

**A57 Link Roads
TR010034
6.5 Environmental Statement
Appendix 8.3 Aquatic Ecology**

APFP Regulation 5(2)(a)

Planning Act 2008 Infrastructure Planning (Applications: Prescribed
Forms and Procedure) Regulations 2009

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1. Introduction

- 1.1.1 This appendix details the aquatic ecological baseline for the A57 Link Roads Scheme, hereafter referred to as 'the Scheme'. This document is not a stand-alone assessment and should be read in conjunction with the Biodiversity chapter (Chapter 8) of the Environmental Statement (ES) (TR010034/APP/6.3).
- 1.1.2 This appendix defines the study areas for watercourses and standing water bodies and the approaches taken in screening those potentially Important Ecological Features (IEFs) to be taken forward to Ecological Impact Assessment (EclA).
- 1.1.3 Section 2 describes the methodologies and screening applied in collating background records and field survey data. Criteria applied in defining the importance of the aquatic receptors are provided in Section 2.10.
- 1.1.4 The aquatic ecological baseline is provided in Section 0 with pertinent raw field survey data records presented as a series of annexes in Appendix A.

2. Methodology

2.1 Screening area

- 2.1.1 The screening area was defined in order to identify aquatic habitats which could be affected by the Scheme. The screening area is not synonymous with the Ecological Zone of Influence (EZoI) which can vary depending on receptor and impact type. The EZoI is defined in Section 2.2.
- 2.1.2 In the absence of published guidance that defines a screening area or EZoI for watercourse and standing water body habitats¹, these have been defined with reference to the design elements of the Scheme, working practices required to construct it and the author's knowledge of similar schemes and working methods.
- 2.1.3 Screening for the presence of watercourses and standing water bodies (ponds and lakes) was undertaken within 150 metres (m) of the Development Consent Order (DCO) boundary² (hereafter referred to as the 'screening area').
- 2.1.4 This screening exercise allows for the identification of:
- Aquatic habitats within the DCO boundary that may be affected by the Scheme, for example a watercourse that is crossed or a pond that is located within the works area.
 - Additional aquatic habitats located within the screening area that, whilst not within the works area, may still be at risk from disturbance due to their proximity to the Scheme. This could be through, for example, overland pollution or mobilisation of fine sediment from the working area.

¹ Excluding those study areas defined for associated protected species, such as Great Crested Newt.

² The DCO boundary delineates the Scheme area.

- Hydrologically connected receiving watercourses and any dependant ponds, lakes and designated sites which are potentially at risk due to propagation of effects from watercourses affected within the screening area (see Ecological Zone of Influence (EZol) below).

2.1.5 Watercourses and standing water bodies that are not in direct hydrological connectivity with an aquatic receptor within the screening area, are sufficiently isolated as to have negligible risk of impact from a construction or operation impact source.

2.2 Ecological Zone of Influence

2.2.1 The EZol for standing water bodies and aquatic designated sites that are not hydrologically connected to a watercourse located within the screening area, is defined as the screening area itself. This is the extent over which these receptors could be affected by the Scheme, through mechanisms identified in Section 2.1.

2.2.2 The EZol for watercourses within the screening area (and by extension any hydrologically connected standing water bodies or designated sites) is larger. Potential ecological impacts originate within the screening area during construction and/or operation of the Scheme. However, impacts have the potential to propagate within watercourses, beyond the screening area (for example through hydrological transport of construction pollutants). The extent to which impacts may propagate defines the EZol for watercourses and any dependant standing water bodies or designated sites.

2.2.3 Potential impacts may arise at the point of construction due to activities required to construct individual design elements. However, review of Scheme designs show that these are typically either localised (for example, riparian habitat loss/degradation and realignments on minor watercourses with small catchments) and/or temporary (for example for the duration of construction).

2.2.4 The Scheme does not act to fundamentally change water quality (for example, through new discharges that are unattenuated and/or carry pollutants) or aquatic species movement (for example, through construction of permanent watercourse barriers). Nor does the Scheme act to fundamentally change hydromorphological processes on main rivers or larger ordinary watercourses (for example, through permanent abstraction of water, or extensive channel realignment).

2.2.5 In the unlikely event of an uncontrolled pollution or sediment mobilisation incident within a watercourse, effects are considered likely to be ameliorated (through deposition or dilution) and/or intercepted within 2 km of their origin.

2.2.6 The EZol for watercourses is therefore considered to be 2 km (measured in linear watercourse extent) from the DCO boundary. This is considered to be an appropriate and conservative EZol within which the assessment assumes potential for effects.

2.3 Study area

2.3.1 Study areas are defined on the basis of the EZol for aquatic receptors.

- 2.3.2 The study area for watercourses located within the screening area, and any hydrologically connected standing water bodies and aquatic designated sites, is defined as 2 km (measured in linear watercourse extent) from the DCO boundary (hereafter referred to as the 2 km study area).
- 2.3.3 The study area for standing water bodies and aquatic designated sites (falling within the screening area), which are not hydrologically connected to a watercourse within the screening area, is defined as the Scheme plus 150 m from the DCO boundary (hereafter referred to as the 150 m study area).
- 2.3.4 When taken together these areas are hereafter referred to as the study area.
- 2.3.5 This aquatic ecology study area is used to review background records for inclusion in the assessment of baseline conditions for aquatic habitats, including review of records of fish, aquatic macroinvertebrates and macrophytes.

2.4 Identification of aquatic receptors

- 2.4.1 All watercourses and standing water bodies within the study area were identified from geospatial analysis and Ordnance Survey (OS) mapping, namely OS Open Rivers layer. For standing water bodies a project Geographic Information System (GIS) layer for ponds was also used, this layer incorporated pond numbers developed for the amphibian assessment for the Scheme. Aerial imagery was used to confirm the presence/absence of aquatic features in cases of uncertainty. Where aerial imagery was unclear, a precautionary approach was taken to screen in features for further assessment. Other project data, for example great crested newt Habitat Suitability Index (HSI) data and/or walkover survey observations were also used to confirm presence of the feature.

Watercourses

- 2.4.2 Watercourses are defined as either:

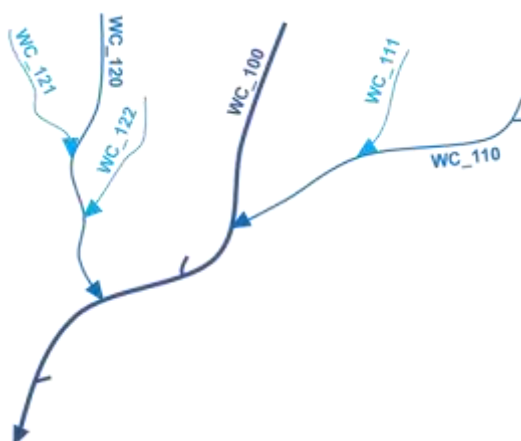
- Main river:
 - A watercourse shown on the statutory main river map³. These are typically larger streams and rivers, but some of them are small watercourses of significance. They include certain structures that control or regulate the flow of water in, into or out of the channel.
 - The Environment Agency has permissive powers, but not a duty, to carry out maintenance, improvement or construction work on designated main rivers. The Environment Agency has powers to regulate the activities of others affecting rivers and their flood plains under the Environmental Permitting Regulations 2016, the Water Resources Act 1991 and land drainage byelaws.
- Ordinary watercourse:
 - All other watercourses (excluding canals) are defined as ordinary watercourses. The Lead Local Flood Authority (LLFA) or, if within an Internal Drainage District, the Internal Drainage Board (IDB) have similar permissive powers to maintain and improve ordinary watercourses.

³ Environment Agency Main River Map
<https://www.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386> (accessed December 2021)

- The LLFA or IDB have powers to regulate works under the provisions of the Land Drainage Act 1991 and local byelaws.
- Ordinary watercourses include rivers, streams, land and roadside ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows.

- 2.4.3 No canals were identified within the study area (with hydrological connectivity to the Scheme).
- 2.4.4 Where available, the watercourse is named as it appears on OS mapping. If the watercourse is unnamed, it has been identified as such, and referred to using its unique identifier as outlined below.
- 2.4.5 All identified named and unnamed watercourses are reported here using the unique watercourse identifier derived under the convention outlined in the Road Drainage and the Water Environment chapter of the ES (TR010034/APP/6.3). This ensures consistent reporting of watercourse codes across chapters.
- 2.4.6 The numbering system (as depicted in Insert 2.1) uses the format “WC_xxx”, where “WC” stands for “watercourse” and “xxx” is a unique three-digit number which is also used to indicate stream order. For example in Insert 2.1, WC_100 is a major named watercourse (i.e. first order), WC_110 and WC_120 are tributaries of that river (i.e. second order), and WC_111, WC_121 and WC_122 are tributaries of the second order streams (i.e. third order).
- 2.4.7 The approach also accommodates ordering of incoming tributaries from upstream to downstream (e.g. WC_110 joins WC_100 upstream of WC_120). Where there are very short (< 100 m in length) tributaries of a watercourse, these are incorporated into the code for the watercourse they are joining as one combined functional receptor. Watercourses which are located within 1km of the DCO boundary (a study area applied within Chapter 13: Road Drainage and the Water Environment), but flow into a major named watercourse outside of this buffer, are given the first digit 0 (i.e. “WC_0xx”).

Insert 2.1: Watercourse identification code convention



Standing water bodies

2.4.8 For the purposes of this assessment, standing water bodies have been defined as either:

- Ponds: artificial or natural standing water bodies less than 2 ha (20,000 m²) in area.
- Lakes: artificial or natural standing water bodies greater than 2 ha (20,000 m²) in area⁴.

2.4.9 No standing water bodies of greater than 2 ha have been identified that could potentially be affected by the Scheme, as such only pond habitats and their associated species assemblages are included within the assessment of effects on standing water bodies.

2.4.10 As with watercourses, each pond has been given a unique pond code in the format “Pxx”, where “P” stands for pond and “xx” is a two-digit unique number.

2.4.11 Watercourses and ponds are shown on Figure 8.5 of the ES (TR010034/APP/6.4).

2.5 Desk study

2.5.1 Existing background records were collated for watercourses and standing water bodies within the aquatic ecology study area. A number of data sources were used in support of the preliminary design stage assessment for aquatic receptors. These data sources are listed below:

- Environment Agency Statutory Main Rivers Map⁵.
- Environment Agency biological survey records for fish, aquatic macroinvertebrates, and macrophytes on the Environment Agency’s Ecology and Fish Data Explorer website⁶.
- Environment Agency River Habitat Survey (RHS) records⁷.
- Environment Agency Water Framework Directive (WFD) classification data on the Environment Agency’s Catchment Data Explorer website⁸, North West River Basin Management Plan (RBMP)⁹ and WFD mitigation measures¹⁰.
- Environment Agency England Non-Native Species records 1965 to 2017 as provided on the National Biodiversity Network’s website (NBN)¹¹.

⁴ Williams, P., Biggs, J., Thorne, A., Bryant, S., Fox, G. and Nicolet, P., 1999. The Pond Book: a guide to the management and creation of ponds. Ponds Conservation Trust, Oxford.

⁵ Environment Agency Main River Map.

<https://www.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386> (accessed January 2021)

⁶ Environment Agency Ecology and Fish Data Explorer. <https://environment.data.gov.uk/ecology-fish/> (accessed January 2021)

⁷ Environment Agency River Habitat Surveys – Survey Details and Summary Results. <https://data.gov.uk/dataset/4cb467c9-346e-44ac-85c6-6cd579111e2c/river-habitat-survey-survey-details-and-summary-results> (accessed January 2021)

⁸ Environment Agency Catchment Data Explorer. <https://environment.data.gov.uk/catchment-planning/> (accessed January 2021)

⁹ Environment Agency (2015). North West Basin District RBMP: 2015.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718335/North_West_RBD_Part_1_river_basin_management_plan.pdf (accessed March 2021)

¹⁰ RBMP measures to achieve water body objectives.

¹¹ <https://registry.nbnatlas.org/public/show/dr827> (accessed February 2021)

- Statutory designated sites, Special Areas of Conservation (SACs), Wetlands of International Importance (Ramsar sites), Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs) that have associated aquatic habitats on the Multi-Agency Geographic Information for the Countryside (MAGIC) online map¹².
- Records for non-statutory designated sites, notable and legally protected species from relevant Local Environmental Record Centres, namely the Derbyshire Biological Records Centre (DBRC)¹³ and Greater Manchester Local Record Centre (GMLRC)¹⁴.

2.5.2 In addition to the data sources listed above, other data associated with the Scheme have also informed this assessment. Scheme data of direct relevance to aquatic receptors include:

- Scheme Habitat Suitability Index (HSI)¹⁵ data for ponds and lakes (index used in the evaluation of pond habitat quality specifically for great crested newts)¹⁶ from 2016 and 2017¹⁷.

2.6 Screening of data

2.6.1 All desk study data were screened for relevance to the Scheme in terms of location, data and period of record. The following criteria were applied to determine the suitability of individual records for inclusion within the baseline:

- Data must have been collected within the aquatic ecology study area.
- Data must have been collected within the past 10 years.

2.6.2 Aquatic species data collected over 10 years ago may not be representative of current community composition, since changes to the aquatic environment and aquatic communities are likely to have occurred over time. The 10-year cut-off reduces the potential for broad-scale habitat changes, and corresponding changes in aquatic communities, to have occurred since the data was collected.

2.6.3 Designated sites (statutory and non-statutory) within the aquatic ecology study area have only been reported in instances where an identified aquatic receptor is noted specifically within the designation citation, or where a watercourse or standing water body is likely to be integral to the maintenance of the designated site's ecological integrity.

¹² <https://magic.defra.gov.uk/MagicMap.aspx> (accessed January 2021)

¹³ Data received 8 October 2019 for protected and notable species records within a 2 km search radius of the Scheme where this search area fell within Derbyshire. Data received 15 October 2020 for non-statutory site citations within 50 m of the affected road network (ARN) as required by DMRB LA 105 guidance. Updated data was received 19 March 2021.

¹⁴ Data received 11 October 2019 for protected and notable species records within a 2 km search radius of the Scheme where this search area fell within Greater Manchester. Data received 6 October 2020 for 5 km bat and notable bird records & non-statutory site citations within 50 m of the ARN.

¹⁵ Oldham R.S., Keeble J., Swan M.J.S. and Jeffcote, M. (2000). Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). *Herpetological Journal*, 10(4), pp. 143-155.

¹⁶ Water bodies were assessed for great crested newt using HSI, environmental DNA (eDNA) and/or traditional presence or likely absence survey in April, May and June 2017. Updated extended Phase 1 habitat survey and the aquatic ecology walkover survey found that the site had not significantly changed since the survey in 2017.

¹⁷ Amphibian surveys were undertaken within 500 m of the DCO boundary during 2016 and 2017, the results of which were presented in a draft ES appendix (Biodiversity Baseline and Preliminary Assessment) for the Scheme that was produced in 2019.

2.7 Screening for assessment

- 2.7.1 The Chartered Institute of Ecology and Environmental Management (CIEEM) (2018)¹⁸ identifies the requirement for EclA to rationalise which ecological features should be subject to detailed assessment. It is not necessary for EclA to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts.
- 2.7.2 CIEEM (2018)¹⁸ also identifies that ecological features subject to detailed assessment will be those that are both considered to be important and potentially significantly affected by the Scheme. Features should be scoped out of detailed assessment either because they are not sufficiently important to warrant further consideration in the Environmental Impact Assessment (EIA) process or because they will not be significantly affected.
- 2.7.3 For completeness, each watercourse and standing water body within the study area has been scheduled within this appendix. A schedule of the aquatic features is provided in Table 3.1 and Table 3.2.
- 2.7.4 However, due to the linear nature of the Scheme and its associated design elements, not all the aquatic receptors identified within the study area are potentially affected by the Scheme. Therefore, a separate exercise was undertaken to screen only potentially affected watercourses and standing water bodies into the impact assessment process i.e. those habitats and species for which an impact pathway is identifiable having assumed implementation of the embedded construction management as detailed in Environmental Statement Chapter 2: Description of the Scheme (TR010034/APP/6.3).
- 2.7.5 In determining aquatic features within the study area to be taken forward for assessment, professional judgement has been applied based on the details of the Scheme and known spatial and temporal impact pathways on aquatic habitats and their species.
- 2.7.6 Typical potential impact pathways which could (in the absence of mitigation) affect watercourses and standing water bodies, include for example:
- Direct loss of watercourse extent or standing water body habitat due to being situated within the direct footprint of the Scheme, culverting requirements and/or channel diversions.
 - Shading effects resulting from the construction of or alteration to crossing structures.
 - Loss of riparian habitat due to construction alongside watercourses and/or construction of new crossing structures and drainage outfalls.
 - Alteration to surface and ground water hydro-morphology.
 - General risks of pollution and sediment ingress associated with construction works.
- 2.7.7 Only features both potentially affected by the Scheme and considered likely to be IEF have been taken forward for baseline and impact assessment.

¹⁸ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

2.8 Screening for survey

- 2.8.1 Field surveys were undertaken within and adjacent to the DCO boundary. It should be noted that watercourse habitat and species surveys may extend beyond the defined DCO boundary where required by the prescribed methodologies applied. For example, a River Corridor Survey which requires a 500 m reach to be assessed may extend beyond the DCO boundary.
- 2.8.2 Field survey requirements were determined with reference to background record availability and potential Scheme impacts. Detailed surveys were undertaken only in the absence of existing baseline data or suitable proxies, ensuring that survey effort was proportionate to the requirement for robust ecological assessment. Existing baseline data (for example, proxy Environment Agency monitoring data) were reviewed to identify the validity of its use (spatially and temporally) in place of the requirement for additional Scheme specific survey.
- 2.8.3 For each aquatic feature, a series of survey screening criteria were applied to determine the exact survey requirements to inform the assessment. These criteria are described in the following sections.

River Corridor Survey (RCS)

- 2.8.4 At the time of survey (between 22 May and 1 June 2018), all watercourses potentially affected by the Scheme were screened as requiring RCS. These surveys were commissioned by Highways England prior to the current preliminary design stage and the author's involvement on the Scheme. As a result, some watercourses identified and delineated through the watercourse naming process outlined in Section 2.4 above have more than one RCS associated with them. Similarly, other watercourses are grouped together within one RCS reach. These data complement the subsequent walkover survey and are used to provide baseline information on physical habitat character for those watercourses surveyed.

Walkover survey

- 2.8.5 All watercourses and standing water bodies potentially affected by the Scheme (within the study area) were screened as requiring a walkover survey to provide habitat information to aid the identification of detailed survey requirements and inform the overall valuation of aquatic receptors.

Modular River Physical (MoRPh) survey

- 2.8.6 Watercourses were screened as requiring MoRPh survey¹⁹ using professional judgement to determine whether they should be considered river/stream or ditch type habitat (the latter being sufficiently characterised by walkover alone).
- 2.8.7 In determining whether a watercourse should be classed as river/stream or ditch type habitat, consideration has been given to whether the watercourse exhibits characteristics that are typical of fluvial systems (e.g. flowing water, active erosion/deposition and geomorphological and ecological features characteristic of river environments). If the channel is heavily modified and lacks typical river features, a professional judgement has been made as to whether it should be classified as a ditch and subsequently screened out of MoRPh survey.

¹⁹ MoRPh Rivers – Modular River Survey (accessed March 2021)

Watercourse ecological survey

- 2.8.8 Watercourses were screened as requiring detailed ecological survey (fish, aquatic macroinvertebrates and macrophytes) based on the following criteria:
- Watercourses exhibited suitable habitat for the detailed survey type based on walkover survey results; and
 - There were no suitable existing baseline ecological data within the 2 km study area e.g. Environment Agency background records <10 years old as screened during the background record screening process outlined in Section 2.6.

Pond survey

- 2.8.9 Standing water bodies were screened as requiring habitat survey (specifically Predictive System for Multimetrics (PSYM)²⁰ survey, which includes detailed ecological assessment of aquatic macroinvertebrates and macrophytes) based on the following criteria:
- The standing water body is to be lost by any mechanism (drainage, land take to construction etc.) or may experience a significant change in water quality or quantity as a result of the Scheme (e.g. severance of feeder surface/groundwater pathways to the pond/lake) based on available design information.
 - Its hydrological characteristics make it suitable for survey within the prescribed PSYM survey window.

2.9 Survey methods

River Corridor Survey

- 2.9.1 RCS were undertaken on potentially affected watercourses²¹ in May and June 2018, within the prescribed survey season.
- 2.9.2 For each RCS the aquatic, marginal, bank and adjacent land zones were mapped and at least one representative cross-section was drawn for each site as per the methodology set out in River Corridor Survey guidance²². Reference photographs were also taken.
- 2.9.3 A broad summary of RCS results is provided in the baseline section of this appendix. RCS maps are shown in Appendix A.4.

Walkover survey

- 2.9.4 To assess the baseline conditions of the watercourses and standing water bodies potentially affected by the Scheme, a walkover survey was undertaken on 11 and 12 March 2020²³ by two experienced aquatic ecologists.

²⁰ Horwood, S., 2002. A guide to monitoring the ecological quality of ponds and canals using PSYM. Environment Agency, 1-14.

²¹ As understood at the time of survey.

²² National Rivers Authority, 1992. River Corridor Surveys: Methods and Procedures. Conservation Technical Handbook.

²³ Whilst there isn't a prescribed survey period for river walkover/reconnaissance, standard survey methods and approaches to river habitat survey (such as RHS, RCS, MoRPh) specify that surveys should not be undertaken during spate conditions. The walkovers undertaken for this assessment were completed during appropriate flow conditions. Where standard guidance advocates optimal survey periods for some habitat types (for example lowland rivers with abundant emergent and bankside vegetation), watercourses within the study area are upland features with little emergent vegetation and are suitably characterised by the walkover surveys undertaken in March.

2.9.5 Watercourses and ponds identified as being potentially affected by the Scheme were visited at key points of Scheme interaction e.g. proposed crossing points.

2.9.6 During the survey, representative georeferenced photographs were taken, and watercourse habitat characteristics were recorded using a bespoke rapid watercourse assessment proforma as shown in Appendix A.2. This proforma broadly follows habitat descriptors outlined in the River Habitat Survey (RHS) methodology²⁴, to capture information on channel dimensions, substrates, flow types, vegetation and presence and extent of channel and bank resectioning. This approach was adopted to allow for a rapid assessment of watercourses within the study area to inform the requirement for further detailed survey.

MoRPh survey

2.9.7 MoRPh surveys were undertaken in accordance with:

- The MoRPh Survey: Technical Reference Manual 2020 version (Gurnell et al. 2020)²⁵ during September 2020.

2.9.8 The MoRPh survey method collects a range of physical habitat data across four broad areas:

- General information – records general survey details such as date, location, channel cross-section measurements and module length.
- Bank top floodplain – records artificial ground cover, bank top vegetation and floodplain water related features e.g. side channels.
- Bank face and channel margin measurements – records bank face profile, bank face material, any bank reinforcements, vegetation type and abundance and bank and marginal features e.g. side bars.
- Channel bed measurements – records channel bed substrates, water surface flow patterns, natural and artificial channel features e.g. mid-channel bars and bridge piers.

2.9.9 Most features are recorded using abundance categories of:

- Absent
- Trace (<5% area)
- Present (5% - <33% area)
- Extensive (>33% area)

2.9.10 As per the guidance, at least 20% of the length of watercourses screened in for MoRPh within the DCO boundary were surveyed in order to provide an accurate River Condition Score which could feed into a Biodiversity Net Gain (BNG) assessment using the DEFRA Biodiversity Metric 2.0²⁶.

²⁴ Environment Agency, 2003. River Habitat Survey in Britain and Ireland. Field Survey Guidance Manual.

²⁵ Gurnell, A., England, J., Shuker, L. and Wharton, G. (2020) The MoRPh Survey: Technical Reference Manual 2020 version.

²⁶ The Biodiversity Metric 2.0 (JP029). <http://nepubprod.appspot.com/publication/5850908674228224> (accessed March 2021)

- 2.9.11 MoRPh is a scalable survey, in which the survey length depends on the predominant width of the river. Five consecutive MoRPh surveys (modules) are undertaken to provide precise information on river dynamics and hydromorphology. Multiple MoRPh5 surveys can be spread across extended reaches to provide a balance of local detail and overall reach coverage. Five coincident MoRPh surveys are called a MoRPh5 survey.
- 2.9.12 In cases where only one MoRPh5 survey is required to make up 20% of the watercourse length within the DCO boundary then the survey is undertaken within a representative reach in which impacts were likely to occur.
- 2.9.13 Where more than one MoRPh5 survey is required on a watercourse, the individual MoRPh5 survey reaches are positioned to cover both areas of highest and least modification as well as areas of likely impact.
- 2.9.14 MoRPh survey locations are provided within the baseline section of this report along with a summary of survey observations and River Condition Scores. River Condition Score indices calculated from the field survey data are provided in Appendix A.3.

Aquatic macroinvertebrate survey

- 2.9.15 Aquatic macroinvertebrate surveys were undertaken at representative locations within each of the watercourses screened as requiring survey. Typically, samples were collected downstream of the Scheme interface with the watercourse so that the location is in the direction in which most effects will propagate. Where access allowed and habitat was suitable, samples were also collected upstream to further characterise the community and provide a control site to support future construction monitoring.
- 2.9.16 Aquatic macroinvertebrate samples were collected using a standard three-minute kick-sampling technique in accordance with RIVPACS²⁷ standard sampling protocols²⁸.
- 2.9.17 Samples were preserved in the field in 99% Industrial Denatured Alcohol (IDA) and returned to the laboratory for analysis. Environmental variables required to generate RIVPACS community predictions were recorded, thus ensuring that should a full suite of WFD classification be required in the future, the data collected was fit for purpose. For each sample, the following biological metrics were calculated:

Whalley Hawkes Paisley Trigg (WHPT)²⁹

- The WHPT metric was developed by the statistical analysis of a large and comprehensive database of field samples, as an update to the Biological Monitoring Working Party (BMWP³⁰) scoring system.

²⁷ RIVPACS is the River Invertebrate Prediction & Classification Systems model implemented within the RICT (River Invertebrate Classification Tool) used by the Environment Agency to determine WFD invertebrate classifications.

²⁸ EU Star UK (2006) RIVPACS Macroinvertebrate Sampling Protocol. Available at: <http://www.eu-star.at/pdf/RivpacsMacroinvertebrateSamplingProtocol.pdf> (accessed April 2021)

²⁹ WFD-UKTAG (2014), River Assessment Method. Benthic Invertebrate Fauna. Invertebrates (General Degradation): Whalley, Hawkes, Paisley & Trigg metric in River Invertebrate Classification Tool (RICT) UKTAG Method Statement. ISBN: 978-1-906934-62-0.

³⁰ Biological Monitoring Working Party (1978). Final report: assessment and presentation of the quality of rivers in Great Britain. Unpublished report, Department of the Environment, Water Data Unit.

- Much like the former BMWP scoring system, WHPT was developed primarily as a means of assessing water quality and does not necessarily correlate intimately with conservation importance. The method has been designed to detect the impact of organic enrichment on aquatic macroinvertebrates. It is also known to be sensitive to toxic pollution. It may also detect the impact of other pressures or combinations of pressures.
- The list of scoring taxa for WHPT is more extensive than the BMWP list, due both to the inclusion of additional taxa and splitting of some BMWP species aggregates. WHPT scoring utilises abundance data rather than just presence/absence as in BMWP.
- The metric is underpinned by sensitivity scores, based on tolerance to organic pollutants. Theoretically, a site with good water quality should result in a higher WHPT than a site with poor water quality.
- The number of scoring aquatic macroinvertebrate taxa (NTAXA) is simply the number of scoring taxa recorded in the site sample and the average score per taxon (ASPT) is the WHPT divided byNTAXA.
- ASPT tends to be less influenced by seasonal community changes and is the most appropriate index of the three by which to monitor a site over time. In general, ASPT scores above 5 represent macroinvertebrate communities living in good water quality. Lower scores are indicative of macroinvertebrate communities suffering from stress due to reduced water quality.
- In combination, the scores can also be used to infer watercourse condition in terms of habitat complexity.

Proportion of Sediment-sensitive Invertebrates (PSI)³¹

- The PSI is based on the known ecological responses of different aquatic macroinvertebrate species or family groups to the accumulation of sediment on riverine substrata.
- Those taxa that are known to benefit from, or that are largely unaffected by sedimentation, are given a high score, known as a Sediment Sensitivity Rating (SSR). Those taxa that are known to suffer from the accumulation of sediment are given a low SSR. The metric also depends on the relative abundance of different taxa and so is not just dependent on “presence-absence”, but also on the numbers of different taxa recorded.
- The PSI score describes the percentage of sediment-sensitive taxa present in a sample with high values indicating a greater proportion (percentage) of silt intolerant macroinvertebrate species present within the aquatic macroinvertebrate community sampled i.e. the less a site is affected by silt the greater the PSI score. Scores range from 0 to 100 with categories from naturally sedimented/unsedimented to heavily sedimented.

³¹ Extence, C.A., Chadd, R.P., England, J., Dunbar, M.J., Wood, P.J. and Taylor, E.D. (2013). The assessment of fine sediment accumulation in rivers using macro-invertebrate community response. *River Research and Applications*, 29, pp. 17-55.

Lotic invertebrate Index for Flow Evaluation (LIFE)³²

- This metric was developed as a means of assessing flow as a stressor on the aquatic macroinvertebrate community. Macroinvertebrate taxa (family and species levels) are assigned to a flow group depending on their documented flow preferences (current velocity) ranging from I (Rapid) to VI (Drought Resistant).
- The calculation of a community LIFE score is underpinned by flow scores. These are derived with reference to an abundance/flow group matrix such that both the abundance and flow preference of recorded taxa is taken into account. Abundance categories are defined by standard Environment Agency categories.
- LIFE score categories identify the community as having a low, moderate or high sensitivity to flow reduction. With a lower score indicating a community made up of proportionally more taxa with a preference for low flows.

Community Conservation Index (CCI)³³

- The CCI is used to assess community conservation value and highlights specific species of conservation importance based on the Joint Nature Conservation Committee (JNCC) threat categories (after Wallace, 1991³⁴).
- Community score categories range from low (i.e. a site that supports only common species and/or a community of low taxon richness) to very high (a community potentially of national significance and may merit statutory protection) conservation value. It should be noted that the CCI does not directly align with nature conservation value.

2.9.18 Following identification, the macroinvertebrate species list for each survey site was checked against known conservation designations using the sources below:

- Joint Nature-Conservation Committee (JNCC) Conservation Designations for UK Taxa³⁵
- Natural History Museum UK Species Data³⁶
- National Biodiversity Network (NBN) Atlas³⁷

2.9.19 A full schedule and broad interpretation of biological metric scores and species designations are provided in the baseline section of this appendix.

PSYM survey

2.9.20 Pond PSYM survey requirements have been identified for standing water bodies screened as requiring survey. The method and standards are detailed in the PSYM manual²⁰. The PSYM method involves three main steps:

³² Extence, C.A., Balbi, D.M. and Chadd, R.P. (1999). River flow indexing using British benthic macroinvertebrates: A framework for setting hydroecological objectives. *Regulated Rivers: Research and Management* 15, pp. 543-574.

³³ Chadd, R.P. and Extence, C.A. (2004). *The conservation of freshwater macroinvertebrate populations: a community-based classification Project*. Aquatic Conservation: Marine and Freshwater Ecosystems, 14, pp. 597-624.

³⁴ Wallace, I.D. (1991). A review of the Trichoptera of Great Britain. *Research and Survey in Nature Conservation* No. 32. Nature Conservancy Council: Peterborough.

³⁵ JNCC (2020) Conservation designations for UK taxa [online] Available at: <https://hub.jncc.gov.uk/assets/478f7160-967b-4366-acdf-8941fd33850b> (accessed March 2021)

³⁶ Natural History Museum (2020) UK Species Data [online] Available at: <https://www.nhm.ac.uk/our-science/data.html> (accessed March 2021).

³⁷ National Biodiversity Network (2020) NBN Atlas [online] Available at: <https://nbnatlas.org/> (accessed March 2021)

- Gathering simple environmental data for the water body including pond area, location and geology.
- Conducting biological surveys of flora and fauna communities (macrophyte and aquatic macroinvertebrate sampling).
- Using biological metrics to calculate an overall PSYM score, to indicate the ecological quality of the water body.

2.9.21 The aquatic macroinvertebrate survey consist of collecting macroinvertebrate samples using a standard three-minute net-sampling technique, based on that developed for National Pond Survey³⁸ as outlined in the PSYM manual. Within each water body the main mesohabitats are identified and sampled (provided they are accessible). Macroinvertebrate samples are typically preserved in the field in 99% IDA and returned to the laboratory for analysis.

2.9.22 In the laboratory, identification of aquatic macroinvertebrates is undertaken to family level for most groups and class level for oligochaetes and all taxa counted. For each sample, the following biological metrics are calculated:

- ASPT
- Number of dragonfly (Odonata) and alderfly (Megaloptera) families (F_OM)
- Number of beetle (Coleoptera) families (F_COL)

2.9.23 Plant surveys consist of identifying and recording all wetland plant species present within the outer edge of the pond and all macrophytes species growing within the pond itself. Plants are surveyed both from the shore and by wading into shallow regions, or using a pond net and grapnel to collect samples from deeper areas. For each water body, the following plant metrics are calculated:

- Number of submerged and emergent plant species (PL_NTX)
- Trophic ranking score for aquatic and emergent plants (TRS_ALL)
- Number of uncommon plant species (PL_NUS)

2.9.24 The biological metrics are then compared to PSYM predicted quality scores (based on a number of physical and chemical variables collected) for each water body and an overall quality index calculated (called the General Quality Assessment (GQA) or PSYM Score).

2.10 Importance/nature conservation evaluation

2.10.1 Biodiversity features are valued following Design Manual for Roads and Bridges (DMRB) guidance³⁹, as presented in Table 2.1 below. The evaluation is based on the information gathered from the desk study and field survey using a combination of professional judgement and accepted criteria⁴⁰ (e.g. diversity, rarity and naturalness). Criteria set out in Gloucestershire's Key Wildlife Site Handbook⁴¹ have also been taken into account during the evaluation.

³⁸ Biggs, J., Fox, G., Nicolet, P., Walker, D., Whitfield, M., and Williams, P., 1998. A guide to the methods of the National Pond Survey. Pond Action, Oxford.

³⁹ Advice note LA 108 Biodiversity Revision 1 (March 2020)

⁴⁰ Set out in Ratcliffe, D.A (1977). A Nature Conservation Review. Cambridge University Press.

⁴¹ Gloucestershire Centre for Environment Records (2015) Gloucestershire Key Wildlife Sites Handbook.

<https://www.gloucestershirewildlifetrust.co.uk/sites/default/files/2018-03/Gloucestershire%20Key%20Wildlife%20Sites%20Handbook%20Part%201%20v4.5%20final.pdf> (accessed September 2020)

- 2.10.2 The valuations applied to aquatic receptors consider the receptor importance in the context of both intrinsic habitat quality and the species it has been identified to support.
- 2.10.3 Consequently, aquatic receptors (habitats) supporting notable species are afforded an ecological valuation which is, at a minimum, commensurate with the conservation value of the habitat and/or species which they support. In this way, mitigation requirements (for example, control of construction works) are associated with the receptor supporting the notable species (e.g. a watercourse), rather than the species itself (e.g. a macrophyte or aquatic macroinvertebrate). This reduces the potential for uncertainty in mitigation application for future phases, with named receptors (River or Pond X) requiring prescribed mitigation.
- 2.10.4 Features that have been identified to be of less than local importance are not considered to be important ecological features and as such have not be considered within the impact assessment within the ES.

Table 2.1: Geographic framework for the evaluation of biodiversity resource

International or European importance	
Sites	Sites including: <ol style="list-style-type: none"> 1) European sites: <ol style="list-style-type: none"> a) Sites of Community Importance (SCIs); b) Special Protection Areas (SPAs); c) Potential SPAs (pSPAs); d) Special Areas of Conservation (SACs); e) Candidate or possible SACs (cSACs or pSACs); f) Wetlands of International Importance (Ramsar sites). 2) Biogenetic Reserves, World Heritage Sites (where recognised specifically for their biodiversity value) and Biosphere Reserves. 3) Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such.
Habitats	N/A
Species	Resident, or regularly occurring, populations of species which can be considered at an international or European level where: <ol style="list-style-type: none"> 1) The loss of these populations would adversely affect the conservation status or distribution of the species at an international or European scale; or 2) The population forms a critical part of a wider population at this scale; or 3) The species is at a critical phase of its life cycle at an international or European scale.
UK or national importance	
Sites	Sites including: <ol style="list-style-type: none"> 1) Sites of Special Scientific Interest (SSSIs) or Areas of Special Scientific Interest (ASSIs); 2) National Nature Reserves (NNRs); 3) National Parks; 4) Marine Protected Areas (MPAs) including Marine Conservation Zones (MCZs); or 5) Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such

Habitats	<p>Habitats including:</p> <ol style="list-style-type: none"> 1) Areas of UK BAP priority habitats; 2) Habitats included in the relevant statutory list of priority species and habitats; and 3) Areas of irreplaceable habitats including : <ol style="list-style-type: none"> a) ancient woodland; b) ancient or veteran trees; c) blanket bog; d) limestone pavement; e) sand dunes; f) salt marsh; g) lowland fen. 4) Areas of habitat which meet the definition for habitats listed above but which are not themselves designated or listed as such.
Species	<p>Resident, or regularly occurring, populations of species which can be considered at an international, European, UK or national level where:</p> <ol style="list-style-type: none"> 1) The loss of these populations would adversely affect the conservation status or distribution of the species at a UK or national scale; or 2) The population forms a critical part of a wider population at this scale; or 3) The species is at a critical phase of its life cycle at a UK or national scale
Regional importance	
Sites	Designated sites (non-statutory) including heritage coasts.
Habitats	Areas of habitats identified (including for restoration) in regional plans or strategies (where applicable).
Species	<p>Species including:</p> <ol style="list-style-type: none"> 1) Resident, or regularly occurring, populations of species which can be considered at an international, European, UK or national level where: <ol style="list-style-type: none"> a) the loss of these populations would adversely affect the conservation status or distribution of the species at a regional scale; or b) the population forms a critical part of a wider regional population; or c) the species is at a critical phase of its life cycle; 2) Species identified in regional plans or strategies.
County or equivalent authority importance	
Sites	<p>Wildlife / nature conservation sites designated at a county (or equivalent) level including:</p> <ol style="list-style-type: none"> 1) Local Wildlife Sites (LWS); 2) Local Nature Conservation Sites (LNCS); 3) Local Nature Reserves (LNRs); 4) Sites of Importance for Nature Conservation (SINCs); 5) Sites of Nature Conservation Importance (SNCIs); 6) County Wildlife Sites (CWSs);
Habitats	Areas of habitats identified in county or equivalent authority plans or strategies (where applicable).
Species	<p>Species including:</p> <ol style="list-style-type: none"> 1) Resident, or regularly occurring, populations of species which can be considered at an international, European, UK or national level where:

	<ul style="list-style-type: none"> a) the loss of these populations would adversely affect the conservation status or distribution of the species at a county or unitary authority scale; or b) the population forms a critical part of a wider county or equivalent authority area population, e.g. metapopulations; or c) the species is at a critical phase of its life cycle. <p>2) Species identified in a county or equivalent authority area plans or strategies.</p>
Local Importance	
Sites	<p>Wildlife / nature conservation sites designated at a local level including:</p> <ul style="list-style-type: none"> 1) Local Wildlife Sites (LWS); 2) Local Nature Conservation Sites (LNCS); 3) Local Nature Reserves (LNRs); 4) Sites of Importance for Nature Conservation (SINCs); 5) Sites of Nature Conservation Importance (SNCIs); 6) Sites of Local Nature Conservation Importance (SLNCIs);
Habitats	<p>Areas of habitat considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal, or genetic exchange.</p>
Species	<p>Populations / communities of species considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal or genetic exchange.</p>

2.11 Limitations

- 2.11.1 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. The ecological surveys undertaken to support this assessment, have not therefore produced a complete list of plants and animals and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, the results of these surveys have been reviewed and are considered to be sufficient to undertake this assessment.
- 2.11.2 Access constraints limited walkover survey of some unnamed tributaries of the Tara Brook (WC_211, WC_212, WC_213 and WC_214). These watercourses were able to be surveyed during RCS for the project, thus this is not considered to significantly affect the assessment.
- 2.11.3 Health and safety concerns around livestock limited the survey of two modules within one MoRPh5 reach (HUR03) on the Hurstclough Brook. Surveyors were able to observe the watercourse at these locations prior to having to retreat. Therefore, whilst survey data was obtained, there is potential for some minor inaccuracy within the survey form which was completed subsequently. Nonetheless, it is considered that broad habitat typology was well recorded and therefore is not considered likely to have significantly affected the overall River Condition Score for the reach.

3. Baseline conditions

3.1.1 This section details the aquatic ecological baseline for the Scheme recorded during the desk and field-based studies undertaken for the EclA.

3.2 Initial screening outcomes

3.2.1 Table 3.1 schedules the watercourses within the study area and their points of interaction with the Scheme.

3.2.2 As described in Section 2.7, due to the linear nature of the Scheme and its associated elements, not all watercourses within the study area are potentially affected by the Scheme. Therefore, the watercourses identified were reviewed against details of the Scheme and known spatial and temporal impact pathways.

3.2.3 Only watercourses for which an impact pathway exists have been taken forward to assessment. These watercourses have been labelled in Table 3.1.

3.2.4 Table 3.2 lists the ponds within the study area and their location relative to the DCO boundary. No lakes were identified within the study area. Only ponds for which an impact pathway exists have been taken forward to further assessment. These ponds have been labelled in Table 3.2. When reviewing potential for impacts, embedded mitigation outlined in Environmental Statement Chapter 2: Description of the Scheme (TR010034/APP/6.3) has been taken into account. This includes, for example, the implementation of general best practice construction pollution prevention measures and the implementation of exclusion zones around retained ponds within the DCO boundary.

Table 3.1: Watercourses within the study area

Watercourse name and ID	Main river / ordinary watercourse	Interaction description	NGR ⁴²	Screened into assessment?	Rationale
Unnamed Watercourse (WC_050)	Ordinary Watercourse	Within study area, but outside of DCO boundary.	SJ 98118 95355	No	No impact pathway identified.
River Etherow (WC_100)	Main River	Crossed by Scheme, located within DCO boundary.	SK 00916 95572	Yes	Potential impacts associated with a new crossing.
Unnamed Watercourse (WC_110)	Ordinary Watercourse	Within study area, but outside of DCO boundary.	SK 00545 96272	No	No impact pathway identified.
Unnamed Watercourse (WC_130)	Ordinary Watercourse	Within DCO boundary, but not impacted.	SK 00835 95523	No	No impact pathway identified.
Unnamed Watercourse (WC_140)	Ordinary Watercourse	Within DCO boundary, but not impacted.	SK 00360 95581	No	No impact pathway identified.
Tara Brook (WC_200)	Ordinary Watercourse	Crossed by Scheme, located within DCO boundary.	SJ 99783 95752 and SJ9997195657	Yes	Potential impacts associated with a new crossing and associated realignment.
Unnamed Watercourse (WC_210)	Ordinary Watercourse	Crossed by Scheme, located within DCO boundary.	SJ 99725 95888	Yes	Potential impact, watercourse partially under the footprint of the Scheme.

⁴² Where a watercourse has one or more interactions with the Scheme (e.g. a crossing) the grid reference has been given for the interactions. Where the watercourse is not crossed by the Scheme, a nominal point along the watercourse has been given (typically the closest point to the DCO boundary).

Watercourse name and ID	Main river / ordinary watercourse	Interaction description	NGR ⁴²	Screened into assessment?	Rationale
Unnamed Watercourse (WC_211)	Ordinary Watercourse	Crossed by Scheme, located within DCO boundary.	SJ 99253 96053	Yes	Potential impacts, watercourse partially under the footprint of the Scheme.
Unnamed Watercourse (WC_212)	Ordinary Watercourse	Crossed by Scheme, located within DCO boundary.	SJ 99515 96067	Yes	Potential impact, watercourse partially under the footprint of the Scheme.
Unnamed Watercourse (WC_213)	Ordinary Watercourse	Crossed by Scheme, located within DCO boundary.	SJ 99651 95969	Yes	Potential impact, watercourse partially under the footprint of the Scheme.
Unnamed Watercourse (WC_214)	Ordinary Watercourse	Within DCO boundary, but not impacted.	SJ9971296007	No	No impact pathway identified.
Unnamed Watercourse (WC_215)	Ordinary Watercourse	Within study area, but outside of DCO boundary.	SJ9977196205	No	No impact pathway identified.
Unnamed Watercourse (WC_220)	Ordinary Watercourse	Within study area, but outside of DCO boundary.	SK0006096142	No	No impact pathway identified.
Hurstclough Brook (WC_300)	Main River (Culverted) downstream of existing A57.	Crossed by Scheme, within DCO boundary.	SJ 98659 95419 and SJ 98893 95922	Yes	Potential impacts associated with a new crossing and associated realignment.
Unnamed Watercourse (WC_320)	Ordinary Watercourse	Within DCO boundary, but not impacted.	SJ 98863 95549	No	No impact pathway identified.

Watercourse name and ID	Main river / ordinary watercourse	Interaction description	NGR ⁴²	Screened into assessment?	Rationale
Unnamed Watercourse (WC_330)	Ordinary Watercourse	Within study area, but outside of DCO boundary.	SJ 98481 95568	No	No impact pathway identified.
Unnamed Watercourse (WC_340)	Ordinary Watercourse	Crossed by Scheme, located within DCO boundary.	SJ 98521 95436	Yes	Potential impacts associated with a new crossing.
Unnamed Watercourse (WC_350)	Ordinary Watercourse	Within study area, but outside of DCO boundary.	SJ 98628 95220	No	No impact pathway identified.
Glossop Brook (WC_400)	Main River	Within study area, but outside of DCO boundary.	SK 01014 95242	No	No impact pathway identified.

Table 3.2: Ponds within the study area

Pond ID	Interaction description	NGR	Screened into assessment?	Rationale
P1	Within study area, but outside of DCO boundary.	SJ 98483 95571	No	No impact pathway identified.
P2	Within DCO boundary and under the footprint of the Scheme.	SJ 98637 95554	Yes	Potential impact, pond located under footprint of the Scheme.
P3	Within DCO boundary and under the footprint of the Scheme.	SJ 98653 95462	Yes	Potential impact, pond located under footprint of the Scheme.
P4	Within DCO boundary and under the footprint of the Scheme.	SJ 98747 95828	Yes	Potential impact, pond located under footprint of the Scheme.
P5	Within DCO boundary and under the footprint of the Scheme.	SJ 98912 95939	Yes	Potential impact, pond located under footprint of the Scheme.

Pond ID	Interaction description	NGR	Screened into assessment?	Rationale
P6	Within study area, but outside of DCO boundary.	SJ 98990 96100	No	No impact pathway identified.
P7	Within DCO boundary and under the footprint of the Scheme.	SJ 99498 96084	Yes	Potential impact, pond located under footprint of the Scheme.
P16	Within DCO boundary.	SJ 98821 95991	No	No impact pathway identified.
P17	Within DCO boundary and under the footprint of the Scheme.	SJ 99027 95985	Yes	Potential impact, pond located under footprint of the Scheme.
P18	Within study area, but outside of DCO boundary.	SJ 99327 96372	No	No impact pathway identified.
P19	Within study area, but outside of DCO boundary.	SK 00091 96105	No	No impact pathway identified.
P20	Within study area, but outside of DCO boundary.	SJ 99936 95955	No	No impact pathway identified.
P22	Garden pond within study area, but outside of DCO boundary.	SJ 99981 95851	No	No impact pathway identified.
P23	Garden pond within study area, but outside of DCO boundary.	SK 00051 95856	No	No impact pathway identified.
P24	Garden pond within study area, but outside of DCO boundary.	SK 00103 95782	No	No impact pathway identified.
P25	Within study area, but outside of DCO boundary.	SK 00186 95815	No	No impact pathway identified.
P26	Garden pond within study area, but outside of DCO boundary.	SK 00227 95517	No	No impact pathway identified.
P27	Within DCO boundary and under the footprint of the Scheme.	SJ 99016 95950	Yes	Potential impact, pond located under footprint of the Scheme.
P28	Within DCO boundary and under the footprint of the Scheme.	SJ 99660 96040	Yes	Potential impact, pond located under footprint of the Scheme.

Pond ID	Interaction description	NGR	Screened into assessment?	Rationale
P30	Within DCO boundary and under the footprint of the Scheme.	SK 00416 95642	Yes	Potential impact, pond located under footprint of the Scheme.
P31	Within DCO boundary and under the footprint of the Scheme.	SJ 99768 95867	Yes	Potential impact, pond located under footprint of the Scheme.
P32	Within study area, but outside of DCO boundary.	SJ 99847 95553	No	No impact pathway identified.

3.3 Existing background records

Designated sites

- 3.3.1 One statutory designation is situated along the Hurstclough Brook (WC_300) approximately 345 m south (Hurstclough Brook LNR) from the DCO boundary. However, the LNR is important for non-aquatic receptors (ancient semi-natural woodland habitat, bryophytes, and fungi).
- 3.3.2 No other statutory or non-statutory designated watercourses, ponds or lakes were identified within the study area.

Environment Agency monitoring data

- 3.3.3 Environment Agency monitoring data were only available for the River Etherow (WC_100) within the aquatic ecology study area. These data are summarised in Table 3.3. These data were collected by the Environment Agency using standard survey methods and are therefore assumed to have been checked and quality assured prior to publication. Data are presented for surveys undertaken within the last 10 years. No macrophyte data are available within the aquatic ecology study area. Survey locations are shown on Figure 8.5 of the ES (TR010034/APP/6.4).

Table 3.3: Available Environment Agency monitoring data on the River Etherow (WC_100)

Type of survey ⁴³	Environment Agency Site ID	NGR and location relative to Scheme	Survey details ⁴⁴
MI	65904	SK 02054 96952 (approximately 2 km upstream of the Scheme crossing, downstream of Bottoms Reservoir at the Waterside/New Road)	28 surveys have been undertaken between 2010 and 2019. Key community biological metrics (most recent score in brackets): WHPT: 69.4 – 165.3 (132.3); WHPT ASPT: 5.34 – 7.36 (6.3); WHPT NTAXA: 13 – 26 (21); LIFE (species): 7.29 – 8.88 (8.12); LIFE (family): 6.87 – 8.27 (7.75); PSI (family): 48 – 80 (69.44).
MI	67595	SK 01396 96522 (just upstream of the Hollingworth Brook confluence, approximately 1.2 km upstream of the Scheme crossing)	15 surveys have been undertaken between 2010 and 2018. Key community biological metrics (most recent score in brackets): WHPT: 55.6 – 150.8 (90.7); WHPT ASPT: 5.54 – 6.91 (6.05); WHPT NTAXA: 10 – 24 (15); LIFE (species): 7.56 to 8.57 (7.75); LIFE (family): 7.33 to 8.13 (7.54); PSI (family): 62.79 – 83.87 (68.97).
MI	67542	SK0099695297 (approximately 0.3 km downstream of the Scheme crossing).	18 surveys have been undertaken between 2010 and 2018. Key community biological metrics (most recent score in brackets): WHPT: 69.1 – 199.9 (118.3); WHPT ASPT: 5.76 – 7.14

⁴³ MI = aquatic invertebrates, FH = fish, MP = macrophytes, RHS = River Habitat Survey

⁴⁴ For aquatic invertebrate the most recent biological metric scores are shown in brackets, with the range of scores within the survey period also presented.

Type of survey ³	Environment Agency Site ID	NGR and location relative to Scheme	Survey details ⁴
			(6.23); WHPT NTAXA: 12 – 28 (19); LIFE (species): 7.86 – 8.50 (8.15); LIFE (family): 7.23 – 8.13 (7.76); PSI (family): 62.22 – 84.21 (74.36).
FH	6934	SK0092395697 (site is centred approximately 100 m upstream of the Scheme crossing).	Three surveys have been undertaken between 2010 and 2016. All surveys were completed using electric fishing method. Notable species included brown/ sea trout (<i>Salmo trutta</i>) and lamprey (<i>Petromyzontidae</i>). 3-spined stickleback (<i>Gasterosteus aculeatus</i>) were also recorded. In the most recent survey, brown/sea trout were observed at a density of 3.7 individuals per 100m ² (33 individuals total) and 3-spined stickleback at a density of 7.2 individuals per 100m ² (65 individuals total).
FH	6945	SK0125696464 (site is located on Hollingworth Brook just upstream of its confluence with the River Etherow, approximately 1.2 km upstream of the Scheme crossing. Whilst not directly on the River Etherow itself, the site is considered to provide useful information on likely species present within the River Etherow and provide baseline information for the tributary systems the River Etherow supports).	One survey has been undertaken at this site (2013) and used electric fishing methods. Brown/sea trout were the only species observed at this site, at a density of 10.7 individuals per 100m ² (25 individuals total).
FH	10261	SK0042794808 (site is located on the main River Etherow channel, approximately 1.2 km downstream of the Scheme crossing).	One survey has been undertaken at this site (2013) and used electric fishing methods. Brown/sea trout, minnow (<i>Phoxinus phoxinus</i>), stone loach (<i>Barbatula barbatula</i>) were observed at this site. Brown/sea trout were surveyed a density of 3.6 individuals per 100m ² (4 individuals total), minnow at 1.1 individuals per 100m ² (3 individuals total) and stone loach at 2.1 individuals per 100m ² (6 individuals total).
RHS	26532	SK0092395578 (located approximately at the Scheme crossing).	One survey completed in 2014. Survey recorded the channel as severely modified with a Habitat Modification Score of 2221.

Type of survey ³	Environment Agency Site ID	NGR and location relative to Scheme	Survey details ⁴
			This high modification score is driven by resectioning with more than 33% of the length of survey recorded as realigned and over deepened. The survey reach includes the ford downstream of the Tara Brook confluence, which comprises a reinforced bed material; riffles and pools were recorded within the reach providing some in-channel habitat complexity. Himalayan balsam (<i>Impatiens glandulifera</i>) was noted as present within the reach.
RHS	26529	SK0205296981 (located approximately 2 km upstream of the Scheme crossing, downstream of Bottoms Reservoir at the Waterside/New Road).	One survey completed in 2014 Survey recorded the channel as severely modified with a Habitat Modification Score of 2440. This high modification score is driven by resectioning with more than 33% of the length of survey recorded as realigned and over deepened, bridges and reinforcements to bed or bank. The flow is recorded as impounded for greater than 33% of the survey length.
RHS	26521	SK0146496664 (located on the River Etherow, just upstream of the Hollingworth Brook confluence, 1.2 km upstream of the proposed Scheme crossing).	One survey completed in 2014 Survey recorded the channel as severely modified with a Habitat Modification Score of 1580. This high modification score is driven by resectioning; the channel is recorded as realigned for more than 33% of the survey reach and over deepened for less than 33% of the reach. However, three riffles were recorded providing some in-channel habitat complexity. Himalayan balsam and Japanese knotweed (<i>Fallopia japonica</i>) were recorded within the survey reach.

3.4 Survey screening outcomes

3.4.1 All watercourses screened into assessment within Table 3.1 were screened as requiring walkover survey as per the approach outlined in Section 2.8.

3.4.2 The following watercourses were also screened as requiring MoRPh and aquatic macroinvertebrate survey:

- River Etherow (WC_100)
- Tara Brook (WC_200)
- Hurstclough Brook (WC_300)

- 3.4.3 Whilst recent background records were available for aquatic macroinvertebrates on the River Etherow (WC_100), the watercourse was screened in for supplementary aquatic macroinvertebrate survey to optimise the location of monitoring sites in relation to potential construction effects. This supports a pre-Scheme baseline which could be incorporated into a construction monitoring strategy as the Scheme progresses.
- 3.4.4 No aquatic macroinvertebrate data were available for Tara Brook (WC_200) or the Hurstclough Brook (WC_300), and as such they were screened in for survey.
- 3.4.5 Environment Agency fish data within the aquatic ecology study area are considered to provide adequate information on likely fish species present within the River Etherow (WC_100). Therefore, no further fish surveys were screened in for the River Etherow (WC_100).
- 3.4.6 No fish data were available for Tara Brook (WC_200) or Hurstclough Brook (WC_300) within the aquatic ecology study area. However, no suitable fish habitat was recorded within these watercourses within the DCO boundary during walkover survey and RCS.
- 3.4.7 Tara Brook (WC_200) exhibits some suitable habitat for fish approximately 1 km downstream of the DCO boundary, limited to a short section of channel with wetted widths of <1 m. No discrete riffle or pool habitat was recorded, however the channel in this location provides rippled flow of depths of approximately 0.15 m over predominantly cobble, pebble, and gravel substrates. Given its proximity to the River Etherow (WC_100) in this location (approximately 250 m), the downstream reaches of the Tara Brook (WC_200) may support species that are present within the River Etherow, and potentially act as rearing grounds for smaller fish. As such, the background records on the River Etherow (WC_100) are considered to provide a suitable proxy for the Tara Brook (WC_200) in terms of potential species presence and sensitivity.
- 3.4.8 Hurstclough Brook (WC_300) has a significant culvert approximately 185 m in length downstream of the existing A57 which is considered likely to act as a barrier to fish movement and as such further limit fish presence on the Hurstclough Brook (WC_300) within the study area. Accordingly, both Tara Brook (WC_200) and Hurstclough Brook (WC_300) were screened out of fish survey.
- 3.4.9 No Environment Agency macrophyte data less than 10 years old were available within the aquatic ecology study area for the River Etherow (WC_100), Tara Brook (WC_200) or Hurstclough Brook (WC_300). However, walkover survey and review of RCS data identified limited suitable macrophyte habitat within these watercourses. As such, they have been screened out of macrophyte survey.
- 3.4.10 All other watercourses within the study area are heavily modified drainage ditches, with limited habitat suitability for aquatic species. These watercourses are suitably characterised by walkover survey and RCS where available; no additional detailed aquatic habitat and species surveys were proposed for these watercourses.

3.5 Watercourse baseline

3.5.1 This section provides a baseline of each of the watercourses screened into further assessment.


Watercourse baseline tables

3.5.2 Table 3.4 to Table 3.8 in this section outline the baseline characterisation of each watercourse taken forward for assessment, as supported by existing background records and survey data.

3.5.3 Existing baseline conditions are considered in relation to each watercourse receptor to determine its overall ecological valuation for the purpose of impact assessment.

3.5.4 Original data from surveys undertaken in support of the ecological valuations are presented in the corresponding Annexes.

Table 3.4: River Etherow (WC_100) baseline

Watercourse: River Etherow (WC_100)	Central NGR: SK 00974 95519
 <p data-bbox="300 1281 823 1344">Photo DSC_0960 – River Etherow past ford (SK 00906 95652).</p>	<p data-bbox="1034 882 1417 1126">Baseline Ecological Valuation: The River Etherow (WC_100) is a mainstem river, providing principal aquatic habitat connectivity for fish and other aquatic species throughout the region and has been ascribed a value of Regional importance.</p>
<p data-bbox="300 1359 576 1391">WFD Characterisation:</p> <p data-bbox="300 1397 1358 1460">Note: The River Etherow is split into two WFD water bodies within the study area, both of which were classified in 2019.</p> <ul data-bbox="300 1467 1410 2058" style="list-style-type: none"> • Classified WFD Waterbody – Etherow (Woodhead Res. to Glossop Bk.) – Heavily Modified Water Body (HMWB) <ul style="list-style-type: none"> – Overall Water Body Status – Moderate – Overall Ecological Status of WFD Waterbody – Moderate – Macrophytes and Phytobenthos Combined classification – Good – Fish classification – Poor – Invertebrate classification – Good – Reasons for Not Achieving Good: Physical modification and invasive non-native species • Classified WFD Waterbody – Etherow (Glossop Brook to Goyt) – HMWB • Classified WFD Catchment – Etherow (Glossop Brook to Goyt) <ul style="list-style-type: none"> – Overall Water Body Status – Poor – Overall Ecological Status of WFD Waterbody – Poor – Macrophytes and Phytobenthos Combined classification – Moderate – Fish classification – Poor – Invertebrate classification – Good 	

Watercourse: River Etherow (WC_100)

Central NGR: SK 00974 95519

- Reasons for Not Achieving Good: Point source pollution, diffuse source pollution, physical modification, flow and invasive non-native species.

Existing data sources

Designated sites:

- None within the aquatic ecology study area. The Etherow Country Park LNR⁴⁵ and associated Campstall Nature Reserve Site of Special Scientific Interest (SSSI)⁴⁶ are both located over 4 km from the DCO boundary and therefore not screened into assessment.

Environment Agency data:

- Aquatic macroinvertebrates
 - There are three EA monitoring sites on the River Etherow within 2 km of the DCO boundary (as listed in Table 3.3).
 - Site 67542: Biological metrics are indicative of moderate to good habitat diversity, good water quality, high flow velocity conditions and low channel sedimentation. CCI scores generally range from 4.36 – 13.42 over the period 2010 to 2018, which are considered to be communities of low to fairly high conservation importance under the scoring system. One sample (April 2014) recorded an unusually high CCI score of 32, likely resulting from high abundances recorded. One regionally notable species⁴⁷ *Protonemura meyeri* was recorded in May and November 2013, although globally this is a species of least concern under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. Four species with local distribution⁴⁸ have been recorded intermittently through the data record. Four invasive non-native invertebrates have been recorded: signal crayfish (*Pacifastacus leniusculus*), *Physella acuta*, *Crangonyx pseudogracilis/floridanus* and *Potamopyrgus antipodarum*
 - Site 67595: Biological metrics are indicative of moderate to good habitat diversity, good water quality, high flow velocity conditions and low channel sedimentation. The CCI scoring system is used to assess the intrinsic conservation importance of the community present. CCI scores range from 4.29 to 13.59 over the period 2010 to 2018, which are considered to be communities of low to fairly high conservation importance under the scoring system. One notable species⁴⁹ *Metacnephia amphora* has been recorded at the site in May 2018 and one regionally notable species *Protonemura meyeri* in October 2016. A further species *Athripsodes bilineatus* with local distribution has been recorded on six occasions through the data record. Three invasive non-native invertebrates have been recorded: signal crayfish, *Crangonyx pseudogracilis/floridanus* and *Potamopyrgus antipodarum*
- Fish
 - There are two EA monitoring sites on the River Etherow and one on the Hollingworth Brook tributary near to its confluence with the River Etherow within 2 km of the DCO boundary (as listed in Table 3.3). Surveys at these sites show that the River Etherow supports a moderately diverse species assemblage including the brown/sea trout and lamprey. Brown/sea trout is a species of Principal Importance under section 41 of the NERC Act 2006 and a UK BAP (2007) priority fish species. There are three species on lamprey within the UK, all of which are Annex II species under the Habitats Regulations⁵⁰, river lamprey (*Lampetra fluviatilis*) is also a UK BAP (2007) priority fish species. The

⁴⁵ <https://designatedsites.naturalengland.org.uk/SiteLNRDetail.aspx?SiteCode=L1009530> (accessed March 2021)

⁴⁶ <https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1002836&SiteName=&countyCode=&responsiblePerson=&unitId=&SeaArea=&IFCAAarea=> (accessed March 2021)

⁴⁷ Regional Notable – Taxa that are too common nationally to fall within the Notable category but which are uncommon in some parts of the country. 'Uncommon', in this case, means found in five or fewer localities as defined under the CCI.

⁴⁸ Those species not uncommon enough to be classed as endangered, vulnerable, rare, or notable under the CCI, but which are nonetheless of some interest. A species may qualify, for example, by being very widely distributed but nowhere common, by being restricted to a specialized habitat such as brackish pools but being a common component of this habitat, or simply by being uncommon but not uncommon enough to be Notable. Species with few records but which are suspected of being badly under-recorded are likely to be placed in the Local category.

⁴⁹ Taxa that do not fall within Red Data Book categories 1–3 but which are nonetheless scarce in Great Britain and thought to occur in fewer than 100 10 km squares of the National Grid.

⁵⁰ The European Council Directive 92/43/EEC was transposed into English and Welsh law through The Conservation of Habitats and Species Regulations 2017 (as amended). The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 have

Watercourse: River Etherow (WC_100)

Central NGR: SK 00974 95519

River Etherow supports a number of minor tributary systems too which may be important spawning and rearing grounds for fish.

- River Habitat Survey (RHS)
 - There are two EA RHS sites on the River Etherow within 2 km of the DCO boundary (as listed in Table 3.3). Surveys at these sites indicate that the watercourse is severely modified, predominantly due to realignments and over deepening of the channel as well as the presence of artificial structures such as bridges and bank reinforcements.
- No Macrophyte surveys have been undertaken since 2010.

River Corridor Survey (RCS11; May/June 2018):

- Location: between SK 00934 96027 and SK 00753 95224
- Summary: The River Etherow corridor runs through an area of broad-leaved woodland and has reinforced banks with man-made stone walls. The river also has several inlets including pipes and tributaries. There are also footbridges and footpaths, road bridges and fords along its course. No aquatic vegetation was observed during the survey; however, bank vegetation was overhanging in places and two fallen trees were observed within the channel. Species within the broad-leaved woodland areas included semi-mature and mature aspen (*Populus tremula*), hawthorn (*Crataegus monogyna*), ash (*Fraxinus excelsior*) and cherry (*Prunus sp*) trees. Japanese knotweed was also present on the banks in the upper course and on an island in the middle of the channel. Ferns, wavy bitter-cress (*Cardamine flexuosa*) and common hogweed (*Heracleum sphondylium*) grew within the gaps in the walls. In the river mid-section, vegetation was dominated by a variety of tall ruderal and grass species including Himalayan balsam. Dense scrub such as the common nettle (*Urtica dioica*) and bramble (*Rubus fruticosus*) also covers much of the banks in the lower course. Along with the woodland (containing the invasive species Japanese Knotweed) in the upper course, there is also a footpath running through and along the channel bank. The mid-section occurs in an area of cattle grazing land and hay meadows and the lower course has more woodland with rich ground flora.

Walkover Survey Rapid Assessment (12 March 2020):

- Spot check location: SK 00906 95652
- Summary: The 250 m walkover survey of the River Etherow measured a wetted width of 8.0 m, a bankfull width of 12.0 m and an unknown depth due to inability to survey and no visibility of the bed. The banks are predominantly comprised of earth. The channel planform has some sinuosity and the flow type at time of survey was rippled. Over the survey reach, one artificial ford was observed, along with overhanging boughs and urban trash. There are semi-continuous trees on both banks. The valley form is U-shaped.

MoRPh survey (16 September 2020):

- Location: SK 00907 95585⁵¹ (downstream of existing A57 road bridge)
- Summary: one MoRPh5 survey was completed on the River Etherow (survey code ETH01). The survey and cross-section was comparable to the features recorded within the walkover survey. Permanently vegetated agriculture was the predominant bank top and riparian land use with a storage area associated with a farm also recorded on the left bank and a farm track on the right bank. At the upstream end of the survey reach, a ford is present across the channel. This was used by a tractor during the survey and is understood to be used several times a day. At this ford the water is approximately 0.5 m deep. The bank top vegetation on both banks comprised a mix of short grasses, tall herbs and grasses, scrub and scattered deciduous trees. The invasive species Himalayan balsam was also recorded. No significant water related features, such as backwaters and connected ponds were recorded, although a small embayment associated with a fallen willow was recorded in module 3 adding to habitat complexity.

been issued to update the domestic law following the UK's departure from the European Union, however the obligations of a competent authority in the 2017 Regulations for the protection of sites or species have not changed. As such, the species and habitats listed under the Habitats Directive remain following the UK's departure from the European Union.

⁵¹ Mid-point of MoRPh5 survey reach.

Watercourse: River Etherow (WC_100)

Central NGR: SK 00974 95519

Banks were steep and predominantly comprised of earth. Trace (<5%) levels of bank reinforcements were recorded around the ford, but no further artificial banks or structures were recorded. Flows were typically smooth or rippled, with small stretches of unbroken standing waves throughout the reach.

- River Condition Score: Moderate
- River Type: Type F - straight to sinuous channel with coarsest substrates comprised of cobble and gravel substrates
- Survey limitations: visibility within the survey area for module 2 was limited. It should be noted that there is potential for some features not to have been recorded accurately as a result of this. However, this is not considered likely to have significantly affected the overall River Condition Score for the reach as visibility for the other four modules was good.

Aquatic macroinvertebrate survey (7 October 2020):

- Location: SK 00917 95653 and SK 01000 95505 upstream and downstream of proposed A57 road bridge
- Summary: two aquatic macroinvertebrate surveys conducted. Biological metrics upstream of the proposed A57 road bridge are indicative of good water quality, high flow velocity conditions and moderate channel sedimentation. Biological metrics at the site downstream of the proposed A57 road bridge are indicative of moderate water quality, high flow velocity conditions and a sedimented channel. No notable species were recorded within the samples.

Table 3.5: Tara Brook (WC_200) baseline

Watercourse: Tara Brook (WC_200)

**Central NGR: SJ 99851 95761
 and SK 00368 95869**



Photo DSC_0927 – Typical view upstream reach within DCO boundary (SJ 99814 95771)



Baseline Ecological Valuation: Tributary system of the River Etherow (WC_100). Upper reaches are heavily poached and not suitable for fish or other truly aquatic species. No notable aquatic macroinvertebrate species were recorded, and extensive invasive Himalayan balsam further reduces condition of the reach within the DCO boundary. However, further downstream the feature exhibits greater diversity and quality of habitat and potential for fish. Overall, the feature is considered to provide an important aquatic linear corridor within the local agricultural landscape and is considered to be of Local importance.

Watercourse: Tara Brook (WC_200)		Central NGR: SJ 99851 95761 and SK 00368 95869
Photo DSC_0933 – Typical view downstream reach outside DCO boundary (SK 00757 95749)		
<p>WFD Characterisation:</p> <ul style="list-style-type: none"> • Classified WFD Waterbody – No • Classified WFD Waterbody Catchment – Etherow (Woodhead Res. to Glossop Bk.) • Overall waterbody status – Moderate 		
<p>River Corridor Survey (RCS6; May/June 2018):</p> <ul style="list-style-type: none"> • Location: upstream reach between SJ 99566 95686 and SK 00063 95738. • Summary: A small stream with channel vegetation from the bank growth. The bank vegetation is very overgrown and fills the channel with species such as Himalayan balsam, willowherb species, hawthorn, common nettle and bramble. Scattered sycamore trees were also present. Within the marshy grassland areas of the river corridor, more herbaceous species were observed on the banks, including bittersweet (<i>Solanum dulcamara</i>), horsetail (<i>Equisetum</i> species), cuckooflower and creeping buttercup (<i>Ranunculus repens</i>). The adjacent land-use is improved grassland with large amounts of high sward growth, possibly for winter feed. <p>River Corridor Survey (RCS7; May/June 2018):</p> <ul style="list-style-type: none"> • Location: downstream reach between SK 00394 95873 and SK 00838 95651. • Summary: The Tara Brook (WC_200) river corridor is a small stream running through agricultural land and a garden of a residential property. Little vegetation was observed within the channel, although small amounts of Himalayan balsam and brooklime (<i>Veronica beccabunga</i>) were present. However, dense scrub of bramble and hawthorn overhangs into the channel. The banks were dominated by tall ruderal species such as common nettle, Himalayan balsam, amphibious bistort (<i>Persicaria amphibia</i>), cleavers (<i>Galium aparine</i>) and broad-leaved dock (<i>Rumex obtusifolius</i>). Opposite-leaved golden-saxifrage and ivy (<i>Hedera helix</i>) occurred in isolated locations. The land to the north was constricted against a stone wall next to the A57, whilst the rest of the land was characterised as semi-improved grassland, other than the residential garden in the lower course. 		
<p>Existing data sources</p> <ul style="list-style-type: none"> • Designated sites: None • Environment Agency data: Suitable proxy fish data are available for the lower reach of the Tara Brook (WC_200) from the River Etherow (WC_100) as noted in Section 3.4.7 and are described in Table 3.4. 		
<p>Walkover Survey Rapid Assessment (11 March 2020):</p> <ul style="list-style-type: none"> • Spot check location: SJ 99814 95771 (upstream reach at Scheme interaction) • Summary: The spot check survey at WC_200 identified a channel wetted width of 0.3 m, a wetted depth of 0.1 m and a bankfull width of 2 m. The bed substrate is 90 % sand and the banks are predominantly comprised of earth. The channel planform has some sinuosity and flow was 100 rippled. The valley form is a shallow vee. <p>Walkover Survey Rapid Assessment (12 March 2020):</p> <ul style="list-style-type: none"> • Spot check location: SK 00757 95749 (downstream reach) • Summary: The 100 m walkover survey of WC_200 identified a bankfull width of 1.4 m and a banktop height of 0.75 m. The bed substrate is comprised of 85 % cobble and 10 % pebble, whilst the bank is predominantly comprised of earth. The channel planform is irregular meanders and the flow type is 85 % rippled. Along the survey reach one footbridge and one pipe crossing were recorded, along with exposed bankside roots, vegetated rocks and urban trash. There were occasional trees on the banks. The valley form is asymmetric. 		
<p>MoRPh survey (16 September 2020):</p> <ul style="list-style-type: none"> • Location: SJ 99801 95766 (at point of interaction with the Scheme) 		

Watercourse: Tara Brook (WC_200)

**Central NGR: SJ 99851 95761
and SK 00368 95869**

- **Summary:** Watercourse was heavily poached by horses and did not have a clear channel form. Extensive Himalayan balsam was recorded both within the riparian zone and across the banks and channel bed.
The watercourse had been bunded upstream of the MoRPh5 reach and as such the flow has been significantly altered with the channel almost fully dry. Limited substrates were present and predominantly were earth where the channel has lost its fluvial function.
- **River Condition Score:** Poor
- **River Type:** Type K – straight-sinuuous channel with coarsest substrates comprised of silt/clay.
- **Survey limitations:** Screened as watercourse within Biodiversity Net Gain assessment due to being headwaters of a fluvial system. However, when on Site the channel was observed to be heavily poached and impounded due to a bund being placed across the channel upstream of the MoRPh5 survey reach (TAR01). This made the channel difficult to define. Access restrictions limited a second survey being undertaken downstream of the Scheme crossing within the DCO boundary. A visual assessment from the surveyed reach looking downstream indicates that the channel form and associated land pressures are similar for the Tara Brook (WC_200) throughout the DCO boundary and as such one MoRPh5 survey is considered to provide an appropriate measure of river condition.

Aquatic macroinvertebrate survey (7 October 2020):

- **Location:** NGR SK 00757 95746 (downstream of Scheme interaction)⁵²
- **Summary:** one aquatic macroinvertebrate survey conducted outside of DCO boundary, downstream of potential impacts on the Tara Brook. Biological metrics are indicative of good water quality, high flow velocity conditions and slight channel sedimentation.

Table 3.6: Unnamed watercourses (WC_210, WC_211, WC_212 and WC_213) baseline

Watercourse: WC_210 / WC_211 / WC_212 / WC_213

**Central NGR: SJ 99647 95976
and SJ 99388 95955**



Photo DSC_0973 – WC_212 (SJ 99513 96082)

Baseline Ecological Valuation: Minor tributary systems of the Tara Brook (WC_200). Typically, field boundary ditches or modified semi-natural surface water flow paths draining hillsides <1 m wide. Limited potential for fish and other truly aquatic species. However, they provide an important aquatic linear corridor within the local agricultural landscape and are thus considered to be of Local importance.

⁵² Aquatic macroinvertebrate survey site was positioned downstream of the Scheme interaction with Tara Brook. This site was chosen because the point of interaction was not deemed suitable for the survey methodology. Moreover, the downstream reach has higher habitat quality and as such is expected to return a greater species diversity than if the survey was undertaken at the site of impact. The survey site is located within the EZol and as such is considered to be appropriate for use in determining the baseline for the watercourse within the aquatic ecology study area.

Watercourse: WC_210 / WC_211 / WC_212 / WC_213

Central NGR: SJ 99647 95976
and SJ 99388 95955



Photo DSC_0919 – View of WC_210, immediately downstream of WC_211 where there is no clear channel form (SJ 99744 95895).

WFD Characterisation:

- Classified WFD Waterbody – No
- Classified WFD Waterbody Catchment – Etherow (Woodhead Res. to Glossop Bk.)
- Overall waterbody status – Poor

River Corridor Survey 3 (RCS3; May/June 2018):

- Location: between SJ 99265 96075 and SJ 99596 95877
- Summary: The river corridor (of WC_211) flows through a broad-leaved woodland, bordered by residential properties on the south-eastern bank. The channel is very steep sided and has been incorporated into gardens in some locations. Invasive plant species and badger setts were observed. There was no vegetation within the channel, however, Himalayan balsam was well-established on both banks along the lower course of the river. The northern bank was heavily vegetated with broad-leaved woodland overhanging the channel, particularly grey willow (*Salix cinerea*), silver birch, sycamore, horse chestnut (*Aesculus hippocastanum*) and beech (*Fagus sylvatica*).

River Corridor Survey (RCS4; May/June 2018):

- Location: between SJ 99504 96082 and SJ 99596 95877.
- Summary: The RCS for the stream at Mottram Moor consists of drainage ditches (WC_212 and WC_213) along field margins, with a pond in the upper course (P7). Where water was present within the channel, there was a lack of vegetation. However, in dry reaches there were soft-rush (*Juncus effusus*), Yorkshire fog, Himalayan balsam, creeping buttercup, marsh thistle (*Cirsium palustre*), and great willowherb. On the banks of the channel were scattered trees including pedunculate oak, sycamore and hawthorn, with overhanging species in the upper course, such as hawthorn, sycamore and holly. The land-use to the north is Old Hall Showground and to the south is grazed improved grassland. The sward was species-poor and was dominated by perennial rye-grass.

Existing data sources

- Designated sites: None
- Environment Agency data: None

Walkover Survey Rapid Assessment (11 March 2020):

- Spot check location: SJ 99746 95893
- Summary: Watercourse WC_210 was identified as having no clear banks, therefore having a wetted width and bankfull width of 1.8 m, with a wetted depth of 0.18 m. The bed substrate is 85 % sand and 10 % gravel, and the predominant bank material is earth. The channel planform is characterised as braided irregular meanders and the flow type was 90%

Watercourse: WC_210 / WC_211 / WC_212 / WC_213

**Central NGR: SJ 99647 95976
and SJ 99388 95955**

rippled. The channel contained trash and trees were observed on both banks, set back from the channel. The valley form is U-shaped.

- Survey limitations: Access was restricted during the walkover survey so a rapid assessment proforma (spot check) was only undertaken on WC_210. Previous project data (namely RCS) are considered to provide adequate detail of these watercourses for assessment.

Not screened in for MoRPh or aquatic macroinvertebrate surveys.

Table 3.7: Hurstclough Brook (WC_300) baseline

Watercourse: Hurstclough Brook (WC_300)

Central NGR: SJ 98776 95615



Photo DSC_0877 – Downstream near existing A57 (SJ 98668 95445)

Baseline Ecological Valuation:
No notable aquatic macroinvertebrate species were recorded. However, Hurstclough Brook is an important feature for dispersal and connectivity for a limited range of aquatic species within the local context and has been ascribed a value of Local importance.

WFD Characterisation:

- Classified WFD Waterbody – No
- Classified WFD Waterbody Catchment – Etherow (Glossop Brook to Goyt)
- Overall waterbody status – Poor

River Corridor Survey (RCS2; May/June 2018):

- Location: between SJ 98888 96228 and SJ 98666 95441.
- Summary: The Hurstclough Brook is a small meandering stream through cattle grazed grassland, in which the lower sections of the stream were cattle poached. The upper sections of the channel were vegetated with floating sweet-grass (*Glyceria fluitans*) and brooklime. Vegetation on the banks included water figwort, Himalayan balsam and spear thistle (*Cirsium vulgare*). The adjacent land-use was improved, and semi-improved acid grassland used for grazing.

Existing data sources

- Designated sites: The Hurst Clough LNR is situated along the Hurstclough Brook approximately 345 m south (downstream) from the DCO boundary. However, the LNR is important for non-aquatic receptors (ancient semi-natural woodland habitat, bryophytes, and fungi).
- Environment Agency data: None

Walkover Survey Rapid Assessment (11 March 2020):

- Spot check location: SJ 98686 95462
- Summary: Over the course of the 100 m walkover survey, the Hurstclough Brook had a wetted width of 0.9 m, a wetted depth of 0.18 m and a bankfull width of 1.8 m. The bed substrate is characterised as 95 % sand and the predominant bank material is earth. The channel has some sinuosity and the flow type was characterised as 98 % rippled.

Watercourse: Hurstclough Brook (WC_300)

Central NGR: SJ 98776 95615

One culvert and one outfall were recorded during the survey, along with trash, underwater tree roots and overhanging boughs. There are also scattered trees on each bank. The valley form is asymmetric.

MoRPh survey (10 September 2020):

Three MoRPh5 surveys undertaken (survey codes HUR01, HUR02 and HUR03)

- Location: SJ 98705 95508 (HUR01), SJ 98826 95798 (HUR02) and SJ 98883 95933 (HUR03).
- Summary: the three surveys indicate that the watercourse within the aquatic ecology study area is a small channel with some minor sinuosity flowing through permanently vegetated agricultural land. Banks were predominantly comprised of natural materials but had been poached by livestock in several locations. There were slight differences between the three reaches survey, with HUR02 and HUR03 having slightly more modification and negative condition indicators (e.g. a culvert and more poaching) than HUR01. Moreover HUR03 was more shaded and had greater cover of riparian trees than HUR01.
- River Condition Score: moderate to fairly good
- River Type: Type K – straight-sinuuous channel with coarsest substrates comprised of silt/clay.
- Survey limitations: Health and safety concerns due to livestock being within the survey area limited the survey of two modules within reach HUR03. Surveyors were able to assess the watercourse at these locations prior to having to retreat and subsequently filled out the missing module survey data in light of these observations. It should be noted though that there is potential for some features not to have been recorded accurately as a result of this. However, this is not considered likely to have significantly affected the overall River Condition Score for the reach.

Aquatic macroinvertebrate survey (7 October 2020):

Location: SJ 98619 95285 (Site 1), SJ 98715 95527 (Site 2), SJ 98885 95930 (Site 3).

- Summary: Three aquatic macroinvertebrate surveys conducted, two within the DCO boundary and one downstream of the existing A57. Biological metrics are indicative of moderate water quality, high flow velocity conditions and a moderately sedimented to sedimented channel. No notable species were recorded within the sample.

Table 3.8: Unnamed watercourse (WC_340) baseline

Watercourse: WC_340

Central NGR: SJ 98479 95466



Photo DSC_0896 – Typical view of overgrown scrub across the channel (SJ 98569 95411).

Baseline Ecological Valuation:
Minor tributary system of the Hurstclough Brook (WC_300). Field boundary ditch <1 m wide. Not suitable for fish and limited potential for other truly aquatic species. However, the feature does provide an important aquatic linear corridor within the local agricultural landscape and are thus is considered to be of Local importance.

WFD Characterisation:

- Classified WFD Waterbody – No
- Classified WFD Waterbody Catchment – Etherow (Glossop Brook to Goyt)
- Overall waterbody status – Poor

Watercourse: WC_340

Central NGR: SJ 98479 95466

River Corridor Survey (RCS1; May/June 2018):

- Location: between SJ 98414 95550 and SJ98574 95410.
- Summary: The river corridor of the WC_340 at Grange Farm is a narrow drainage ditch flowing along a field margin and very overgrown. The channel has steep banks at approximately 1.5 m and is approximately 0.5 m wide. The channel and banks contained species such as common hogweed and Himalayan balsam. A hedgerow also shaded much of the channel. The banks were fenced off and tall ruderal vegetation had developed. Overhanging silver birch was also present. The adjacent land-use on either side of the channel was improved grassland; this was a marshy grassland used for grazing.

Existing data sources

- Designated sites: None
- Environment Agency data: None

Walkover Survey Rapid Assessment (11 March 2020):

- Spot check location: SJ 98544 95419
- Summary: WC_340 bed material is largely unconsolidated sand and gravel with both banks comprised of earth. The channel has some sinuosity and the flow type was classified as smooth/rippled and not visible. Water was observed at a depth of 0.1 m, there was a wetted width of 0.5 m and the river has a bankfull width of 1.5 m. Within the 50 m walkover length there was one culvert recorded, one outfall and large woody debris in the channel. The left bank has semi-continuous trees, whilst the right bank has scattered trees; the channel contains exposed roots and overhanging boughs. The valley form is asymmetric.

Not screened in for MoRPh or aquatic macroinvertebrate surveys.

3.6 Pond baseline

3.6.1 This section provides a baseline of each of the ponds screened into further assessment.

Review of Scheme HSI data has been undertaken for all ponds screened in for assessment as listed in Table 3.2 above. A walkover survey of these ponds was also undertaken in March 2020 to inform the baseline and further survey requirements. Table 3.9 presents a summary of the HSI and walkover survey results along with the screening outcome for detailed ecological survey (PSYM). Table 3.10 to

3.6.2 Table 3.13 present PSYM survey results.

3.6.3 Existing baseline conditions are considered in relation to each pond taken forward to determine its overall ecological valuation for the purpose of impact assessment. Original PSYM survey data are presented in Appendix A.7 and A.8.

HSI and walkover survey data

Table 3.9: Pond PSYM screening

Pond	HSI Score	HSI description	Walkover survey description (March 2020)	Screened in for further PSYM survey
P2	0.55 (below average)	Approximately 15m x 15m hollow dominated by soft-rush and water horsetail (<i>Equisetum fluviatile</i>), with a small, ephemeral pool (c. 2 m x 2 m) covered in floating sweetgrass. Breeding palmate newts and common frog were present during the 2017 surveys. The pond had almost completely dried out from early April to mid-May.	Soft-rush around margins and encroaching on approximately 55% of the feature. Some open water present, however much of this was covered in common duck weed. Pond is situated in a depression on the hillside and total footprint of ephemeral features is approximately 12 m wide.	Screened in
P3	0.5 (below average)	Ephemeral pond situated within a shallow depression dominated with soft-rush with a small section of floating sweet-grass. Palmate newts and common toad were recorded within the pond during the 2017 surveys. Common frog eggs (but no adults) were also identified. The pond had almost completely dried out in mid-May.	Considered to be a defunct feature which occasionally holds surface water. Terrestrial grasses throughout the feature suggesting it dries out regularly. Rushes were also present, particularly around the margins. Small patches of common water starwort (<i>Callitriche stagnalis</i>) were recorded where the feature was wet (maximum depth approximately 0.2 m), but these were not extensive. Not considered to be an important ecological pond feature within the local or wider geographical area.	Screened out (defunct feature)
P4	N/A (defunct)	Small hollow with patch of soft-rush. The 'pond' showed no signs of holding water. Assumed defunct.	Not visited due to access constraints. Assumed defunct on the basis of HSI.	Screened out (defunct feature)
P5	0.57 (below average)	A shallow, highly ephemeral hollow with dense soft-rush. One adult common frog and eggs were recorded during the 2017 surveys; however, the pond was dry in early May.	Permanent pond with a fringe of rushes, but no other aquatic vegetation. Water quality appeared to be poor with high turbidity at the time of survey. The bed of the feature was not visible.	Screened in

Pond	HSI Score	HSI description	Walkover survey description (March 2020)	Screened in for further PSYM survey
			<p>An embankment is present on the southern side of the feature.</p> <p>Debris and trash (including old used tyres) were present. No frogspawn or other notable features were recorded, such as nests or islands.</p>	
P7	0.69 (average)	<p>Situated within a fenced-off steep sided hollow with mature trees and scrub scattered around the banks. There was good habitat structure with submerged and emergent vegetation present together with marginal floating mats that provided excellent terrestrial and aquatic amphibian habitat. The pond measured approximately 8 m x 12 m. The pond was generally shallow with a water depth of up to approximately 0.4 m. Breeding palmate newts and adult common toad and common frog eggs were recorded within the pond.</p>	<p>Permanent pond feature within a small woodland area on a field boundary. Marginal macrophytes were starting to grow at pond edge during the March 2020 survey.</p>	Screened in
P17	0.35 (poor)	<p>Small, ephemeral feature in shallow hollow shaded by mature willow and elder (<i>Sambucus nigra</i>) scrub. Surrounded by marshy grassland and sheep pasture. It is unclear how readily water persists in this area and the pond appears likely to be prone to regular drying out.</p>	<p>Willow species growing within feature. There were no obvious signs of a pond margin or wetland plant species which would have been indicative of an ephemeral pond feature. Considered to be a defunct feature which occasionally holds surface water. Not considered to be an important ecological pond feature within the local or wider geographical area. Bed comprised a layer of leaf litter and silt.</p>	Screened out (defunct feature)
P27	0.44 (poor)	<p>Small hollow (approximately 9 m x 4 m) with invasive New Zealand Pygmyweed (<i>Crassula helmsii</i>). Floating sweet-grass also present. Completely dry by early April.</p>	<p>Defunct feature located within a depression. Small wet pool during site visit, but not a permanent feature and not thought to function as a pond. Terrestrial grasses present throughout.</p> <p>Rushes present, as is common throughout the area, but no other marginal vegetation.</p>	Screened out (defunct feature)

Pond	HSI Score	HSI description	Walkover survey description (March 2020)	Screened in for further PSYM survey
P28	0.43 (poor)	Small hollow with water-cress (<i>Nasturtium officinale</i>) and great willowherb; located within a horse-grazed field in Nettle Hall Farm. Palmate newts were recorded within the pond during the 2017 surveys. Not present on OS maps and not thought to be a permanent feature.	Not visited due to access constraints. Review of HSI data and photographs shows feature is very small and heavily poached by horses. While water was present during HSI survey it is not thought to be a permanent feature and is defunct as a pond.	Screened out (defunct feature)
P30	0.46 (poor)	Small turbid pond located within a field margin in Carr House Farm. The pond margins were denuded of vegetation.	In depression at base of hill. Clear water with leaf litter on bed. Some trash present. Outfall appears to take water from the pond to a pipe under the agricultural field (possibly for irrigation or drainage purposes). This has likely reduced the size of this feature which has terrestrial grasses around margins and within main body. No frogspawn. Some young shoots of emergent macrophytes which suggests the pond could be choked during summer.	Screened in
P31	0.47 (poor)	Small, shallow garden pond within a residential property north of Mottram Moor. The landowner confirmed that the waterbody had been previously used as a fish pond, but it had silted up over the last few years. The surface of the pond was covered with Yellow Iris (<i>Iris pseudacorus</i>).	Not visited due to access constraints. Assumed defunct on the basis of HSI.	Screened out (defunct feature)

3.6.4 P3, P4, P17, P27, P28 and P31 were identified through HSI and/or walkover survey to be defunct, dry, or virtually dry features and subsequently are not deemed to be important ecological features and have been screened out of further assessment. P2, P5, P7 and P30 have been screened in for further assessment and PSYM survey on the basis that they are potentially impacted by the Scheme, are likely important ecological features and meet the PSYM survey screening criteria listed in Section 2.8.

3.6.5 Table 3.13 in this section outline the baseline characterisation of each watercourse taken forward for assessment, as supported by existing background records and PSYM survey data.

Table 3.10: Pond 2 baseline

Pond: Pond 2	Central NGR: SJ 98637 95554
	<p>Baseline Ecological Valuation: Local importance</p>
<p>Photo DSC_0888 (SJ 98648 95559)</p>	
<p>Existing data sources</p> <ul style="list-style-type: none"> • Designated sites: None • Ecological records: None 	
<p>PSYM (18 August 2020)</p> <ul style="list-style-type: none"> • Summary: relatively small (100m²) semi-permanent pond resembling a small quaking bog in parts, located in the bottom of the valley within grazing pasture. One inflow was recorded at the time of survey and is considered likely to remain wet throughout the year, although was recorded as almost dry in April/May 2017. Emergent plant cover was low (5%) comprising soft-rush. Despite an absence of shading only two other plant species were recorded, common duckweed (<i>Lemna minor</i>) and a moss (<i>Sphagnum</i> sp.). Water quality sampling shows the pond to be alkaline (pH8). • Priority Habitat Assessment: The pond does not meet published criteria for definition as Priority Habitat. 	

Table 3.11: Pond 5 baseline

Pond: Pond 5	Central NGR: SJ 98912 95939
	<p>Baseline Ecological Valuation: Local importance</p>
<p>Photo DSC_0907 (SJ 98904 95935)</p>	
<p>Existing data sources</p> <ul style="list-style-type: none"> • Designated sites: None • Ecological records: None 	

Pond: Pond 5	Central NGR: SJ 98912 95939
PSYM (18 August 2020) <ul style="list-style-type: none"> • Summary: pond with an open water area of 150m² located within grazing pasture with no surrounding scrub or trees to provide shade. Emergent plant cover was recorded as largely absent although small stands of emergent vegetation were recorded. No uncommon plant species were recorded. Water quality samplings indicates the pond is alkaline (pH8.36). • Priority Habitat Assessment: the pond does not meet published criteria for definition as Priority Habitat. 	

Table 3.12: Pond 7 baseline



Pond: Pond 7	Central NGR: SJ 99498 96084
	Baseline Ecological Valuation: Local importance
Photo DSC_0970 (SJ 99513 96082)	
Existing data sources <ul style="list-style-type: none"> • Designated sites: None • Ecological records: None 	
PSYM (18 August 2020) <ul style="list-style-type: none"> • Summary: shallow pond with an open water area of 200 m² located within grazing pasture but fenced preventing livestock access. One inflow was recorded at the time of survey. Vegetation provides shade across 50% of the pond although no emergent plant cover was recorded. In total seven species of submerged and marginal plants were recorded with one noted as uncommon, flat-stalked pondweed (<i>Potamogeton friesii</i>). Water quality sampling indicates the pond is slightly alkaline (pH 7.8). • Priority Habitat Assessment: the pond does not meet published criteria for definition as Priority Habitat. 	

Table 3.13: Pond 30 baseline

Pond: Pond 30	Central NGR: SK 00416 95642
 <p data-bbox="300 770 738 801">Photo DSC_0956 (SK 00433 95633)</p>	<p data-bbox="1034 322 1398 389">Baseline Ecological Valuation: Local importance</p>
<p data-bbox="300 826 560 857">Existing data sources</p> <ul data-bbox="300 864 635 931" style="list-style-type: none"> • Designated sites: None • Ecological records: None 	
<p data-bbox="300 956 592 987">PSYM (18 August 2020)</p> <ul data-bbox="300 994 1428 1245" style="list-style-type: none"> • Summary: pond with an open water area of 150 m² located within grazing pasture. The pond is partially fenced but does not limit livestock access. Predominantly terrestrial grasses present suggesting either temporarily/recently wetted or raised level. No inflow recorded at the time of survey, but groundwater input is considered likely. No shading or emergent vegetation were recorded. Three submerged and marginal species were recorded but none were noted as uncommon. Water quality sampling indicates the pond is alkaline (pH8.36). • Priority Habitat Assessment: the pond does not meet published criteria for definition as Priority Habitat. 	

3.6.6 None of the ponds that underwent PSYM survey meet published criteria for definition as Priority Habitat. PSYM survey assesses each of the surveyed ponds as poor quality, reflecting their impoverished macrophyte and aquatic macroinvertebrate communities none of which are notable species. Despite only supporting a limited range of aquatic flora and fauna, collectively these ponds (P2, P5, P7 and P30) have been ascribed a value of Local importance since they provide habitat complexity and an important ecological resource within the landscape.

Appendices

A.1 Aquatic ecology screening and survey data

A.2 Walkover survey proformas

River habitat spot check form

Project/Site name: A57	Approx. survey reach length: 250 m	Photo no. DSC_960-963	NGR SK 00906 95652
Watercourse name: River Etherow (WC 100)	Adverse conditions? Yes / <input checked="" type="checkbox"/> No	DSC_964	SK 00920 95551
u/s NGR: SK0090695652	If yes, please state:		
	Surveyed from: LB / <input checked="" type="checkbox"/> RB Channel		
Survey date and time: 12/03/2020 11:20	Is bed of river visible? Yes / <input checked="" type="checkbox"/> No		
Surveyor name: NL + ED	River or artificial channel? River		

CHANNEL FORM

Bed material is : consolidated / unconsolidated **unknown**

Complete all fields in m.

Banktop = first major break in slope above which cultivation or development is possible; **Bankfull height** = measured at point river spills onto flood plain; **Wetted width** = distance from waters edge to waters edge; **Embanked height** = the extra height above the flood plain created by embanked material (where embankments are present). Include setback embankments where practicable. NB. Banktop height may include embanked height (see RHS guidelines).

Bed substrates

Bed substrates	Tick if present	% area
Bedrock	<input type="checkbox"/>	—
Cobble	<input type="checkbox"/>	—
Boulder	<input type="checkbox"/>	—
Pebble	<input type="checkbox"/>	—
Gravel	<input type="checkbox"/>	—
Sand	<input type="checkbox"/>	—
Silt/clay	<input type="checkbox"/>	—
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input checked="" type="checkbox"/>	—

Bed substrates: Record substrate types present and estimate % area. cover

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping.

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles.

Bank material: record predominant bank material for each bank.

CHANNEL PLANFORM

Channel Planform	Tick dominant condition
	Straight <input type="checkbox"/>
	Some sinuosity <input checked="" type="checkbox"/>
	Regular meanders <input type="checkbox"/>
	Irregular meanders <input type="checkbox"/>
	Tortuous <input type="checkbox"/>

Flow Types

Flow Types	Tick if present	% area	Tick if present	% area
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>
CH = chute	<input type="checkbox"/>	—	SM = smooth	<input type="checkbox"/>
NV = not visible	<input type="checkbox"/>	—	NP = no perceptible flow	<input type="checkbox"/>
BW = broken standing waves (white water)	<input type="checkbox"/>	—	DR = no flow (dry)	<input type="checkbox"/>
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>
RP = rippled	<input checked="" type="checkbox"/>	100	No. of pools = 0	No. of riffles = 0

Predominant Bank Material (tick one per bank)

	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

Channel features: Record if present. Include number for artificial structures.

Valley form: Select predominant valley form.

Valley form

Shallow vee	<input type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input checked="" type="checkbox"/>

Natural and artificial channel features

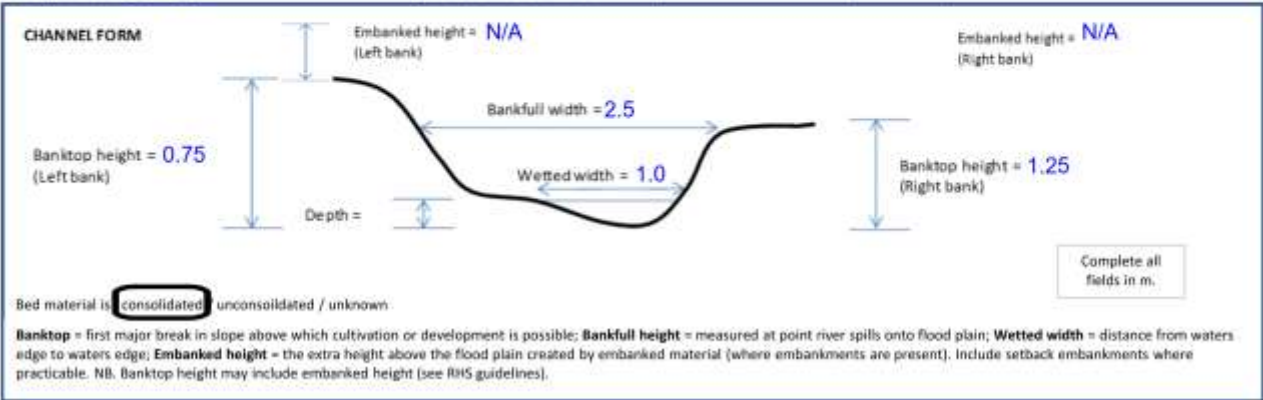
Natural and artificial channel features	Tick if present	Record number*	Tick if present	
Culverts	<input type="checkbox"/>	—	Exposed bankside roots	<input type="checkbox"/>
Dam/weir/sluice	<input type="checkbox"/>	—	Overhanging boughs	<input checked="" type="checkbox"/>
Ford (man made)	<input checked="" type="checkbox"/>	1	Fallen trees	<input type="checkbox"/>
Deflectors	<input type="checkbox"/>	—	Exposed bedrock	<input type="checkbox"/>
Outfalls/intakes	<input type="checkbox"/>	—	Exposed boulders	<input type="checkbox"/>
Bridges	<input type="checkbox"/>	—	Vegetated rock	<input type="checkbox"/>
Resectioned**	<input type="checkbox"/>	—	Unvegetated mid-channel ba	<input type="checkbox"/>
Reinforced	<input type="checkbox"/>	—	Vegetated mid-channel bar	<input type="checkbox"/>
Large woody debris	<input type="checkbox"/>	—	Mature island	<input type="checkbox"/>
Fallen trees	<input type="checkbox"/>	—	Trash (urban debris)	<input checked="" type="checkbox"/>
Underwater tree roots	<input type="checkbox"/>	—	None	<input type="checkbox"/>

Trees (LB): none / scattered / single, regular / occasional clumps / semi-continuous / continuous
 Trees (RB): none / scattered / single, regular / occasional clumps / semi-continuous / continuous

* Artificial structures only.
 ** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.

River habitat spot check form

Project/site name: A57	Approx. survey reach length: 50 m	Photo no. 050_967-968	NGR
Watercourse name: WC 130	Adverse conditions? Yes / No	SK 00825 95469	
u/s NGR: SK 00825 95469	If yes, please state:		
	Surveyed from: LB / RB / Channel		
Survey date and time: 12/03/2020 11:45	Is bed of river visible? Yes / No		
Surveyor name: NL + ED	River or artificial channel? Ditch		



Bed substrates	Tick if present.	% area.
Bedrock	<input type="checkbox"/>	—
Cobble	<input type="checkbox"/>	—
Boulder	<input type="checkbox"/>	—
Pebble	<input type="checkbox"/>	—
Gravel	<input type="checkbox"/>	—
Sand	<input type="checkbox"/>	—
Silt/clay	<input checked="" type="checkbox"/>	100
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input type="checkbox"/>	—

Bed substrates: Record substrate types present and estimate % area cover.

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping.

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles.

Bank material: record predominant bank material for each bank.

CHANNEL PLANFORM	Tick dominant condition
	Straight <input type="checkbox"/>
	Some sinuosity <input checked="" type="checkbox"/>
	Regular meanders <input type="checkbox"/>
	Irregular meanders <input type="checkbox"/>
	Tortuous <input type="checkbox"/>

Flow Types	Tick if present	% area	Tick if present	% area
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>
CH = chute	<input type="checkbox"/>	—	SM = smooth	<input type="checkbox"/>
NV = not visible	<input type="checkbox"/>	—	NP = no perceptible flow	<input checked="" type="checkbox"/> 100
BW = broken standing waves (white water)	<input type="checkbox"/>	—	DR = no flow (dry)	<input type="checkbox"/>
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>
RP = rippled	<input type="checkbox"/>	—	No. of pools = 0	No. of riffles = 0

Likely to dry in summer, very shallow

Predominant Bank Material (tick one per bank)	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

Channel features: Record if present. Include number for artificial structures.

Valley form: Select predominant valley form.

Valley form	Tick if present
Shallow vee	<input type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input checked="" type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input type="checkbox"/>

Natural and artificial channel features	Tick if present	Record number*	Tick if present
Culverts	<input type="checkbox"/>	—	Exposed bankside roots
Dam/weir/slucice	<input type="checkbox"/>	—	Overhanging boughs
Ford (man made)	<input type="checkbox"/>	—	Fallen trees
Deflectors	<input type="checkbox"/>	—	Exposed bedrock
Outfalls/intakes	<input type="checkbox"/>	—	Exposed boulders
Bridges	<input type="checkbox"/>	—	Vegetated rock
Resectioned**	<input type="checkbox"/>	—	Unvegetated mid-channel bar
Reinforced	<input type="checkbox"/>	—	Vegetated mid-channel bar
Large woody debris	<input type="checkbox"/>	—	Mature island
Fallen trees	<input type="checkbox"/>	—	Trash (urban debris)
Underwater tree roots	<input type="checkbox"/>	—	None

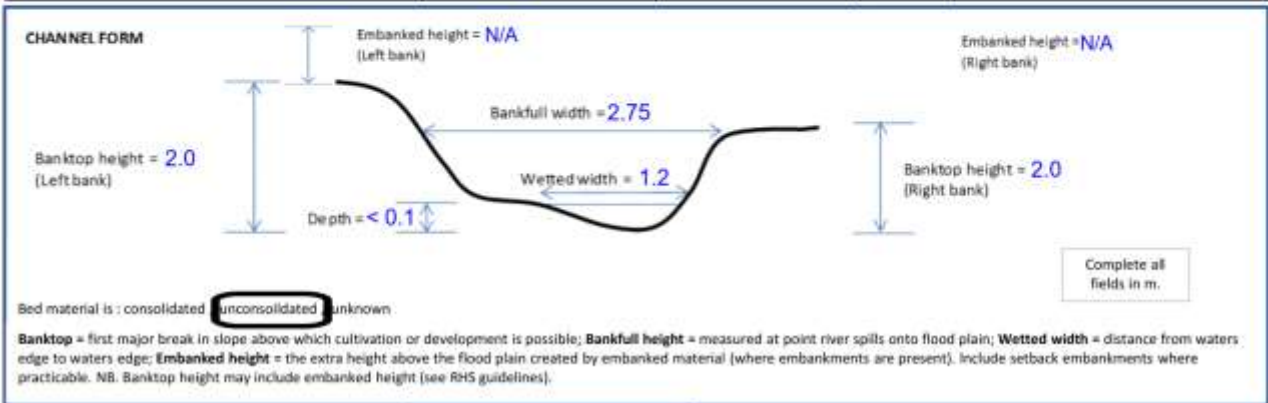
Trees (LB): none / **scattered** / single, regular / occasional clumps / semi-continuous / continuous
 Trees (RB): **none** / scattered / single, regular / occasional clumps / semi-continuous / continuous

* Artificial structures only.
 ** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.

Note: Fenced on left bank

River habitat spot check form

Project/Site name: A57	Approx. survey reach length: 50 m	Photo no. DSC_937	NGR SK 00449 95396
Watercourse name: WC_140	Adverse conditions? Yes / No		
u/s NGR: SK 00449 95396	If yes, please state:		
Reach aligned with RCSB	Surveyed from: LB / RB / Channel		
Survey date and time: 12/03/2020 09:50	Is bed of river visible? Yes / No		
Surveyor name: NL + ED	River or artificial channel? Ditch		



Bed substrates	Tick if present	% area
Bedrock	<input type="checkbox"/>	—
Cobble	<input checked="" type="checkbox"/>	80
Boulder	<input type="checkbox"/>	—
Pebble	<input type="checkbox"/>	—
Gravel	<input checked="" type="checkbox"/>	15
Sand	<input checked="" type="checkbox"/>	5
Silt/clay	<input type="checkbox"/>	—
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input type="checkbox"/>	—

Bed substrates: Record substrate types present and estimate % area. cover

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping.

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles.

Bank material: record predominant bank material for each bank.

CHANNEL PLANFORM	Tick dominant condition
	<input type="checkbox"/>
	<input checked="" type="checkbox"/>
	<input type="checkbox"/>
	<input type="checkbox"/>
	<input type="checkbox"/>

Flow Types	Tick if present	% area	Tick if present	% area
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>
CH = chute	<input type="checkbox"/>	—	SM = smooth	<input type="checkbox"/>
NV = not visible	<input type="checkbox"/>	—	NP = no perceptible flow	<input type="checkbox"/>
BW = broken standing waves (white water)	<input type="checkbox"/>	—	DR = no flow (dry)	<input type="checkbox"/>
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>
RP = rippled	<input checked="" type="checkbox"/>	100	No. of pools = 0	No. of riffles = 0

Predominant Bank Material (tick one per bank)	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

Channel features: Record if present. Include number for artificial structures.

Valley form: Select predominant valley form.

Valley form	Tick if present
Shallow vee	<input checked="" type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input type="checkbox"/>

Natural and artificial channel features	Tick if present	Record number*	Tick if present	
Culverts	<input checked="" type="checkbox"/>	1	Exposed bankside roots	<input type="checkbox"/>
Dam/weir/sluiice	<input type="checkbox"/>	—	Overhanging boughs	<input type="checkbox"/>
Ford (man made)	<input type="checkbox"/>	—	Fallen trees	<input type="checkbox"/>
Deflectors	<input type="checkbox"/>	—	Exposed bedrock	<input type="checkbox"/>
Outfalls/intakes	<input type="checkbox"/>	—	Exposed boulders	<input type="checkbox"/>
Bridges	<input type="checkbox"/>	—	Vegetated rock	<input type="checkbox"/>
Resectioned**	<input type="checkbox"/>	—	Unvegetated mid-channel bar	<input type="checkbox"/>
Reinforced	<input type="checkbox"/>	—	Vegetated mid-channel bar	<input type="checkbox"/>
Large woody debris	<input type="checkbox"/>	—	Mature island	<input type="checkbox"/>
Fallen trees	<input type="checkbox"/>	—	Trash (urban debris)	<input checked="" type="checkbox"/>
Underwater tree roots	<input type="checkbox"/>	—	None	<input type="checkbox"/>

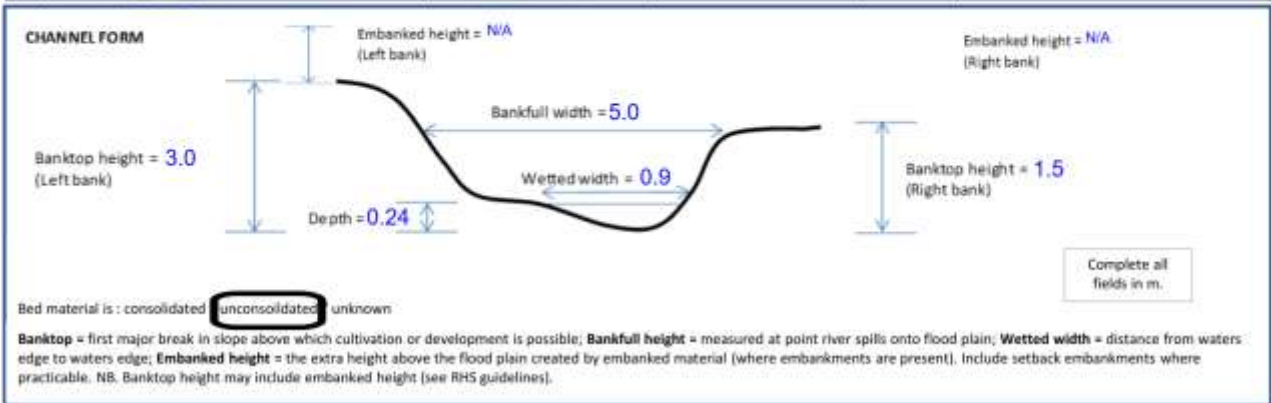
Trees (LB): none / **scattered** / single, regular / occasional clumps / semi-continuous / continuous
 Trees (RB): none / scattered / **single, regular** / occasional clumps / semi-continuous / continuous

* Artificial structures only.
 ** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.

Note: Culvert ~ 1m in diameter

River habitat spot check form

Project/Site name: A57	Approx. survey reach length: 100 m	Photo no.	NGR
Watercourse name: WC_140	Adverse conditions? Yes / No	DSC_949-950 SK 00250 95573	
u/s NGR: SK 00222 95570	If yes, please state:	DSC_950-955 SK 00220 85568	
Reach aligned with RCS9	Surveyed from: (18) RB / Channel		
Survey date and time: 12/03/2020 11:45	Is bed of river visible? (Yes) / No		
Surveyor name: NL + ED	River or artificial channel? Ditch		



Bed substrates	Tick if present	% area
Bedrock	<input type="checkbox"/>	—
Cobble	<input checked="" type="checkbox"/>	80 Occasionally present
Boulder	<input checked="" type="checkbox"/>	—
Pebble	<input type="checkbox"/>	—
Gravel	<input checked="" type="checkbox"/>	15
Sand	<input checked="" type="checkbox"/>	5
Silt/clay	<input type="checkbox"/>	—
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input type="checkbox"/>	—

← **Bed substrates:** Record substrate types present and estimate % area cover

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping →

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles. →

Bank material: record predominant bank material for each bank. ←

CHANNEL PLANFORM	Tick dominant condition
	Straight <input type="checkbox"/>
	Some sinuosity <input type="checkbox"/>
	Regular meanders <input type="checkbox"/>
	Irregular meanders <input checked="" type="checkbox"/>
	Tortuous <input type="checkbox"/>

Flow Types	Tick if present	% area	Tick if present	% area
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>
CH = chute	<input type="checkbox"/>	—	SM = smooth	<input checked="" type="checkbox"/> 2.5
NV = not visible	<input type="checkbox"/>	—	NP = no perceptible flow	<input type="checkbox"/>
BW = broken standing waves (white water)	<input checked="" type="checkbox"/>	2.5	DR = no flow (dry)	<input type="checkbox"/>
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>
RP = rippled	<input checked="" type="checkbox"/>	95	No. of pools = 1	No. of riffles = 0

Predominant Bank Material (tick one per bank)		
	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

← **Channel features:** Record if present. Include number for artificial structures. →

Valley form: Select predominant valley form. ↓

Valley form	
Shallow vee	<input checked="" type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input type="checkbox"/>

Natural and artificial channel features			
	Tick if present	Record number*	Tick if present
Culverts	<input checked="" type="checkbox"/>	1	Exposed bankside roots <input checked="" type="checkbox"/>
Dam/weir/slucice	<input type="checkbox"/>	—	Overhanging boughs <input type="checkbox"/>
Ford (man made)	<input type="checkbox"/>	—	Fallen trees <input type="checkbox"/>
Deflectors	<input type="checkbox"/>	—	Exposed bedrock <input type="checkbox"/>
Outfalls/intakes	<input checked="" type="checkbox"/>	3	Exposed boulders <input type="checkbox"/>
Bridges	<input type="checkbox"/>	—	Vegetated rock <input type="checkbox"/>
Resectioned**	<input type="checkbox"/>	—	Unvegetated mid-channel bar <input type="checkbox"/>
Reinforced	<input type="checkbox"/>	—	Vegetated mid-channel bar <input type="checkbox"/>
Large woody debris	<input type="checkbox"/>	—	Mature island <input type="checkbox"/>
Fallen trees	<input type="checkbox"/>	—	Trash (urban debris) <input checked="" type="checkbox"/>
Underwater tree roots	<input type="checkbox"/>	—	None <input type="checkbox"/>

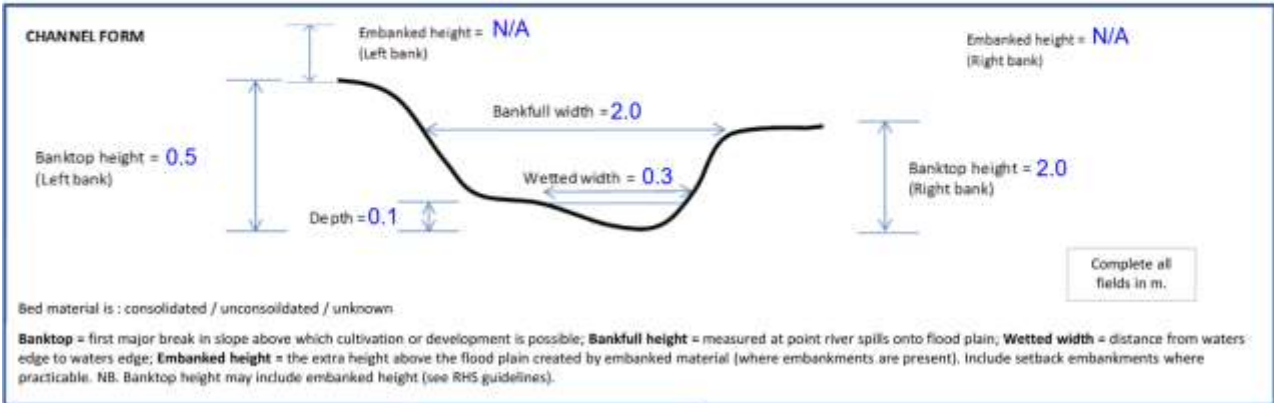
Trees (LB): none / **scattered** / single, regular / occasional clumps / semi-continuous / continuous
 Trees (RB): none / scattered / single, regular / occasional clumps / **semi-continuous** / continuous

* Artificial structures only.
 ** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.

Note: Fenced on left bank

River habitat spot check form

Project/Site name: A57	Approx. survey reach length:	Spot check	Photo no.	NGR
Watercourse name: Tara Brook WC_200	Adverse conditions?	Yes / <input checked="" type="checkbox"/> No	DSC_927-930	SJ 99814 95771
u/s NGR: SJ 99814 95771	If yes, please state:			
Upstream reach (in line with RC6)	Surveyed from:	<input type="checkbox"/> LB / <input type="checkbox"/> RB / Channel		
Survey date and time: 11/03/2020 17:00	Is bed of river visible?	<input checked="" type="checkbox"/> Yes / No*		
Surveyor name: NL + ED	River or artificial channel?	River (ditch like at survey location)		



Bed substrates	Tick if present	% area
Bedrock	<input type="checkbox"/>	—
Cobble	<input type="checkbox"/>	—
Boulder	<input type="checkbox"/>	—
Pebble	<input checked="" type="checkbox"/>	5
Gravel	<input checked="" type="checkbox"/>	5
Sand	<input checked="" type="checkbox"/>	90
Silt/clay	<input type="checkbox"/>	—
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input type="checkbox"/>	—

← **Bed substrates:** Record substrate types present and estimate % area, cover.

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping. →

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles. →

Bank material: record predominant bank material for each bank.

CHANNEL PLANFORM	Tick dominant condition
	Straight <input type="checkbox"/>
	Some sinuosity <input checked="" type="checkbox"/>
	Regular meanders <input type="checkbox"/>
	Irregular meanders <input type="checkbox"/>
	Tortuous <input type="checkbox"/>

Flow Types	Tick if present	% area	Tick if present	% area
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>
CH = chute	<input type="checkbox"/>	—	SM = smooth	<input type="checkbox"/>
NV = not visible	<input type="checkbox"/>	—	NP = no perceptible flow	<input type="checkbox"/>
BW = broken standing waves (white water)	<input type="checkbox"/>	—	DR = no flow (dry)	<input type="checkbox"/>
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>
RP = rippled	<input checked="" type="checkbox"/>	100	No. of pools = 0	No. of riffles = 0

Predominant Bank Material (tick one per bank)	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

← **Channel features:** Record if present. Include number for artificial structures. →

Valley form: Select predominant valley forms. ↓

Valley form	Tick
Shallow vee	<input checked="" type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input type="checkbox"/>

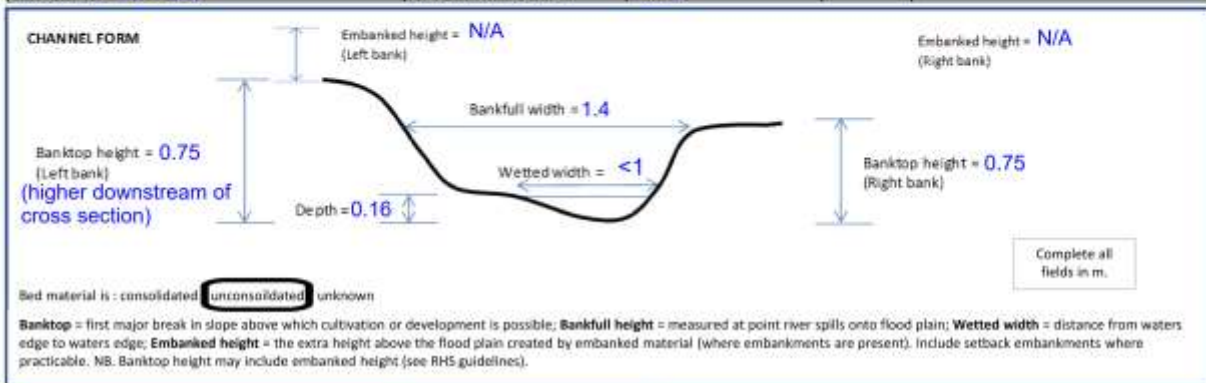
Natural and artificial channel features	Tick if present	Record number*	Tick if present
Culverts	<input checked="" type="checkbox"/>	1	Exposed bankside roots <input type="checkbox"/>
Dam/weir/sluice	<input type="checkbox"/>	—	Overhanging boughs <input type="checkbox"/>
Ford (man made)	<input type="checkbox"/>	—	Fallen trees <input type="checkbox"/>
Deflectors	<input type="checkbox"/>	—	Exposed bedrock <input type="checkbox"/>
Outfalls/intakes	<input type="checkbox"/>	—	Exposed boulders <input type="checkbox"/>
Bridges	<input type="checkbox"/>	—	Vegetated rock <input type="checkbox"/>
Resectioned**	<input type="checkbox"/>	—	Unvegetated mid-channel bar <input type="checkbox"/>
Reinforced	<input type="checkbox"/>	—	Vegetated mid-channel bar <input type="checkbox"/>
Large woody debris	<input type="checkbox"/>	—	Mature island <input type="checkbox"/>
Fallen trees	<input type="checkbox"/>	—	Trash (urban debris) <input type="checkbox"/>
Underwater tree roots	<input type="checkbox"/>	—	None <input type="checkbox"/>

Trees (LB): none / scattered / single, regular / occasional clumps / semi-continuous / continuous
Trees (RB): none / scattered / single, regular / occasional clumps / semi-continuous / continuous

* Artificial structures only.
** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.

River habitat spot check form

Project/site name: A57	Approx. survey reach length: 100 m	Photo no. DCS_934-936	NGR SK 00754 95752
Watercourse name: Tara Brook WC_200	Adverse conditions? Yes / No	DCS_936	SK 00767 95715
u/s NGR: SK 00757 95396	If yes, please state:		
Downstream reach (in line with RC7)	Surveyed from: LB RB Channel		
Survey date and time: 12/03/2020 09:00	Is bed of river visible? Yes / No		
Surveyor name: NL + ED	River or artificial channel? River		



Bed substrates	Tick if present	% area
Bedrock	<input type="checkbox"/>	—
Cobble	<input checked="" type="checkbox"/>	85
Boulder	<input type="checkbox"/>	—
Pebble	<input checked="" type="checkbox"/>	10
Gravel	<input checked="" type="checkbox"/>	2.5
Sand	<input checked="" type="checkbox"/>	2.5
Silt/clay	<input type="checkbox"/>	—
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input type="checkbox"/>	—

Bed substrates: Record substrate types present and estimate % area, cover

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping.

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles.

Bank material: record predominant bank material for each bank.

CHANNEL PLANFORM	Tick dominant condition
	<input type="checkbox"/>
	<input type="checkbox"/>
	<input type="checkbox"/>
	<input checked="" type="checkbox"/>
	<input type="checkbox"/>

Flow Types	Tick if present	% area	Tick if present	% area
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>
CH = chute	<input checked="" type="checkbox"/>	5	SM = smooth	<input type="checkbox"/>
NV = not visible	<input type="checkbox"/>	—	NP = no perceptible flow	<input type="checkbox"/>
BW = broken standing waves (white water)	<input checked="" type="checkbox"/>	10	DR = no flow (dry)	<input type="checkbox"/>
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>
RP = rippled	<input checked="" type="checkbox"/>	85	No. of pools = 0	No. of riffles = 0

Predominant Bank Material (tick one per bank)	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

Channel features: Record if present. Include number for artificial structures.

Valley form: Select predominant valley form.

Valley form	Tick if present
Shallow vee	<input type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input checked="" type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input type="checkbox"/>

Natural and artificial channel features	Tick if present	Record number*	Tick if present	
Culverts	<input type="checkbox"/>	—	Exposed bankside roots	<input checked="" type="checkbox"/>
Dam/weir/sluice	<input type="checkbox"/>	—	Overhanging boughs	<input type="checkbox"/>
Ford (man made)	<input type="checkbox"/>	—	Fallen trees	<input type="checkbox"/>
Deflectors	<input type="checkbox"/>	—	Exposed bedrock	<input type="checkbox"/>
Outfalls/intakes	<input type="checkbox"/>	—	Exposed boulders	<input type="checkbox"/>
Bridges	<input checked="" type="checkbox"/>	1 (footbridge)	Vegetated rock	<input checked="" type="checkbox"/>
Resectioned**	<input type="checkbox"/>	—	Unvegetated mid-channel bar	<input type="checkbox"/>
Reinforced	<input type="checkbox"/>	—	Vegetated mid-channel bar	<input type="checkbox"/>
Large woody debris	<input type="checkbox"/>	—	Mature island	<input type="checkbox"/>
Fallen trees	<input type="checkbox"/>	—	Trash (urban debris)	<input checked="" type="checkbox"/>
Underwater tree roots	<input type="checkbox"/>	—	None	<input type="checkbox"/>

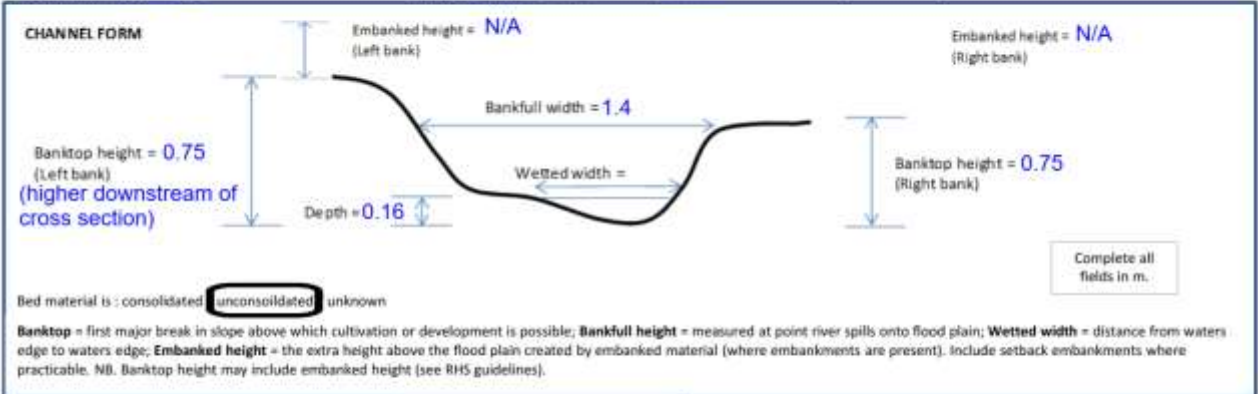
Trees (LB): none / scattered / **single, regular** / occasional clumps / semi-continuous / continuous
 Trees (RB): none / scattered / **single, regular** / **occasional clumps** / semi-continuous / continuous

* Artificial structures only.
 ** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.

Note: 1 pipe crossing ~ 0.15 m in width

River habitat spot check form

Project/Site name: A57	Approx. survey reach length: 100 m	Photo no.	NGR
Watercourse name: Tara Brook WC_200	Adverse conditions? Yes / <u>No</u>	DCS_934-935	SK 00754 95752
u/s NGR: SK 00757 95396	If yes, please state:	DCS_936	SK 00767 95715
Downstream reach (in line with RC7)	Surveyed from: (LB) (RB) Channel		
Survey date and time: 12/03/2020 09:00	Is bed of river visible? (Yes) / No		
Surveyor name: NL + ED	River or artificial channel? River		



Bed substrates	Tick if present	% area
Bedrock	<input type="checkbox"/>	—
Cobble	<input checked="" type="checkbox"/>	85
Boulder	<input type="checkbox"/>	—
Pebble	<input checked="" type="checkbox"/>	10
Gravel	<input checked="" type="checkbox"/>	2.5
Sand	<input checked="" type="checkbox"/>	2.5
Silt/clay	<input type="checkbox"/>	—
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input type="checkbox"/>	—

Bed substrates: Record substrate types present and estimate % area. cover

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping.

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles.

Bank material: record predominant bank material for each bank.

CHANNEL PLANFORM	Tick dominant condition
	Straight <input type="checkbox"/>
	Some sinuosity <input type="checkbox"/>
	Regular meanders <input type="checkbox"/>
	Irregular meanders <input checked="" type="checkbox"/>
	Tortuous <input type="checkbox"/>

Flow Types	Tick if present	% area	Tick if present	% area
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>
CH = chute	<input checked="" type="checkbox"/>	5	SM = smooth	<input type="checkbox"/>
NV = not visible	<input type="checkbox"/>	—	NP = no perceptible flow	<input type="checkbox"/>
BW = broken standing waves (white water)	<input checked="" type="checkbox"/>	10	DR = no flow (dry)	<input type="checkbox"/>
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>
RP = rippled	<input checked="" type="checkbox"/>	85	No. of pools = 0	No. of riffles = 0

Predominant Bank Material (tick one per bank)	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

Channel features: Record if present. Include number for artificial structures.

Valley form: Select predominant valley form.

Valley form	Tick if present
Shallow vee	<input type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input checked="" type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input type="checkbox"/>

Natural and artificial channel features		Tick if present	
Tick if present	Record number*	Tick if present	
Culverts	<input type="checkbox"/>	Exposed bankside roots	<input checked="" type="checkbox"/>
Dam/weir/slucice	<input type="checkbox"/>	Overhanging boughs	<input type="checkbox"/>
Ford (man made)	<input type="checkbox"/>	Fallen trees	<input type="checkbox"/>
Deflectors	<input type="checkbox"/>	Exposed bedrock	<input type="checkbox"/>
Outfalls/intakes	<input type="checkbox"/>	Exposed boulders	<input type="checkbox"/>
Bridges	<input checked="" type="checkbox"/>	Vegetated rock	<input checked="" type="checkbox"/>
Resectioned**	<input type="checkbox"/>	Unvegetated mid-channel bar	<input type="checkbox"/>
Reinforced	<input type="checkbox"/>	Vegetated mid-channel bar	<input type="checkbox"/>
Large woody debris	<input type="checkbox"/>	Mature island	<input type="checkbox"/>
Fallen trees	<input type="checkbox"/>	Trash (urban debris)	<input checked="" type="checkbox"/>
Underwater tree roots	<input type="checkbox"/>	None	<input type="checkbox"/>

1 (footbridge)

Trees (LB): none / scattered / single, regular / occasional clumps / semi-continuous / continuous
 Trees (RB): none / scattered / single, regular / occasional clumps / semi-continuous / continuous

* Artificial structures only.
 ** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.

Note: 1 pipe crossing – 0.15 m in width

River habitat spot check form

Project/Site name: A57	Approx. survey reach length: N/A	Photo no. DSC_917	NGR SJ 99732 95871
Watercourse name: WC_210	Adverse conditions? Yes / No	DSC_918-919	SJ 99744 95895
u/s NGR: SJ 99746 95893	If yes, please state:		
	Surveyed from: LB / RB Channel		
Survey date and time: 11/03/2020 16:32	Is bed of river visible? Yes / No		
Surveyor name: Naomi Lowden	River or artificial channel? Ditch		



Bed substrates	Tick if present	% area
Bedrock	<input type="checkbox"/>	—
Cobble	<input checked="" type="checkbox"/>	3
Boulder	<input type="checkbox"/>	—
Pebble	<input checked="" type="checkbox"/>	2
Gravel	<input checked="" type="checkbox"/> (rubble)	10
Sand	<input checked="" type="checkbox"/>	85
Silt/clay	<input type="checkbox"/>	—
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input type="checkbox"/>	—

No clear channel, tried to record substrates with wet area, but with also present

Bed substrates: Record substrate types present and estimate % area, cover

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping.

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles.

Bank material: record predominant bank material for each bank.

CHANNEL PLANFORM	Tick dominant condition
	Straight <input type="checkbox"/>
	Some sinuosity <input type="checkbox"/>
	Regular meanders <input type="checkbox"/>
	Irregular meanders (braided and poached) <input checked="" type="checkbox"/>
	Tortuous <input type="checkbox"/>

Flow Types	Tick if present	% area	Tick if present	% area
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>
CH = chute	<input type="checkbox"/>	—	SM = smooth	<input type="checkbox"/>
NV = not visible	<input type="checkbox"/>	—	NP = no perceptible flow	<input type="checkbox"/>
SW = broken standing waves (white water)	<input checked="" type="checkbox"/>	10	DR = no flow (dry)	<input type="checkbox"/>
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>
RP = rippled	<input checked="" type="checkbox"/>	90	No. of pools = 0	No. of riffles = 0

Predominant Bank Material (tick one per bank)	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

Channel features: Record if present. Include number for artificial structures.

Valley form: Select predominant valley form.

Valley form	Tick if present
Shallow vee	<input type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input checked="" type="checkbox"/>

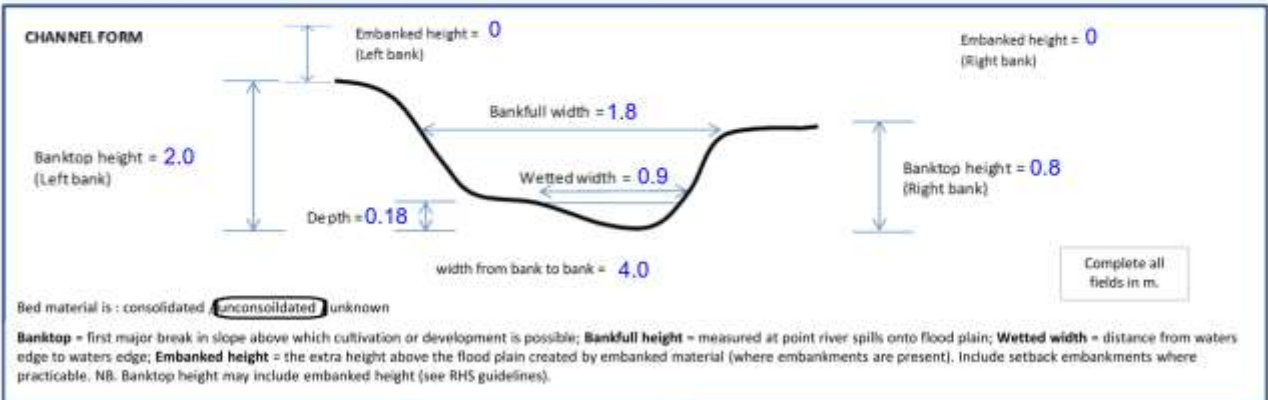
Natural and artificial channel features	Tick if present	Record number*	Tick if present	
Culverts	<input type="checkbox"/>	—	Exposed bankside roots	<input type="checkbox"/>
Dam/weir/sluice	<input type="checkbox"/>	—	Overhanging boughs	<input type="checkbox"/>
Ford (man made)	<input type="checkbox"/>	—	Fallen trees	<input type="checkbox"/>
Deflectors	<input type="checkbox"/>	—	Exposed bedrock	<input type="checkbox"/>
Outfalls/intakes	<input type="checkbox"/>	—	Exposed boulders	<input type="checkbox"/>
Bridges	<input type="checkbox"/>	—	Vegetated rock	<input type="checkbox"/>
Resectioned**	<input type="checkbox"/>	—	Unvegetated mid-channel bar	<input type="checkbox"/>
Reinforced	<input type="checkbox"/>	—	Vegetated mid-channel bar	<input type="checkbox"/>
Large woody debris	<input type="checkbox"/>	—	Mature island	<input type="checkbox"/>
Fallen trees	<input type="checkbox"/>	—	Trash (urban debris)	<input checked="" type="checkbox"/>
Underwater tree roots	<input type="checkbox"/>	—	None	<input type="checkbox"/>

Trees (LB): none / scattered / single, regular / occasional clumps / semi-continuous / **continuous**
 Trees (RB): none / scattered / single, regular / **occasional clumps** / semi-continuous / continuous

* Artificial structures only.
 ** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.
 *** Trees set back from waters edge on both banks
 Possible giant hogweed remnants, although could be native hogweed
 Heavily poached.

River habitat spot check form

Project/Site name: A57	Approx. survey reach length: 100 m	Photo no. DSC_877-08	NGR SJ 98688 95445
Watercourse name: HurtscloUGH Brook (WC_300)	Adverse conditions? Yes / No		
u/s NGR: SJ 98686 95462	If yes, please state:		
	Surveyed from: LB / RB / Channel		
Survey date and time: 11/03/2020 12:25	Is bed of river visible? Yes / No		
Surveyor name: Naomi Lowden	River or artificial channel? River (small natural flow path)		



Bed substrates	Tick if present	% area
Bedrock	<input type="checkbox"/>	—
Cobble	<input type="checkbox"/>	—
Boulder	<input type="checkbox"/>	—
Pebble	<input checked="" type="checkbox"/>	5
Gravel	<input type="checkbox"/>	—
Sand	<input checked="" type="checkbox"/>	95
Silt/clay	<input type="checkbox"/>	—
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input type="checkbox"/>	—

Bed substrates: Record substrate types present and estimate % area, cover.

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping.

CHANNEL PLANFORM	Tick dominant condition
	Straight <input type="checkbox"/>
	Some sinuosity <input checked="" type="checkbox"/>
	Regular meanders <input type="checkbox"/>
	Irregular meanders <input type="checkbox"/>
	Tortuous <input type="checkbox"/>

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles.

Bank material: record predominant bank material for each bank.

Flow Types	Tick if present	% area	Tick if present	% area	
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>	—
CH = chute	<input checked="" type="checkbox"/>	2	SM = smooth	<input type="checkbox"/>	—
NV = not visible	<input type="checkbox"/>	—	NP = no perceptible flow	<input type="checkbox"/>	—
BW = broken standing waves (white water)	<input type="checkbox"/>	—	DR = no flow (dry)	<input type="checkbox"/>	—
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>	—
RP = rippled	<input checked="" type="checkbox"/>	98	No. of pools = 0	No. of riffles = 0	

Predominant Bank Material (tick one per bank)	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

Channel features: Record if present. Include number for artificial structures.

Valley form: Select predominant valley form.

Valley form	Tick if present
Shallow vee	<input type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input checked="" type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input type="checkbox"/>

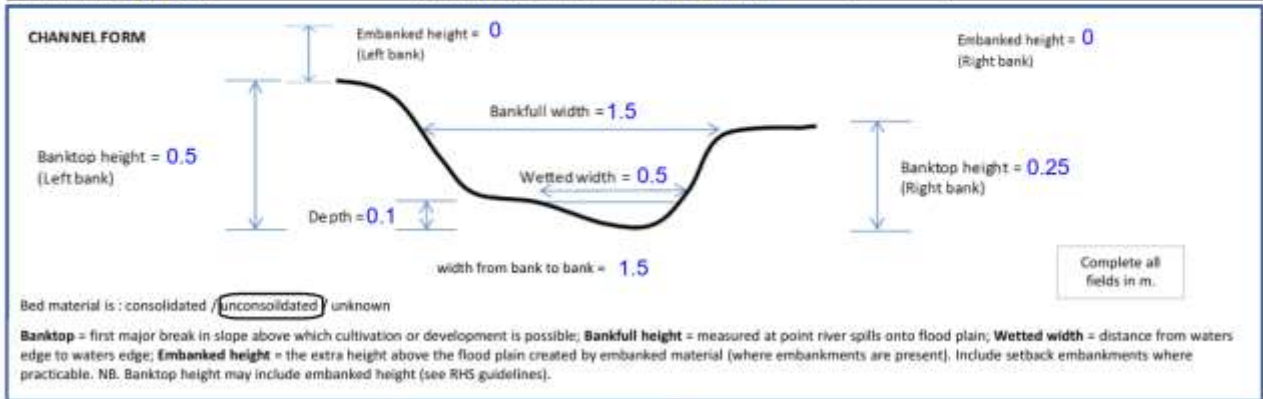
Natural and artificial channel features	Tick if present	Record number*	Tick if present	
Culverts	<input checked="" type="checkbox"/>	1	Exposed bankside roots	<input type="checkbox"/>
Dam/weir/sluice	<input type="checkbox"/>	—	Overhanging boughs	<input checked="" type="checkbox"/>
Ford (man made)	<input type="checkbox"/>	—	Fallen trees	<input type="checkbox"/>
Deflectors	<input type="checkbox"/>	—	Exposed bedrock	<input type="checkbox"/>
Outfalls/intakes	<input checked="" type="checkbox"/>	1	Exposed boulders	<input type="checkbox"/>
Bridges	<input type="checkbox"/>	—	Vegetated rock	<input type="checkbox"/>
Resectioned**	<input type="checkbox"/>	—	Unvegetated mid-channel bar	<input type="checkbox"/>
Reinforced	<input type="checkbox"/>	—	Vegetated mid-channel bar	<input type="checkbox"/>
Large woody debris	<input type="checkbox"/>	—	Mature island	<input type="checkbox"/>
Fallen trees	<input type="checkbox"/>	—	Trash (urban debris)	<input checked="" type="checkbox"/>
Underwater tree roots	<input checked="" type="checkbox"/>	—	None	<input type="checkbox"/>

Trees (LB): none / scattered / single, regular / occasional clumps / semi-continuous / continuous
 Trees (RB): none / scattered / single, regular / occasional clumps / semi-continuous / continuous

* Artificial structures only.
 ** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.

River habitat spot check form

Project/Site name: A57	Approx. survey reach length: 50 m	Photo no.	NGR
Watercourse name: WC 340	Adverse conditions? Yes / No	DSC_890-892	SJ 98544 95419
u/s NGR: SJ 98544 95419	If yes, please state:	DSC_893-897	SJ 98500 95411
Survey date and time: 11/03/2020	Surveyed from: LB RB / Channel		
Surveyor name: NL + ED	Is bed of river visible? Yes / No		
	River or artificial channel? River/Ditch		



Bed substrates	Tick if present	% area
Bedrock	<input type="checkbox"/>	—
Cobble	<input type="checkbox"/>	—
Boulder	<input type="checkbox"/>	—
Pebble	<input type="checkbox"/>	—
Gravel	<input checked="" type="checkbox"/>	10
Sand	<input checked="" type="checkbox"/>	90
Silt/clay	<input type="checkbox"/>	—
Peat	<input type="checkbox"/>	—
Earth	<input type="checkbox"/>	—
Artificial	<input type="checkbox"/>	—
Not visible	<input type="checkbox"/>	—

Bed substrates: Record substrate types present and estimate % area, cover

Planform: May be visible in the field but can also be reviewed against OS/aerial mapping.

CHANNEL PLANFORM	Tick dominant condition
	Straight <input type="checkbox"/>
	Some sinuosity <input checked="" type="checkbox"/>
	Regular meanders <input type="checkbox"/>
	Irregular meanders <input type="checkbox"/>
	Tortuous <input type="checkbox"/>

Flow types: Record flow types present and estimate % area. Record no. of pools and riffles.

Bank material: record predominant bank material for each bank.

Flow Types	Tick if present	% area	Tick if present	% area
FF = free fall	<input type="checkbox"/>	—	UP = upwelling	<input type="checkbox"/>
Ch = chute	<input type="checkbox"/>	—	SM = smooth	<input checked="" type="checkbox"/> 10
NV = not visible	<input checked="" type="checkbox"/>	75	NP = no perceptible flow	<input type="checkbox"/>
BW = broken standing waves (white water)	<input type="checkbox"/>	—	DR = no flow (dry)	<input type="checkbox"/>
CF = chaotic flow	<input type="checkbox"/>	—	UW = unbroken	<input type="checkbox"/>
RP = rippled	<input checked="" type="checkbox"/>	15	No. of pools = 0	No. of riffles = 0

Predominant Bank Material (tick one per bank)	LB	RB
Bedrock	<input type="checkbox"/>	<input type="checkbox"/>
Boulder	<input type="checkbox"/>	<input type="checkbox"/>
Cobble	<input type="checkbox"/>	<input type="checkbox"/>
Gravel/sand	<input type="checkbox"/>	<input type="checkbox"/>
Earth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peat	<input type="checkbox"/>	<input type="checkbox"/>
Clay	<input type="checkbox"/>	<input type="checkbox"/>
Concrete	<input type="checkbox"/>	<input type="checkbox"/>
Sheet piling	<input type="checkbox"/>	<input type="checkbox"/>
Wood piling	<input type="checkbox"/>	<input type="checkbox"/>
Gabion	<input type="checkbox"/>	<input type="checkbox"/>
Brick/laid stone	<input type="checkbox"/>	<input type="checkbox"/>
Rip-rap	<input type="checkbox"/>	<input type="checkbox"/>
Tipped debris	<input type="checkbox"/>	<input type="checkbox"/>
Fabric	<input type="checkbox"/>	<input type="checkbox"/>
Bio-engineering materials	<input type="checkbox"/>	<input type="checkbox"/>

Channel features: Record if present. Include number for artificial structures.

Valley form: Select predominant valley form.

Natural and artificial channel features	Tick if present	Record number*	Tick if present	
Culverts	<input checked="" type="checkbox"/>	1	Exposed bankside roots	<input checked="" type="checkbox"/>
Dam/weir/sluice	<input type="checkbox"/>	—	Overhanging boughs	<input checked="" type="checkbox"/>
Ford (man made)	<input type="checkbox"/>	—	Fallen trees	<input type="checkbox"/>
Deflectors	<input type="checkbox"/>	—	Exposed bedrock	<input type="checkbox"/>
Outfalls/intakes	<input checked="" type="checkbox"/>	1 (outfall)	Exposed boulders	<input type="checkbox"/>
Bridges	<input type="checkbox"/>	—	Vegetated rock	<input type="checkbox"/>
Resectioned**	<input type="checkbox"/>	—	Unvegetated mid-channel bar	<input type="checkbox"/>
Reinforced	<input type="checkbox"/>	—	Vegetated mid-channel bar	<input type="checkbox"/>
Large woody debris	<input checked="" type="checkbox"/>	—	Mature island	<input type="checkbox"/>
Fallen trees	<input type="checkbox"/>	—	Trash (urban debris)	<input type="checkbox"/>
Underwater tree roots	<input type="checkbox"/>	—	None	<input type="checkbox"/>

Trees (LB): none / scattered / single, regular / occasional clumps / **semi-continuous** / continuous
 Trees (RB): none / **scattered** / single, regular / occasional clumps / semi-continuous / continuous

* Artificial structures only.
 ** Refers to the channel cross-section being artificially altered e.g. through widening/deepening.

Valley form	Tick if present
Shallow vee	<input type="checkbox"/>
Deep vee	<input type="checkbox"/>
Gorge	<input type="checkbox"/>
Asymmetric	<input checked="" type="checkbox"/>
No valley sides	<input type="checkbox"/>
Concave	<input type="checkbox"/>
U shaped	<input type="checkbox"/>

A.3 MoRPh survey summary tables

River condition score for each site and break down of scores for each component of the MoRPh survey. Green indicates positive scores and red indicates negative scores.

Site	Final condition class	Final condition score	Bank top					Bank face									
			Vegetation structure (B1)	Tree feature richness (B2)	Water related features (B3)	Invasive species (B4)	Managed ground cover (B5)	Riparian vegetation structure (C1)	Tree feature richness (C2)	Natural bank profile extent (C3)	Natural bank profile richness (C4)	Natural bank material richness (C5)	Bare sediment extent (C6)	Artificial bank profile extent (C7)	Reinforcement extent (C8)	Reinforcement material severity (C9)	Invasive species (C10)
ETH01	Moderate	3	3	2	1	-2	-4	3	2	3	3	2	1	0	-1	-2	-3
TAR01	Poor	1	1	0	0	-4	-2	1	0	0	0	1	4	-4	-2	-2	-3
HUR01	Fairly good	4	2	1	0	0	-2	2	0	3	4	1	1	0	0	0	0
HUR02	Moderate	3	2	1	0	-1	-2	3	1	2	2	2	2	-3	0	0	-1
HUR03	Moderate	3	3	0	0	-1	-2	2	1	2	4	1	2	-2	0	0	-1

(Continued) River condition score for each site and break down of scores for each component of the MoRPh survey. Green indicates positive scores and red indicates negative scores.

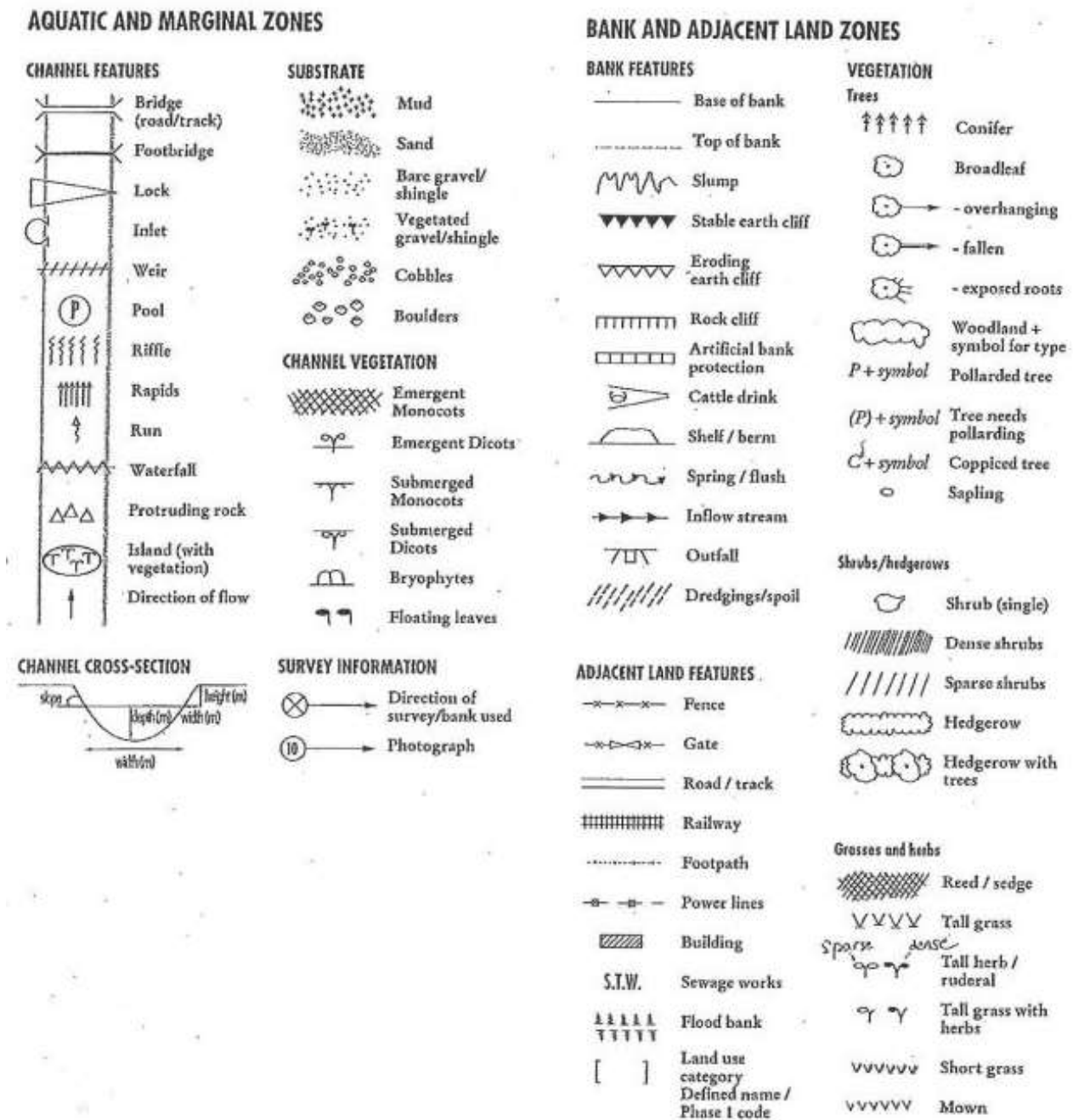
Site	Water margin					Channel											
	Aquatic vegetation extent (D1)	Aquatic morphotype richness (D2)	Physical feature extent (D3)	Physical feature richness (D4)	Artificial features (D5)	Aquatic morphotype richness (E1)	Tree feature richness (E2)	Hydraulic richness (E3)	Natural feature extent (E4)	Natural feature richness (E5)	Material richness (E6)	Bed siltation (E7)	Reinforcement extent (E8)	Reinforcement severity (E9)	Artificial feature severity (E10)	Invasive species (E11)	Filamentous algae (E12)
ETH01	2	2	1	2	-1	0	1	2	0	0	3	-2	0	0	0	0	0
TAR01	0	0	0	0	0	2	0	0	0	0	2	0	0	-2	-4	-3	0
HUR01	2	2	1	1	0	3	0	1	1	1	3	0	0	0	0	0	0
HUR02	2	3	1	1	0	3	1	2	1	1	3	0	0	0	-4	0	0
HUR03	1	1	1	1	0	2	1	2	1	1	3	0	0	0	-2	-1	0

A.4 River Corridor Survey Maps

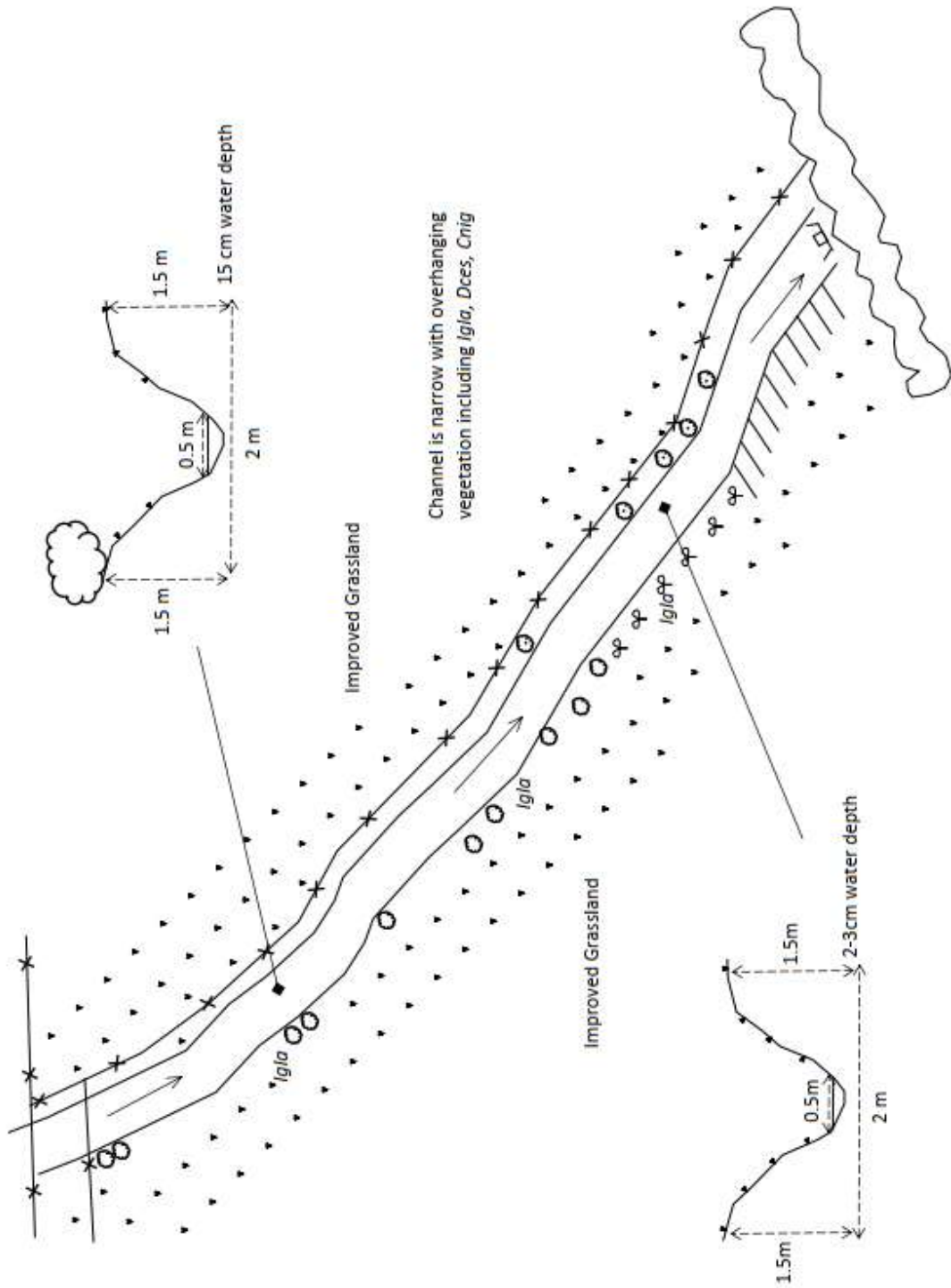
A.4.1 Standard RCS symbols, as provided in the *River Corridor Surveys Methods and Procedures (Conservation Technical Handbook)*, were used for RCS mapping. A key to these symbols, extracted from the handbook, is shown below.

A.4.2 Plant species are recorded using an abbreviated version of their scientific name, using the following convention: first letter of the generic name followed by the first three letters of the species name.

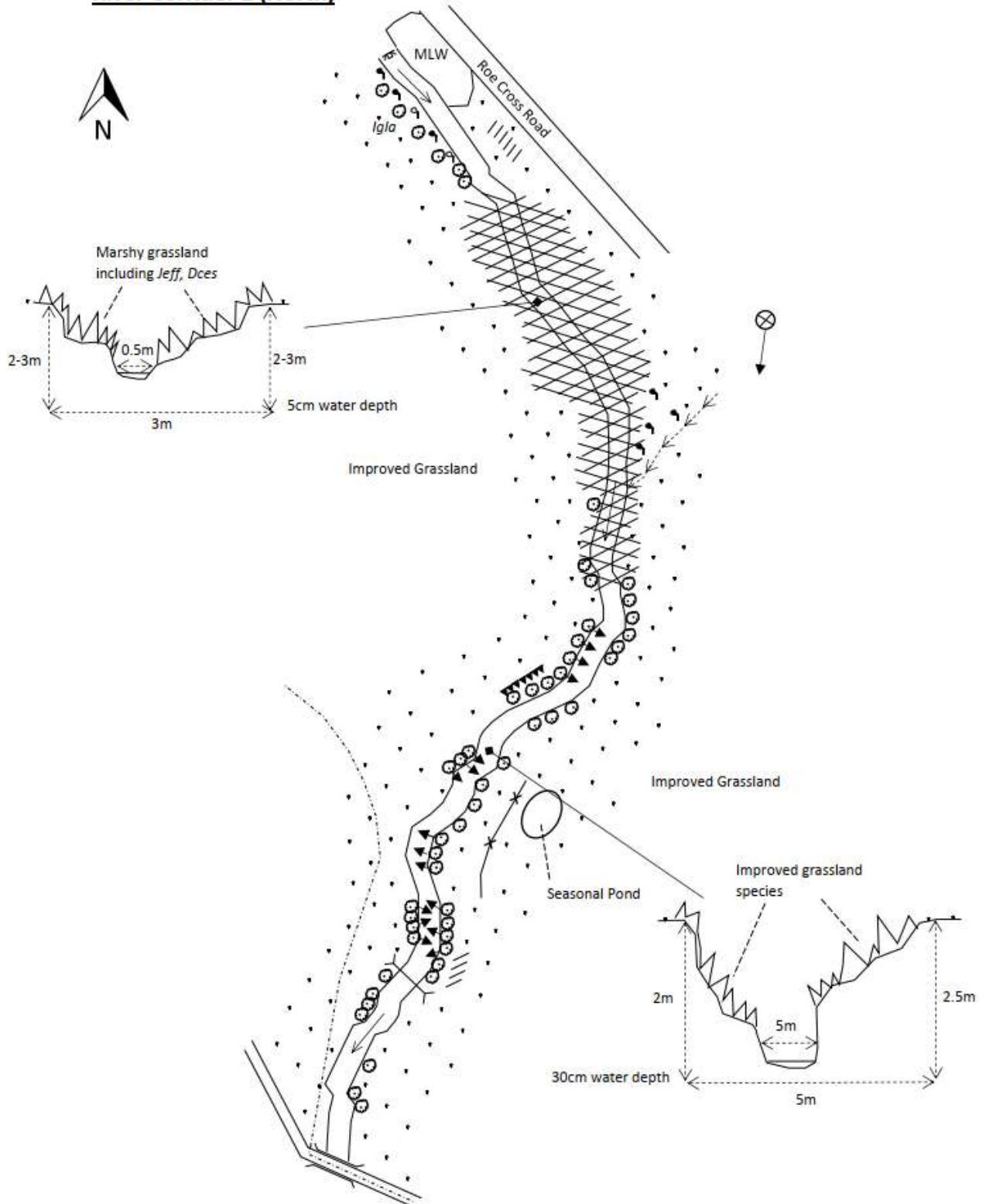
Standard symbols used in River Corridor Survey



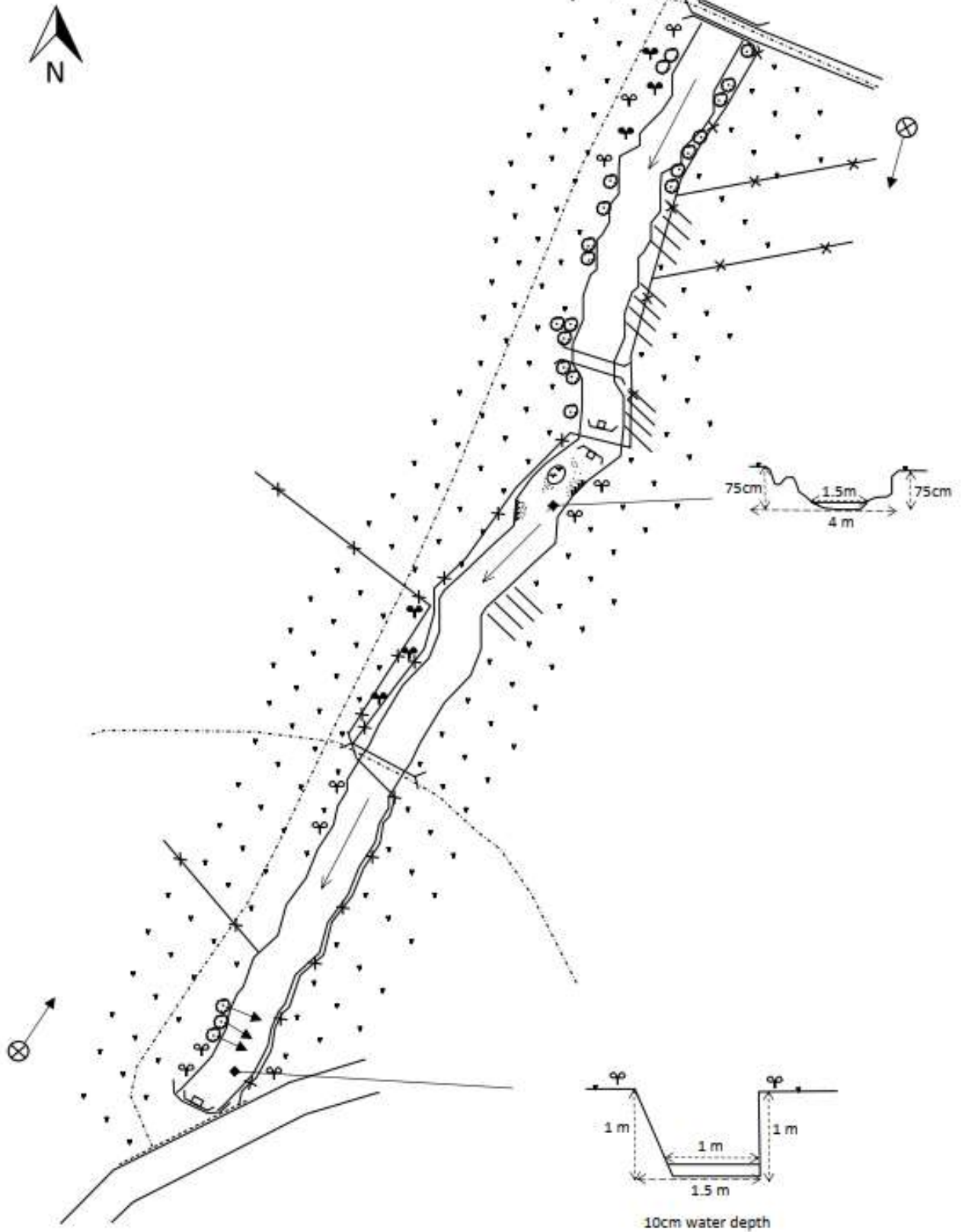
River Corridor 1

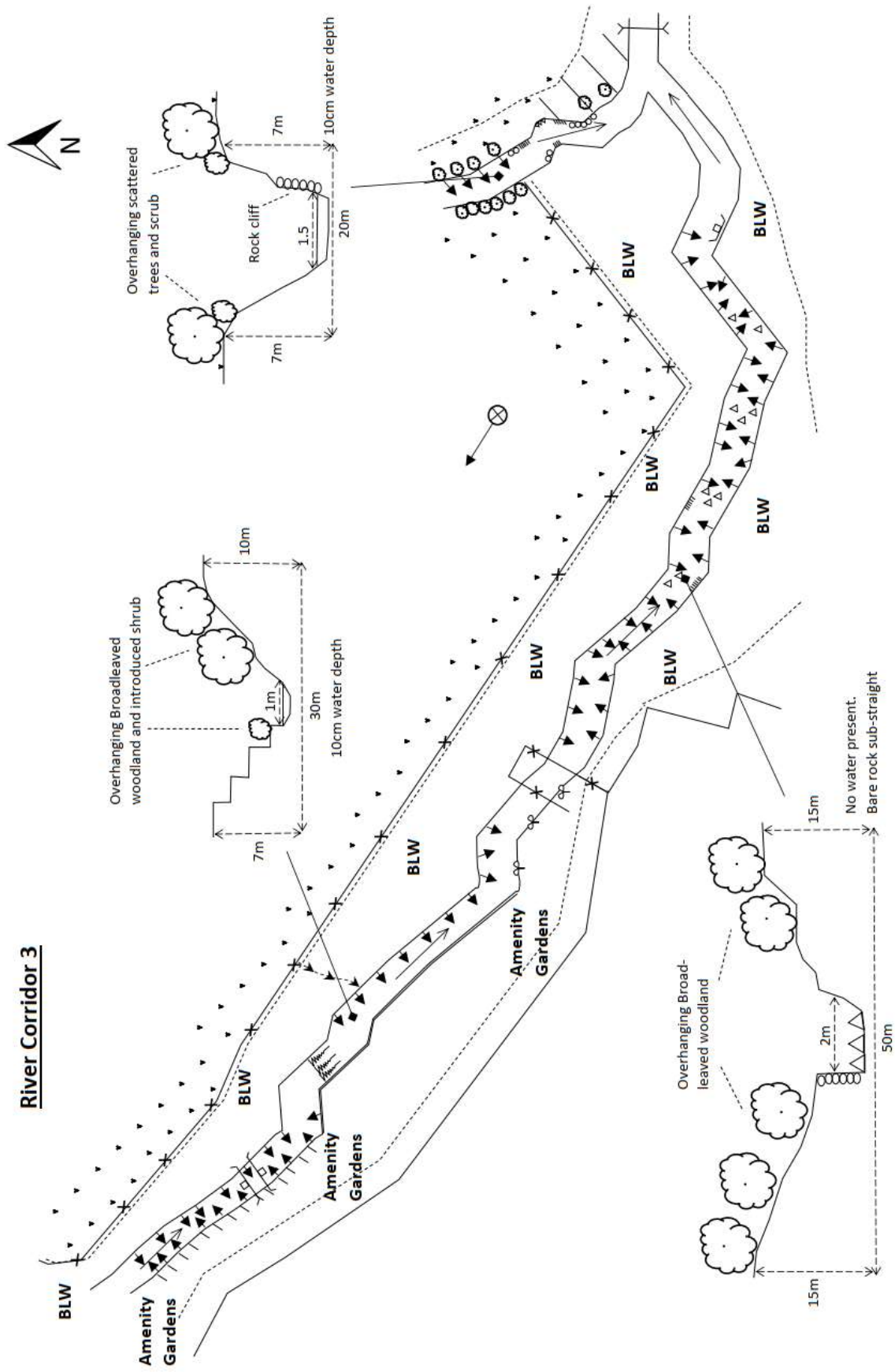


River Corridor 2 (North)

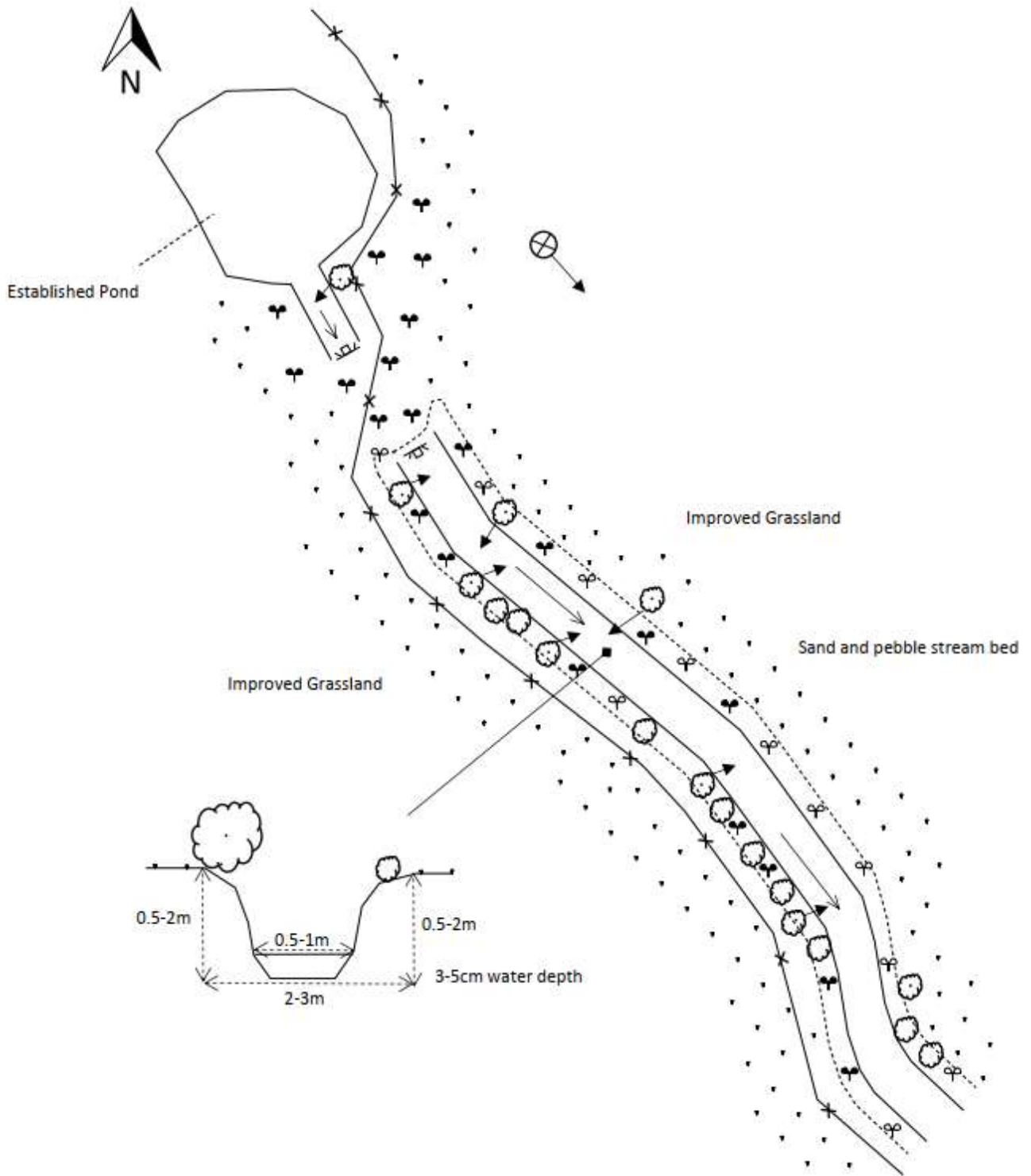


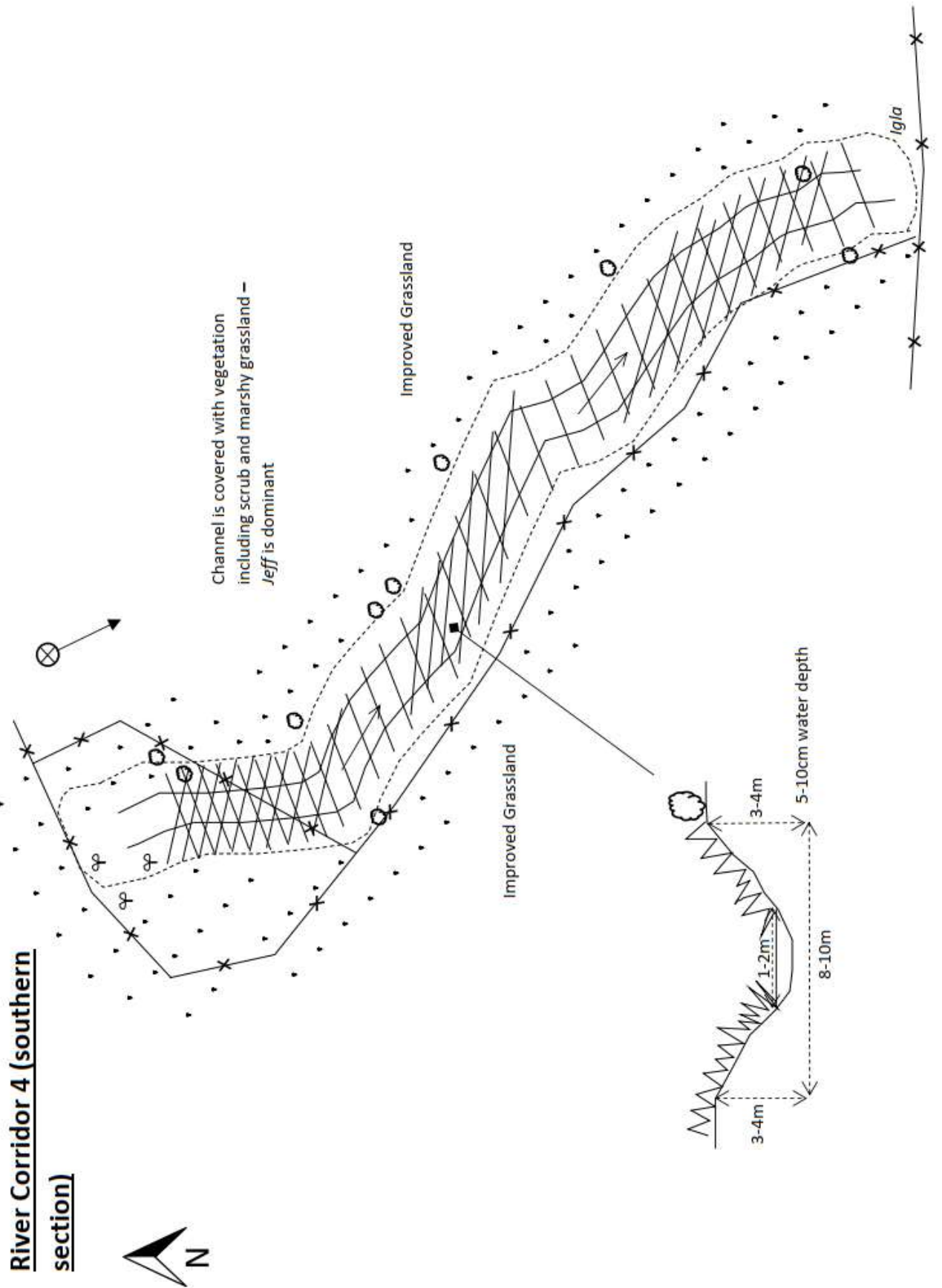
River Corridor 2 (South)



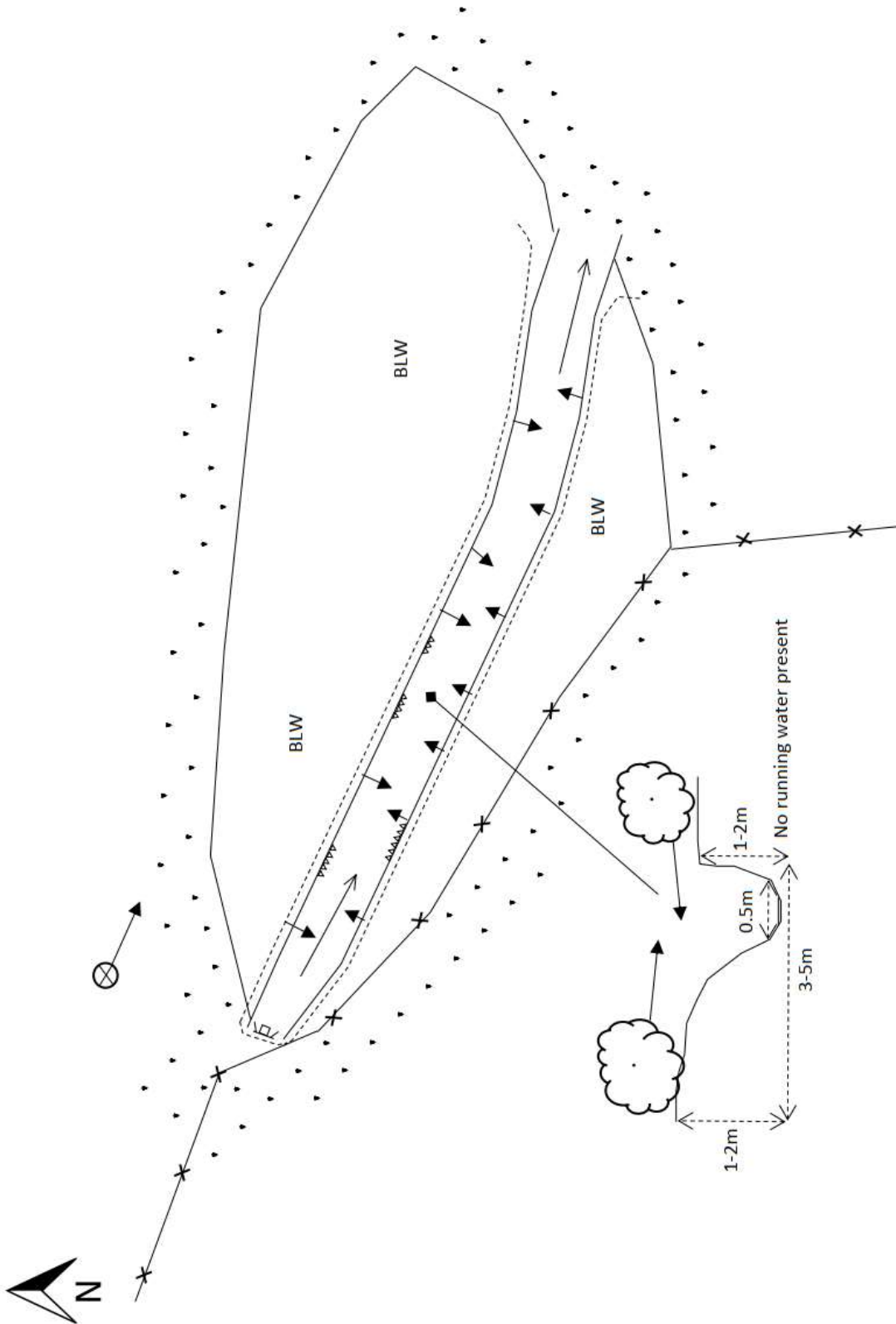


River Corridor 4 (middle section)

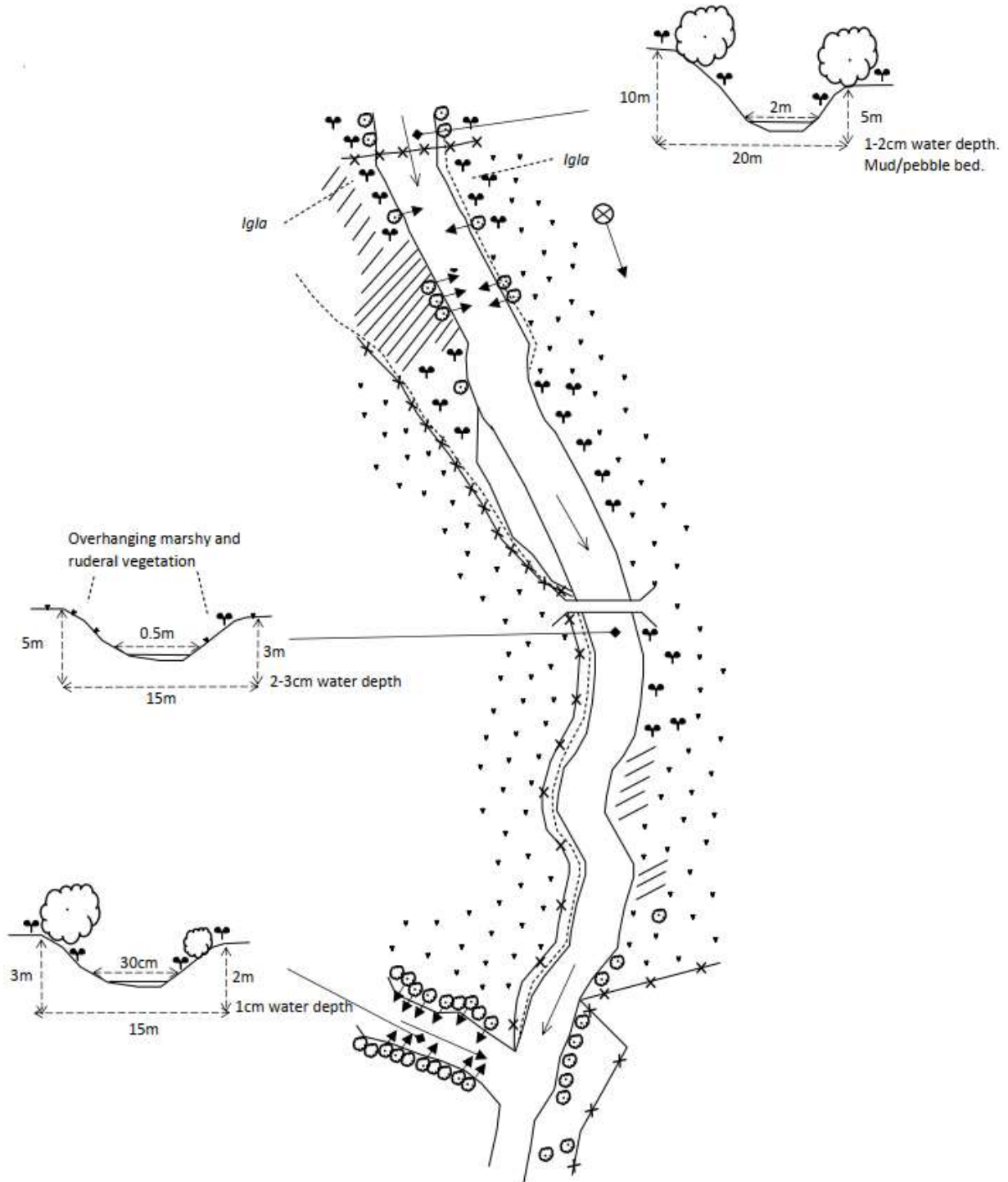


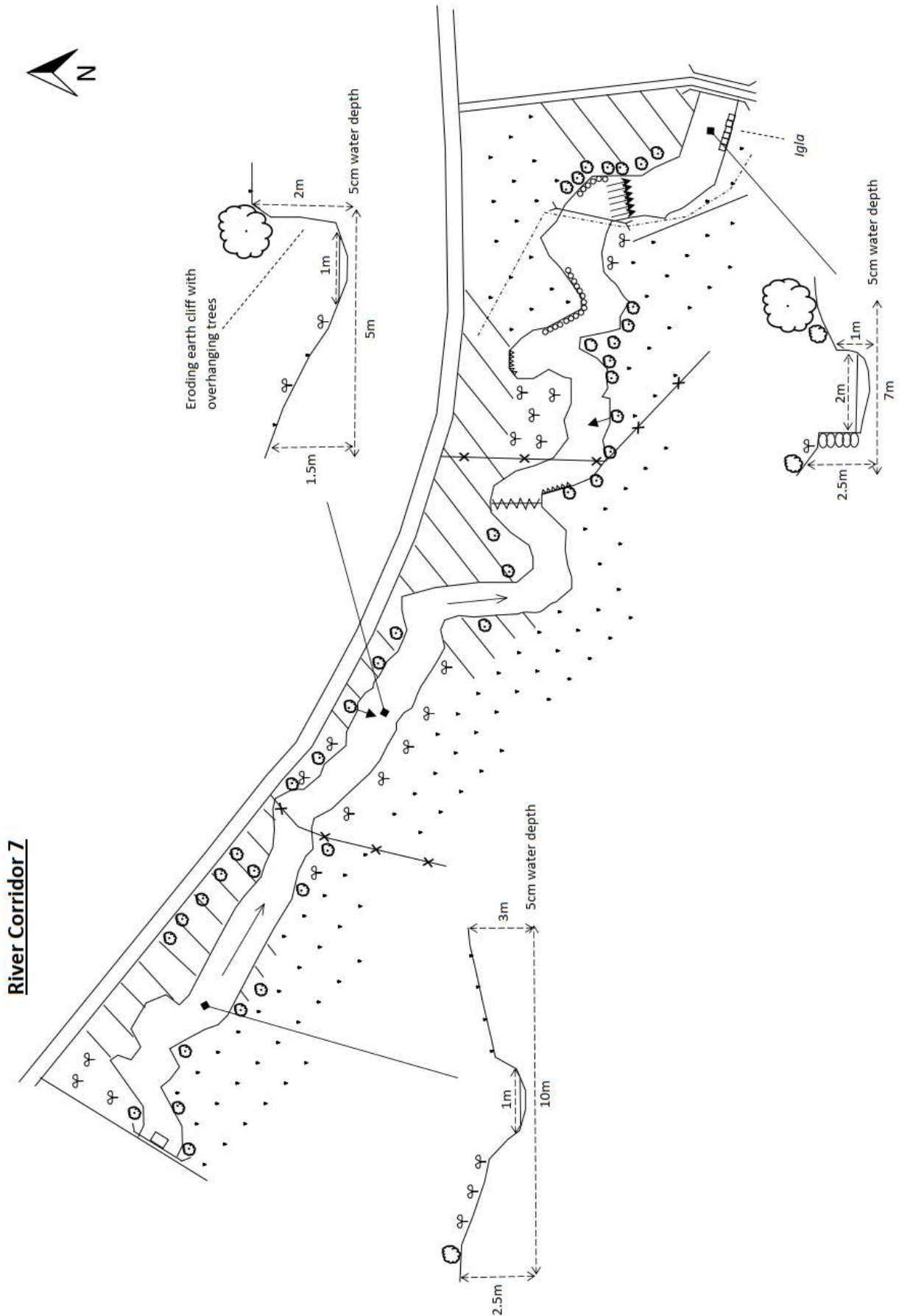


River Corridor 4 (north-westerly section)

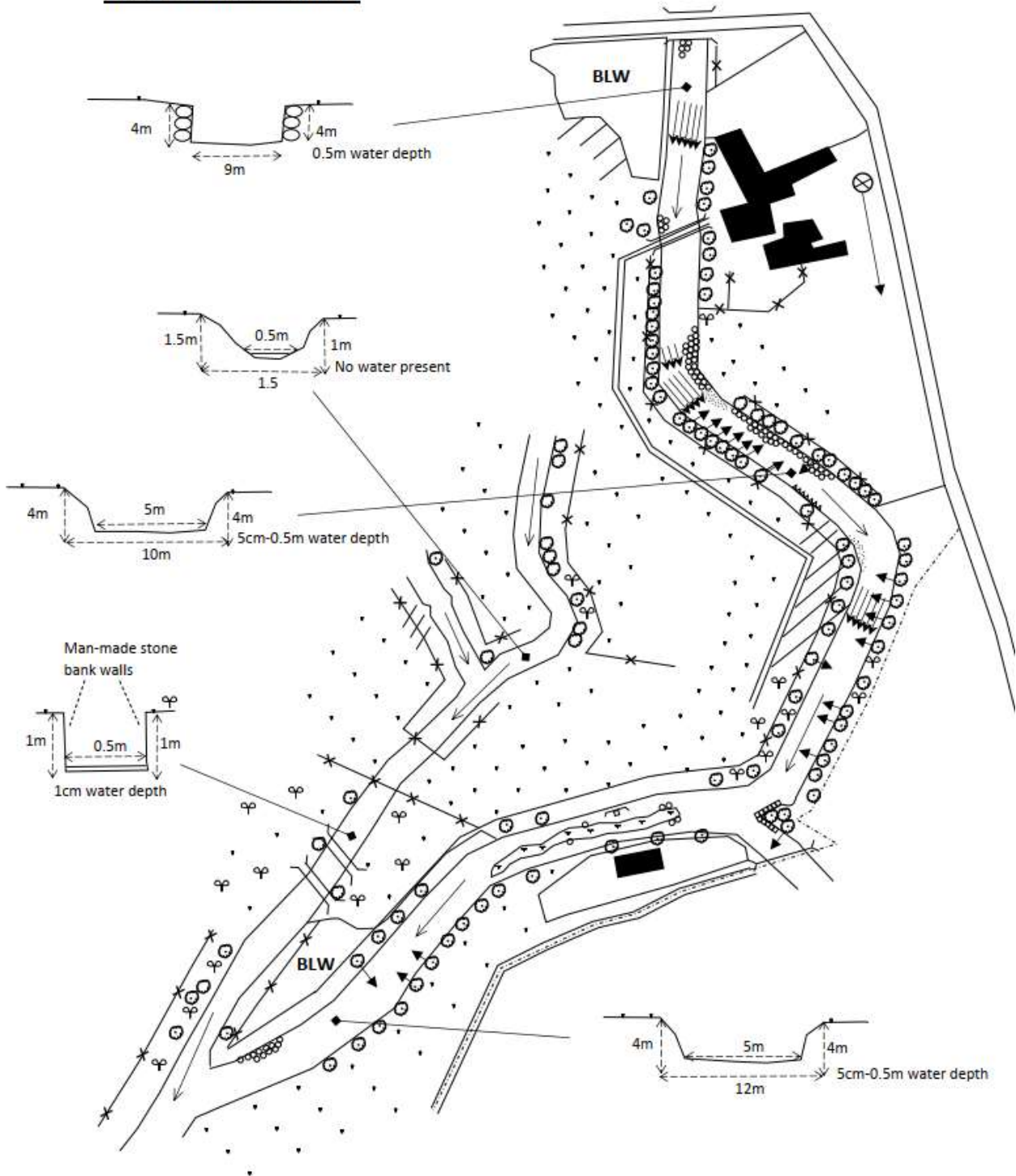


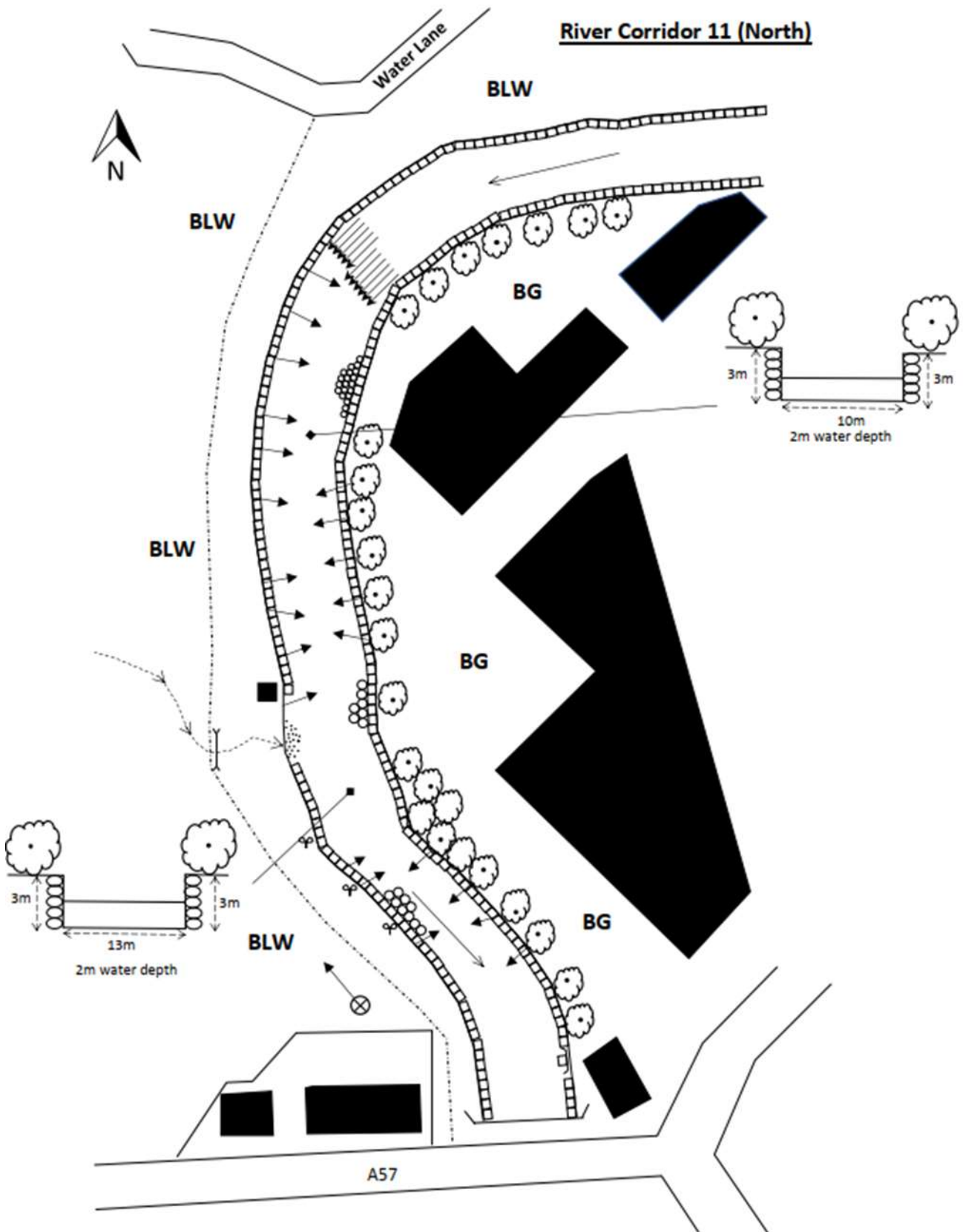
River Corridor 6





River Corridor 10 and 11





A.5 Aquatic macroinvertebrate taxa list

Sample Number	24846	24845	24844	24843	24842	24841
Watercourse	River Etherow (WC_100)	River Etherow (WC_100)	Tara Brook (WC_200)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)
Site Description	Site 6	Site 5	Site 4	Site 3	Site 2	Site 1
Sample Date	07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020	07/10/2020
Taxa						
Tricladida				1		
Polycelis sp.				4	1	3
Polycelis felina	1			5	20	9
Polycelis nigra/tenuis		1				1
Nematoda		2	12			
Gastropoda	1		1			
Potamopyrgus antipodarum	43	32	65	674		3
Lymnaeidae	3	1				
Radix balthica		1				
Ancylus fluviatilis	66	5				
Ancylus group (Ancylus, Ferrissia & Acroloxus)	2					
Pisidium sp.	44	23	8	31	1	10
Oligochaeta	34	117	73	117	85	57
Glossiphonia complanata				12	2	2

Sample Number	24846	24845	24844	24843	24842	24841
Watercourse	River Etherow (WC_100)	River Etherow (WC_100)	Tara Brook (WC_200)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)
Site Description	Site 6	Site 5	Site 4	Site 3	Site 2	Site 1
Haemopsis sanguisuga			1			
Erpobdellidae			1	1	1	
Trocheta pseudodina (bykowskii)					1	
Trocheta subviridis	1			1		5
Hydracarina			1	1		
Oribatei			2			
Asellus aquaticus		13	46	3	7	14
Crangonyx pseudogracilis/floridanus	50	26	5			
Gammarus sp.	33	4	10	15	13	
Gammarus pulex	26	163	203	251	75	348
Gammarus pulex/fossarum	50	12	47	472	9	85
Collembola			1			
Baetidae				1		
Baetis sp.				6		
Baetis rhodani	2	31	166	6	26	11
Baetis atlanticus/rhodani	2	20	148	16	19	16
Heptageniidae		1				
Rhithrogena sp.			3			
Heptagenia sulphurea		5				

Sample Number	24846	24845	24844	24843	24842	24841
Watercourse	River Etherow (WC_100)	River Etherow (WC_100)	Tara Brook (WC_200)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)
Site Description	Site 6	Site 5	Site 4	Site 3	Site 2	Site 1
Ecdyonurus sp.		24	74			
Ecdyonurus torrentis		1				
Leptophlebiidae			9			
Leptophlebia sp.			1			
Paraleptophlebia sp.		2	2			
Ephemera sp.	1					
Serratella ignita		1				
Caenis rivulorum	1					
Nemoura sp.			2			
Leuctra sp.			8			
Leuctra fusca		1	24			
Anacaena globulus				1		
Hydraena gracilis			5			
Elodes sp.				10		
Elmidae	1					
Elmis aenea		6	31			
Limnius volckmari	5	4	32			
Oulimnius sp.	13	3				
Trichoptera						1

Sample Number	24846	24845	24844	24843	24842	24841
Watercourse	River Etherow (WC_100)	River Etherow (WC_100)	Tara Brook (WC_200)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)
Site Description	Site 6	Site 5	Site 4	Site 3	Site 2	Site 1
Rhyacophila sp.		3	36			
Rhyacophila dorsalis		1	53			1
Agapetus sp.			1			
Agapetus fuscipes			1			1
Lype sp.	1	1				
Psychomyia pusilla		1				
Tinodes waeneri	5					
Polycentropodidae	1					
Plectrocnemia conspersa				4		11
Polycentropus flavomaculatus	15	7				
Hydropsyche sp.		11	79			
Hydropsyche angustipennis	1					
Hydropsyche pellucidula	1					
Hydropsyche siltalai	3	5	4			
Diplectrona felix				3		
Limnephilidae		1		2		1
Micropterna sequax				11	3	
Chaetopteryx villosa				1		
Silo pallipes		1	3			

Sample Number	24846	24845	24844	24843	24842	24841
Watercourse	River Etherow (WC_100)	River Etherow (WC_100)	Tara Brook (WC_200)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)
Site Description	Site 6	Site 5	Site 4	Site 3	Site 2	Site 1
Beraea pullata				1		
Athripsodes albifrons group (bilineatus & commutatus)	2					
Mystacides azurea	2					
Pyralidae	2					
Diptera		3				
Tipula sp.	3	1	1			1
Limoniidae					1	
Helius sp.				1	5	
Neolimonia sp.					4	
Eloeophila sp.				2		1
Pilaria sp.	1			1	1	
Erioptera sp.				1	3	
Molophilus sp.					4	
Dicranota sp.		2	5	8		1
Psychodidae	1		7	2	1	
Dixa maculata group				1		
Ceratopogonidae	5	1	13	3		1
Simuliidae		1	10	90	5	
Simulium argyreatum/variegatum				5		

Sample Number	24846	24845	24844	24843	24842	24841
Watercourse	River Etherow (WC_100)	River Etherow (WC_100)	Tara Brook (WC_200)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)	Hurstclough Brook (WC_300)
Site Description	Site 6	Site 5	Site 4	Site 3	Site 2	Site 1
Simulium ornatum/trifasciatum/intermedium				26	1	
Simulium sp.			1			
Simulium angustipes/velutinum					1	
Simulium equinum/lineatum/pseudequinum		1				
Chironomidae	4	8	23	2	12	1
Tanypodinae [sub-family]	1	2	8	5	1	1
Prodiamesinae [sub-family]				26		
Orthoclaadiinae [sub-family]	3	5	12	70	12	1
Chironomini [tribe]	9	1		2	4	1
Tanytarsini [tribe]	10	2	95	14	15	2
Beris sp.		1	1			
Hemerodrominae			1			
Chelifera sp.			3	1		1
Syrphidae				1	3	
Limnophora sp.			6			

A.6 Aquatic macroinvertebrate biotic indices

Watercourse	Site	NGR	LIFE score (family)	LIFE Score (Species)	CCI Score	PSI Species Score	Species PSI Interpretation	PSI Family Score	Family PSI Interpretation	WHPT ASPT	WHPT N Taxa
River Etherow (WC_100)	Site 6	SK 01000 95505	6.82	7.63	4.5	51.02	Moderately Sedimented	36.84	Sedimented	4.99	21
River Etherow (WC_100)	Site 5	SK 00917 95653	7.41	8	7.11	68.06	Slightly Sedimented	57.69	Moderately Sedimented	5.73	26
Tara Brook (WC_200)	Site 4	SK 00757 95746	7.7	8.38	6.15	71.62	Slightly Sedimented	63.46	Slightly Sedimented	5.72	27
Hurstclough Brook (WC_300)	Site 3	SJ 98885 95930	6.41	7.79	6.23	55.36	Moderately Sedimented	48.89	Moderately Sedimented	4.99	23
	Site 2	SJ 98715 95527	6.45	7.91	9.29	44.12	Moderately Sedimented	38.46	Sedimented	4.25	14
	Site 1	SJ 98619 95285	6.62	7.62	4.64	58.33	Moderately Sedimented	51.61	Moderately Sedimented	4.94	17

A.7 PSYM pond survey data

Site Details				
Site name	P2	P5	P7	30
Survey date	18/08/2020	18/08/2020	18/08/2020	18/08/2020
Grid reference (e.g. SP123456 of higher precision)	SJ9863895555	SJ9891295940	SJ9950496088	SK0041695642
No. of submerged + marginal plant species (not including floating leaved)	2	1	7	3
Number of uncommon plant species	0	0	1	0
Trophic Ranking Score (TRS)	5.75	8.75	8.43	9
ASPT	4.3	3.8	3.78	4.1
Odonata + Megaloptera (OM) families	0	0	1	1
Coleoptera families	3	1	1	3
Altitude (m)	205	210	210	210
Easting	3986	3989	3995	3989
Northing	3955	3959	3960	3959
Shade (%)	0	0	50	0
Inflow (0/1)	1	0	1	0
Grazing (%)	100	100	0	100
pH	8	8.36	7.8	8.36
Emergent plant cover (%)	5	0	0	0
Base clay (1-3)	3	3	3	3
Base sand, gravel, pebbles (1-3)	1	1	1	1
Base peat (1-3)	1	1	1	1
Base rock (1-3)	1	1	1	1
Area (m ²)	100	150	200	150

Site Details				
Site name	P2	P5	P7	30
Survey date	18/08/2020	18/08/2020	18/08/2020	18/08/2020
Grid reference (e.g. SP123456 of higher precision)	SJ9863895555	SJ9891295940	SJ9950496088	SK0041695642
Predicted (SM)	15.4	15.6	16.1	15.6
Actual (SM)	2.0	1.0	7.0	3.0
EQI (SM)	0.1	0.1	0.4	0.2
IBI (SM)	0	0	1	0
Predicted (U)	2.8	2.7	2.8	2.7
Actual (U)	0.0	0.0	1.0	0.0
EQI (U)	0.0	0.0	0.4	0.0
IBI (U)	0	0	1	0
Predicted (TRS)	7.76	8.15	8.44	8.15
Actual (TRS)	5.75	8.75	8.43	9.00
EQI (TRS)	0.74	1.07	1.00	1.10
IBI (TRS)	3	2	3	1
Predicted (ASPT)	5.29	5.00	5.12	5.00
Actual (ASPT)	4.30	3.80	3.78	4.10
EQI (ASPT)	0.81	0.76	0.74	0.82
IBI (ASPT)	2	2	2	2
Predicted (ASPT)	5.29	5.00	5.12	5.00
Actual (ASPT)	4.30	3.80	3.78	4.10
EQI (ASPT)	0.81	0.76	0.74	0.82
IBI (ASPT)	2	2	2	2
Predicted (OM)	2.68	2.77	3.19	2.77
Actual (OM)	0.00	0.00	1.00	1.00
EQI (OM)	0.00	0.00	0.31	0.36
IBI (OM)	0	0	1	1

Site Details				
Site name	P2	P5	P7	30
Survey date	18/08/2020	18/08/2020	18/08/2020	18/08/2020
Grid reference (e.g. SP123456 of higher precision)	SJ9863895555	SJ9891295940	SJ9950496088	SK0041695642
Predicted (CO)	3.83	3.70	3.80	3.70
Actual (CO)	3.00	1.00	1.00	3.00
EQI (CO)	0.78	0.27	0.26	0.81
IBI (CO)	3	1	1	3
Sum of Individual Metrics	8	5	9	7
Index of Biotic Integrity (%)	44%	28%	50%	39%
PSYM quality category (IBI >75%=Good, 51-75%= Moderate, 25- 50%=Poor, <25%=V Poor)	Poor	Poor	Poor	Poor
Is this a Priority Pond? (Good quality category)	No	No	No	No

A.8 PSYM pond survey macroinvertebrate taxa list

Sample Number	24731	24732	24733	24735
Site Description	P2	P5	P7	P30
Sample Date	20/08/2020	20/08/2020	21/08/2020	21/08/2020
Sample Method	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)
Nematoda			1	
Potamopygrus antipodarum				3
Lymnaeidae				54
Stagnicola sp.				40
Radix balthica	79			
Planorbidae			3	
Planorbis sp.			197	
Planorbis			28	
Ferrisia clessiniana				18
Succineidae	5			176
Sphaeriidae			1	19
Pisidium	5	1	1	159
Oligochaeta	4	182	163	121
Theromyzon tessulatum			1	
Helobdella stagnalis			1	3
Hydracarina				2

Sample Number	24731	24732	24733	24735
Site Description	P2	P5	P7	P30
Sample Date	20/08/2020	20/08/2020	21/08/2020	21/08/2020
Sample Method	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)
Cladocera			1	
Ostracoda		4		
Asellus aquaticus	169		112	
Crangonyx pseudogracilis/floridanus	814		118	
Collembola				13
Baetidae		8		
Cloeon dipterum		8		
Coenagrionidae				4
Gerridae			1	
Gerris lacustris			1	
Corixidae				
Callicorixa praeusta		104		
Hesperocorixa castanea		278		
Sigara distincta gp (falleni&fallenoidea)				
Sigara lateralis		487		
Haliphus ruficollis group	1			2
Dytiscidae	2			
Hydroporinae		2		47

Sample Number	24731	24732	24733	24735
Site Description	P2	P5	P7	P30
Sample Date	20/08/2020	20/08/2020	21/08/2020	21/08/2020
Sample Method	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)
Hygrotus sp.		1		
Hygrotus confluens		4		
Hygrotus impressopunctatus	1	2		
Hydroporus sp.				1
Hydroporus gyllenhalii				4
Hydroporus incognitus				31
Hydroporus planus				2
Hydroporus pubescens				1
Graptodytes sp.		1		
Agabus sp.				18
Agabus bipustulatus				9
Agabus sturmii			2	
Ilybius/Agabus sp.				2
Ilybius sp.	18		3	9
Ilybius ater				1
Colymbetes fuscus		1		
Hydrophilidae	4			10
Helophorus grandis	2			1

Sample Number	24731	24732	24733	24735
Site Description	P2	P5	P7	P30
Sample Date	20/08/2020	20/08/2020	21/08/2020	21/08/2020
Sample Method	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)
Helophorus brevivalpis	4			3
Helophorus flavipes/obscurus				1
Helophorus longitarsis/griseus/minutus		1		
Helophorus obscurus				1
Hydrobius fuscipes				9
Anacaena globulus	1			4
Anacaena limbata	1			1
Laccobius sp.	1			3
Laccobius bipunctatus	1			3
Hydrocyphon deflexicollis			1	1
Sialis lutaria			1	
Limnephilus lunatus	1			
Lepidoptera	10			
Cataclysta lemnata	17			
Helius sp.	1			
Pilaria sp.				1
Psychodidae				28
Ptychoptera sp.				1

Sample Number	24731	24732	24733	24735
Site Description	P2	P5	P7	P30
Sample Date	20/08/2020	20/08/2020	21/08/2020	21/08/2020
Sample Method	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)	Pond Sweep 3 Minutes (Spp)
Dixella sp.	4		1	3
Dixella aestivalis				2
Dixella amphibia			1	
Dixella martini				7
Culcidae	10	55	18	84
Culiseta sp.	4		2	6
Culex sp.	16	48		5
Ceratopognidae	5			2
Tanypodinae [sub-family]		96	52	91
Orthocladiinae [sub-family]	2			5
Chironomini [tribe]	1	1080	225	9
Beris sp.				9
Sciomyzidae				2
Ephydridae	2		1	8

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