# A83 Rest and Be Thankful

## LTS EIAR VOLUME 4, APPENDIX 11.6 - AQUATIC RECEPTOR REPORT

Transport Scotland

A83AAB-AWJ-EAC-LTS_GEN-RP-LE-000262

# A11-6.Aquatic Receptor Report

## A11-6.1. Introduction

A11-6.1.1. AtkinsRéalis WSP Joint Venture (AWJV) were commissioned by Transport Scotland as part of the A83 Rest and Be Thankful Project (hereafter referred to as the Proposed Scheme), to prepare an aquatic ecology baseline report.

A11-6.1.2. This report also includes baseline aquatic survey results of the Proposed Scheme Natural Capital (NC) and Biodiversity Net Gain (BNG) enhancement areas.

### Purpose of the Report

A11-6.1.3. This report is intended to provide baseline information regarding aquatic ecology (including aquatic habitats, fish, aquatic plants and aquatic macroinvertebrates) to inform the Environmental Impact Assessment (EIA) Report for the Proposed Scheme.

A11-6.1.4. The report presents ecological information obtained during the following:

- a desk-study undertaken between 15 June 2023 and 1 December 2023 and
- field surveys and monitoring undertaken between 1 March 2023 and 18 June 2024.

## A11-6.2. Legislation

A11-6.2.1. See Appendix 11.2: Biodiversity Legislation, Policy and Guidance for a summary of key relevant legislation.

## A11-6.3. Methodology

### Study Area

A11-6.3.1. Screening for aquatic receptors (watercourses, ponds and lakes that may provide important habitats for aquatic species assemblages, i.e. fish, aquatic

invertebrate and aquatic macrophytes) was undertaken within the Proposed Scheme's combined permanent and temporary works plus 150m (the 'aquatic screening area') – see Volume 3, Figure 11.6a: Aquatic Ecology Screening Area and Survey Results. The study area was then extended to 2km to identify hydrologically connected aquatic receptors which could be impacted because of downstream propagation of effects e.g. in the event of a pollution incident. In the unlikely event of an uncontrolled pollution or sediment mobilisation incident within a watercourse, impacts are considered likely to be ameliorated (through deposition or dilution) and / or intercepted within 2km of their origin.

A11-6.3.2. This screening exercise allows for:

- Identification of aquatic habitats within the Proposed Scheme that may be affected by the Proposed Scheme. Effects could arise through direct/ indirect habitat loss, physical modification, disturbance and/ or changes to water quality / quantity.
- Identification of additional aquatic habitats located within 150m from The Site that, whilst not within the works area, may still be at risk from disturbance due to their proximity to the Proposed Scheme. This could be through, for example, overland pollution or mobilisation of fine sediment from the working 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.

A11-6.3.3. Watercourses, ponds and lakes that are not in direct hydrological connectivity with an aquatic receptor within the screening area, are considered to be sufficiently isolated as to have negligible risk of impact from construction and/or operational impacts.

A11-6.3.4. As part of the Proposed Scheme's commitments to BNG under National Planning Framework 4 (NPF4), four off-site enhancement areas have been identified and included within The Site. The condition of the watercourses within

these enhancement areas has been assessed and reported within this Appendix. For full details of the off-site enhancement areas see Appendix 4.1: Biodiversity Net Gain/ Natural Capital Assessment.

### Desk Study

A11-6.3.5. All watercourses and standing waterbodies within the study area were identified from geospatial analysis, aerial imagery and Ordnance Survey mapping (OS MasterMap Networks – Water Layer).

A11-6.3.6. Hydrological walkover surveys conducted in June and July 2023 confirmed the locations of these aquatic receptors.

### Data Collection

A11-6.3.7. A number of data sources were used to provide baseline information in support of the assessment of aquatic ecological constraints within the study area. This included data gathering in relation to aquatic statutory and non-statutory designated sites for nature conservation and protected and priority aquatic habitats and species as defined by CIEEM Guidelines for Preliminary Ecological Appraisal. The SBL is a list of flora, fauna and habitats considered by the Scottish Ministers to be of principal importance for biodiversity conservation. These data sources are listed below.

### Publicly Available Data Sets

- Details of any aquatic statutory and non-statutory designated sites were obtained using publicly available sources including NatureScot's Site Link, and DEFRA's Magic Map Application
- Argyll Fisheries Trust, South Argyll Rivers Project Survey Report
- Water Framework Directive (WFD) water bodies and Scotland's River Basin Management Plan (RBMP)
- Scottish Environment Protection Agency (SEPA) data sets:

- Water Classification Hub
- River Classifications
- SEPA Obstacles to Fish Migration

- National Biodiversity Network (NBN) biological records which were publicly available and excluded 'CC-BY-NC' data which are not permitted for commercial use.

### Supplementary Data Sets

A11-6.3.8. Data requests were also submitted to regulators, stakeholders and record centres for aquatic species. Due to the mobility of many aquatic species (such as migratory salmonids), aspects of these data requests were extended beyond the study area (i.e. to a catchment scale) to identify all suitable data that could help inform the assessment of the impacts of the Proposed Scheme. The data received from these data requests are listed below:

- SEPA river biological, morphological and chemical monitoring data within the Croe and Kinglas catchments collected intermittently from 2005 - 2016. This included a request for taxa lists and biological metrics associated with aquatic macroinvertebrate, macrophyte and phytobenthos communities, as well as barriers to fish migration (received 5 September 2023).
- Argyll Fisheries Trust electric fishing records within the Croe and Kinglas catchments from 2008 and 2007 – 2022 respectively (received 22 February 2023).
- Argyll Biological Records Centre records within 2km of the Proposed Scheme.

### Relevant Existing Ecological Reports for the Proposed Scheme.

A11-6.3.9. Surveys undertaken for the DMRB Stage 2 Assessment of the aquatic receptors within the study area were also used to inform the ecological baseline and refine proposed additional field survey locations. This includes the following surveys:

- electric fishing surveys on Croe Water and Restil Water during August 2022
- macrophyte surveys on Loch Restil, Restil Water and two unnamed watercourses within the study area (tributaries of Croe Water), during August 2022; and

- macroinvertebrate surveys on Loch Restil, Restil Water, Croe Water and three unnamed watercourses within the study area (tributaries of Croe Water) during autumn 2021 and spring 2022.

### Field Survey

A11-6.3.10. Where appropriate, all surveys on watercourses (fish, macroinvertebrate and Modular River Physical (MoRPh) survey) were geographically aligned – see Volume 3, Figure 11.6: Aquatic Ecology Screening Area and Survey Results. This was only possible where fish and macroinvertebrate habitats overlapped, which was restricted to lower gradient sections of watercourse. For specific site locations of each field survey see relevant appendices contained within this report, for each survey type.

### Watercourse Walkover

A11-6.3.11. Site walkovers were undertaken in June and July 2023 to characterise watercourses within the study area and their suitability for aquatic species (namely macrophytes, macroinvertebrates and fish).

### River Condition Assessment: Modular Physical Survey

A11-6.3.12. With the exception of the Croe Water and the High Glen Croe Tributary, all watercourses within the study area are relatively small upland headwater systems. It is difficult to define discrete watercourses within these systems due to the presence of bifurcations and multiple sub-tributaries. For this report, distinct watercourses for survey and assessment were defined by their interaction (or nearest) point associated with the A83, with all sub-tributaries and bifurcations considered as part of the same system. This maximised survey efficiency, as walkover surveys and aerial imagery identified all channels as having a similar typology.

A11-6.3.13. MoRPh survey guidance states 20% of total watercourse length within the Proposed Scheme Boundary must be surveyed. Given the high number of watercourses crossed by the Proposed Scheme and uncertainty around the Proposed Scheme Boundary, a representative subset of watercourses crossed by the Proposed Scheme were screened into the MoRPh survey (50m) effort.

This approach fulfilled the criteria to achieve 20% total watercourse length surveyed within The Site and ensured survey efficiency. For full MoRPh survey methodology see: The MoRPh Survey Technical Reference Manual.

A11-6.3.14. MoRPh surveys were undertaken in November 2023 by accredited surveyors.

A11-6.3.15. The inclusion of off-site enhancement areas within The Site to fulfil the Proposed Scheme's BNG requirements meant further MoRPh surveys were undertaken to characterise the watercourses within these off-site enhancement areas. As per The MoRPh Survey Technical Reference Manual, MoRPh surveys were undertaken on at least 20% of the total river length in each of these off-site enhancement areas (with the exception of one of the off-site enhancement areas – see limitations). MoRPh surveys were undertaken in March and June 2024 by accredited surveyors.

### River Condition Assessment: River Type Assessment

A11-6.3.16. River Condition Assessment (RCA) requires desk based geospatial characterisation of watercourses within the study area using the Cartographer workspace. Distinct reaches are delineated based on aerial imagery of watercourse typology and planform, resulting in each reach being assigned an indicative River Type. River Type and MoRPh valuation are used to give a final condition score for each watercourse. For detailed instruction on RCA see: A guide to Assessing River Condition.

### Watercourse Macroinvertebrate Survey

A11-6.3.17. A subset of watercourses within the study area were taken forward for detailed aquatic macroinvertebrate survey following Environment Agency Operational Instruction 018_08. A stratified sampling approach was undertaken given the high number of watercourses with similar planform and typology identified from desk study.

A11-6.3.18. Macroinvertebrate surveys were located on a representative subset of watercourses both upstream and downstream of the Proposed Scheme to capture habitat variation within these watercourses.

A11-6.3.19. The recognised survey seasons for macroinvertebrate survey are spring (March-May), summer (1 June to 31 August) and autumn (September-November). All macroinvertebrate survey and identification were undertaken by APEM Ltd in May 2023, August 2023 and October 2023 (spring, summer and autumn sampling seasons), with samples preserved and subsequently analysed by competent taxonomists.

A11-6.3.20. Environmental variables required to generate RIVPACS community predictions were also collected. This ensures that, should it be required in future, the data collected will support a full site RIVPACS classification.

A11-6.3.21. Species level macroinvertebrate identification was undertaken to allow for the calculation of the Community Conservation Index (CCI) which, alongside individual species conservation designations, has been used to assess community conservation value for this assessment. The CCI provides a measure of overall community conservation value and highlights specific species of conservation importance based on Joint Nature Conservation Committee (JNCC) threat categories.

A11-6.3.22. Where multiple surveys were undertaken on watercourses of a similar character, the taxa list was also amalgamated to calculate a reach-based (i.e. multi-site) CCI score range.

A11-6.3.23. Other key macroinvertebrate community indices were calculated in addition to CCI to identify broad community character based on water quality, flow and benthic sediment loading. A full list of macroinvertebrate community indices used, along with their interpretation, can be found in Annex 11.6.B.

A11-6.3.24. Given the potentially ephemeral nature of many of the watercourses, an adapted field survey method was also undertaken to enable subsequent assessment using the Monitoring Intermittent Streams Index if deemed required following review of species present within samples. The adapted survey method included targeted sampling of marginal/semi-aquatic transitional habitats.

### Watercourse Fish Survey

A11-6.3.25. Electric fishing surveys were undertaken in August 2023 in accordance with BS EN 14011:2003 and with reference to applicable aspects of the Electrofishing Programme for Scotland Standard Operating Procedure.

A11-6.3.26. Fully quantitative (three-run) electric fishing surveys were undertaken over a 100m2 reach at each location, with estimates of biomass and density based on the three-catch removal method (Carle & Strub 1978). All catches were identified to species level and measured (fork length for salmonids and total length for all other species).

A11-6.3.27. All surveys were completed under appropriate licence from Marine Scotland. Specifically, authorisation to use otherwise unlawful methods under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003.

A11-6.3.28. Watercourses within the study area identified as having suitable habitat for fish during the walkover survey were screened into electric fish survey. Where possible, fish survey locations were aligned to MoRPh and macroinvertebrate survey. Fish watercourse habitat suitability was based on methods adapted from Hendry and Cragg-Hine 1997.

### Watercourse Macrophyte Survey

A11-6.3.29. Desk Study and walkover surveys confirmed that the predominantly high gradient watercourses are dynamic and highly sediment-mobile watercourses that do not support significant macrophyte communities. Watercourse macrophyte surveys were therefore screened out of this assessment and not subject to quantitative survey. Macrophyte identification and recording was undertaken on an ad hoc basis during MoRPh surveys. Given their potential importance within the study area, bryophytes (associated with watercourses and other habitat types) have been considered separately and are reported within Appendix 11.15: Bryophyte Report.

### Loch Macroinvertebrate Survey

A11-6.3.30. The study area was screened to identify any standing waterbodies. Loch macroinvertebrate surveys were undertaken in May 2023 in accordance with BS EN ISO 10870:2012 and Environment Agency Operational Instruction, with identification species/mixed level analysis in accordance with Environment Agency Operational Instruction 024_08.

### Loch Macrophyte Survey

A11-6.3.31. Macrophyte surveys were also undertaken on all such waterbodies within the study area and/or where potential impacts to the waterbody were identified through direct hydrological connectivity to a receptor within the study area.

A11-6.3.32. Loch macrophyte surveys were undertaken in August 2023 in accordance with BS EN ISO 15460: 2007 and Lake LEAFPACS methods.

### Freshwater Pearl Mussel Survey

A11-6.3.33. No freshwater pearl mussel (FWPM) survey was undertaken for the Proposed Scheme given:

- walkover surveys did not identify suitable habitat for FWPM within the study area and
- no records of FWPM within the catchment from any of the public or private data sources reviewed during the desk study.

### Survey Limitations

A11-6.3.34. Ecological surveys are limited by factors that 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, surveys undertaken are sufficient to characterise the aquatic ecology baseline of the

Proposed Scheme, informing the impact assessment and any required mitigation.

A11-6.3.35. All aquatic surveys (macroinvertebrate, macrophyte, fish) except MoRPh surveys were undertaken in their respective recommended survey windows. As MoRPh surveys record geomorphological and ecological characteristics of a watercourse, it is possible that aspects of the MoRPh surveys, particularly, bank top, bank face and river bed vegetation cover, would be under recorded. However, alternative surveys within the study area (aquatic habitat walkovers, fish surveys, macroinvertebrate surveys and a National Vegetation Classification (NVC) survey of terrestrial habitats) were undertaken during the optimum MoRPh survey period and enabled the broad characterisation of macrophyte assemblages. Therefore, the timing of MoRPh surveys is not a constraint.

A11-6.3.36. Given the large number of watercourses of similar typology within the study area, a stratified sampling approach that screened only a representative subset of watercourses into detailed survey. This assessment therefore assumes watercourses of similar character exhibit similar habitats and species assemblages.

A11-6.3.37. Due to access constraints, MoRPh surveys were not undertaken on one of the off-site enhancement sites (Enhancement Site 2; refer to Appendix 4.1: Biodiversity Net Gain / Natural Capital Assessment for full details of Enhancement Sites). Observation with aerial imagery and habitat mapping of this site suggests watercourses within this site are of a similar typology to watercourses included in the MoRPh survey programme, which can be used as a proxy for watercourses within this site. As it stands however, Enhancement Site 2 has been identified for terrestrial habitat enhancements only.

## A11-6.4. Results

### Desk Study

### Aquatic Receptors Screening

A11-6.4.1. The desk study identified 54 watercourses within the study area. This includes 46 watercourses that are crossed by the Proposed Scheme and eight that are within 150m of the Proposed Scheme but not crossed. A summary of watercourses within the study area are provided in Annex 11.6.C. Of the 46 watercourses crossed by the Proposed Scheme; 11 are present on a 1:50k OS map and 26 on a 1:25k OS map, with nine not included in either level of OS mapping. Watercourses not present on a 1:50k OS map are classed as minor watercourses under The Water Environment (Controlled Activities) (Scotland) Regulations 2011.

A11-6.4.2. Loch Restil is the only standing waterbody within the study area.

### WFD Water Body Screening

A11-6.4.3. There are two WFD delineated catchments within the study area: the Croe Water (WFD ID: 10215) and the Kinglas Water (WFD ID: 10217). These watercourses are classed as having moderate overall ecological condition and poor ecological potential respectively under WFD classification methods. The quality elements failing to achieve good status in the Croe Water are macroinvertebrates, biological elements, overall ecology and water quality. The quality elements listed as poor or moderate and failing to achieve good status in the Kinglas Water are overall ecology, Biological elements (fish), overall hydrology (due to all hydrological elements) and hydromorphology.

A11-6.4.4. The Croe Water flows north to south through Glen Croe and is the main catchment intersected by the Proposed Scheme. Within the Kinglas Water catchment, only Loch Restil is within the study area, however wider impacts within the catchment are possible through downstream propagation.

A11-6.4.5. Loch Restil is unclassified by SEPA. It lies within the Kinglas Water catchment and is within the boundary of Beinn an Lochain Site of Special Scientific

Interest (SSSI,) which is designated for its siliceous scree boulder field and upland species assemblages.

A11-6.4.6. No records of Invasive Non-native Species (INNS) are recorded within the study area; however, there are records of the following INNS within the Croe Water and Kinglas Water catchments:

- American skunk cabbage *Lysichiton americanus*
- Chilean rhubarb Gunnera tinctoria
- Japanese knotweed *Fallopia japonica* and
- Rhododendron Rhododendron ponticum.

### Existing Data

A11-6.4.7. Historical (2008) fish monitoring on the Croe Water by Argyll Fisheries Trust recorded Atlantic salmon *Salmo salar* (in low abundance) and brown trout *Salmo trutta* (in moderate abundance), including a sea-run component to the trout population. Both Atlantic salmon and brown trout are priority species. The migratory component of the trout population, as well as the salmon population, are considered likely to be restricted to the lower extents of the Croe Water, the majority of which falls outside of the study area. The main component of the fish population within the study area is considered likely to be resident brown trout. The presence of a natural and typically impassable barrier within the downstream extent of the Croe Water is likely to limit the presence of migratory species throughout the majority of the study area. Associated data provided by Argyll Fisheries Trust is included within Annex 11.6.F.

A11-6.4.8. SEPA collected mixed and family-level macroinvertebrate data on the Croe Water (Location code 533249) during spring 2019 (undated) and May 2023 respectively (at NGR NN 24806 04460). In both instances the community was indicative of good water quality and the Nationally Scarce (Occurring in 16-100 hectads in Great Britain, including rare species qualifying under the main IUCN criteria) *Baetis digitatus* (a mayfly) was recorded during the spring 2019 survey.

A11-6.4.9. Croe Water fish surveys (single pass electric fishing surveys) undertaken during August 2022 in support of the DMRB Stage 2 Assessment (NGRs NN 24352 05208, NN 23125 08615) identified brown trout in moderate abundances and no other fish species.

A11-6.4.10. Croe Water (mainstem and selected tributaries) macroinvertebrate river surveys undertaken during November 2021 and April 2022 in support of the DMRB Stage 2 Assessment (at NGRs NN 23840 06443, NN 24000 06003, NN 24263 05627, NN 24554 04943, NN 238 060336), identified communities indicative of good water quality, with no priority species recorded.

A11-6.4.11. Loch Restil and Restil Water surveys undertaken during October 2021 and April 2022 in support of the DMRB Stage 2 Assessment (NGRs NN 23227 08664, NN 23057 08195, NN 22898 07561) identified the Nationally Scarce mayfly species Paraleptophlebia cincta and Paraleptophlebia werneri in both Restil Water and Loch Restil.

A11-6.4.12. Restil Water fish surveys (single pass electric fishing surveys) undertaken during August 2022 in support of the DMRB Stage 2 Assessment (NGR NN 23125 08615) identified brown trout and minnow Phoxinus phoxinus in low abundances.

A11-6.4.13. Macrophyte surveys undertaken during August 2022 on Loch Restil (NGRs NN 22931 07561, NN 23053 08217) Restil Water (NGRs NN 23223 08656, NN 23089 08585) and two unnamed tributaries of the Croe Water (NGRs NN 24379 05294, NN 24410 05130) identified species-poor communities typical of the watercourse and waterbody types, with no aquatic or marginal priority species.

A11-6.4.14. SEPA and the Argyll Fisheries Trust included macroinvertebrate and fish data respectively for the Kinglas Water, which fall outside of the study area.

## Field Survey

### Walkover Survey

A11-6.4.15. Aquatic habitats within the study area were characterised as upland high gradient watercourses with modified riparian habitat (grazed, deforested) with a 'flashy' hydrological regime. Watercourses exhibited modifications associated with current land use and the existing road network with extensive bank erosion present downstream of the A83.

A11-6.4.16. Field observations in June 2023 suggest the Croe Water suffers from reduced water quality, excessive filamentous algae growth (noting this was during a period of sustained low flows and high temperatures) and localised ferric hydroxide deposition within a section in upper Glen Croe (NN 23563 06630). Observed livestock poaching on tributaries of the Croe Water in the northern extent of Glen Croe might be contributing to nutrient loading within the Croe catchment. No SEPA water quality data after November 2006 is available to inform the physicochemical status of the Croe Water.

### River Condition Assessment

A11-6.4.17. Fifteen MoRPh surveys were undertaken across 15 watercourses that intersect the Proposed Scheme and a further 14 MoRPh surveys were undertaken on watercourses within the off-site enhancement areas. Surveys were recorded on the Cartographer app and correlated with a desk-based River Type Survey to obtain a watercourse condition score. Three River Types were identified across all survey sites, with all watercourses intersecting the scheme classified under the same River Type, substantiating the stratified survey approach undertaken at these locations.

A11-6.4.18. Table A11-6.1 and Table A11-6.2 provide summaries of the River Condition Assessment, respectively for survey locations on watercourses intersecting the Proposed Scheme and those within the Enhancement Areas. A range of river MoRPh condition from Fairly Poor to Fairly Good was recorded across the survey locations. Negative MoRPh indicators (refer to Annex 11.6.H) are predominantly associated with reduced riparian habitat complexity and an absence of wooded features normally associated with tree cover, the absence

of which is a legacy of agricultural land use. MoRPh surveys were intentionally sited to exclude the existing infrastructure of the A83 and Old Military Road (OMR), thereby appropriately characterising extents of open water habitat that may potentially be affected by further modifications associated with the Proposed Scheme. Outside of the MoRPh survey extents (which were located on open watercourse extents), other river modifications are associated with the A83 and OMR (culverts and headwalls).

**Table A11-6.1 - River condition assessment summary (watercourses intersecting the Proposed Scheme)**

| Watercourse ID | Survey Location (National Grid Reference (NGR) for midpoint of MoRPh survey) | Date of Survey | Habitat (River Type) | Final River Condition |
|---|---|---|---|---|
| Croe Water A83_ML_015_000 | NN 24157 05997 | 29/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Fairly Good |
| Tributary of Croe A83_ML_017_000 | NN 24102 06198 | 29/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate |
| Tributary of Croe A83_ML_018_000 | NN 24015 06357 | 29/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate |
| Tributary of Croe A83_ML_019_000 | NN 23936 06482 | 28/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate |

| Watercourse ID | Survey Location (National Grid Reference (NGR) for midpoint of MoRPh survey) | Date of Survey | Habitat (River Type) | Final River Condition |
|---|---|---|---|---|
| Tributary of Croe A83_ML_021_000 | NN 23893 06551 | 28/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Fairly Poor* |
| Tributary of Croe A83_ML_023_000 | NN 23786 06715 | 28/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate* |
| Tributary of Croe A83_ML_024_000 | NN 23752 06809 | 28/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Fairly Poor* |
| Tributary of Croe A83_ML_025_000 | NN 23668 06909 | 27/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate* |
| Tributary of Croe A83_ML_026_B01 | NN 23594 06953 | 27/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Fairly Poor* |
| Tributary of Croe A83_ML_027_000 | NN 23534 07065 | 27/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate |
| Tributary of Croe A83_028_000_000 | NN 23493 07107 | 27/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate |

| Watercourse ID | Survey Location (National Grid Reference (NGR) for midpoint of MoRPh survey) | Date of Survey | Habitat (River Type) | Final River Condition |
|---|---|---|---|---|
| Tributary of Croe A83_ML_029_000 | NN 23439 07188 | 27/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate |
| Tributary of Croe A83_ML_030_000 | NN 23399 07254 | 27/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Fairly Poor |
| Tributary of Croe A83_ML_031_000 | NN 23361 07293 | 27/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate |
| Tributary of Croe A83_032_000_000 | NN 23265 07309 | 27/11/2023 | C - Straight/sinuous to step-pool, coarsest BO/BE, average CO | Moderate |

Table Note: Final Condition Score within five watercourses (*) downgraded by one condition class to account for excessive scour from upstream culvert jetting as per RCA guidance.

**Table A11-6.2 - River condition assessment summary (watercourses within Enhancement Sites)**

| Watercourse ID | Survey Location (National Grid Reference (NGR) for midpoint of MoRPh survey) | Date of Survey | Habitat (River Type) | Final River Condition |
|---|---|---|---|---|
| Trib of High Glen Croe Tributary (Enhancement Site 1) A83_LF_050_000 | NN 22881 06976 | 18/06/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Fairly Good |
| Trib of High Glen Croe Tributary (Enhancement Site 1) A83_LF_050_000 | NN 23020 07021 | 18/06/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Fairly Good |
| Trib of High Glen Croe Tributary (Enhancement Site 1) A83_LF_050_000 | NN 23148 06987 | 18/06/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Fairly Good |
| High Glen Croe Tributary (Enhancement Site 3a) | NN 23632 06506 | 27/03/2024 | F - Straight/sinuous, coarsest CO, average GP | Fairly Good |

| Watercourse ID | Survey Location (National Grid Reference (NGR) for midpoint of MoRPh survey) | Date of Survey | Habitat (River Type) | Final River Condition |
|---|---|---|---|---|
| High Glen Croe Tributary (Enhancement Site 3a) | NN 23750 06358 | 27/03/2024 | F - Straight/sinuous, coarsest CO, average GP | Fairly Good |
| High Glen Croe Tributary (Enhancement Site 3a) | NN 23842 06198 | 18/06/2024 | F - Straight/sinuous, coarsest CO, average GP | Moderate |
| High Glen Croe Tributary (Enhancement Site 3a) | NN 23877 06025 | 18/06/2024 | F - Straight/sinuous, coarsest CO, average GP | Moderate |
| Croe Water A83_ML_015_000 (Enhancement Site 3b) | NN 24223 05291 | 26/03/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Fairly Good |
| Croe Water A83_ML_015_000 (Enhancement Site 3b) | NN 24498 04969 | 26/03/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Fairly Good |

| Watercourse ID | Survey Location (National Grid Reference (NGR) for midpoint of MoRPh survey) | Date of Survey | Habitat (River Type) | Final River Condition |
|---|---|---|---|---|
| Croe Water A83_ML_015_000 (Enhancement Site 3b) | NN 24656 04566 | 26/03/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Moderate |
| Croe Water A83_ML_015_000 (Enhancement Site 3b) | NN 25464 04237 | 25/03/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Moderate |
| Croe Water A83_ML_015_000 (Enhancement Site 3b) | NN 25953 04190 | 25/03/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Fairly Good |
| Croe Water A83_ML_015_000 (Enhancement Site 3b) | NN 26394 04057 | 25/03/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Fairly Good |
| Croe Water A83_ML_015_000 (Enhancement Site 3b) | NN 26879 03830 | 25/03/2024 | D - Straight/sinuous to plane bed, coarsest BO/BE, average GP | Fairly Good |

### Watercourse Macroinvertebrate Survey

A11-6.4.19. The stratified sampling approach identified 14 macroinvertebrate survey sites, over 11 watercourses, for detailed assessment. Watercourse aquatic macroinvertebrate communities recorded across the study area are indicative of high flow velocity, minimal sedimentation and moderate to low levels of organic pollution. Communities are highly sensitive to flow reduction and sedimentation.

A11-6.4.20. Taxa richness was high, with 79 species recorded across all the sites surveyed, including three priority species (as defined by CIEEM), one of which is listed on the SBL. Refer to Table A11-6.3 for a summary of macroinvertebrate surveys, including the range of key biotic indices associated with the survey events. For a full list of species recorded and community metrics refer to Annex 11.6.D and Annex 11.6.E respectively.

**Table A11-6.3 - Watercourse macroinvertebrate summary**

| Survey Site ID and (NGR) | Watercourse(s) | CCI Range | LIFE (Species) Range | PSI (Species) Range | WHPT (NTAXA) Range | WHPT (ASPT) Range | WHPT | Summary | Priority Species |
|---|---|---|---|---|---|---|---|---|---|
| A83_ML_008_000 (NN 24361 05285)<br>A83_ML_015_000 (NN 24312 06114)*<br>ML_A83_015_000 (NN 24000 05989)*<br>A83_ML_018_000 (NN 239920 6326)<br>A83_ML_021_000 (NN 23886 06492)<br>A83_ML_027_000 (NN 23518 07046)<br>A83_ML_024_000 (NN 23629 06670)<br>A83_ML_031_000 (NN 23336 07093)<br>A83_ML_045_000 (NN 23097 08296)<br>A83_LF_013_000 (NN 24146 05256)<br>*Croe Water sites within the high gradient section flowing east-west beneath the Proposed Scheme. | Headwaters | 4.75 - 18.85 | 7.75 - 9.00 | 57.14 - 100.00 | 7-26 | 5.43 - 8.18 | 38.01 - 192.75 | Community species richness is high within these headwater systems, with a total of 71 species recorded across all watercourses. The mean number of scoring taxa per watercourse is 15 (Scottish mean is approximately 25).<br>Biological metrics are indicative of minimally sedimented systems with a species assemblage sensitive to reduced flows and organic pollution. CCI scores are variable and are indicative of species assemblages of moderate to high conservation importance. | *Ameletus inopinatus* (a mayfly) - Nationally Scarce - Occurring in 16-100 hectads in Great Britain. Includes rare species qualifying under the main IUCN criteria.<br><br>*Laccobius ytenensis* (a beetle) - Nationally Scarce (Notable B) - Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain and thought to occur in between 31 and 100 10km squares of the National Grid. |

| Survey Site ID and (NGR) | Watercourse(s) | CCI Range | LIFE (Species) Range | PSI (Species) Range | WHPT (NTAXA) Range | WHPT (ASPT) Range | WHPT | Summary | Priority Species |
|---|---|---|---|---|---|---|---|---|---|
| CROE_10215_003 (NN 23974 05864)<br>CROE_10215_002 (NN 24582 04906)<br>CROE_10215_001(NN 25210 04348)<br>Croe Water sites within the lower gradient section flowing north to south, downstream of the confluence of the High Glen Croe Tributary, and the high-gradient section of Croe Water flowing east-west beneath the Proposed Scheme. | Croe Water | 4.33 - 15.00 | 7.71 - 8.86 | 75.00 - 100.00 | 6 - 22 | 6.14 - 7.70 | 44.88 - 163.9 | Community species richness is variable within the upper reaches of the Croe Water, with a total of 43 species recorded across all sites. The mean number of scoring taxa is 13 (Scottish mean is approximately 25).<br>Biological metrics are indicative of minimally sedimented systems with a species assemblage sensitive to reduced flows and organic pollution. CCI scores are variable and are indicative of species assemblages of moderate to fairly high conservation importance. | *Baetis niger* (a mayfly) - Taxa within SBL (qualifying as a UK Biodiversity Action Plan species). |
| CROE_10215_004 (NN 23612 06525) | High Glen Croe Tributary | 6.00 - 12.50 | 8.27 -8.67 | 80.00 - 88.40 | 8 - 18 | 5.94 - 6.84 | 52.32 - 123.12 | Community species richness is low within the upper Croe survey site with 18 species recorded. (Scottish mean is approximately 25).<br>Biological metrics are indicative of minimally sedimented systems with a species assemblage sensitive to reduced flows and organic pollution. CCI scores are indicative of species assemblages of moderate conservation importance. | *Baetis niger* (a mayfly) - Taxa within SBL (qualifying as a UK Biodiversity Action Plan species). |

### Fish Survey

A11-6.4.21. Seven sites were surveyed for fish. Of these surveys, four were undertaken at sites on the Croe Water (three within the lower gradient section flowing north-south, and one within the higher gradient section flowing east-west, downstream of the A83), one on the High Glen Croe Tributary and two on headwaters that intersect the Proposed Scheme (with surveys located downstream of the A83, approximately 15m upstream of watercourse confluences with the Croe Water). Due to high gradients and ephemeral nature of the headwater systems upstream of the A83, these watercourses were considered broadly unsuitable for fish. For details of each electric fish survey site refer to Annex 11.6.F.

A11-6.4.22. Brown tout were recorded in all sites surveyed with European eel Anguilla anguilla recorded at one site, both of which are included on the SBL and are Criterion Level B qualifying species under JNCC priority river species list. Habitat at survey locations consisted of high oxygen concentration as defined by the Scottish River Basin District (Standards) Directions gravel/pebble dominated riffle and run sequencies with boulder dominated runs more prevalent at higher gradient survey locations. For a summary of fish survey results refer to Table A11-6.4.

**Table A11-6.4 - Electric fish survey summary**

| Watercourse ID | Survey Location (NGR for downstream limit) | Species recorded | Summary |
|---|---|---|---|
| Croe Water (north-south) CROE_10215_001 | NN 25236 04340 | Brown trout | Gravel dominated riffle with an estimated biomass of 100.1g/100m$^2$ and a density of 53/100m$^2$. |

| Watercourse ID | Survey Location (NGR for downstream limit) | Species recorded | Summary |
|---|---|---|---|
| Croe Water (north-south) CROE_10215_002 | NN 24578 04898 | Brown trout<br>European eel | Cobble dominated riffle / run with an estimated biomass of 193g/100m$^2$ and a density of 24/100m$^2$. |
| Croe Water (north-south) CROE_10215_003 | NN 23936 05882 | Brown trout | Pebble and boulder dominated riffle with an estimated biomass of 140g/100m$^2$ and a density of 20/100m$^2$. One European eel was recorded. |
| Croe Water (east-west) A83_ML_015_000 | NN 23987 05989 | Brown trout | Cobble and boulder dominated run with an estimated biomass of 197g/100m$^2$ and a density of 20/100m$^2$. |
| High Glen Croe Tributary CROE_10215_004 | NN 23612 06522 | Brown trout | Pebble/sand/gravel dominated run with an estimated biomass of 574g/100m$^2$ and a density of 46/100m$^2$. |
| A83_ML_008_000 | NN 24347 05268 | Brown trout | Gravel dominated riffle with an estimated biomass of 100.1g/100m$^2$ and a density of 53/100m$^2$. |
| A83_ML_011_00 | NN 24259 05622 | Brown trout | Pebble/sand/gravel dominated run with an estimated biomass of 34g/100m$^2$ and a density of 10/100m$^2$. |

### Waterbody Macroinvertebrate Survey

A11-6.4.23. Two aquatic macroinvertebrate samples were undertaken on Loch Restil from the southern and eastern shore.

A11-6.4.24. Waterbody aquatic macroinvertebrate communities recorded across two sites within Loch Restil are indicative of high levels of sedimentation and moderate levels of organic pollution. Communities are of low conservation value. Results from Loch Restil macroinvertebrate surveys are presented in Table A11-6.5, alongside key community biotic indices. For a full list of macroinvertebrates recorded in Loch Restil refer to Annex 11.6.D.

**Table A11-6.5 - Loch Restil macroinvertebrate survey summary**

| Survey location | Survey Location (NGR) | CCI Range | WHPT (NTAXA) | WHPT ASPT Range | WHPT Range | Summary | Priority Species |
|---|---|---|---|---|---|---|---|
| Loch Restil Southern End | Loch (NN 22904- 07599) | 4.00 - 5.45 | 14 -15 | 4.97 - 5.93 | 74.55 – 83.02 | Community species richness is variable within Loch Restil with 17 species recorded across both sites.<br>Biological metrics are indicative of a species assemblage of low to moderate sensitivity to organic pollution. CCI scores for both sites and are indicative of species assemblages of low conservation importance. | None recorded |
| Loch Restil Eastern Shore | Loch (NN 22996 07951) | | | | | | |

### Waterbody Macrophyte Survey

A11-6.4.25. Macrophyte survey transects (perimeter, wader and boat) were undertaken within four sectors on Loch Restil.

A11-6.4.26. All four sectors have a combined NTAXA of 11 and are indicative of LEAFPACS ecological quality ratio (EQR) representing high status. No priority species were recorded. A full list of macrophyte species recorded is included in Annex 11.6.G.

## A11-6.5. Discussion and Conclusion

A11-6.5.1. A total of 55 watercourses were identified in the aquatic receptor study area from the desk study. These include 46 watercourses that are crossed by the Proposed Scheme and eight that are within 150m of the Proposed Scheme but not crossed.

A11-6.5.2. Watercourses and waterbodies (i.e. Loch Restil) were characterised from a combination of desk study and a suite of field surveys based on habitat suitability from walkover surveys and, for river macroinvertebrate sampling, a stratified sampling regime to ensure that survey effort was proportionate. Detailed survey methods for rivers comprised: MoRPh survey, electric fish survey, and aquatic macroinvertebrate survey. Detailed survey methods for standing waterbodies comprised: macroinvertebrate survey and LEAFPACS macrophyte survey.

A11-6.5.3. Analysis of desk study and field survey data, including species level conservation information (including CCI scores for macroinvertebrate communities and individual species designations as presented on the JNCC species of conservation interest spreadsheet) has been undertaken to inform the baseline nature conservation evaluation and impact assessment for each aquatic receptor identified within the study area, as reported in Volume 2, Chapter 11: Biodiversity.

# Annexes

# Annex 11.6.A. Argyll Fisheries Trust Electric Fishing Data

**Table A11-6.6 - Croe Water electric fishing sites**

| Site No. | Sub catchment | Easting | Northing | Altitude (m) |
|---|---|---|---|---|
| 3 | Middle mainstem | 225873 | 704179 | 55 |
| 4 | Middle mainstem | 225350 | 704300 | 80 |
| 5 | Middle mainstem | 224548 | 704774 | 95 |
| 6 | Tributary (upper river) | 224030 | 706016 | 125 |
| 7 | Upper mainstem | 223852 | 706109 | 115 |

**Table A11-6.7 - Croe Water electric fishing data**

| Site | Area (m²) | Salmon (no of fish) - Fry | Salmon (no of fish) - Parr | Salmon (no of fish) - Total | Trout (no of fish) - Fry | Trout (no of fish) - Parr | Trout (no of fish) - Total | Total Fish Density |
|---|---|---|---|---|---|---|---|---|
| 3 | 218 | 0.9 | 0.0 | 0.9 | 4.6 | 1.4 | 6.0 | 6.9 |
| 4 | 180 | 0.0 | 0.0 | 0.0 | 2.2 | 3.9 | 6.1 | 6.1 |
| 5 | 81 | 0.0 | 0.0 | 0.0 | 20.9 | 4.9 | 25.9 | 25.9 |
| 6 | 157 | 0.0 | 0.0 | 0.0 | 0.6 | 3.8 | 4.5 | 4.5 |
| 7 | 56 | 0.0 | 0.0 | 0.0 | 1.8 | 0.0 | 1.8 | 1.8 |

# Annex 11.6.B. Macroinvertebrate Indices - Descriptions

The following metrics were used to characterise macroinvertebrate community assemblages.

## Whalley Hawkes Paisley Trigg (WHPT)

WHPT score gives an indication of the degree of anthropogenic influence on the system. This includes organic discharges and the pressures associated with them, such as increases in organic loading, the concentrations of nutrients, ammonia and suspended solids, reduction in oxygen concentration and saturation, and habitat degradation, including reduced habitat diversity and increased siltation. It is made up of three metrics. WHPT total is the sum of all scores. WHPT N taxa is the number of scoring taxa found in the survey so is a measure of species richness. WHPT Average Score Per Taxa (ASPT) is the average WHPT score across all taxa recorded (calculated by dividing the WHPT total by N taxa).

## Average Score Per Taxon (ASPT)

This is the total WHPT score divided by the number of WHPT scoring taxa and is therefore independent of sample size. ASPT can vary from 0.00 (grossly polluted) to 6.00+ (excellent quality).

## Community Conservation Index (CCI)

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, 1991). CCI score interpretation can be found in Table A11-6.8.

**Table A11-6.8 - CCI score interpretation**

| CCI score | Interpretation | Conservation value |
|---|---|---|
| 0.0 to 5.0 | Sites supporting only common species and/or a community of low taxon richness. | Low |
| >5.0 to 10.0 | Sites supporting at least one species of restricted distribution and/or a community of moderate taxon richness. | Moderate |
| >10.0 to 15.0 | Sites supporting at least one uncommon species, or several species of restricted distribution and/or a community of high taxon richness. | Fairly high |
| >15.0 to 20.0 | Sites supporting several uncommon species, at least one of which may be nationally rare and/or a community of high taxon richness. | High |
| >20.0 | Sites supporting several rarities, including species of national importance, or at least one extreme rarity (e.g. taxa included in the British RDBs) and/or a community of very high taxon richness. | Very high |

## Proportion of Sediment-sensitive Invertebrates (PSI)

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 invertebrate species present within the macroinvertebrate community sampled i.e. the less a site is affected by silt the greater the PSI score. PSI score interpretation can be found in Table A11-6.9.

**Table A11-6.9 - PSI score interpretation**

| PSI Score | Riverbed Condition |
|---|---|
| 81-100 | Minimally sedimented/unsedimented |
| 61-80 | Slightly Sedimented |
| 41-60 | Moderately sedimented |
| 21-40 | Sedimented |

## Lotic invertebrate Index for Flow Evaluation (LIFE)

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. LIFE score interpretation can be found in Table A11-6.10.

**Table A11-6.10 - LIFE score interpretation**

| LIFE score | Interpretation |
|---|---|
| >7.2612q | High sensitivity to reduced flows |
| 6.51 - 7.25 | Moderately sensitive to reduced flows |
| <6.5 | Lowe sensitivity to reduced flows |

# Annex 11.6.C. Watercourse Screening

**Table A11-6.11 - Watercourses crossed by the Proposed Scheme within the study area**

Where the Length expected to be impacted by Proposed Scheme (m) is 'N/A' the watercourse is crossed by the Proposed Scheme, but no further watercourse loss is expected. For example, where an existing culvert is not being extended as part of the Proposed Scheme.

| Watercourse | Surveys undertaken | Length expected to be impacted by Proposed Scheme (m) | Appears on 1:50k OS Map | Appears on 1:25k OS Map |
|---|---|---|---|---|
| A83_ML_034_000 | N/A | 70.8 | No | No |
| A83_ML_033_B03 | N/A | Not Applicable | No | No |
| A83_ML_033_B02 | N/A | 5.6 | No | No |
| A83_ML_033_000 | N/A | Not Applicable | Yes | Yes |
| A83_ML_035_000 | N/A | Not Applicable | No | No |
| A83_ML_032_000 | MoRPh | 5.1 | Yes | Yes |
| A83_ML_031_A01 | N/A | Not Applicable | Yes | Yes |
| A83_ML_031_000 | Macroinvertebrates | Not Applicable | Yes | Yes |
| A83_ML_030_000 | MoRPh | 1.8 | No | Yes |
| A83_ML_029_000 | MoRPh | 14.0 | No | Yes |
| A83_ML_028_000 | MoRPh | 19.1 | No | Yes |

| Watercourse | Surveys undertaken | Length expected to be impacted by Proposed Scheme (m) | Appears on 1:50k OS Map | Appears on 1:25k OS Map |
|---|---|---|---|---|
| A83_ML_027_000 | Macroinvertebrates, MoRPh | 27.2 | Yes | Yes |
| A83_ML_026_B02 | N/A | Not Applicable | No | No |
| A83_ML_026_B01 | MoRPh | 22.9 | No | Yes |
| A83_ML_024_000 | Macroinvertebrates, MoRPh | 30.8 | Yes | Yes |
| A83_ML_023_000 | MoRPh | 55.2 | No | Yes |
| A83_ML_022_000 | N/A | 60 | No | No |
| A83_ML_021_000 | Macroinvertebrates, MoRPh | 88.9 | Yes | Yes |
| A83_ML_020_000 | MoRPh | 10.2 | No | No |
| A83_ML_019_000 | MoRPh | 92.7 | No | Yes |
| A83_ML_018_000 | Macroinvertebrates, MoRPh | 43.1 | No | Yes |
| A83_ML_024_B01 | N/A | Not Applicable | No | Yes |
| A83_ML_017_B01 | N/A | 10.4 | No | Yes |
| A83_ML_017_000 | MoRPh | 44.2 | No | Yes |
| A83_ML_021_B01 | N/A | 15.9 | No | Yes |
| A83_ML_016_000 | N/A | Not Applicable | No | Yes |

| Watercourse | Surveys undertaken | Length expected to be impacted by Proposed Scheme (m) | Appears on 1:50k OS Map | Appears on 1:25k OS Map |
|---|---|---|---|---|
| Croe Water A83_ML_015_000 | Macroinvertebrates, MoRPh (Proposed Scheme crossing and enhancement areas), Fish | 16.9 | Yes | Yes |
| A83_ML_014_000 | N/A | 33.7 | No | No |
| A83_ML_012_B03 | N/A | 35.5 | No | No |
| A83_ML_012_B02 | N/A | Not Applicable | No | Yes |
| A83_ML_025_000 | MoRPh | Not Applicable | Yes | Yes |
| A83_ML_012_000 | N/A | Not Applicable | Yes | Yes |
| A83_ML_011_000 | Macroinvertebrates, Fish | Not Applicable | Yes | Yes |
| A83_ML_010_B02 | N/A | Not Applicable | No | No |
| A83_ML_009_000 | N/A | Not Applicable | No | No |
| A83_ML_008_000 | N/A | Not Applicable | No | Yes |
| A83_ML_010_B01 | N/A | Not Applicable | No | Yes |
| A83_ML_Z05_B06 | N/A | Not Applicable | No | No |
| A83_ML_Z05_B05 | N/A | Not Applicable | No | No |
| A83_ML_Z05_B04 | N/A | Not Applicable | No | No |
| A83_ML_Z05_B03 | N/A | Not Applicable | No | No |

| Watercourse | Surveys undertaken | Length expected to be impacted by Proposed Scheme (m) | Appears on 1:50k OS Map | Appears on 1:25k OS Map |
|---|---|---|---|---|
| A83_ML_Z05_B02 | N/A | Not Applicable | No | No |
| A83_ML_Z05_B01 | N/A | Not Applicable | No | No |
| B828_001 | N/A | Not Applicable | No | No |
| B828_002 | N/A | Not Applicable | No | No |
| B828_003 | N/A | Not Applicable | No | No |

**Table A11-6.12 - Watercourses within 150m of the Proposed Scheme but not crossed**

| Watercourse | Surveys undertaken | Appears on 1:50k OS Map | Appears on 1:25k OS Map |
|---|---|---|---|
| A83_LF_050_000 | N/A | Yes | Yes |
| High Glen Croe Tributary | Macroinvertebrates, MoRPh (enhancement area only) | Yes | Yes |
| A83_LF_028_000 | N/A | No | No |
| A83_LF_026_000 | N/A | No | No |
| A83_LF_004_000 | N/A | No | Yes |
| A83_ML_037_000 | N/A | No | No |
| A83_LF_008_000 | N/A | Yes | Yes |
| A83_ML_036_000 | N/A | No | No |

# Annex 11.6.D. Macroinvertebrate Surveys

## Spring

**Table A11-6.13 - Species recorded within selected headwaters during spring surveys**

| Species | A83_ML_031_000 | A83_ML_024_000 | A83_ML_027_000 | A83_ML_021_000 | A83_ML_018_000 | A83_ML_015_000 | ML_A83_015_000 | A83_LF_013_000 | A83_ML_045_000 | A83_ML_008_000 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Chaetopteryx villosa* | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Oulimnius tuberculatus* | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Protonemura meyeri* | 1 | 0 | 0 | 0 | 0 | 3 | 8 | 0 | 0 | 0 |
| *Leuctra inermis* | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 2 | 4 | 9 |
| *Chloroperla tripunctata* | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 |
| *Velia caprai* | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| *Anacaena globulus* | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 6 | 8 |
| *Hydraena gracilis* | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| *Diplectrona felix* | 1 | 0 | 2 | 3 | 9 | 0 | 0 | 0 | 0 | 7 |
| *Potamophylax cingulatus* | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Silo pallipes* | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| *Oreodytes sanmarkii* | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Odeles marginata* | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| *Crenobia alpina* | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | 0 |
| *Isoperla grammatica* | 3 | 8 | 1 | 1 | 0 | 3 | 1 | 4 | 7 | 7 |
| *Electrogena lateralis* | 4 | 3 | 0 | 0 | 7 | 2 | 16 | 2 | 0 | 0 |
| *Limnius volckmari* | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| *Hydropsyche siltalai* | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Amphinemura sulcicollis* | 6 | 1 | 4 | 1 | 11 | 8 | 2 | 0 | 0 | 9 |
| *Elmis aenea* | 7 | 1 | 5 | 1 | 7 | 0 | 1 | 4 | 0 | 1 |

| Species | A83_ML_031_000 | A83_ML_024_000 | A83_ML_027_000 | A83_ML_021_000 | A83_ML_018_000 | A83_ML_015_000 | ML_A83_015_000 | A83_LF_013_000 | A83_ML_045_000 | A83_ML_008_000 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Simulium tuberosum* | 7 | 0 | 0 | 0 | 0 | 3 | 5 | 0 | 0 | 0 |
| *Baetis muticus* | 12 | 4 | 13 | 0 | 4 | 5 | 0 | 2 | 3 | 0 |
| *Plectrocnemia conspersa* | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 2 | 1 | 1 |
| *Siphonoperla torrentium* | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 |
| *Philopotamus montanus* | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| *Hydropsyche instabilis* | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Beraea pullata* | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Amphinemura sp.* | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 3 |
| *Galba truncatula* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Halesus radiatus* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 |
| *Dixa puberula* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Plectrocnemia geniculata* | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| *Siphlonurus lacustris* | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 10 | 0 |
| *Rhyacophila dorsalis* | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 |
| *Perla bipunctata* | 0 | 0 | 0 | 0 | 0 | 6 | 11 | 0 | 0 | 0 |
| *Polycentropus flavomaculatus* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| *Serratella ignita* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| *Glossosoma conformis* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| *Baetis rhodani* | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 |
| *Ameletus inopinatus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| *Gyrinus substriatus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| *Ampullaceana balthica* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| *Dinocras cephalotes* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

| Species | A83_ML_031_000 | A83_ML_024_000 | A83_ML_027_000 | A83_ML_021_000 | A83_ML_018_000 | A83_ML_015_000 | ML_A83_015_000 | A83_LF_013_000 | A83_ML_045_000 | A83_ML_008_000 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Wormaldia occipitalis* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| *Crunoecia irrorata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| *Leuctra moselyi* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| *Halesus digitatus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| *Brachyptera risi* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 |

**Table A11-6.14 - Species recorded within the Croe Water during spring surveys**

| Species | CROE_10215_003 | CROE_10215_002 | CROE_10215_001 |
|---|---|---|---|
| *Amphinemura sulcicollis* | 1 | 1 | 0 |
| *Isoperla grammatica* | 1 | 2 | 0 |
| *Elmis aenea* | 1 | 7 | 1 |
| *Amphinemura sp.* | 1 | 0 | 0 |
| *Brachyptera risi* | 1 | 0 | 0 |
| *Serratella ignita* | 1 | 28 | 7 |
| *Perla bipunctata* | 2 | 0 | 0 |
| *Limnius volckmari* | 3 | 28 | 12 |
| *Protonemura meyeri* | 3 | 3 | 0 |
| *Rhyacophila dorsalis* | 3 | 2 | 0 |
| *Antocha vitripennis* | 3 | 5 | 1 |

| Species | CROE_10215_003 | CROE_10215_002 | CROE_10215_001 |
|---|---|---|---|
| *Simulium argyreatum* | 3 | 0 | 0 |
| *Simulium tuberosum* | 5 | 99 | 0 |
| *Electrogena lateralis* | 5 | 0 | 0 |
| *Siphonoperla torrentium* | 0 | 1 | 0 |
| *Anacaena globulus* | 0 | 1 | 0 |
| *Oulimnius tuberculatus* | 0 | 1 | 1 |
| *Polycentropus flavomaculatus* | 0 | 1 | 1 |
| *Cordulegaster boltonii* | 0 | 1 | 0 |
| *Esolus parallelepipedus* | 0 | 1 | 0 |
| *Leuctra inermis* | 0 | 2 | 0 |
| *Baetis muticus* | 0 | 2 | 1 |
| *Hydropsyche siltalai* | 0 | 3 | 0 |
| *Hydraena gracilis* | 0 | 4 | 0 |

| Species | CROE_10215_003 | CROE_10215_002 | CROE_10215_001 |
|---|---|---|---|
| *Simulium cryophilum* | 0 | 0 | 1 |
| *Chaetopteryx villosa* | 0 | 0 | 1 |
| *Ancylus fluviatilis* | 0 | 0 | 1 |
| *Sialis fuliginosa* | 0 | 0 | 1 |
| *Oreodytes sanmarkii* | 0 | 0 | 2 |
| *Halesus digitatus* | 0 | 0 | 2 |
| *Siphlonurus lacustris* | 0 | 0 | 4 |
| *Halesus radiatus* | 0 | 0 | 5 |
| *Centroptilum luteolum* | 0 | 0 | 15 |

**Table A11-6.15 - Species recorded within the High Glen Croe tributary during spring surveys**

| Species | High Glen Croe Tributary |
|---|---|
| *Silo pallipes* | 1 |
| *Leuctra inermis* | 1 |
| *Amphinemura sulcicollis* | 1 |
| *Halesus radiatus* | 1 |
| *Baetis niger* | 1 |
| *Simulium cryophilum* | 1 |
| *Hydropsyche siltalai* | 2 |
| *Oreodytes sanmarkii* | 3 |
| *Isoperla grammatica* | 3 |
| *Siphonoperla torrentium* | 7 |

| Species | High Glen Croe Tributary |
|---|---|
| *Limnius volckmari* | 8 |
| *Simulium tuberosum* | 92 |

**Table A11-6.16 - Species recorded within Loch Restil during spring surveys**

| Species | Southern Shore | Eastern Shore |
|---|---|---|
| *Anabolia nervosa* | 6 | 0 |
| *Athripsodes cinereus* | 2 | 1 |
| *Chaetopteryx villosa* | 0 | 1 |
| *Cloeon dipterum* | 2 | 0 |
| *Cloeon simile* | 0 | 4 |
| *Cyrnus trimaculatus* | 0 | 1 |
| *Helobdella stagnalis* | 0 | 3 |
| *Leptophlebia vespertina* | 0 | 3 |

| Species | Southern Shore | Eastern Shore |
|---|---|---|
| *Limnephilus lunatus* | 7 | 0 |
| *Mystacides azurea* | 8 | 2 |
| *Nebrioporus elegans* | 0 | 1 |
| *Oulimnius tuberculatus* | 11 | 0 |
| *Plectrocnemia conspersa* | 2 | 0 |
| *Polycentropus flavomaculatus* | 0 | 1 |
| *Sericostoma personatum* | 1 | 0 |
| *Sialis lutaria* | 0 | 1 |
| *Tinodes waeneri* | 1 | 4 |

## Summer

**Table A11-6.17 - Species recorded within selected headwaters during summer surveys**

| Site/Species | A83_ML_031_000 | A83_ML_024_000 | A83_ML_027_000 | A83_ML_021_000 | A83_ML_018_000 | A83_ML_015_000 | ML_A83_015_000 | A83_LF_013_000 | A83_ML_045_000 | A83_ML_008_000 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Beraea maurus* | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| *Hydraena gracilis* | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 |
| *Oulimnius tuberculatus* | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Simulium argyreatum* | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Limnius volckmari* | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Rhyacophila dorsalis* | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| *Simulium cryophilum* | 2 | 4 | 0 | 2 | 0 | 0 | 0 | 3 | 0 | 2 |
| *Hydropsyche siltalai* | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Leuctra fusca* | 4 | 4 | 0 | 2 | 5 | 1 | 1 | 1 | 14 | 6 |
| *Odeles marginata* | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 7 | 2 | 1 |
| *Serratella ignita* | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Elmis aenea* | 10 | 0 | 9 | 12 | 6 | 2 | 0 | 3 | 0 | 4 |
| *Baetis muticus* | 0 | 1 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Electrogena lateralis* | 0 | 1 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 |
| *Isoperla grammatica* | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Plectrocnemia geniculata* | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| *Potamopyrgus antipodarum* | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| *Simulium aureum* | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Anacaena globulus* | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| *Chaetopteryx villosa* | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| *Plectrocnemia conspersa* | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 12 | 0 |

| Site/Species | A83_ML_031_000 | A83_ML_024_000 | A83_ML_027_000 | A83_ML_021_000 | A83_ML_018_000 | A83_ML_015_000 | ML_A83_015_000 | A83_LF_013_000 | A83_ML_045_000 | A83_ML_008_000 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Dixa dilatata* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 0 |
| *Philopotamus montanus* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Rhyacophila obliterata* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Velia caprai* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| *Amphinemura sulcicollis* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Cordulegaster boltonii* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Dixa nebulosa* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Silo pallipes* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Diplectrona felix* | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 |
| *Dixa puberula* | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| *Perla bipunctata* | 0 | 0 | 0 | 0 | 0 | 12 | 4 | 0 | 0 | 0 |
| *Oreodytes sanmarkii* | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| *Diura bicaudata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| *Agabus guttatus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| *Siphlonurus lacustris* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| *Baetis vernus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |

**Table A11-6.18 - Species recorded within the Croe Water during summer surveys**

| Site/Species | CROE_10215_003 | CROE_10215_002 | CROE_10215_001 |
|---|---|---|---|
| *Elmis aenea* | 1 | 0 | 0 |
| *Platambus maculatus* | 1 | 0 | 1 |
| *Simulium erythrocephalum* | 1 | 0 | 0 |
| *Rhyacophila dorsalis* | 2 | 0 | 0 |
| *Perla bipunctata* | 2 | 0 | 0 |
| *Limnius volckmari* | 4 | 9 | 27 |
| *Serratella ignita* | 4 | 4 | 49 |
| *Leuctra fusca* | 7 | 9 | 0 |
| *Plectrocnemia geniculata* | 0 | 1 | 0 |

| Site/Species | CROE_10215_003 | CROE_10215_002 | CROE_10215_001 |
|---|---|---|---|
| *Ancylus fluviatilis* | 0 | 2 | 3 |
| *Oulimnius tuberculatus* | 0 | 0 | 1 |
| *Ampullaceana balthica* | 0 | 0 | 1 |
| *Oreodytes sanmarkii* | 0 | 0 | 2 |
| *Simulium cryophilum* | 0 | 0 | 2 |
| *Baetis vernus* | 0 | 0 | 2 |
| *Centroptilum luteolum* | 0 | 0 | 2 |
| *Polycentropus flavomaculatus* | 0 | 0 | 2 |

**Table A11-6.19 - Species recorded within the High Glen Croe Tributary during summer surveys**

| Site/Species | CROE_10215_004 |
|---|---|
| *Oreodytes sanmarkii* | 1 |
| *Cordulegaster boltonii* | 1 |
| *Leuctra fusca* | 10 |
| *Limnius volckmari* | 3 |

## Autumn

**Table A11-6.20 - Species recorded within selected headwaters during autumn surveys**

| Site/Species | A83_ML_031_000 | A83_ML_024_000 | A83_ML_027_000 | A83_ML_021_000 | A83_ML_018_000 | A83_ML_015_000 | ML_A83_015_000 | A83_LF_013_000 | A83_ML_045_000 | A83_ML_008_000 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Baetis atlanticus/rhodani* | 13 | 1 | 4 | 34 | 43 | 5 | 7 | 23 | 2 | 20 |
| *Paraleptophlebia submarginata* | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Protonemura meyeri* | 3 | 0 | 0 | 14 | 16 | 4 | 6 | 10 | 0 | 12 |
| *Protonemura praecox/montana* | 1 | 0 | 0 | 0 | 0 | 6 | 2 | 48 | 3 | 6 |
| *Leuctra inermis* | 3 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 0 | 0 |
| *Perlodes mortoni* | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 1 |
| *Isoperla grammatica* | 9 | 0 | 25 | 9 | 21 | 3 | 0 | 16 | 13 | 10 |
| *Chloroperla tripunctata* | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Elmis aenea* | 3 | 0 | 7 | 5 | 5 | 0 | 0 | 2 | 0 | 1 |
| *Philopotamus montanus* | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 0 |
| *Plectrocnemia geniculata* | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hydropsyche siltalai* | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Diplectrona felix* | 1 | 0 | 4 | 4 | 34 | 0 | 0 | 3 | 1 | 2 |
| *Crunoecia irrorata* | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| *Rhyacophila dorsalis* | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| *Dixa puberula* | 0 | 1 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 0 |
| *Heptagenia group (Heptagenia, Electrogena & Kageronia)* | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| *Electrogena lateralis* | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 1 | 0 | 0 |

| Site/Species | A83_ML_031_000 | A83_ML_024_000 | A83_ML_027_000 | A83_ML_021_000 | A83_ML_018_000 | A83_ML_015_000 | ML_A83_015_000 | A83_LF_013_000 | A83_ML_045_000 | A83_ML_008_000 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Amphinemura sulcicollis* | 0 | 0 | 2 | 2 | 13 | 0 | 0 | 8 | 0 | 0 |
| *Leuctra hippopus* | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| *Siphonoperla torrentium* | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 |
| *Laccobius ytenensis* | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Chaetopteryx villosa* | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cordulegaster boltonii* | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Crenobia alpina* | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 |
| *Baetis muticus* | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| *Leuctra moselyi* | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 |
| *Anacaena globulus* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Limnebius truncatellus* | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| *Odeles marginata* | 0 | 0 | 0 | 0 | 11 | 1 | 0 | 0 | 0 | 0 |
| *Potamophylax cingulatus/latipennis* | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| *Silo pallipes* | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 1 | 5 |
| *Beraea maurus* | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 |
| *Dixa dilatata* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Perla bipunctata* | 0 | 0 | 0 | 0 | 0 | 1 | 18 | 0 | 0 | 0 |
| *Schmidtea lugubris/polychroa* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Ameletus inopinatus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| *Hydraena gracilis* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| *Plectrocnemia conspersa* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 |
| *Leuctra nigra* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

**Table A11-6.21 - Species recorded within the Croe Water during autumn surveys**

| Site/Species | CROE_10215_003 | CROE_10215_002 | CROE_10215_001 |
|---|---|---|---|
| *Protonemura praecox/montana* | 0 | 0 | 0 |
| *Perlodes mortoni* | 0 | 0 | 0 |
| *Diura bicaudata* | 0 | 0 | 0 |
| *Isoperla grammatica* | 0 | 0 | 0 |
| *Limnius volckmari* | 0 | 0 | 5 |
| *Rhyacophila dorsalis* | 0 | 1 | 0 |
| *Baetis atlanticus/rhodani* | 6 | 6 | 5 |
| *Protonemura meyeri* | 1 | 1 | 3 |
| *Perla bipunctata* | 1 | 1 | 0 |
| *Centroptilum luteolum* | 0 | 0 | 4 |

| Site/Species | CROE_10215_003 | CROE_10215_002 | CROE_10215_001 |
|---|---|---|---|
| *Baetis muticus* | 0 | 0 | 1 |
| *Baetis digitatus/niger* | 0 | 0 | 16 |

**Table A11-6.22 - Species recorded within the High Glen Croe tributary during autumn surveys**

| Site/Species | CROE_10215_004 |
|---|---|
| *Protonemura praecox/montana* | 1 |
| *Perlodes mortoni* | 2 |
| *Diura bicaudata* | 1 |
| *Isoperla grammatica* | 7 |
| *Limnius volckmari* | 2 |
| *Rhyacophila dorsalis* | 1 |

# Annex 11.6.E. Macroinvertebrate Indices - Results

## Spring

**Table A11-6.23 - Spring biotic indices for all sites**

| SITE ID | CCI | LIFE (species) | PSI (species) | WHPT NTAXA | WHPT ASPT | WHPT Score |
|---|---|---|---|---|---|---|
| A83_ML_008_000 | 12 | 8.38 | 82.93 | 20 | 6.56 | 131.20 |
| A83_ML_015_000 | 12.27 | 8.25 | 91.89 | 15 | 8.03 | 120.45 |
| ML_A83_015_000 | 12.33 | 8.41 | 93.75 | 19 | 7.69 | 146.11 |
| A83_ML_018_000 | 12.08 | 8.07 | 80.56 | 18 | 6.10 | 109.80 |
| A83_ML_021_000 | 6.00 | 7.75 | 78.57 | 11 | 6.13 | 67.43 |
| A83_ML_027_000 | 6.67 | 8.09 | 100.00 | 12 | 6.98 | 83.76 |
| A83_ML_024_000 | 5.70 | 8.46 | 93.55 | 15 | 7.30 | 109.5 |

| SITE ID | CCI | LIFE (species) | PSI (species) | WHPT NTAXA | WHPT ASPT | WHPT Score |
|---|---|---|---|---|---|---|
| A83_ML_031_000 | 10.24 | 8.08 | 86.27 | 24 | 6.67 | 160.08 |
| A83_ML_045_000 | 10.42 | 7.81 | 73.53 | 16 | 7.02 | 112.32 |
| A83_LF_013_000 | 5.00 | 8.57 | 90.48 | 10 | 6.68 | 66.80 |
| CROE_10215_003 | 11.67 | 8.50 | 94.87 | 16 | 7.30 | 116.80 |
| CROE_10215_002 | 10.26 | 8.38 | 87.30 | 22 | 7.45 | 163.90 |
| CROE_10215_001 | 11.56 | 7.71 | 76.32 | 18 | 6.17 | 111.06 |
| CROE_10215_004 | 9.58 | 8.32 | 88.37 | 18 | 6.84 | 123.12 |
| Loch Restil Southern End | 4.00 | 6.36 | 23.81 | 5.93 | 14.00 | 83.02 |
| Loch Restil Eastern Shore | 5.45 | 6.67 | 25.00 | 4.97 | 15.00 | 74.55 |

## Summer

**Table A11-6.24 - Summer biotic indices for all sites**

| SITE ID | CCI | LIFE (species) | PSI (species) | WHPT NTAXA | WHPT ASPT | WHPT Score |
|---|---|---|---|---|---|---|
| A83_ML_008_000 | 12.00 | 8.38 | 82.93 | 20 | 6.56 | 131.20 |
| A83_ML_015_000 | 13.33 | 8.33 | 89.66 | 15 | 7.00 | 105.00 |
| ML_A83_015_000 | 6.43 | 8.38 | 100.00 | 9 | 6.86 | 61.74 |
| A83_ML_018_000 | 11.15 | 8.00 | 80.00 | 18 | 6.69 | 120.42 |
| A83_ML_021_000 | 11.82 | 8.62 | 81.08 | 15 | 6.52 | 97.80 |
| A83_ML_027_000 | 5.50 | 7.78 | 76.92 | 11 | 5.48 | 60.28 |
| A83_ML_024_000 | 11.67 | 8.43 | 90.32 | 13 | 6.47 | 84.11 |
| A83_ML_031_000 | 4.75 | 8.19 | 86.84 | 16 | 6.62 | 105.92 |
| A83_ML_045_000 | 14.09 | 8.50 | 86.84 | 16 | 6.53 | 104.48 |
| A83_LF_013_000 | 12.22 | 8.47 | 88.57 | 14 | 7.22 | 101.08 |

| SITE ID | CCI | LIFE (species) | PSI (species) | WHPT NTAXA | WHPT ASPT | WHPT Score |
|---|---|---|---|---|---|---|
| CROE_10215_003 | 4.33 | 8.42 | 100.00 | 10 | 6.83 | 68.30 |
| CROE_10215_002 | 5.14 | 8.17 | 91.30 | 11 | 6.18 | 67.98 |
| CROE_10215_001 | 9.62 | 8.00 | 75.00 | 19 | 6.14 | 116.66 |
| CROE_10215_004 | 6.00 | 8.27 | 80.00 | 10 | 5.94 | 59.40 |

## Autumn

**Table A11-6.25 - Autumn biotic indices for all sites**

| SITE ID | CCI | LIFE (species) | PSI (species) | WHPT NTAXA | WHPT ASPT | WHPT Score |
|---|---|---|---|---|---|---|
| A83_ML_008_000 | 11.79 | 8.58 | 83.67 | 23 | 7.77 | 178.71 |
| A83_ML_015_000 | 14.29 | 8.70 | 100.00 | 9 | 8.16 | 73.44 |
| ML_A83_015_000 | 13.57 | 9.00 | 96.15 | 10 | 7.93 | 79.30 |
| A83_ML_018_000 | 12.62 | 8.54 | 85.71 | 26 | 7.38 | 191.88 |
| A83_ML_021_000 | 15.00 | 8.54 | 81.58 | 18 | 7.49 | 134.82 |

| SITE ID | CCI | LIFE (species) | PSI (species) | WHPT NTAXA | WHPT ASPT | WHPT Score |
|---|---|---|---|---|---|---|
| A83_ML_027_000 | 18.85 | 8.22 | 86.36 | 18 | 6.63 | 119.34 |
| A83_ML_024_000 | 11.67 | 8.00 | 57.14 | 7 | 5.43 | 38.01 |
| A83_ML_031_000 | 13.21 | 8.68 | 95.83 | 15 | 8.18 | 122.70 |
| A83_ML_045_000 | 12.78 | 8.47 | 87.50 | 15 | 6.75 | 101.25 |
| A83_LF_013_000 | 13.13 | 8.67 | 92.31 | 18 | 7.48 | 134.64 |
| CROE_10215_003 | 15.00 | 8.6 | 100.00 | 6 | 7.48 | 44.88 |
| CROE_10215_002 | 12.50 | 8.86 | 88.89 | 8 | 7.70 | 61.60 |
| CROE_10215_001 | 11.50 | 8.00 | 82.14 | 14 | 6.80 | 95.20 |
| CROE_10215_004 | 12.50 | 8.67 | 87.50 | 8 | 6.54 | 52.32 |

# Annex 11.6.F. Fish Surveys

**Table A11-6.26 - Electric fishing survey data for all sites**

| Site/Parameter | Croe_10215_001 | Croe_10215_002 | Croe_10215_003 | A83_ML_015_000 | High Glen Croe Tributary | A83_ML_008_000 | A83_ML_011 |
|---|---|---|---|---|---|---|---|
| Date | 08/08/2023 | 08/08/2023 | 09/08/2023 | 09/10/2023 | 10/08/2023 | 09/08/2023 | 10/08/2023 |
| Site Length (m) | 32.0 | 32.0 | 32.0 | 35.0 | 70.0 | 70.0 | 30.0 |
| Av width (m) | 7.5 | 8.0 | 5.5 | 3.0 | 1.5 | 1.0 | 1.0 |
| Max depth (m) | 0.7 | 0.5 | 0.4 | 0.3 | 0.7 | 0.4 | 0.3 |
| Av depth (m) | 0.3 | 0.2 | 0.3 | 0.3 | 0.2 | 0.1 | 0.1 |
| Flow conditions (m/s) | 0.25 | 0.5 | 0.25 | 0.3 | 0.30 | 0.4 | 0.4 |

| Site/Parameter | Croe_10215_001 | Croe_10215_002 | Croe_10215_003 | A83_ML_015_000 | High Glen Croe Tributary | A83_ML_008_000 | A83_ML_011 |
|---|---|---|---|---|---|---|---|
| Equipment | Backpack eFish | Backpack efish | Backpack efish | Backpack efish | Backpack efish | Backpack efish | Backpack efish |
| Conductivity (mS) | 43 | 44.06 (spc 53.95) | 50.83 (spc 62.08) | 31.54 (spc 40.37) | 48 | 34 | 50.72 |
| p.H. | 7.1 | 7.4 | 7.1 | 7.9 | 6.8 | 6.7 | 7.0 |
| % Riffle | 0 | 55 | 65 | 30 | 35 | 65 | 50 |
| % Run | 80 | 30 | 30 | 60 | 35 | 30 | 49 |
| % Glide | 10 | 15 | 5 | 0 | 15 | 5 | 0 |
| % Pool | 10 | 0 | 0 | 10 | 15 | 0 | 1 |
| No of anodes | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| O2 (mg/L) | 9.4 | 9.2 | 9.1 | 9.8 | 9.0 | 9.9 | 9.4 |

| Site/Parameter | Croe_10215_001 | Croe_10215_002 | Croe_10215_003 | A83_ML_015_000 | High Glen Croe Tributary | A83_ML_008_000 | A83_ML_011 |
|---|---|---|---|---|---|---|---|
| Temp, (°C) | 13.8 | 15.4 | 15.5 | 13.6 | 13.7 | 11.2 | 13.3 |
| % Sand & silt | 10 | 10 (sand) | 5 | 5 | 30 | 10 (sand) | 25 |
| % Gravel | 65 | 15 | 15 | 15 | 30 | 45 | 25 |
| % Cobble | 14 | 55 | 15 | 45 | 10 | 15 | 25 |
| % Pebble | 10 | 10 | 30 | 15 | 30 | 25 | 0 |
| % Boulder | 1 | 10 | 35 | 20 | 1 | 5 | 25 |
| % Bedrock | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 (%) | 91.6 | 92.8 | 91.9 | 95.1 | 87.0 | 91.1 | 90.5 |
| Sal. (ppt) | 0.025 | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 |
| Brown Trout | 12 | 59 | 32 | 21 | 42 | 35 | 3 |

| Site/Parameter | Croe_10215_001 | Croe_10215_002 | Croe_10215_003 | A83_ML_015_000 | High Glen Croe Tributary | A83_ML_008_000 | A83_ML_011 |
|---|---|---|---|---|---|---|---|
| European eel | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Average forklength | 87.8 | 80.7 | 81.4 | 89.1 | 91.5 | 66.1 | 55.0 |
| Biomass grams fish per 100 $m^2$ | 55.0 | 193.0 | 139.7 | 197.3 | 574.0 | 199.1 | 34.0 |
| fish per 100 $m^2$ ± Standard Error | 5 ± 0 | 0.39 ± 0 | 19.89 ± 1.51 | 20 ± 0 | 45.71 ± 4.29 | 52.86 ± 2.85 | 10.00 ± 0 |

# Annex 11.6.G. Macrophyte Surveys

**Table A11-6.27 – Macrophyte species within each survey sector of Loch Restil**

| Sector | Perimeter | Wader | Boat | NGR |
|---|---|---|---|---|
| 1 | *Isoetes lacustri, Juncus bulbosus, Eriophorum angustifolium, Ranunculus flammula* | *Juncus bulbosus, Littorella uniflora, Lobelia dortmanna, Myriophyllum alterniflorum, Ranunculus (sub sect. Batrachian) sp., Juncus acutiflorus, Juncus effusus* | *Juncus bulbosus, Littorella uniflora, Lobelia dortmanna, Myriophyllum alterniflorum, Subularia aquatica* | NN 23049 09221 |
| 2 | *Isoetes lacustris, Juncus bulbosus, Eriophorum angustifolium, Juncus acutiflorus, Juncus articulatus* | *Isoetes lacustris, Juncus bulbosus, Littorella uniflora, Lobelia dortmanna, Nitella flexilis agg., Sparganium angustifolium, Subularia aquatica, Carum verticillatum, Ranunculus flammula* | *Littorella uniflora* | NN 22890 08103 |
| 3 | *Juncus bulbosus, Potamogeton polygonifolius, Sparganium angustifolium, Juncus acutiflorus* | *Isoetes lacustris, Juncus bulbosus, Littorella uniflora, Lobelia dortmanna, Myriophyllum alterniflorum, Nitella flexilis agg., Subularia aquatica, Juncus acutiflorus* | | NN 22890 07732 |
| 4 | *Juncus bulbosus, Caltha palustris, Glyceria fluitans, Juncus acutiflorus* | *Isoetes lacustris, Juncus bulbosus, Littorella uniflora, Lobelia dortmanna, Myriophyllum alterniflorum, Nitella flexilis agg., Subularia aquatica, Juncus acutiflorus, Nitella flexilis agg., Ranunculus (sub sect. Batrachian) sp., Subularia aquatica, Ranunculus flammula* | *Nitella flexilis agg.* | NN 23028 07886 |

# Annex 11.6.H. MoRPh Indicators values

**Table A11-6.28 - Positive and negative MoRPh indicator scores for each site (watercourses intersecting the Proposed Scheme)**

| SITE ID | B1 | B2 | B3 | B4 | B5 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | D1 | D2 | D3 | D4 | D5 | E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 | E11 | E12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A83_ML_015_000 | 2 | 0 | 0 | 0 | -3 | 2 | 0 | 3 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 2 | 4 | 3 | 4 | 0 | 0 | 0 | -1 | 0 | 0 |
| A83_ML_017_000 | 2 | 0 | 0 | 0 | -2 | 2 | 0 | 3 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 3 | 4 | 3 | 3 | 0 | 0 | 0 | -1 | 0 | -1 |
| A83_ML_018_000 | 2 | 0 | 0 | 0 | -2 | 2 | 0 | 2 | 2 | 3 | 1 | -1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 3 | 2 | 3 | 0 | 0 | 0 | -1 | 0 | 0 |
| A83_ML_019_000 | 2 | 0 | 3 | 0 | -2 | 2 | 0 | 1 | 1 | 1 | 1 | -4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 3 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| A83_ML_021_000 | 2 | 0 | 0 | 0 | -2 | 2 | 0 | 3 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 2 | 4 | 2 | 3 | 0 | 0 | 0 | -4 | 0 | -1 |
| A83_ML_023_000 | 2 | 0 | 0 | 0 | -1 | 2 | 0 | 3 | 4 | 3 | 4 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 1 | 0 | 1 | 0 | 2 | 3 | 2 | 3 | 0 | 0 | 0 | -2 | 0 | 0 |

| SITE ID | B1 | B2 | B3 | B4 | B5 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | D1 | D2 | D3 | D4 | D5 | E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 | E11 | E12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A83_ML_024_000 | 2 | 0 | 0 | 0 | -2 | 2 | 0 | 2 | 3 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 0 | 1 | 4 | 2 | 3 | 0 | 0 | 0 | -1 | 0 | -1 |
| A83_ML_025_000 | 2 | 0 | 0 | 0 | -2 | 1 | 0 | 3 | 3 | 4 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 3 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| A83_ML_026_B01 | 2 | 0 | 0 | 0 | -2 | 1 | 0 | 3 | 3 | 2 | 4 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | -2 | 0 | -1 |
| A83_ML_027_000 | 1 | 0 | 0 | 0 | -2 | 2 | 0 | 3 | 3 | 4 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | -2 |
| A83_028_000_000 | 1 | 0 | 0 | 0 | -2 | 2 | 0 | 3 | 4 | 3 | 0 | -1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 1 | 3 | 2 | 2 | 0 | 0 | 0 | -2 | 0 | 0 |
| A83_ML_029_000 | 2 | 0 | 0 | 0 | -2 | 2 | 0 | 3 | 4 | 3 | 1 | -3 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 3 | 1 | 3 | 0 | 0 | 0 | -2 | 0 | -1 |
| A83_ML_030_000 | 1 | 0 | 0 | 0 | -3 | 0 | 0 | 3 | 1 | 0 | 1 | 0 | -4 | -4 | 0 | 0 | 0 | 0 | 0 | -1 | 2 | 0 | 1 | 3 | 1 | 0 | 0 | -4 | 0 | 0 | 0 | -1 |

| SITE ID | B1 | B2 | B3 | B4 | B5 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | D1 | D2 | D3 | D4 | D5 | E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 | E11 | E12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A83_ML_-31_000 | 2 | 0 | 0 | 0 | -2 | 1 | 0 | 3 | 2 | 4 | 0 | -2 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 4 | 3 | 3 | 0 | 0 | 0 | -2 | 0 | -1 |

**Table A11-6.29 - Positive and negative MoRPh indicator scores for each site (watercourses within Enhancement Sites)**

| SITE ID | B1 | B2 | B3 | B4 | B5 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | D1 | D2 | D3 | D4 | D5 | E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 | E11 | E12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Croe Water | 4 | 1 | 1 | 0 | -2 | 3 | 1 | 3 | 4 | 4 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 3 | 0 | 1 | 0 | 3 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Croe Water | 2 | 0 | 1 | 0 | -2 | 2 | 1 | 3 | 4 | 4 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Croe Water | 4 | 1 | 2 | -1 | -4 | 2 | 1 | 3 | 3 | 4 | 2 | -2 | -2 | -2 | 0 | 2 | 1 | 1 | 2 | -1 | 1 | 1 | 1 | 3 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Croe Water | 3 | 2 | 0 | 0 | -3 | 3 | 1 | 3 | 4 | 4 | 1 | -2 | -2 | -2 | 0 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | -3 | 0 | 0 |

| SITE ID | B1 | B2 | B3 | B4 | B5 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | D1 | D2 | D3 | D4 | D5 | E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 | E11 | E12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Croe Water | 4 | 2 | 0 | 0 | -3 | 3 | 2 | 3 | 4 | 4 | 1 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 1 | 0 | 1 | 2 | 2 | 3 | 3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Croe Water | 4 | 2 | 2 | -2 | -1 | 3 | 2 | 3 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 3 | 0 | 1 | 0 | 2 | 3 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Croe Water | 4 | 1 | 0 | -3 | 0 | 3 | 2 | 3 | 4 | 2 | 1 | 0 | 0 | 0 | -1 | 3 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 4 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| High Glen Croe Tributary | 2 | 1 | 2 | 0 | -1 | 2 | 0 | 3 | 4 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 2 | 0 | 2 | 3 | 2 | 3 | 0 | 0 | 0 | -3 | 0 | 0 |
| High Glen Croe Tributary | 3 | 0 | 2 | 0 | -1 | 2 | 1 | 3 | 4 | 2 | 4 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 3 | 0 | 1 | 0 | 2 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| High Glen Croe Tributary | 3 | 0 | 2 | 0 | -1 | 2 | 0 | 3 | 4 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 2 | 3 | 2 | 2 | -1 | 0 | 0 | -3 | 0 | -3 |

| SITE ID | B1 | B2 | B3 | B4 | B5 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | D1 | D2 | D3 | D4 | D5 | E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 | E11 | E12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High Glen Croe Tributary | 2 | 0 | 1 | 0 | -1 | 2 | 1 | 3 | 4 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 | 1 | 2 | 3 | 2 | 3 | -2 | 0 | 0 | -1 | 0 | -4 |
| A83_LF_050_000 | 3 | 2 | 0 | 0 | -2 | 3 | 1 | 3 | 3 | 4 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 3 | 3 | -1 | 0 | 0 | 0 | 0 | -3 |
| A83_LF_050_000 | 3 | 0 | 0 | 0 | 0 | 3 | 1 | 3 | 2 | 3 | 4 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 3 | 4 | 4 | 3 | -1 | 0 | 0 | 0 | 0 | -3 |
| A83_LF_050_000 | 3 | 0 | 0 | 0 | 0 | 3 | 1 | 3 | 2 | 3 | 4 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 2 | 1 | 2 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | -2 |
| High Glen Croe Tributary | 3 | 0 | 2 | 0 | -1 | 2 | 0 | 3 | 4 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 2 | 3 | 2 | 2 | -1 | 0 | 0 | -3 | 0 | -3 |

# Annex 11.6.I. Photographs

## Photographs from module three (midpoint) of each MoRPh survey locations (watercourses intersecting the Proposed Scheme)

**Photograph 1 - SITE ID - A83_ML_015_000 NGR - NN 24145 06008 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 2 - SITE ID - A83_ML_017_000 NGR - NN 24099 06135 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 3 - SITE ID - A83_ML_018_000 NGR - NN 24034 06384 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 4 - SITE ID - A83_ML_019_000 NGR - NN 23934 06475 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 5 - SITE ID - A83_ML_021_000 NGR - NN 23891 06541 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 6 - SITE ID - A83_ML_023_000 NGR - NN 23790 06718 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 7 - SITE ID - A83_ML_024_000 NGR - NN 23740 06781 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 8 - SITE ID - A83_ML_025_000 NGR - NN 23650 06882 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 9 - SITE ID - A83_ML_026_B01 NGR - NN 23602 06961 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 10 - SITE ID - A83_ML_027_000 NGR - NN 23538 07070 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 11 - SITE ID - A83_028_000_000 NGR - NN 23494 07112 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 12 - SITE ID - A83_ML_029_000 NGR - NN 23420 07178 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 13 - SITE ID - A83_ML_030_000 NGR - NN 23399 07252 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 14 - SITE ID - A83_ML_031_000 NGR - NN 23358 07279 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 15 - SITE ID - A83_032_000_000 NGR - NN 23265 07296 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

## Photographs from module three (midpoint) of each MoRPh survey locations within Enhancement sites

**Photograph 16 - SITE ID - Croe Water Survey ID: FLS_HGCT_001 NGR - NN 24231 05318 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 17 - SITE ID - Croe Water Survey ID: FLS_HGCT_002 NGR - NN 24484 04989 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 18 - SITE ID – Croe Water Survey ID: FLS_HGCT_003 NGR – NN 24654 04568 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 19 - SITE ID – Croe Water Survey ID: FLS_HGCT_005 NGR – NN 25475 04236 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 20 - SITE ID: Croe Water Survey ID: FLS_HGCT_006 NGR - NN 25956 04191 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 21 - SITE ID – Croe Water Survey ID: FLS_HGCT_007 NGR - NN 26383 04050 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 22 - SITE ID – Croe Water Survey ID: FLS_HGCT_008 NGR - NN 26887 03824 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 22 - SITE ID - High Glen Croe Tributary Survey ID: FLS_HGCT_001 NGR - NN 23633 06504 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 23 - SITE ID - High Glen Croe Tributary Survey ID: FLS_HGCT_002 NGR - NN 23756 06360 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 24 - SITE ID - High Glen Croe Tributary Survey ID: FLS_HGCT_003 NGR - NN 23839 06197 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 25 - SITE ID - High Glen Croe Tributary Survey ID: FLS_HGCT_004 NGR - NN 23876 06032 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 26 - SITE ID - A83_LF_050_000 Survey ID: FLS_HGCT_101 NGR - NN 22880 06975 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 27 - SITE ID - A83_LF_050_000 Survey ID: FLS_HGCT_102 NGR - NN 22992 07003 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**

**Photograph 28 - SITE ID - A83_LF_050_000 Survey ID: FLS_HGCT_103 NGR - NN 23149 06984 showing watercourse habitat characteristics, taken from MoRPh module three (survey midpoint)**