Appropriate Assessment Stage 1 Screening and Stage 2 Natura Impact Statement of the Long Term Management Plan for the Great Western Lakes

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Table of Contents

1. INTRODUCTION

Inland Fisheries Ireland (IFI) is the statutory body with the responsibility for the protection, development and management of the inland fishery resource within the State (Inland Fisheries Act 2010). Inland Fisheries Ireland (IFI) is responsible for the day-to-day management of our inland fisheries resource, which includes the protection, management, conservation and improvement of inland fisheries, including sea angling. IFI enforces fisheries legislation, sets conservation limits for salmon and sea trout fisheries, and issues fishing licences and permits. It is also responsible for fisheries and habitat development, and for providing scientific research and management advice to the Minister for the Environment, Climate Action and Communications

Historically, a number of large limestone lakes in the west of Ireland have been managed preferentially as wild Brown trout (*Salmo trutta*) fisheries. In accordance with Inland Fisheries Ireland's (IFI) most recent policy direction and their statutory remit for the management of Ireland's inland fisheries resources, seven lakes, primarily in the west of Ireland, are managed as salmonid waters. These lakes are Loughs Corrib, Mask, Carra, Cullen, Conn, Arrow and Sheelin. The emphasis of proposed management programmes for these lakes will be to protect, conserve and, where possible, enhance their natural attributes and native biodiversity which will, in turn, optimise their potential as sustainable wild Brown trout and, in some cases, Atlantic salmon (*Salmo salar*) fisheries. Atlantic salmon are listed in Annex II of the EU Habitats Directive (92/43/EEC) and their conservation is mandated in European countries. Brown trout are not specifically protected by the EU Habitats Directive. IFI's interest in other fish species not specifically protected by the EU Habitats Directive include the European eel (*Anguilla anguilla*) (Council Regulation (EC) No 1100/2007, establishing measures for the recovery of the stock of European eel), Arctic Char (*Salvelinus alpinus*) (which were once found in most of the 7 lakes but are now only found in Lough Mask) and Ferox trout (*Salmo ferox*) (large, long-lived trout that are behaviourally and genetically distinct from other wild Brown trout stocks) is also reflected in the plan. Through a series of targeted actions, connected to an overall strategy (The Long-term Management Plan for the Great Western Lakes), IFI will coordinate programmes under 7 categories of High-Level Objectives (HLO). Each HLO aligns to IFI's Corporate Plan (2021 to 2025) and is outlined in the following Sections of this document with an associated proposed series of actions.

1.1. INVAS Biosecurity Company Background

INVAS Biosecurity Ltd. is an Irish company that uses the most up-to-date applied research and science to inform its environmental consultancy and contracting services. The team includes experienced contractors and world-renowned scientists. The company specialises in the control and management of harmful invasive species on land and in water, and on developing materials and methods to conduct and promote best biosecurity practice by all. Clients include State and semi-State organisations, cross-border bodies, Local Authorities, Consultants, Contractors, among others. Staff are currently involved with a number of national and multi-national European projects, all with a primary focus on the judicious management of invasive species.

Prof Joe Caffrey (Company Director), who joined INVAS in January 2015, having been a Senior Research Officer (SRO) with IFI since 1976. While working with IFI and its predecessor organisations, Joe was the SRO-in-charge of the Invasive Species Section within Research. Joe is also a biosecurity specialist who has prepared protocols for national bodies and targeted stakeholders and has developed new and innovative biosecurity products for broad-scale use. He has a broad range of experience with invasive terrestrial and aquatic plant sampling, identification, control and management, as well as habitat restoration post-traumatic events (e.g. biological invasions). Since the year 2000, he has been involved in several major national and international projects, mostly dealing with invasive species management, including;

- Life+ CAISIE from 2009 to 2013 – project leader
- Interreg IVA CIRB from 2010 to 2014 – project partner
- Life+ Mulkear from 2009 to 2014 – technical advisor
- EPA 3-year project on ‘Prevention, control and eradication of invasive alien species’ (2016 –2020), where INVAS is project partner with IT Sligo and QUB
- River Suck peat siltation project, monitoring salmonid stocks in the River Suck tributaries 1980 – 1984.

With a specialist skillset including;

- Netting for fish using all net types (e.g. braided / multimesh gill, fyke, seine, trawl) in streams, rivers, canals, lakes and estuaries

- Electrofishing in small streams and from boats in large rivers/lake littorals, using 240v and 600v pulsed electricity
- Stream/river rehabilitation techniques
- Habitat restoration post-traumatic events (e.g. biological invasions, dredging)
- Lake fishery creation (including design, planting, fish stocking) in cutaway bogs
- Biosecurity specialist who has prepared protocols for targeted stakeholders (e.g. anglers, boaters, paddle sports, divers, field staff, etc.) and has developed new and innovative biosecurity products for broad-scale use.

Dr. William Earle has a Ph.D. in invasive species management and is working full-time as a biosecurity manager with INVAS since 2016. His Ph.D. focused on *Lagarosiphon major*, an aquatic invasive weed that can severely impacts on salmonids, particularly in Lough Corrib. William is responsible for Invasive Alien Species (IAS), macrophyte and ecological field surveys using drone and GPS technology. He is in charge of GIS mapping and map production in INVAS, as well as site survey reports and Appropriate Assessment preparation. William has produced AA Screenings and NIS reports for IFI on the management of Natura sites and their Conservation Objectives throughout Ireland, with some of the most relevant projects including;

- Appropriate Assessment Stage 1 Screening for Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations 2020 & 2021
- Appropriate Assessment Stage 1 Screening for Conservation of Salmon and Sea Trout (Draft Nets and Snap Nets) Bye-law, 2021 & 2022
- AA Screening & Natura Impact Statement for numerous River Enhancement Plans in the Corrib Catchment 2019 to present
- Appropriate Assessment Screening for the Management of *Lagarosiphon major* in Lough Corrib 2020
- Appropriate Assessment Stage 1 Screening for Fisheries Maintenance Projects the Lough Corrib Catchment in 2020.

1.2. Legislative context of Appropriate Assessment

The Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) provide a legal framework for Europe's nature conservation policies. In Ireland, both Directives have combined to establish an ecological network of protected areas, known as Natura 2000 sites, which require special consideration when planning projects or developments. The network consists of Special Protection Areas (SPA), for the protection of Annex I birds, regular migratory birds and their habitats, and Special Areas of Conservation (SAC) for the protection of Annex I habitats and Annex II flora and fauna, other than birds. Also included as part of the network are candidate Special Areas of Conservation (cSAC) and proposed Special Protection Areas (pSPA).

Article 6 (3) of The Habitats Directive sets out the requirement for Appropriate Assessment in relation to Natura 2000 sites for any plan or project that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An Appropriate Assessment is an evaluation of the potential effects of the proposed plans, on their own or in combination with other projects, on the habitat types and species protected by the Natura 2000 network.

> *"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."*

Each stage of the Appropriate Assessment (AA) method is a source of origin for the next stage. Each decision made will influence the outcome of the assessment, so a careful approach to the documentation of the results at each stage is needed for sufficient traceability and transparency of each decision. The AA will provide a detailed investigation into the possible risks that a proposed plan or project may have on a Natura 2000 site, with respect to its objectives for conservation. The aim of an AA is not to prohibit a project, plan or activities. An AA is to address any concern for possible threats that a project or plan may have to Natura 2000 sites,

with Article 6(3) at the forefront of each decision in each stage, this includes any decision relating to funding and other supports.

1.1. Stages

The European Commission's methodological guidance[1] promotes a four-stage process, as set out below, to complete an Appropriate Assessment:

• Stage 1 – Screening for Appropriate Assessment

Stage 1 involves determining whether a project or plan, individually or combined with another, requires an AA screening. An AA screening is a thorough impact assessment that identifies whether a project or plan will have any effect on a Natura 2000 site, relating to the tests of Article 6 (3). If a project or plan is considered to have significant or possibly significant effects, or it is uncertain whether the Natura 2000 site will be affected, an AA screening will be necessary with the process proceeding to stage 2. Modification of the AA screening can only be done in the circumstances that the impact on the Natura 2000 site can be prevented by doing so. If the project or plan is deemed to have no risk of impact on the site, full evidence and justification must be provided.

• Stage 2 – Appropriate Assessment

The AA requires a description of the Natura 2000 site(s) that could be affected, with data, information, and analysis of the possible effects on the site, provided in a Natura Impact Statement (NIS). This AA must also include measures that can be taken to reduce or prevent any possible impacts on the site. There is no defined method for the AA, but it must be conducted based on scientific evidence and methods. The NIS must be prepared by ecological specialists and with input from other relevant experts such as hydrologists or engineers. The NIS must be prepared for advocate of the project or plan to submit to a capable authority for review. The capable authority proceeds with the AA after successful review of the NIS. The project or plan will have to be stopped or it will be required to proceed to stage 3 if it cannot avoid or mitigate the impacts on the Natura 2000 site.

1 European Communities (2002). Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites. Methodological Guidance on the Provision of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. European Communities, Luxembourg

• Stage 3 – Alternative Solutions and

Alternative solutions to the project or plan are reviewed in this stage. These alternatives may allow the project or plan to be carried out with no significant effects to the Natura 2000 site. If any alternative is considered, the proposal must revert to stage 2 of the appropriate assessment. The alternative must be reviewed before the test of Article 6(4) is carried out. The project or plan must be abandoned if no alternatives reduce or avoid the risk on the Natura 2000 site. If the negative impacts on the site can be completely avoided, the project or plan can be approved for progression.

• Stage 4 – The 'IROPI Test' (Imperative Reasons of Overriding Public Interest)

If the project or plan will have no harmful effects on the Natura 2000 site, it can now move on to be authorised by planning officials to decide on the approval or refusal of the project or plan. Imperative reasons of overriding public interest, there are no alternatives that are less damaging and the identification of actions that will offset the possible damages are the only exceptions for the approval of a project or plan, if there is still a threat to the conservation of the Natura 2000 site. The proposal must then go through the steps of Article 6(4). These extra measures are taken for special protection of the habitats and species listed in Annex I. IROPI reasons include concerns about public health and safety, or importance for the environment. Reasons that are not included here must be decided by the commission, with any measures that will compensate the damage to be approved by the minister.

2. PROJECT DESCRIPTION

2.1. Background

An integral part of IFI's responsibility is in the management of habitats and waters inhabited by fish species of conservation interest. The Long-term Management Plan for the Great Western Lakes has been prepared for a group of waterbodies and their catchment areas to advance the conservation and restoration of their ecological integrity and thus, resident fish stocks. The seven lakes and their catchments are managed as salmonid waters in Ireland. These waterbodies are large by Irish standards (1,266 - 16,562 ha.) and are generally based on carboniferous limestone. Their bathymetry, water chemistry and unique assemblages of flora and fauna has resulted in the evolution of rare and highly valued ecosystems that offer an abundance of services to society and the natural environment. The lakes have become an integral part of the European Natura 2000 network and immense centres for recreational and cultural activity, particularly angling.

This Plan sets out a series of measures which aim to address and manage many of the factors currently impacting on the ecological integrity and the status of resident fish stocks on the designated lakes and their catchments. There are three key objectives set out in the Long-term Management Plan for the Great Western Lakes:

1. to ensure the sustainability of salmonid fish and fisheries within the designated waterbodies and to introduce measures to mitigate against the pressures currently impacting on their ecological integrity;

2. to protect, manage and where they have been damaged, restore the natural attributes and biodiversity of the designated waterbodies; and

3. to optimise existing habitat and its potential to support sustainable wild Brown trout and Atlantic salmon fisheries.

Although this Plan relates primarily to the conservation and management of salmonid fish, the importance of their co-dependence and relationship with other, resident flora and fauna must also be recognised. All seven lakes and significant parts of their catchments are designated as Special Areas of Conservation (SAC) or Special Protection Areas (SPA) under European Legislation (Council Directive 92/43/EEC). The protection of other species and habitats of

community interest, which are also important to the health and integrity of these important aquatic ecosystems, is also a vital component of the Plan (NPWS 2017).

The NPWS website (accessed 14/07/2022) provides guidance on Conservation Plans for 'habitats and species other than those for which a Natura 2000 site has been selected':

"*Other site-specific conservation objectives, dealing with habitats and species other than those for which a Natura 2000 site has been selected, may be set when a* ***conservation management plan*** *is compiled for that site.*

Conservation plans *have been drawn up for a number of sites. Such plans include descriptive information and a management framework section that outlines objectives and strategies. However, these objectives may have been superseded by the site's Conservation Objectives. Maps are produced to accompany text including indicative habitat maps. The final stage of plan preparation is a three-month period of public consultation.*

Conservation statements *are written as a precursor to conservation plans. They are intended to provide useful site-specific information to landowners, other land managers, local authorities and other stakeholders. They list and describe qualifying features, other habitats and species, land use and management issues. They also state generic conservation objectives, but these may have been superseded by the site's Conservation Objectives. A boundary map and indicative habitat map accompanies each statement.*"

This Stage 1 Appropriate Assessment Screening outlines the key actions proposed as part of the Long-term Management Plan for the Great Western Lakes. It will determine whether the proposed HLOs, alone or in combination with any other Project or Plan, will have the potential for significant effect on the Conservation Objectives of a Natura 2000 site or its associated Features of Interest. However, it must be noted at this point that Appropriate Assessments will also be carried out for all specific future proposed projects and management actions on these Great Western Lakes. These assessments will be necessary to ensure that sensitive species and habitats, that are qualifying interests for the Natura 2000 sites, are not adversely affected by any fisheries management measures proposed resulting from the implementation of this Plan.

The implementation of the Long-term Management Plan for the Great Western Lakes will require a multi-disciplinary, multi-agency approach and will seek to engage local communities and other interested stakeholders within the catchment areas. The Plan also endorses the concept of adaptive management, whereby actions and measures are periodically assessed in

terms of their benefits and impacts on critical receptors (e.g. salmonid stocks, water quality) within the western lake catchments. This concept will utilise the most up to date survey data and other scientific information to inform decision making within the parameters of the Actions proposed in the Long-term Management Plan for the Great Western Lakes. The effects of various management strategies will be regularly evaluated by IFI and modified accordingly, to better achieve the desired outcomes. Existing management systems are already in place for the protection of certain salmonid species through Regulations, such as the Wild Salmon and Sea Trout Tagging Scheme (S.I. No. 585 of 2018) and a series of associated Bye-Laws to protect fish stocks of both species in Ireland. Through this Regulation, Conservation Limits (CL) and Atlantic Salmon surplus are annually assessed on a catchment-by-catchment basis, providing up to date information for management.

It is widely recognised that resident fish stocks, water and habitat quality have declined on the western lakes over the last three decades. This Plan proposes a series of actions aimed at redressing these declines and, in association with other relevant state authorities and local communities, IFI will endeavour to achieve improvements that will secure resident fish stocks and their habitat into the future.

2.2. Description of the proposed project

The preparation of the Long-term Management Plan for the Great Western Lakes could be interpreted as the preparation of a national Plan, as defined by the Habitats Directive. For this reason, IFI wishes to carry out an Appropriate Assessment for the preparation of the Plan, in reference to the Habitats Directive. The purpose of the Appropriate Assessment is to determine if the actions proposed as part of the Plan have the potential to have an adverse impact on the integrity of the associated Natura 2000 sites. This AAS will concentrate specifically on the seven lakes and their catchments designated as salmonid lakes by IFI. The EU Water Framework Directive (2000/60/EC) (WFD) establishes a framework for the protection, improvement and management of surface water and groundwater. The Catchment dataset is built on clusters of subcatchments. All Natura 2000 sites within the WFD catchments for each lake system and those with a hydrological connection downstream will be assessed.

A list of proposed actions has been clearly set out as part of the Long-term Management Plan for the Great Western Lakes. Using this predefined list, an initial desktop study was carried out to assess if each of the proposed actions have the potential to have an uncertain or adverse impact on the integrity of any Natura 2000 site (Table 3.1). The actions deemed to have a

potential for uncertain or adverse impacts will then be used to Screen In or Out any Natura 2000 site for a Stage 2 NIS. This table will provide a list of potential impacts that the preliminary establishment of each proposed action may have.

Future projects based on the proposed actions within the Long-term Management Plan for the Great Western Lakes are likely to take place within, upstream/downstream of or in close proximity to several Natura 2000 sites. As the specific details of several proposed projects are yet unknown, the full extent of their potential for adverse impacts is impossible to determine. As a consequence, each of the plans or projects that will arise under the guidance of the Long-term Management Plan for the Great Western Lakes will need to be Screened for Aprropriate Assessment on a case-by-case basis, taking into account up to date, objective scientific information.

2.2.1. The Great Western Lakes

The following summary descriptions are extracted from IFI's Water Framework Directive (WFD) fish sampling reports. (See http://wfdfish.ie)

2.2.2. Lough Arrow

Lough Arrow is a limestone lake situated in Co. Sligo, approximately 24km south-east of Sligo town and 6.4km north-west of Boyle, Co. Roscommon. It is sheltered on three sides by hills and is the source of the Unshin River. Lough Arrow is the smallest of the Western lake catchments fed largely by springs on the lake bed and as such is hydrologically different from most lakes in Ireland (Roscommon County Council, 2009).

Lough Arrow has a surface area of 1,266ha, with a mean depth of 9m and a maximum depth of 33m. It is categorised as typology class 12 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), greater than 50ha with high alkalinity (>100mg/l CaCO3). It is of major conservation significance as it conforms to a type (hard water lake) listed in Annex I of the EU Habitats Directive. The shores of the lake are, for the most part, stony, although the common club-rush (*Scirpus lacustris*) and common reed (*Phragmites australis*) occur abundantly in several bays (NPWS, 1999). Recent research conducted on the lake has reported the presence of extensive stands of the invasive alien species Nuttall's waterweed (*Elodea nuttallii*) in bays throughout the lake.

The lake was once stocked with hatchery reared in brown trout but this practice was discontinued (circa 2005) and there does not appear to be any genetic remnant in current stocks. Artificial augmentation of stocks in the western lakes was largely abandoned in the late 1990s and replaced with fisheries enhancement programmes. In the Lough Arrow catchment, spawning and nursery areas for brown trout were restored over the period 1998 to 2000 involving re-creation of pools and natural meander patterns, fencing of streams from livestock and the placing of additional spawning gravels in streams where appropriate (O' Grady, 2004). Adult wild brown trout average 0.45kg in weight, with fish up to 2.7kg having been taken by anglers in the past. Up to 1994, only perch, pike and brown trout were recorded in stock surveys, although three-spined stickleback were also recorded in the stomachs of pike. Rudd were encountered for the first time in 2002 and were captured again in the 2007 survey. The lake was also previously surveyed by IFI for the WFD fish monitoring programme in 2009, 2012 and 2015 (Kelly et al., 2010, 2013 and 2016, Conner et.al 2019). During the 2018 survey, perch were found to be the dominant species present in the lake. Brown trout, roach, three-spined stickleback, roach x bream hybrids, bream, rudd, pike and eels were also captured during the survey. Lough Arrow was assigned an ecological status of Good in 2018 based on the fish populations present. In previous years the lake was also assigned Good status. The Waters of the Ballysadare River catchment (including the Unshin and Lough Arrow) are open for angling in 2022 with a fish surplus of 2,013 Atlantic Salmon above the Conservation Limit set for the catchment (Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations 2021).

2.2.3. Lough Conn

Lough Conn is located in the Moy catchment in north County Mayo. It is connected to its immediate neighbour to the south, Lough Cullin, by a narrow channel that passes under a regional road at Pontoon village. The River Deel flows into Lough Conn and exits Lough Cullin at its southern end near Foxford, before joining the River Moy which discharges into the Atlantic at Killala Bay. The lake has a surface area of 4,704ha and a maximum depth of 37.9m. The lake is categorised as typology class 12 (as designated by the EPA for the Water Framework Directive), i.e. deep (mean depth >4m), greater than 50ha and high alkalinity (>100 mg/l CaCO3). Lough Conn is part of a Special Protection Area (SPA) (Site code: 004228) under the E.U. Birds Directive. It also forms part of the River Moy SAC where Atlantic Salmon are a qualifying interest.

The SPA is of special conservation interest for the following species: Greenland White-fronted Goose, Tufted Duck, Common Scoter and Common Gull. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated water birds are of special conservation interest. Lough Conn's reputation as a fine brown trout and salmon fishery goes back to the very beginning of angling in the west of Ireland. The main run of spring salmon enters Lough Conn from the end of March and continues right through April. The grilse run begins in May and continues into July.

The lake was surveyed by Inland Fisheries Ireland (IFI) on eight occasions between 1978 and 2001 (1978, 1984, 1990, 1994, 1998, 2001, 2005 and 2013) as part of a brown trout fish stock assessment programme. Brown trout, rudd, roach, perch and pike were captured in the surveys. Historically the lake held a population of Arctic char; however, they have been extinct for some time. Following the apparent collapse of the Arctic char population IFI surveyed the spawning areas where Arctic char, if present, would be congregating to spawn. The surveys were carried out during the Arctic char spawning seasons of 1991 to 1994. Three Arctic char were captured in the 1991 sampling, one fish in 1992 and none thereafter in 1993 or 1994. An examination of pike stomachs from fish captured in various parts of Lough Conn, throughout the 1990s, found no Arctic char. It is now established that Arctic char had become extinct in Lough Conn by the mid-1990s. Based on the fish populations present, Lough Conn was assigned an ecological status of Good in 2016, the most recent survey under the WFD. In the 2010 to 2015 surveillance monitoring reporting period, the EPA also assigned Lough Conn an overall ecological status of Good. The Waters of the Moy River catchment (including the Lough Cullin and Lough Conn) are open for angling in 2022 with a fish surplus of 12,555 Atlantic Salmon above the Conservation Limit set for the catchment (Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations 2021).

2.2.4. Lough Cullin

Lough Cullin is a large, shallow lake situated to the west of Foxford, which is connected to Lough Conn by a narrow inlet at Pontoon, Co. Mayo. The outflow from the lake discharges directly into the River Moy south-west of Foxford (NPWS, 2004). Lough Cullin has a surface area of 1019.3ha with a maximum depth of approximately 3m (O' Reilly, 2007). The underlying geology of the lake is mainly granite with some areas of limestone present in the southern region of the catchment (NPWS, 2004). The lake is categorised as typology class 10

(as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (100mg/l CaCO3).

Lough Cullin is located within the River Moy Special Area of Conservation (SAC) (NPWS, 2005). The underlying geology of the majority of the SAC is Carboniferous limestone, with areas of Carboniferous sandstone, Dalradian quartzites and schists also present. Some of the tributaries at the east and south of Lough Conn, and all inflowing to Lough Cullin are underlain by granite. The site has been selected as a candidate SAC for containing alluvial wet woodlands, raised bog, old oak woodlands (present on the shores of Lough Cullin), degraded raised bog and *Rhynchosporion* depressions (*Rhynchospora alba*), all priority habitats on Annex I of the E.U. Habitats Directive.

This SAC has also been selected due to the presence of the following species, listed on Annex II of the same Directive – Atlantic salmon, otter, sea and brook lamprey and white-clawed crayfish. Lough Cullin has relatively low colour and good water clarity. The phytoplankton in the lake is dominated by diatoms and blue-green algae. Lough Cullin also supports important wintering waterfowl and is designated as a Special Protection Area, as its one of the few breeding sites for Common Scoter in Ireland (NPWS, 2005). Lough Cullin was once regarded as one of Ireland's premier brown trout fisheries but was often considered to be the 'poor relation' of Lough Conn. Historically, in angling terms, Lough Cullin was noted for supporting a large population of relatively small (brown trout (O' Grady and Delanty, 2001). Today brown trout averaging 0.3kg to 0.45kg are often caught, with some weighing up to 1.8kg (O' Reilly 2007). The lake was also regarded as a very important salmon fishery and receives a run of salmon during the spring and summer months (NPWS, 2004; O' Reilly, 2007). In fact, all the salmon, of which there can be many, destined for Lough Conn and its inflowing rivers must pass through Lough Cullin. The Waters of the Moy River catchment (including the Lough Cullin and Lough Conn) are open for angling in 2022 with a fish surplus of 12,555 Atlantic Salmon above the Conservation Limit set for the catchment (Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations 2021).

Lough Cullin was previously surveyed in 1994, 1998 and 2001 as part of a fish stock assessment by IFI's research section using seven-panel benthic braided survey gill nets. These surveys revealed that the brown trout population declined between 1995 and 2001. Eutrophication problems have been evident in the lake in recent years. There was a population of rudd in the lake since the 1960s; however roach, a highly prolific non-native species, became

established in the lake in the 1990s. The lake was also previously surveyed by IFI for the WFD fish monitoring programme in 2009, 2012, 2018 and 2022. During the 2018 survey, roach were found to be the dominant species present in the lake. Perch, brown trout, tench, eels and pike were also captured during the survey. Lough Cullin was assigned an ecological status of Moderate following the most recent WFD survey (2018) based on the fish populations present.

2.2.5. Lough Carra

Lough Carra is situated in County Mayo and forms the most northerly part of the Great Western Lakes system of Loughs Corrib, Mask and Carra. It is located approximately 5km north of Ballinrobe, Co. Mayo. Lough Carra is the largest marl lake in Ireland, with a surface area of approximately 1600ha. It is a hard water lake which acquires most of its water via the feeder streams that flow in at various points around its perimeter (Huxley and Huxley, 2009) with some contributions from ground-water springs. The majority of the lake is shallow with a mean depth of approximately 1.8m; however, there are sections of the lake where depths reach over 19m (Huxley and Huxley, 2009). Lough Carra is well known for its green/blue colour which is due to the formation of calcareous encrustations (NPWS, 2004). The lake contains well developed stonewort communities with *Chara curta*, *C. desmacantha*, *C. rudis* and *C. contraria* also recorded (NPWS, 2004). Dense and expanding stands of *Myriophyllum verticillatum* have been recorded in the lake over the past decade. It is categorised as typology class 10 (as designated by the EPA for the purposes of the Water Framework Directive (WFD)), i.e. shallow (100mg/l CaCO3).

The average size of the brown trout taken from Lough Carra is greater than any of the other western lakes as they grow rapidly in this rich ecosystem. Lough Carra is believed to be one of the few remaining wild brown trout calcareous lakes within the EU (Irvine et al. 2003). During the 1990s fishery rehabilitation and enhancement works were undertaken in Lough Carra's spawning streams by Inland Fisheries Ireland (IFI) and this led to increased recruitment of juvenile brown trout to the lake (O' Grady, 2009). The lake was surveyed eight times from 1978 to 2009 as part of IFI's brown trout research programme using seven-panel benthic braided survey gill nets; brown trout, perch and pike were recorded on all sampling occasions. The most recent results (March 2009) using this survey method suggested that the lake supported an excellent and healthy stock of brown trout (IFI, 2009). More recently, the lake was surveyed by IFI for the WFD fish surveillance monitoring programme in 2009, 2012 and 2015 (Kelly et al., 2010, 2013, 2016, Corcoran et. al., 2020). In these surveys, Perch were the

most numerous fish with brown trout numbers declining slightly. In the 2013 to 2018 surveillance monitoring reporting period, the EPA assigned Lough Carra an overall draft ecological status of Good (Corcoran et. al., 2020), based on all monitored physico-chemical and biological elements, including fish.

Notwithstanding this relatively recent designation, lough Carra has experienced a significant deterioration in water quality over the last decade. Recent EPA reports indicate rises in ortho-phosphate and Nitrogen levels and increased algal biomass in lake water samples. These worrying trends lead to the formation of the Lough Carra Catchment Association in 2018. This community-based group aims to engage people living and farming in the Carra catchment area to help reduce harmful nutrient inputs. They have succeeded in raising awareness in the local community of the problems facing Lough Carra but their greatest challenge, one that is facing all of the great western lakes, is in shifting the current emphasis away from intensification of agriculture in sensitive western catchments to a more environmentally friendly land management policy. The Waters of the Corrib River catchment (including the Lough Corrib, Lough Mask and Lough Carra) are open for angling in 2022 with a fish surplus of 4,139 Atlantic Salmon above the Conservation Limit set for the catchment (Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations 2021).

2.2.6. Lough Mask

Lough Mask is situated north of Lough Corrib, adjacent to the town of Ballinrobe, Co. Mayo. It is the sixth largest lake in Ireland with a surface area of approximately 8,218ha. The length of the lake from north to south is approximately 16km and the width is approximately 6.4km at its widest point. The main rivers flowing into Lough Mask are the Cloon, Robe, Owenbrin, Finny, Glensaul, Glentraig and the Keel River, which is the out flowing river from Lough Carra. Lough Mask is linked to Lough Corrib by the Cong Canal. It is generally a shallow lake with a mean depth of 5m; however, it attains a maximum depth of 57m along a long narrow trench on the western shore of the lake (NPWS, 2004). The lake is categorised as typology class 12 (as designated by the EPA for the purposes of the WFD), i.e. deep (>4m), greater than 50ha and high alkalinity (>100mg/l CaCO3).

The underlying geology of Lough Mask is Carboniferous limestone, with areas of shale and sandstone, and it is an excellent example of a lowland oligotrophic lake (NPWS, 2004). Lough Mask, Carra and Cloon make up the Lough Carra/Lough Mask Special Area of Conservation

(SAC) complex. Six habitats listed on Annex I of the EU Habitats Directive are found in this site, including two priority habitats - limestone pavement and *Cladium* fen (NPWS, 2004). This is also an important SAC for otter, a species that is listed on Annex II of the E.U. Habitats Directive. The zebra mussel, an invasive species in Ireland, was confirmed to be present in Lough Mask in 2008.

Roach, an invasive fish species was first recorded in a fish stock assessment survey in 1996, since then the population has spread throughout the lake. Lough Mask is noted for its populations of brown trout and ferox trout, with the average size of brown trout ranging from 0.6kg to 1.4kg. The largest ferox trout can reach up to 9kg in weight (O' Reilly, 2007). The lake was previously surveyed in 1996 as part of Inland Fisheries Ireland's (IFI) brown trout stock assessment programme using seven-panel benthic braided survey gill nets. Five fish species were recorded at that time; brown trout, Arctic char, pike, perch and a single roach. More recently the lake was surveyed by IFI for the WFD fish monitoring programme in 2009, 2012 and 2015 (Kelly et al., 2010, 2013, 2016 and 2019). During the most recent survey, perch, roach, brown trout, bream, Arctic char, eels, pike, stone loach and roach x bream hybrids were recorded.

Lough Mask was assigned an ecological status of Good for 2019 based on the fish populations present. The lake was also assigned Good fish status in 2009, 2012 and 2015. The Waters of the Corrib River catchment (including the Lough Corrib, Lough Mask and Lough Carra) are open for angling in 2022 with a fish surplus of 4,139 Atlantic Salmon above the Conservation Limit set for the catchment (Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations 2021).

2.2.7. Lough Corrib

Lough Corrib, the largest of the western lakes and the second largest lake in Ireland (after Lough Neagh), is situated in Co. Galway in the River Corrib catchment. The lake stretches from outside Galway city to within three kilometres of Maam Cross, a distance of over 50 kilometers. The main rivers draining into Lough Corrib include the Black, Clare, Dooghta, Cregg, Cornamona, Maam, Owenriff Rivers and the Cong canal which joins Lough Corrib to Lough Mask.

The lake can be divided into two parts: Lower Lough Corrib - a relatively shallow basin underlain by carboniferous limestone in the south (Fig. 1.1), and Upper Lough Corrib - a larger,

deeper basin underlain by more acidic granite, schists, shales and sandstones to the north. The lake has a surface area of 16,562Ha (5,042ha Lower Lough and 11,520ha Upper Lough), and has a maximum depth of 42m. The lower lake is categorised as typology class 10 (as designated by the EPA for the Water Framework Directive), i.e. shallow (mean depth <4m – Total hardness >100mg/l CaCO3) and the upper lake fits into typology class 12, i.e. deep (mean depth >4m), greater than 50ha and high alkalinity (>100mg/l CaCO3).

The lake supports 14 protected habitats and six species, including salmon that are listed on Annex I and Annex II respectively of the EU Habitats Directive (NPWS, 2004). It is one of the best game fisheries in the world and is internationally renowned for its brown trout fishing. The lake is known to hold brown trout, salmon, perch, roach, bream, roach x bream hybrids, eels, 3-spined stickleback, 9 spine stickleback pike and stone loach. Unfortunately, roach, a non-native invasive fish species, was first identified in Lower Lough Corrib in the early 1980s and subsequently spread to all corners of the lake. High numbers of roach were observed in routine netting operations on the lake from the late 1980s until 1992 when a decline in the stock was observed. It was during this period that Arctic char were thought to have disappeared from L. Corrib. In early 2007, large numbers of the protozoan parasite *Cryptosporidium* sp. were detected in water from the lake, leading to contamination of the public water supply and an outbreak of cryptosporidiosis in Galway city.

Another unwelcome visitor to the lake is the highly invasive plant species *Lagarosiphon major* (also known as "Curly Waterweed") which was first identified in the lake in 2005. This rapidly colonizing plant has already excluded native plant species from bays in which it has become established. The Zebra mussel (*Dreissena polymorpha*), another invasive species in Ireland was first recorded in Lough Corrib during 2007 and it is thought they were introduced to the lake in 2000/2001.

Lough Corrib has been included in Inland Fisheries Irelands long term water quality monitoring programme of lake ecosystems since 1975. The lake is currently classified as mesotrophic. It was previously surveyed to assess its fish stocks by Inland Fisheries Ireland (formerly the Central Fisheries Board and the Western Regional Fisheries Board) in 1986 and 1996

Lough Corrib has been included in Inland Fisheries Irelands long term water quality monitoring programme of lake ecosystems since 1975. The lake is currently classified as mesotrophic. It was previously surveyed to assess its fish stocks by Inland Fisheries Ireland (formerly the

Central Fisheries Board and the Western Regional Fisheries Board) in 1986 and 1996. The Waters of the Corrib River catchment (including the Lough Corrib, Lough Mask and Lough Carra) are open for angling in 2022 with a fish surplus of 4,139 Atlantic Salmon above the Conservation Limit set for the catchment (Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations 2021).

2.2.8. Lough Sheelin

Lough Sheelin is situated in counties Cavan, Meath and Westmeath in the Inny sub-catchment of the River Shannon Basin District. The lake is located north-east of Finnea, Co. Westmeath. It is seven kilometres long and has a surface area of 1,900 hectares. The River Inny flows through the lake. Lough Sheelin is a relatively shallow lake with a mean depth of 4.4m, a maximum depth of 15m, and 51% of the lake is less than 5m in depth. The geology of the catchment is predominantly Carboniferous limestone, but Silurian/Ordovician formations underlie the western and northern drainage basin.

The lake is eutrophic, and is categorised as typology class 12 (as designated by the EPA for the Water Framework Directive), i.e. deep (>4m), greater than 50ha and high alkalinity (>100 mg/l CaCO3). In the 1960s and 1970s Lough Sheelin was one of Ireland's top trout angling lakes, managed and developed by the Inland Fisheries Trust (now Inland Fisheries Ireland). Phosphorus originating from intensive agricultural developments has caused progressive enrichment of Lough Sheelin since the early 1970s (Champ, 1998 and 2003). This has resulted in the trout population diminishing and the fish stock becoming dominated by cyprinids. The lake has been stocked with brown trout in the past, with approximately 16,000 2+ fish introduced in 2004, followed by between 3,000 and 6,000 per year thereafter. Stocking of brown trout into the lake ceased in 2011. The water quality in the lake and the catchment was monitored on a continuous basis by Inland Fisheries Ireland (previously the Shannon Regional Fisheries Board and the Central Fisheries Board) from the 1970s to 2015. A modest decrease in the total phosphorus loadings to the lake was noted between 1988 and 2005, suggesting that the phosphorus losses from the catchment declined during that period but more recent data from 2006 to 2014, indicates that there has been no improvement in the nutrient loadings to the lake.

Zebra mussels (*Dreissena polymorpha*), an invasive species in Ireland, were first noted in Lough Sheelin during 2003 and it is thought they were introduced to the lake in 2000 and 2001. Large populations of the mussel have been evident in the lake since 2004.

The fish population in Lough Sheelin has been surveyed regularly since 1978 by Inland Fisheries Ireland using a gill netting technique that was developed in the late 1970s to assess trout stocks (trout > 19.8cm in length) on selected lake fisheries. Other fish species are also captured as a by-catch during these surveys. This work has proved to be an effective management tool in illustrating the fluctuations in fish stocks over time. An extensive database has been developed based on this method. The standing crop of trout (>19.8cm) in Lough Sheelin varied between 100,000 and 120,000 fish in the early 1980s and has since decreased substantially. Unfortunately, roach, a non-native invasive species, were introduced into the lake during the 1970s and their population has fluctuated dramatically since that time. Lough Sheelin currently holds stocks of brown trout, pike, perch, roach, roach hybrids, tench, 3-spined stickleback, 9-spined stickleback and eels. The Waters of the Lower Shannon River catchment (below Parteen Weir) are partially open for Catch and Release angling in 2022 with no fish surplus of Atlantic Salmon above the Conservation Limit set for the catchment (Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations 2021). The Waters of the Upper Shannon River catchment (above Parteen Weir) are closed for Atlantic Salmon angling in 2022. Atlantic Salmon are not designated as site specific Conservation Objectives for any SAC from the upstream extent of the Lower River Shannon SAC at Killaloe to the River Inny and Lough Sheelin.

2.2.9. Other Salmonid Catchments

The issues currently impacting on vulnerable salmonid stocks are not confined to the lakes included in this plan. There are numerous river and lake systems, particularly in the western counties from Donegal to Kerry where salmonids are severely threatened. Problems associated with invasive fish introduction and aquaculture are of particular concern in some of these catchments.

A series of separate plans are proposed for these catchments which will seek to address the issues currently impacting on these waterbodies and their fish stocks.

3. STAGE 1 APPROPRIATE ASSESSMENT SCREENING OF NATURA 2000 SITES

3.1. Preliminary Determination of the Potential for Significant Effects of the Proposed Actions

This assessment identifies effects that may arise directly or indirectly as a result of the implementation of the actions proposed in the The Long-term Management Plan for the Great Western Lakes, or in-combination with any other project. Each Action will be assessed individually to determine the potential for any plan or project to impact on the integrity of any Natura 2000 site (Table 3.1). As The Long-term Management Plan for the Great Western Lakes is a strategic plan, there are no detailed projects being assessed here. Only general impacts may be predicted with further Appropriate Assessment Screenings to be carried out for site specific projects under actions determined to have the potential for significant or uncertain effects on the Conservation Objectives or Features of Interest on Natura 2000 sites.

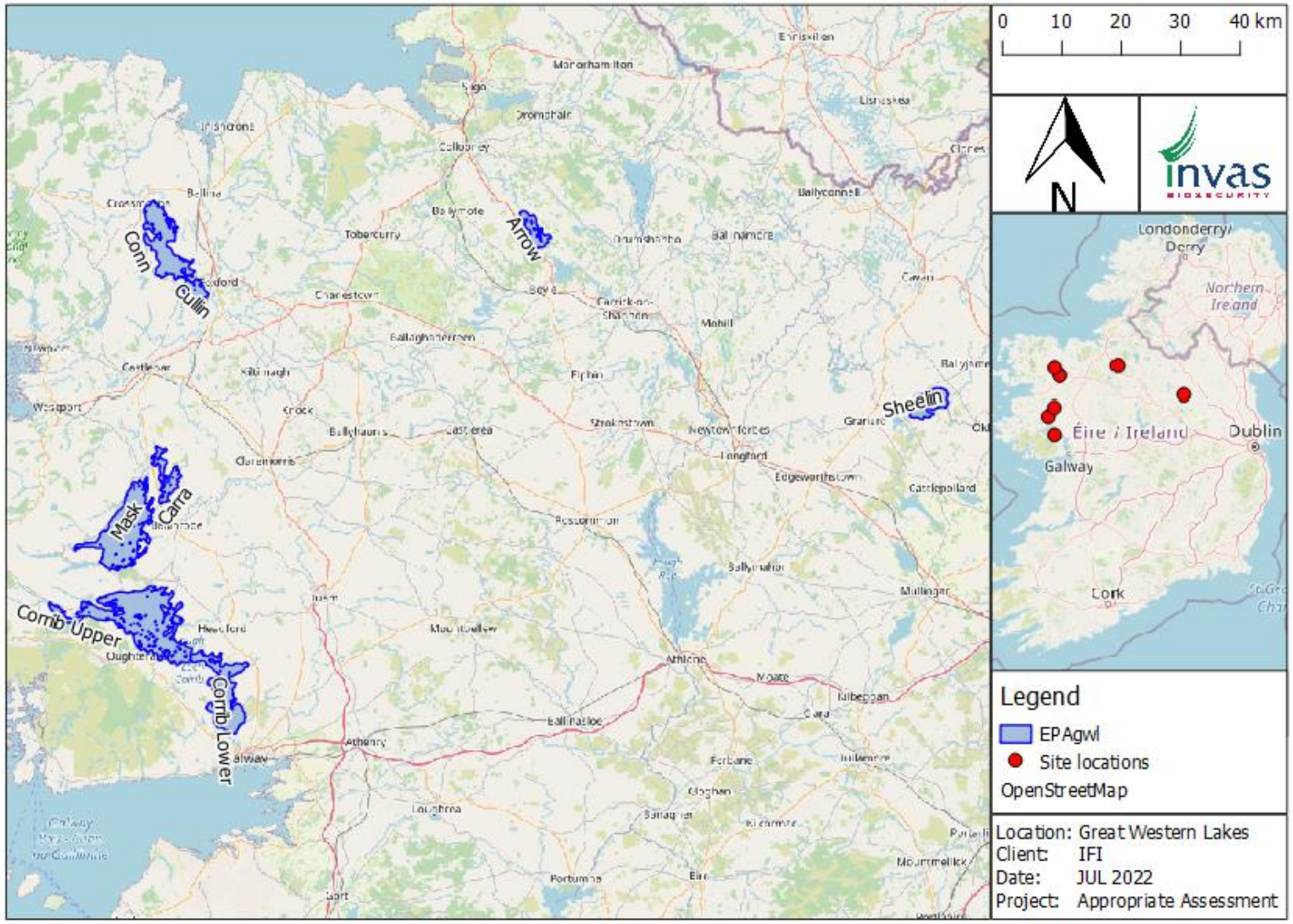

Figure 2.1: A map of the seven Great Western Lakes including Lough Corrib, Mask, Carra, Conn, Cullin, Arrow and Sheelin.

Table 3.1: Through a series of targeted actions, connected to an overall strategy, IFI will coordinate programmes under 7 categories of High-Level Objectives (HLO). A modified version of Table 1 from the Long-term Management Plan for the Great Western Lakes is reproduced here to provisionally determine if an action is likely to have any potential impacts on the integrity of any Natura 2000 site. A determination is then made as to whether a site should be further assessed due to the potential for uncertain or adverse impacts.

HLO 1. (Section 4)	**Stakeholder Engagement**	**Start**	**Finish**	**Potential impacts of proposed actions on Natura 2000 sites**	**Preliminary determination of the potential for uncertain or adverse impacts on any Natura 2000 site**
Action 1.1: Establish a communication schedule. Identify and engage with existing catchment groups, federations, Clubs, trusts and associations to assist with the progression of common catchment management goals.		2023	Review needed after 5 years	Development and enhancement of site-specific management goals through the engagement of local and national stakeholders. Creation of an awareness among stakeholders of the diversity and worth of the resident fishes (and associated fauna, flora and habitat) in these lakes, and the work being conducted to protect them.	**No further Assessment required.** The potential impacts of stakeholder engagement will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of interest.
Action 1.2: Where such groups have not yet been established, engage local communities, stakeholders and relevant authorities in the protection, development and conservation of their lake and river catchments through the establishment of more Catchment Management Associations for the Western Lakes.		2023	Review needed after 5 years	Engagement of local stakeholders and authorities to improve the protection, development and conservation of their river catchments	**No further Assessment required.** The potential impacts of stakeholder engagement will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of interest.

Action 1.3: Enhance communication mechanisms and networks between IFI, relevant stakeholder groups, state agencies, farming organisations, academic institutions, local communities and catchment groups.		2023	Ongoing	Positive: Improve communication between stakeholders and authorities to improve the protection, development and conservation of their river catchments. It will be important to ensure that the communication is a two-way process, to derive the maximum benefit from the wide range of stakeholders engaged.	**No further Assessment required.** The potential impacts of improved communication and stakeholder engagement will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of interest.
HLO 2. (Section 5)	**Climate Action & Biodiversity**	**Start**	**Finish**	**Potential impacts of proposed actions on Natura 2000 sites**	**Preliminary determination of the potential for uncertain or adverse impacts on any Natura 2000 site**
Action 2.1: Identify manageable factors which will contribute to the climate resilience of sensitive habitats and species.		Started	TBC	Climate resilience of sensitive habitats and species will play a key role in maintaining the Conservation Objectives of the Natura 2000 network into the future.	**No further Assessment required.** The potential impacts of the identification of manageable factors which will contribute to the climate resilience of sensitive habitats and species will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
Action 2.2: Maintain existing woodland where it occurs and promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate high temperatures and nutrient /sediment run-off.		Started	Review needed after 5 years	The establishment of significant aquatic buffer zones has the potential to enhance biodiversity and ameliorate nutrient /sediment run-off. This can have positive impacts on water and instream habitat quality. These projects should be accompanied by long term invasive alien species management plans, reporting	**Further Assessment required due to potential for uncertain or adverse impacts.** This Action fundamentally aims to improve the management and condition of habitat quality for the long-term sustainability of salmonid populations. The implementation of future plans and projects based on the guidance of the Long-term Management Plan for the Great Western Lakes may present uncertain impacts on Natura 2000 sites.

			systems and action plans for new incursions. Potential impacts include the accidental spread/dispersal of IAS, petrochemical/silt pollution and the disturbance/destruction of protected habitats and species.	Future plans or projects arising from the development of this action in relation to promotion for the establishment of significant aquatic buffer zones must be Screened for Appropriate Assessment on a case-by-case basis. This action can be viewed as a mitigation measure and following the precautionary principle, will necessitate a Stage 2 NIS.
Action 2.3: Develop spatial network models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased droughts, flood frequency and severity.	TBC	TBC	Tree planting should be carefully managed to avoid tunnelling of river channels but which will provide optimal shading to facilitate the reinstatement of habitats which are suitable for salmonids. Other important riparian plant species must also be considered to allow for high levels of biodiversity in aquatic and transitional zones. These projects should be accompanied by long term invasive alien species management plans, reporting systems and action plans for new incursions. Potential impacts include the accidental spread/dispersal of IAS, petrochemical/silt pollution and the disturbance/destruction of protected habitats and species.	**Further Assessment required due to potential for uncertain or adverse impacts.** This Action fundamentally aims to improve the management and condition of habitat quality for the long-term sustainability of salmonid populations. The implementation of future plans and projects based on the guidance of this Long-term Management Plan for the Great Western Lakes may present uncertain impacts on Natura 2000 sites. Future plans or projects arising from the development of this action in relation to development of models to inform the strategic planting of native woodlands must be Screened for Appropriate Assessment on a case-by-case basis. This action can be viewed as a mitigation measure and following the precautionary principle, will necessitate a Stage 2 NIS.

HLO 3. (Section 6)	Water Quality	Start	Finish	Potential impacts of proposed actions on Natura 2000 sites	Preliminary determination of the potential for uncertain or adverse impacts on any Natura 2000 site
Action 3.1: Enhance the current statutory powers of Inland Fisheries Ireland by authorising officers to enforce the relevant provisions of the Habitat Regulations.		2023	Review needed after 5 years	Improvement of implementation of the Habitats Regulation	**No further Assessment required.** The potential impacts of the enhancement of the current statutory powers of Inland Fisheries Ireland will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
Action 3.2: Enhance the capacity of IFI to detect and enforce water quality offences by using all available technology and increasing the number of Fisheries Environmental Officers working in the catchment areas of the Western lakes.		2023	2028	Improvement of implementation and compliance with Water Quality Regulations	**No further Assessment required.** The potential impacts of the enhancement the capacity of IFI to detect and enforce water quality offences will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
Action 3.3: Continue to improve and enhance working relationships with key environmental authorities in the western lake catchments so that information is shared effectively and increased efficiencies, with regard to environmental enforcement, are achieved.		Started	Review needed after 5 years	Improvement of working relationships with environmental authorities	**No further Assessment required.** The potential impacts of the improved and enhanced working relationships with key environmental authorities will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
Action 3.4: Provide information and assistance with the designation of nutrient sensitive catchments and areas for action.		Ongoing	2028	Improvement of implementation and compliance with Water Quality Regulations	**No further Assessment required.** The potential impacts of providing information and assistance with the designation of nutrient sensitive catchments and areas for action will not have any foreseeable adverse impacts on

					the Conservation Objectives of any Natura 2000 site or their Features of Interest.
HLO 4. (Section 7)	**Invasive Species**	**Start**	**Finish**	**Potential impacts of proposed actions on Natura 2000 sites**	**Preliminary determination of the potential for uncertain or adverse impacts on any Natura 2000 site**
Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes.		Started	Review needed every 5 years	A definition of an invasive alien species must be made clear prior to the establishment of any strategic stock management and weed management programmes. Ensure proper biosecurity for staff or any persons or groups involved with IAS management. Potential impacts include the accidental spread/dispersal of IAS, petrochemical/silt pollution and the disturbance/destruction of protected habitats and species.	**Further Assessment required due to potential for uncertain or adverse impacts.** This Action fundamentally aims to improve the management and condition of habitat quality for the long-term sustainability of salmonid populations. The implementation of future plans and projects based on the guidance of this Long-term Management Plan for the Great Western Lakes may present uncertain impacts on Natura 2000 sites. As the details of the future plans or projects associated to this action are as yet unknown, the potential for adverse impacts are uncertain. Future plans or projects arising from the development of this action in relation to removal and/or management of harmful invasive species must be Screened for Appropriate Assessment on a case-by-case basis. This action can be viewed as a mitigation measure and following the precautionary principle, will necessitate a Stage 2 NIS.
Action 4.2: Continue to use digital and conventional media to alert the public about potentially harmful invasive species in the western lakes and their wider catchments.		Started	Review needed every 5 years	Increased awareness of the presence and impacts of IAS in these lakes and catchments will benefit local, catchment wide and national biosecurity goals	**No further Assessment required.** The potential impacts of the continued use of digital and conventional media to alert the public about potentially harmful invasive species in the western lakes will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.

Action 4.3: Provide biosecurity advice and resources to stakeholder groups to prevent the spread of invasive species in the western lakes.	Started	Review needed every 5 years	Ensure that stakeholders are aware of the importance of proper biosecurity and of how best this should be implemented by users of these Great Lake systems.	**No further Assessment required.** The potential impacts of the provision of biosecurity advice and resources will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
Action 4.4: Encourage relevant stakeholder groups to participate in a range of conservation activities including the management of invasive species.	TBC	TBC	Encourage relevant stakeholder groups to participate as long as biosecurity advice is provided and adhered to, and appropriate biosecurity equipment is made available.	**No further Assessment required.** The potential impacts of the encouragement of relevant stakeholder groups to participate in a range of conservation activities including the management of invasive species does not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest as long as biosecurity advice is provided and adhered to, and appropriate biosecurity equipment is made available. All works will comply with IFI Biosecurity Protocols (Appendix 2). Biosecurity protocols are considered to be standard practice when carrying out any form of work in or near a watercourse and is not specific mitigation measure required where works are carried out in or near a Natura 2000 site. No specific mitigation measures are required for the protection of designated sites.
Action 4.5: Enhance legislation and increase penalties for the illegal transfer of live fish.	Started	TBC	Increase awareness of the adverse effects that such transfers can cause; improve biosecurity practice.	**No further Assessment required.** The potential impacts of the enhancement of legislation and increased penalties for the illegal transfer of live fish will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.

HLO 5. (Section 8)	Stock Management	Start	Finish	Potential impacts of proposed actions on Natura 2000 sites	Preliminary determination of the potential for uncertain or adverse impacts on any Natura 2000 site
Action 5.1: Produce stock management plans annually, on a local RBD basis, to reduce impacts on salmonids from other fish populations.		Started	Review needed every 5 years	Where there is empirical evidence that other fishes (e.g. bream, perch, roach, pike) are having a direct and adverse impact on salmonid fish populations, stock management plans to mitigate this should be produced.	**Further Assessment required due to potential for uncertain or adverse impacts.** This Action fundamentally aims to improve the management and condition of habitat quality for the long-term sustainability of salmonid populations. The implementation of future plans and projects based on the guidance of this Long-term Management Plan for the Great Western Lakes may present uncertain impacts on Natura 2000 sites. Annual fish stock management plans, including those for 2022, must be Screened for Appropriate Assessment on a case-by-case basis. As the details of the future plans or projects associated to this action are as yet unknown, the potential for adverse impacts are uncertain. Future plans or projects arising from the development of this action in relation to the production of stock management plans annually must be Screened for Appropriate Assessment on a case-by-case basis. . This action can be viewed as a mitigation measure and following the precautionary principle, will necessitate a Stage 2 NIS.
Action 5.2: Adjust stock management plans as population models on each of the lakes are refined.		2023	TBC	It will be important to continually provide updated information on the status of fish populations in these lakes. This data will be required not only for salmonids but also for the fish species deemed to be impacting the salmonids in these watercourses.	**Further Assessment required due to potential for uncertain or adverse impacts.** This Action fundamentally aims to improve the management and condition of habitat quality for the long-term sustainability of salmonid populations. The implementation of future plans and projects based on the guidance of this Long-term Management Plan for the Great Western Lakes may present uncertain impacts on Natura 2000 sites. Annual fish stock management plans, including those for 2022, must be Screened for Appropriate Assessment on a case-by-case basis.

				As the details of the future plans or projects associated to this action are as yet unknown, the potential for adverse impacts are uncertain. Future plans or projects arising from the development of this action in relation to the adjustment of stock management plans as population models on each of the lakes are refined must be Screened for Appropriate Assessment on a case-by-case basis. . This action can be viewed as a mitigation measure and following the precautionary principle, will necessitate a Stage 2 NIS.
Action 5.3: Enable local stakeholder groups to contribute to population modelling and research programmes including creel surveys (through citizen science).	2023	TBC	Stakeholders should be encouraged to become involved in providing data for population modelling and contributing to research programmes. It will be important that proper guidance is provided to these stakeholders and that the data provided is regularly monitored for its accuracy. (The latter reflects the fact that some stakeholders may have motives that are not totally in alignment with the objectives of the IFI management plans (e.g. pike anglers *vs* salmonid anglers)).	**No further Assessment required.** The potential impacts of enabling local stakeholder groups to contribute to population modelling and research programmes will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
Action 5.4: Develop risk matrix for Atlantic salmon and trout based on physical characteristics of each waterbody and the implications of these as survival bottlenecks.	TBC	TBC	This will enhance the survival opportunities for these fish species.	**No further Assessment required.** The potential impacts of the development of a risk matrix for Atlantic salmon and trout based on physical characteristics of each waterbody will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.

HLO 6. (Section 9)	Habitat Restoration	Start	Finish	Potential impacts of proposed actions on Natura 2000 sites	Preliminary determination of the potential for uncertain or adverse impacts on any Natura 2000 site
Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.		Underway in Corrib, Mask, Cara, Sheelin and Conn	Review needed every 5 years	Projects aim to provide additional habitat for spawning and juvenile salmonids, improved spawning and increase production of juveniles. This will be achieved through riparian management and protection, substrate augmentation and addition and the installation of instream structures to improve the physical diversity of channels to enhance instream habitat. Potential impacts include the accidental spread/dispersal of IAS, petrochemical/silt pollution and the disturbance/destruction of protected habitats and species. Each project must be subject to a thorough impact assessment that identifies whether a project or plan will have any effect on a Natura 2000 site, relating to the tests of Article 6 (3). Site-by-site issues, including but not limited to protected species present, IAS present, sensitive habitats, nesting birds, other local issues, must be considered as in all Appropriate Assessment Screenings.	**Further Assessment required due to potential for uncertain or adverse impacts.** This Action fundamentally aims to improve the management and condition of habitat quality for the long-term sustainability of salmonid populations. The implementation of future plans and projects based on the guidance of this Long-term Management Plan for the Great Western Lakes may present uncertain impacts on Natura 2000 sites. As the details of the future plans or projects associated to this action are as yet unknown, the potential for adverse impacts are uncertain. Future plans or projects arising from addressing the salmonid habitat deficits in the western lakes catchments through targeted restoration projects must be Screened for Appropriate Assessment on a case-by-case basis. This action can be viewed as a mitigation measure and following the precautionary principle, will necessitate a Stage 2 NIS.

Action 6.2: Streamline administrative processes to bring habitat restoration projects through planning processes to fruition with maximum efficiency.		Started	2023	This will improve overall efficiency.	**No further Assessment required.** The potential impacts of streamlining the administrative processes to bring development projects through planning processes to fruition with maximum efficiency will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
Action 6.3: Ensure that all relevant environmental protection processes are in place to avoid damage to other sensitive species and habitats.		Ongoing	Ongoing		**No further Assessment required.** The potential impacts of ensuring that all relevant environmental protection processes are in place does not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
HLO 7. (Section 10)	**Research**	**Start**	**Finish**	**Potential impacts of proposed actions on Natura 2000 sites**	**Preliminary determination of the potential for uncertain or adverse impacts on any Natura 2000 site**
Action 7.1: Continue to develop new and refine existing fish stock monitoring programmes (e.g. WFD) to provide the necessary data for fish population models for the western lakes.		2022	Ongoing	These programmes should not be restricted to salmonids but also include those fishes that may impact on salmonid populations.	**No further Assessment required.** The potential impacts of ensuring that the continued refining of existing fish stock monitoring programmes will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
Action 7.2: Use all available sources of data incl. WFD surveys, Stock management and, where appropriate, angling returns to feed into population models for the western lakes.		Started	Ongoing	Ensure the veracity of angler returns, where possible.	**No further Assessment required.** The potential impacts of ensuring that the use of all available sources of data to feed into fish population models for the western lakes will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.

Action 7.3: Continue research on climate change impact under current programmes (CCMRP) to help improve resilience in catchments and species.	Started	Ongoing	Develop and continually upgrade climate impact models.	**No further Assessment required.** The potential impacts of ensuring that the continued development of climate impact models under current research programmes (CCMP) to improve resilience in catchments and species will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.
Action 7.4: Continue to develop IFI's Brown Trout Research Policy with recommendations for the future conservation of all sub-species.	TBC	TBC	Some of these sub-species of trout are endemic to one or more of these lakes and will greatly benefit from the development of such a programme.	**No further Assessment required.** The potential impacts of the development of a bespoke research programme with recommendations for the future conservation of all sub-species of wild Brown trout will not have any foreseeable adverse impacts on the Conservation Objectives of any Natura 2000 site or their Features of Interest.

3.2. Stage 1 Screening of Natura 2000 Sites Potentially Effected by Plans or Projects Resulting from the Proposed List of Actions

A list of Natura 2000 sites within the WFD catchments of the 7 Great Western Lakes, including those sites with a direct hydrological link downstream are presented in Table 3.2 to 3.5. Plans or projects arising from the actions selected for further assessment must consider the potential for significant impacts in Natura 2000 sites identified in the table. Each site will be Screened In or Out based on the list of Actions where further assessment has been deemed necessary. This determination is driven by the potential for uncertain or significant effect identified in Table 3.1 for each Action. The details of plans or projects arising from each of the following Actions are not yet known and the full extent of their potential for uncertain or significant effects cannot be fully determined. As a result, Natura 2000 sites within the WFD Catchment area and with a hydrological connection to each of the 7 Great Western Lakes will be Screened In. Those Natura 2000 sites beyond the immediate hydrometric area but with a hydrological pathway to the site where no uncertain or significant impact can be foreseen will be Screened Out at this time. The list of Actions where an additional site-specific AA Screening will be required include:

- Action 2.2: Maintain existing woodland, where it occurs and promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate high temperatures and nutrient /sediment run-off;
- Action 2.3: Develop spatial network models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased droughts, flood frequency and severity;
- Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes;
- Action 5.1: Produce stock management plans annually, on a local RBD basis, to reduce impacts on salmonids from other fish populations;
- Action 5.2: Adjust stock management plans as population models on each of the lakes are refined;
- Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.

Table 3.2: A list of NATURA 2000 sites and their Features of Interest within the WFD catchments of Lough Corrib, Mask and Carra. Also included are those sites with a direct hydrological link downstream.

Site Name/Code	**Features of Interest**	**Screened In/Out for Stage 2 Natura Impact Statement**
Special Protection Areas within the WFD Catchment area of Lough Corrib, Mask and Carra		
Lough Corrib SPA 004042	Gadwall (*Anas strepera*) [A051] Shoveler (*Anas clypeata*) [A056] Pochard (*Aythya ferina*) [A059] Tufted Duck (*Aythya fuligula*) [A061]	In

	Common Scoter (*Melanitta nigra*) [A065] Hen Harrier (*Circus cyaneus*) [A082] Coot (*Fulica atra*) [A125] Golden Plover (*Pluvialis apricaria*) [A140] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] Wetland and Waterbirds [A999]	
Lough Mask SPA 004062	Tufted Duck (*Aythya fuligula*) [A061] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183] Common Tern (*Sterna hirundo*) [A193] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] Wetland and Waterbirds [A999]	In
Lough Carra SPA 004051	Common Gull (*Larus canus*) [A182]	In
Special Protection Areas beyond the WFD Catchment area with a direct hydrological link		
Inner Galway Bay SPA (Marine) 004031	Black-throated Diver (*Gavia arctica*) [A002] Great Northern Diver (*Gavia immer*) [A003] Cormorant (*Phalacrocorax carbo*) [A017] Grey Heron (*Ardea cinerea*) [A028] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Red-breasted Merganser (*Mergus serrator*) [A069] Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Sandwich Tern (*Sterna sandvicensis*) [A191] Common Tern (*Sterna hirundo*) [A193] Wetland and Waterbirds [A999]	Out Located downstream of the catchment in the marine habitat
Special Areas of Conservation within the WFD Catchment area of Lough Corrib, Mask and Carra		
Lough Corrib SAC 000297	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110]	In

	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* [3130] Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [3140] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] Petrifying springs with tufa formation (*Cratoneurion*) [7220] Alkaline fens [7230] Limestone pavements [8240] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Bog woodland [91D0] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Salmo salar* (Salmon) [1106] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Najas flexilis* (Slender Naiad) [1833] *Hamatocaulis vernicosus* (Slender Green Feather-moss) [6216]	
Lough Carra/Mask Complex SAC 001774	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflo*rae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae and/or Isoeto-Nanojuncetea* [3130] Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140] European dry heaths [4030] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] Alkaline fens [7230]	In

	Limestone pavements [8240] Alluvial forests with *Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Hamatocaulis vernicosus* (Slender Green Feather-moss) [6216]	
Levally Lough SAC 000295	Turloughs [3180]	In
Kildun Souterrain SAC 002320	*Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	In
Derrinlough (Cloonkeenleananode) Bog SAC 002197	Degraded raised bogs still capable of natural regeneration [7120]	In
Mocorha Lough SAC 001536	Calcareous fens with Cladium mariscus and species of the *Caricion davallianae* [7210]	In
Clyard Kettle-holes SAC 000480	Turloughs [3180] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]	In
Skealoghan Turlough SAC 000541	Turloughs [3180]	In
Ardkill Turlough SAC 000461	Turloughs [3180]	In
Greaghans Turlough SAC 000503	Turloughs [3180]	In
Kilglassan/Caheravoostia Turlough Complex SAC 000504	Turloughs [3180]	In
Carrowkeel Turlough SAC 000475	Turloughs [3180]	In
Tower Hill House SAC 002179	*Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	In
Moore Hall (Lough Carra) SAC 000527	*Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	In
Ballymaglancy Cave, Cong SAC 000474	Caves not open to the public [8310] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	In
Maamturk Mountains SAC 002008	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Northern Atlantic wet heaths with *Erica tetralix* [4010] Alpine and Boreal heaths [4060]	In

	Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the *Rhynchosporion* [7150] Siliceous rocky slopes with chasmophytic vegetation [8220] *Salmo salar* (Salmon) [1106] *Najas flexilis* (Slender Naiad) [1833]	
Connmara Bog Complex SAC 002034	Coastal lagoons [1150] Reefs [1170] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* [3130] Natural dystrophic lakes and ponds [3160] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] Depressions on peat substrates of the *Rhynchosporion* [7150] Alkaline fens [7230] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] *Euphydryas aurinia* (Marsh Fritillary) [1065] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Najas flexilis* (Slender Naiad) [1833]	In
Mweelrea/ Sheeffry/ Erriff Complex SAC 001932	Coastal lagoons [1150] Annual vegetation of drift lines [1210] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150] Dunes with *Salix repens ssp. argentea (Salicion arenariae*) [2170] Humid dune slacks [2190] Machairs (* in Ireland) [21A0] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110]	In

	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae and/or Isoeto-Nanojuncetea* [3130] Natural dystrophic lakes and ponds [3160] Water courses of plain to montane levels with the *Ranunculion fluitantis and Callitricho-Batrachion* vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] *Juniperus communis* formations on heaths or calcareous grasslands [5130] *Hydrophilous* tall herb fringe communities of plains and of the montane to alpine levels [6430] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] Depressions on peat substrates of the Rhynchosporion [7150] Petrifying springs with tufa formation (*Cratoneurion*) [7220] Alkaline fens [7230] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae and Galeopsietalia ladani*) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] *Vertigo geyeri* (Geyer's Whorl Snail) [1013] *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Petalophyllum ralfsii* (Petalwort) [1395] *Najas flexilis* (Slender Naiad) [1833]	
Cloughmoyne SAC 000479	Limestone pavements [8240]	In
Shrule Turlough SAC 000525	Turloughs [3180]	In
Lough Lurgeen Bog/Glenamaddy Turlough SAC 000301	Turloughs [3180] Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation [3270] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	In
Williamstown Turloughs SAC 002296	Turloughs [3180]	In

Lisnageeragh Bog and Ballinastack Turlough SAC 000296	Turloughs [3180] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	In
Gortnandarragh Limestone Pavement SAC 001271	Limestone pavements [8240]	In
Ross Lake and Woods SAC 001312	Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp*. [3140] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	In
Special Areas of Conservation beyond the WFD Catchment area with a direct hydrological link		
Galway Bay Complex SAC (Marine) 000268	Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Turloughs [3180] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] Alkaline fens [7230] Limestone pavements [8240] *Lutra lutra* (Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]	Out Located downstream of the catchment in the marine habitat

Table 3.3: A list of NATURA 2000 sites and their Features of Interest within the WFD catchments of Lough Conn and Cullin. Also included are those sites with a direct hydrological link downstream.

Site Name/Code	Features of Interest	Screened In/Out for Stage 2 Natura Impact Statement
Special Protection Areas within the WFD Catchment area of Lough Conn and Cullin		
Lough Conn and Lough Cullin SPA 004228	Tufted Duck (*Aythya fuligula*) [A061] Common Scoter (*Melanitta nigra*) [A065] Common Gull (*Larus canus*) [A182] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] Wetland and Waterbirds [A999]	In
Special Protection Areas beyond the WFD Catchment area with a direct hydrological link		
Killala Bay/Moy Estuary SPA 004036	Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Wetland and Waterbirds [A999]	Out Located downstream of the catchment in the marine habitat
Special Areas of Conservation within the WFD Catchment area of Lough Conn and Cullin		
River Moy SAC 002298	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150] Alkaline fens [7230] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]	In
Bellacorrick Bog Complex SAC 001922	Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with *Erica tetralix* [4010] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the *Rhynchosporion* [7150] Alkaline fens [7230]	In

	Vertigo geyeri (Geyer's Whorl Snail) [1013] *Saxifraga hirculus* (Marsh Saxifrage) [1528]	
Lough Hoe Bog SAC 000633	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Blanket bogs (* if active bog) [7130] *Vertigo geyeri* (Geyer's Whorl Snail) [1013] *Austropotamobius pallipes* (White-clawed Crayfish) [1092]	In
Ox Mountains Bog SAC 002006	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] Depressions on peat substrates of the *Rhynchosporion* [7150] *Vertigo geyeri* (Geyer's Whorl Snail) [1013] *Saxifraga hirculus* (Marsh Saxifrage) [1528]	In
Lough Nabrickkeagh Bog SAC 000634	Blanket bogs (* if active bog) [7130]	In
Owenduff/Nephin Complex SAC 000534	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Natural dystrophic lakes and ponds [3160] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] Alpine and Boreal heaths [4060] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Saxifraga hirculus* (Marsh Saxifrage) [1528] *Hamatocaulis vernicosus* (Slender Green Feather-moss) [6216]	In
Balla Turlough SAC 000463	Turloughs [3180]	In
Special Areas of Conservation beyond the WFD Catchment area with a direct hydrological link		
Killalla Bay/Moy Estuary SAC 000458	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310]	Out Located downstream of the catchment in the marine habitat

	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014] *Petromyzon marinus* (Sea Lamprey) [1095] *Phoca vitulina* (Harbour Seal) [1365]	

Table 3.4: A list of NATURA 2000 sites and their Features of Interest within the WFD catchments of Lough Arrow. Also included are those sites with a direct hydrological link downstream.

Site Name/Code	**Features of Interest**	**Screened In/Out for Stage 2 Natura Impact Statement**
Special Protection Areas within the WFD Catchment area of Lough Arrow		
Lough Arrow SPA 004050	Little Grebe (*Tachybaptus ruficollis*) [A004] Tufted Duck (*Aythya fuligula*) [A061] Wetland and Waterbirds [A999]	In
Special Protection Areas beyond the WFD Catchment area with a direct hydrological link		
Ballysadare Bay SPA 004129	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Grey Plover (*Pluvialis squatarola*) [A141] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*) [A157] Redshank (*Tringa totanus*) [A162] Wetland and Waterbirds [A999]	Out Located downstream of the catchment in the marine habitat
Special Areas of Conservation within the WFD Catchment area of Lough Arrow		
Unshin River SAC 001898	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]	In
Lough Arrow SAC 001673	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [3140]	In
Bricklieve Mountains and Keishcorran SAC 001656	Turloughs [3180]	In

	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*) [8120] *Euphydryas aurinia* (Marsh Fritillary) [1065] *Austropotamobius pallipes* (White-clawed Crayfish) [1092]	
Knockalongy and Knockachree Cliffs SAC 001669	*Trichomanes speciosum* (Killarney Fern) [1421]	In
Ox Mountains Bog SAC 002006	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] Depressions on peat substrates of the *Rhynchosporion* [7150] *Vertigo geyeri* (Geyer's Whorl Snail) [1013] *Saxifraga hirculus* (Marsh Saxifrage) [1528]	In
Cloonakillina Lough SAC 001899	Transition mires and quaking bogs [7140]	In
Templehouse and Cloonacleigha Loughs SAC 000636	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [3140] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	In
Turloughmore (Sligo) SAC 000637	Turloughs [3180]	In
Doocastle Turlough SAC 000492	Turloughs [3180]	In
Flughany Bog SAC 000497	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	In
Boleybrack Mountain SAC 002032	Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Blanket bogs (* if active bog) [7130]	Out No direct hydrological connection

Arroo Mountain SAC 001403	Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Blanket bogs (* if active bog) [7130] Petrifying springs with tufa formation (*Cratoneurion*) [7220] Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*) [8120] Calcareous rocky slopes with chasmophytic vegetation [8210]	Out No direct hydrological connection
Ben Bulben, Gleniff And Glenade Complex SAC 000623	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion vegetation [3260]* Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] Petrifying springs with tufa formation (*Cratoneurion*) [7220] Alkaline fens [7230] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae and Galeopsietalia ladani*) [8110] Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*) [8120] Calcareous rocky slopes with chasmophytic vegetation [8210] *Vertigo geyeri* (Geyer's Whorl Snail) [1013] *Lutra lutra* (Otter) [1355]	Out No direct hydrological connection
Lough Gill SAC 001976	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	Out No direct hydrological connection

	Austropotamobius pallipes (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]	
Special Areas of Conservation beyond the WFD Catchment area with a direct hydrological link		
Ballysadare Bay SAC 000622	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014] *Phoca vitulina* (Harbour Seal) [1365]	Out Located downstream of the catchment in the marine habitat

Table 3.5: A list of NATURA 2000 sites and their Features of Interest within the WFD catchments of Lough Sheelin. Also included are those sites with a direct hydrological link downstream.

Site Name/Code	**Features of Interest**	**Screened In/Out for Stage 2 Natura Impact Statement**
Special Protection Areas within the WFD Catchment area of Lough Sheelin		
Lough Sheelin SPA 004065	Great Crested Grebe (*Podiceps cristatus*) [A005] Pochard (*Aythya ferina*) [A059] Tufted Duck (*Aythya fuligula*) [A061] Goldeneye (*Bucephala clangula*) [A067] Wetland and Waterbirds [A999]	In
Lough Kinale and Derragh Lough SPA 004061	Pochard (*Aythya ferina*) [A059] Tufted Duck (*Aythya fuligula*) [A061] Wetland and Waterbirds [A999]	In
Lough Derravaragh SPA 004043	Whooper Swan (*Cygnus cygnus*) [A038] Pochard (*Aythya ferina*) [A059] Tufted Duck (*Aythya fuligula*) [A061] Coot (*Fulica atra*) [A125] Wetland and Waterbirds [A999]	In
Garriskil Bog SPA 004102	Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	In
Glen Lough SPA 004045	Whooper Swan (*Cygnus cygnus*) [A038]	In
Lough Iron SPA 004046	Whooper Swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Shoveler (*Anas clypeata*) [A056]	In

	Coot (*Fulica atra*) [A125] Golden Plover (*Pluvialis apricaria*) [A140] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] Wetland and Waterbirds [A999]	
Special Protection Areas beyond the WFD Catchment area with a direct hydrological link		
Lough Ree SPA 004064	Little Grebe (*Tachybaptus ruficollis*) [A004] Whooper Swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Mallard (*Anas platyrhynchos*) [A053] Shoveler (*Anas clypeata*) [A056] Tufted Duck (*Aythya fuligula*) [A061] Common Scoter (*Melanitta nigra*) [A065] Goldeneye (*Bucephala clangula*) [A067] Coot (*Fulica atra*) [A125] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Common Tern (*Sterna hirundo*) [A193] Wetland and Waterbirds [A999]	Out Located downstream of the catchment beyond 15km
Middle Shannon Callows SPA 004096	Whooper Swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Corncrake (*Crex crex*) [A122] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Black-tailed Godwit (*Limosa limosa*) [A156] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Wetland and Waterbirds [A999]	Out Located downstream of the catchment beyond 15km
Lough Derg (Shannon) SPA 004058	Cormorant (*Phalacrocorax carbo*) [A017] Tufted Duck (*Aythya fuligula*) [A061] Goldeneye (*Bucephala clangula*) [A067] Common Tern (*Sterna hirundo*) [A193] Wetland and Waterbirds [A999]	Out Located downstream of the catchment beyond 15km
River Shannon and River Fergus Estuaries SPA 004077	Cormorant (*Phalacrocorax carbo*) [A017] Whooper Swan (*Cygnus cygnus*) [A038] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Scaup (*Aythya marila*) [A062] Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160]	Out Located downstream of the catchment in the marine habitat

	Redshank (*Tringa totanus*) [A162] Greenshank (*Tringa nebularia*) [A164] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Wetland and Waterbirds [A999]	
Special Areas of Conservation within the WFD Catchment area of Lough Sheelin		
Moneybeg and Clareisland Bogs SAC 002340	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	In
Derragh Bog SAC 002201	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120]	In
Ardagullion Bog SAC 002341	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	In
Garriskil Bog SAC 000679	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150]	In
Ballymore Fen SAC 002313	Transition mires and quaking bogs [7140]	In
Special Areas of Conservation beyond the WFD Catchment area with a direct hydrological link		
Lough Ree SAC 000440	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Alkaline fens [7230] Limestone pavements [8240] Bog woodland [91D0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Lutra lutra* (Otter) [1355]	Out Located downstream of the catchment beyond 15km
River Shannon Callows SAC 000216	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] Alkaline fens [7230] Limestone pavements [8240] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Lutra lutra* (Otter) [1355]	Out Located downstream of the catchment beyond 15km

Lough Derg, North-east Shore SAC 002241	*Juniperus communis* formations on heaths or calcareous grasslands [5130] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] Alkaline fens [7230] Limestone pavements [8240] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0]	Out Located downstream of the catchment beyond 15km
Lower River Shannon SAC 002165	Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] *Lutra lutra* (Otter) [1355]	Out Located downstream of the catchment in the marine habitat

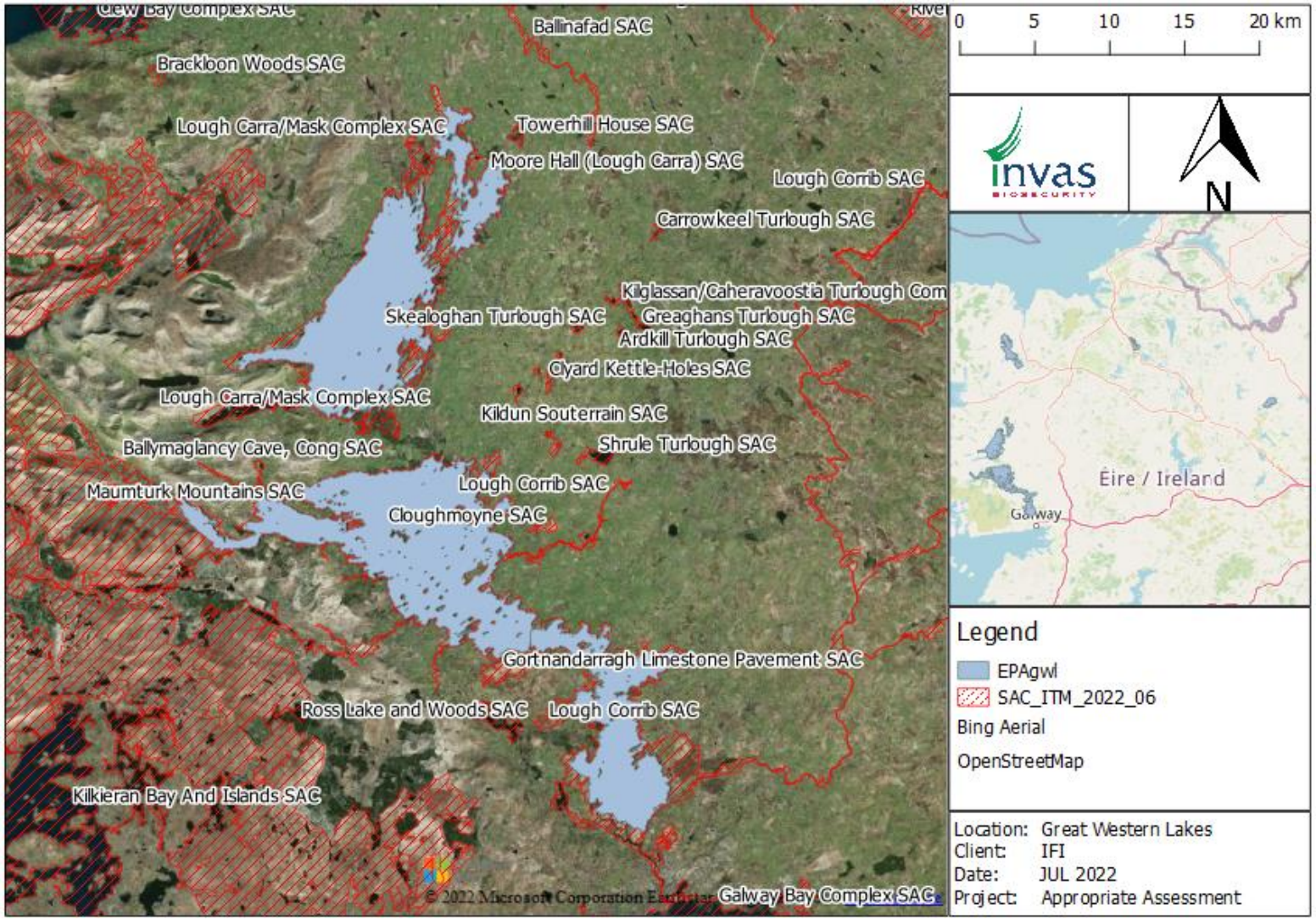

Figure 2.2: A map of the Special Areas of Conservation in proximity to Lough Corrib, Mask, and Carra.

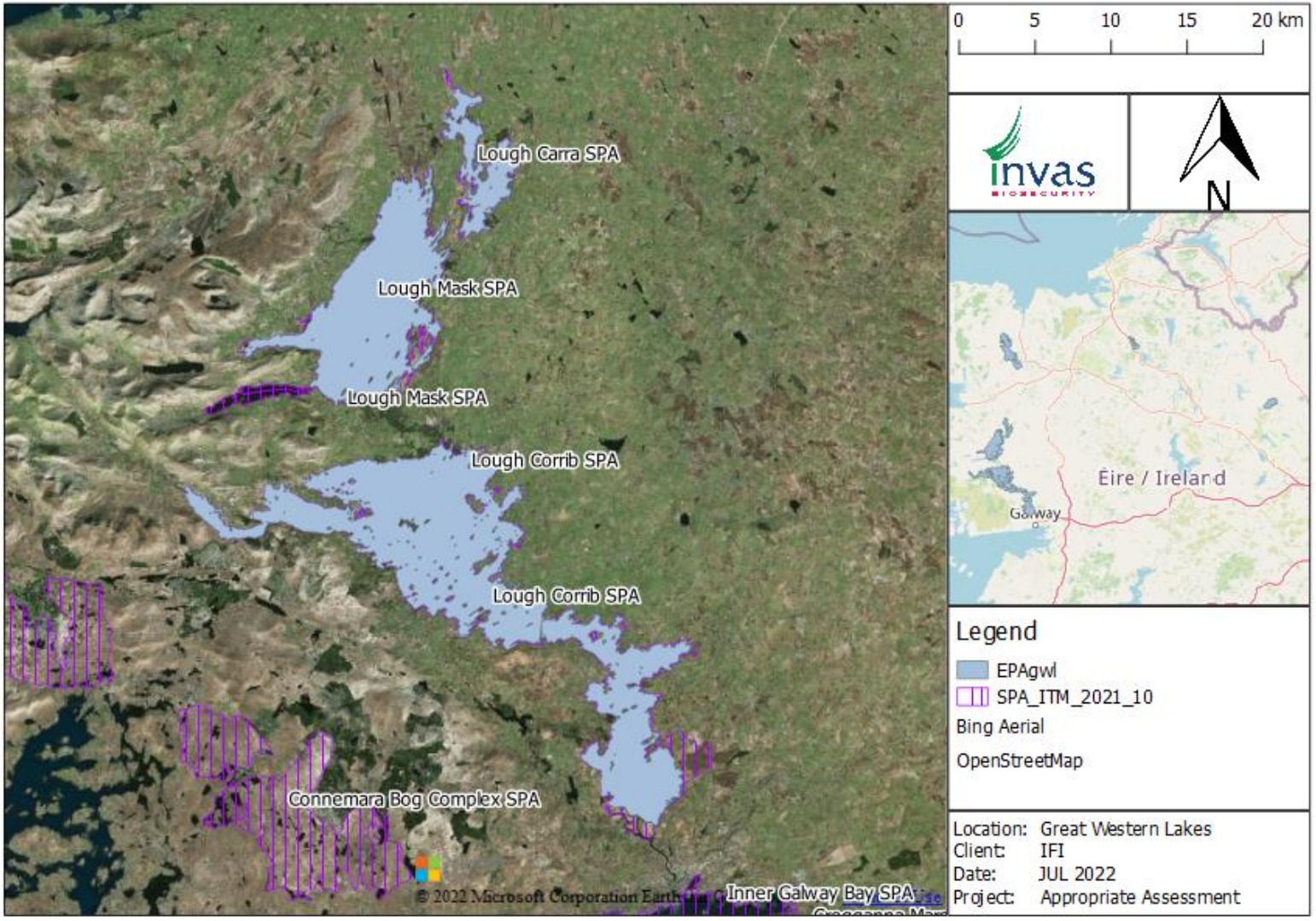

Figure 2.3: A map of the Special Protection Areas in proximity to Lough Corrib, Mask, and Carra.

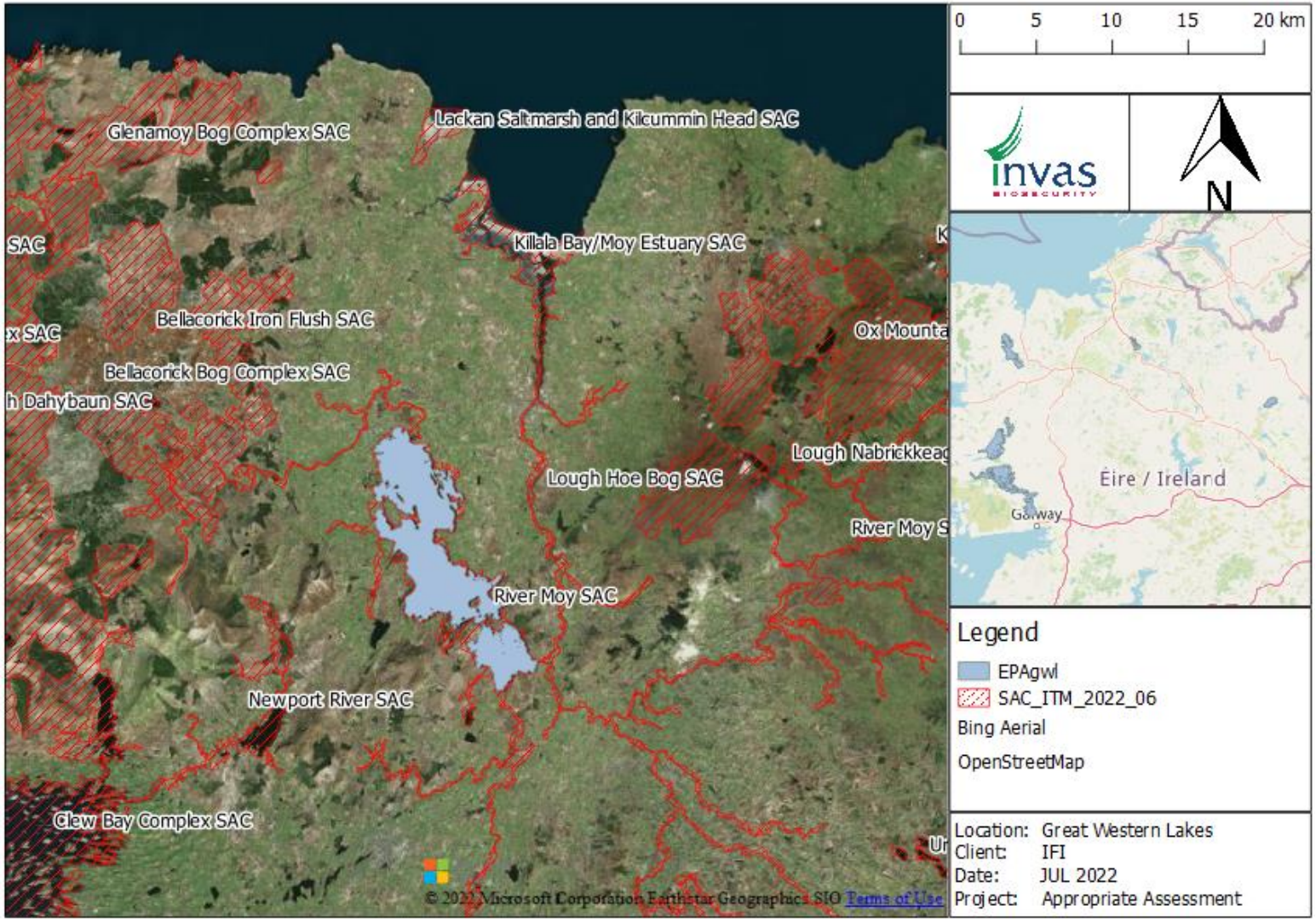

Figure 2.4: A map of the Special Areas of Conservation in proximity to Lough Conn and Cullin.

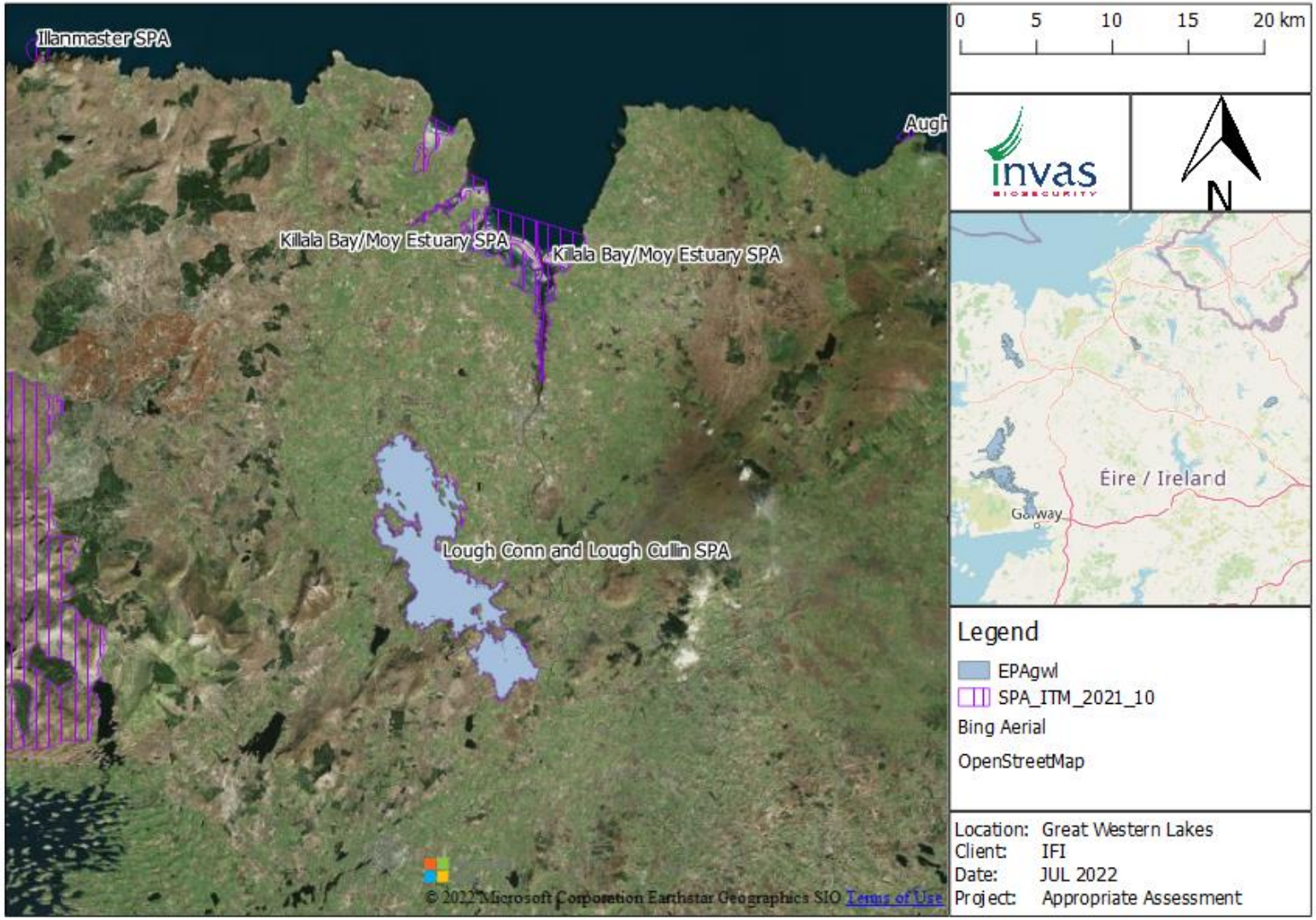

Figure 2.5: A map of the Special Protection Areas in proximity to Lough Conn and Cullin.

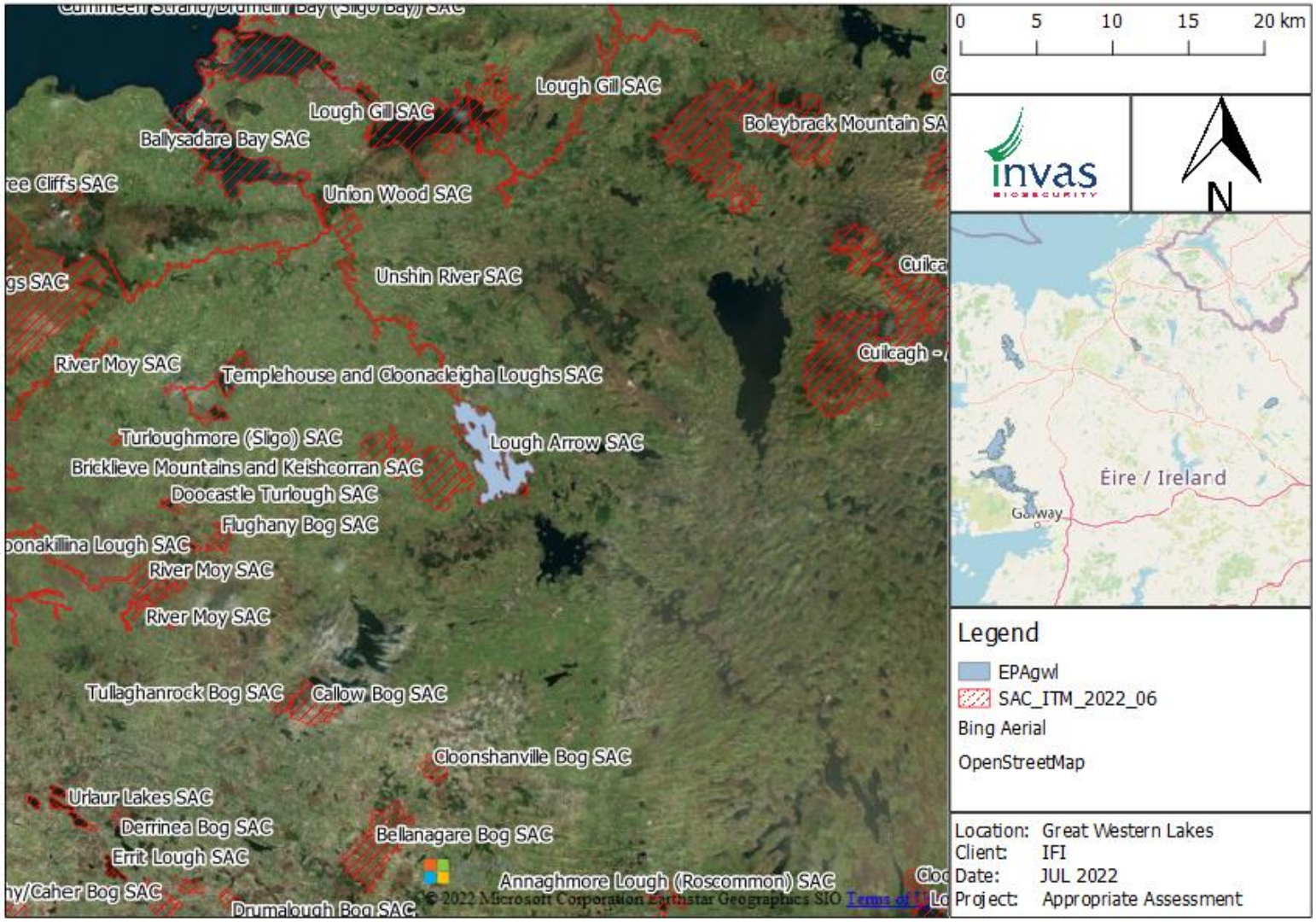

Figure 2.6: A map of the Special Areas of Conservation in proximity to Lough Arrow.

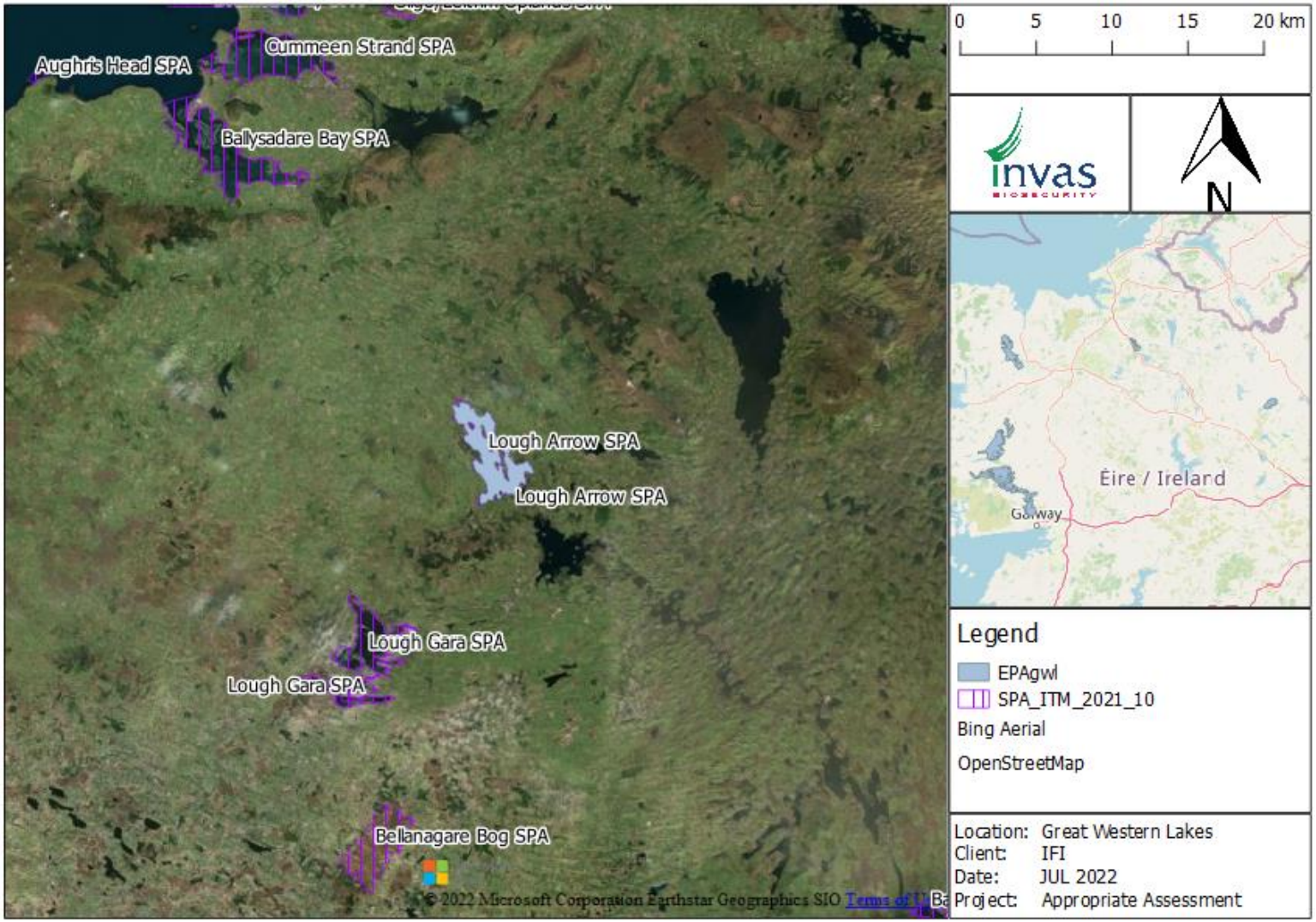

Figure 2.7: A map of the Special Protection Areas in proximity to Lough Arrow.

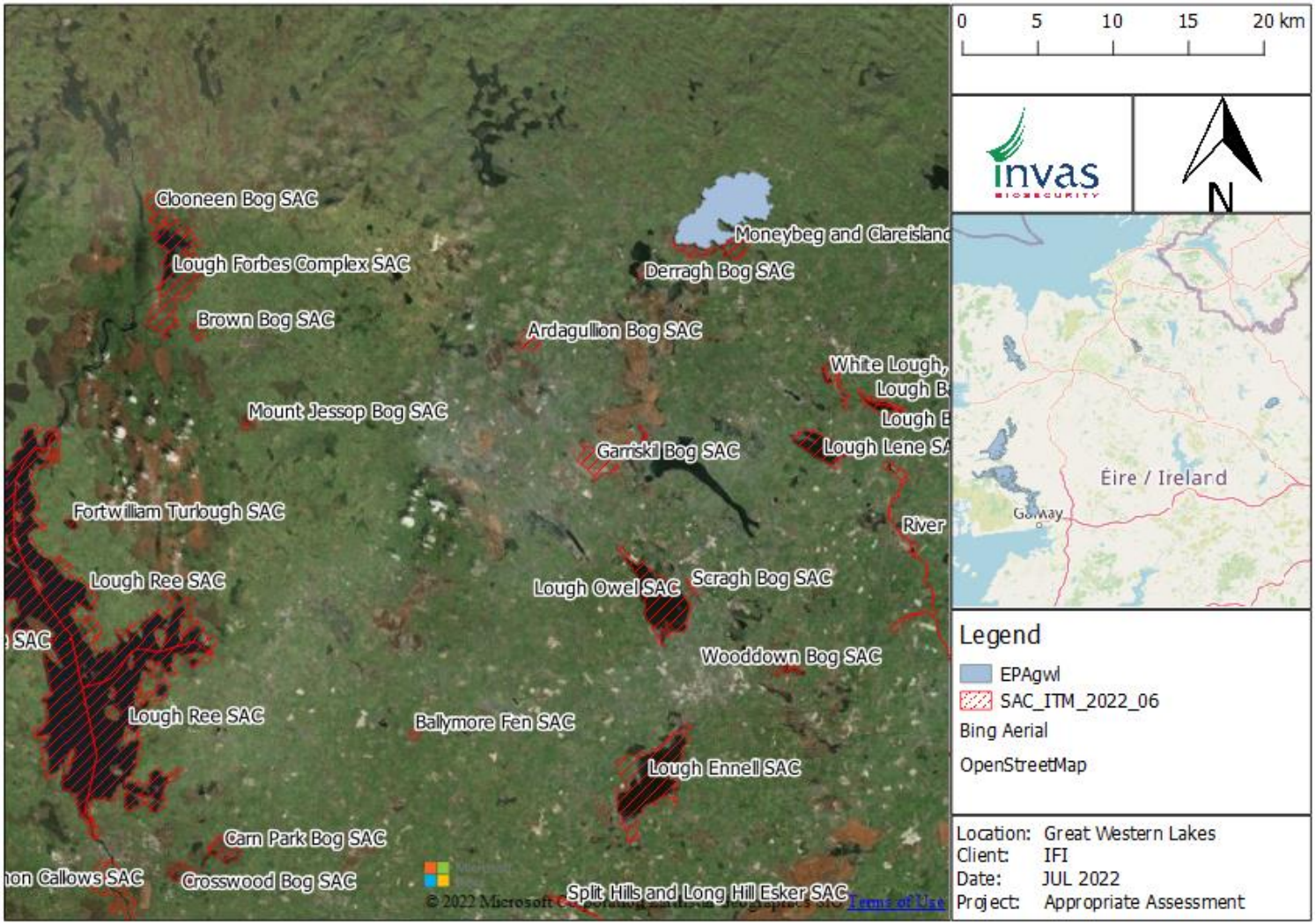

Figure 2.8: A map of the Special Areas of Conservation in proximity to Lough Sheelin.

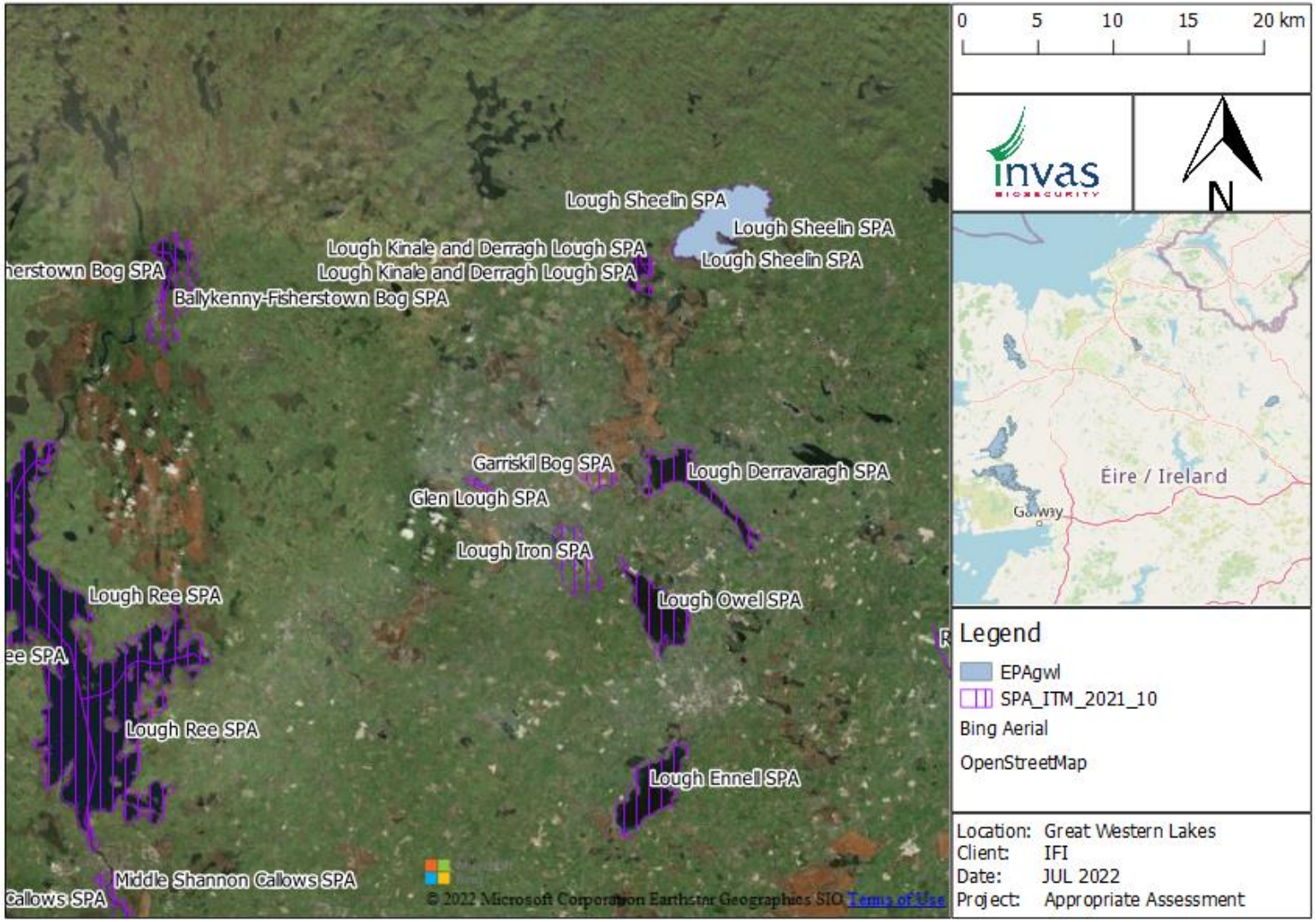

Figure 2.9: A map of the Special Protection Areas in proximity to Lough Sheelin.

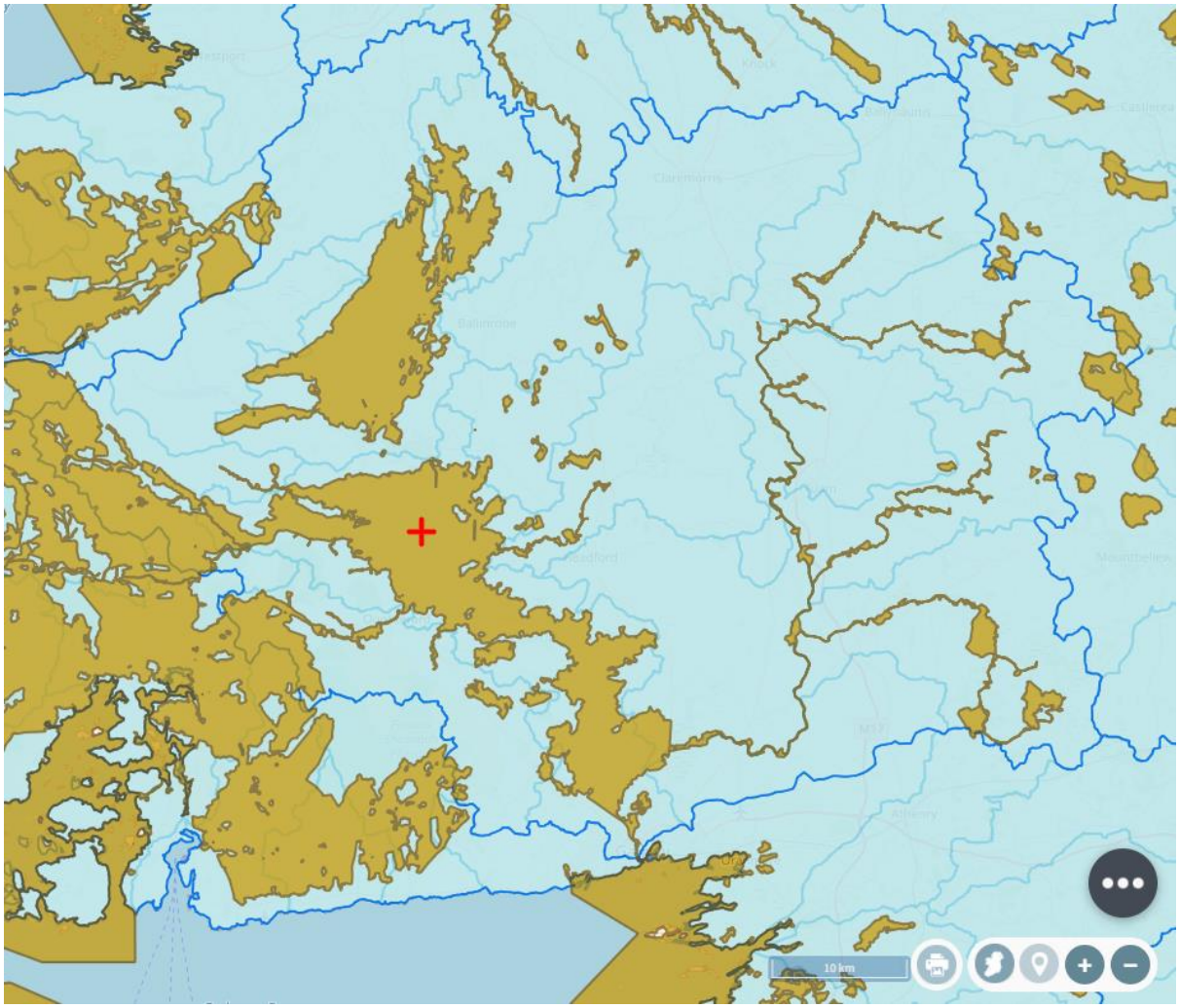

Figure 2.10: A map of the Special Areas of Conservation within the catchment and sub-catchments of Lough Corrib, Mask, and Carra from the EPA AAGeoTool website (25/07/22).

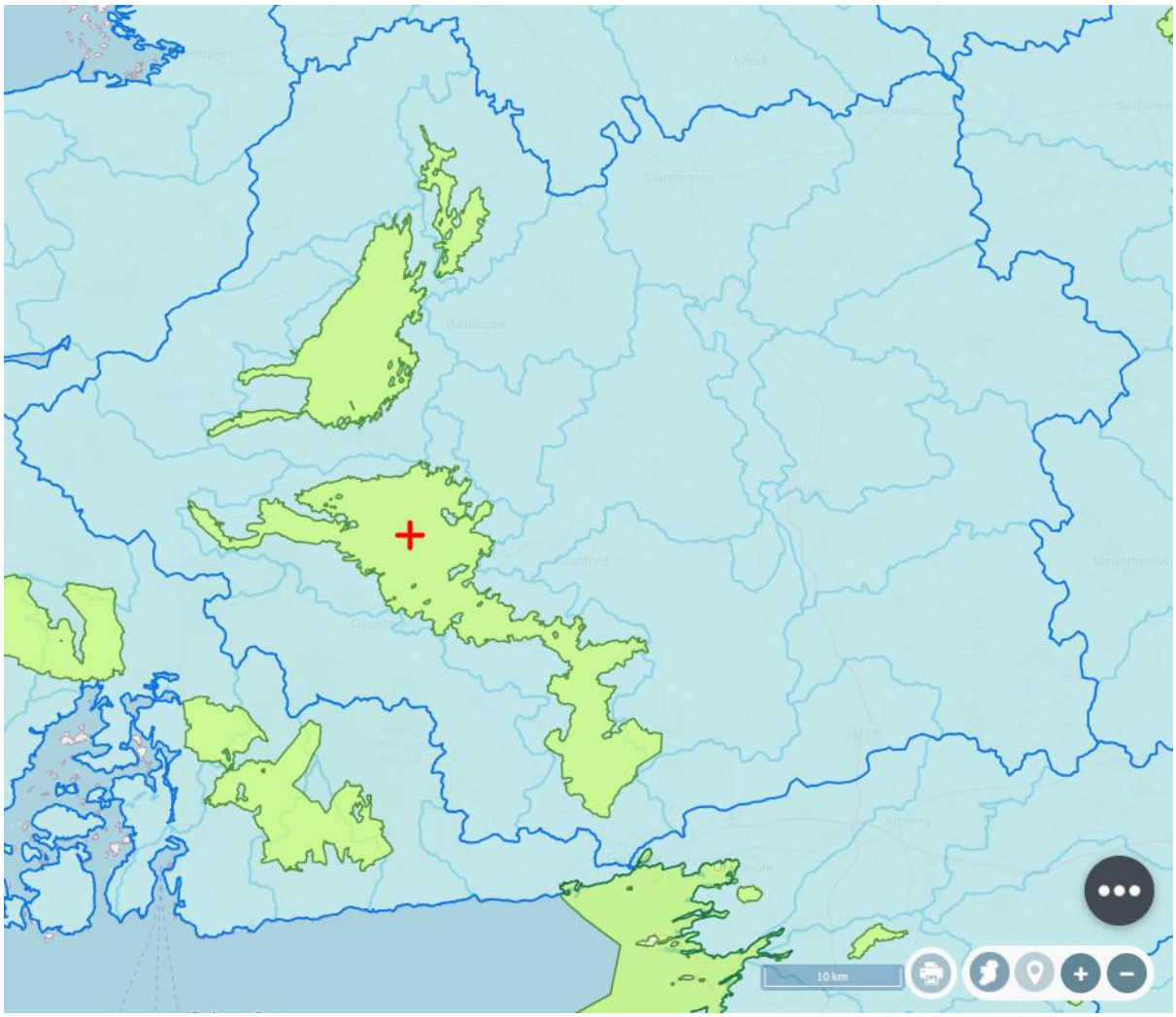

Figure 2.11: A map of the Special Protection Areas within the catchment and sub-catchments of Lough Corrib, Mask, and Carra from the EPA AAGeoTool website (25/07/22).

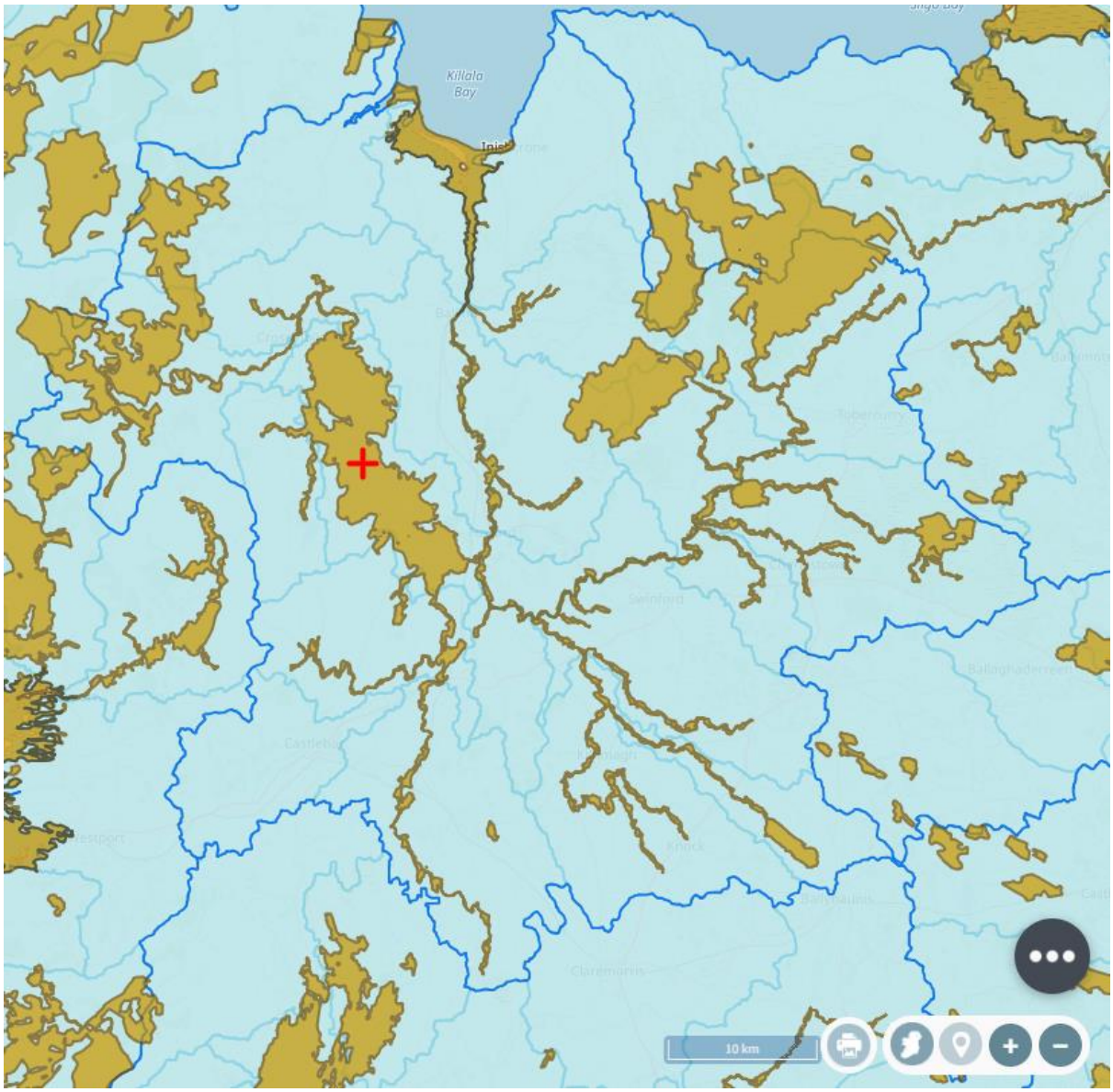

Figure 2.12: A map of the Special Areas of Conservation within the catchment and sub-catchments of Lough Conn and Cullin from the EPA AAGeoTool website (25/07/22).

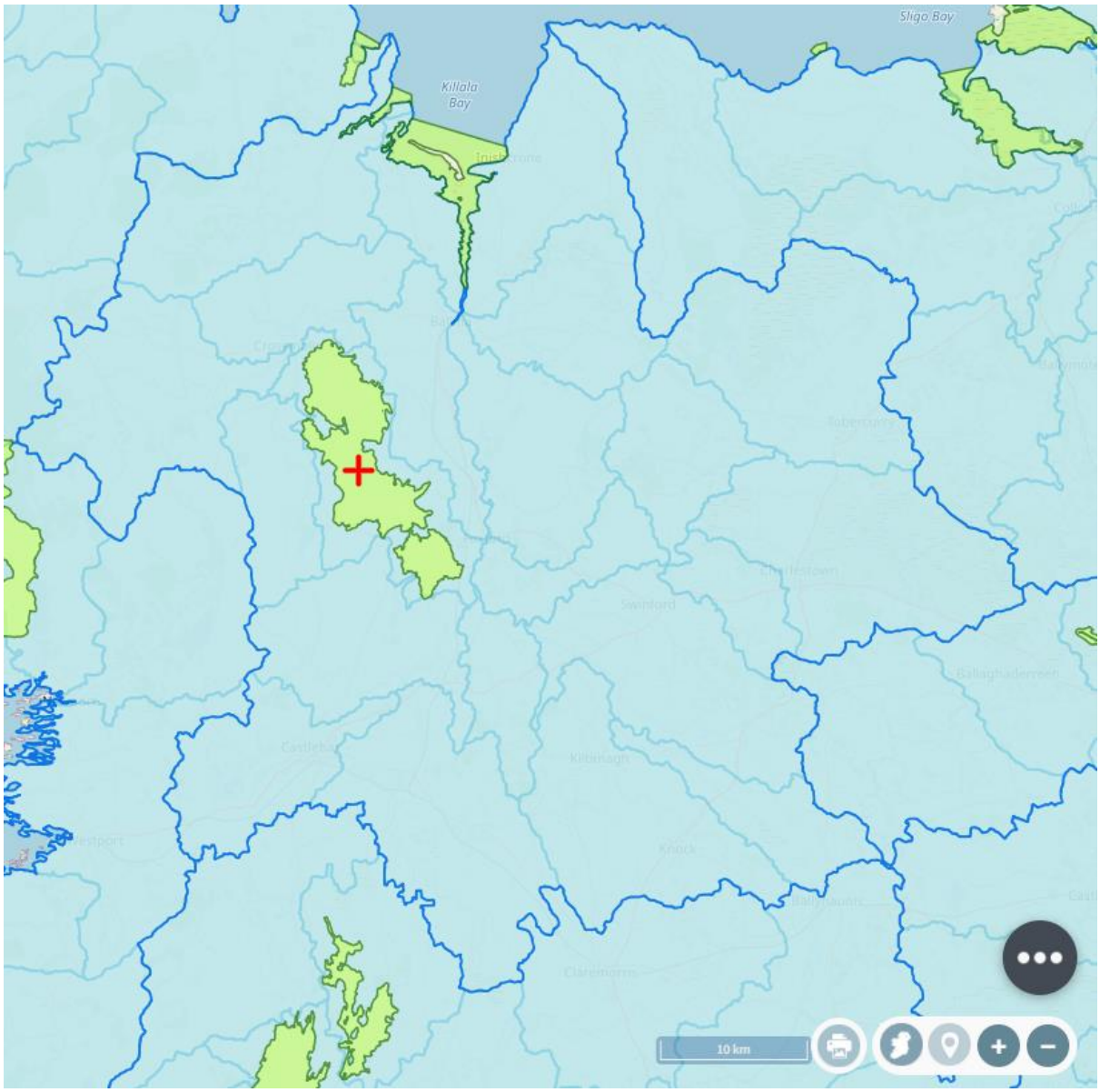

Figure 2.13: A map of the Special Protection Areas within the catchment and sub-catchments of Lough Conn and Cullin from the EPA AAGeoTool website (25/07/22).

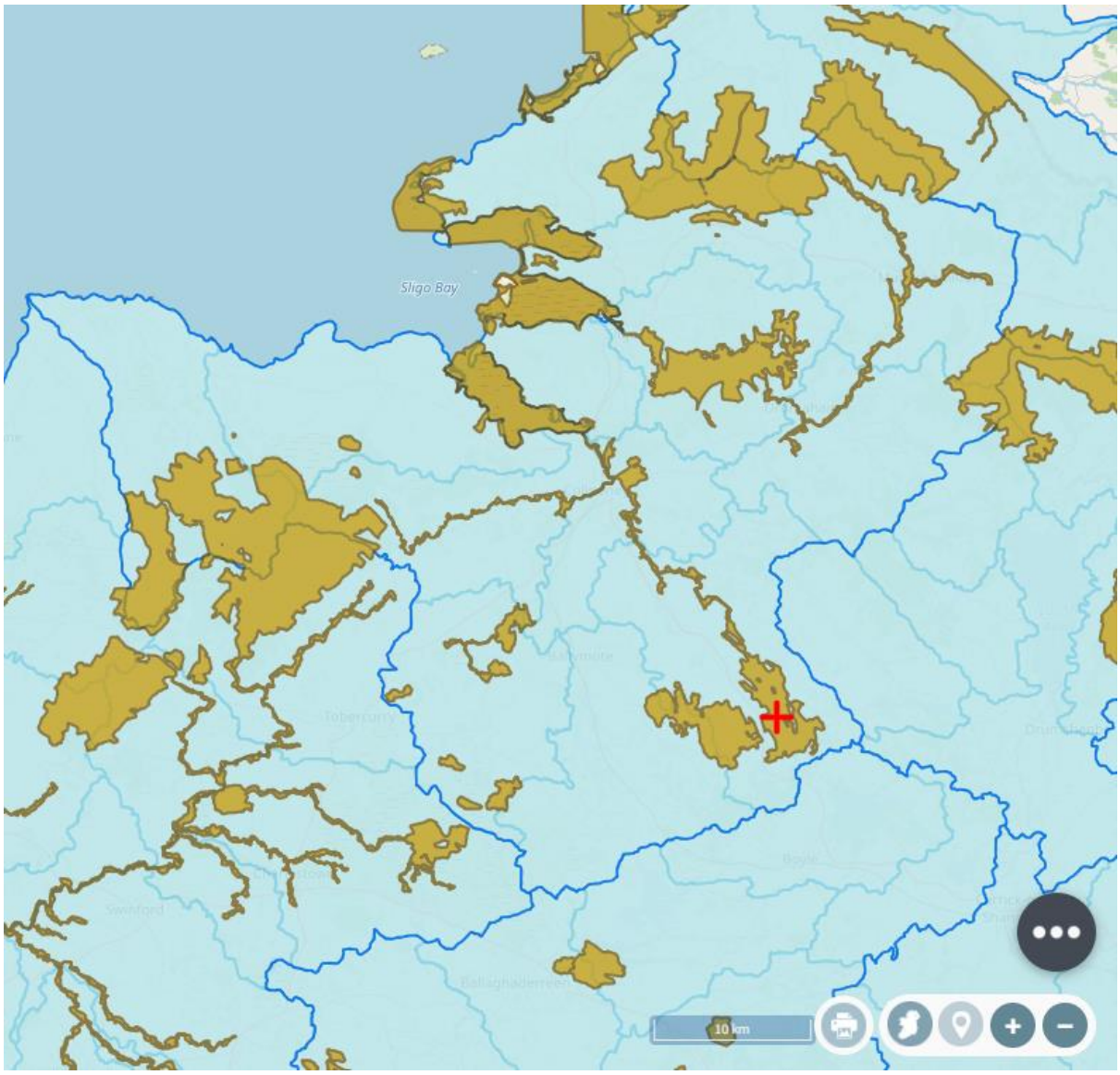

Figure 2.14: A map of the Special Areas of Conservation within the catchment and sub-catchments of Lough Arrow from the EPA AAGeoTool website (25/07/22).

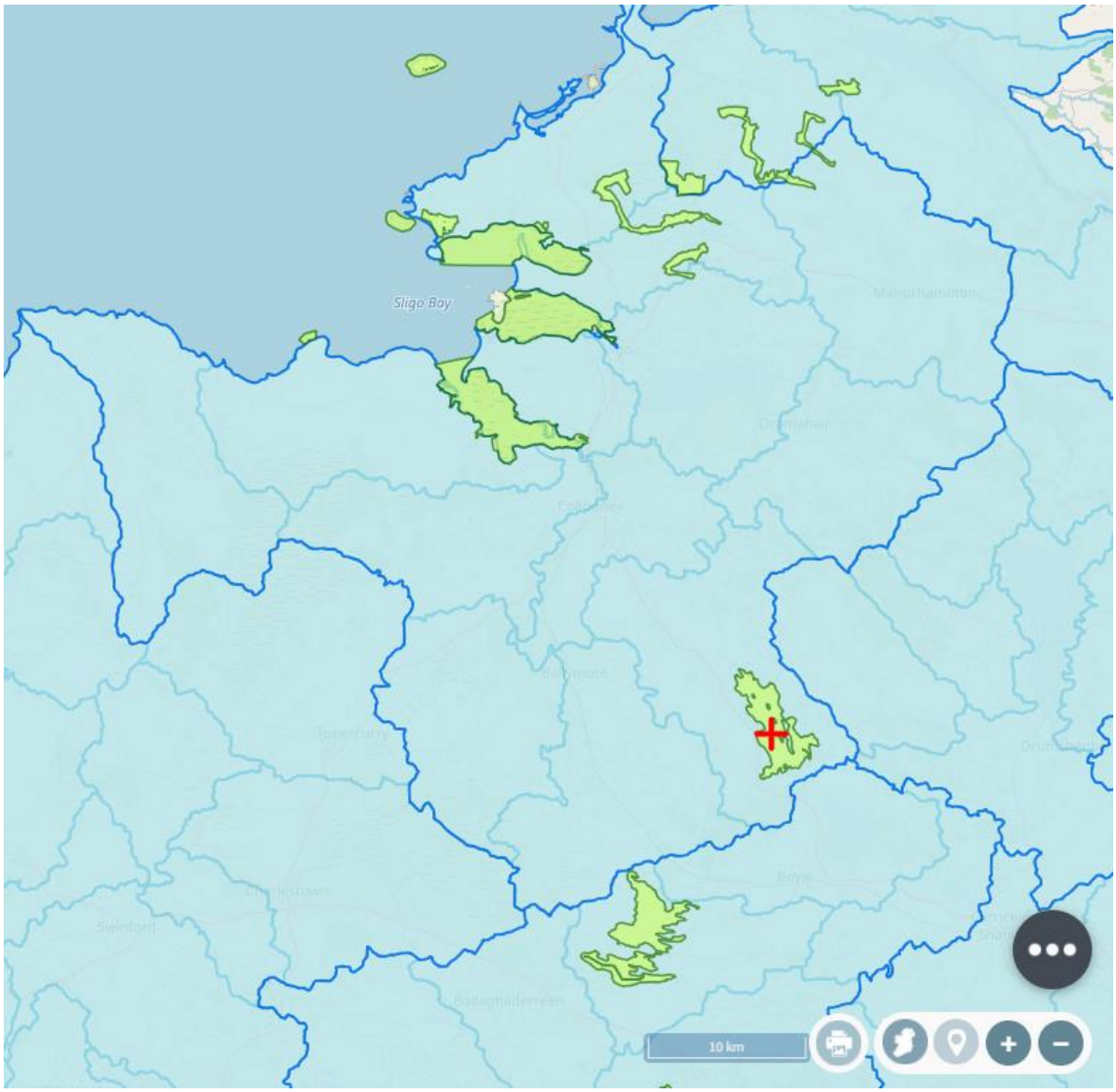

Figure 2.15: A map of the Special Protection Areas within the catchment and sub-catchments of Lough Arrow from the EPA AAGeoTool website (25/07/22).

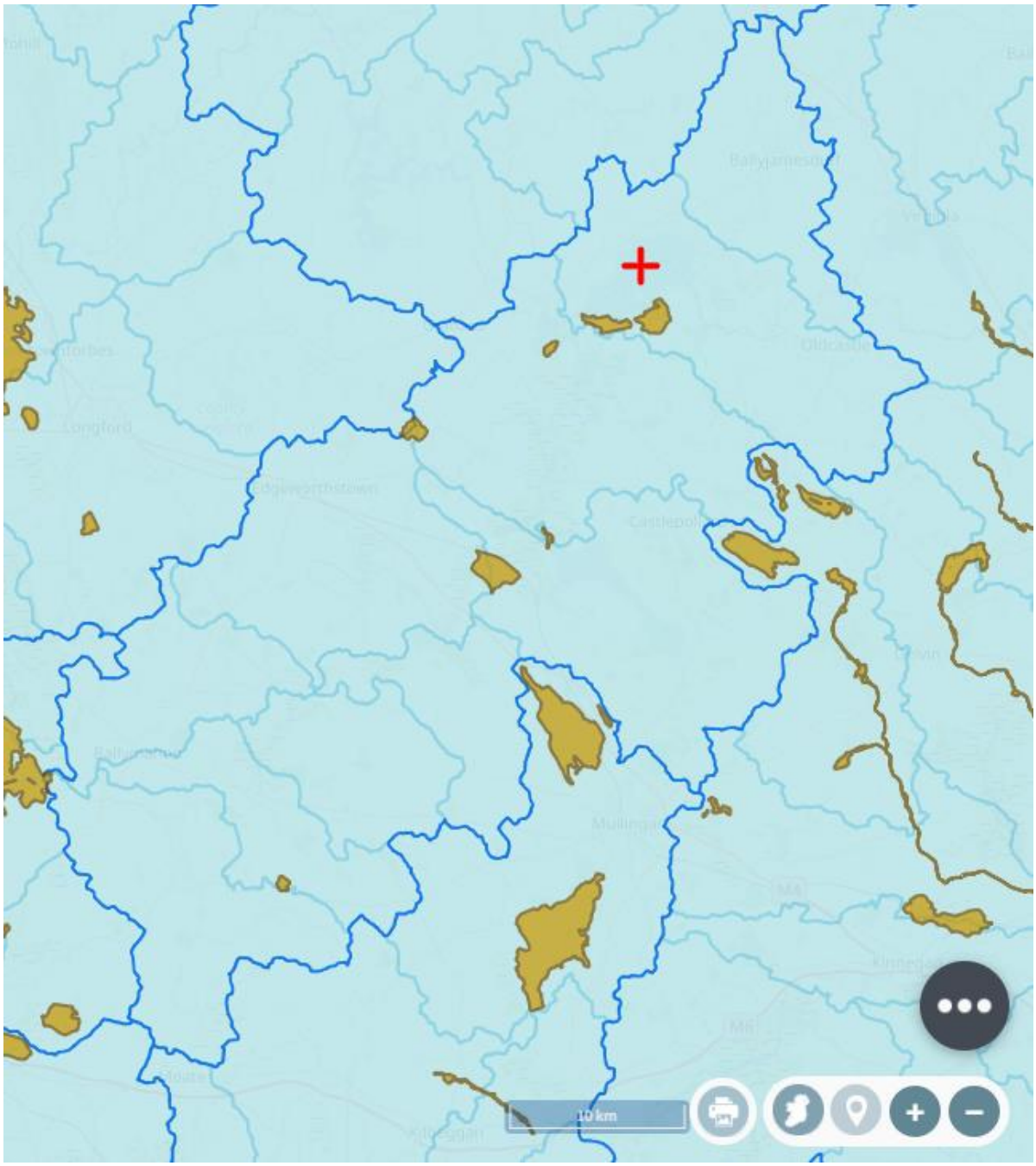

Figure 2.16: A map of the Special Areas of Conservation within the catchment and sub-catchments of Lough Sheelin from the EPA AAGeoTool website (25/07/22).

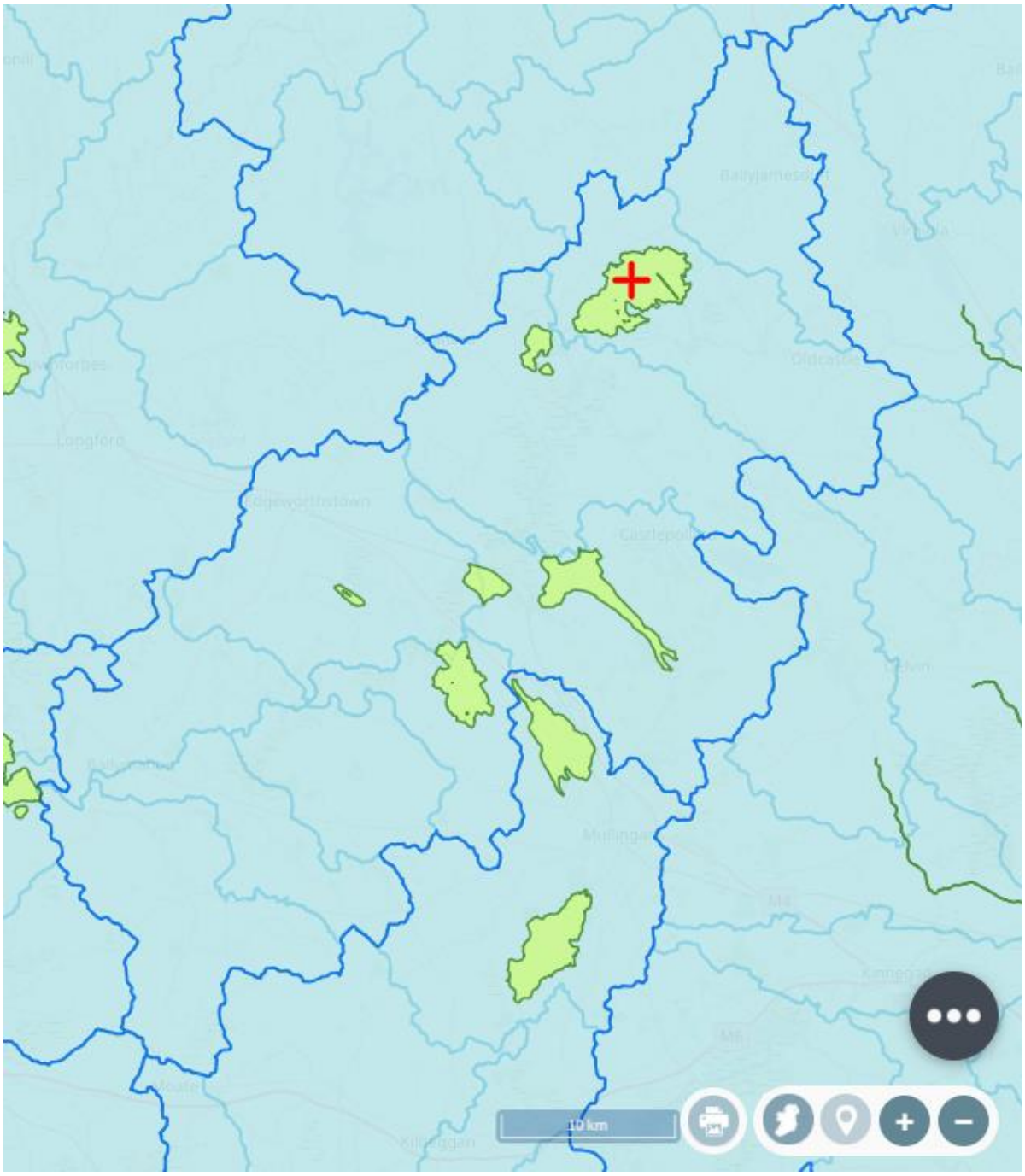

Figure 2.17: A map of the Special Protection Areas within the catchment and sub-catchments of Lough Sheelin from the EPA AAGeoTool website (25/07/22).

4. CONCLUSIONS OF STAGE 1 APPROPRIATE ASSESSMENT SCREENING

The proposed Long-term Management Plan for the Great Western Lakes is likely to contribute to the maintenance or restoration of the favourable conservation condition of habitats and species within Natura 2000 sites where they have been designated as a feature of interest. However, the potential for adverse impacts on Natura 2000 sites are uncertain. Potential impacts as a result of the proposed Actions include the accidental spread/dispersal of IAS, petrochemical/silt pollution and the disturbance/destruction of protected habitats and species (including, but not limited to, Atlantic Salmon, Freshwater pearl mussel, Lamprey, Otter, White-clawed crayfish). Impacts may occur during or after the implementation of the proposed Actions including the establishment of buffer zones, planting programs for native trees, management of IAS, fish stock management plans and restoration of salmonid habitat. These enhancement works are likely to contribute to the long-term improvement in salmonid fish stocks and their habitats, with the potential for added benefits to local biodiversity.

Based on the above AA Screening a Natura Impact Statement is required in relation to Actions 2.2, 2.3, 4.1. 5.1, 5.2 and 6.1. This Long-term Management Plan for the Great Western Lakes fundamentally aims to improve the management and condition of habitat quality for the long-term sustainability of salmonid populations. Although the specific details of plans or projects arising from the implementation of the aforementioned Actions based on the guidance of the Long-term Management Plan, there is the potential for significant or uncertain impacts on Natura 2000 sites within the WFD catchments of each of the Lakes. As a result, future plans or projects arising from the proposed actions in this Plan must be Screened for Appropriate Assessment on a case-by-case basis. This can be viewed as a mitigation measure and following the precautionary principle, will necessitate a Stage 2 NIS for each of the actions that have been screened in.

5. APPROPRIATE ASSESSMENT STAGE 2: NATURA IMPACT STATEMENT

Following the stage 1 AA Screening process, it was concluded that six of the Actions from the proposed Long Term Management Plan for the Great Western Lakes and future plans or projects arising from the six proposed Actions in this Plan must be Screened for Appropriate Assessment on a case-by-case basis. This can be viewed as a mitigation measure and presented an unknown potential for significant adverse effects or potential for significant adverse effects on protected sites. In case C-323/17 People Over Wind and Peter Sweetman v Coillte, the Court of Justice of the European Union (CJEU) ruled that mitigation measures could not be taken into account at the screening stage of an appropriate assessment. As a result, the AA process should proceed to stage 2, Natura Impact Statement (NIS) for the six proposed Actions that were Screened In as part of the Stage 1 AA.

The list of proposed actions to be assessed as part of the stage 2 NIS are all necessary to the management of NATURA 2000 sites. The actions fundamentally aim to improve the water quality, habitat quality and survival of all stages of salmonids, including Atlantic Salmon, in the Great Western Lakes. The list of proposed actions and their potential for significant adverse effects are presented below (Table 6.1).

5.1. Assessment of Potential Significant Effects on the Conservation Objectives and Features of Interest

The potential for likely significant adverse effects arising from the proposed Actions on the integrity of the Conservation Objectives and Features of Interest throughout the Natura 2000 network, is examined throughout this section. The potential for significant adverse impacts may arise from works required in the field to implement the six proposed Actions and associated site access. At this stage the site-specific plans and projects associated with each action are unknown. To best assess the list of proposed Actions, descriptions of the likely impacts are presented including the mitigation measures identified in the Stage 1 AA Screening.

Table 5.1: An evaluation of the six Actions with their potential for unknown or significant adverse effects on the Natura 2000 Network.

Source	Potential for Unknown/ Significant Adverse Effects	Mitigation Measures
Action 2.2: Maintain existing woodland, where it occurs and promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate high temperatures and nutrient /sediment run-off.	Potential plans or projects associated with this action may include, but is not limited to, the fencing of watercourses, planting of native trees/plant species, installation of cattle drinkers, management of riparian habitat and the stabilisation of riparian zones. This Action will require pedestrian access with tools and machinery and possibly plant and machinery access to areas where plans or projects are to take place. As standard practice within IFI the works associated with these Actions follow several Guidance documents including; Appendix 2 'Biosecurity Measures for working in (or beside) Rivers' (IFI 2012); Appendix 3 'Standard Operating Procedure - Cleaning of gravels and spawning habitat maintenance' (IFI 2020); Appendix 4 'Standard Operating Procedure - Hedge Pruning and Tree Maintenance'; Appendix 5 'Guidelines on protection of fisheries during construction works in and adjacent to waters' (IFI 2016); and Appendix 6 'EP 10 Silt Management, page 58 of the *"Environmental Guidance: Drainage Maintenance & Construction"* handbook' (OPW 2019). The implementation of standard construction and operational phase controls in compliance with a Method Statement, IFI Guidelines/ Protocols, OPW, Water Pollution Acts, Local Authorities and the National Parks and Wildlife Service conditions will ensure protection of Natura 2000 habitats and species.	Future plans or projects arising from this proposed Action must be Screened for Appropriate Assessment on a case-by-case basis. This can be viewed as a mitigation measure. If this mitigation measure is correctly implemented the Action, alone or in combination with other projects, will not have a significant adverse effect on the integrity of the Natura 2000 Network.
Action 2.3: Develop spatial network models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased droughts, flood frequency and severity	Potential plans or projects associated with this action may include, but is not limited to, the fencing of watercourses, planting of native trees/plant species, management of riparian habitat and the stabilisation of riparian zones. This Action will require pedestrian access with tools and machinery and possibly plant and machinery access to areas where plans or projects are to take place. As standard practice within IFI the works associated with these Actions follow several Guidance documents including; Appendix 2 'Biosecurity Measures for working in (or beside) Rivers' (IFI 2012); Appendix 3 'Standard Operating Procedure - Cleaning of gravels and spawning habitat maintenance' (IFI	Future plans or projects arising from this proposed Action must be Screened for Appropriate Assessment on a case-by-case basis. This can be viewed as a mitigation measure. If this mitigation measure is correctly implemented the Action, alone or in combination with other projects, will not have a significant adverse effect on the integrity of the Natura 2000 Network.

	2020); Appendix 4 'Standard Operating Procedure - Hedge Pruning and Tree Maintenance'; Appendix 5 'Guidelines on protection of fisheries during construction works in and adjacent to waters' (IFI 2016); and Appendix 6 'EP 10 Silt Management, page 58 of the *"Environmental Guidance: Drainage Maintenance & Construction"* handbook' (OPW 2019). The implementation of standard construction and operational phase controls in compliance with a Method Statement, IFI Guidelines/ Protocols, OPW, Water Pollution Acts, Local Authorities and the National Parks and Wildlife Service conditions will ensure protection of Natura 2000 habitats and species.	
Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes	Potential plans or projects associated with this action may include, but is not limited to, management of invasive alien plant species (IAPS) and animal species in riparian and aquatic habitats. The focus is likely to be on those invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477 of 2011) or the EU Invasive Alien Species Regulations (1143/2014). This Action will require pedestrian access with tools and machinery and possibly plant and machinery access to areas where plans or projects are to take place. There may also be an element of herbicide use for the management of certain terrestrial and riparian IAPS. As standard practice within IFI the works associated with these Actions follow several Guidance documents including; Appendix 2 'Biosecurity Measures for working in (or beside) Rivers' (IFI 2012); Appendix 4 'Standard Operating Procedure - Hedge Pruning and Tree Maintenance'; Appendix 5 'Guidelines on protection of fisheries during construction works in and adjacent to waters' (IFI 2016); and Appendix 6 'EP 10 Silt Management, page 58 of the *"Environmental Guidance: Drainage Maintenance & Construction"* handbook' (OPW 2019). The implementation of standard construction and operational phase controls in compliance with a Method Statement, IFI Guidelines/ Protocols, OPW, Water Pollution Acts, Local Authorities and the National Parks and Wildlife Service conditions will ensure protection of Natura 2000 habitats and species. IFI have completed an Appropriate Assessment Screening for the Management of the aquatic IAPS *Lagarosiphon major*	Future plans or projects arising from this proposed Action must be Screened for Appropriate Assessment on a case-by-case basis. This can be viewed as a mitigation measure. If this mitigation measure is correctly implemented the Action, alone or in combination with other projects, will not have a significant adverse effect on the integrity of the Natura 2000 Network.

	in Lough Corrib in 2021. The invasive fish 'Chub' (*Squalius cephalus*) has also been eradicated by IFI following the illegal release of the species in the River Inny (Caffrey et. al. 2018).	
Action 5.1: Produce stock management plans annually, on a local RBD basis, to reduce impacts on salmonids from other fish populations	The protection of Native Species of High Conservation value through stock management plans produced annually, on a local RBD basis, involves the management of several Non-Native fish species. Native fish species may be subject to pressures from other species through predation, competition for spawning habitat and other resources and even reported habitat destruction. Where there is empirical evidence that other fishes (e.g. bream, perch, roach, pike) are having a direct and adverse impact on salmonid fish populations, stock management plans to mitigate this should be produced.	Future plans or projects arising from this proposed Action must be Screened for Appropriate Assessment on a case-by-case basis. This can be viewed as a mitigation measure. If this mitigation measure is correctly implemented the Action, alone or in combination with other projects, will not have a significant adverse effect on the integrity of the Natura 2000 Network.
Action 5.2: Adjust stock management plans as population models on each of the lakes are refined	The protection of Native Species of High Conservation value through stock management plans produced annually, on a local RBD basis, involves the management of several Non-Native fish species. Native fish species may be subject to pressures from other species through predation, competition for spawning habitat and other resources and even reported habitat destruction. Where there is empirical evidence that other fishes (e.g. bream, perch, roach, pike) are having a direct and adverse impact on salmonid fish populations, stock management plans to mitigate this should be produced. It will be important to continually provide updated information on the status of fish populations in these lakes. This data will be required not only for salmonids but also for the fish species deemed to be impacting the salmonids in these watercourses.	Future plans or projects arising from this proposed Action must be Screened for Appropriate Assessment on a case-by-case basis. This can be viewed as a mitigation measure. If this mitigation measure is correctly implemented the Action, alone or in combination with other projects, will not have a significant adverse effect on the integrity of the Natura 2000 Network.
Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.	Potential plans or projects associated with this action may include, but is not limited to, the fencing of watercourses, planting of native trees/plant species, installation of cattle drinkers, stabilisation of riparian zones, installation of spawning gravels, cleaning of existing gravels, installation of instream structures and the management of riparian zones. This Action will require pedestrian access with tools and machinery and possibly plant and machinery access to areas where plans or projects are to take place. As standard practice within IFI the works associated with these Actions follow several Guidance documents	Future plans or projects arising from this proposed Action must be Screened for Appropriate Assessment on a case-by-case basis. This can be viewed as a mitigation measure. If this mitigation measure is correctly implemented the Action, alone or in combination with other projects, will not have a significant adverse effect on the integrity of the Natura 2000 Network.

	including; Appendix 2 'Biosecurity Measures for working in (or beside) Rivers' (IFI 2012); Appendix 3 'Standard Operating Procedure - Cleaning of gravels and spawning habitat maintenance' (IFI 2020); Appendix 4 'Standard Operating Procedure - Hedge Pruning and Tree Maintenance'; Appendix 5 'Guidelines on protection of fisheries during construction works in and adjacent to waters' (IFI 2016); and Appendix 6 'EP 10 Silt Management, page 58 of the *"Environmental Guidance: Drainage Maintenance & Construction"* handbook' (OPW 2019). The implementation of standard construction and operational phase controls in compliance with a Method Statement, IFI Guidelines/ Protocols, OPW, Water Pollution Acts, Local Authorities and the National Parks and Wildlife Service conditions will ensure protection of Natura 2000 habitats and species.	

Table 5.2: The Qualifying Interests (QI) for habitats in the Natura 2000 Network and their National conservation status published under Article 17 (NPWS 2019) in 2007, 2013 and 2019.

Table 1: Assessment results by habitat for 2007, 2013 and 2019.

Code	Common name	2007 Overall Status	2013 Overall Status and operator	2019 Overall Status and trend	2019 Range	2019 Area	2019 Structure & Functions	2019 Future Prospects
1110	Sandbanks	Unfavourable-Inadequate	Favourable	Stable	Stable	Stable	Stable	Favourable
1130	Estuaries	Unfavourable-Inadequate	Improving	Declining	Stable	Stable	Declining	Unfavourable-Inadequate
1140	Tidal mudflats and sandflats	Unfavourable-Inadequate	Improving	Declining	Stable	Stable	Declining	Unfavourable-Inadequate
1150	Lagoons*	Unfavourable-Bad	Stable	Declining	Stable	Stable	Declining	Unfavourable-Bad
1160	Large shallow inlets and bays	Unfavourable-Inadequate	Improving	Declining	Stable	Stable	Declining	Unfavourable-Bad
1170	Reefs	Unfavourable-Inadequate	Declining	Stable	Stable	Stable	Stable	Unfavourable-Inadequate
1180	Submarine structures made by leaking gases			Stable	Stable	Stable	Stable	Favourable
1210	Drift lines	Unfavourable-Inadequate	Declining	Declining	Stable	Declining	Stable	Unfavourable-Inadequate
1220	Vegetated shingle	Unfavourable-Inadequate	Stable	Stable	Stable	Stable	Stable	Unfavourable-Inadequate
1230	Vegetated sea cliffs	Unfavourable-Inadequate	Stable	Stable	Stable	Stable	Stable	Unfavourable-Inadequate
1310	Salicornia mud	Unfavourable-Inadequate	Declining	Stable	Stable	Stable	Stable	Favourable
1320	Spartinion	Unfavourable-Inadequate						
1330	Atlantic salt meadows	Unfavourable-Inadequate	Stable	Declining	Stable	Declining	Stable	Unfavourable-Inadequate
1410	Mediterranean salt meadows	Unfavourable-Inadequate	Stable	Declining	Stable	Declining	Stable	Unfavourable-Inadequate
1420	Halophilous scrub	Unfavourable-Bad	Declining	Declining	Declining	Declining	Stable	Unfavourable-Bad
2110	Embryonic shifting dunes	Unfavourable-Inadequate	Stable	Stable	Stable	Stable	Stable	Unfavourable-Inadequate
2120	Marram dunes (white dunes)	Unfavourable-Bad	Stable	Stable	Stable	Declining	Stable	Unfavourable-Inadequate
2130	Fixed dunes (grey dunes)*	Unfavourable-Bad	Stable	Declining	Stable	Stable	Declining	Unfavourable-Bad
2140	Empetrum dunes*	Unfavourable-Bad	Stable	Stable	Stable	Stable	Stable	Favourable
2150	Dune heath*	Unfavourable-Bad	Stable	Stable	Stable	Stable	Stable	Unfavourable-Inadequate
2170	Dunes with creeping willow	Unfavourable-Inadequate	Stable	Stable	Stable	Stable	Stable	Unfavourable-Inadequate
2190	Dune slacks	Unfavourable-Bad	Declining	Declining	Declining	Declining	Stable	Unfavourable-Inadequate
21A0	Machair*	Unfavourable-Bad	Stable	Stable	Stable	Declining	Stable	Unfavourable-Inadequate
3110	Oligotrophic isoetid lake habitat	Unfavourable-Bad	Declining	Stable	Stable	Stable	Stable	Unfavourable-Bad
3130	Mixed Najas flexilis lake habitat	Unfavourable-Bad	Stable	Declining	Stable	Stable	Declining	Unfavourable-Inadequate
3140	Hard water lakes	Unfavourable-Bad	Declining	Declining	Stable	Stable	Declining	Unfavourable-Bad
3150	Rich pondweed lake habitat	Unfavourable-Bad	Stable	Stable	Stable	Stable	Stable	Unfavourable-Inadequate
3160	Acid oligotrophic lakes	Unfavourable-Bad	Declining	Stable	Stable	Stable	Unknown	Unfavourable-Inadequate
3180	Turloughs*	Unfavourable-Inadequate	Stable	Stable	Stable	Stable	Stable	Unfavourable-Inadequate
3260	Vegetation of flowing waters	Unfavourable-Bad	Declining	Declining	Stable	Stable	Declining	Unfavourable-Inadequate
3270	Chenopodion rubri	Favourable	Favourable	Stable	Stable	Stable	Stable	Favourable

STATUS: Favourable Unfavourable-Inadequate Unfavourable-Bad Unknown

TREND: Improving Stable Declining Unknown

* priority habitat. Please note "Spartinion" was not considered post-2007 as this habitat is comprised of non-native species.

Table 5.2 continued: The Qualifying Interests (QI) for habitats in the Natura 2000 Network and their National conservation status published under Article 17 (NPWS 2019) in 2007, 2013 and 2019.

Code	Common name	2007 Overall Status	2013 Overall Status and operator	2019 Overall Status and trend	2019 Range	2019 Area	2019 Structure & Functions	2019 Future Prospects
4010	Wet heaths	Bad	Bad =	Bad ▼	Favourable =	Inadequate ▼	Bad =	Bad
4030	Dry heaths	Inadequate	Bad =	Bad =	Favourable =	Inadequate ▼	Bad =	Bad
4060	Alpine and subalpine heath	Inadequate	Bad ▲	Bad ▲	Favourable =	Inadequate ▼	Bad ▲	Bad
5130	Juniper scrub	Inadequate	Inadequate =	Favourable =	Favourable =	Favourable =	Favourable =	Favourable
6130	Calaminarian grasslands	Inadequate	Inadequate =	Inadequate ▼	Inadequate ▼	Inadequate ▼	Inadequate ▼	Inadequate
6210	Orchid-rich calcareous grassland*	Bad	Bad =	Bad ▼	Favourable =	Bad ▼	Inadequate =	Bad
6230	Species-rich *Nardus* grassland*	Bad	Bad ▼	Bad =	Favourable =	Bad =	Bad =	Bad
6410	*Molinia* meadows	Bad	Bad ▼	Bad ▼	Inadequate ▼	Bad ▼	Bad =	Bad
6430	Hydrophilous tall-herb swamp	Inadequate	Bad =	Bad ▼	Inadequate ▼	Inadequate ▼	Bad =	Bad
6510	Hay meadows	Bad	Bad =	Bad ▼	Bad ▼	Bad ▼	Bad ▼	Bad
7110	Raised bog (active)*	Bad	Bad ▼	Bad ▼	Bad =	Bad ▼	Bad ▼	Bad
7120	Degraded raised bogs	Bad	Bad ▼	Bad ▼	Bad =	Bad ▼	Bad ▼	Bad
7130	Blanket bog (active)*	Inadequate	Bad ▼	Bad ▼	Favourable =	Inadequate ▼	Bad ▼	Bad
7140	Transition mires	Bad	Bad x	Bad =	Favourable =	Inadequate =	Bad x	Bad
7150	Rhynchosporion depressions	Favourable	Inadequate ▼	Bad ▼	Favourable =	Bad ▼	Bad ▼	Bad
7210	*Cladium* fens*	Bad	Bad x	Inadequate =	Favourable =	Inadequate =	Inadequate x	Inadequate
7220	Petrifying springs*	Bad	Inadequate =	Inadequate ▼	Favourable =	Favourable =	Inadequate ▼	Inadequate
7230	Alkaline fens	Bad	Bad x	Bad ▼	Favourable =	Inadequate ▼	Bad x	Bad
8110	Siliceous scree	Inadequate	Inadequate ▲	Inadequate =	Favourable =	Favourable =	Inadequate =	Inadequate
8120	Eutric scree	Inadequate	Inadequate =	Inadequate =	Favourable =	Favourable =	Inadequate =	Inadequate
8210	Calcareous rocky slopes	Inadequate	Inadequate =	Inadequate =	Favourable =	Favourable =	Inadequate =	Inadequate
8220	Siliceous rocky slopes	Inadequate	Inadequate =	Inadequate =	Favourable =	Favourable =	Inadequate =	Inadequate
8240	Limestone pavement*	Inadequate	Inadequate =	Inadequate =	Favourable =	Inadequate ▼	Inadequate ▲	Inadequate
8310	Caves	Favourable	Favourable	Favourable =	Favourable =	Favourable =	Favourable =	Favourable
8330	Sea caves	Favourable	Favourable	Favourable =	Favourable =	Favourable =	Favourable =	Favourable
91A0	Old oak woodland	Bad	Bad ▲	Bad ▼	Favourable =	Bad ▼	Bad =	Bad
91D0	Bog woodland*	Inadequate	Favourable	Favourable =	Favourable =	Favourable =	Favourable =	Favourable
91E0	Alluvial woodland*	Bad	Bad ▲	Bad ▼	Favourable =	Bad ▼	Inadequate ▼	Bad
91J0	Yew woodland*	Bad	Bad ▲	Bad =	Bad =	Bad =	Bad =	Bad

Table 5.3: The Qualifying Interests (QI) for species in the Natura 2000 Network and their National conservation status published under Article 17 (NPWS 2019) in 2007, 2013 and 2019.

Table 3: Assessment results by species for 2007, 2013 and 2019.

Code	Species name	Annex	2007 Overall Status	2013 Overall Status and operator	2019 Overall Status and trend	2019 Range	2019 Population	2019 Habitat for the species	2019 Future Prospects
6985	Killarney fern (*Vandenboschia speciosa*)	II, IV							
1528	Marsh saxifrage (*Saxifraga hirculus*)	II, IV							
1833	Slender naiad (*Najas flexilis*)	II, IV							
6216	Slender green feather moss (*Hamatocaulis vernicosus*)	II							
1395	Petalwort (*Petalophyllum ralfsii*)	II							
1376	Maërl (*Lithothamnium corralloides*)	V							
1377	Maërl (*Phymatholithon calcareum*)	V							
1400	White cushion moss (*Leucobryum glaucum*)	V							
1409	Sphagnum genus (*Sphagnum spp.*)	V							
1413	Lycopodium group (*Lycopodium spp.*)	V							
1378	Cladonia subgenus cladina (*Cladonia (Cladina) subsp.*)	V							
1013	Geyer's whorl snail (*Vertigo geyeri*)	II							
1014	Narrow-mouthed whorl snail (*Vertigo angustior*)	II							
1016	Desmoulin's whorl snail (*Vertigo moulinsiana*)	II							
1024	Kerry slug (*Geomalacus maculosus*)	II, IV							
1029	Freshwater pearl mussel (*Margaritifera margaritifera*)	II, V							
1990	Nore pearl mussel (*Margaritifera durrovensis*)	II, V							
1092	White-clawed crayfish (*Austropotamobius pallipes*)	II, V							
1065	Marsh fritillary (*Euphydryas aurinia*)	II							
1095	Sea lamprey (*Petromyzon marinus*)	II							
1096	Brook lamprey (*Lampetra planeri*)	II							
1099	River lamprey (*Lampetra fluviatilis*)	II, V							
5046	Killarney shad (*Alosa killarnensis*)	II, V							
1103	Twaite shad (*Alosa fallax*)	II, V							
5076	Pollan (*Coregonus pollan*)	V							
1106	Atlantic salmon (*Salmo salar*)	II, V							
6284	Natterjack toad (*Epidalea calamita*)	IV							
1213	Common frog (*Rana temporaria*)	V							
1223	Leatherback turtle (*Dermochelys coriacea*)	IV							
1303	Lesser horseshoe bat (*Rhinolophus hipposideros*)	II, IV							
1309	Common pipistrelle (*Pipistrellus pipistrellus*)	IV							
5009	Soprano pipistrelle (*Pipistrellus pygmaeus*)	IV							
1317	Nathusius' pipistrelle (*Pipistrellus nathusii*)	IV							
1322	Natterer's bat (*Myotis nattereri*)	IV							

STATUS: Favourable Unfavourable-Inadequate Unfavourable-Bad Unknown Vagrant

TREND: ▲ Improving = Stable ▼ Declining × Unknown

88

Table 5.3 continued: The Qualifying Interests (QI) for species in the Natura 2000 Network and their National conservation status published under Article 17 (NPWS 2019) in 2007, 2013 and 2019.

Code	Species name	Annex	2007 Overall Status	2013 Overall Status and operator	2019 Overall Status and trend	2019 Range	2019 Population	2019 Habitat for the species	2019 Future Prospects
1314	Daubenton's bat (*Myotis daubentonii*)	IV							
1330	Whiskered bat (*Myotis mystacinus*)	IV							
1326	Brown long-eared bat (*Plecotus auritus*)	IV							
1331	Leisler's bat (*Nyctalus leisleri*)	IV							
1334	Mountain hare (*Lepus timidus*)	V							
1355	Otter (*Lutra lutra*)	II, IV							
1357	Pine marten (*Martes martes*)	V							
1364	Grey seal (*Halichoerus grypus*)	II, V							
1365	Harbour seal (*Phoca vitulina*)	II, V							
1345	Humpback whale (*Megaptera novaeangliae*)	IV							
1349	Common bottlenose dolphin (*Tursiops truncatus*)	II, IV							
1350	Common dolphin (*Delphinus delphis*)	IV							
1351	Harbour porpoise (*Phocoena phocoena*)	II, IV							
2027	Killer whale (*Orcinus orca*)	IV							
2029	Long-finned pilot whale (*Globicephala melas*)	IV							
2030	Risso's dolphin (*Grampus griseus*)	IV							
2031	White-sided dolphin (*Lagenorhynchus acutus*)	IV							
2032	White-beaked dolphin (*Lagenorhynchus albirostris*)	IV							
2034	Striped dolphin (*Stenella coeruleoalba*)	IV							
2035	Cuvier's beaked whale (*Ziphius cavirostris*)	IV							
2038	Sowerby's beaked whale (*Mesoplodon bidens*)	IV							
2618	Minke whale (*Balaenoptera acutorostrata*)	IV							
2621	Fin whale (*Balaenoptera physalus*)	IV							
5020	Blue whale (*Balaenoptera musculus*)	IV							
2624	Sperm whale (*Physeter macrocephalus*)	IV							
5033	Northern bottlenose whale (*Hyperoodon ampullatus*)	IV							
2619	Sei whale (*Balaenoptera borealis*)	IV							
1348	Northern right whale (*Eubalaena glacialis*)	IV							
2028	False killer whale (*Pseudorca crassidens*)	IV							
2037	True's beaked whale (*Mesoplodon mirus*)	IV							
2622	Pygmy sperm whale (*Kogia breviceps*)	IV							
5029	Beluga/White whale (*Delphinapterus leucas*)	IV							
5034	Gervais' beaked whale (*Mesoplodon europaeus*)	IV							
1102	Allis shad (*Alosa alosa*)	II, V							
1320	Brandt's bat (*Myotis brandtii*)	IV							

6. IN-COMBINATION ASSESSMENT

6.1. Source/Pathway/Receptor Assessment

6.1.1. Source

The development of the Long-term Management Plan for the Great Western Lakes may result in direct or indirect impacts on Natura 2000 sites through some of the proposed Actions (Action 2.2, 2.3, 4.1, 5.1, 5.2 and 6.1). Future projects based on the proposed actions within the Long-term Management Plan for the Great Western Lakes are likely to take place within, upstream/downstream of or in close proximity to several Natura 2000 sites. As the details of several proposed project are yet unknown, their potential for adverse impacts are uncertain. Each of the plans or projects that will arise under the guidance of the Long-term Management Plan for the Great Western Lakes will need to be Screened for Aprropriate Assessment on a case-by-case basis, taking into account up to date, objective scientific information. This action can be viewed as a mitigation measure.

6.1.2. Pathway

There is a potential for 'direct' pathway impacts from any plans/projects arising from the Long-term Management Plan for the Great Western Lakes to Natura 2000 sites contained within the catchments of the designated lakes.

6.1.3. Receptor

The Natura 2000 site receptors of any proposed plans/projects in Great Western Lakes or their catchments must be assessed on a case-by-case basis. Natura 2000 sites potentially impacted by plans or projects arising from the Long-term Management Plan for the Great Western Lakes have been outlined in Section 3.

6.2. In-Combination Effects

In relation to existing Plans, Schemes, Strategies and Directives there is a potential for in-combination effects that may have an uncertain or adverse impact on a Natura 2000 site (Table 4.1). Arterial Drainage Schemes are likely to have overlapping works zones. The promotion of the Wild Atlantic Way and associated angling activity may increase biosecurity risks for overseas and domestic travellers with limited knowledge of IAS. Local development plans may have overlapping works zones and site designations with future plans and projects arising from the Long-term Management Plan for the Great Western Lakes. There is also the potential for positive effects associated with

each action including the engagement of local stakeholders, promotion of action plans and knowledge relating to pollution and IAS and habitat enhancement and restoration.

Table 4.1: A list of plans and schemes assessed for in-combination effects.

Plan/Scheme/ Strategy/Directive	Function	Potential for in-combination impacts
Inter-Agency Cooperation	IFI will continue to work with other relevant agencies, particularly LAWPRO and engage with established catchment groups, angling Federations, rivers trusts and associations to assist with the progression of common catchment management goals. Where such groups have not yet been established, IFI will continue to participate in the encouragement of local communities, stakeholders and relevant authorities to form local Catchment Management Groups for the Western Lakes. These will engage with communities, particularly, farming groups, to help raise awareness and assist with the implementation of measures to address water quality and habitat issues. IFI will endeavour to improve communication mechanisms with catchment organisations and relevant authorities, while continuing to enhance networking and reporting relationships at various levels within the organisations.	*Action 2.2: Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off* Buffer zones will overlap with adjacent stakeholder lands. *Action 2.3: Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity* Planting schemes will overlap with adjacent stakeholder lands. *Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes* Infestations will overlap with adjacent stakeholder lands. *Action 5.1: Produce stock management plans annually, to reduce impacts on salmonids from other fish populations* Management sites will overlap with stakeholder catchments. *Action 5.2: Adjust stock management plans as population models on each of the lakes are refined* Management sites will overlap with stakeholder catchments. *Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.* Restoration projects will overlap with adjacent stakeholder lands.
Arterial Drainage Schemes	Arterial Drainage Schemes were carried out under the Arterial Drainage Act, 1945 to improve land for agriculture and to mitigate flooding. Rivers, lakes weirs and bridges were modified to enhance	*Action 2.2: Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off* Buffer zones may overlap with Arterial Drainage Scheme access routes.

	conveyance, embankments were built to control the movement of flood water and various other work was carried out under Part II of the Arterial Drainage Act, 1945. The purpose of the schemes was to improve land for agriculture, to ensure that the 3 – year flood was retained in bank this was achieved by lowering water levels during the growing season to reduce waterlogging on the land beside watercourses known as callows. Flood protection in the benefiting lands was increased as a result of the Arterial Drainage Schemes.	*Action 2.3: Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity* Planting schemes may overlap with Arterial Drainage Scheme access routes. *Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes* Infestations may overlap with Arterial Drainage Scheme access routes. *Action 5.1: Produce stock management plans annually, to reduce impacts on salmonids from other fish populations* N/A *Action 5.2: Adjust stock management plans as population models on each of the lakes are refined* N/A *Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.* Restoration projects may overlap with Arterial Drainage Scheme access routes.
Wild Salmon and Sea Trout Tagging Scheme (S.I. No. 585 of 2018) and series of associated Bye-Laws	These Regulations amend the Wild Salmon and Sea Trout Tagging Scheme Regulations 2013 to provide for, the quotas of fish that can be harvested by commercial fishing engines and rod and line from those rivers identified in Schedule 2. The Regulations also provide for the use of brown tags in specified rivers which are identified in Schedule 4.	*Action 2.2: Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off* Improved habitat and water quality for salmonids *Action 2.3: Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity* Improved habitat and water quality for salmonids *Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes* Improved habitat quality for salmonids

		Action 5.1: Produce stock management plans annually, to reduce impacts on salmonids from other fish populations Improved habitat quality for salmonids *Action 5.2: Adjust stock management plans as population models on each of the lakes are refined* Improved habitat quality for salmonids *Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.* Improved habitat quality for salmonids
Promotion of the Wild Atlantic Way	The Wild Atlantic Way is a tourism trail on the west coast, and on parts of the north and south coasts, of Ireland. The 2,500 km driving route passes through nine counties and three provinces, stretching from County Donegal's Inishowen Peninsula in Ulster to Kinsale, County Cork, in Munster, on the Celtic Sea coast. Recreational angling is promoted as part of the Wild Atlantic Way (https://fishinginireland.info/wp-content/uploads/2021/11/WAW-WEB-pub.pdf)	*Action 2.2: Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off* N/A *Action 2.3: Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity* Planting regimes may overlap with areas targeted for tourism *Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes* Infestations may overlap with areas targeted for tourism *Action 5.1: Produce stock management plans annually, to reduce impacts on salmonids from other fish populations* Stock management sites may overlap with areas targeted for tourism *Action 5.2: Adjust stock management plans as population models on each of the lakes are refined* Stock management sites may overlap with areas targeted for tourism *Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.* Restoration projects may overlap with areas targeted for tourism
Nitrates Directive	The Government has published Ireland's Fifth Nitrates Action	*Action 2.2: Promote the establishment of significant aquatic buffer zones to enhance*

	Programme. The Programme sets out new measures that have been introduced since the Fourth Programme. Ireland's Nitrates Action Programme is given effect by the European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2022 (S.I. No. 113 of 2022) . The regulations contain specific measures to protect surface waters and groundwater from nutrient pollution arising from agricultural sources. The Fifth Nitrates Action Programme was developed following an initial public consultation, which was held in late 2020, and a second consultation period that concluded in September 2021. A third consultation period focused on the draft Natura Impact Statement and draft Strategic Environmental Assessment for the Programme was concluded on January 2022. Approximately 700 submissions were received during the three consultation periods and these have informed the final Programme.	*biodiversity and ameliorate nutrient /sediment run-off* Improved water quality *Action 2.3: Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity* Improved habitat and water quality for salmonids *Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes* Improved habitat and water quality for salmonids through reduced sedimentation *Action 5.1: Produce stock management plans annually, to reduce impacts on salmonids from other fish populations* N/A *Action 5.2: Adjust stock management plans as population models on each of the lakes are refined* N/A *Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.* Improved habitat and water quality for salmonids
WFD	The Water Framework Directive [WFD] (2000/60/EC) establishes a legal framework to protect and restore clean water across Europe and to ensure its long-term, sustainable use, requiring an integrated approach across sectors. The main tool for implementing the WFD is through the RBMPs. The 1st Cycle plans covered the period 2010-2015, with the 2nd Cycle implemented late and covering the period 2018-2021. The 3rd Cycle plan covers the period 2022-2027.	*Action 2.2: Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off* Improved habitat and water quality for salmonids *Action 2.3: Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity* Improved habitat and water quality for salmonids *Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes* Improved habitat and water quality for salmonids

		Action 5.1: Produce stock management plans annually, to reduce impacts on salmonids from other fish populations N/A *Action 5.2: Adjust stock management plans as population models on each of the lakes are refined* N/A *Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.* Improved habitat and water quality for salmonids
Fisheries Maintenance Projects in the Lough Corrib Catchment from 2022 to 2026	IFI intends to carry out annual maintenance projects on 46 river sections throughout the Lough Corrib catchment starting in July 2022 until the end of February 2027. The projects are necessary to the management of Lough Corrib SAC and aims to maintain the habitat required by Atlantic Salmon (*Salmo salar*) as a Qualifying Interest (QI) throughout the Corrib catchment. The objectives of the project are to ensure necessary Salmon migratory routes are free of obstruction; to ensure that the spawning substrates present can be utilised; and to ensure that excessive tunnelling is minimised through selective riparian pruning	*Action 2.2: Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off* Improved habitat and water quality for salmonids *Action 2.3: Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity* Improved habitat and water quality for salmonids *Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.* Improved habitat and water quality for salmonids
National Biodiversity Action Plan 2023-2027.	The Plan will aim to improve the governance of biodiversity in Ireland so that we can better respond to the biodiversity crisis. This means ensuring a 'whole of Government', 'whole of society' approach to this crisis, and properly recognising biodiversity's contributions to people, the economy and society. The Plan will also address the connections between biodiversity and climate change, and the need to enhance the evidence base for biodiversity conservation policy and practice. The Plan has been in development since October 2021.	*Action 2.2: Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off* Improved habitat and water quality for salmonids *Action 2.3: Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity* Improved habitat and water quality for salmonids *Action 4.1: Remove and/or manage harmful invasive alien species through*

	The first phase of work involved an extensive review of national, European, and international policies, strategies, legislation and science relating to biodiversity. This review helped to inform a first draft of the Plan, which was circulated to an initial group of stakeholders for feedback. The feedback from this first group of stakeholders is currently being incorporated into a second draft of the Plan, which will be issued for public consultation later in 2022. The final version of the Plan will be published in early 2023, to allow the recommendations of the ongoing Citizens Assembly on Biodiversity to be reviewed and incorporated where appropriate.	*strategic stock management and weed management programmes* Improved habitat quality for salmonids *Action 5.1: Produce stock management plans annually, to reduce impacts on salmonids from other fish populations* Improved habitat quality for salmonids *Action 5.2: Adjust stock management plans as population models on each of the lakes are refined* Improved habitat quality for salmonids *Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.* Improved habitat quality for salmonids
Local development plans	A development plan consists of a written statement and series of maps that describe how your local authority aims to use particular areas, for example, residential, industrial or agricultural areas. It also sets out development objectives for the area, such as plans to improve roads and local amenities.	*Action 2.2: Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off* Buffer zones may overlap with local development *Action 2.3: Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity* Planting schemes may overlap with local development *Action 4.1: Remove and/or manage harmful invasive alien species through strategic stock management and weed management programmes* Infestations may overlap with local development *Action 5.1: Produce stock management plans annually, to reduce impacts on salmonids from other fish populations* N/A *Action 5.2: Adjust stock management plans as population models on each of the lakes are refined* N/A

		Action 6.1: Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects. Restoration projects may overlap with local development

7. CONCLUSIONS OF THE NATURA IMPACT STATEMENT

This document has been prepared following the Habitats Directive and Regulations, as well as all other relevant guidance and legislation. An AA Screening was carried out leading to the requirement for a NIS as six of the proposed Actions will require mitigation measures. These measures may no longer be considered by competent authorities in the "screening stage" of the AA process when determining whether a proposed plan/project is likely to have a significant effect on a Natura 2000 site. In the absence of mitigation measures the Great Western Lakes Management Plan may have adverse effects on the integrity of the Natura 2000 Network. This Natura Impact Statement, following objective scientific information and the Precautionary Principal, concludes that as a mitigation measure project and site-specific Appropriate Assessments must be carried out under each of the six proposed Actions (2.2, 2.3, 4.1. 5.1, 5.2 and 6.1). The proposed Actions involve the management of aquatic and riparian habitats and the installation of features to enhance the ecological conditions of the Great Western Lakes by improving the water quality, habitat quality and survival of all stages of salmonids. The management of the riparian and instream habitat aims to enhance salmonid spawning sites, including Atlantic Salmon, and can inadvertently improve habitat quality for other local biodiversity including species such as Otter, Crayfish and Lamprey.

No adverse effects on the integrity of Natura 2000 sites are likely. The proposed works are necessary to the Management of Natura 2000 sites and will positively impact on the Conservation Objectives and Features of Interest. The proposed Great Western Lakes Management Plan is not likely to have adverse effects on the Conservation Objectives or Features of interest of the Natura 2000 Network, alone or in combination with other Plans or Projects. As outlined above, following the implementation of mitigation the proposed Plan is not likely to have adverse effects on any features of interest or conservation objectives of Natura 2000 sites or Natura 2000 sites with a hydrological link to the Great Western Lakes.

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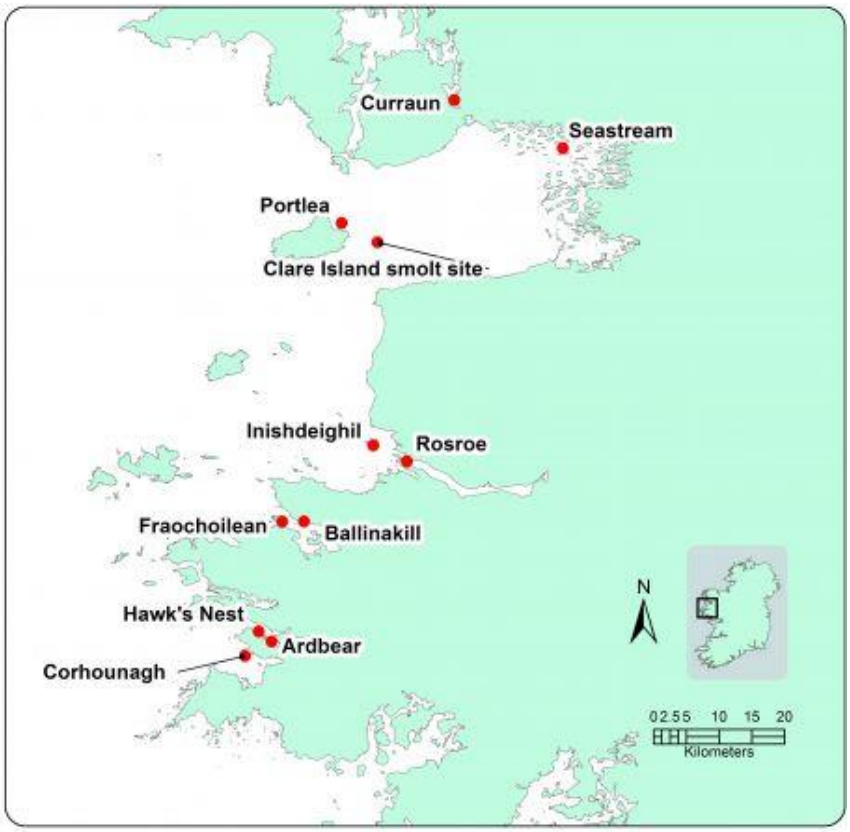
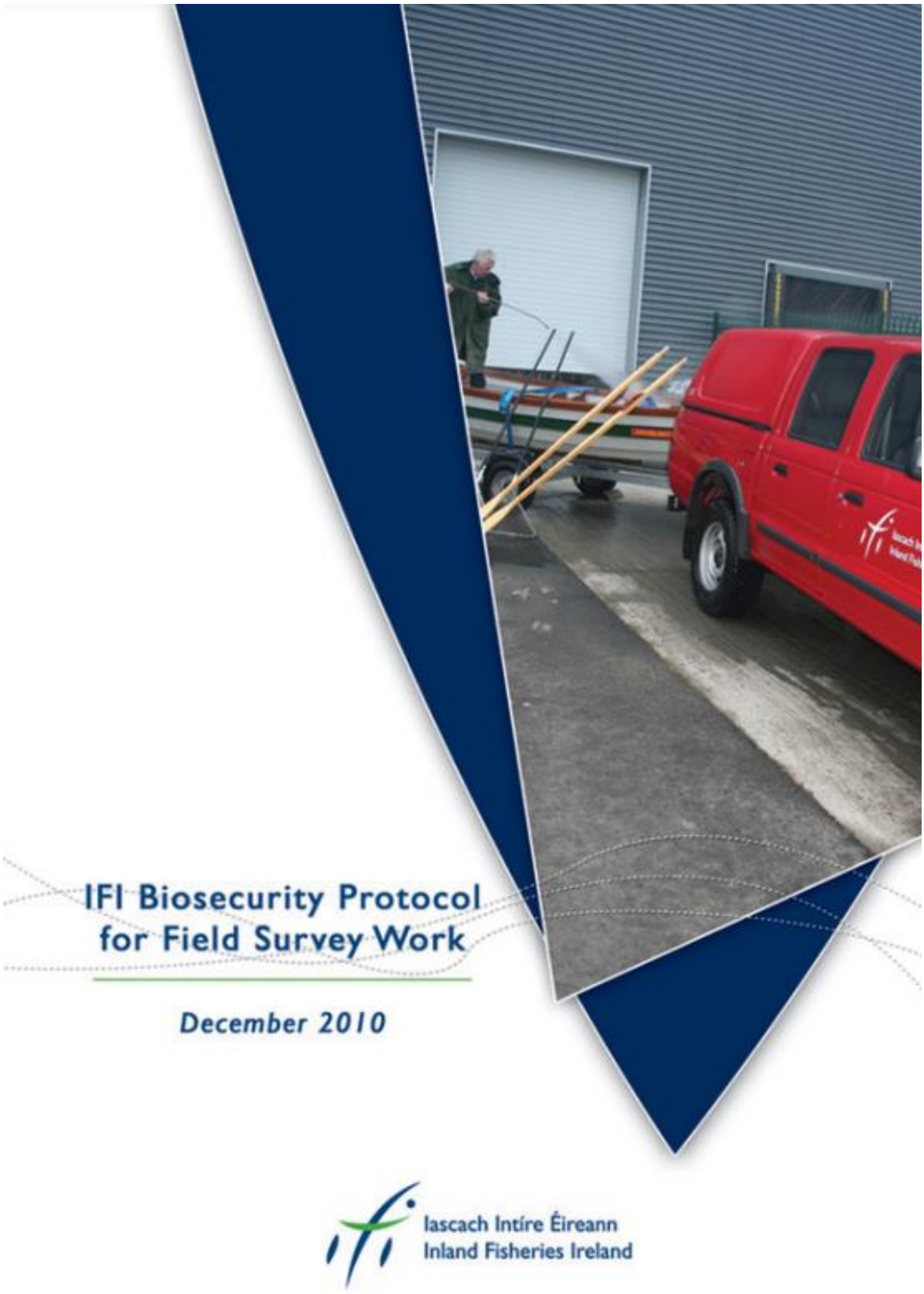
Appendices

Appendix 1: Locations of salmonid fish farms along the coast of Ireland (Marine Institute).



Appendix 2: Biosecurity Measures for working in (or beside) Rivers.



Biosecurity Protocol for Field Survey Work

Invasive species are an ever present threat in our aquatic and riparian systems and it is imperative that none of our field operations exacerbate the risks to the environment and to the economy that are posed by these species. Fish parasites, pathogens and diseases also represent a significant threat to the health status of our watercourses. The introduction or transfer of such pathogens or diseases has the potential to wipe out large populations of fish in affected waters or catchments. Vigilance is required if we are to stop the spread of invasive species and fish diseases, and it is imperative that we in IFI lead by example in the ongoing struggle against these significant threats to our fishery watercourses.

The need for basic biosecurity in our fisheries operations must become ingrained in the psyche of our staff if we are to do our part to stop the spread of hazardous invasive species and fish pathogens. Much to do with biosecurity involves awareness, common sense and agreed procedures. Listed below are some basic procedures that must be implemented when conducting field survey work.

Each field vehicle must carry a 'disinfection box'. This should contain Virkon Aquatic or another proprietary disinfectant, a spray bottle, cloths or sponges, a scrubbing brush and protective gloves.

On completion of any field operation, all equipment used must be treated according to the procedures listed below. Equipment in this respect includes the following:
boats, trailers, outboard motors, anchors and rope, weights, tanks, buckets and bins, all PPE (including boots, wellingtons, waders, wetsuits, dry suits, waterproof clothing, life jackets, diving apparatus, etc.) and any technical or sampling apparatus used as part of the survey. Protective gloves must be worn when using any disinfectant solution in any of the procedures listed below.

- Visually inspect all equipment that has come into contact with the water for evidence of attached plant or animal material, or adherent mud or debris. This should be done before leaving the site.

- Remove any attached or adherent material (fish, fish scales, vegetation and debris) before leaving the site of operation.

- Ensure that all water is drained from boats, live wells and other water retaining compartments, outboard motors, tanks and other equipment before transportation elsewhere.

- High-pressure steam cleaning, with water > 40 degrees C, is recommended for boats (including oars, row locks, attachment ropes, anchors and buoys), trailers and outboard motors that are being moved from one watercourse to another. Many roadside garages provide these facilities. If it is not possible to steam clean the equipment, a normal power hose must be used. After cleaning visually inspect the equipment to ensure that all adherent material and debris has been removed.

- It is recommended to apply disinfectant, using the spray bottle from the 'disinfection box', to the undercarriage and wheels of the vehicle and trailer after steam cleaning or power hosing.

- Wet or live wells and other water retaining compartments in survey boats must be cleaned, rinsed or flushed with a 1% solution of Virkon Aquatic or another proprietary disinfection product. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. Rinse thoroughly with clean water.

- Tanks that are used to stock or transfer live fish should be thoroughly washed with a 1% solution of Virkon Aquatic or another proprietary disinfection product. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. All disinfected equipment must be thoroughly rinsed with clean water.

- Outboard motors should be flushed with a 1% solution of Virkon Aquatic or another proprietary disinfection product, or with water > 40 degrees C. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. Facilities will be provided at IFI stores countrywide to accommodate this operation.

- Nets (to include monofilament and braided gill nets, fyke nets and seine nets) must be cleaned of all vegetation and debris before returning to base. The clean nets must then be placed in a freezer for a period of four days (3 days will suffice for monofilament nets). Following this treatment the nets must be soaked in a 1% solution of Virkon Aquatic or a proprietary disinfectant for a period of not less than 15 minutes and thoroughly rinsed thereafter. Where these proprietary disinfectants are not available the nets must be soaked in a 5% solution (100 ml / 20 litre solution) of chlorine bleach for 1 hour and thoroughly rinsed after.
  An SOP on 'Management and Disinfection of Survey Nets' is available on request from IFI Swords.

- Footwear should be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards.

- All PPE should be visually inspected and any attached vegetation or debris removed. Where appropriate, the gear should be wiped down with a cloth soaked in 1% solution of Virkon Aquatic or another proprietary disinfection product. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. Rubber gloves must be worn when undertaking this procedure.

- Sampling equipment (e.g. electrofishing electrodes and cable, grab samplers, meter sticks, buckets and bins, etc.) must be cleaned, rinsed or wiped down with or dipped in a suitable disinfectant solution.

- Landing nets and hand nets must be dipped in disinfectant solution and rinsed in clean water.

- All field equipment must be suitably disinfected before being returned to the IFI Swords warehouse for storage. Staff will be requested to sign a prepared form detailing the nature of the disinfection process carried out and the date on which this was conducted.

Note
Disinfectants must be used with care and in strict accordance with the manufacturer's instructions. They must be disposed of safely and never in close proximity to open waters,

For additional information, please contact:

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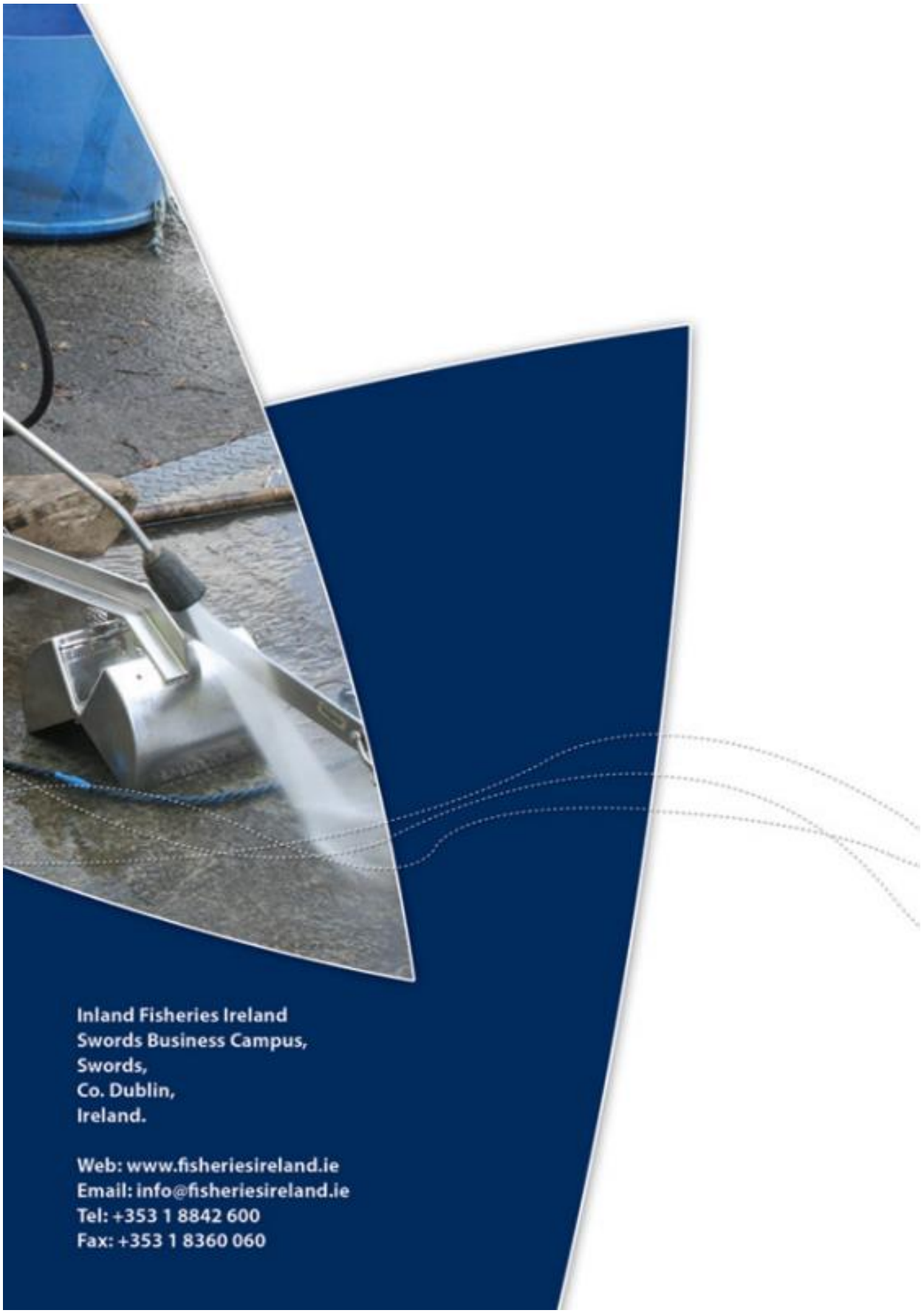
Senior Research Officer

Inland Fisheries Ireland, Swords.
01 8842600



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Appendix 3: Standard Operating Procedure - Cleaning of gravels and spawning habitat maintenance

Standard Operating Procedure
Cleaning of gravels and spawning habitat maintenance

May 2020

Name of Document:					
Author (s):		Fergus Lynch, Cornelius McMahon, Ronan Cusack			
Description of Content:		SOP for cleaning gravels and spawning habitat maintenance			
Approved by:		Milton Matthews			
Date of Approval:					
Revisions					
Revision Nr	Status	Revised by	Reviewed by	Approved by	Date

Introduction

River beds that are usually suitable for the spawning of salmonids will occasionally become unsuitable as a result of the presence of fine silt, the washing away of gravels or the growth of weeds. In certain circumstances Inland Fisheries Ireland will decide to take action to enhance the suitability of river beds for spawning. This Standard Operating Procedure describes how some of those actions should be carried out.

Before making this decision it may be necessary to carry out Appropriate Assessment. Please refer to the Standard Operating Procedure on working in Natura 2000 sites to see if Appropriate Assessment is required. If AA is required, the action should not take place until this process has been completed.

- **Personal protective equipment**:

The Personal Protection Equipment identified in the Risk Assessment for the activity should be worn. These may include the following: high visibility jacket, Waders, gloves, protective eyewear, and ear protection. Antiseptic hand gel and wipes may also be required to protect against water borne diseases disease, cuts and grazes.

1.2 Equipment / Hand-tools:

Pruning shears / Heavy duty garden rake or drag / Petrol hedge trimer / Three prong fork / Chainsaw / Slash-hook / Hedge clippers

1.3 Equipment / Mechanical:

Long reach digger / Bush-cutting flail / Riddle bucket / Teleporter

1.4 Time of year:

Carefully select an appropriate time during late summer or early autumn (times vary dependent on fish species) to carry out instream works. This allows enough time for that particular years fry to mature and yet gives adequate time to complete the work before trout or salmon return to spawn.

1.5 Selective pruning:

Please refer to the Standard Operating Procedure for hedge pruning and tree management for the land based removal of bankside vegetation. This SOP describes how to remove bankside vegetation from the river side.

Care and consideration needs to be given when removing bankside vegetation. Not all overhanging branches and shrubbery needs to be removed as this provides much needed cover for juvenile fish during low water periods of the summer. When water levels are low juvenile fish are extremely vulnerable to predation from birds such as gulls and the Grey Heron.

1.6 Instream Vegetation:

Instream vegetation may also need to be removed selectively in areas of excessive growth. Excessive removal of such vegetation may significantly reduce habitat for aquatic insects to shelter and survive, which may impact on food available to both adult and juvenile fish. Sections within a channel where excessive weed growth has taken over spawning areas needs to be cleared, exposing fresh gravel to migrating fish.

Trees or branches which may cause a blockage during high water periods of the year should be removed. (Note – roots may provide bank stabilization)

The Procedure

2.1 Manual maintenance on a spawning channel

The manual removal of both instream and bankside vegetation is normally a three person job and should not be carried out in more than 1meter of water. A starting point is first selected and the lead person moves upstream opening up the channel by cutting back both banks with the assistance of either a hedge clippers, a petrol hedge trimmer or a chainsaw. In some cases where tunnelling has occurred along a river or stream, selective bacnk clearance may be required to allow the correct amount of light to enter the channel. The material that is cut away is allowed to fall into the channel and the person following behind carefully divides this into small amounts using a heavy duty garden rake. As the small rafts of material are carried downstream in the current, the third person then removes them from the channel with a fork and places them on the river bank. In areas where vegetation cover is excessive, particular care should be given to the amount removed at one time. This particular plant is largely made up of water and is heavy to lift in large amounts. Good communication is very important between the three workers as not to overload the person downstream.
When spawning gravel is exposed from underneath weed beds it should be examined for compaction. Sometime sediment builds up in the gravel and fish are unable to utilise it for spawning. To rectify this problem, gravel needs to be loosened up with a garden fork or rake allowing the current in the river or stream to flow through the gravel and wash away unwanted sediment.

2.2 Mechanical maintenance on a spawning channel

In areas where it is not possible to manually remove excessive weed or shrubbery along a river or stream, the assistance of a long reach digger may be necessary. This work is usually carried out by a contractor and overseen by IFI personnel. The driver is guided by the fishery officer as what to remove and what to leave. The use of a riddle bucket on a digger is very important as it can carefully remove aquatic weed without disturbing the spawning gravel or the bed of the channel. When the vegetation has been removed and placed on the river bank, the driver then carefully rakes through the gravel with the riddle bucket causing the compacted sediment to wash away in the current. The design of the riddle bucket allows for the gravel to fall through the bottom of the bucket and leaves a perfect environment for spawning salmonids. On some larger rivers with extensive and defined riffle areas the excavator could be operated in the river, working on the actual gravel bed. On smaller rivers

with a regular riffle glide pool sequence this method may be practical. On rivers that have an abundance of gravel deposited throughout the system, they possibly do not need any gravel cleaning.

A bush-cutting flail attachment for a digger is often used to cut back dense growth on river banks. With a skilled driver, this attachment can do percussion work and eliminates tunnelling with minimum effort. The material that is left after the flail has finished are usually broken up in small pieces and remain on the bank of the river.

2.3 Replacement of spawning gravel:

In some high energy channels, gravel can get washed away over time and may need to be replaced. This can be easily done with the help of a Teleporter. A teleporter has an extendable arm and can deposit large or small amounts of gravel where deemed necessary. Particular care needs to be given when introducing new gravel into a river or stream. It is very important not to put too much gravel in one area as it may interfere with the flow of the river and cause flooding problems in the future. Also the gravel must be spread evenly on the bed of the channel and covered with water at all times. Sometimes during spawning times of the year we may get long periods of frost which result in significant drop in water level. If this occurs and gravel becomes exposed ova can be lost.

Gravel size should be selected carefully, as trout and Salmon require different size stone to successfully cut to form a redd for spawning.

For Trout, gravel of between 5mm and 50mm in diameter should be used (pea to egg size gravel).
For Salmon gravel of between 5mm and 70mm in diameter (gravel/cobble) should be used.
Spawning gravel should be rounded, washed and sourced locally if possible.

2.4 Equipment Mechanical:

1. Digger
2. Bush-cutting flail
3. Riddle Bucket
4. Teleporter

2.5 Equipment Hand-tools:

1. Three prong fork
2. Petrol hedge trimmer
3. Heavy duty rake
4. Hedge clippers
5. Pruning shears
6. Drag
7. Slash hook

Appendix 4: Standard Operating Procedure - Hedge Pruning and Tree Maintenance

Standard Operating Procedure

Hedge Pruning and Tree Maintenance

May 2020

Name of Document:		Standard Operating Proceedure for Hedge Pruning and Tree Managament V4			
Author (s):		Peter Kelly, Hugh Gilsenan, John Twomey			
Description of Content:		SOP Hedge Pruning and Tree Management			
Approved by:		David McInerney			
Date of Approval:		22/5/2020			
Revisions					
Revision Nr	Status	Revised by	Reviewed by	Approved by	Date

Introduction

Trees, hedging and vegetation are all an integral part of a healthy and vibrant riverine habitat providing shade from summer heat, cover for insects, birds and leaf litter providing a food source for macroinvertebrates. However when these become over grown tunneling can become a problem where all light is excluded from the river / stream. Where light is excluded bank side and riverine vegetation will fail to grow leading to the loss of food sources for macroinvertebrates. As a result maintenance will be required in the form of tree and hedge pruning. Research suggests that tunneled channel reaches, once ≥ 100m in length, are likely to have a reduced salmonid carrying capacity (O'Grady, 1993).

Before tree / hedge pruning is undertaken a walk over survey should be conducted to assess the level of tunneling and the appropriate level of pruning that maybe required. The timing is also important to ensure other riverine animals and birds are not affected. Adopted in 1992, the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.

This SOP should be read in conjunction with the SOP for managing water based invasive species and the SOP for the management of land based invasive species

The Wildlife Act allows the cutting of vegetation to occur between September 1st and the end of February.

Site inspection:

A site inspection, risk assessment and method statement should be put together in relation to the proposed works.

Key questions need to be addressed, such as;

- Is there a need for tree / hedge pruning from a fisheries aspect/ perspective? (for example evidence of bank erosion/channel over widening, limited or no instream vegetation, reduced capacity for salmonids, for maintenance works etc)

- What level of tree / hedge pruning is required to satisfy the fisheries objectives?
- Are there any invasive species (IS) present? If there are, no works should take place until the IS have been treated in accordance with the SOP on the treatment of land based invasive species.

Pruning Work Plan.

For habitat enhancement works a comprehensive tree / hedge pruning plan needs to be drawn up in consultation with and the approval of Inland Fisheries Ireland. The plan/ programme of works needs to consider the level of pruning required. A high proportion of cover needs to be maintained on southern facing banks in order to provide shading from the summer sun. On the northern facing banks a great amount of material can be cut back to encourage light to reach the stream in the winter. The aim of the plan is to be sensitive to the fishery needs of the stream ensuring that adequate light is reaching the stream to promote a healthy growth of instream and riparian plant life. At the same time there needs to be adequate cover to provide shading from the summer sun to ensure that the stream remains cool during periods of increase water temperatures.

Points to consider, in any plan, would be to remove lower growth/branches and tree limbs while maintaining growth and tree limbs at a higher level. (Above two meters). With this approach light should penetrate through to the stream at the lower level while the tree canopy will provide shade from the sun at the higher level. Tree coppicing or pollarding should also be considered. These are management practices where trees and hedgerows are laid down and allowed to regrow (see Appendix 1).

Consideration should also be given to the removal of trees and hedging that appears to have been weakened due to wind damage and may fall into the stream.

Undertaking the work.

Timing, work should be planned to take account of the Wildlife Act which states a closed season between March 1st and August 31st.

- Tools that could be used tractor and flail machine.
- Track machine and scissors / tree shears.
- Pole saw.
- Chainsaw.

- Strimmer / Brush cutter.

The Procedure

- Follow the prepared risk assessment and method statement.
- Devise a selective approach, straight trees retained, branches and limbs impeding light to be removed.
- Retain native species over non – native trees and hedging.
- Retain an appreciate level of natural vegetation to aid in soil erosion prevention, and maintain a level of shading.
- Expect mammal burrows in dense undergrowth, these should be avoided.
- Inspect trees for ivy and suitable bat habitat. Trees like these should not be felled.
- Use mechanical trees shears or chainsaws, do not use machine bucket to break branches.
- Manage excess woody vegetation in the following order of preference,
- Reuse by landowner.
- Subject to landowner agreement, stockpile to form natural cover.
- Shred and spread along bark and vegetation, rising floodwater may move material.
- Recycle timber into back protection where there is a maintenance plan is in place.
- Avoid cutting yew trees, they are poisonous to bovines.
- Retain as much riparian vegetation as possible.
- Repair damaged ground as soon as possible and seed.
- Follow IFI safety statement. (See appendix 2)

Appendix 1.

Coppicing

Coppicing is a traditional method of woodland management which exploits the capacity of many species of trees to put out new shoots from their stump or roots if cut down. In a coppiced wood, which is called a copse, young tree stems are repeatedly cut down to near ground level, resulting in a stool. New growth emerges and after a number of years, the coppiced tree is harvested and the cycle begins anew. Pollarding is a similar process carried out at a higher level on the tree.

Many silviculture practices involve cutting and regrowth; coppicing has been of significance in many parts of lowland temperate Europe. The widespread and long-term practice of coppicing as a landscape-scale industry is something that remains of special importance in southern England. Many of the English-language terms referenced in this article are particularly relevant to historic and contemporary practice in that area.

Typically a coppiced woodland is harvested in sections or coups[1] on a rotation. In this way, a crop is available each year somewhere in the woodland. Coppicing has the effect of providing a rich variety of habitats, as the woodland always has a range of different-aged coppice growing in it, which is beneficial for biodiversity. The cycle length depends upon the species cut, the local custom, and the use to which the product is put. Birch can be coppiced for faggots on a three- or four-year cycle, whereas oak can be coppiced over a fifty-year cycle for poles or firewood.

Coppicing maintains trees at a juvenile stage, and a regularly coppiced tree will never die of old age; some coppice stools may therefore reach immense ages. The age of a stool may be estimated from its diameter, and some are so large—perhaps as much as 5.4 metres (18 ft) across—that they are thought to have been continually coppiced for centuries.[2]

Pollarding

Pollarding is a pruning system involving the removal of the upper branches of a tree, which promotes the growth of a dense head of foliage and branches. In ancient Rome, Propertius mentioned pollarding during the 1st century BCE.[1] The practice occurred commonly in Europe since medieval times, and takes place today in urban areas worldwide, primarily to maintain trees at a determined height.[2]

Traditionally, people pollarded trees for one of two reasons: for fodder to feed livestock or for wood. Fodder pollards produced "pollard hay" for livestock feed; they were pruned at intervals of two to six years so their leafy material would be most abundant. Wood pollards were pruned at longer intervals of eight to fifteen years, a pruning cycle tending to produce upright poles favored for fencing and boat construction. Supple young willow or hazel branches may be harvested as material for weaving baskets, fences, and garden constructions such as bowers. Nowadays, the practice is sometimes used for ornamental trees, such as crapemyrtles in southern states of the USA,[3][4] although the resulting tree has a stunted form rather than a natural-looking crown.

Pollarding tends to make trees live longer by maintaining them in a partially juvenile state and by reducing the weight and windage of the top part of the tree.[5] Older pollards often become hollow, so it can be difficult to determine age accurately. Pollards tend to grow slowly, with denser growth-rings in the years immediately after cutting.

Appendix 2.

Extracts from IFI's safety statement.

Table 1: Pole Saw Hazard

14.40 Pole-Saws Hazard:	Sharp edge, moving parts, noise, dust, vibration, falling objects, chemicals, fire, uneven surfaces, slippery surfaces, manual handling.
Level of Risk:	High
Controls:	See details outlined below

- Read and follow the manufacturer's operating manual for safe operation and maintenance.
- Staff must be trained and competent.
- Ensure the following Personal Protective Equipment is worn:
- Eye and head protection, hearing defenders, footwear which is stable and offer good grip (safety boots), gloves should be worn. A combined helmet visor and ear muffs may be worn.
- Clothing should be of a durable material, avoid loose clothing or jewelry which may catch in moving parts. Helmets are essential when using a pole saw overhead.
- Where provided, a harness should be worn to support the machine while in use.
- A guard should be fitted to avoid where practicable objects from being thrown towards the operator.
- Check the spark plug cap and lead are not damaged otherwise you could suffer an electrical shock.
- Do not operate the machine indoors or in poorly ventilated areas as the carbon monoxide emissions are poisonous.
- Always inspect the guard and cutting chain for damage prior to use.
- Visually inspect the pole saw prior to operation and be sure there are no missing or loose nuts or bolts.
- Inspect the air filter and clean as necessary
- Inspect the guide bar for wear, clean, repair or replace as necessary.
- Inspect the drive sprocket for wear and replace as necessary.
- Inspect and be sure your chain is sharp with the proper tension before using any power saw!
- Remember to fill the bar oil reservoir when fuelling the saw.
- A damaged cutting attachment should always be replaced.

- Ensure the cutting chain teeth are lubricated and maintained at the proper tension.
- Never refuel the machine while the engine is running, always stop the engine and let it cool for a few minutes before fueling.
- Move the machine 3 meters from the fueling point before starting.
- Avoid all skin contact with fuel. Fuel is a skin irritant.
- Before starting the operation ensure that people and animals cannot affect your control of the machine. Keep a minimum distance of 15 metres from people and animals to avoid accidental contact with the cutting attachment or been struck by loose or falling objects.
- Avoid using the pole saw near overhead power lines.
- Never work on a ladder, stool or any other raised position that is not fully secured.
- Do not operate in bad weather, such as dense fog, heavy rain, strong wind or intense cold. Working in bad weather is tiring and often brings added risks such as unstable ground and unpredictable falling direction.
- Make sure you can move and stand safely. Check the area around you for possible obstacles such as roots rocks and branches and take extra care on sloping ground.
- Switch off the engine before moving to another area. Fit a transport guard before carrying or transporting the equipment any distance.
- Never put the machine down with the engine running unless you have it in clear sight.
- Do not operate the machine alone and always have a first aid kit available.
- Allow the exhaust to cool before transporting or storing.

Operator's use of pole saws while standing in a watercourse is prohibited without a site specific risk assessment.

Table 2: Chainsaw Hazard

14.41 Chainsaws Hazard:	Sharp edge, moving parts, noise, dust, vibration, falling objects, chemicals, fire, uneven surfaces, slippery surfaces, manual handling, kickback.
Level of Risk:	High
Controls:	See details outlined below

Read and follow the manufacturer's operating manual for safe operation and maintenance.

Training

14.41.1 Training

- Staffs who operate chainsaws must have received training and hold a relevant certificate of competence.
- Staff must also receive regular refresher training. The basic training course is completed in 5 days. The course covers maintenance, chain sharpening, crosscutting, snedding and tree/branch felling of a diameter not exceeding 15 inches (the guidebar). The duration of refresher training taking place after three years is three days. The duration of refresher training taking place after five years is five days.
- Additional training is required for felling trees which are greater than 15 inches in diameter and less than 30 inches. This training includes the use of a felling wedge, boring cut technique, snedding and cross cutting under tension and compression.
- Further more advanced course is required for tree felling in excess of 30 inches.
- Specialist training is also required for delimbing windblown trees which are under tension and compression.

Maintenance & Checks & PPE

14.41.2 Maintenance & Checks & PPE

- Read and follow the manufacturer's operating manual for safe operation and maintenance.
- The saw must be maintained in its manufactured condition with all safety devices in efficient working order and all guards in place. It must be serviced by someone who is competent to do the job.
- Operators should report any damage or excessive wear from daily checks on the following:
- On-off switch;
- Chain brake;
- Chain catcher;
- Silencer;
- Guide bar, drive sprocket and chain links;
- Side plate, front and rear hand guards;
- Anti-vibration mounts;
- Starting cord for correct tension.
- Protective clothing complying with the following standards should provide a consistent level of resistance to chainsaw cut through. Other clothing worn with the PPE should be close fitting and non-snagging.
- Safety Helmet – to EN 397

- Hearing Protection – to EN 352-1
- Eye Protection – mesh visors to EN 1731 or safety glasses to EN 166
- Upper Body Protection - chainsaw jackets to BS EN 381-11 Chainsaw jackets can provide additional protection where operators are at increased risk (e.g. trainees, unavoidable use of a chainsaw above chest height). However, this needs to be weighed against increased heat stress generated by physical exertion (e.g. working from a rope and harness).
- Gloves – to EN 381-7
- Leg Protection – to EN 381-5 (all round protection is recommended for arborists working in trees and occasional users such as those working in agriculture)
- Chainsaw Boots – to EN 345-2 and bearing a shield depicting a chainsaw to show compliance with EN 381-3. (For occasional users working on even ground where there is little risk of tripping or snagging on undergrowth or brash, protective gaiters conforming to EN 381-9 worn in combination with steel-toe-capped safety boots.)
- Lone working with a chainsaw must be avoided.
- Anyone working with chainsaws needs to understand how to control major bleeding and to deal with crush injuries, so it is recommended that operators hold a first aid certificate.
- When preparing to use a chainsaw, operators should check:
- All nuts, screws etc. are tight;
- The saw chain is correctly tensioned;
- The throttle cannot be squeezed unless the throttle lock-out is pressed; and they are wearing the correct PPE.
- When starting a chainsaw with a cold engine, operators should:
- Place the saw on level ground.
- Secure the saw firmly, e.g. put a foot on the rear-handle base plate and a hand on the front handle.
- Set the controls as recommended by the manufacturer.
- Pull the starter cord firmly.
- Once the saw has started, operators should rev the throttle to warm up the engine and check.
- The saw chain stops moving when the engine revs return to idle;
- The chain brake is effective when applied at maximum revs or according to the manufacturer’s specification.
- The engine continues to run when the saw is turned through 90° in any direction.
- The stop switch works correctly.
- Lubrication to the guide bar and chain is working properly.

- Make sure the operators use the saw in a way which avoids kickback by:
- Not allowing the nose of the guide bar to accidentally come into contact with any obstruction, e.g. branches, logs, stumps.
- Not over-reaching.
- Keeping the saw below chest height.
- Keeping the thumb of the left hand around the back of the front handle.
- Using the appropriate chain speed for the material being cut.
- Do not operate in bad weather, such as dense fog, heavy rain, strong wind or intense cold. Working in bad weather is tiring and often brings added risks such as unstable ground and unpredictable falling direction.

Felling Timber

14.41.3 Felling Timber

- When felling a tree consider factors such as the wind, the natural lean of the tree, location of large limbs, and whether the trunk is sound, hollow or partially rotted. Watch for the presence of dead limbs overhead and for the presence of overhead power lines in the vicinity.
- Plan the work to minimise manual handling.
- Before felling a tree, decide on its direction of fall and select a suitable escape route to the rear and diagonal to the line of fall of a tree. The area directly behind the tree is also a danger zone because the tree may bounce or slide back when it hits the ground. The escape route should always be kept clear of obstructions.
- Felling is a one person operation.
- Ensure that any bystanders are at a safe distance for the tree felling operation. Persons in the vicinity should be at least two tree lengths away from the person operating the chainsaw.
- Clear any undergrowth likely to interfere with the operator and the chainsaw and remove any dead material that could catch fire.
- Make sure your foothold is secure and free from any obstruction. If working on sloping ground work from an uphill position.
- Hold the saw firmly with both hands.
- Make sure you have the necessary equipment close to hand in case it is needed during the felling work. Such equipment would include a breaker bar, alloy or plastic wedges and a sledgehammer.
- If a tree is likely to become hung-up on another tree during felling, you will need to

have the competence and the equipment to bring the hung-up tree down safely. Seek expert help if necessary.

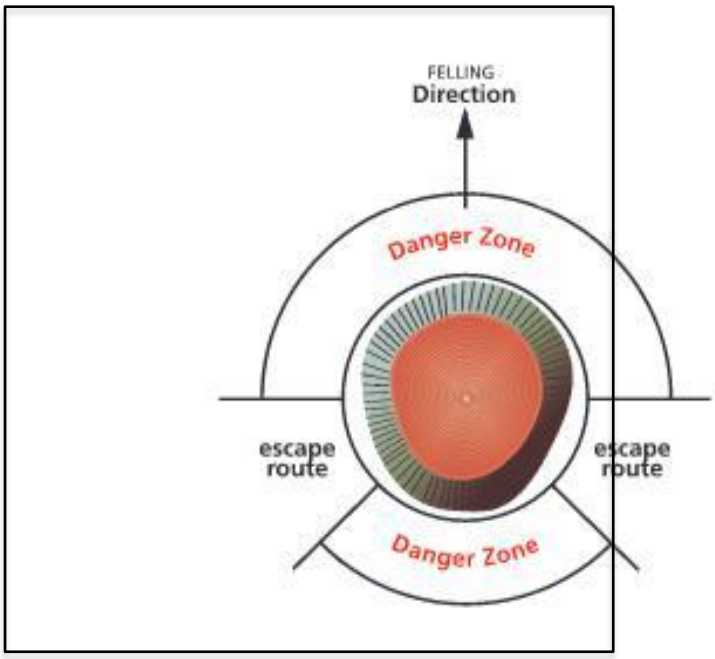


Figure 14.2.1 Felling Direction

- Lopping branches off trees and working on ditches is extremely dangerous. The Chainsaw operator may be tempted to work in dangerous positions and to use the saw above shoulder height. Therefore this type of work should only be carried out by a skilled and competent operator.
- When felling a tree less than the diameter of the guide bar:
- Cut a notch one-third of the diameter of the trunk at a right angle to the fall. The back cut (main felling cut) should be at least 25 mm higher than the notch and leave a hinge of uncut wood to guide the tree and control the rate and direction of fall. The hinge must have the same thickness from end to end to direct the fall at right angles to the notch.
- If there is any chance that the tree might not fall-over in the desired direction or may rock back and bind the saw stop cutting before the back cut is completed and switch off the engine.
- Use a wooden, plastic or aluminum wedges (never hard metal) to open the cut and tilt the tree in the desired direction of fall. Never cut through the hinge.

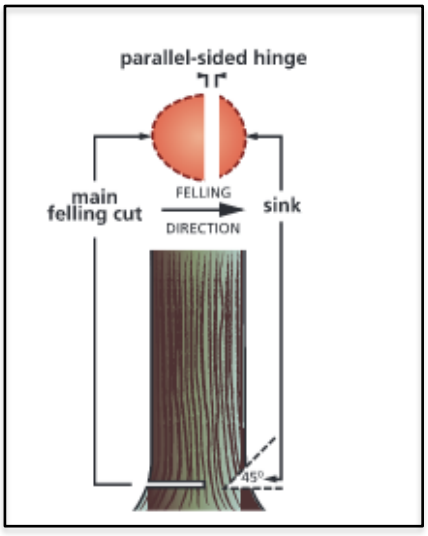


Figure 14.2.2 Felling Direction

- Once a felling cut has been started on a tree the tree must not be left standing.
- When the tree begins to fall, step back and to the side into the escape route. Look out for falling branches and tops.
- Beware of branches under tension and watch out for them springing back. When a branch is in tension, when cut the timber could spring and cause injury or death.
- When lopping make a preliminary cut underneath the branch and then complete the cut from the top.
- Never stand astride a felled tree when cutting off the branches. If the tree is lying across a slope never stand on the lower side if there is any risk of it rolling.
- When cutting lengths of timber, for example cutting firewood, ensure that the timber is securely supported at about waist height to allow room for the blade to cut.
- When cross cutting make sure no-one comes closer than five meters or within twice the length of the longest piece of timber.
- Trees with diameters greater than the diameter of the guide bar should only be felled by persons properly trained in the safe procedures for this type of operation

Operator's use of chainsaws while standing in a watercourse is prohibited without a site specific risk assessment. Chainsaw waders must be worn with protective trousers or protective chaps must be worn.

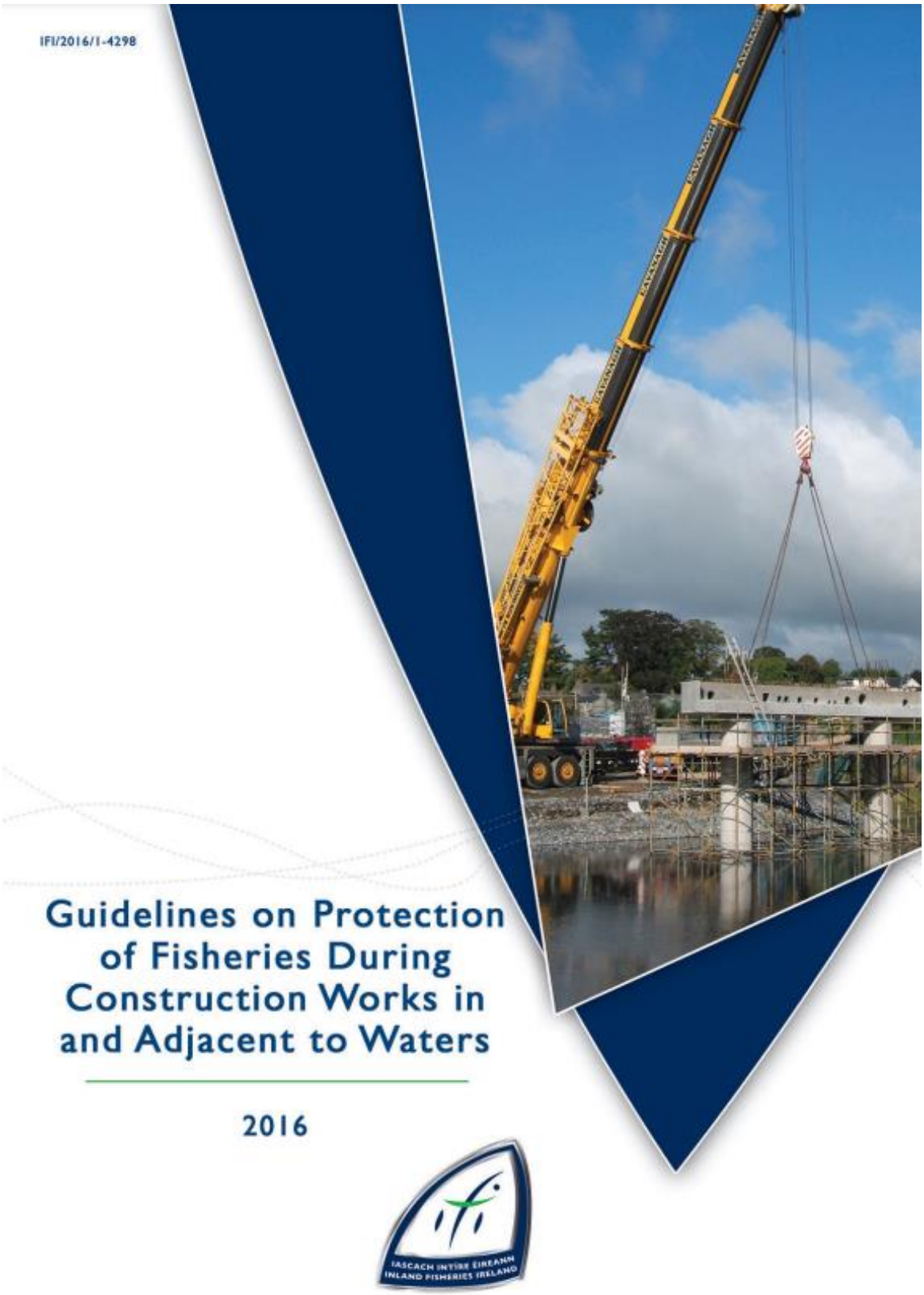
Table 3: Petrol Strimmer / Brush Cutter Hazard

14.42 Petrol Strimmer/Brush Cutters Hazard:	Moving parts, noise, vibration, chemicals, fire, slippery/uneven surfaces
Level of Risk:	Low

Controls:	See details outlined below

- Read and follow the manufactures operating manual for safe operation and maintenance.
- Ensure before beginning work that guarding is adequate and not damaged.
- Operators must ensure that there are no other people within 15m of the working area.
- Steel toe boots which also offer good grip and trousers protecting against grass juices and wet vegetation are recommended.
- Operators must wear hearing and face shield protection.
- A harness should be worn to reduce the effects of manual handling if strimming for long periods of time.
- Do not operate in bad weather, such as dense fog, heavy rain, strong wind or intense cold. Working in bad weather is tiring and often brings added risks such as unstable ground and unpredictable falling direction.
- Strimming adjacent to water should not be carried out alone. Where the water's edge is particularly hazardous e.g. uneven/unstable ground underfoot avoid strimming.

Appendix 5: Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016).



GUIDELINES ON PROTECTION OF FISHERIES DURING CONSTRUCTION WORKS IN AND ADJACENT TO WATERS

INLAND FISHERIES IRELAND

2016

GUIDELINES ON PROTECTION OF FISHERIES DURING CONSTRUCTION WORKS IN AND ADJACENT TO WATERS.

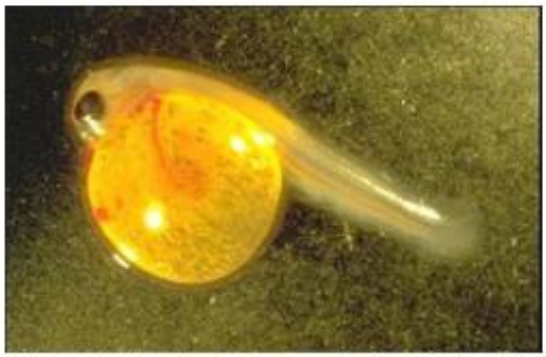
CONTENTS

GUIDELINES ON PROTECTION OF FISHERIES DURING CONSTRUCTION WORKS IN AND ADJACENT TO WATERS

1. INTRODUCTION.

1.1 Inland Fisheries Ireland (IFI) is responsible for the protection, management and conservation of the inland fisheries resource in Ireland, which includes over 70,000 kilometres of rivers and streams and 144,000 hectares of lakes. The agency is also responsible for sea angling. The waters concerned contain a wide range of fish species, which are particularly sensitive in terms of threats to their physical habitat and to water quality such as arise during construction works in and adjacent to waters.

1.2 IFI policy is aimed at maintaining a sustainable fisheries resource through preserving the productive capacity of fish habitat by avoiding habitat loss, and harmful alteration to habitat. Construction works particularly those entailing the installation of new river and stream crossing structures and the realignment of river channels have the potential to significantly impact both in the short and long term on fisheries resources if they are not carried out in an environmentally sensitive manner.



A brown trout at the alevin stage shortly after hatching. This life stage is very sensitive to pollution and physical disturbance.

1.3 These guidelines identify the main issues of concern in terms of construction impacts and their prevention. They set out ***inter alia*** requirements in relation to bridges and culverts and the need for such structures to allow for unhindered upstream and downstream movement of fish and aquatic life.

2 OBLIGATIONS ON DEVELOPERS DESIGNERS AND CONTRACTORS TO CONSULT IFI.

2.1 Contact should be made with IFI at the earliest possible stage in the planning and design process where works such as road construction, installation of culverts and bridges, the crossing of rivers/streams with pipelines and works on and in the environs of waters are planned. Such consultation will enable those concerned to comply with the provisions of the Fisheries Acts and Habitats Regulations.

2.2 In addition to the general guidance and requirements detailed herein, there will be design and construction issues specific to individual projects and locations. In such cases IFI will issue detailed operational and construction requirements.

3. THE ISSUES OF CONCERN.

3.1 Damage to the Aquatic and Associated Riparian Habitat, e.g.

- Removal and loss of instream spawning gravels and larger stones.

- Loss of submerged and emergent aquatic vegetation.
- Loss or damage to bankside cover including removal of trees, shrubs and bankside root masses.
- Undesirable changes in watercourse morphology and hydrology.

Drip tray is undersized, dangerously positioned and leaking oil. Unacceptable practice.

3.2 Pollution of Waters.

Pollutant	Examples of Construction Source
Silts and solids.	Earthworks, new drainage networks and instream works.
Cementitious residues.	Bridge, culvert and drainage headwall construction, etc.
Oils and greases. Anti freeze.	Construction plant and equipment.
Wood preservative.	Treatment of new timber fencing.

3.3 Introduction of Non Native Species.

Invasive Species	Construction Source
Plants, algae, fish and shellfish.	Earthmoving equipment, pumps, boats, ropes etc, previously used perhaps unknowingly in waters containing invasive species.
Plants and algae.	Imported materials such as top soil.

Further information on invasive species their impact and control, and on bio-security is available at www.inlandfisheriesireland.ie

It is a serious offence to discharge deleterious matter such as oil contaminated residues to waters.

3.4 Interference with Upstream and Downstream Movement of Aquatic Life.

- Improperly designed or installed temporary and/or permanent watercourse crossing structures. For example, insufficient water depth in culverts, culverts with perched inlets, outfalls and excessive slope.

- Insufficient water depth over bridge aprons/scour slabs.
- Physical alteration of stream channels resulting in:
  - Altered hydraulic characteristics.
  - Changes in stream profile, particularly in width, depth, gradient and current speed.

Temporary crossing impassable to fish life.

4. TIMING OF INSTREAM WORKS.

4.1 There are significant variations in the timing and duration of salmonid (Salmon and Trout) spawning activity throughout the Republic of Ireland. To minimise adverse impacts on the fisheries resource works in rivers, streams, watercourses, lakes, reservoirs and ponds should normally (except in exceptional circumstances and with the agreement of IFI) be carried out during the period July-September.

4.2 The appropriate 'window' for instream works can vary depending on the nature of the fishery resource concerned and the existence of other factors such as catchment or sub catchment specific Bye Laws and Regulations.

5. TEMPORARY CROSSING STRUCTURES ON WATERS.

5.1 All watercourses which have to be traversed during construction projects should be effectively bridged prior to commencement of works. There is sometimes a serious misconception that in installing temporary crossing structures, the only issue is keeping water flowing from above a temporary crossing to below it. Design and choice of temporary crossing structures must provide for passage of fish and macroinvertebrates, the requirement to protect important fish habitats e.g. spawning and over wintering areas, as well as preventing erosion and sedimentation. In certain circumstances, access for angling or commercial fishing purposes may also be required.

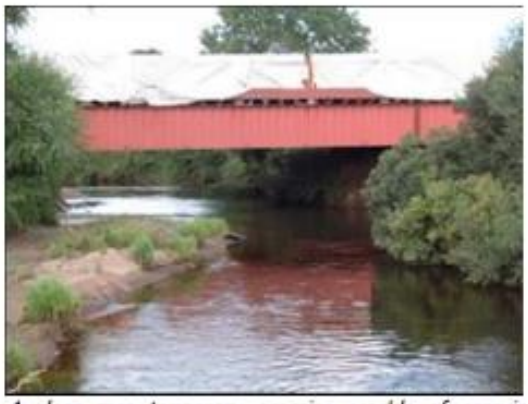
Temporary crossing structure. Impassable for aquatic life and emitting silt to waters as construction equipment traverses the crossing. Unacceptable practice.

5.2 No temporary crossing on any watercourse shall be installed without the approval of IFI as regards sizing, location, duration and timing.

The same temporary crossing location as shown on the previous page, but with a laden dumper dislodging and causing loss of cover material to waters.

Temporary clear span 'bailey bridge' ensuring free upstream and downstream movement of aquatic life. The streamside fencing should be 5 metres from the watercourse, not immediately alongside as in this photograph.

The inevitable result from the crossing shown above. Continuous silt discharges. Unacceptable practice.



A clear span temporary crossing capable of carrying heavy axle loadings and long wheel base vehicles.

5.3 The preferred option is for clear span 'bridge type' structures on fisheries waters.

5.4 The crossing of watercourses at natural fords is not permitted because of the amount of uncontrolled sedimentation that can be generated.

5.5 The creation of fords on streams and rivers through the introduction of stone is prohibited.

5.6 Where circumstances such as space or access difficulties preclude use of clear span structures, temporary crossings structures shall:

5.6.1 Comprise one or more metal or concrete pipes, prefabricated culverts or such other material as IFI may permit of minimum diameter 900 mm. Pipes or culverts may be vertically stacked.

5.6.2 Be laid in such manner as to maintain the existing stream profile.

5.6.3 Ensure no significant alteration in current speed or hydraulic characteristics, in particular not result in scouring, deposition or erosion upstream or downstream the temporary crossing location.

5.6.4 Have capacity to convey the full range of flows including flood flows likely to be encountered without the crossing being overtopped.

5.6.5 Be covered with clean inert material such as to allow for the safe crossing of the widest items of plant and equipment without cover material being dislodged and entering waters.

5.7 The approach and departure routes to temporary crossing structures should be designed and installed so that drainage will fall away from the watercourse being crossed. In the event that the fall of ground does not permit sufficient control on drainage, additional earthworks settlement areas shall be provided.

5.8 Temporary crossing structures should be fenced with terram or similar material to prevent wind blow carrying dusts and other potentially polluting matter to waters.

5.9 Side armour (e.g. reinforced concrete traffic barriers) should be provided on temporary crossing structures to ensure machinery cannot drive over its edge, or force the discharge of material from the bridge deck to waters.

5.10 IFI wish to emphasise that site selection for temporary crossings should have regard to all access and construction needs ranging from those of fencing contractors vehicles to the longest wheelbase of multi-axle cranes.

A crossing structure over a designated salmonid water. Note: terram covered fencing, reinforced concrete traffic barriers and fall back from the watercourse.

5.11 It is not permissible, except in exceptional circumstances, to reposition temporary crossing structures where these are not of a clear span type.

6. RIVER AND STREAM PERMANENT CROSSING STRUCTURES.

Is the culvert adequately sized?

6.1 Structures should not damage fish habitat or create blockages to fish and macroinvertebrate passage. Design and choice of structure should be based on its technical

and economic feasibility to pass fish and macroinvertebrates, the requirement to protect important fish habitats e.g. spawning and over-wintering areas, provision in certain areas of angling and commercial fishing access including boat access and prevention of erosion and sedimentation.

6.2 Culverts are the most frequently used river/stream crossing structures and are associated with some of the most common fish passage problems. The culverting of long stretches of fisheries water is extremely undesirable and can result in significant loss of valuable habitat. In the case of crossing structures over fishery waters, the preferred position is for clear span structures (bridges), so as not to interfere in any way with the bed or bank of the watercourses in question.

Excessively wide culverts can result in reduced current speed, ponding, and siltation of instream gravels.

6.3 Bridge foundations should be designed and positioned at least 2.5 metres from the river bank so as not to impact on the riparian habitat.

Excessively long culvert resulting in habitat loss and reduced productivity due to inadequate light penetration.

6.4 Generally, bridges and bottomless culverts are the best option for maintaining natural stream channel characteristics and have the least impact on habitat. However, because of design and load bearing considerations, bottomless culverts may not always be suitable for installation particularly on narrow river channels, as foundations may encroach on the channel itself and possibly result in future scouring or erosion.

6.5 Taking account of recent advances and investigations in the area of climate change and flood studies, designs should be such as to verifiably have carrying capacity for a 1 in 100 year fluvial flood flow whilst maintaining a minimum freeboard of 300 mm.

6.6 The Office of Public Works (OPW) is the lead agency for flood risk management in the Republic of Ireland. Design and capacity of structures must also be in accordance with their requirements. IFI strongly recommends that contact be made with OPW at the earliest stage in the planning and design process. (www.opw.ie)

An embedded box culvert sized to match existing stream profile.

6.7 Clear span designs maintain channel profile, do not alter gradients, readily pass sediment and debris and provide unrestricted passage for all size classes of fish by retaining the natural stream bed and gradient. Water velocity is not changed and they can be designed to maintain the normal stream width. Foundations should be positioned at least 2.5 metres from waters.

6.8 Embedded box and pipe culverts are less preferable to bridges and bottomless culverts. Embedded culverts must maintain the natural channel gradient, width and substrate configuration. They should be buried to a minimum of 500 mm. below the stream bed at the natural gradient. Box and pipe culverts must be sized to maintain the natural stream channel width. The gradient should not exceed 3%. The availability of suitably sized material (depending on hydraulic conditions) to initiate "simulation" of the stream bed is the most preferable approach to establish fish and faunal passage through culverts.

6.9 Culverts should be positioned where the watercourse is straightest and aligned with its bed.

Off-line culvert at construction stage back filled with gravel. The size range and depth of fill required will be site specific.

6.10 In the case of bridges and bottomless culverts, structures should be designed and installed so as to:

6.10.1 Allow for the maintenance of channel profile and existing gradient.

6.10.2 Be capable of passing such debris as might arise during flood flow conditions.

6.10.3 Ensure adequate light penetration to minimise loss in primary productivity.

6.10.4 Not result in damage to the riparian habitat or necessitate construction within 2.5 metres of waters.

6.10.5 Provide at locations specified by IFI, angling access and/or access for commercial fishing purposes.

Box culvert positioned at incorrect level. Upstream fish passage is made difficult. Culvert invert should be 500 mm. below existing bed level and back filled with clean gravel to match the existing stream profile.

6.11 While the preferred option is for bottomless culverts, IFI is prepared in certain circumstances to consider proposals for the installation of box or pipe culverts on fisheries waters. These may be installed subject to structures being sized so as to meet the requirements at 6.10 in terms of channel profile, gradient, flood debris capacity, light, access and:

6.11.1 Be positioned such that both the upstream and downstream invert shall be 500 mm. below the upstream and downstream river bed invert levels respectively.

6.11.2 Never exceed a slope of 5%, in which circumstances baffles generally are required, and preferably not exceed a slope of 3%. As baffles can reduce the hydraulic efficiency of culverts, appropriate capacity provision must be included in the overall design.

6.11.3 In the case of box culverts on angling waters, be 3 meters in height.

The smooth concrete finish is totally unsuitable for fish passage.

6.12 Pipe culverts are not generally considered acceptable on fisheries waters. They are normally only appropriate for use on minor watercourses and drainage ditches where these can be demonstrated as not being significant in terms of fisheries habitat.

Unacceptable culverting practice. These pipes are totally impassable to fish.

6.13 Bank protection works are often required upstream and downstream of new structures, to ensure no undercutting or destabilisation of either the structure or riparian bank areas occurs. In carrying out bank protection works, it is essential that large enough boulders are selected and strategically positioned, to ensure they cannot be undercut. Normally this entails part burying boulders up to one third of their depth below stream bed

level and securing them into their final position. In areas of high water energy, to ensure stability, boulders size should be a minimum of 0.5 ton.

The boulders in these bank protection works are not large enough, not sunken below stream bed level and likely to be undercut and dislodged in a storm event.

Suitably sized rock armour built to high water level at a location influenced by tidal back-up.

6.14 To facilitate revegetation, each course of boulders laid should be back filled with a layer of top soil. Selection of boulders in terms of shape to facilitate their placement and stability is a major consideration. Irregularly shaped boulders are very difficult to work with in terms of building multiple stable courses.

Revegetation of rock armour facilitated by the placing of locally sourced topsoil (to ensure no importation of non local grasses and shrubs) between each layer or course of boulders at installation time.

6.15 The height to which rock armour is built must take account not only of the riparian zone requiring protection, but also in certain circumstances of the need to protect e.g. kingfisher and sand martin habitat. In many instances, one or two layers of armour will be sufficient to protect and stabilise the toe of embankments while allowing nesting.

Visually unsightly stone filled gabion baskets.

6.16 Gabions are not a preferred option when it comes to bank protection. They can easily be vandalised and once the mesh is cut or broken, baskets can collapse. Gabion baskets can be unsightly and it is difficult to successfully

establish and maintain vegetation on side walls. Gabion baskets are normally only acceptable at locations where due to access constraints it is not possible to install rock armour.

7. CONSTRUCTION IMPACTS.

7.1 Uncured concrete can kill fish, plant life and macroinvertebrates by altering the pH of the water. Pre-cast concrete should be used whenever possible, to eliminate the risk to all forms of aquatic life.

7.2 Discharge of silt-laden waters to fisheries streams is of particular concern. Silt can clog fish spawning beds and juvenile fish species are particularly sensitive. Plant and macroinvertebrate communities can literally be blanketed over, and this can lead to loss or degradation of valuable habitat. It is important to incorporate best practices into construction methods to minimise discharges of silt/suspended solids to waters.

Construction sites require careful management. Is this the optimal haul route in terms of impact minimisation?

Silt discharge minimisation by providing retention areas to reduce discharge velocity and allow settlement during rainfall events.

7.3 Discharges of fuels and oils can be directly toxic to aquatic life and at sub lethal levels lead to tainting of fish tissues, rendering fish inedible. Oil films on water can seriously interfere with the diffusion of oxygen from the atmosphere into waters and in extreme cases result in oxygen depletion.

The practical impact of poor silt control.

7.4 IFI require that:

7.4.1 When cast-in-place concrete is required, all work must be done in the dry and effectively isolated from any flowing water (or water that may enter streams

and rivers) for a period sufficient to ensure no leachate from the concrete.

Silt control pond. The blue hose conveying pumped silt laden waters has its outlet securely anchored within the stone aggregate thereby dissipating energy, minimising disturbance, and preventing pond contents being disturbed and re-suspended.

Poor work practice. The drip tray is undersized, constructed of too light a material, and accordingly overly flexible, easily damaged, and unlikely to retain oil residues.

7.4.2 No direct discharges be made to waters where there is potential for cement or residues in discharges.

7.4.3 Designated impermeable cement washout areas must be provided.

7.4.4 The pH of any and all discharges made from and during construction works shall be in the range 6.0 - 9.0 units and not alter the pH of any receiving fisheries waters by more than +/- 0.5 pH units.

Silt control pond. Note hose conveying pumped silt laden waters with its outlet positioned within the gravel mound thus ensuring no disturbance of pond contents.

7.4.5 Silt traps/settlement ponds or other forms of containment and treatment shall be constructed at locations that will intercept run-off to streams. Traps shall not be constructed immediately adjacent to natural watercourses. A buffer zone should remain between the silt trap and the watercourse with natural vegetation left intact. Alternatively, imported materials such as terram, straw bales, coarse to fine gravel should be used either separately or in combination as appropriate to remove suspended matter from discharges.

7.4.6 The level of suspended solids in any discharges to fisheries waters as a consequence of construction works shall not exceed 25 mg/l, nor result in the deposition of silts on gravels or any element of the aquatic flora or fauna.

7.4.7 All oils and fuels shall be stored in secure bunded areas and care and attention taken during refuelling and maintenance operations. Particular

attention shall be paid to gradient and ground conditions which could increase the risk of discharge to waters.

7.4.8 Temporary oil interceptor facilities shall be installed and maintained where site works involve the discharge of drainage water to receiving rivers and streams.

7.4.9 There shall be no visible oil film in any discharges from construction works to waters.

7.4.10 That all containment and treatment facilities are regularly inspected and maintained.

7.4.11 Waterproofing and other chemical treatment to structures in close proximity to waters shall be applied by hand.

7.4.12 Hydroseeding shall not be carried out in close proximity to water. These areas shall be seeded by hand.

Terram lined (to prevent erosion) silt control pond outlet channel showing gravel acting as filter medium for silt removal.

8. DUST SUPPRESSION AND WATER ABSTRACTION.

8.1 It is accepted in the interests of protection of terrestrial ecosystems and so as to avoid a wide range of impacts on persons and property, that dust control measures sometimes may be required. This is normally achieved by abstraction from watercourses adjacent to the site of earthworks. In such circumstances it is essential that the aquatic resource is protected and that over-abstraction does not take place especially in low flow summer conditions at locations supporting important fish populations.

Continuous abstraction using submersible pump. No screening in place to prevent the entry of e.g. juvenile fish species to the pump. Unacceptable practice.

8.2 IFI require that:

8.2.1 Water abstraction for dust suppression shall not take place from any water body containing or suspected to contain aquatic invasive species.

8.2.2 Abstraction is confined to only those larger waters identified and agreed as being of sufficient size and volume so as to allow abstraction without adverse impact.

8.2.3 Abstraction points shall be screened so as to ensure that fish and aquatic plants are not removed from waters in the abstraction process.

A screened abstraction point using terram fitted over a fabricated support frame.

9. PLANNING, DESIGN AND CONSTRUCTION ISSUES.

9.1 The preferred position from the fisheries perspective is for clear span river and stream crossing structures thereby allowing for installation/construction without the need to alter or move existing watercourses. In the case of bridges and bottomless culverts, designers should ensure proposals are such that foundations and abutments including wing walls can be constructed without entering on or damaging the riparian zone, or existing channel profile.

9.2 Where on-line construction is proposed or taking place, it may be necessary for IFI, following an assessment of on the ground conditions with the contractors involved, to temporarily remove using electro-fishing equipment, fish from the reaches involved.

9.3 Where on line box or pipe culvert construction is proposed, it will be necessary to install a temporary by-pass channel so as to allow for stream continuity and the normal upstream and downstream movement of fish and aquatic life depending on location and seasonality.

9.4 Temporary long term by-pass channels shall be excavated and sized such as to replicate existing upstream and downstream channel conditions as regards width, depth, gradient and instream materials. Where necessary, rock armouring will be provided. In terms of capacity, by-pass channels shall be sized so as to accommodate such flood event as might reasonably be expected based on examination of hydrometric data and catchment characteristics.

9.5 In newly constructed by-pass channels the process of diverting waters and associated movement of fish stocks may only take place under the direction and supervision of IFI or its agents. Adequate advance notice of all such proposed works shall be given to IFI.

Extreme meanders installed during excavation of a new channel to overcome excessive gradient between the original course of the stream (in the background at tree line) and the point of entry of the newly created channel to a culvert (in foreground under the timber fencing). In this instance there was inadequate provision at the planning and design stage for the necessary land take.

9.6 Where temporary short term by-pass channels are required for a number of days, these shall be excavated and sized such as to accommodate such flood event as might reasonably be expected over the period in question.

9.7 Where a structure installed on line is completed within the period during which instream works normally may be undertaken (July-September), flow may be re-established through the new structure, fish transferred from the temporary by-pass channel back to the original channel, and the by-pass decommissioned immediately on completion of the fish removal with the area levelled and landscaped as appropriate. Such works may only take place following the giving of advance notice to IFI and under its supervision.

9.8 Where a structure installed on line is not completed within the period during which instream works normally may be undertaken, flow may not except in exceptional circumstances be re-established through the new structure until the next approved 'window' for such instream works.

9.9 Where on-line construction is not feasible and a structure is constructed off-line (subject to IFI approval), the course of the existing stream can be altered and new approach/departure channels designed and installed to link into the original stream channel

9.10 IFI require where box and/or pipe culverts are installed off-line on fisheries waters that:

9.10.1 Particular attention shall be given by designers and contractors to survey pre-existing upstream and downstream stream bed levels at appropriate locations, taking account of the requirement to ensure newly installed box or pipe culverts are lain with their invert level 500 mm. below bed level, so that in overall terms the newly created section of stream shall replicate and where appropriate, improve on that which it replaces.

9.10.2 The approach and departure channels for newly installed culverts shall be excavated and sized such as to replicate and be compatible with existing upstream and downstream channel conditions as regards width, depth, gradient and instream materials. Bends and meanders shall be incorporated into the new channel.

9.10.3 The approach and departure channels for newly installed culverts are back filled to a depth of up to 500 mm with clean round gravel in such size range as required where IFI determine that the material in the newly formed channel is unsuitable in terms of fish habitat.

9.11 Where as an exceptional measure consequent on limited land availability or other space constraints a culvert having a gradient greater than 5% is permitted, IFI require as follows:

9.11.1 Water velocity through the culvert should not exceed 1.2m/sec. in the case of salmonid habitat and 0.8 m/sec. in the case of cyprinid habitat.

9.11.2 Baffles should be provided within the culvert structure to locally reduce flow velocity thus aiding fish swimming upstream without undue stress.

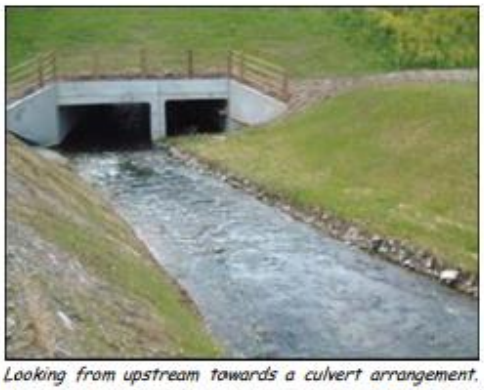
9.11.3 The entry and exit points of the structure must be drowned out to a minimum depth of 150 mm. in the case of salmon waters and 100 mm. for trout waters.

9.11.4 Where culvert gradient is too steep to achieve backwatering, the downstream water level should be raised by providing one or more ponding weirs below the culvert outfall. Ponding weirs should have fish notches to facilitate upstream movement and the pools formed by them should provide resting and take-off conditions for fish.

9.12 The fitting of mesh or screens to culverts, albeit with the intention of intercepting instream debris is prohibited.

9.13 Newly constructed river and stream channels shall have banks battered to a finished angle of not greater than 45° on one bank and not greater than 30° on the opposite bank, (to allow for maintenance of a low flow channel, an overflow and a flood flow channel). Banks shall be top soiled and seeded so as to ensure the growth and development of a broad range of local grasses and shrubs thereby facilitating development of stable bank root structures.

Well vegetated newly established river channel, with broadleaves planted to within 5 meters of the overflow channel. The root structures aid bankside stability.



Looking from upstream towards a culvert arrangement. Moderate and flood flows are conveyed in the right hand culvert. Entry to that culvert is dictated by the invert and contour of the right hand portion of the newly created river channel. The left hand bank finished batter angle is approx. 45°. The first portion of the right hand bank to convey the moderate flow is battered to approx. 30°. The extreme right bank area is battered to approx. 45° to convey flood flows.

9.14 Broadleaves shall, where prescribed by IFI, be planted along newly created channels so as to provide a mixture of dapple and shade conditions. Planting shall be a minimum of 5 meters from the watercourse channel.

9.15 In the case of culverts, low flows can be accommodated in an appropriately sized structure, thereby sustaining the fisheries resource. Moderate and flood flows should be directed through a culvert that becomes operable only at a pre-determined discharge level. Moderate and flood flow culverts should be installed such that the culvert empties in its entirety when the flood has passed.

9.16 To aid in the colonisation and development of newly created river channels, it is desirable to transfer established riparian plants, shrubs and trees together with living root structures as well as boulders, stones and gravels from decommissioned to new channels where they can be positioned, inserted and replanted as appropriate.

Newly created channel. The riparian grasses on the right bank have been transferred from the previous course of the now redundant original channel. The root structures stabilise the bank area while the grasses provide a degree of cover and shade and provide habitat for aquatic insects which form part of the food for fish.

9.17 In the case of newly created stream and river channels IFI require that:

9.17.1 Such transfer of riparian plants, trees and instream material(s) as necessary, is carried out under IFI's direct supervision.

9.17.2 Gravels and stones are removed from the dried out river channels and securely stored for re-use in the newly created river channels.

9.18 Stock proof and mammal proof fencing shall not cause an obstruction to fish passage or angling.

9.19 IFI shall be reimbursed the cost of fish removal and replacement operations associated with river and stream diversions and associated works.

10.0 REPAIRS TO EXISTING BRIDGES, CULVERTS AND SCOUR SLABS.

10.1 There are within Ireland very many old stone bridges in need of strengthening and repair works. The most commonly used methods for such works include pressure grouting, guniting and pointing of joints

Grout loss to waters is normally stopped by placing dry cement over the leak, with sand bags on top to restrict grout flow until the leak solidifies. (This photograph was taken after water flow was re-established following solidification of the grout.)

10.2 The concerns as regards sensitivity of aquatic life to pollutants and physical disturbance set out earlier in this document all apply, particularly as regards loss of grout and gunite rebound, both of which are highly alkaline.

Repairs to a single arch bridge and scour slab with stream flow piped from upstream to downstream (foreground) during both grouting and slab repair.

10.3 Grouting is a high risk process, as it is not always possible to pre-determine the route that grout will follow. It may travel through

fissures and appear upstream or downstream of the structures under repair, sometimes metres from the location of injection. Particular vigilance is required. During grout injection at least one member of a repair crew should be closely monitoring for grout losses both upstream and downstream of the structure. Portable pH monitoring facilities should always be available and staff trained in its use.

10.4 Where the structure to be grouted comprises a number of arches, water flow should be diverted away from the arch being repaired so as to allow working in the dry. Diversion of water by means of temporary damming should be undertaken. Sand bags in conjunction with e.g. plastic sheeting, marine plywood and other suitable materials may be used. A number of manufacturers provide heavy duty rubber type aqua dams which can readily be deployed, linked together and filled on site with river water thus forming a very effective seal to a bunded area. While such damming and diversion of water as is required will normally be only for a short period, the dam or berm must nonetheless be high enough not to be over topped in the event of a rainfall event and increased water levels.

10.5 Where a single arch structure is under repair, to achieve grouting in the dry, water may be diverted from upstream to downstream by means of a secure flume arrangement, or through piping, or in very limited circumstances, by means of over pumping. Screening to preclude entry of aquatic life to pumps must be carried out.

Gunite rebound on a stream bed where no precautions were taken to prevent its entry to waters. Rebound having a pH >11.5 would have entered the actively flowing stream with dire environmental consequences.

10.6 In all instances of guniting and repair works including repointing and masonry cleaning, the entirety of the area of water over which works are taking place should be protected from gunite rebound, mortar and vegetation loss by installation of a sealed and secure decking which shall extend upstream and downstream the structure concerned so as to ensure no losses to water.

Apron/scour slab inaccessible on its downstream end to fish life because of the extent of perching and impassable due to a combination of excessive water velocity and lack of water depth across its surface.

10.7 Approved forms of scaffolding are required to support decking. It is essential that

the decking completely captures all falling debris and rebound. All materials captured must be removed for safe disposal.

10.8 Repairs to bridge aprons/scour slabs must be undertaken so as to ensure upstream and downstream passage of fish is possible in all flow conditions. Particular care must be exercised to ensure perching does not result where new concrete slabs are poured.

Low level stone weirs installed on a salmonid nursery stream to back water the bridge apron /scour slab originally installed at too high a level.

10.9 Existing stream bed materials (stones and boulders depending on conditions) should be set into new concrete aprons/slabs thereby providing for non uniform baffled flow of varying depth across the structure which will allow for the weakest fish species to swim upstream through the deeper water area.

10.10 Scour slabs should be dished so as to provide a deeper zone and consequently deeper water to facilitate fish passage.

10.11 It is difficult and costly to retrospectively render a poorly installed apron/scour slab passable, especially where it has been installed at too high a level. In some instances the installation of one or more low level weir type structures in the river downstream may assist in back-flooding the apron thereby rendering it passable.

10.12 The installation of baffles can assist where excessive water velocity over an apron/scour slab prohibits free upstream fish movement. Baffles should be positioned so as to reduce velocity and provide temporary rest areas for weaker fish attempting to swim upstream.

Large stone baffles held in position on concrete apron with stainless steel dowel rods drilled into both the apron and stones. (Poor placement of the livestock fencing as shown in the photograph has the potential to cause blockage by catching debris.)

11.0 PIPELINE INSTALLATION.

11.1 In the case of pipeline crossings under fisheries waters, the preferred method is by way of trenchless crossings using techniques such as horizontal directional drilling, auger boring or micro-tunnelling. There are many advantages from use of such methods. Apart from the obvious avoidance of impacts on the fisheries resource, works do not have to be confined to the July-September 'window' period.

11.2 Where circumstances such as site size and contour or the existence of buildings

preclude trenchless methodologies, open cut or trench type crossings may be undertaken.

11.3 In the case of trenchless crossing of waters IFI require as follows:

11.3.1 Locations for drill rig positioning and pipeline pull areas shall be chosen or engineered such that the fall is away from the waters in question, thereby facilitating installation of pollution containment and control facilities.

11.3.2 Where drilling fluids are being returned for cleaning and re-use or recirculation through a temporary fluid return line, pneumatic leak testing shall be carried out to confirm the integrity of the return line.

11.3.3 Where circumstances necessitate the running of a return fluid line across the bed of the waters being under bored, the pipeline shall be sunken and weighted down by means of prefabricated concrete collars or by sand bags attached using web construction straps, or such other means as appropriate and securely anchored. Marker buoys and on-land marker posts will be required and all such fluid return pipelines and markers shall not interfere with or constitute a fouling risk to licensed and legally used fishing equipment.

11.3.4 Spent drilling fluids including separated drill materials shall be contained in secure bunded areas for off-site disposal at a licensed disposal facility.

11.4 In the case of open cut or trench type crossing of waters IFI require as follows:

11.4.1 Water shall be diverted from upstream to downstream the pipeline crossing location by means of a secure open flume arrangement, or through piping, or in limited circumstances, by means of over pumping.

11.4.2 Screening to preclude entry to pumps of aquatic life must be carried out.

11.4.3 The waters being crossed shall be effectively dammed both upstream and downstream of the trench location so as to ensure that works are undertaken in the dry.

11.4.4 Where concrete ballast is used to prevent pipelines rising as a result of buoyancy, it should be precast.

11.4.5 Following completion of backfilling, river bed and banks shall be reformed to match their original profile.

11.5 It will normally be necessary to temporarily remove, using electrofishing equipment, fish from the reaches involved.

12. ANGLING AND COMMERCIAL FISHING ACCESS.

12.1 In circumstances where crossings of important angling waters are concerned, it will often be necessary to provide for angling access to and from stretches of water during the construction phase of projects. It is important to note that fishing rights are property rights and that it is a legal right for anglers to access fisheries. Additionally, certain commercial fishing activities may have entry and access requirements. In such site specific circumstances, IFI will issue project and location specific requirements.

A tidal water with access for vehicles and on the opposite side, access for anglers.

12.2 IFI require:

12.2.1 In the case of permanent crossing structures on waters recognised as of angling importance, that a minimum walkway through or under the structure 1.5 meters in width and 2.5 meters in height be provided. The walkway shall be self draining and have a non slip finish.

12.2.2 In the case of a bridge spanning a specific salmon angling site, up to 7 meters clearance above water level and in the case of trout angling, up to 4 metres clearance to allow casting.

13.0 PROVISION OF DOCUMENTS.

13.1 In the case of structures and pipelines crossing waters, IFI shall be provided in Excel spreadsheet format with precise details of all watercourse crossings including seasonal streams. The spreadsheet shall in respect of each watercourse contain:

13.1.1 The number, code or other means of identification of the location.

13.1.2 Easting and northing coordinates (Irish Grid Ref).

13.1.3 Dimensions including width, height, length and gradient of proposed structures and the estimated discharge.

13.1.4 A description of the proposed structure including its shape.

13.2 Contractors/developers shall provide or have provided to IFI:

13.2.1 In the case of road construction, a copy of the Discovery 1:50,000 map(s) showing the proposed road scheme.

13.2.2 In the case of road construction, engineering drawings and OS maps in A3 size showing mainline and side road plans, chainage and profiles for all locations where watercourse crossings and drainage issues arise.

13.2.3 Engineering drawings and OS maps in A3 size of all crossing structures and pipelines in final proposal stage for construction. These shall include dimensions, setting out points, and where necessary gradient expressed as a percentage.

13.2.4 Such other details and method statements as may reasonably be required.

14.0 CONTACT BETWEEN DESIGNERS, DEVELOPERS, CONTRACTORS AND IFI.

14.1 IFI is committed in the national interest to working in a positive and cooperative manner with all relevant parties including

representatives of State and public authorities undertaking works in order to ensure that impacts on the fisheries resource are minimised. IFI is obliged to ensure that all structures are designed, installed and maintained so as to ensure the free upstream and downstream movement of aquatic life and the sustainable maintenance of the aquatic and associated riparian zone.

14.2 IFI require that contact be established and maintained between senior representatives of the developer, designer and contractor with responsibility for earthworks, structures and environmental management issues and relevant river basin district personnel in advance of commencement and for the duration of the specified construction project.

14.3 IFI has offices located within each of the River Basin Districts situated wholly or partly in the Republic of Ireland. Contact details and a map showing the locations of IFI's regional offices and areas covered are given in Appendix 1.

14.4 Responsibility for waters in the Republic of Ireland which form parts of the North Western, Neagh Bann and Shannon International River Basin Districts lies with IFI Ballyshannon, IFI Blackrock and IFI Limerick respectively.

APPENDIX 1

CONTACT DETAILS AND LOCATIONS OF IFI REGIONAL OFFICES

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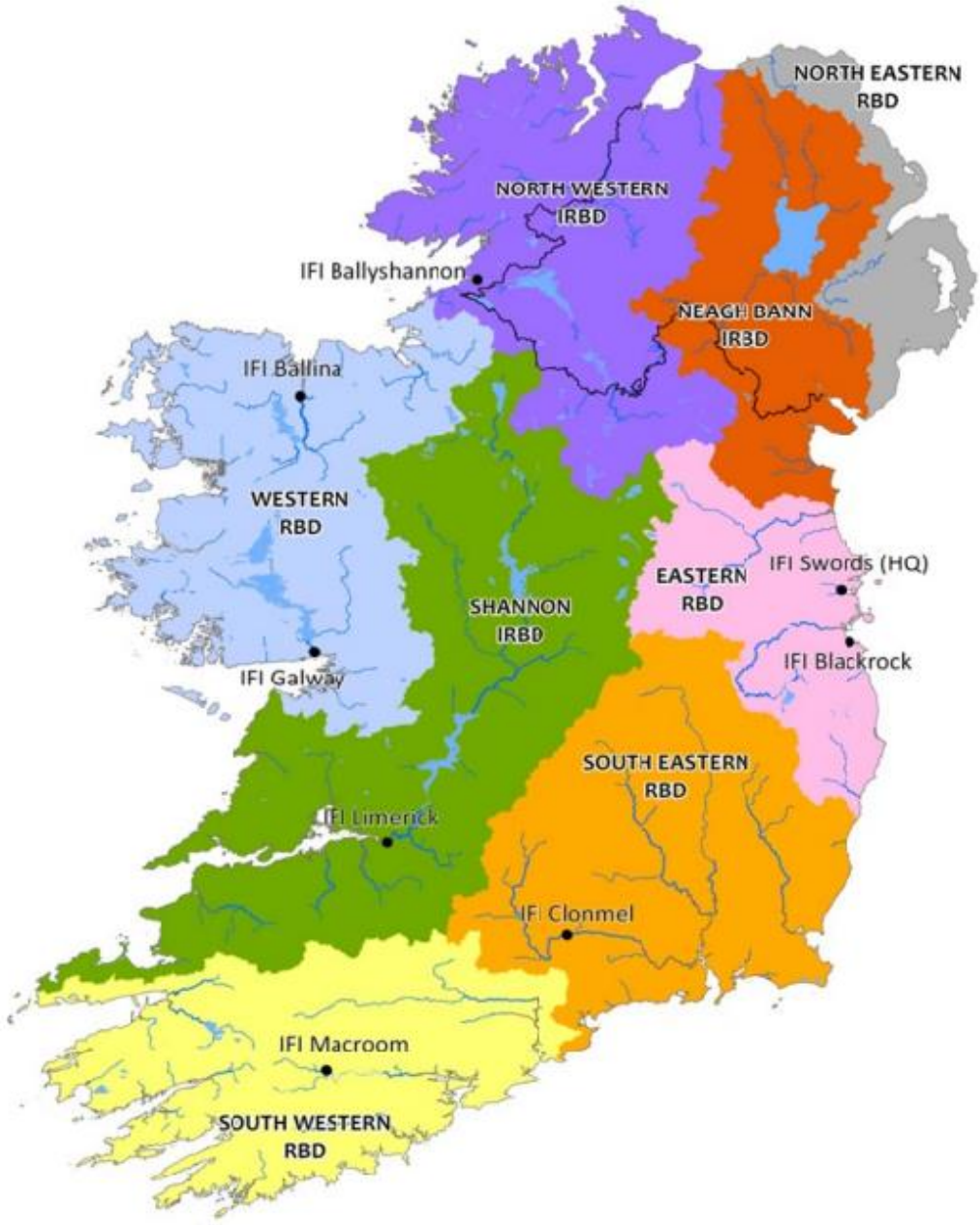
Fax: +353 71 9851816


NORTH EASTERN
RBD
NORTH WESTERN
IRBD
IFI Ballyshannon
NEAGH BANN
IR3D
IFI Ballina
WESTERN
RBD
EASTERN
RBD
IFI Swords (HQ)
SHANNON
IRBD
IFI Galway
IFI Blackrock
SOUTH EASTERN
RBD
IFI Limerick
IFI Clonmel
IFI Macroom
SOUTH WESTERN
RBD

25

APPENDIX 2

RELEVANT LEGISLATION

The Arterial Drainage Act 1945.

The Fisheries Consolidation Act 1959 (as amended).

The Fisheries (Amendment) Act 1997.

The Inland Fisheries Act 2010.

Council Directive 78/659/EEC on the Quality of Freshwaters Needing Protection or Improvement in Order to Support Fish Life.

The European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988).

European Communities (Quality of Shellfish Waters) Regulations 2006 (S.I. 268 of 2006).

European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2009 (S.I. No. 55 of 2009).

The Wildlife Act 1976.

The Wildlife (Amendment) Act 2000.

The Local Government (Water Pollution) Act 1977.

The Local Government (Water Pollution) Amendment) Act 1990.

The Habitats Directive (92/43/EEC).

The European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011).

The Water Framework Directive (2000/60/EC).

The European Communities (Water Policy Regulations 2003 (S.I. 722 of 2003).

The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009).

The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S.I. 296 of 2009).

GLOSSARY

Alevin Newly hatched salmon, trout or related fish usually with a yolk sac attached which acts as a primary nutrient source, before it emerges from the spawning gravel to begin swimming freely.

Armouring Lining of watercourse banks with rock or other material to protect from scour.

Apron Erosion protection placed below watercourse bed level in an area of high velocity such as downstream of a bridge or culvert.

Cyprinid Belonging to the largest European freshwater fish family. Common examples in Irish waters include roach, rudd, dace, minnow, gudgeon bream and carp.

Ecosystem Any combination of living and non living components that with a supply of matter and energy is self sustaining over a defined period of time

Electrofishing Fishing with electrical devices based on electro-taxis and electro-narcosis (state of immobility resulting from muscular slackening of fish due to electric current).

Gabions Baskets normally made of woven wire and filled with stone/rock or other hard material generally used to form erosion resistant structures.

Habitat The natural abode of a plant or animal, especially the particular location where it normally grows or lives.

Invasive species Species that have been introduced, generally by human intervention, outside their natural range and whose establishment and spread can threaten native ecosystems

Perched Set at an elevated level, or in a higher position, and in the context of culverts – and scour slabs, the tendency to develop a water fall or cascade due to erosion of a watercourse downstream of a structure.

Riparian The terrestrial aquatic interphase or area immediately alongside the bank of a watercourse.

Salmonids The only two indigenous fishes in the genus Salmo in Ireland - Atlantic salmon (Salmo salar L.) and brown trout (Salmo trutta L.).

Terram A geotextile cloth type permeable material normally made from polypropylene or polyester used in construction as a separation layer.

Toe The point at which the bottom of a bank and the bed of the alongside watercourse intersect.

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