

Lough Sheelin Riparian Zone Enhancement - EIP Project 2022 Final Report – August 2023

Executive Summary

The riparian zone enhancement project in seven Lough Sheelin sub-catchments completed the regeneration of approximately 10km of river bankside (riparian) areas with associated benefits for biodiversity and water quality. The locations where works took place, were within fisheries sensitive areas and areas of known salmonid production. The fencing, pruning and insertion of solar drinkers was completed by November 2022 on the seven riverine sub-catchments. By using fencing, pruning and novel drinker technologies, the works showcase the economic and environmental benefits of good farm management along watercourses. Two separate contractors were utilised to deliver this project. The first carried out selective pruning on along approximately 7km of channel, to allow light to penetrate the channel at strategic locations while ensuring sufficient shade to combat the effects of climate change. This also allowed access for instream works and for the erecting of fencing. The fencing contractor erected 6.7km of fencing, provided 47 drinking troughs, eleven solar pumps and installed nearly 7km of piping from pumps to drinking troughs. Works were designed to help improve water quality, enhance fisheries sensitive areas, improve biodiversity in the riparian areas and to promote the use of carbon neutral solar pumps.

Brief description of the project

The Sheelin EIP project looked at enhancing riparian areas along important salmonid spawning & nursery areas in the Lough Sheelin catchment. Inland Fisheries Ireland (IFI) and the Lough Sheelin Trout Preservation Association (LSTPA) had identified important spawning areas for brown trout, in need of riverine enhancement works, from 2020-2021. Detailed riverine enhancement plans and specification were completed by IFI through both these years, including instream features and riparian (bankside) works. The Office of Public Works (OPW) came on board in support of some instream enhancement plans as part of the Environmental Riverine Enhancement Programme (EREP). An application was made for the EIP project, to address the riparian enhancement elements of the plans. The project enabled the completion of the riparian works elements in the seven subcatchments (Finaway, Halfcarton, Mountnugent, Pound, Kildorrrough, Dromone and Maghera Rivers). Riparian pruning was carried out to approximately 7km of channel and fencing was erected on 6.7km of channel in total. The pruning element was carried out by track machine with a shears, for selective pruning. The fencing contractor also installed eleven solar pumps, which is providing drinker water to forty-seven drinking troughs and ensures stock are kept out of these important spawning/nursery areas. Landowners were consulted and engaged throughout the process, from the initial walkover surveys to the final contractor stages. The landowners were part of the discussions on the need for carrying out the works, the type of works which will benefit water quality and biodiversity and on the type of systems which could be installed to benefit both farming and water quality. Works were completed in November 2022.

Baseline data

The specifications for this project were drawn up by Inland Fisheries Ireland, in consultation with the Lough Sheelin Trout Preservation Association and the Office of Public Works. The works were designed to enhance riverine areas impacted by previous drainage schemes and to enhance important natal spawning and nursery areas for brown trout. The specific baseline data was recorded through walkover surveys by Inland Fisheries Ireland in 2020 and 2021. All areas were walked and features



An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine



The European Agricultural Fund
for Rural Development
Europe investing in rural areas



were recorded by photographs and through the geolocating of features. All instream features, closing off of drinker access, fencing areas, pruning areas and location of solar pumps and drinking troughs were geolocated and produced on detailed planning maps in QGIS. Seven different plans were compiled for the seven sub-catchments and AA Screening and Natura Impact Statements were completed for each plan.

Electrofishing surveys were undertaken in each catchment before works began. Post electrofishing surveys will be carried out in the catchments when the instream enhancement elements of the works are completed.

Specific water quality data was not taken as part of this project. This sampling is carried out other agencies on an ongoing basis, as part of Water Framework Directive sampling. The various River Basin Plan Cycles have shown that nutrient enrichment, predominantly from Agriculture and hydromorphological impacts are significant threats in the Sheelin catchment areas. The nutrient enrichment problems are most likely from diffuse sources, resulting from leaching from soils, poor buffering capacities along natural surface waters, drainage of lands, overspreading, among others Both the instream enhancement features and the riparian enhancement measures are known to help address both hydro-morphological impacts and water quality and as such, it is hoped that the scale of this project will help improve results from further WFD sampling, improve biodiversity and increase brown trout production in these sub-catchments.

Outline of project works area – Lough Sheelin sub-catchments



Key Performance Indicators (KPI)

The project was successfully completed by November 2022, approximately six months later than anticipated. This delay was due to weather and land conditions and the requirement for working within appropriate seasons. However, the delivery of the key metrics was achieved.

One of the main elements of the project was the planning and surveying element, and seeing as this work was almost complete at the project application stage, it allowed for the completing of this scale of project with one year post award of the project.

The procurement elements and engagement with contractors was completed as per public procurement guidelines. It was beneficial tendering for the two different elements of the works, the pruning and fencing, as they were different skills with different plant requirements.

Works needed to take place within particular seasons (pruning elements) and therefore poor weather in Nov-Feb 2021/2022, delayed the pruning elements into September 2022 and hence the fencing in these areas. This wasn't a problem, as the timelines were within the EIP project timeframe.

A webinar with landowners was envisaged at the outset, as Covid-19 was still a threat at the project initiation stage. However, relaxing of restrictions allowed for plenty of on-site consultation with landowners and so this option was utilised over the webinar. A poster was designed and presented at the EIP stakeholder conference in Athlone in 2022.

The table below shows the project timelines and deliverables (planned and actual) in a gantt chart.

	2020				2021								2022					Sep-23											
	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Stakeholder engagement	■	■																											
Site walkovers surveys	■	■																											
Agreements with landowners																													
Development of Autocad																													
PSDP (H&S) reports for 7 sites																													
AA Screening/NIS reports																													
Costing/quotations																													
Planning (if required)																													
tendering for works																													
Engaging contractors																													
Method Statements (Environmental mitigation)																													
Riparian management																													
Drinkers installation																													
Fencing																													
Supervision of works																													
Project meetings																													
Webinar with landowners on best practice approaches																													
On-site meetings with landowners																													
Project reporting/claims																													

■ Initially planned
 ■ Change to initial plan
 ■ Not completed

Completed works quantities for the seven sub-catchments (Lough Sheelin)

River Name	Tree pruning (length in meters)	Fencing (length in meters)	Number of solar pumps	Number of drinking troughs	Pipe laying (meters)
Finaway	640	333	1	4	458
Maghera	890	300	1	5	450

Drumone		780	0	2	8	1215
Halfcarton		793	418	3	7	974
Pound		1643	3465	2	9	1555
Mountnugent		727	1120	2	4	591
Kildorrrough		1802	1069	0	10	1425
Totals		7275	6705	11	47	6668

The benefits derived from pruning and fencing in the Sheelin sub-catchments:

- Regeneration of approximately 6km of river riparian area
- Mitigation for climate change impacts through increased shading
- Improved habitat for aquatic species and increased biodiversity
- Enhanced spawning and nursery potential for Lough Sheelin brown trout
- Regenerated buffer zones along vulnerable salmonid spawning areas
- Stock control along important watercourses and increased bank stability
- Improved water quality, with less bank erosion and enhanced buffers
- Less chance for nutrient run-off through soil erosion

The benefits from installing solar pumps and drinking troughs

- Negates the need for direct access by stock to the watercourse
- Improved water quality through less bank erosion and soil run-off, improved riparian zones and eliminating animal faecal matter instream
- Less 'poaching' and nutrient run-off through drinking greater trough set-back distances (> 20m)
- Environmentally friendly and carbon neutral approach to drinker provision on farms
- Increased awareness of riparian zone management
- Low maintenance drinking supply option

The benefits for biodiversity include:

- Regeneration of native riparian vegetation
- Increased insect, bird, aquatic mammals and fish populations
- Improved cover for aquatic mammals such as otter
- Improved shading, providing cover for aquatic species and helping control temperature fluctuations and impacts from climate change
- Reduced trampling by stock in-stream, improving water quality and preventing physical impacts on fish eggs and smaller aquatic species.

The benefits for water quality include:

- Reduced siltation to the watercourse and hence reduced nutrient load
- Buffering capacity of the vegetated riverbanks, helping control land run-off and filtering capacity
- Prevention of stock access to rivers, reducing nutrient load, sedimentation and potential public health impacts
- Carbon sequestering benefits of native riparian regeneration

- Temperature regulation and positive impact for thermosensitive aquatic species (e.g., brown trout)

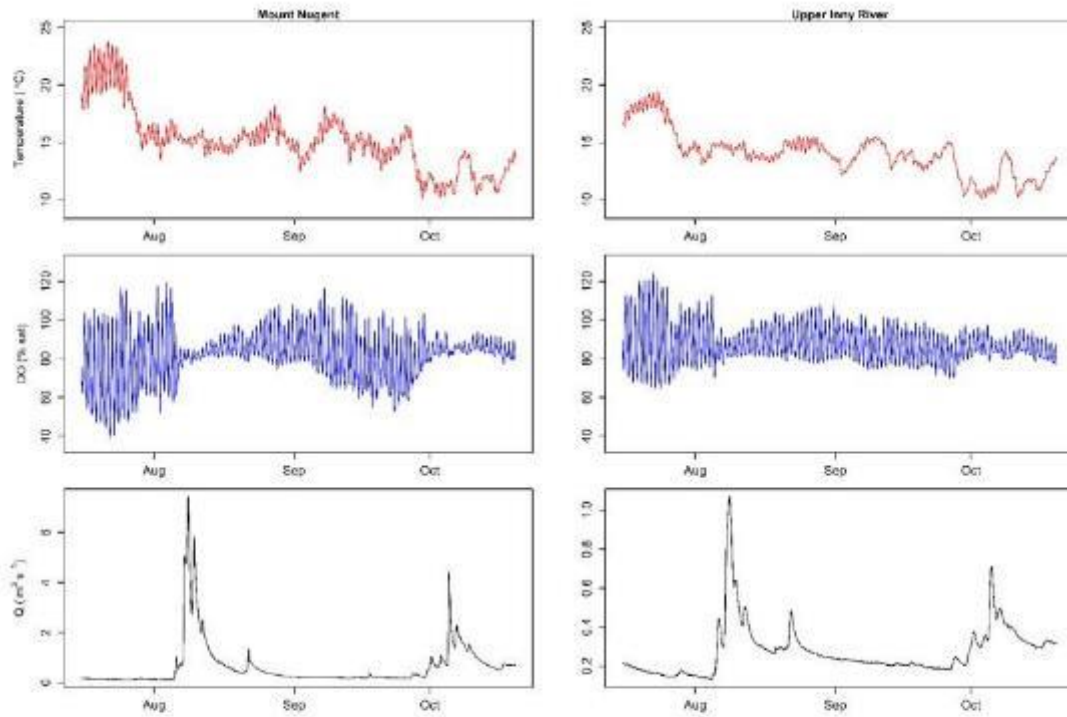
Stakeholder engagement

Inland Fisheries Ireland and the Lough Sheelin Trout Preservation Association (LSTPA) are partners in this project and have worked with landowners to implement the various stages of this project. Along with the riparian elements, funded through this project, the partners have drawn up a detailed set of in-stream restoration plans to help address hydro-morphology impacts and to improve spawning and nursery conditions for salmonids. These plans have gone through the environmental screening process and relevant permissions. The Office of Public Works carried out some in-stream restoration elements in the Kildorrrough River in 2022. The in-stream works will be ongoing over the next 3-5 years. Landowners throughout the sub-catchment areas have fully engaged in the project. Regular consultations, through site visits, have taken place to promote aquatic resource conservation and riparian management, in the relevant areas. This was favoured over the planned webinar, as Covid-19 restrictions eased following the award of the project.

A poster was prepared and displayed at the EIP conference in Athlone in October 2022, to further disseminate information on the project and to showcase the benefits from the works.

Climate change

The impacts of climate change are evident, with more frequent flooding events and regular summer drought conditions. Natural vegetated riparian areas can help control temperature fluctuations in smaller, shallower rivers by providing shade, mitigating for the worst effects of climate change. The graph below shows a comparison of temperature and dissolved oxygen (DO) levels between monitored sites on the Mount Nugent River & Upper Inny River, in the Sheelin catchment (from IFI's Climate Change Mitigation Research Programme (CCMRP)). Temperatures and DO fluctuations were more erratic at the Mount Nugent site, where there was no riparian cover and 20°C was exceeded, for a period, in the Mount Nugent River. The type of works completed under the EIP project in the Sheelin catchment, will promote the vegetation of riparian areas, which can help mitigate for the worst temperature extremes in the catchment.



Timeseries of (a) water temperature (°C), (b) Dissolved oxygen saturation (%) and (c) stream flow ($Q \text{ m}^3 \text{ s}^{-1}$) at 10-minute intervals between July 16th to October 19th 2021 for the Mount Nugent River (left panels) and the Upper Inny River (right panels). (Note that the y-axis scales are equivalent except for streamflow).

Financial Report

The total expenditure on the project is shown in the table below.

Date	Supplier	Description	Amount
Jan to May 2022- Claim 1	Tony Harten Plant Hire	Plant Hire - Tree & Srub Pruning	€13,560.00
Jun to Dec 2022- Claim 2	Brackely Contracts Inv 1683	Role of PSCS	€37,939.67
	Brackely Contracts Inv 1683_Vat Recharge	Vat Recharge on Invoice	€5,121.86
	Brackely Contracts Inv 1733	Role of PSCS	€32,808.34
	Brackely Contracts Inv 1733_Vat Recharge	Vat Recharge on Invoice	€4,429.00
	Brackely Contracts Inv 1757	Role of PSCS	€33,796.33
	Brackely Contracts Inv 1773	Role of PSCS	€37,744.57
	Tony Harten Plant Hire Inv 42	Plant Hire - Tree Pruning	€26,020.00
	Brackley Contracts Inv 1757_Vat Recharge	Vat Recharge on Invoice	€4,562.50
	Brackley Contracts Inv 1773_Vat Recharge	Vat Recharge on Invoice	€5,095.44
	Tony Harten Plant Hire Inv 42_Vat Recharge	Vat Recharge on Invoice	€3,512.70
		Total	€204,590.41

The expenditure exceeded the funding awarded by €19,892.41. This was due to very high construction price inflation encountered between the time the funding was applied for and the works were delivered. The additional cost for the works was paid for by Inland Fisheries Ireland.

The funding awarded from the Farm and Community Biodiversity initiative was recovered in two claims during 2022 as outlined in the table below.

Award	€184,698.00
Claim 1 Works Jan to May 2022	€13,560.00
Claim 2 Works Jun to Nov 2022	€191,030.41
Total Spend	€204,590.00
Eligible Award Claimed	€184,698.00

Lessons learned

The Sheelin EIP project involved completed riparian enhancement works on almost 10km of river channel in seven different Lough Sheelin sub-catchments. In terms of surveying, specifications, planning, environmental consents and landowner consents, it is a massive undertaking and the planning phase alone for such a project, takes a number of years to complete. One huge advantage with this project, is that a walkover (specification) surveys were complete as per the details provided in the project application. Preliminary landowner discussions and permissions were also obtained. All the project specifications and mapping with the help of ArcGIS and AutoCAD, were well advanced by the project application stage. This provided a number of advantages

- Specific metrics were reasonable accurate
- Permissions for the various location were obtained in advance, and this prevented any major changes to the deliverables.
- Environmental requirements and mitigation were already known and mitigation drafted.
- Restrictions on land access were already surveyed and known, again preventing any surprises and deviation from the metrics

Some lessons were learned on the tendering side, as specific competencies were required, which isn't always best achieved by one contractor. The pruning and fencing elements required different plant and so we found be splitting the contract elements, allowed for more competition, helping to achieve best value for money.

Land conditions and access is crucial for this scale of project and contingencies need to be in place for deteriorating conditions. Timeframes need to have contingency built in to allow for postponement and to take account of open seasons for specific type of works (e.g., tree pruning). Deteriorating conditions meant a six-month delay for us for some pruning.

Agreements with landowners needs to be specific and in writing, for the benefit and clarity of all. We had these agreements built in to or projects and they specified the access requirements, fencing and drinker types and quantity being supplied, maintenance arrangements and insurance indemnities.

Sump areas for the water intake for pumps needs to be identified and appropriate, in advance of contractors coming on-site. This improves the efficiencies of the pumps and leads to less downtime and maintenance.

Contractors installing pumps, need to have specific talk/demonstration with each landowner, to go over the maintenance requirements of the pumps, in particular, overwintering to prevent frost damage.

Actions to carry forward

Inland Fisheries Ireland are progressing the instream elements of the plans in these same sub-catchment and are working on the final planning elements for these plans, to deliver a programme of works, with OPW and LSTPA support.

Post in-stream works efishing will be completed, when the instream restoration plans are complete.

Continued liaising with the project landowners and other landowners in the region is vital to further educating on the requirements for improved biodiversity and improved water quality.

Further assessment of WFD monitoring results and liaising with other relevant agencies through the River Basin Plans is essential for identifying further areas for improvement.

Details of dissemination of project findings

A project poster was displayed at the EIP conference in Athlone in 2022.

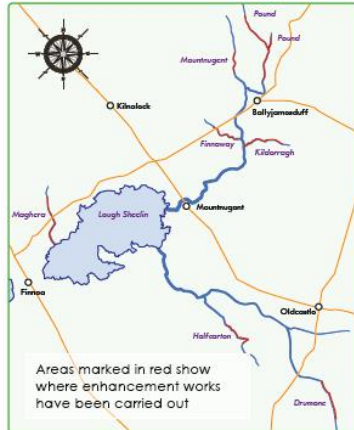
A short video of the solar pumps in the Sheelin catchment will be taken for IFI's Innovation day (September 2023).

IFI's website will display the main outputs from the Sheelin EIP project.

Lough Sheelin Riparian Zone Enhancement - EIP Project 2022

Project Overview

The riparian zone enhancement project in seven Lough Sheelin sub-catchments completed the regeneration of approximately 10km of river bankside (riparian) areas with associated benefits for biodiversity and water quality. The locations where works took place are within fisheries sensitive areas and areas of known salmonid production. The fencing, pruning and insertion of solar drinkers was completed by November 2022 on the seven riverine sub-catchments. By using fencing, pruning and novel drinker technologies, it is hoped to showcase the economic and environmental benefits of good farm management along watercourses.



Fencing & Pruning



Halfcarton before pruning works



Halfcarton during works



Halfcarton post works

The benefits derived from pruning and fencing in the Sheelin sub-catchments:

- Regeneration of approximately 10km of river riparian area
- Mitigation for climate change impacts through increased shading
- Improved habitat for aquatic species and increased biodiversity
- Enhanced spawning and nursery potential for Lough Sheelin brown trout
- Regenerated buffer zones along vulnerable salmonid spawning areas
- Stock control along important watercourses and increased bank stability
- Improved water quality, with less bank erosion and enhanced buffers
- Less chance for nutrient run-off through soil erosion

Solar Drinker Installation



In river cattle drinker



Solar cattle drinker

The benefits from installing solar pumps and drinking troughs:

- Negates the need for direct access by stock to the watercourse
- Improved water quality through less bank erosion and soil run-off, improved riparian zones and eliminating animal faecal matter instream
- Less 'poaching' and nutrient run-off through drinking greater trough set-back distances (> 20m)
- Environmentally friendly and carbon neutral approach to drinker provision on farms
- Increased awareness of riparian zone management
- Low maintenance drinking supply option

Climate Change

The impacts of climate change are evident, with more frequent flooding events and regular summer drought conditions.

Natural vegetated riparian areas can help control temperature fluctuations in smaller, shallower rivers by providing shade, mitigating for the worst effects of climate change.

The graph shows a comparison of temperature and dissolved oxygen (DO) levels between monitored sites on the Mount Nugent River & Upper Inny River. Temperatures and DO fluctuations were more erratic at the Mount Nugent site, where there was no riparian cover and 20°C was exceeded, for a period, in the Mount Nugent River.

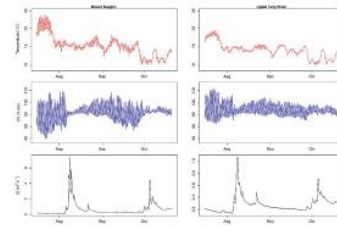


Figure 3.4. Time-series of (a) water temperature (°C), (b) dissolved oxygen saturation (%) and (c) stream flow (m³ s⁻¹) at 10-minute intervals between July 16th to October 19th 2021 for the Mount Nugent River (left panels) and the Upper Inny River (right panels). (Note that the y-axis scales are equivalent except for streamflow).

River Name	Completed works quantities				
	Tree pruning (length in meters)	Fencing (length in meters)	No. of solar pumps	No. of drinking troughs	Pipe laying (meters)
Finaway	640	333	1	4	458
Maghera	890	300	1	5	450
Drumone	780	0	2	8	1215
Halfcarton	793	418	3	7	974
Pound	1643	3465	2	9	1555
Mounnugent	727	1120	2	4	591
Kildarrough	1802	1067	0	10	1425
Totals	7275	6705	11	47	6468

Quantities of the specific works completed at each of the seven river sites in the Lough Sheelin catchment.

Stakeholder engagement

Inland Fisheries Ireland and the Lough Sheelin Trout Preservation Association (LSTPA) are partners in this project and have worked with landowners to implement the various stages of this project. Along with the riparian elements, funded through this project, the partners have drawn up a detailed set of in-stream restoration plans to help address hydro-morphology impacts and to improve spawning and nursery conditions for salmonids. These plans have gone through the environmental screening process and relevant permissions. The Office of Public Works carried out some in-stream restoration elements in the Kildarrough River in 2022. The in-stream works will be ongoing over the next 3-5 years. Landowners throughout the sub-catchment areas have fully engaged in the project. Regular consultations, through site visits, have taken place to promote aquatic resource conservation and riparian management in the relevant areas.



Plates

Completed works – Sheelin EIP project



Plate 1: Double panel solar pump on the Mountnugent River



Plate 2: Aerial view of fencing and solar pump on the Mountnugent River



Plate 3: Aerial view of fencing and solar pump on the Mounnugent River



Plate 4: Electric fencing on the Kildorrrough River, Lough Sheelin



Plate 5: Barbed-wire fencing on the Finaway River, November 2022



Plate 6: Sheep fencing on the Halfcarton River, 2022.



Plate 7: Before pruning works on the Halfcarton River, September 2022



Plate 8: Post pruning on the Halfcarton River, September 2022.



Plate 9: Tree pruning on the Pound River, September 2022



Plate 10: Installation of drinking water supply via mole.



Plate 11: Installation of drinking water supply by cut and cover method.



Plate 12: Drinking water trough.