMMON NAME	POND B	POND L	POND M	POND N	POND P
<i>Agrostis stolonifera</i>	Creeping Bent		X	X	X	X
<i>Alisma plantago-aquatica</i>	Common water plantain					X
<i>Berula erecta</i>	Lesser water-parsnip			X		
<i>Bolboschoenus maritimus</i>	Sea clubrush	X	X	X		X
<i>Cardamine pratensis</i>	Cuckoo flower					X
<i>Carex otrubae</i>	False-fox sedge	X				
<i>Carex pendula</i>	Pendulous sedge		X		X	
<i>Carex rostrata</i>	Bottle sedge				X	
<i>Chara sp.</i>	Stonewort sp.		X			
<i>Deschampsia cespitosa</i>	Tufted hairgrass	X	X		X	
<i>Eleocharis palustris</i>	Common spike-rush		X			X
<i>Epilobium ciliatum</i>	Fringed willowherb				X	
<i>Epilobium hirsutum</i>	Great willowherb		X	X	X	X
<i>Epilobium parviflorum</i>	Hoary willowherb	X				
<i>Filipendula ulmaria</i>	Meadowsweet	X			X	X
<i>Glyceria maxima</i>	Reed sweet-grass				X	
<i>Hydrocotyle vulgaris</i>	Marsh pennywort	X				

LATIN NAME	COMMON NAME	POND B	POND L	POND M	POND N	POND P
<i>Iris pseudacorus</i>	Yellow flag Iris	X		X	X	
<i>Juncus articulatus</i>	Jointed rush		X			
<i>Juncus effusus</i>	Soft rush				X	
<i>Juncus inflexus</i>	Hard rush	X	X		X	
<i>Lemna trisulca</i>	Ivy-leaved duckweed			X		
<i>Lychnis flos-cuculi</i>	Ragged Robin					X
<i>Lythrum salicaria</i>	Purple loosestrife	X			X	
<i>Mentha aquatica</i>	Water mint			X	X	
<i>Myosotis sp (undet.)</i>	Forget-me-not sp.	X				
<i>Myriophyllum alterniflorum</i>	Alternate water-milfoil		X			
<i>Myriophyllum spicatum</i>	Spiked water-milfoil			X		X
<i>Oenanthe crocata</i>	Hemlock water-dropwort			X		
<i>Phragmites australis</i>	Common reed	X		X		X
<i>Potamogeton obtusifolius</i>	Blunt-leaved pondweed			X		
<i>Potamogeton crispus</i>	Curly Pondweed					X
<i>Potamogeton pectinatus</i>	Fennel Pondweed					X
<i>Potamogeton pusillus</i>	Lesser Pondweed					X
<i>Pulicaria dysenterica</i>	Common Fleabane					X



LATIN NAME	COMMON NAME	POND B	POND L	POND M	POND N	POND P
<i>Ranunculus aquatilis</i>	Common Water crowfoot					X
<i>Ranunculus sceleratus</i>	Celery-leaved buttercup				X	
<i>Ranunculus sp. (undet.)</i>	Aquatic buttercup sp.		X			
<i>Rorippa nasturtium-aquaticum</i>	Watercress			X		
<i>Schoenoplectus tabernaemontani</i>	Grey club-rush	X	X	X		X
<i>Solanum dulcamara</i>	Bittersweet	X	X	X	X	X
<i>Typha latifolia</i>	Bulrush	X	X	X	X	X
<i>Veronica beccabunga</i>	Brooklime				X	
<i>Veronica sp. (undet.)</i>	Speedwell sp.			X		
Total Number of Species		14	14	16	17	18