Sneem / Ardsheelane River Safari and Recommendations Report

Overview of River Safari, April 2024, and Recommendations on Habitat and Water Quality Enhancement Options

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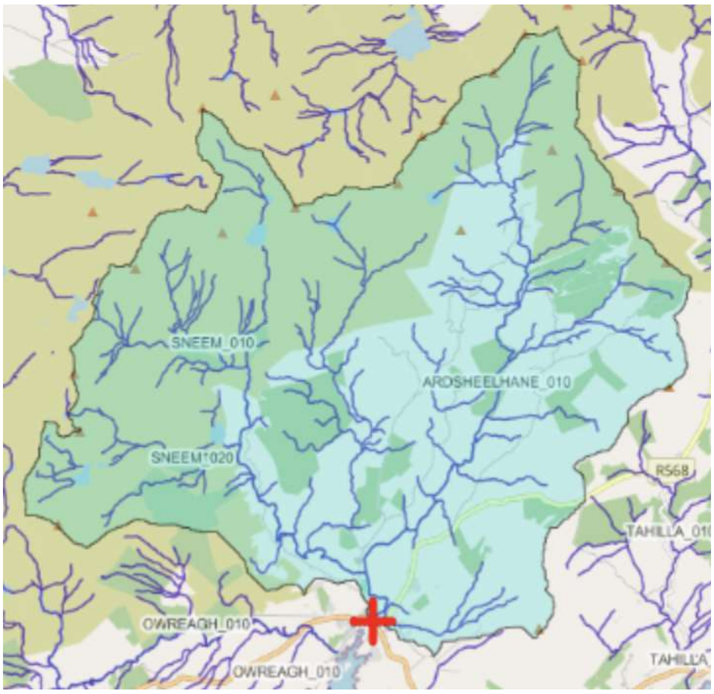
1.0 Introduction

Sneem Tidy Towns approached FH Wetland Systems in the winter of 2023 to explore opportunities for improving the water and habitat quality of the Sneem River and Ardsheelane River which flow through Sneem village. As part of this process members of the local community and the Local Authorities Waters Programme (LAWPro) officer Colum Walsh met with Féidhlim Harty of FH Wetland Systems in April 2024 to carry out a river safari on selected parts of the river and to explore suitable sites for possible stormwater management options and water-related biodiversity measures. This process has been made possible by a grant from the Local Authorities Waters Programme (LAWPro).

1.1 Site Location and Background

The focus of this process was to gain a general overview of the full catchment of the Sneem and Ardsheelane river system, insofar as it was easily accessible from the public roads within the catchment. The roads only extend up a certain amount into the catchment, and only reach a certain number of tributaries of the branched Sneem river.



The Ardsheelane is the longer of the two rivers, which flows south through a single primary channel at the eastern side of the catchment. The Sneem River flows east and south through three primary channels to the western and central sections of the wider catchment, before joining the main Ardsheelane channel just upstream from Sneem village (marked with the red cross).
Source Map: *https://gis.epa.ie/EPAMaps/Water*

1.2 Blue Dot Catchment

The Sneem, Ardsheelane and Owreagh rivers are all classified as "Blue Dot Catchments". This designation means that the rivers are identified as being waterways which are the focus of particular attention for conservation and/or restoration of water quality.

LAWPro Officer Colum Walsh has flagged that this catchment is a Blue Dot Catchment:

> The term "Blue Dot Catchment" refers to areas with the highest water quality, often in pristine or near-pristine conditions, based on the European Union's Water Framework Directive. These catchments contain rivers, lakes, and estuaries that have been identified for special protection due to their ecological importance and exceptional water quality.

Three rivers in and around the village of Sneem are within Bluedot catchments. The Sneem, Ardsheelane and Owreagh Rivers fall within this categorisation. The "Blue Dot" designation often involves efforts to maintain or restore water quality through conservation, pollution control, and sustainable land management.

Together, the Sneem River, its estuary, and the surrounding catchment area make for an important natural environment that supports both local communities and wildlife, while also being a part of Ireland's treasured landscapes.

2.0 Sneem and Ardsheelane River water quality

Water quality is often expressed in terms of Q-values. These measurements are based on biological assessments of a watercourse, specifically the number and diversity of a suite of macroinvertebrates (insects and other similar aquatic fauna). They offer a picture of the habitat value of a river or stream and thus a good overview of general water quality over an extended time period.

Q-values are expressed on the EPA maps (https://gis.epa.ie/EPAMaps/Water) and reports by both colour and number; where Q5 is classed as high quality water and Q1 is classed as bad quality water.

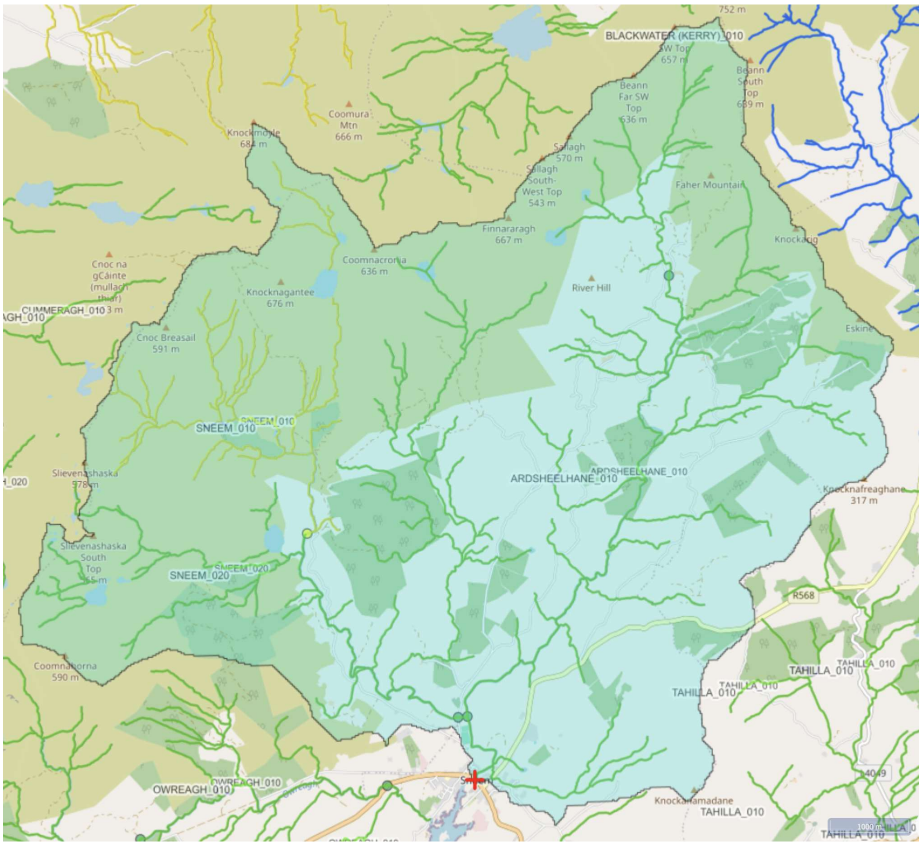
High	Good	Moderate	Poor	Bad
Q5	Q4	Q3	Q2	Q1

The colour of the river channel on the map shows the overall river quality status (Q4 - green; for all of the Ardsheelane and most of the Sneem river). This takes into account the macroinvertebrate Q-value analysis as well as physical and chemical lab analysis and the overall hydromorphology of the waterbody (the shape and structure of the river and the degree of engineered interference over the decades or centuries).

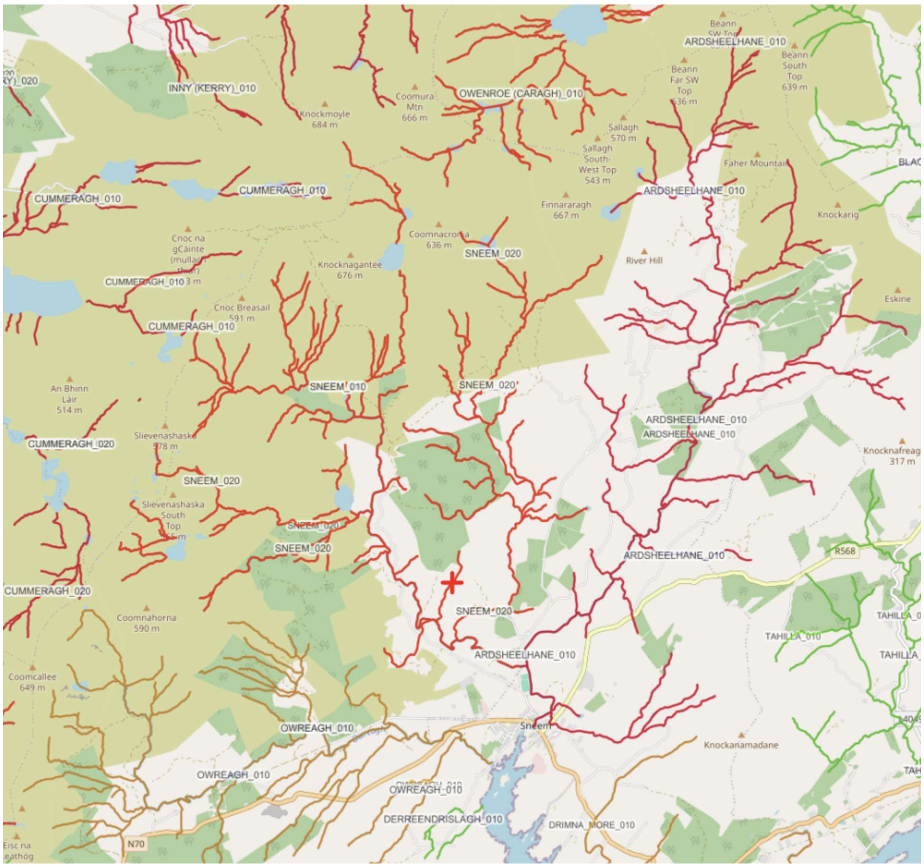
Ireland has an obligation under the Water Framework Directive to achieve good (Q4; green) status for all rivers by 2027; an obligation that we are can achieve only with a huge shift in priorities for both urban and agricultural water management. In this light, all measures, large and small, that can help with improving the water quality in the river are highly recommended, and the proposed SUDS and land management measures in this document can be part of the overall set of solutions available.

The latest Q-values for the Ardsheelane River (https://gis.epa.ie/EPAMaps/Water) show that the river water quality is classed as Good (green channel colour; plus green Q-value dots at the EPA monitoring sites). For the Sneem River catchment, most of the river is also showing as Q4 (green), but the central strand of the three branches of the Sneem River is showing as Q3 (yellow) until it joins with the western branch of the river, where it is classed as Q4 to the sea.

The Sneem/Ardsheelane catchment showing river water quality status and Q-value monitoring locations. (Source; https://gis.epa.ie/EPAMaps/Water)



Unfortunately the river quality status is at odds with the risk status for the river system. The entire system including the three branches of the Sneem River and the longer eastern branch of the catchment which is the Ardsheelane River, are classed as “At Risk” of not achieving their Water Framework Directive target of Q4 by 2027.



This may be explained by the decline in river quality compared with previous rounds of Q-value assessments; where the river achieved high status (Q5) in the upper catchments of both the Sneem and Ardsheelane Rivers in the past.

It may also be due to various pressures on the river; both the Sneem and the Ardsheelane branches of the catchment. The maps overleaf show the EPA Map pressures for the catchment. These include pressures from both extractive industry and forestry within the Ardsheelane river (the eastern most branch of the river system) and hydromorphology pressures for the Sneem river (the three shorter western and central branches of the river system).

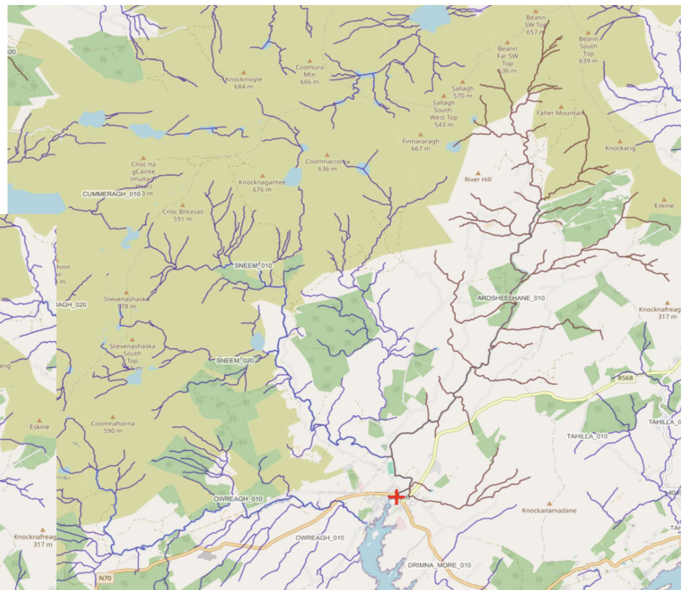
The EPA Maps outlines the categorisation of "significant pressures" as follows:

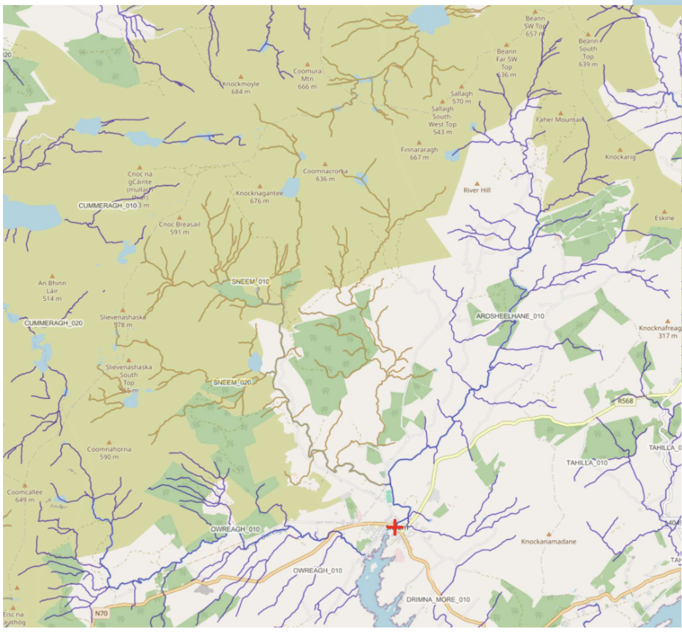
> Significant pressures have been identified for waterbodies that are At Risk of not meeting their water quality objectives under the Water Framework Directive. While there are a multitude of pressures in every waterbody, the significant pressures are those pressures which need to be addressed in order to improve water quality. Many of our waterbodies have multiple significant pressures.
>
> A robust scientific assessment process has been carried out to determine which pressures are the significant pressures. This has incorporated over 140 datasets, a suite of modelling tools, and local knowledge from field and enforcement staff from the Local Authorities, Inland Fisheries Ireland and EPA.

The categories for this river system are as follows:

> River Extractive Industry Pressures – Impacts from extractive sites include sediment/siltation pollution and alteration to the physical environment.
>
> River Forestry Pressures – Impacts from forestry include nutrient, acidification and sediment pollution, as well as alteration to habitats. Forestry pressures are subcategorised into forestry, drainage, clear felling, planting and establishment stage.
>
> River Hydromorphology Pressures – Significant hydromorphology pressures are subcategorised into channelization, embankment, dams, barriers, weirs, locks, culverts, land drainage, overgrazing and bank erosion.

"River Extractive Industry Pressures" and "River Forestry Pressures" (shown in dark red in the Ardsheelane River)
Source; https://gis.epa.ie/EPAMaps/Water



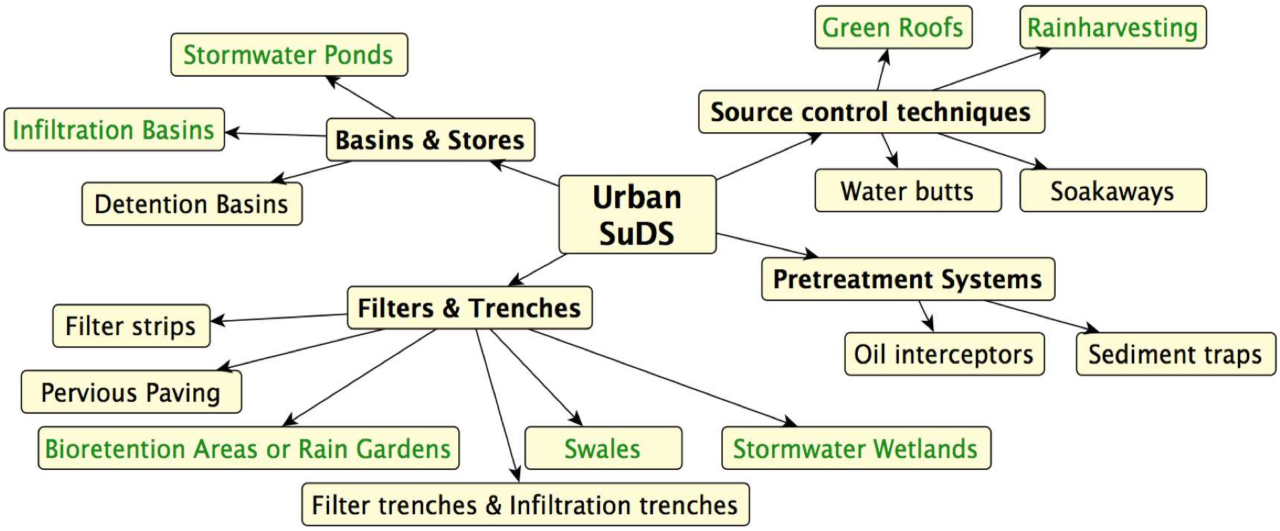


"River Hydromorphology Pressures" (shown in light brown in the Sneem River)
Source; https://gis.epa.ie/EPAMaps/Water

3.0 SUDS Options for Urban Runoff

The water flowing from paved surfaces is termed stormwater. Sustained Urban Drainage Systems (SUDS) or Sustainable Drainage Systems (SuDS) are techniques or technologies that are used to protect waterways from silt, nutrients or other contaminants in stormwater. SUDS were developed as a design solution in an urban context to help prevent flooding downstream of new developments or existing urban areas. SUDS are designed specifically to offer hydraulic buffering for flood control, and can also offer water filtration as part of their overall design, depending on the system selected.

Overview of urban SUDS options. Green denotes planted or more ecofriendly options



Following are some of the different categories of SuDS units that can be used for urban runoff:

- Source control techniques include **green roofs**, **soakaways**, **water butts** and **rainwater harvesting systems**. These minimise the volume of water contributed to the wider catchment during a storm event, making storage and treatment more straightforward and effective.
- Pre-treatment systems such as **oil interceptors** and **sediment traps** are typically concrete or plastic tanks which are useful (and/or necessary) where hydrocarbons are stored or likely to be part of stormwater runoff.
- **Filter strips** are wide grassed or thickly planted buffer zones adjacent to impervious surfaces for treatment of runoff water. These are typically used alongside new motorways, but perimeter planting adjacent to car parks can be an effective urban application.
- **Filter trenches** and **infiltration trenches** are gravel filled trenches which treat runoff water from road edges or paved areas.
- **Swales** are wide grassed channels which (typically) permit infiltration as well as transporting runoff water and/or providing storage. These are useful on sites where the topography supports an easy introduction of open drainage rather than covering in pipework.
- **Bioretention areas** are shallow planted areas that temporarily store stormwater runoff and allow it to percolate into the ground. Sometimes called

Rain Gardens, these are typically engineered areas that are filled with soil, gravel or other medium and planted with plant species that can tolerate cycles of flooding and drying. They are used most often in urban landscapes for receiving road runoff as a landscaped feature within a street or car park. They are also useful for receiving roof runoff from individual buildings in the form of a raised planter.

- **Detention basins** are designed for water quality improvement as well as storage of runoff in storm events. They are typically dry basins, but built to facilitate flooding to a considerable depth as needed for storage purposes, then releasing water to the receiving environment or the next stage of the SUDS treatment train. They are often plastic lined and not necessarily as effective at pollution removal as stormwater wetlands for example, so while they provide flood water storage, they are not necessarily the best option where uptake of residual oil/petrol or silt inputs are likely.
- **Infiltration basins** function in a similar manner to detention basins, but are designed specifically to facilitate infiltration of all flows into the ground. These can be very cost effective to build, and can often simply rely on contouring of existing ground within green spaces down-gradient of runoff areas.
- **Pervious paving** allows water to flow into a gravel substrate beneath the paved surface where it is stored for percolation, reuse or for filtration through the substrate to the receiving water or next stage of the SUDS.
- **Geocellular systems** are preformed plastic media which can be used to store runoff water below ground beneath paved areas. They are expensive to install, particularly in existing sites and do not offer a filtration function.
- **Sand filters** are typically used from industrial yards or urban runoff areas where elevated pollution loads are anticipated, or where receiving water sensitivity is high. They require more regular maintenance than some other solutions such as ponds, stormwater wetlands or infiltration basins.
- **Ponds** are a popular SUDS component for both motorway runoff and urban runoff. They are designed to maintain a sufficient depth of water, as well as providing runoff water storage and filtration. They can double as a habitat for wetland wildlife.
- **Stormwater wetlands** are relatively shallow wetland areas that are designed to both store and filter the water volume generated during a storm event. They can be low cost to build and maintain, and provide valuable wildlife habitat.

Regardless of the application any SUDS unit needs to be carefully designed and constructed or installed in order to fulfil the required objectives, in this case amelioration of an existing runoff issue in terms of both volumes and quality. The CIRIA SUDS Manual[1] is a useful reference for SUDS design. Note that many of the low-tech, low-cost solutions can often involve lower maintenance in the long term, as well as being more affordable at the start. Where green areas are present, contouring of the ground can provide an effective infiltration basin or filter wetland, depending on the infiltration rate in the indigenous soils on site.

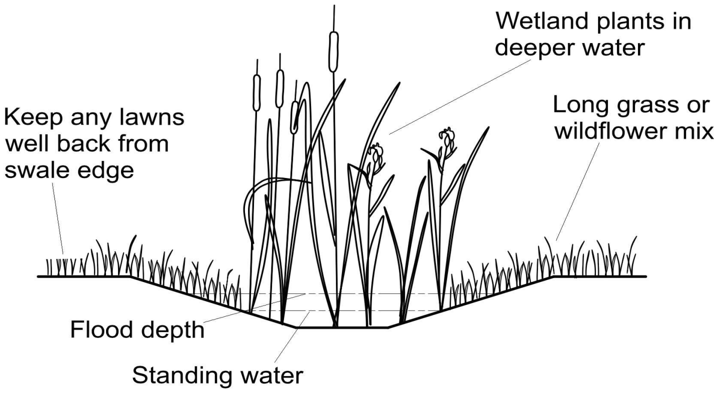
1 Woods-Ballard B, Kellagher R, Martin P, Jeffries C, Bray R, Shaffer P (2007) The SUDS Manual. CIRIA, London

3.1 Proposed SUDS Measures

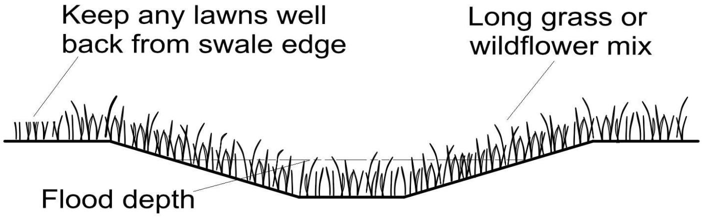
The main measures which appear suitable for use in Sneem include swales, bioretention areas or rain gardens and stormwater ponds and wetlands. These may be augmented with rainwater planters or water butts at individual houses, churches or school grounds for additional benefits to local hydrology.

Swales

Grassed or wetland planted channel set on or close to the contour for filtration of water en route to the river. (See *In Praise of Swales* in Horticulture Connected, 2019, for more Info: https://horticultureconnected.ie/?s=feidhlim+harty&post_type=post)



Section through planted wet swale (L). In essence, a wider version of this set-up serves as a stormwater wetland. (Image: FHWS)



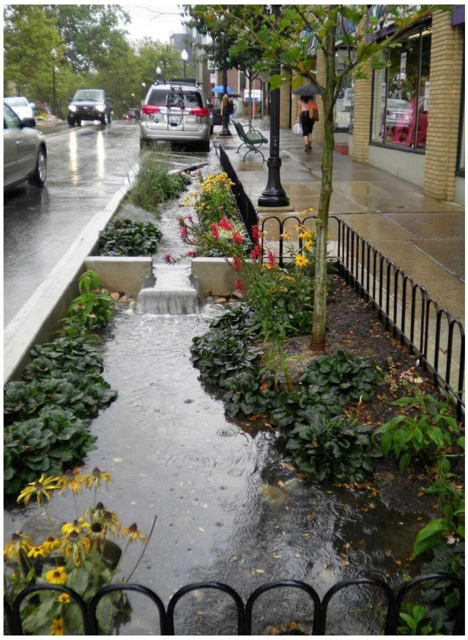
Section through a grassed dry swale (R). Careful contouring of suitable ground can create opportunities for filtration with very little cost. (Image: FHWS)

Two swale examples from a stormwater drainage system in Denmark taking village urban runoff. Dry grassed swale (L) and wetland planted swale (R) both filter water en route to a stormwater wetland lower in the catchment.

Roadside swale in north Cork, with earthen check-dams and pocket pools planted by volunteers as part of local community scheme.

Bioretention areas / rain-gardens

Planted infiltration areas for receiving runoff from roads or car park areas to provide both filtration and attenuation of the runoff en route to ground. These may have an overflow facility to surface water for excess volumes during storm events, but during dry weather flows are typically able to store and percolate all inputs. (https://horticultureconnected.ie/horticulture-connected-print/2020/spring-2020/site-drainage-with-an-eco-twist-feidhlim-harty/)



Rain-garden during downpour (R) Reproduced with permission from State College PA, USA.
https://www.statecollegepa.us/345/On-Street-Rain-Gardens

Sunken rain-garden strips between parking rows (below)

Stormwater ponds and wetlands

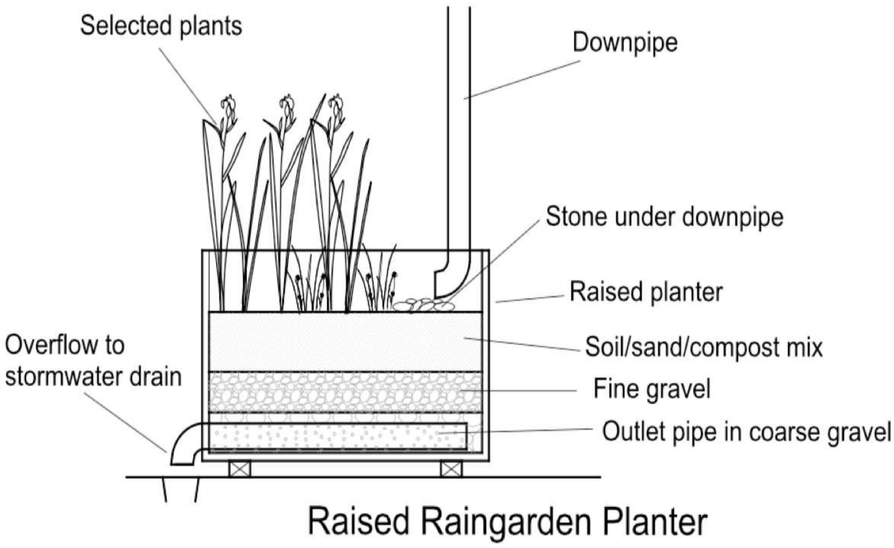
Filter marsh or pond areas that can receive rainfall runoff from streets for storage and filtration en route to the river. Some infiltration may occur, but the base is sufficiently impermeable to support a wetland habitat (in the case of stormwater wetlands) or is lined with indigenous clay, peat or synthetic liner membrane (in the case of ponds). (See: https://www.wetlandsystems.ie/Stormwater.html or more info.)

Stormwater wetland at University of Limerick (below)

Bulrush (upper right) and early planting (lower right) at the Moycullen stormwater wetland, Co. Galway

Raised planters and water butts

Raised planters and water butts can be useful for urban scenarios where space is limited, but where a solution to roof runoff is still needed. What these do is to store rainwater and thus minimise the throughput to the stream. Details for building raised planters can be downloaded here: https://www.dublincity.ie/sites/default/files/2021-04/a-how-to-guide-to-rainwater-planters-english.pdf



4.0 Summary of Farm-scale Measures

Agriculture is recognised as having one of the largest impacts on water quality in Ireland. Current agricultural payment schemes generally reward the removal of natural habitat from our farmland, in favour of satellite images of grass or ploughed fields. However with the new Waters EIP and changes to CAP funding, this is changing, and increasingly farmers are being offered supports for bringing back nature onto the farm and improving water quality.

Pollution inputs from farms can be divided into two main categories:

- Point source pollution from identified sources such as farm yards. Also identifiable flows from clean yards, roads, roof surfaces etc.
- Diffuse pollution from fields without a readily identifiable stream or input flow.

4.1 Point source pollution

Point source pollution inputs can be addressed using proper storage and spreading in the appropriate spreading window (which pushes the problem to diffuse pollution instead to a greater or lesser extent). Solutions may include large willow plantations or Integrated Constructed Wetlands for receiving all wash waters and yard runoff.

Fig. 11.1 – Farm scale constructed wetland system

Fig. 11.2 – Spreading pipes in an irrigated willow plantation

Inputs from clean yards, sheds and roads has until recently been regarded as unimportant from a water quality perspective, yet still causes problems for water. Suitable measures include silt traps, in-channel filter marshes and in-channel ponds directly within the drains exiting the runoff areas.

- **In-channel wetland buffer zones**: essentially overgrown open drains, dammed at the lower end to hold back water to improve filtration.
- **Silt traps and in-channel ponds**: Widened areas of drains for habitat and filtration.

Fig. 11.3 – In-channel linear buffer (essentially a planted farm drain modifications to better filter water)

Fig. 11.4 – In-channel pond for habitat; and removal of nitrates

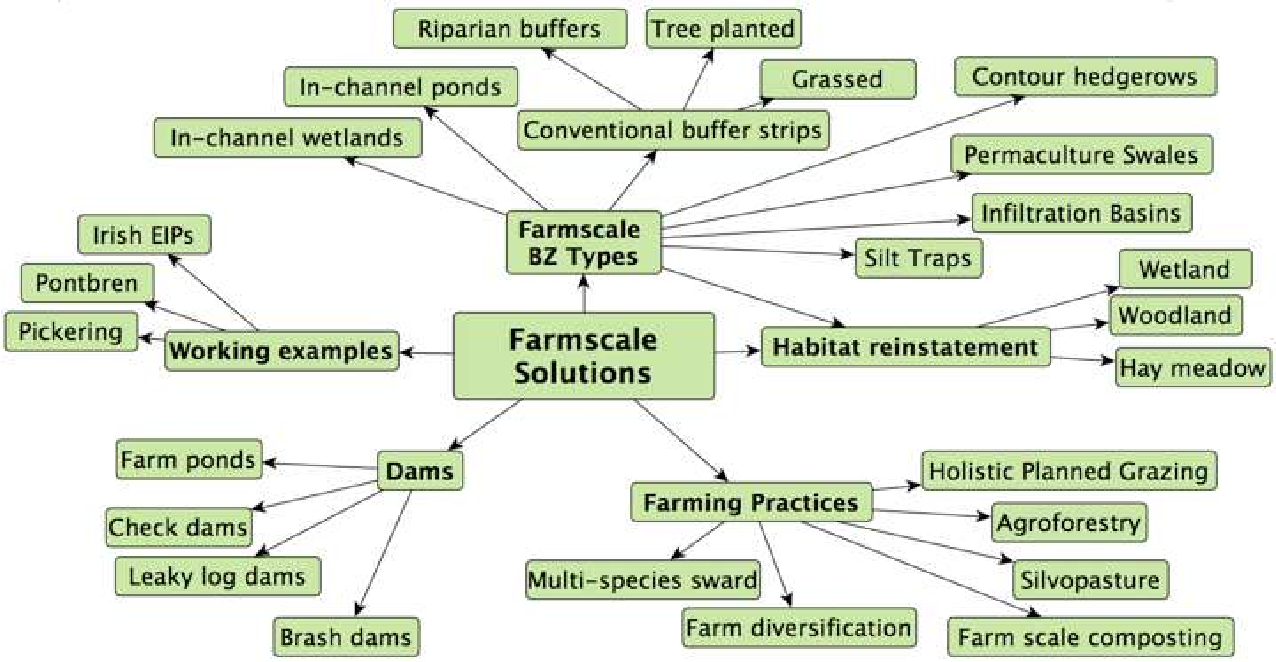
4.2 Diffuse pollution

Diffuse pollution is by its nature more difficult to identify than point source pollution; and can thus be more difficult to address. Solutions can include :

- Slow and filter the flow of surface runoff exiting fields via buffer zones
- Use in-channel buffer zones in farm drains
- Reduce the inputs of polluting substances onto the fields
- Reduce movement of contaminants down through the soil into the groundwater

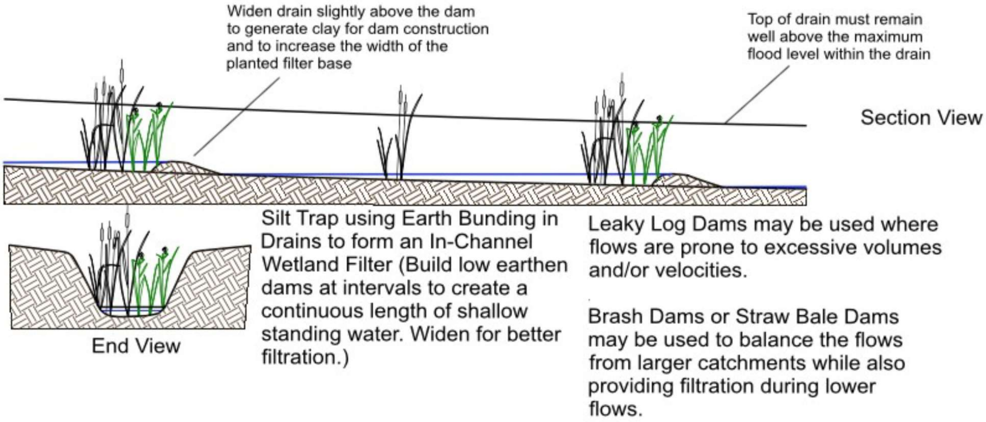
4.3 Overview of measures

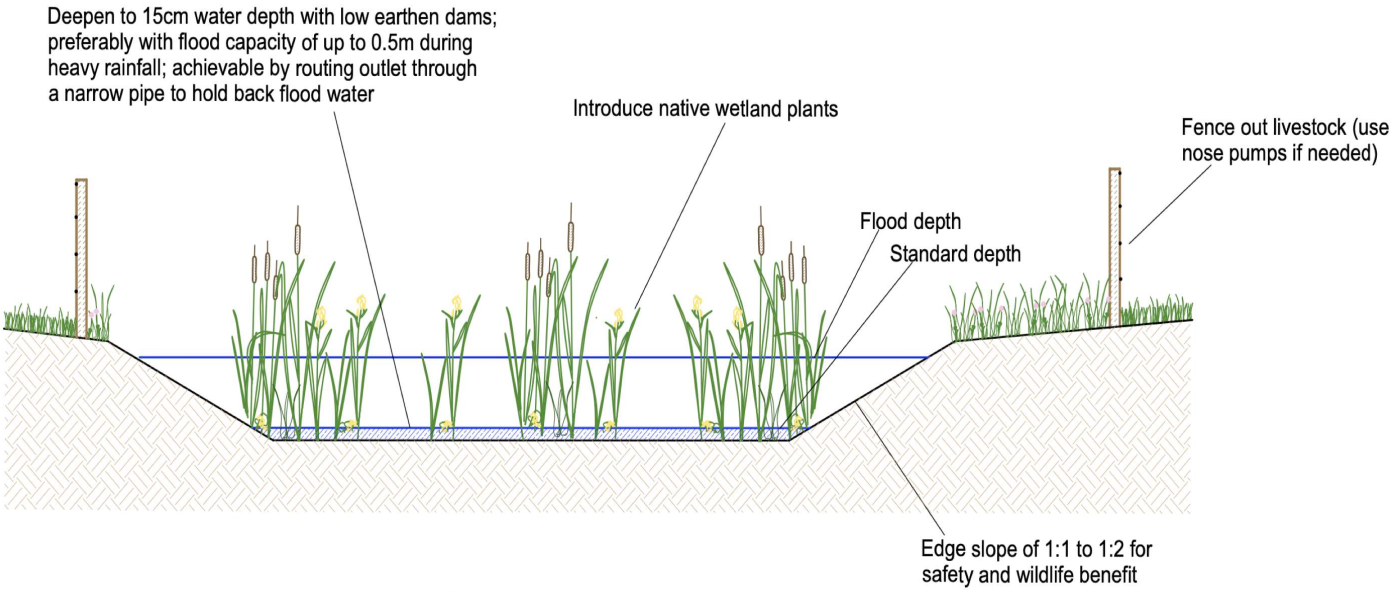
Overview of main farm-scale solutions for water quality enhancement



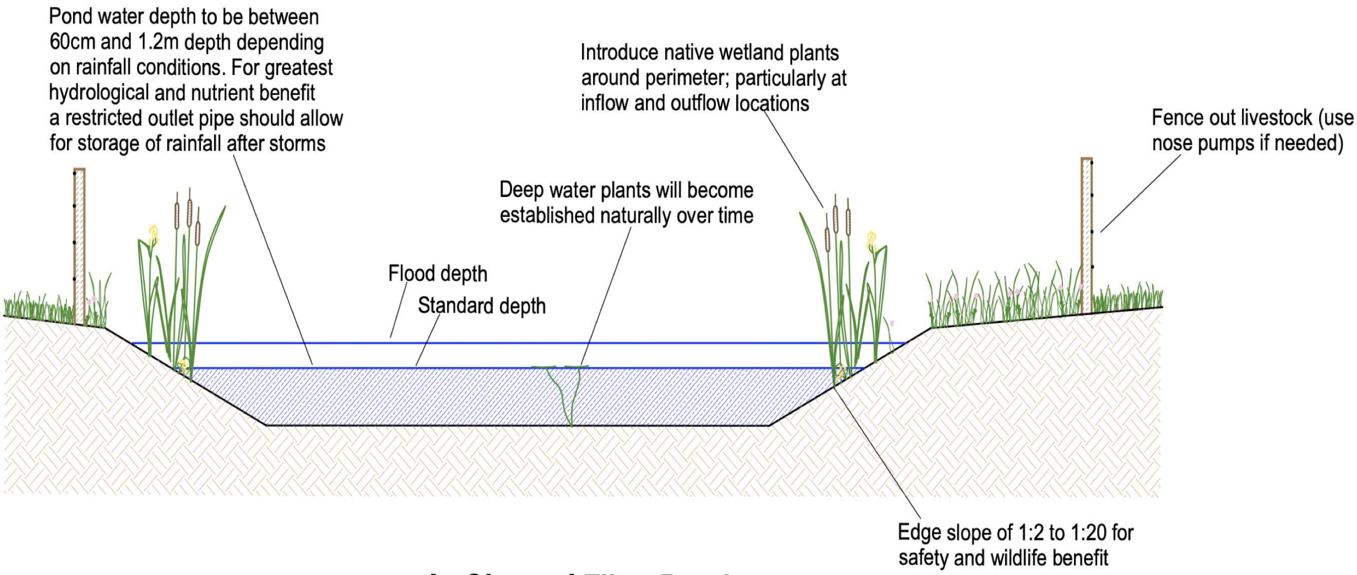
Three examples are given overleaf of measures that may be used to reduce pollution inputs, silt and/or hydrological disturbances which lead to flooding and drought conditions in waterways. These are in-channel planting, in-channel ponds and in-channel wetlands for use within farm drains. Note that any works in streams (as oppose to seasonal drains) needs permission from Inland Fisheries Ireland.

In-Channel Filter Buffers for silt settlement in farm drains (Planted Drains)





In-Channel Filter Wetland



In-Channel Filter Pond

5.0 River Safari

A river safari is a site walk-over to assess inputs to rivers or streams, highlighting possible or known pollution inputs and other landuse issues, both positive and negative. This river safari was carried out by FH Wetland Systems and Sneem Tidy Towns on 25th and 26th April 2024 as part of a LAWPro funded process in Sneem to assess inputs with a view to seeking input from the local community to explore options and opportunities for improving the water quality, hydrology and habitat value of the rivers in question.

For this process the photographs have been divided into a number of different sections, as follows:

- 6.1 – Within the village of Sneem.
- 6.2 – From Sneem into the estuary.
- 6.3– The Owreagh River and Sewage Treatment System
- 6.4 – The Sneem River (western branch of the catchment)
- 6.5 – The Ardsheelane River from the Coomyana road
- 6.6 – The Ardsheelane River from the Ardeen Road

5.1 Within the village of Sneem

The bridge over the river in Sneem provides a focal point within the village. Here the non-native invasive species Montbretia, can be seen in the foreground, growing below the Church of Ireland church beside the bridge. The water here is clear and shows on the EPA Maps as being of good quality (Q4).

The gravel bar on the opposite side of the river (east bank) may be the result of recent storms, or may be indicative of ongoing erosive action in the upper catchment. A gravel base on a river or stream provides good habitat for fish and insects, but excessive erosion of stone can be problematic for the river system and should be assessed further.

Just below the gravel bar is a stand of Japanese Knotweed (L). This non-native invasive species can overshadow river banks and shade out the native species that would otherwise protect the stream bank from erosion. Action proposed: investigate chemical free methods such as https://rootwave.com/ and establish a programme of knotweed removal. .

Grass from church mowings is piled up at the top of the slope near the river (R). The runoff from grass can be remarkably rich in pollutants (silage effluent can be over 300 times more polluting than raw sewage), so it is recommended to use cut grass in modest amounts as a mulch around young trees instead of piling it up where it can ensile and produce runoff.

There was a profusion of algal growth at the base of the steps down to the upper side of the river from the bridge through Sneem. This looks as if it is related to either grey water misconnections or septic tank ingress from nearby buildings. Action required; either address the misconnections at source, upgrade the septic tank, and/or plant this area with common reed as a very modest filter measure to address some of the nutrient inputs.

The rock river bed viewed from the main bridge in Sneem looks out over the estuary. Note the construction works at the LHS of the photo. Any works adjacent to the river, or with runoff that flows into the river, should be properly set back and/or contained to prevent silt ingress.

Close to the bridge, there is what looks like a metal pipe in the rock. Any further information on what this is would be interesting, although it looks as if it is long disused.

Below the Digital Hub a tributary of the Ardsheelane flows through a deciduous woodland and joins the main channel. There is a rocky base which can provide good ecological habitat, but a relatively steep sided edge, indicating erosion through the soft peaty substrate. Also visible are Montbretia, growing through the other woodland flora. It is recommended to carry out a trail with hand pulling of Montbretia in June and July and assess the effectiveness of this as a removal method.

Erosion of the soft peat can be seen here below an overhanding willow tree. It is recommended that the flow patters of the wider river system be assessed to help mitigate high flood velocities. The measures outlined for the upper catchment will address this.

The same tributary of the Ardsheelane flows through private gardens at the R568 en route to the main river channel. It is recommended that the area adjacent to any river or tributary be managed in a way that is chemical free and as wildlife friendly as possible. Here there is pleasant growth of ferns, ivy and bankside vegetation and a nice stony stream bed.

Within the village there are a number of locations where rain-gardens could be built into the existing paved street-scape to hold and filter stormwater. Generally these can be most readily installed where existing gullies are located in areas where sufficient space is available to set aside as a planted filter area.

The photos at left and below (L&R) show potential areas where small on-street rain-gardens could be built.

At the entrance from the village to the Community Park there are signs of silt settling on the path and also flowing off towards the river. Areas such as these are very easy areas to set aside as small rain gardens. Deepen an area off the pathway by 150mm or so and plant with suitable wetland plant species to hold and filter the water.

5.2 From Sneem into the estuary

There is a pipe entering the western side of the upper estuary (R); slightly crushed by concrete fill material. This doesn't have any overt sign of water flows and may be unused. If any other information is known about this pipe it may be of use in steering potential stormwater actions, but it may be long disconnected.

Common reed (*Phragmites australis*) (L) growing in a reed bed at the eastern side of the estuary. There is a small stream entering here from private land above (below R) via the concrete pipe (below L) which flows beneath the footpath. Algae on the pipe may well be from nutrients in sea water rather than from the small stream. Stream could be widened into a filter and/or habitat pond if the land owner is amenable to such measures.

Just below the bridge at the western side of the river a stormwater pipe appears to be flowing into the water, showing a distinct clouding of the water on the wet day of assessment (R).

The gully (L) is the closest visible stormwater input point, but the inlet may also be from the wider stormwater network in the village. Action: stormwater drainage maps should be obtained and full stormwater filtration be used, such as stormwater wetlands, rain-gardens, ponds etc.

Further downriver, at the Rowing Club, stormwater runoff from the road can be seen to be bringing a silt load with it towards the water (R). Any opportunity for settlement should be availed of. In this instance a rain garden or stormwater wetland would be effective at catching and holding the water during heavy rainfall, and allowing cleaner water to either soak into the soil below or to flow over to the river without as much silt.

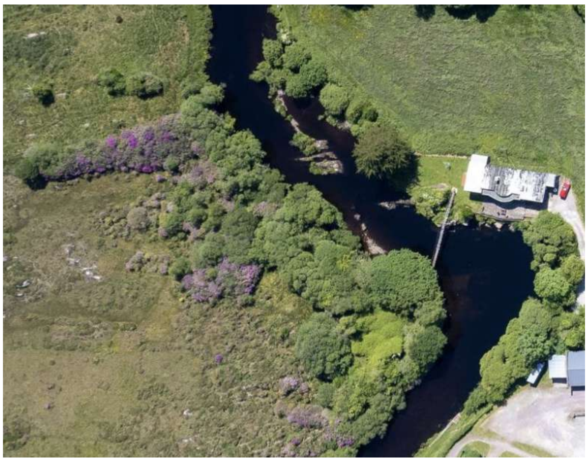
This gate at the Rowing Club car parking area (L) is reported to be the site of a pumping station to pump sewage to the main sewage treatment system. This report does not have the scope to assess whether this is a potential storm sure overflow location to the river in high rainfall events. If it is, then designing a stormwater wetland to take this overflow would greatly help to protect the river from storm surge pollution during heavy rainfall.

This gully below the Sneem Holiday Village appears to flow into an open drain below the road. This would be a very easy stormwater measure to address by widening the drain as a filter swale and holding water back behind check dams to form settlement ponds. These would double as both filter ponds and wildlife habitat.

Cut grass and hedge trimmings below the Community Playground have the potential to introduce nutrients and organic loading to the river. It is recommended that these be composted to create rich soil for the gardens instead.

The new weeding machine in Sneem is a wonderful way to avoid the use of herbicides in the village. Chemicals used on the street would otherwise inevitably find their way into the waterway where they cause many problems for aquatic life.

The fishing spot at the GAA grounds is a testament to the fact that there is clean enough water to support salmonid fish species within the catchment.



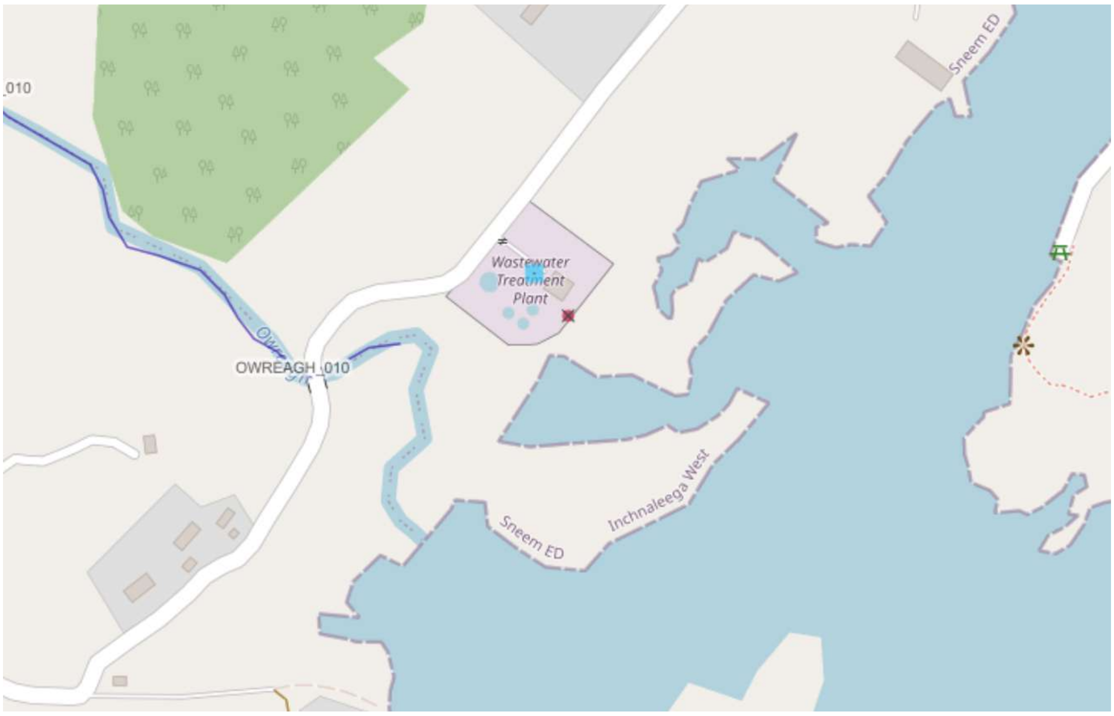
Close to the GAA grounds, Rhododendron has been identified in drone footage (Source: Sneem Tidy Towns). This invasive species excludes light from the understory, preventing recovery of native riparian woodland of oak, willow, birch etc.

Addressing invasive species control can often involve chemical use which is directly problematic for more than just the target plant species. The Gaelic Woodland Project (https://gaelicwoodlandproject.com/fighting-invasive-species/) has developed a chemical free methodology for Cherry Laurel control, which may be transferrable to here.

5.3 The Owreagh River and Sewage Treatment System

The Owreagh River flows into the Estuary less than 1km south of the centre of Sneem. There is a very attractive waterfall at the base of the river just below the public road.

The river is close to the wastewater treatment plant (denoted by a blue dot on the EPA map below) and the discharge point to the estuary (shown as a red dot at the sewage treatment system site boundary).



The following photographs show the water and algae growth adjacent to the wastewater treatment plant, indicative of elevated levels of BOD loading (Biochemical Oxygen Demand – essentially food value for microbes) and nutrients. A potential action here would be to install a tertiary treatment constructed wetland within the existing natural reed bed to help filter out excess nutrients; and/or carry out stormwater measures to limit storm sewer overflow – which may or may not be an issue for Sneem, and would require further investigation.

5.4 The Sneem River

This series of photographs starts in the lower section of the Sneem River and follows the westernmost branch of the river north as far as the public road permits. Not all of the river system is accessible by road, so the photographs show only a limited overview of the entire Sneem River.

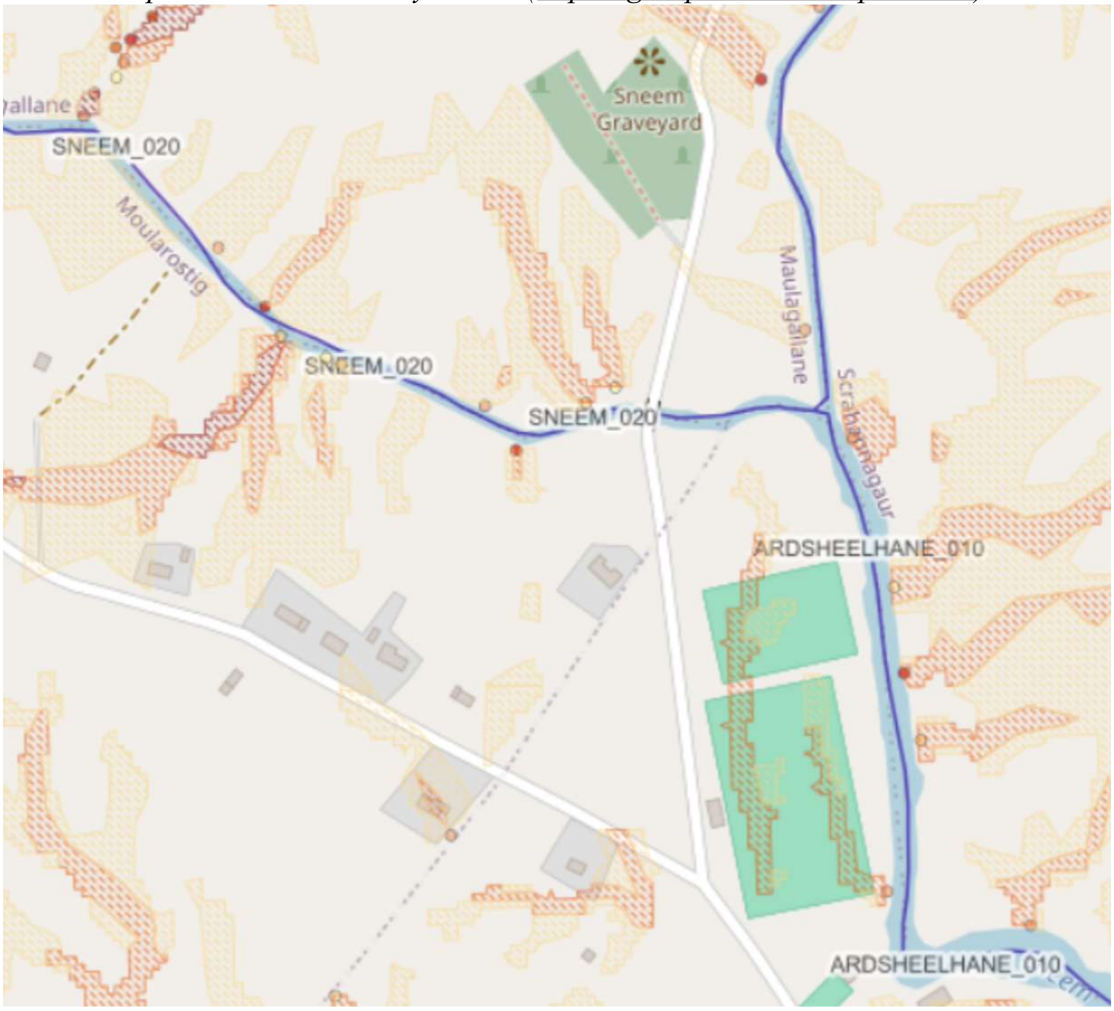
The lowest bridge on the Sneem River before it joins the main Ardsheelane River is between the GAA Club and the cemetery. Looking east, there is a good tree planted riparian buffer zone, which helps to filter any nutrients entering from adjacent farmland and to slow down water movement from the land to the river, which are both important aspects of a healthy river system.

Looking west from the same bridge, grazing land can be seen right to the edge of the water. This means that livestock are free to graze along the banks leading to nutrient inputs and erosion by both grazing and footfall. It is recommended that stream and river margins be fenced to exclude livestock and allow a suite of natural riparian vegetation to develop.

When water lands on a field it follows the natural contours of the ground, and ultimately wanders its way back to the nearest drain, stream or river. The photos below show runoff pathways where nutrients or silt can flow preferentially towards the river. It is a relatively easy matter to build buffer zones within these natural pathways to hold water and allow it to settle and soak into the ground.

The EPA has a mapping tool which looks at Pollution Impact Potential (PIP maps) to provide an overview of the likelihood of a certain parcel of land to lead to pollution. PIP maps for nitrogen and phosphorus are mapped on the EPA mapping tool; and the delivery paths are shown below, indicating the general topography of the land and the potential route that polluted runoff may take in a rainfall event.

PIP – Phosphorus Flow Delivery Paths (https://gis.epa.ie/EPAMaps/Water)



At the bridge at Lomanagh North there is what appears to be an Irish Water or Kerry County Council mains drinking water supply line which crosses the river. Note that any works which involve works at the river bank may require Inland Fisheries Ireland input; and always involve the need for care to avoid causing silting or other contamination or damage to the river.

Having checked the EPA maps for water abstraction in this general area I don't see anything that corresponds to this pipe, so it may be worth checking to confirm that it is indeed a public supply.

The very stony bed of the river, contrasting with lower flow volumes at the time the photo was taken, is indicative of a high variability in flow regimes. This is consistent with the hydromorphological pressures on the Sneem River identified in the EPA Maps. At this location there is good riparian tree cover, which is helpful at filtering water and buffering hydrological extremes. The actions required are further up along the catchment, where there is space to hold water on the landscape.

Just up from the water pipes some of the causes of hydromorphological disturbance can be clearly witnessed. These drains (R and below) within the field at this location do not allow rainfall to soak into the soil beneath, but rather move it rapidly from the field tot he river channel. This exacerbates downstream flooding in wet weather and drought conditions during dry weather.

Fortunately it is relatively easy to address the problems of excessive drainage. These include blocking drains with small earthen check dams (if flows are modest) or stone check dams or leaky log dams (for higher flows); digging in-channel pools as silt traps and water stores to slow the flow; planting riparian woodland; reinstating habitat in the form of hedgerows, wetlands, boggy corners, tree planting etc. These measures are now possible to seek funding from via the new Waters EIP.

Further up the catchment is what looks like the Kerry County Council water treatment plant associated with the pipes further downstream. The photo to the right shows the legal hazard warning sign associated with sodium hypochlorite, one of the standard chlorination chemicals used to sterilise water prior to delivery to homes and farms in the area. While in standard usage chlorination chemicals are used to kill pathogenic microorganisms in drinking water supplies, they have the potential to spill into waterways causing devastation to the species that live there.

In the recent past a disturbingly significant number of separate instances of fish kills have been linked to water treatment chemicals: on the River Allow in Co. Cork (chlorine spillage)[2&3]; the Ballymulcraven River in Co. Clare [4](waste iron sludge spill) as well as further spills[5] in the South East and a case of intentional chlorine dosing[6] of streams at Dunmore East in Co. Waterford. In the case of Sneem, the action proposed here is to work with KCC or Úisce Éireann to assess the security of all chemical storage at the water treatment plant and ensure that proper storage facilities and bunding is in place to protect the river.

Chlorination chemicals and iron sludges are not the only threat to waterways. Any stored liquid that is damaging to aquatic life can also pose a significant threat to river health. Storage tanks should be adequately protected by use of bunded tanks (double skinned storage tanks) or bunded aprons below the storage tank to hold water in the event of a spillage. Note that in the photo (R) it is not known whether the tank itself has an internal bund (double chamber) or not, but it is clear that any potential leakage from the tap or hose connections would enter the environment directly below the tank, leading to pollution of nearby waterways and potentially the wider Sneem river.

Wherever there are works being carried, examine potential opportunities for water storage and filtration. Here (L and below) there are opportunities to widen the lower area of ground beside the new hardcore area and to block the drain outlet so that the area holds water more effectively as a pond or wetland. This acts as a silt trap, habitat, carbon sink and water storage area.

2 https://www.irishtimes.com/ireland/2024/06/11/the-river-was-effectively-sterilised-at-least-5000-fish-dead-in-co-cork-fish-kill/
3 https://www.farmersjournal.ie/news/news/river-allow-farm-group-livid-over-cork-fish-kill-822618
4 https://www.agriland.ie/farming-news/uisce-eireann-to-pay-over-e15000-after-very-significant-fish-kill/
5 https://www.fisheriesireland.ie/what-we-do/protection/enforcement-case-studies/chlorine-fish-kill
6 https://www.thejournal.ie/waterford-beach-bleach-5847170-Aug2022/

This area already has standing water, which if either left as is, or assisted by plugging any obvious spill over areas, can provide all of the benefits described above.

Similarly wherever pipes are used, take the opportunity to dig a small pool or wetland below the outfall point to filter any water flowing through the area and reduce the flood/drought problems in the catchment.

Similarly, any opportunity to preserve existing native tree cover such as willow, birch etc. should be embraced. This will help to hold water in the soil rather than loosing it to nearby drains too quickly, as currently happens in the river here.

Wherever open drains are present on relatively level ground, take the opportunity to slow the flow with stone check dams (for high flow areas) or earthen dams (for slower moving water without such an erosive force). Plant these with wetland vegetation such as bulrush, yellow flag Iris etc. to filter and hold the water further. In-channel pools and/or in-channel wetlands can be made by widening the channel further and holding water in deep or shallow areas respectively.

Whether the water in the drains is silted (L) or overly rich in nutrients (R) or even clean but subject to hydrological extremes, it is well worth widening and planting to form in-channel filters and silt traps en route to the stream or river.

This drain is flowing out onto a relatively level field (R), providing a perfect opportunity for a pond within the landscape. Increasingly Dept. of Ag. Programmes are assisting with pond and filter buffer zone creation on farms, so these are well worth exploring. Or they can be created easily and cheaply by hand or machine with the right local know how.

Turf cutting (R) in the upper catchment area of the Sneem River. This is a centuries old practice, which has all but ceased in Ireland. Although traditional in many parts of the West and Midlands, it has direct impacts on catchment hydrology, as well as carbon storage. Action: find ways to support land owners who cut turf with alternative farm support payments to build water storage on the land instead of removing it.

Close to the highest point at which the public road can view the river, there are overt signs of erosion of the stream bank and base. (L and below) In the photo to the left it is clear that this has been an ongoing issue which has removed some of the field to the right; and has merited rock armour placement to help alleviate the problem. Often rock armour can exacerbate the issue, leading to eddies and rapid flows around the rocks, which further scours the soil behind it.

Upstream of the bridge (R) the field edges are being washed into the water during storm events on the left bank. Notice that were the bank is fenced from grazing pressure, the erosion damage is significantly less. Part of the issue is the widescale removal of upland native forest cover; and also to the common practice of draining upland bogs and agricultural lands to improve the soil for grazing and to show up as "productive land" in satellite maps to quality for CAP payments.

Further examples of erosion within the upper catchment are shown below L and R.

Actions proposed: organise an upland planting programme to restore native upland forests and riparian woodlands, and explore the potential for leaky log dams, brash dams, in-channel check dams etc. in the drains leading to these heavily eroded rivers. Also, field drainage practices should all include in-channel ponds and wetlands to hold water at the lower end of each drain and allow water to settle briefly before entering the stream. Drain maintenance practices should also be amended to allow vegetation to thrive (particularly where this does not impact on farm productivity) and thus slow the flow and filter runoff water further. It is also worth noting that recent changes to CAP allow for an increase from 15% to 50% “non productive land” to still quality for area payments, so leaving boggy fields be may be more financially viable than clearing them for the sake of the grant payments.

In areas of existing problem erosion consider willow spiling and willow mattresses as a flood defence measure rather than rock armour. This has been used successfully by the Inishowen Rivers Trust at Carndonagh: https://www.youtube.com/watch?v=KtvGFsb_ToE

A newly cleared drain near this area shows an example of how management may be altered to help prevent erosion. At a most basic level, instead of clearing the drain in full, (which is standard practice since it is the cheapest way to get the job of clearing the drain completed) clear only in sections of 20m long; leaving 20m alone. That way the tall wetland vegetation that thrives in wetlands can continue to grow in at least 50% of a drainage channel; and grow back towards the centre again prior to the next clear. Also, only clear where there is an active need to do so; such as where water is backing up on level ground to within 40cm of the ground surface, or where the water level in the drain is such that it threatens to block incoming field drainage pipes.

A further measure could involve widening a section into an in-channel wetland, or both widening and deepening to form an in-channel pond. These help to store water so that during heavy rain there is less runoff into rivers and streams.

This photo (L) from the same general area, shows a stream/drain with extensive grass growth. While the grass isn't necessarily as effective at filtering water or slowing the flow, it provides a lot more filtration than an open earthen base. If the grass is simply left as is, a selection of appropriate wetland plants will get established over time.

5.5 The Ardsheelane River from the Coomyana road

The main pressures listed on the EPA maps for the Ardsheelane catchment are forestry and extractive industries (presumably peat harvesting, whether recent or continuing). As with the Sneem River however, there are also signs of erosion of the river banks by grazing pressures.

The photo here shows clumps of purple moor grass, a symptom of overgrazing by sheep; as well as Sitka plantation forestry in the distance. Also in the photo are bare rocks showing through the upland areas; of very limited value for grazing, habitat, water storage or carbon sequestration. Actions proposed here are challenging ones for Irish upland farmers; notably a shift in grazing practices to help develop a more diverse sward with lower grazing pressures, and reinstatement of the native upland woodlands. This would be beneficial for all of the issues present in the area, such as the creation of more diverse farm income streams from timber and forest products, improved grazing on pasture land where it remains, much greater water holding in the soil cover, water filtration and improved biodiversity and habitat value.

Near the Coomyauna Bridge riparian tree cover provides protection of the banks from erosion as well as habitat and filtration benefits.

Where grazing continues to he river bank it leads to erosion and ultimately to reductions in both water quality and hydrodynamic regulation. Recommended actions: fence waterways to limit livestock access. Ideally plant with riparian woodlands[7].

Erosion is clearly visible in the upper catchment (below). Witness the erosion of the far river bank at the LHS of the photo and a stone bar at the right RHS where the heaviest stones have been dumped at the first opportunity of slightly slower flow. Other stones, silt and peat will inevitably be washed further downstream.

While willow spiling (woven willow mattresses) may be used to protect eroding river banks, the most effective solution to flooding in the main river channel is often to assess the myriad of inflows and address each in turn to hold water on the land insofar as possible.

This small stream (L) has a good stony base and some willow cover. The foxgloves may indicate that in the past the tree cover was more extensive. One thing that can be done to hold water better on such streams is to use leaky log dams, which hold water during storm events but allow free flow during lower flows.

7 https://www.farmersjournal.ie/more/climate-and-environment/new-scheme-offers-landowners-over-20-000-to-plant-1ha-of-woodland-789216

Where streams are on flatter pockets of ground (R), there is always an opportunity to create pools, wetlands or even stands of wet woodlands such as willow, alder or birch.

Anywhere pipes flow below roads, there is benefit in opening a small pool below the pipe fall so that flow velocities are reduced and erosion is minimised. This also allows water to soak into the soil, recharging water tables and reducing the impact of the next rainfall event on the river.

Plastic debris in rivers and streams can cause problems for wildlife and also break down over time into microplastics which can enter both wildlife and the human food chain. Occasional catchment-wide clean-ups can help to keep plastic in check.

Increasingly there are grants available for fencing rivers and streams. These should be explored and pursued to help protect the stream edges from erosion through over grazing and foot fall.

Slower moving farm drains (L and below) can be contained with an earthen dam and short pipe run to prevent the soil washing away. Where there is the possibility of fish needing to navigate the channel, avoid the use of pipes, or allow for fish passage by using rock check-dams on the lower side of the pipe. While drains can be amended, stream works requires permission from Inland Fisheries Ireland.

In the upper catchment area (L) sitka forestry plantations threaten water quality in a number of different ways. The harvesting process typically involves digging drains through the peaty soil, releasing carbon into the atmosphere over time, and allowing silt and nutrients to enter the water.
Any fertiliser operations during the growing phase add nitrates and/or phosphates to the water. The acidic nature of spruce needles impacts on the quality of streams and aquatic wildlife. At the time of harvest, the standard method used is clearfelling, which typically destroys the soil cover and allows nutrients and silt to wash into waterways. Many of these issues can be resolved on existing plantations by shifting to continuous cover forestry management, which is now a grant aided process funded by the Dept of Ad. Action proposed: explore who owns the sitka plantations in the catchment and examine the opportunities for encouraging a grant assisted shift to continuous cover forestry.

Also in the photo above is a winding stream, showing as what looks like a pale meander of purple moor grass. If this were planted with willow, alder and birch, and/or dammed at intervals to restore the blanket bog habitat, it would encourage greater wildlife and water quality protection and yet not encroach beyond the existing generous fenced margin.

This small stream or drain flows through mosses and willow roots en route down through the catchment. The lighter shade from the deciduous trees allows for more growth at ground level than beneath conifers.

Anywhere where earth is churned up beside a road, explore opportunities for creating a settlement pool or wetland area to catch silt and buffer flow volumes.

Where shallow scrapes are present in the landscape for seldom-used access roads (L), for example, explore opportunities for deepening sections of these for biodiversity and water holding. Note that it is also important to carry out any such work with care to avoid loosing the existing habitat, only deepening outside the scrape area or only a small proportion of the total area.

This stone filled land drain helps to protect the road edge from becoming boggy and thus losing silt into the catchment. At the lower end of any drain, a small settlement pool or wetland can greatly help to reduce hydrological or pollution inputs.

These two open drains show a newly cleaned drain (L) and a drain with good plant growth (R). Looking at the photos, it is easy to understand that the left hand drain will flow more swiftly after heavy rainfall and that it will be offered much less filtration of silt and nutrients than the right hand drain. The uptake could be further enhanced in either drain by building earthen check dams at intervals to hold the water back within the drain and by planting these areas to assist with both pollution and hydrological retention. Also at intervals, particularly at areas of the field where the ground levels off a bit, pools or wetlands can be introduced to help slow the flow further.

Sometimes water movement can be facilitated by simple contouring of the ground to assist with removal of excess water from the land. In such cases a small pool or wetland at the low end of the field can act as habitat and filter area with little risk of erosion of the retaining earthen bund. When building an earthen bund use a grassy sod at the top of the bank, well pressed into the clay bund with the digger. This will allow water to flow over the dam without causing erosion of the bare earth beneath.

5.6 The Ardsheelane River from the Ardeen Road

This section takes the road from Sneem up along the eastern side of the Ardsheelane catchment.

Frothing on the surface of a river or stream is often indicative of elevated levels of surfactants such as detergents or phosphorus.

This close up (L) of the drain in the wider landscape (R) shows slight frothing where the emerging grasses slow the flow. What we are seeing is not only the pollutants made visible, but also the vegetation beginning to remedy the situation by stopping the froth and taking up nutrients as the water flows by. The more opportunities for slowing the flow with plants, the better the water quality will be.

Although it is not very clearly discernable from the photos, there are signs of erosion within the catchment (erosion at L and deposition at R). This can be eased by all of the methods discussed already; such as fencing out livestock, reducing the speed of water flow off the land and reinstating riparian and upland deciduous cover.

Small high-catchment streams can look clear and gravelly at the base, a sign of a healthy waterway (R).

However as soon as the water gets an opportunity to slow down (below), we can see silt settling out of suspension, indicating erosion of the land above. To protect the fields from washing away, contour hedgerows can trap silt below fields; settlement basins at field access points can allow runoff from bare ground caused by vehicle movement to settle and soak in; woodland cover in steeper areas avoids the grazing pressures on vulnerable soils; and permanent pasture and appropriate grazing patterns helps to preserve a cover of vegetation on the field itself, and can also help to build soil carbon.

As outlined previously, any opportunity to plant newly maintained drains or to adjust drain maintenance in the first instance to limit exposure of bare soil is to be embraced (both L and R below).

The large stones in this stream (R) and drain or dry stream channel (below) suggest high flows at regular enough intervals to remove silt and gravel from the substrate mix. High flow velocities at high elevation may be best addressed by adopting continuous cover native deciduous forestry in the higher ground.

Where streams pass through pipes or over weirs there is the risk of creating obstacles to fish passage (R). It may be worthwhile liaising with Inland Fisheries Ireland to investigate how high in the catchment fish are likely to navigate and to explore options for making fish passage possible.

Wherever clean water is left to stand within the landscape aquatic habitats will form. Here at a shallow scrape beside the road a stand of wetland plants has developed (L) including pondweeds or *Potamogeton* species (R)

The green flush on this stone (below) and in this small drain (R) indicate slightly elevated levels of nitrates and phosphates in the waterway. The algal growth is modest, so may easily be remedied by allowing the drain to establish with filter plants or putting in a pool or wetland at low points along the drain length.

Unrestricted access by livestock (L) can lead to erosion and elevated nutrients. Fencing along waterways may be funded via the Waters EIP for sites such as this one, to help protect the waterway.

Rock armour can exacerbate erosion behind and below the stone. If this is happening, willow spiling provides a growing shield to the field behind.

The silt at the drain base (R) could be greatly reduced by having a cover of plants (such as are shown below at the opposite side of the same access-way). As outlined previously, an opportunity for planted, dammed drains; wetlands, ponds or tree-planted settlement basins will all help to reduce silt losses from the land, pollution of the waterways, and will help to regulate the flood/drought hydrological imbalances within this catchment.

To close out this section of the river safari, a long view into the catchment from the R568 shows a felled tree in the foreground and long run of newly opened land drain in the middle ground (R).

In the far view (above and L) the bare rock of the uplands can be seen. In permaculture there is a phrase: “the problem is the solution”. Perhaps instead of cutting natural tree growth to keep land visible for satellite mapping and grant processes, we can explore how to get supports to fund land owners with naturally regenerating upland vegetation to protect the waterways and the wildlife in the area.

6.0 Proposals and recommendations for the Sneem/Ardsheelane

The following measures are proposed for adoption over time within the Sneem area, both within the village and the wider catchment. They are generally grouped by location but not by priority. They offer a general overview of the possibilities that exit for addressing water quality deterioration in the river system here and the extremes of flooding that occur within the catchment. Many of the wider catchment measures are by necessity on privately owned farms, so while they are recommended here as possibilities for action, the full participation of the land owners is clearly needed for implementation.

1. Locate any misconnection points where sewage and/or grey water may escape into the river (such as beneath the bridge on the NE bank of the river) and address these through repair of misconnections, proper sewage treatment and/or in-channel buffer zones or wetland filters.
2. Upgrade the existing sewage treatment system to include a large tertiary polishing filter using a constructed wetland within the existing reed bed area.
3. Filter any stormwater input points (such as the SW bank of the river below the main bridge in the village) before entry to the river or estuary.
4. Check the KCC drainage maps for the village and ensure that all input points are addressed by a wetland planted buffer zone or other filter.
5. Check the location of the storm sewer overflow point and install a constructed wetland system to filter flows en route to the river.
6. Discuss within the village and with KCC areas for implementation of a suite of on-street SUDS measures.
7. Map non-native invasive species within the catchment and investigate chemical free methods of control (where control and/or removal is deemed necessary) and implement trials for same. Particularly target species which shade the river bank and add to erosion pressures (e.g. knotweed, Rhododendron, etc.).
8. Avoid piling grass or hedge clippings adjacent to the river bank. Use mowings to mulch young trees as a natural weed block and fertiliser. Use clippings to make compost or as a brash pile for wildlife.
9. Check the nature of the metal pipe below the bridge and assess whether further action is required or not.
10. Collect street litter and plastic debris from the water at the earlies opportunity throughout the catchment.
11. Avoid using chemicals on the street or in close proximity to the river. Ideally toxic chemicals would be phased out within the entire catchment as a water protection measure.
12. Sheep dip can be particularly problematic if it leaks into waterways. Assess sheep dip usage and management for the area and if issues become apparent explore ways to minimise use and protect water and implement these.
13. Map any areas where on-street silt is present, and seek ways to provide settlement in SUDS rain-gardens or other features.

14. Map opportunities for slowing and planting slow moving drains within the village and wider catchment.
15. Using direct observation of the land and EPA PIP mapping tools, map opportunities for other farm scale measures such as the following:
    - in-channel ponds
    - in-channel wetlands
    - silt traps
    - contour hedgerows
    - leaky log dams
    - brash dams
    - fencing of waterways
    - provision of alternative water trough arrangements
    - introduction of riparian buffer zones (wooded or wetland planted)
16. Map opportunities for on-farm measures to build soil carbon and prevent soil erosion from fields, such as the following:
    - holistic planned grazing
    - farm scale composting
    - diversification of livestock types for greater soil health and species diversity
    - use of permanent pastures
    - use of diverse swards
    - shift towards continuous cover forestry of native deciduous trees
17. Explore collaborations with land owners and implement both of the above lists where possible.
18. Map areas of erosion in the river system and explore funding avenues for introduction of willow spiling as a bank protection measures. Implement willow spiling works where appropriate.
19. In light of regular chemical spillages in recent years in Ireland, carry out an assessment with KCC and/or Úisce Éireann to ensure that the chemicals used, and the sludges generated, in the water treatment plant are stored in a way that do not pose a risk to the river system.
20. Introduce appropriate bunding to any storage tanks within the catchment, for hydrocarbons and/or other chemicals used. These should address both the potential for tank breaks/leaks as well as any drips or spills generated during standard use.
21. Take every opportunity with any new works on field or forest access-ways to introduce ponds, wetlands or basins on either side of the new road or gate. Email reeds@wetlandsystems.ie for guidelines if needed.
22. Map opportunities for habitat or filter ponds at any piped sections within the catchment. Implement same where possible.

23. Ensure that all fertilisers or slurry are stored appropriately to ensure that nutrients are returned to the land and not wasted as pollution to the waterways.
24. Step back from turf cutting in the catchment by finding ways to support land owners with alternative payments that build water storage on the land instead of removing it.
25. Investigate the possibilities for a large scale upland planting programme for all land owners in the catchment; for the establishment of dense native woodland cover. Implement where possible.
26. Explore opportunities for hydrological buffering in the uplands by using leaky log dams, brash dams, stone check dams etc. Implement where possible.
27. Amend drain maintenance practise to only remove 20m runs in any one drainage year; leaving 20m runs untouched so that plants can reestablish prior to the next draining year (with perhaps 5-10 year intervals between draining years).
28. Advertise the fact that the new CAP rules allow for 50% of a land holding to be "non-productive land" (aka: habitat). This may allow some land owners to step back from regular clearing of land not suitable for cultivation for the sake of payments alone.
29. Map areas where road margins get muddy regularly, and implement measures to hold and settle silt before runoff reaches the river.
30. Hold water events to highlight the value of the rivers and flag the potential threats and the opportunities for introducing measures to protect them.
31. Work with a local second school or third level institution to map the ecology of the small roadside streams within the catchment, checking the plant and insect species found in them.
32. Similarly work with local schools and colleges to carry out regular ecological assessments of the uplands, the drains, streams and rivers themselves. This will help to map changes in the landscape as data builds up about the species and habitats present.
33. Map the septic tanks within the catchment and explore opportunities for introducing upgrades and/or willow buffer zones down-gradient of them. Upgrade any which appear to be causing problems.
34. Explore and pursue any opportunity for introducing habitat within the wider catchment; in the form of woodlands, blocking bog drains where appropriate to reinstate peatland habitat, ponds, wetlands, hedgerows etc. These will all support biodiversity, enhance water filtration, limit flooding and sequester and store atmospheric carbon.
35. Organise a BioBlitz event or similar public event to celebrate local biodiversity in the village and/or wider catchment.
36. Host a local food event to celebrate the land, the river and the sea. Include local river fish, sea fish and shellfish, local meat and vegetables etc.

7.0 Conclusion

This report sets out a summary of the site meeting discussions between FHWS and the Sneem Tidy Towns members, outlining potential urban SUDS and catchment scale measures for the main areas discussed for filtering and attenuating runoff.

The information presented here is a proposal of a suite of the most suitable measures, but does not constitute a design for either the village or wider catchment. Further research or design input may be needed for certain areas to ensure that opportunities to address peak flows and erosion are maximised.

Overall there is a lot of potential for water filtration and attenuation both with the village and across the catchment. The measures proposed will help to regulate the flow dynamics in the Sneem and Ardsheelane Rivers, as well as improving water quality throughout the entire catchment.

The next steps are for the local community to review this report and begin to select measures to adopt for the coming year. Another round of LAWPro funding may be helpful in getting a start made on implementation of the measures proposed.