

Newcastle River, Newcastle Village, Co. Wicklow

Ecological Assessment

Report Prepared for Newcastle Tidy Towns Group



Funded by the Local Authority Waters Programme (LAWPRO)
Community Water Development Fund 2022

FINAL REPORT

7th July 2023



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Newcastle River, Newcastle Village, Co. Wicklow

Ecological Assessment

1. INTRODUCTION

1.1 Background

Faith Wilson Ecological Consultant was commissioned by Newcastle Tidy Towns Group to prepare a preliminary ecological assessment of a stretch of the Newcastle River within Newcastle Village in Co. Wicklow. The Newcastle Tidy Towns Group successfully received funding for the study from the Local Authority Waters Programme (LAWPRO) Community Water Development Fund 2022.

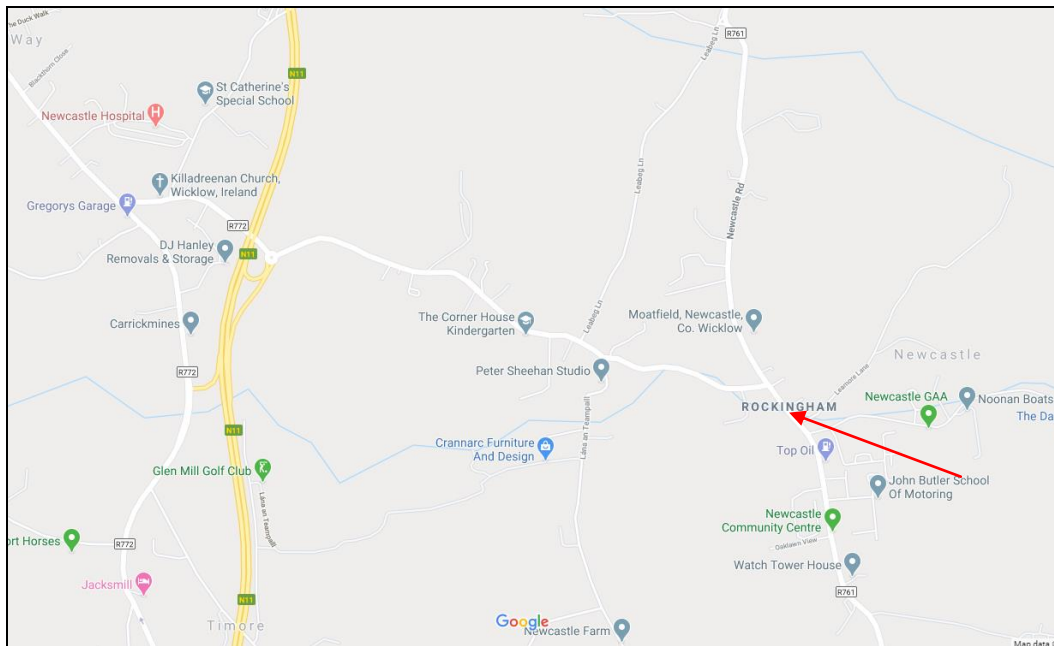


Figure 1. Newcastle Village, Co. Wicklow.

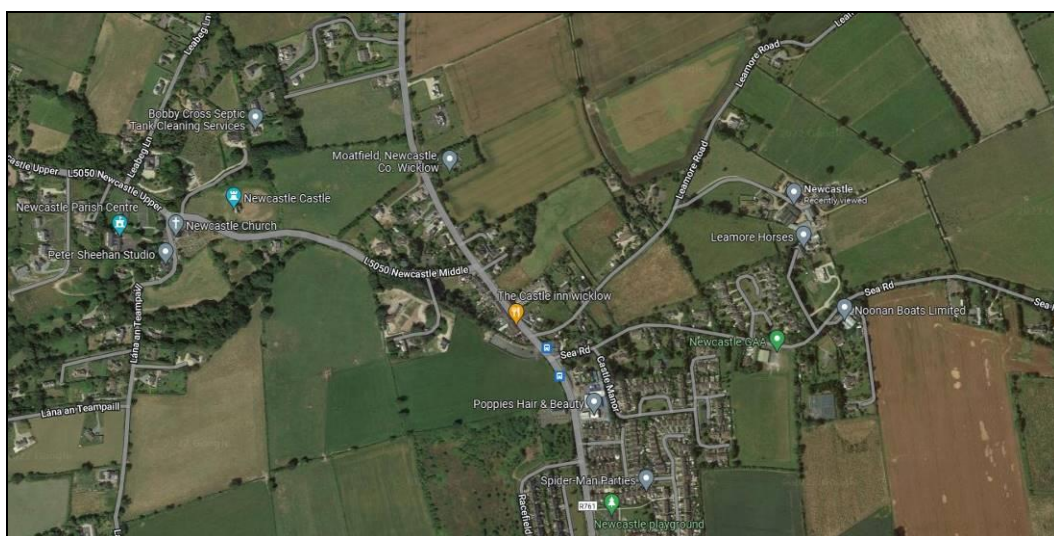


Figure 2. Newcastle Village (Google Maps imagery).

The objectives of the study were as follows:

- To record the habitats in and surrounding the Newcastle River in the vicinity of Newcastle Village, and make recommendations on how to manage and enhance biodiversity along the river,
- To gain an understanding of the baseline water quality of the Newcastle River and make recommendations to improve water quality and aquatic biodiversity,
- To identify the locations of invasive species along the Newcastle River and within the environs of Newcastle Village,
- To raise awareness of invasive species within the community and other stakeholders such as Wicklow County Council, LAWPRO and Inland Fisheries Ireland,
- To raise awareness of how invasive species become established in the wild by escaping from gardens or through construction/maintenance works, and
- To provide recommendations on how to eradicate/treat any populations present.

2. METHODOLOGY

2.1 Desktop Research

A desk study was carried out to collate the available information on the ecological environment of the river within the study area in Newcastle Village. The proposed study area is the length of the river between Temple Lane and downstream of Hunters Brook as shown on **Figure 3** below.

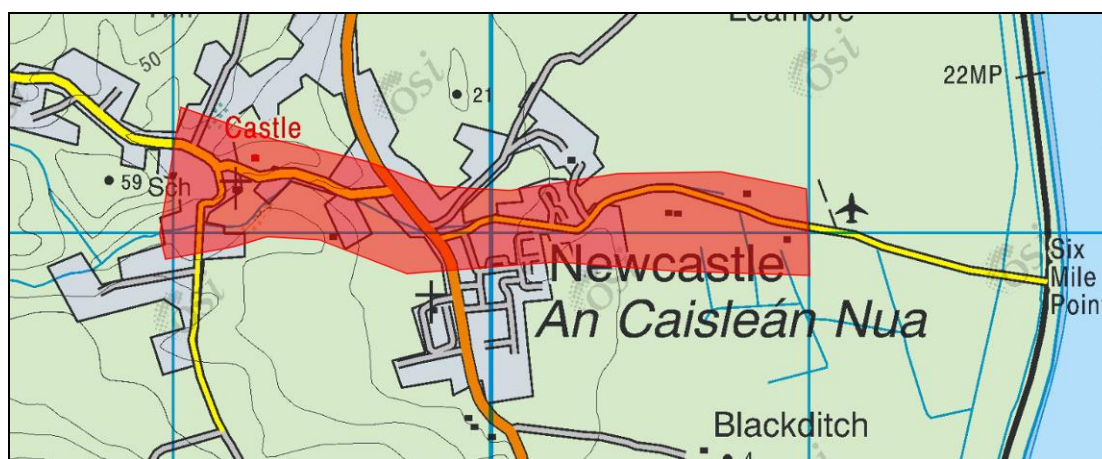


Figure 3. River Study Area - shown in red (Source: National Biodiversity Data Centre).

The study will hopefully increase a better understanding, appreciation and management of the river within the environs of the village as well as more effective engagement with the local community and groups like the Newcastle Tidy Towns Committee.

2.2 Field Surveys

The flora and habitats within the environs of the river in Newcastle Village were surveyed in March and April 2023 using the Phase 1 habitat survey methodology (JNCC, 1993) and Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.*, 2011) to map the vegetation communities and habitats present. These are described using Fossitt (2000)¹. Plant identification follows Parnell *et al* (2012)², and species nomenclature follows Scannell & Synnott (1987)³.

Guidance on dealing with invasive species was taken from:

- The Management of Invasive Alien Plant Species on National Roads – Technical Guidance. GE-ENV-01105. (Transport Infrastructure Ireland, 2020). December 2020.
- The Management of Invasive Alien Plant Species on National Roads – Standard GE-ENV-01104. (Transport Infrastructure Ireland, 2020). December 2020.
- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010), Revision 1, December 2010.
- Best Practice Management Guidelines for Japanese knotweed (Invasive Species Ireland, 2008),
- Best Practice Management Guidelines for Rhododendron and Cherry Laurel (Invasive Species Ireland, 2008),
- Managing Japanese knotweed on development sites - the knotweed code of practice (Environment Agency, September 2013),
- Invasive Species Ireland guidance (<http://invasivespeciesireland.com>);
- and other international best practice.

¹ Fossitt, J. (2000) A Guide to Habitats in Ireland. The Heritage Council, Ireland.

² Parnell, J. and Curtis, T. (2012). An Irish flora (8th edn). Cork University Press.

³ Scannell, M. and D. Synnott (1987). Census Catalogue of the Flora of Ireland - Clár de Phlandaí na hÉireann. Stationery Office Dublin, Dublin.

2.3 Relevant Legislation

2.3.1 Invasive Species

Invasive alien species are plants and animals that are introduced accidentally or deliberately into a natural environment where they are not normally found, with serious negative consequences for their new environment. They represent a major threat to native plants and animals on a global scale and are considered as one of the most significant drivers of ecological change.

Ireland's Draft 4th National Biodiversity Action Plan contains a target to;

“Prevent or reduce the rate of introduction and establishment of invasive alien species by 50%, and control or eradicate such species to eliminate or reduce their impacts”.

The Third National Biodiversity Action Plan (2017 - 2021) contained the following target:

“By 2020, invasive alien species and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new invasive alien species”

Action 28 of the First National Biodiversity Plan (2002), required Ireland to prepare strategies, in consultation with Northern Ireland, to control introduced species and to prevent, or minimise future (accidental or deliberate) introduction of alien species, which might threaten biodiversity both within and outside protected areas.

There are many invasive species that can be found in Ireland including terrestrial plants, aquatic plants and animal species which can cause damage to native ecosystem functions and their services.

2.3.2 European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

The Birds and Habitats Regulations (2011) which were signed on 21st September 2011 by the then Minister for Arts, Heritage and the Gaeltacht Jimmy Deenihan, included new legislation on invasive and non-native species in Sections 49 and 50.

Since then the EU Regulation on Invasive Alien Species (EU Regulation 1143/2014) also came into force on the 3rd August 2016.

The plant and animal species to which the Birds and Habitats Regulations (2011) apply are presented in Schedule Three. Part 1 details the plants species, while Part 3 outlines those animal or plant vector materials and are presented below.

Species which were recorded along the Newcastle River are highlighted in yellow.

Third Schedule: Part 1 Plants**Non-native species subject to restrictions under Regulations 49 and 50.**

First column	Second column	Third column
Common name	Scientific name	Geographical application
American skunk-cabbage	<i>Lysichiton americanus</i>	Throughout the State
A red alga	<i>Grateloupia doryphora</i>	Throughout the State
Brazilian giant-rhubarb	<i>Gunnera manicata</i>	Throughout the State
Broad-leaved rush	<i>Juncus planifolius</i>	Throughout the State
Cape pondweed	<i>Aponogeton distachyos</i>	Throughout the State
Cord-grasses	<i>Spartina</i> (all species and hybrids)	Throughout the State
Curly waterweed	<i>Lagarosiphon major</i>	Throughout the State
Dwarf eel-grass	<i>Zostera japonica</i>	Throughout the State
Fanwort	<i>Cabomba caroliniana</i>	Throughout the State
Floating pennywort	<i>Hydrocotyle ranunculoides</i>	Throughout the State
Fringed water-lily	<i>Nymphoides peltata</i>	Throughout the State
Giant hogweed	<i>Heracleum mantegazzianum</i>	Throughout the State
Giant knotweed	<i>Fallopia sachalinensis</i>	Throughout the State
Giant-rhubarb	<i>Gunnera tinctoria</i>	Throughout the State
Giant salvinia	<i>Salvinia molesta</i>	Throughout the State
Himalayan balsam	<i>Impatiens glandulifera</i>	Throughout the State
Himalayan knotweed	<i>Persicaria wallichii</i>	Throughout the State
Hottentot-fig	<i>Carpobrotus edulis</i>	Throughout the State
Japanese knotweed	<i>Fallopia japonica</i>	Throughout the State
Large-flowered waterweed	<i>Egeria densa</i>	Throughout the State
Mile-a-minute weed	<i>Persicaria perfoliata</i>	Throughout the State
New Zealand pigmyweed	<i>Crassula helmsii</i>	Throughout the State
Parrot's feather	<i>Myriophyllum aquaticum</i>	Throughout the State
Rhododendron	<i>Rhododendron ponticum</i>	Throughout the State
Salmonberry	<i>Rubus spectabilis</i>	Throughout the State
Sea-buckthorn	<i>Hippophae rhamnoides</i>	Throughout the State
Spanish bluebell	<i>Hyacinthoides hispanica</i>	Throughout the State
Three-cornered leek	<i>Allium triquetrum</i>	Throughout the State
Wakame	<i>Undaria pinnatifida</i>	Throughout the State
Water chestnut	<i>Trapa natans</i>	Throughout the State
Water fern	<i>Azolla filiculoides</i>	Throughout the State
Water lettuce	<i>Pistia stratiotes</i>	Throughout the State
Water-primrose	<i>Ludwigia</i> (all species)	Throughout the State
Waterweeds	<i>Elodea</i> (all species)	Throughout the State
Wireweed	<i>Sargassum muticum</i>	Throughout the State

2.3.3 EU Regulation 1143/2014 on Invasive Alien Species

On 14 July 2016 the European Commission published Commission Implementing Regulation 2016/1141 which set out an initial list of 37 species to which the EU Invasive Alien Species Regulation 1143/2014 applies. The associated restrictions and obligations came into force on 3rd August 2016.

Three distinct types of measures are envisaged under the Directive, which follow an internationally agreed hierarchical approach to combatting IAS:

- Prevention: a number of robust measures aimed at preventing IAS of Union concern from entering the EU, either intentionally or unintentionally.
- Early detection and rapid eradication: Member States must put in place a surveillance system to detect the presence of IAS of Union concern as early as possible and take rapid eradication measures to prevent them from establishing.
- Management: some IAS of Union concern are already well-established in certain Member States and concerted management action is needed so that they do not spread any further and to minimize the harm they cause.

Plant species listed on the directive include:

- American skunk cabbage *Lysichiton americanus*
- Asiatic tearthumb *Persicaria perfoliata* (*Polygonum perfoliatum*)
- Curly waterweed *Lagarosiphon major*
- Eastern Baccharis *Baccharis halimifolia*
- Floating pennywort *Hydrocotyle ranunculoides*
- Floating primrose willow *Ludwigia peploides*
- Green cabomba *Cabomba caroliniana*
- Kudzu vine *Pueraria lobata*
- Parrot's feather *Myriophyllum aquaticum*
- Persian hogweed *Heracleum persicum*
- Sosnowski's hogweed *Heracleum sosnowskyi*
- Water hyacinth *Eichhornia crassipes*
- Water primrose *Ludwigia grandiflora*
- Whitetop weed *Parthenium hysterophorus*

Animal species listed on the directive include:

- Amur sleeper *Perccottus glenii*
- Asian hornet *Vespa velutina*
- Chinese mitten crab *Eriocheir sinensis*
- Coypu *Myocastor coypus*
- Fox squirrel *Sciurus niger*
- Grey squirrel *Sciurus carolinensis*
- Indian house crow *Corvus splendens*
- Marbled crayfish *Procambarus* spp.
- Muntjac deer *Muntiacus reevesii*
- North american bullfrog *Lithobates* (*Rana*) *catesbeianus*
- Pallas's squirrel *Callosciurus erythraeus*
- Raccoon *Procyon lotor*
- Red swamp crayfish *Procambarus clarkii*
- Red-eared terrapin/slider *Trachemys scripta elegans*

- Ruddy duck *Oxyura jamaicensis*
- Sacred ibis *Threskiornis aethiopicus*
- Siberian chipmunk *Tamias sibiricus*
- Signal crayfish *Pacifastacus leniusculus*
- Small Asian mongoose *Herpestes javanicus*
- South American coati *Nasua nasua*
- Spiny-cheek crayfish *Orconectes limosus*
- Topmouth gudgeon *Pseudorasbora parva*
- Virile crayfish *Orconectes virilis*

On 13 July 2017 the European Commission published Commission Implementing Regulation 2017/1263 which added a further 12 species to the current list of 37 species regulated under the EU Invasive Alien Species Regulation (1143/2014).

These are:

Plant species

- Alligator weed (*Alternanthera philoxeroides*)
- Milkweed (*Asclepias syriaca*)
- Nuttall's waterweed (*Elodea nuttallii*)
- Chilean rhubarb (*Gunnera tinctoria*)
- Giant hogweed (*Heracleum mantegazzianum*)
- Himalayan balsam (*Impatiens glandulifera*)
- Japanese stiltgrass (*Microstegium vimineum*)
- Broadleaf watermilfoil (*Myriophyllum heterophyllum*)
- Crimson fountaingrass (*Pennisetum setaceum*)

Animal species

- Egyptian goose (*Alopochen aegyptiacus*)
- Raccoon dog (*Nyctereutes procyonoides*)
- Muskrat (*Ondatra zibethicus*)

The associated restrictions and obligations came into force from 2 August 2017 for all these species apart from the Raccoon dog, which came into force on 2 February 2019.

2.3.4 Non-native Species Which Threaten Biodiversity

Several other non-native invasive species have been recorded within the environs of Newcastle Village and the Newcastle River. These include:

- Butterfly bush (*Buddleia davidii*)*,
- Winter heliotrope (*Petasites fragrans*)*,
- Pendulous sedge (*Carex pendula*),
- Montbretia (*Crocsmia x crocosmiiflora*)*,
- Alexanders (*Smyrnum olusatrum*),
- Old Man's beard (*Clematis vitalba*)*,
- Cherry laurel (*Prunus laurocerasus*)*, and
- Sycamore (*Acer pseudoplatanus*).

Each of those species marked with an asterisk (*) are listed in the Transport Infrastructure Ireland (TII) document **'The Management of Invasive Alien Plant Species on National Roads - Technical Guidance GE-ENV-01105 December 2020** and in the previous document **NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads'**.

Information on the control and eradication of some of these species is presented on the Invasive Species Ireland website, and although there are no legal requirements to eradicate or control these a plan to remove/control them and other non-native species within the environs of the river and village is in line with best practice as they cause issues for biodiversity.

A detailed survey for these invasive species was conducted within the environs of the Newcastle River within the study area.

3. RESULTS - DESKTOP RESEARCH

3.1 Underlying Geology & Soils

Newcastle Village is underlain by greywacke and quartzites, which are Cambrian rocks and form part of what is known as the Bray Head Formation as can be seen on **Figure 4** below. The upper part of the catchment is overlain by glacial till in a soil formation known as the 'Clonroche soil association' which consists of a fine loamy drift with siliceous stones. Below the village the soils here are coarser and are part of the 'Puckane Association', while towards the coast they are alluvial in nature, with fen peat deposits at the East Coast Nature Reserve at Blackditch as shown on **Figure 5** below.

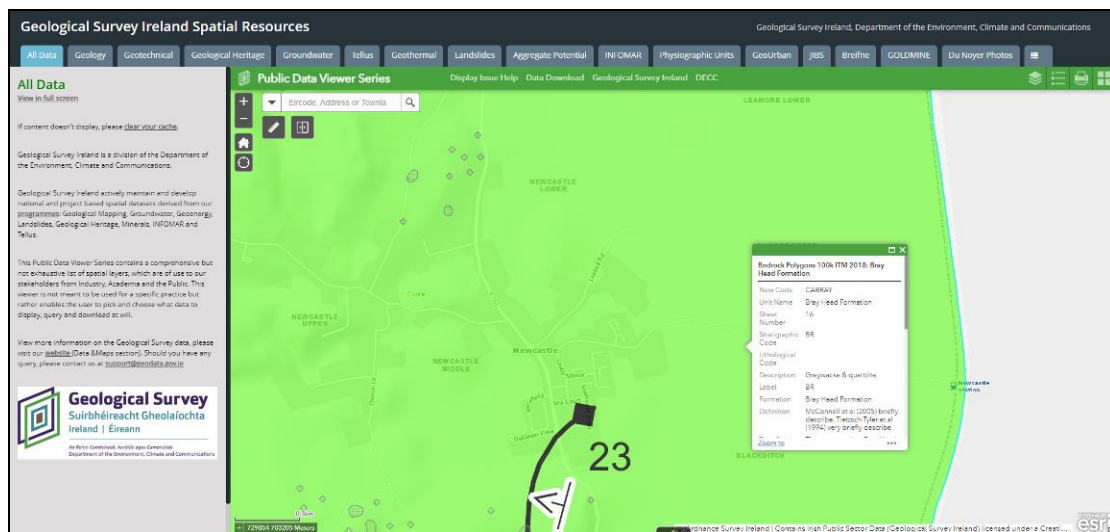


Figure 4. Geology of Newcastle Village (Source: Geological Survey of Ireland).

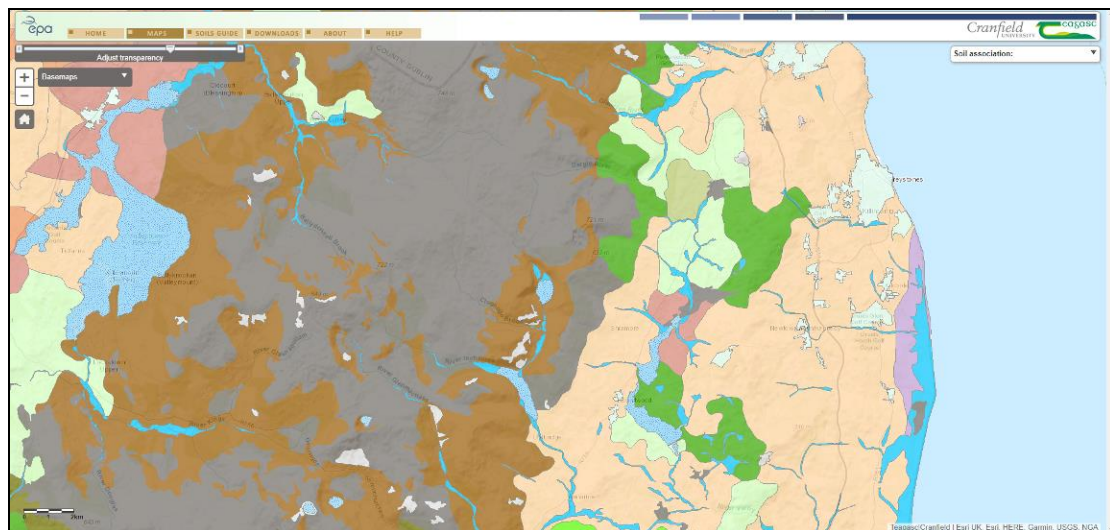


Figure 5. Soils of Newcastle Village (Source: EPA).

3.2 Nature Conservation Designations

The lands within and adjoining Newcastle Village are not currently the subject of any of the formal proposed nature conservation designations as described above in **Section 2.3.1**. There are a number of areas designated for nature conservation within the wider environs of the village – the locations of these are shown on **Figure 6** below.

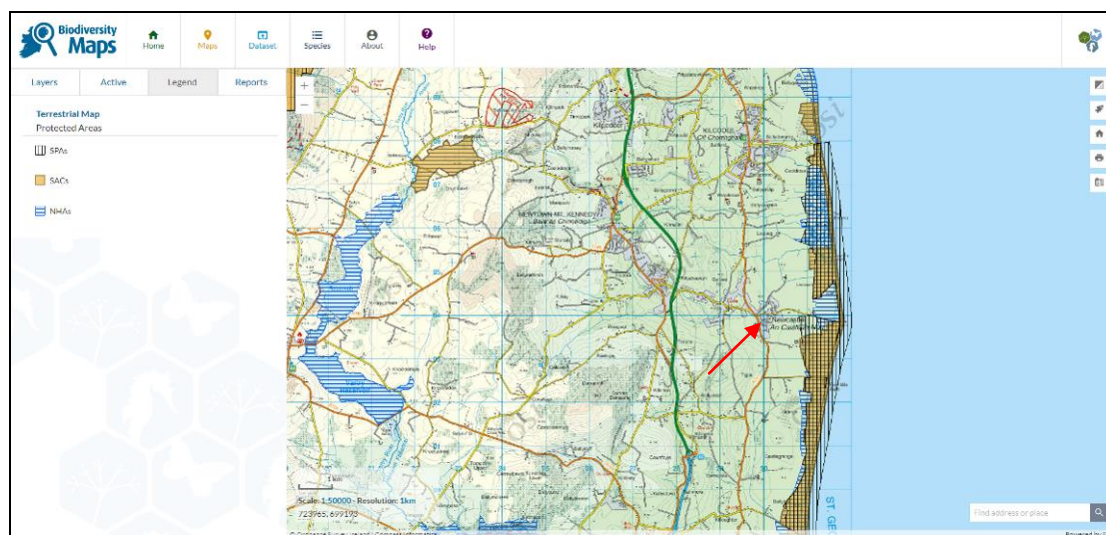


Figure 6. Areas legally designated for nature conservation within the environs of Newcastle Village (indicated by the red arrow).

The most important of these is The Murrough, which is designated as both a Special Area of Conservation (The Murrough Wetlands SAC (Site Code: 002249)), a Special Protection Area (for Birds) (The Murrough Wetlands SPA (Site Code: 004186)) and a proposed Natural Heritage Area (The Murrough NHA (Site Code: 000730)). The site synopsis, which is a document that summarises the conservation interest of these designated sites is presented in **Appendix 1** and **2**.

The Newcastle River forms an important conduit between the uplands at Callow Hill and the designated sites at the coast.

3.3 Newcastle River

The Newcastle River is located within the Ovoca Vartry Catchment (010) and within the Newcastle (Wicklow) Sub catchment (SC_010). The Newcastle River rises on Callow Hill above Newtownmountkennedy before flowing in an easterly direction to the coast, under the M11 motorway and through Newcastle Village to the East Coast Nature Reserve at Blackditch where it enters a series of drains before flowing north to enter the sea at The Breaches. There are five tributary streams of the Newcastle River as shown on **Figure 7** below.

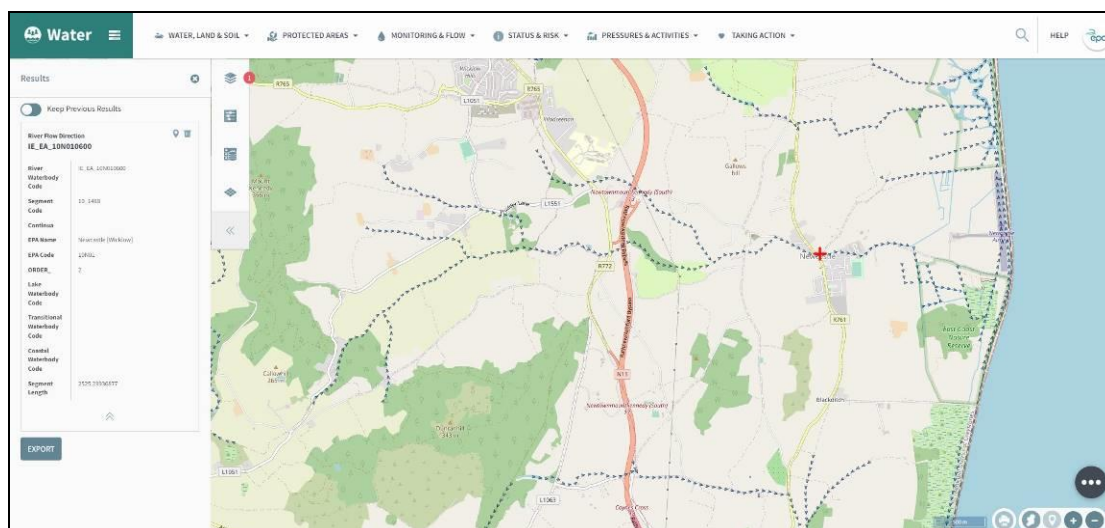


Figure 7. The Newcastle River.

Habitat Classification

Within the environs of the village the Newcastle River is best classified as a lowland depositing watercourse.

Lowland Depositing Rivers (FW2) are described by Fossitt (2000) as follows:

“This category includes watercourses, or sections of these, where fine sediments are deposited on the river bed. Depositing conditions are typical of lowland areas where gradients are low and water flow is slow and sluggish. These rivers vary in size but are usually larger and deeper than those above. In a natural state these rivers erode their banks and meander across floodplains. Because of this, most have been modified to some extent to control water flow, facilitate navigation or prevent flooding and erosion. Canalised or walled sections of rivers are included here, as are natural watercourses that have been dredged or deepened, and those with artificial earth banks. If channels have been excavated to divert water away from the main watercourse, these should be considered under canals - FW3. Tidal sections of rivers with brackish water influence are excluded (see tidal rivers - CW2). Rejuvenated sections of lowland rivers associated with rapids, waterfalls and weirs should be considered under **eroding/upland rivers - FW1** if eroding conditions predominate.

Plant and animal communities are influenced by numerous factors including substratum type, water force, nutrient status, water quality, channel size, water depth, human impact, disturbance and shade. Within a river channel there may be deep pools, backwaters, banks or mid-channel bars of gravel, sand or mud, in addition to vegetated islands and fringing reedbeds. The substratum of depositing/lowland rivers comprises mainly fine alluvial or peaty sediments. Vegetation may include floating and submerged aquatics, with fringing emergents in shallow water or overgrowing the banks. Floating aquatics can include water-lilies (*Nuphar lutea*, *Nymphaea alba*), pondweeds (*Potamogeton* spp.), water-starworts (*Callitriche* spp.) and Unbranched Bur-reed (*Sparganium emersum*). Tall emergents such as Common Club-rush (*Schoenoplectus lacustris*), Common Reed (*Phragmites australis*) and Yellow Iris

(*Iris pseudacorus*) may also be present. Large areas of fringing reedbed should be considered under reed and large sedge swamps - FS1”.

3.4 Newcastle River – Water Quality

Newcastle River rises west and northwest of Newcastle Village as shown on Figure 7 above – it is 26.42km in length. Water quality in the Newcastle River is monitored as part of Ireland’s reporting obligations under the Water Framework Directive. Samples are taken at a standard sampling location (RS10N010600) which is located 0.5km downstream of Newcastle Bridge as shown on Figure 8 below.

Between 2007 and 2009 water quality in the River was assessed as ‘Moderate’ and in 2010 – 2012 this had improved to ‘Good’ and overall remained at ‘Good’ status in the period 2010 – 2015 as shown on Figure 9 below.

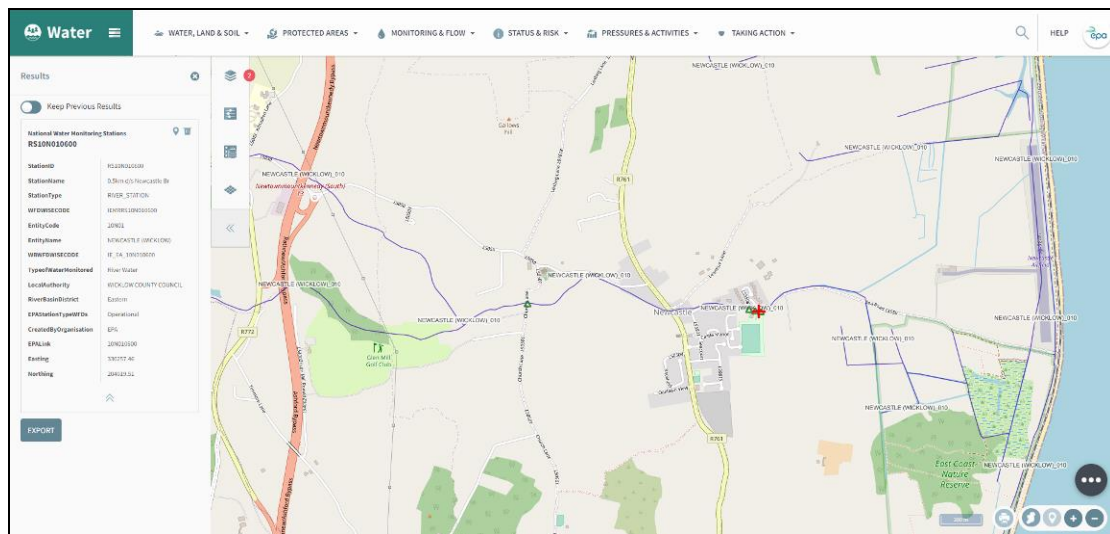


Figure 8. Water sampling location on the Newcastle River.

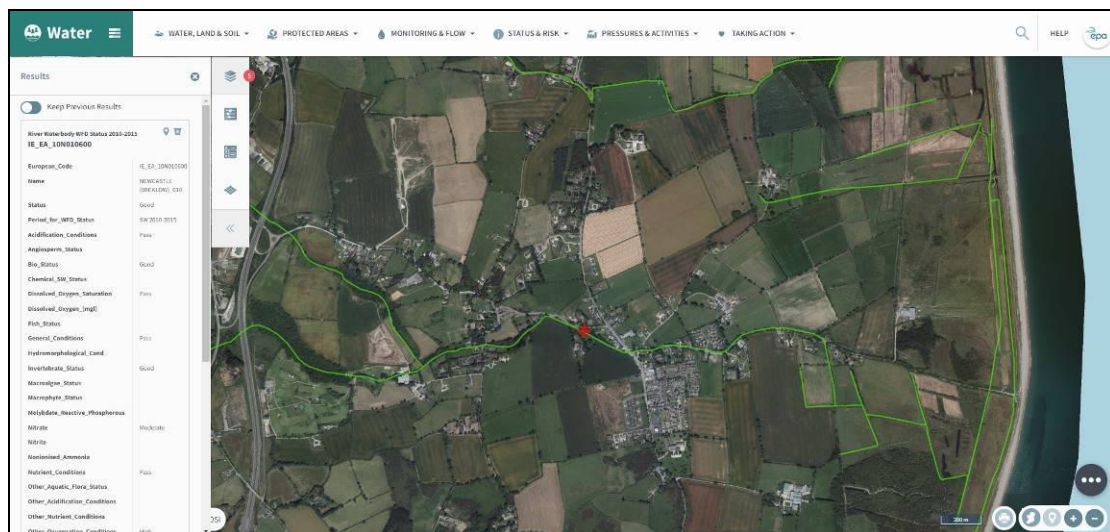


Figure 9. The Newcastle River was assessed as ‘Good’ status during the 2010 – 2015 round of the Water Framework Directive (Source: www.catchments.ie).

Water quality showed some declines during the 2013 – 2018 period when it was assessed as ‘Moderate’ and has further declined during the 2016 – 2021 period and is now assessed as ‘Poor’. These results are shown on **Figures 10 to 13** below.

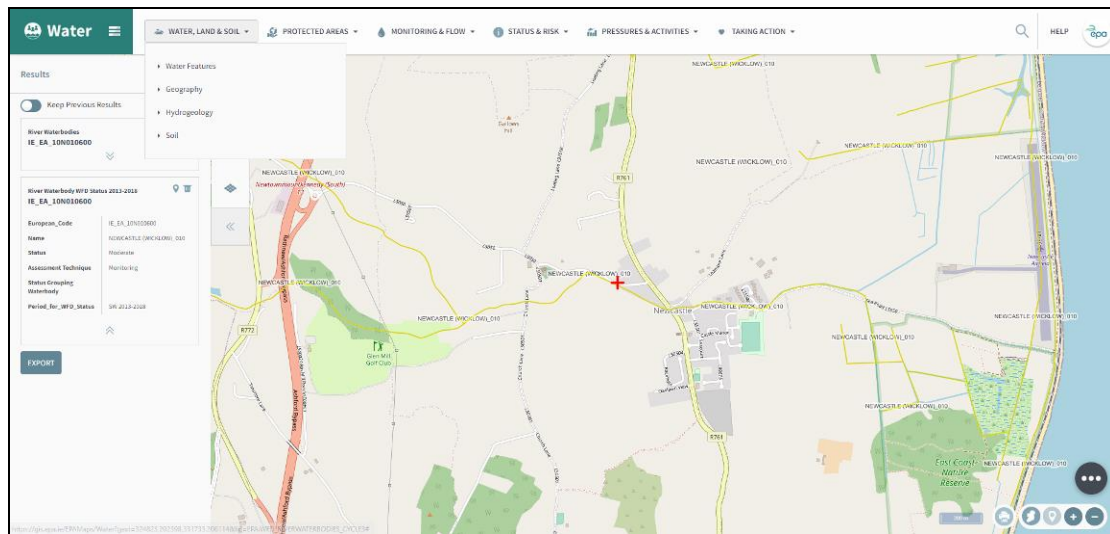


Figure 10. The Newcastle River was assessed as ‘Moderate’ status during the 2013 – 2018 monitoring period (Source: www.catchments.ie).

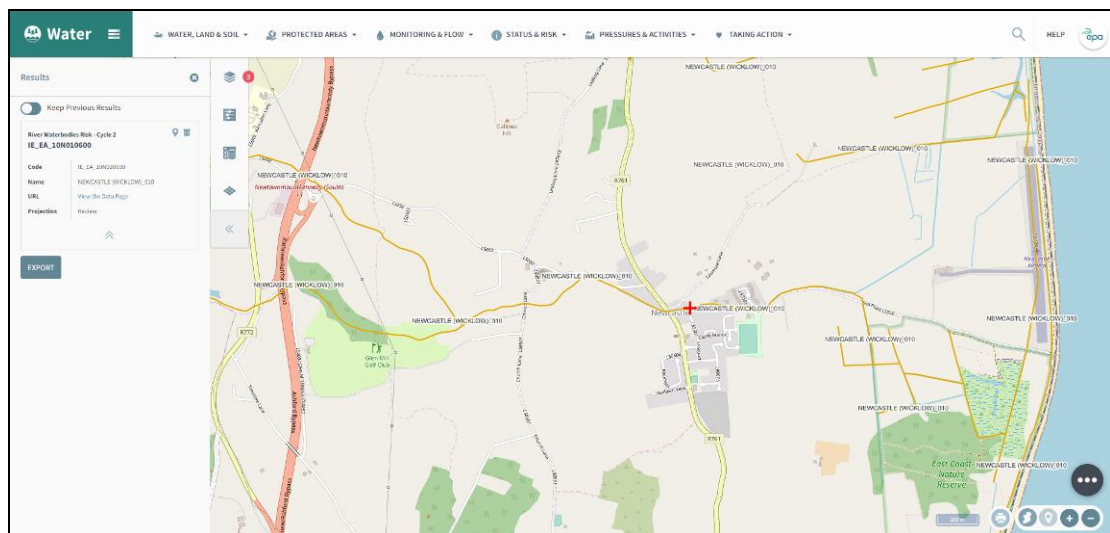


Figure 11. The status of the Newcastle River was under ‘Review’ during the 2nd cycle of the Water Framework Directive (Source: www.catchments.ie).

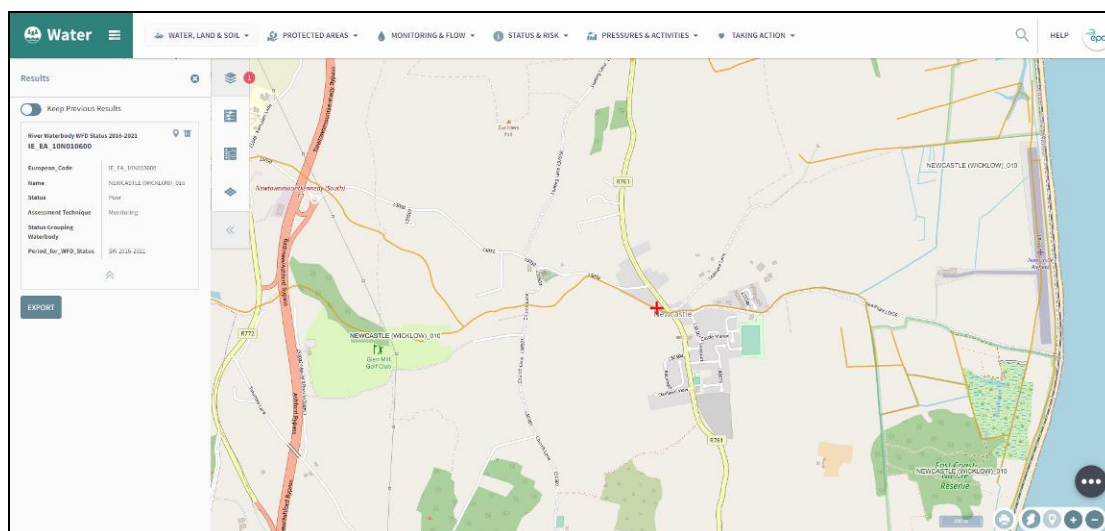


Figure 12. The Newcastle River was assessed as 'Poor' status during the 2016 – 2021 monitoring period (Source: www.catchments.ie).

The Newcastle River (IE_EA_10N010600) therefore remains classified as “at risk” of failing to meet the Water Framework Directive (WFD) objective of at least “good” ecological status by 2027.

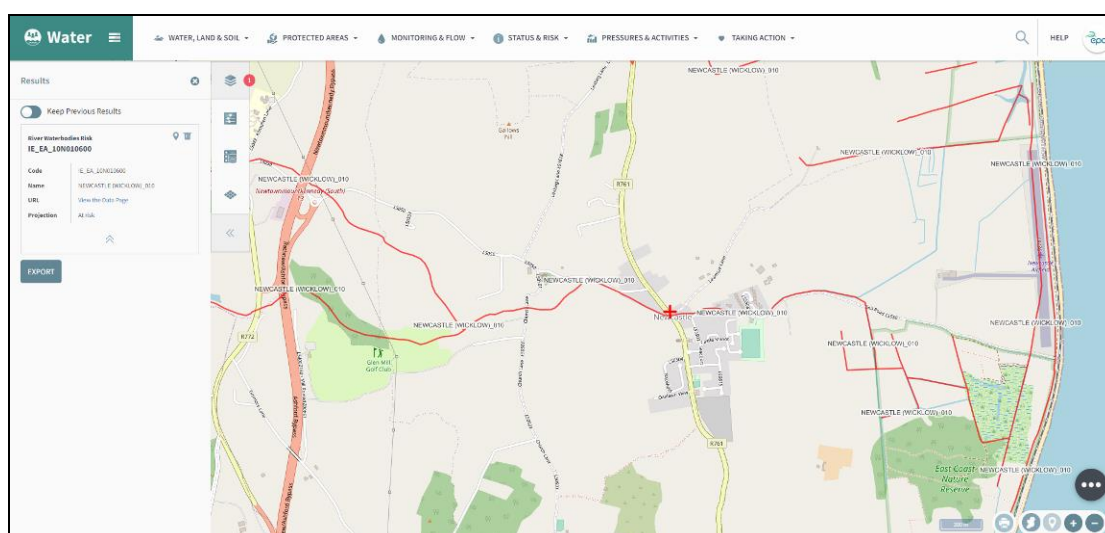


Figure 13. The status of the Newcastle River remains 'At Risk' during the 3rd cycle of the Water Framework Directive (Source: www.catchments.ie).

3.5 Fish

The Newcastle River supports populations of Brown Trout, Sea Trout, and most likely lampreys (probably Brook lamprey and River Lamprey) as well as Eel and the smaller species such as Three spined stickleback and Minnow (Matt Carroll, Inland Fisheries Ireland, pers. comm.).

The coastal shingle beaches of The Murrough are used for shore angling and species caught here include; bass, mackerel, small flatfish, small coalfish, small whiting, dogfish, smooth Hound, and latterly shore caught tope (October – November). Bottom fishing in this area results in catches of Codling, Flounder and Dabs, with Conger, Bass and Gurnard also reported. It is reported that over fishing and mussel dredging offshore has affected the quality of these coastal fisheries.

3.6 Biodiversity Records

A review of biodiversity records from within the study area held by the National Biodiversity Data Centre was completed. These are presented in **Table 1** in **Appendix 1**. They include records of:

- Worms
- Birds
- Crustaceans
- Insects – beetles
- Insects – butterflies
- Insects – caddis fly, may fly, stone fly and true flies
- Molluscs, and
- Mammals

4. RESULTS - FIELD SURVEYS

The Newcastle River flows below a beautiful stone bridge on Temple Lane, which is undoubtedly of some antiquity, before passing under a more modern intervention designed to carry the weight of some very large trucks using this area. On the old 6" maps a ford across the river is marked here. Hart's-tongue fern (*Phyllitis scolopendrium*), Dandelion (*Taraxacum* agg.) and Common Figwort (*Scrophularia nodosa*) grow in the mortar and on this bridge.



Plate 1. Possible Medieval Bridge over the Newcastle River on Temple Lane.

Downstream of this bridge species such as Water Dropwort (*Oenanthe crocata*), Herb Robert (*Geranium robertianum*), Hedge Mustard (*Alliaria petiolata*) and the invasive non-native shrubs Butterfly bush (*Buddleia davidii*) and Cherry Laurel (*Prunus laurocerasus*) were recorded.

A possible spring or a small stream gushes out of the bank at the corner of the road below the Newcastle Vicarage. This area supports a nice community of typical herbaceous species associated with springs including Opposite-leaved Golden Saxifrage (*Chrysosplenium oppositifolium*), Nettle (*Urtica dioica*), Hogweed (*Heracleum sphondylium*) and a rich community of mosses and liverworts were found in the splash zone of this spring. Unfortunately the non-native invasives (*Carex pendula*) and Alexanders (*Smyrniium olusatrum*) are also present.

This spring flows along the eastern side of the road to meet the river and for some distance is bordered by our native Wild Garlic (*Allium ursinum*). A not so welcome species the Three Cornered Leek (*Allium triquetrum*) was then noted near the bridge. This is a species listed under the Birds and Natural Habitats Regulations 2011, which should be controlled.

A number of non-native invasive species are again a feature of private lands located immediately downstream of the bridge. Species recorded from the woodland here include; Three Cornered Leek, Rhododendron (*Rhododendron ponticum*), Cherry Laurel, Butterfly Bush, Giant Rhubarb (*Gunnera* sp.), Alexanders and Sycamore (*Acer pseudoplatanus*).

There is a treeline of immense Sycamore whose antiquity has been extended through coppicing along the northern boundary of this property. These multi-stemmed trees could be in the region of 200 - 300 years old and a treeline in this location is shown on the First Edition Ordnance Survey Ireland 6" map series but is not shown on the later editions.



Plate 2. Spring on Temple Lane. Invasives noted with red arrows.



Plate 3. Wild garlic beside the ditch.



Plate 4. Three cornered leek at the bridge.

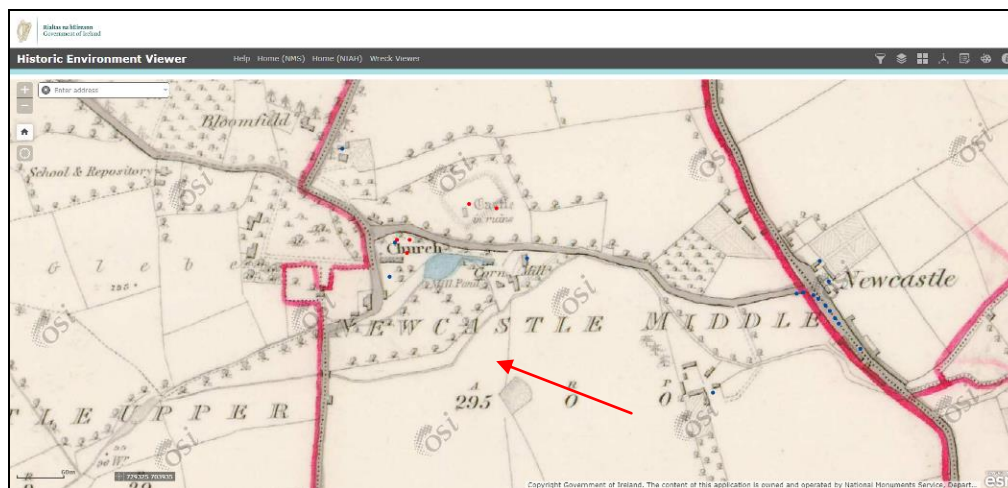


Figure 14. A treeline of coppiced Sycamores are shown on the First Edition 6" maps, which appear to remain extant today.



Plate 5. Coppiced Sycamore Trees in Newcastle Middle.

The private woodlands east of the bridge are classified as either WD4 Conifer Plantation or WD2 - Mixed Broadleaf/Conifer Woodland (if broadleaves are present). The southern banks of the river are very steep and planted with Sycamore, European Larch (*Larix decidua*), Silver Fir (*Abies alba*), Black Pine (*Pinus nigra*), Beech (*Fagus sylvatica*), and Scots Pine (*Pinus sylvestris*). The Black Pine, which forms a treeline on the brow of the valley slopes, are depicted on the last edition 6" and 25" Ordnance Survey Ireland maps but the remainder of the wood is younger and of more recent origin.

The woodland on the northern bank of the river which is located more on the floodplain contains a greater diversity of native species below the conifers with Wild Cherry (*Prunus avium*), Hawthorn (*Crataegus monogyna*), Elder (*Sambucus nigra*),

Holly (*Ilex aquifolium*), Hazel (*Corylus avellana*), Cherry Laurel, and sapling Horse Chestnut (*Aesculus hippocastanum*) found in the understorey. This area is of importance for woodland mammals.

The woodland ground flora on the northern bank on the floodplain of the river includes Wild Garlic, Common dog violet (*Viola riviniana*), Wood anemone (*Anemone nemorosa*), Bramble (*Rubus fruticosus* agg.), Herb Robert, Ivy (*Hedera helix*), Hart's-tongue Fern, Male Fern (*Dryopteris filix-mas*), Lords and Ladies (*Arum maculatum*), Lesser Celandine (*Ficaria verna*), and Wood sorrel (*Oxalis acetosella*).

Downstream of this woodland stock have access to the river and there are remnants of woodland here in the form of old Sycamore trees on the southern slopes, which are mostly devoid of ground flora on account of stock trampling and congregating in this area.



Plate 6. Conifer plantation (WD4) on the slopes above the river in Newcastle Middle.



Plate 7. Remnant woodland on the southern slopes of the river valley. Stock have access to the river here.



Plate 8. The Newcastle River in Newcastle Middle.



Plate 9. Steep slopes on the southern bank of the river.



Plate 10. Wild garlic on the northern bank of the river.



Plate 11. Rhododendron within the woodlands adjoining the river.



Plate 12. Giant rhubarb on the river bank within the woodland.



Plate 13. Conifer woodland.

Various construction works are underway on the lands in Oaklawn and a silt fence has been erected to protect the river along the edge of the construction access road here. This needs to be regularly checked and maintained.



Plate 14. Silt fence adjoining the construction access road in Oaklawn.

There is no cover along the Newcastle River on the lands adjoining the Newcastle Inn and the banks here are vulnerable to erosion as a result.



Plate 15. Development on the bank of the river. Note general lack of cover and riparian vegetation.

The development of the car park adjoining the river and the Chancel Way development provide opportunities for biodiversity enhancement if native species are used in the landscaping proposals.



Plate 16. Construction works at Chancel Way.



Plate 17. Pendulous Sedge at the bridge in the village.

Downstream of the R761 the lands on both side of the river have been developed with a number of private residences. Lands east of on the northern boundary of the river are currently not in use for agricultural purposes and have frequent populations of the non-native invasive species Alexanders. The hedgerows and treelines which run south to the river from Leamore Lane provide important connectivity for species such as foraging bats.



Figure 15. Treelines and hedgerows form important ecological corridors linking the river to Leamore Lane.



Plate 18. Ash and oak in treelines leading from Leamore Lane to the river.

The river adjoining these fields and the Sea Road has been much altered and engineered with reprofiling of the banks and the installation of rock gabions and built structures.



Plate 19. Canalisation of the river beside the Sea Road and installation of rock gabions.



Plate 20. Important cover for wildlife on the north side of the river bank.



Plate 21. Invasive species include Three cornered leek, Alexanders, Pendulous sedge.



Plate 22. Giant rhubarb.



Plate 23. Hard engineering along the banks of the Newcastle River.

Biological water quality (macro-invertebrates)

As part of this study three kick samples were completed to indicate the current ecological condition and health of the river – the river is then described as being ‘at risk’, ‘indeterminate’ and ‘not at risk’. These samples were taken at the bridge at Temple Lane, at the main bridge in the village and downstream of the wastewater treatment plant as shown on **Figure 16** below.



Figure 16. Kick sample locations.

The samples were taken with a standard kick sampling hand net from areas of riffle/glide utilising a two-minute sample. Large cobbles were also washed at each site where present and the samples examined on the river bank. The results of these samples are presented below on **Figures 17, 18** and **19**. The upstream sample came out as being 'not at risk', the village one as being 'not at risk', and the one below the waste water treatment plant was 'indeterminate'.

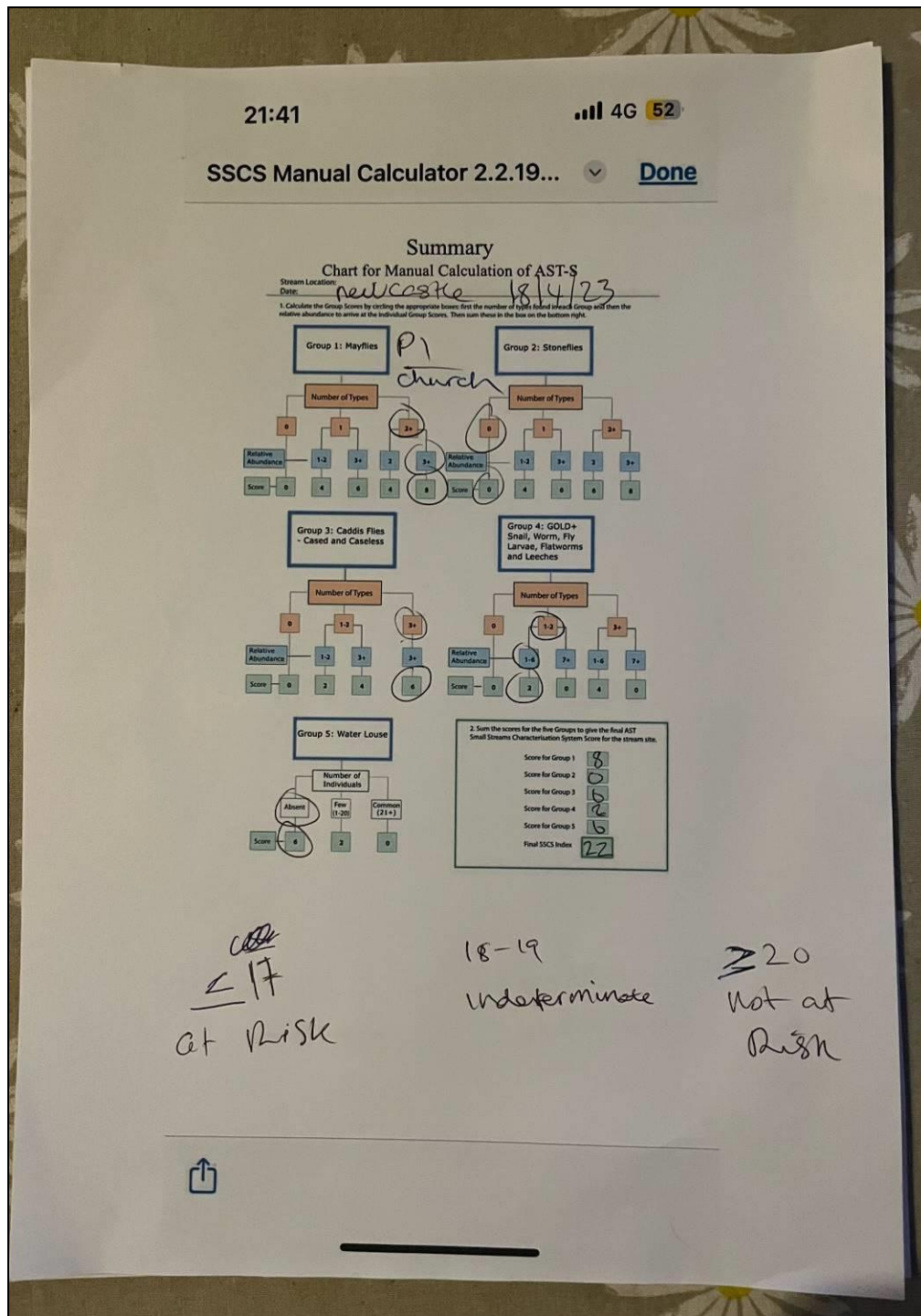


Figure 17. Kick sample at Temple Lane - 'Not at Risk'.

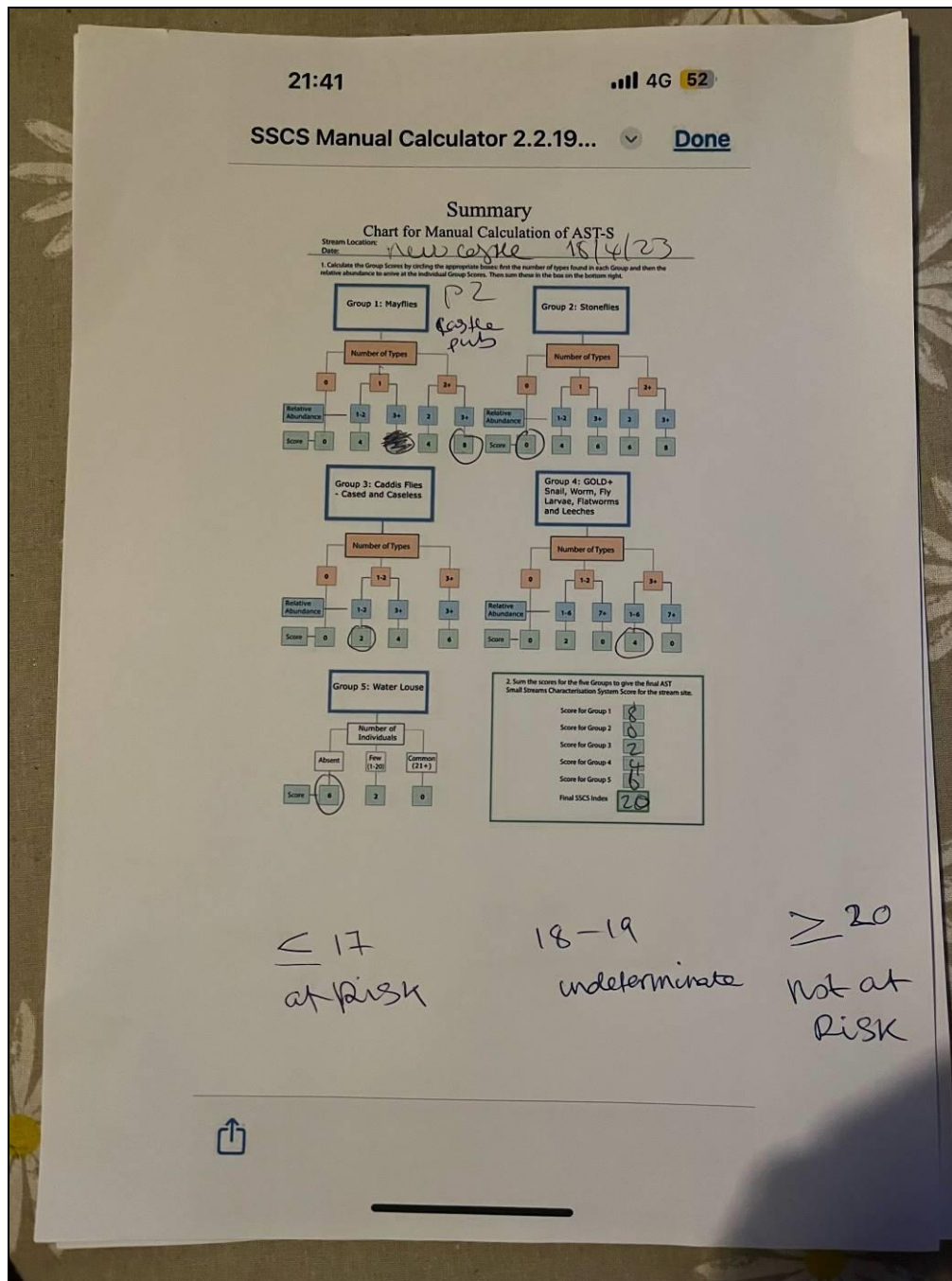


Figure 18. Kick sample at Village Inn - 'Not at Risk'.

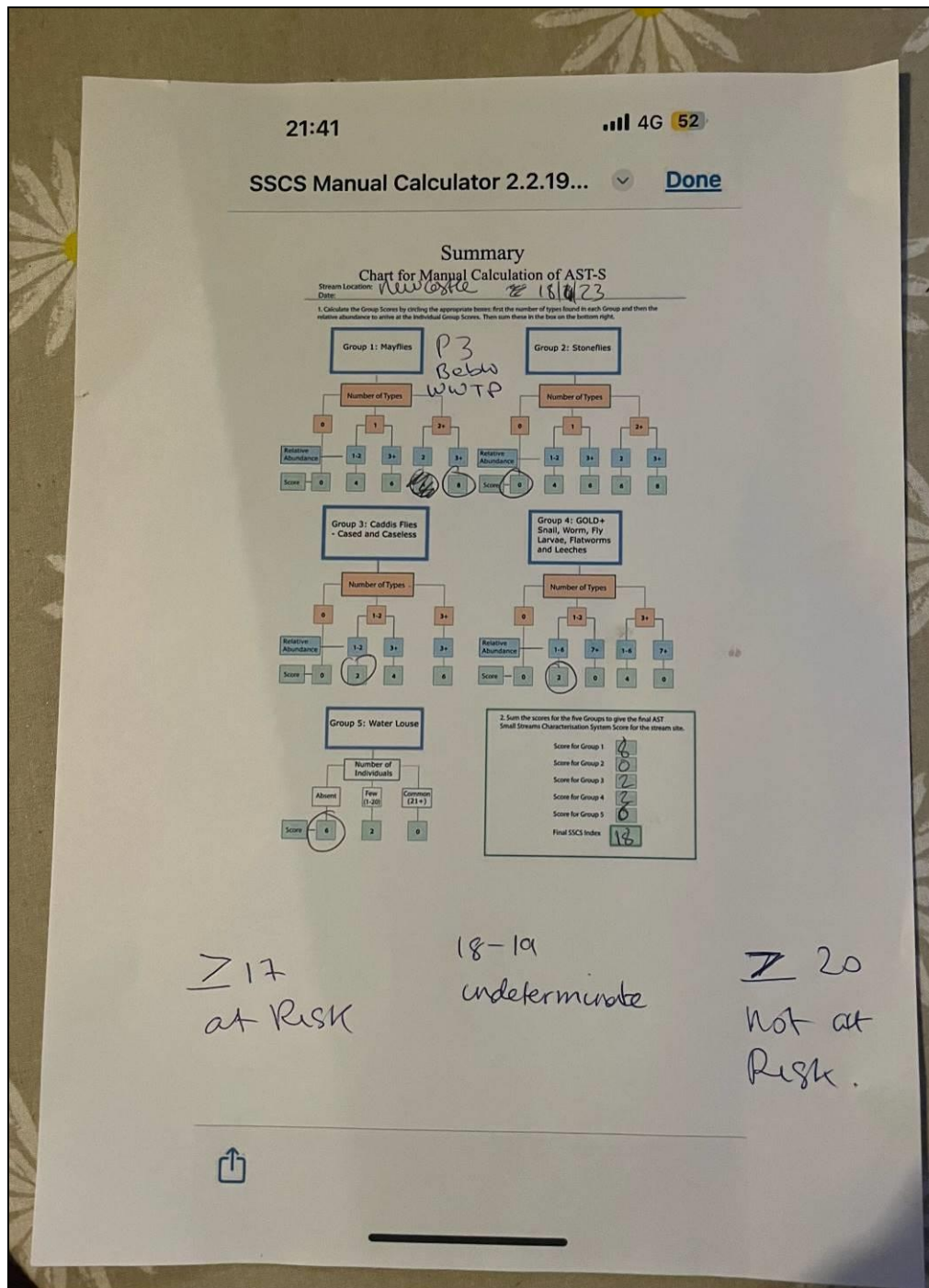


Figure 19. Kick sample below the waste water treatment plant - 'Indeterminate'.



Plate 24. Freshwater invertebrates in the Kick Sample.

5. RECOMMENDATIONS FOR THE NEWCASTLE RIVER

Wicklow County Council was the first local authority in Ireland to declare “a biodiversity and climate-change emergency”, recognising the need to respond more urgently to the threat of climate breakdown and the global decline of species.

A number of recommendations and proposals to enhance the Newcastle River from the perspective of biodiversity and climate change resilience are set out below. Some of these could be taken up and implemented by the local community whilst others will need to be discussed with housing developers, local farmers or individual private land owners and could be supported with actions by state agencies such as the Forest Service. Others need to be addressed at a higher level through the planning sections of the local authority and supported by them.

5.1 Developments in Newcastle Village and within the River Corridor

Development has been allowed within the Newcastle Village immediately on the top of the banks (and in some cases practically within the river) which has contributed to the loss of riparian habitat and compromises the functionality of the river.

There has been a series of events which have been documented by local residents and reported to the various local authorities. These include siltation entering the river from adjoining development as reported on the 4 March and 11 July 2022 and loss of riparian habitat and trees.

Ideally a river within an urban area/village should have several zones adjoining it as shown on the graphics produced by Inland Fisheries Ireland presented below (Figures 20 and 21). This should allow for a series of zones which keep developments (such as housing or other infrastructure) a minimum of 40m from the river and incorporate a streamside zone, a middle zone (which can include a foot path or linear feature with associated planting) and an outer zone which includes the required SuDS measures for any development proposals.

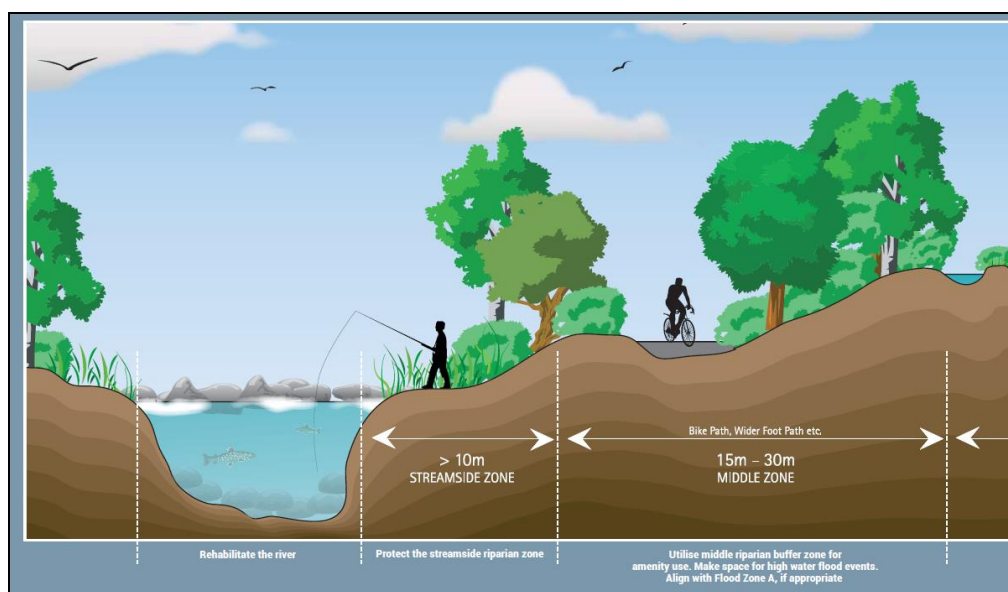


Figure 20. Good Riparian Planning for Urban Areas (IFI 2022).

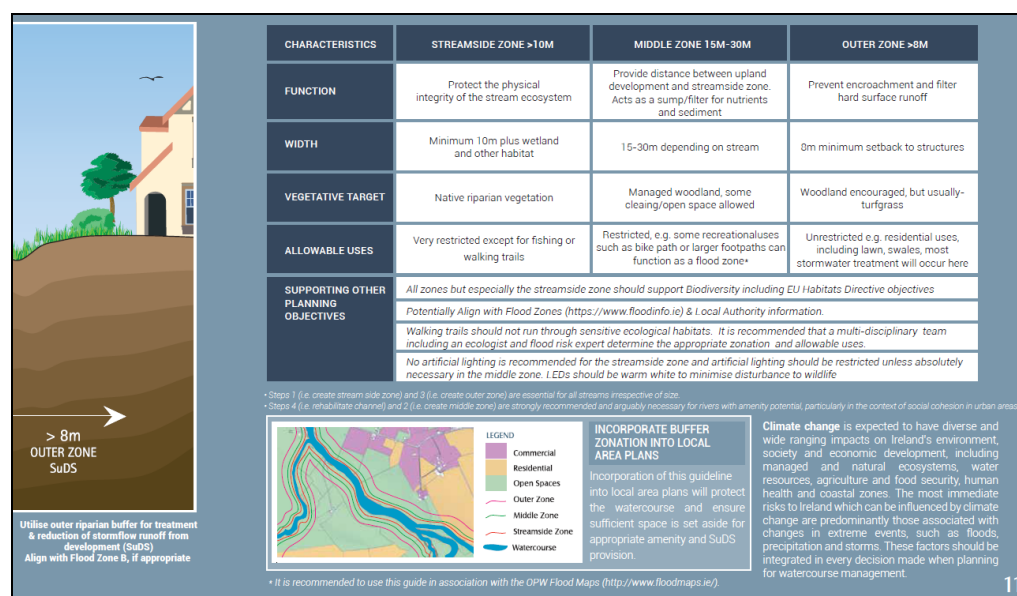


Figure 21. Good Riparian Planning for Urban Areas (contd.) (IFI 2022).

Wastewater

Newcastle is a designated Level 6 Small Town Plan (Type 2) settlement within the County Development Plan 2022-2028 (Volume 2). The village is currently served by a Waste Water Treatment Plant located on Sea Road. The capacity of the treatment plant is 1,000 population equivalent (pe) with a 2022 loading of c. 900 pe; therefore capacity for new development is limited.

Several sections of the Newcastle River have been straightened and canalised and the banks have been modified with hard engineering in the form of rock gabions or walls.

Flood Risk

The County Development Plan has identified that a large proportion of the lands downstream of the R761 are now at risk of flooding as shown on **Figure 22** below.

This is unsurprising as the natural floodplain of the river has been lost in parts through inappropriate development and the ability of the river and adjoining lands to buffer flood events has been compromised.

In many locations any instream material such as rocks or fallen trees have been removed which results in the loss of pools and instream habitat variability (riffles and runs etc.). These are necessary to support older fish, invertebrates and other aquatic fauna and flora.

In addition in many instances the river banks have been planted with non-native vegetation, which is of lower biodiversity value than native species and many invasive species are present – see **Section 5.7**.

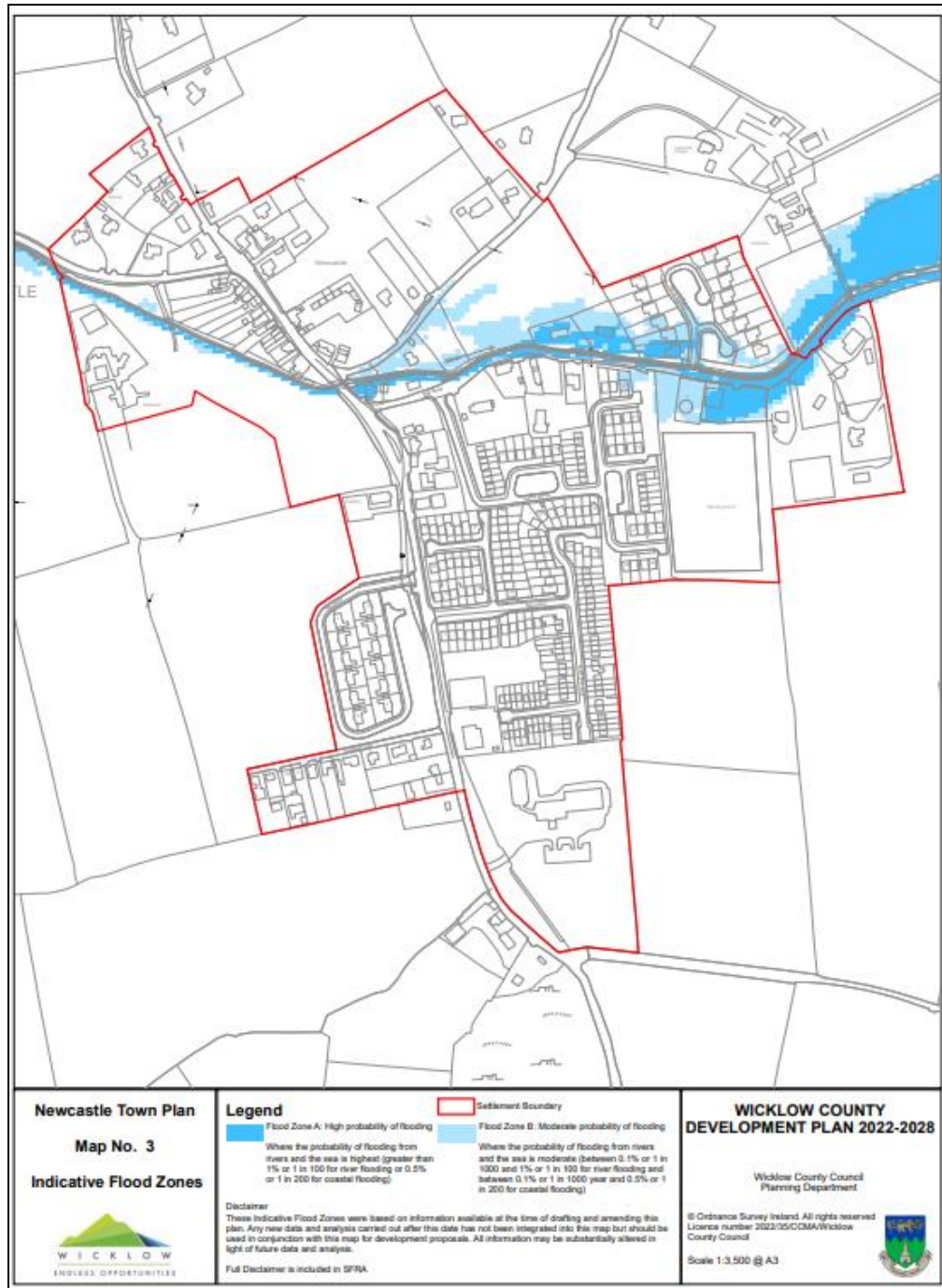


Figure 22. Indicative flood zones in Newcastle Village (Wicklow County Development Plan 2022 - 2028).

Fish Kills

There have been fish killed within the Newcastle River as reported by local residents to Inland Fisheries Ireland. This included a fish kill on the Newcastle River just across the road from the Waste Treatment Plant on the Sea Road on the 28th July 2021 (Irish Water Case Reference Number 8027377073) which resulted in the death of over 50 fish ranging from Brown Trout to Minnows and Flounders. This was inspected by the EPA who reported that a site inspection was ‘carried out at Newcastle wastewater treatment plant on 28/07/2021 and it was confirmed then that the fish kill was not linked to the wastewater treatment plant’.



Plate XX. Fish Kill in 2021.

5.2 Riparian Corridor

The ecological function of the Newcastle River as an ecological corridor has been degraded as a result of the various developments outlined above.

Riverine Linear Park

Within the plan for the village is a proposal to develop a linear landscaped park along the Newcastle River as well as a 'town park' or 'village green' across the road front of the R761. The plan states that the width and layout of the riverine linear park as shown on **Figure 23** shall be determined at the application stage having regard to the requirement to

- a) protect the river from adverse environmental impacts during both the construction and operational phases of the development having regard to its hydrological links to the Murrough Wetlands SAC / SPA,
- b) to maintain a suitable undeveloped buffer along the river in the interest of flood risk management and protection of local flora and fauna (not less than 10m) and
- c) the requirement to provide for an area of land suitable for the creation of walks / paths and to enhance biodiversity.

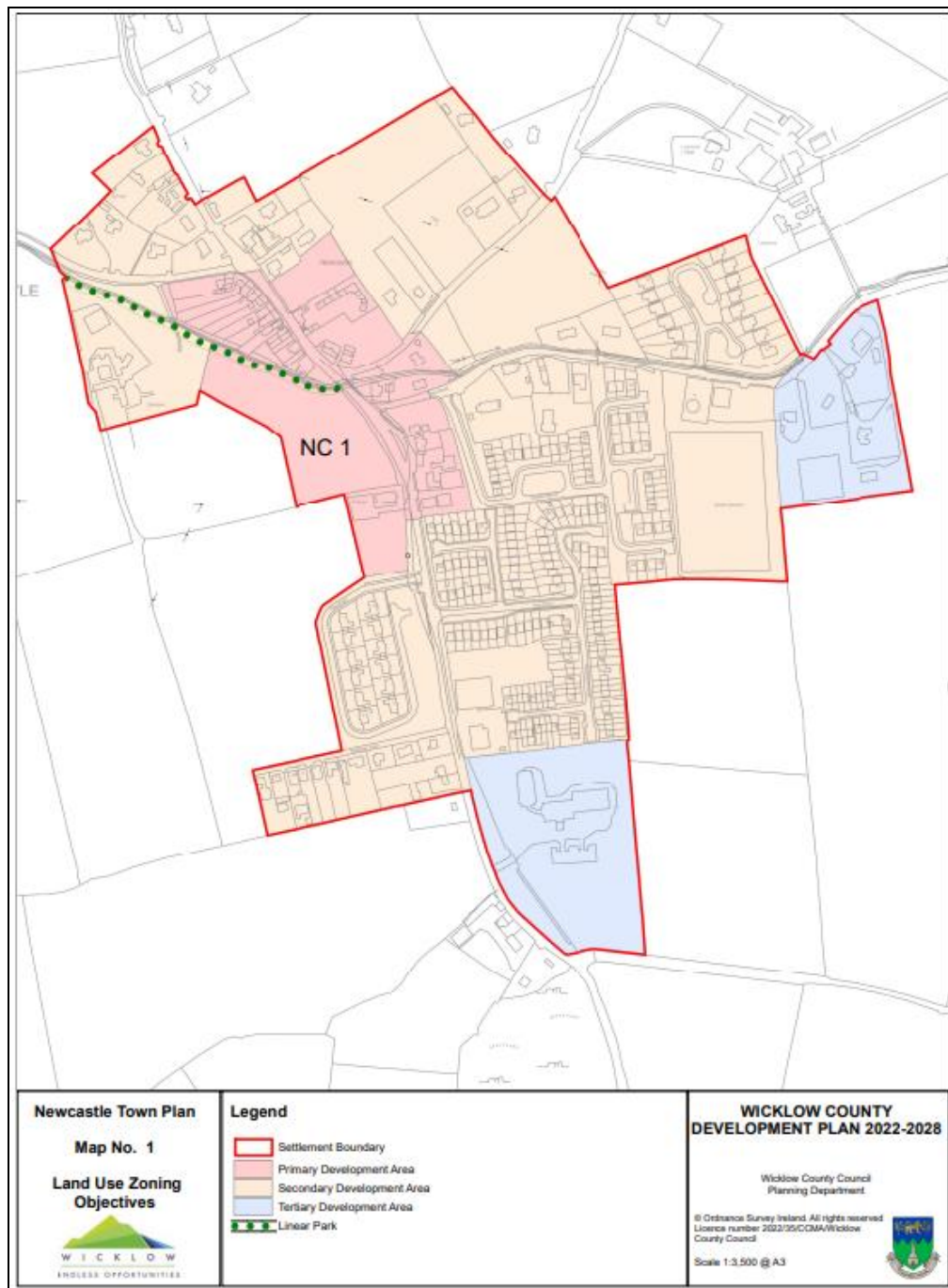


Figure 23. Proposed linear park for Newcastle Village (Source: Wicklow County Development Plan 2022 - 2028).

There are a number of locations where works to restore or improve the riparian corridor of the Newcastle river are recommended. The amount of land allocated and protected for the linear park on the ground seems to be negligible at present and will require active rehabilitation prior to planting.

Oaklawn

A corridor of native tree and shrub species should be established within the Oaklawn development between the road and the existing river corridor which needs to be strengthened and buffered.

The purpose of this planting is to develop and strengthen an ecological corridor along the river and increase biodiversity on these lands. Suitable species include: Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Spindle (*Euonymus europaeus*), Guelder Rose (*Viburnum opulus*), Gorse (*Ulex europaeus*), Holly (*Ilex aquifolium*), Dog Rose (*Rosa canina*), and Elder (*Sambucus nigra*), with trees of Wild Cherry (*Prunus avium*), Oak (*Quercus robur*) and Scots Pine (*Pinus sylvestris*) established to form a treeline.



Plate 25. Native woodland planting should be implemented between the construction access road in Oaklawn and the river to create an ecological corridor and protect the river. The land here will need to be rehabilitated prior to planting.

Castle Inn

There has been an almost complete denudation of the bankside vegetation along the river banks at the Castle Inn and adjoining the proposed 'town park' or 'village green'.

Suitable species for (re-) establishment on the banks here include a variety of native Willows (*Salix cinerea*, *Salix aurita*) and Alder (*Alnus glutinosa*). These will help to stabilise the bank which is collapsing in places and eroding allowing silt and sediment to enter the river. They will also provide cover for wildlife.

Willow revetment works along the toe of the southern bank of the stream could also be considered to help prevent erosion.



Plate 26. Bare banks at the Castle Inn devoid of vegetation following recent construction works and collapsing as a result.

5.3 Garden Waste

It is often tempting (and handy) to dump material such as grass cuttings or clippings onto the bank or into the adjoining watercourse. These however will leach nutrients into the river. Such actions also often result in the spread of invasive species along the river.

Dumping of grass cuttings is a common problem associated with private houses and housing developments, which have lands and gardens bordering water courses and a plan for same needs to be developed.

An awareness campaign for all landowners along the river could be developed by Tidy Towns to highlight this and the need for the creation/retention of a buffer zone of undisturbed habitat.

5.4 Woodland Management

The areas of WD4 Conifer Woodland/WD2 - Mixed Broadleaf/Conifer Woodland adjoining the river in Newcastle Middle act as a protection forest for the Newcastle River helping to buffer it from the adjoining intensively managed agricultural lands. These areas would benefit from thinning to allow more light in and to stabilise the stand. This would also favour natural regeneration of trees which would improve the understorey but a flush of Sycamore saplings would be expected and should be controlled. Some enrichment planting of native understorey species such as Hazel would be useful to improve the shrub layer.



Figure 24. Thinning and Under-planting of the Woodland coupled with Invasive Species Management is recommended here.

5.5 Woodland Establishment/Restoration

Downstream of here stock have access to the river and the remnant woodland on the slopes is degraded due to their trampling and congregating under the trees.

The slopes here could be fenced and replanted with native woodland to stabilise them. This would reduce the risk of silt and sediment getting into the river at this location.

Funding is available from the Department of Food Agriculture and the Marine through schemes such as the Native Woodland Scheme and Woodlands for Water.

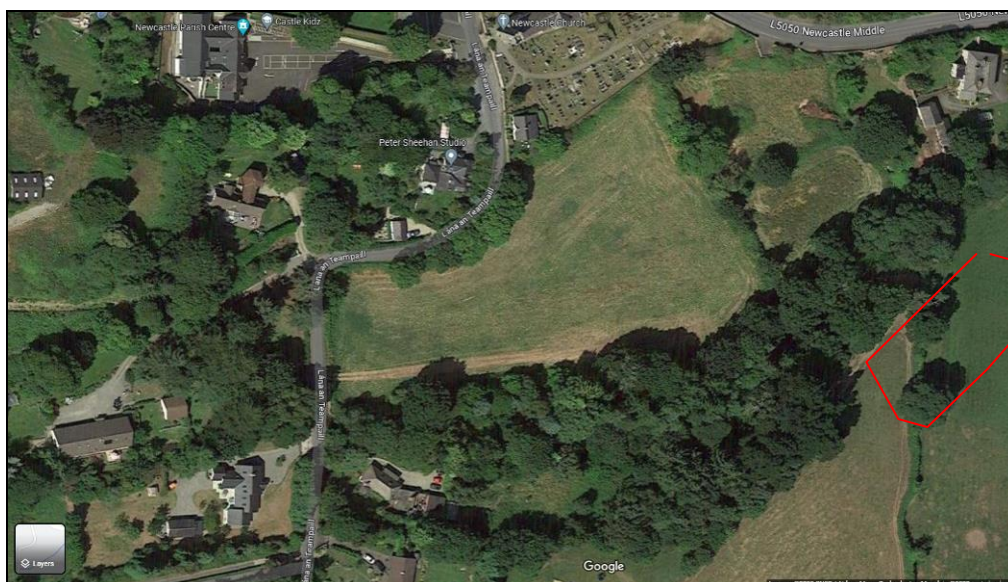


Figure 25. Woodland Restoration, Fencing and the Provision of a Nose Pump Feeder/Water Trough for stock is recommended here.

5.6 Fencing of the Watercourse

A nose pump feeder or drinking trough should be installed to provide stock with drinking water and in line with best practice the river bank should be fenced to prevent stock accessing the river.

5.7 Control of Invasive Alien Plant Species

Control of invasive alien plant species can be divided into either physical or chemical methods. Whilst there should generally be a preference for physical control methods, chemical control may, in some instances, be more appropriate. In other instances, a combination of treatment by herbicide and physical methods may be most appropriate.

Members of the local community are probably best placed to implement physical control of invasives through cutting, digging up or grubbing out but would need to be supported by the local authority or other statutory agencies with those species that require chemical control. Note that for any treatments using chemicals the proximity of the adjoining river and areas of native habitat must be considered. A training day is recommended.

As reported by TIII:

‘Chemical treatment involves the application of pesticides/herbicides, either by targeted spraying or direct application to the individual plant by injection, weed-wiping or other method. Professional users of pesticides must be registered pursuant to Regulation 4 of the Sustainable Use of Pesticides Regulations, and must have the appropriate training (with associated certificates) required to perform the necessary treatment to suitably manage the targeted IAPS. Chemical treatments must always be used in compliance with the product label.

In general, the application of herbicides and pesticides should not be undertaken in the following conditions:

- Windy weather where there is a risk of spray drift occurring
- During or preceding rainfall which can result in the chemical being washed off
- During periods of particularly cold weather which can reduce the plant’s ability to uptake the chemical

When chemicals are being used, it is important to refer to the Official Register of PPPs in Ireland (www.pcs.agriculture.gov.ie). This website specifies the list of approved products, the crops/situations for which they are approved and information on the national register of professional users

(**Note:** A professional user is any person who applies/sprays professional use herbicide/pesticide products, regardless of quantity or method of application)’.

The use of herbicide near the Newcastle River or areas of native vegetation to treat invasives must be considered on a case by case basis. The current best practice guidance for dealing with each species encountered during the survey is presented below.

5.7.1 Three cornered leek (*Allium triquetrum*)

Three-cornered leek, also known as Three-cornered garlic has become widely established in the east and south-east of Ireland. It has narrow, green, strongly keeled and hairless leaves with bell-shaped white flowers and a strong garlic scent. It flowers between April to June. It is often found on roadsides, waste grounds, forests, and riparian and shaded areas and is known to rapidly colonise and dominate waste ground, outcompeting native vegetation. The species is often found in a mosaic with other non-native species such as winter heliotrope and is present at several locations throughout the village and along the river.

The TII Guidelines recommend the following:

Physical Control/digging

Remove small and scattered plants first and then target outer edges of larger infestations by digging. Best removed prior to seed when plants are fully grown and parent bulb exhausted. Bulbs must be buried at a depth of at least 2m, incinerated or disposed of to licensed landfill. The contaminated soil should be disposed of to licensed landfill.

Chemical Control

Follow-up with herbicide to deal with missed bulbs re-sprouting. Glyphosate can be used during the active growth period in late spring or summer and should be applied as foliar spray, wiper applicator or spot treatment'.

5.7.2 Rhododendron (*Rhododendron ponticum*)

As reported by TIII:

'Rhododendron is a perennial evergreen, acid-loving shrub that was introduced to Ireland in the 18th Century. It is native to south-west Europe and south-west Asia. There are more than 900 species of Rhododendron, but only one, *Rhododendron ponticum*, is invasive in Ireland. Since then, it has established itself as a major weed of acid woodlands, most notably in Kerry and Donegal where concerted efforts to control it have been ongoing for many decades. It is only likely to be a problematic species on road schemes in areas of acid or peaty soils. Rhododendron produces masses of showy lilac flowers in May, which help endear it to members of the public. Each flower head can produce between 3,000 and 7,000 tiny seeds. The small, light seeds are produced in capsules and have a high germination rate. They are primarily dispersed by wind and can persist in soils for up to three years. The plant can also spread by vegetative means where plants sucker or throw up new sprouts from roots as well as from branches (layering). It forms dense thickets that can exclude all light from the understorey thereby eliminating herbaceous plants and preventing the natural regeneration of trees and shrubs. It can withstand considerable shade and thrives as an understorey species in woodland, although it also tolerates open conditions in suitable acid soils.

Its dense tangle of stems, commonly referred to as thickets, can block pathways, smother watercourses and encroach on roadways, thereby impinging on sight-lines and reducing the capacity of the road to dry out. The dense foliage of Rhododendron can reach several metres in height, creating a dark sterile environment that outcompetes native flora. The leaf litter produced by the plant contains various

compounds that have an allelopathic action on other species (inhibiting their growth), which may further inhibit native flora from growing within close proximity. These toxins, which include 'free' phenols make the plant unpalatable to most herbivores and grazing animals.

Rhododendron ponticum is also a carrier of the fungus-like pathogen *Phytophthora ramorum* that causes 'Sudden Oak Death', which can cause significant damage to a wide range of native flora'.

The TII Guidelines recommend the following:

'Considerable effort has been focused on the control of *Rhododendron*, particularly in woodland habitats, in Ireland and elsewhere in the northern hemisphere. The choice of control method can influence the recovery of the site and should be considered prior to undertaking any control operation. *Rhododendron* grows vigorously when cut and the tiny seeds may be unintentionally spread by machinery, on clothes, boots, or other PPE. Hence, biosecurity measures must be put in place to prevent further spread of the plant when undertaking any control works. Regular follow-up is required to deal with re-growth and seedling germination, irrespective of the control method employed.

Chemical control

When dealing with large *Rhododendron* infestations, foliar spraying with herbicides is not recommended. This reflects the fact that considerable quantities of herbicide will be required, which can have effects on understorey flora beneath the target species and cause significant drift that will impact other non-target species. However, if access to the base of the main stems is possible, herbicide may be applied directly to the stem. Stem injection is another option for chemical control that involves herbicide application directly into the stems of large plants. This method enables a more precise application of the herbicide. Holes > 3cm diameter should be drilled into the stem and herbicide applied immediately. Herbicides should be applied during periods of active growth, i.e. late spring or summer.

Physical control

A range of physical control measures have been developed for *Rhododendron* in response to the general sensitivity of acid woodland (and other) sites where it is frequently established (collateral damage by chemical spray drift on non-target species is a prime concern in such sites). Manual pulling of plants that are less than 20cm high is successful, once all of the roots are removed. The pulled material should be bagged for removal from site. It is also an option to flail and or mulch young material, and to leave the mulch on site. As there will be no seeds present (the plant does not seed until it is 10-12 years old), it is possible to leave this material on site.

Cutting of large stems is another physical control option; however, the plant's capacity for regeneration from suckers that emerge from roots or stems that remain in the ground renders this method relatively ineffective unless applied in areas of limited infestation, where adequate follow-up can be made. This approach can also be very labour-intensive and expensive.

It is possible to mechanically uproot mature Rhododendron plants due to the shallow nature of the root system. However, this is generally only appropriate for sites where access to machinery is possible and at sites of low ecological interest where damage to existing native vegetation is not a concern. Where chemical control of cut stumps and rootstocks is not an option, stump extraction will be necessary. This will normally involve using machinery, where access is possible. Heavy trafficking of woodland soils can result in puddling of soils, giving rise to sediment run-off and nutrient leaching which can impact on watercourses.

Combined chemical and physical control

With isolated plants (> 1m tall) or small infestations, effective control can be achieved by cutting the plant to the stump and immediately treating the latter with herbicide. The use of an inert dye mixed with the herbicide will ensure that no stumps are missed. Another option is to cut the stem and treat the tender regrowth with herbicide. For plants with a stem diameter less than 2cm, the stem can be broken at the base ensuring that it is not fully severed and a concentrated solution of herbicide immediately applied. For plants greater than 2cm in diameter, notches can be cut in the stem using a hatchet or saw (referred to as feathering) and a concentrated solution of herbicide immediately applied. It is important to apply shallow cuts so that the herbicide has access to the plant's transport system, which is just inside the bark. This type of treatment is effective all year-round, although it is deemed to be most effective when conducted between November and April. Regular follow-up is required to deal with re-growth and seedling germination, irrespective of the control method employed.

Any cut material will need to be removed from the site to avoid resprouting or suckering, which will produce new plants and potential infestations. Mulching is a good option for disposal and the mulch may be left on site, if no seeds are present'.

5.7.3 Winter heliotrope (*Petasites fragrans*)

This species was recorded along the river and in the environs of the village. Due to its ability to regenerate and spread *via* rhizome material, great care must be taken when managing Winter heliotrope.

Eradication of this species may take a number of years and it is important to ensure that no viable rhizome material remains in the soil.

The TII Guidelines recommend the following:

'Chemical control

Infestations of Winter heliotrope can be treated with herbicide during the active growing season. Due to the potential for re-infestation from rhizome fragments, follow-up treatments will be required to deal with any regrowth.

Physical control

Due to its extensive rhizome network, which extends to *circa* 30cm deep, total physical removal of Winter heliotrope is difficult to achieve. Where mechanical means can be employed, it should be possible to deal with larger infestations but due to the potential for regeneration from rhizome fragments, it may be best to

tackle its control using a combination of excavation with follow-up treatment by herbicides. As with other plants with the potential to spread from small rhizome fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant (refer to GE-ENV-01104 Biosecurity Measures). Other means of disposal include burial of material at a depth of at least 0.5m, incineration or disposal to licensed landfill'.



Plate 27. Winter heliotrope in flower during the winter months.

5.7.4 Cherry laurel (*Prunus laurocerasus*)

Cherry laurel is an issue as an invasive species when it threatens the diversity of native woodlands or other habitats of conservation value as it tends to form dense thickets and outcompetes native vegetation as can be seen in many Irish woodlands. It is an unpalatable species and is likely to be toxic to mammals and invertebrates due to the presence of cyanide in the leaves, stem and bark of the plant.

Eradication/management of cherry laurel

Cut and remove stems by hand or chainsaw, cutting as close to the ground as possible to remove above ground growth. Remove the cut material from the area to allow for effective follow-up work and prevent regrowth. The stems can be chipped but the chippings should be removed.

The removal of above ground growth will not prevent regrowth as *Cherry laurel* will regrow from cut stems and stumps. There are four recommended methods to achieve successful management after the initial cut and removal:

1. Digging the stumps out. The effectiveness of this technique is increased by removing all viable roots. This can be done manually or with a tractor and plough. To avoid regrowth, stumps should be turned upside down and soil should be brushed off roots.

2. Direct stump treatment by painting or spot spraying freshly cut low stumps with a herbicide immediately after been cut. Glyphosate (20% solution), triclopyr (8% solution) or ammonium sulphate (40% solution) are known to be effective during suitable weather conditions i.e. dry weather. The herbicide concentrations used and timings of applications vary according to which chemical is used. Use of a vegetable dye is recommended to mark treated stumps and all stumps should be targeted. A handheld applicator will help avoid spray drift onto surrounding non-target species. Always read the label and follow the manufacturer's guidelines when using herbicides.
3. A variation on the stump treatment method is stem injection, using a 'drill and drop' methodology, whereby, if the main stem is cut and is large enough for a hole to be drilled into it, the hole can be used to facilitate the targeted application of glyphosate (25% solution).
4. Stump regrowth and seedlings can be effectively killed by spraying regrowth with a suitable herbicide, usually glyphosate. Best practice spraying protocols should be carefully followed. General broadcast spraying is not as effective as stump spot treatment and has the potential to impact on surrounding non-target species. The leaves are thick and waxy. For herbicide treatment to be effective **each individual leaf needs be thoroughly wetted with herbicide to kill the plant.**

5.7.5 Butterfly Bush (*Buddleia davidii*)

Buddleia tolerates a broad range of environmental conditions and a wide diversity of soil types, including very poor soils, it is capable of growing on walls, rock outcrops or sub-soils. It has established itself as a problem plant along watercourses where, due to its shallow root system, it is frequently washed away, resulting in erosion of the river banks and downstream blockages.

Buddleia is a plant that also favours disturbed sites. The physical removal of plants can provide ideal conditions for the germination of seeds that are present in the soil. For this reason, care needs to be taken to ensure that revegetation of treated areas is undertaken swiftly. The branches of *Buddleia* are capable of rooting as cuttings, so care should also be taken to ensure material is disposed of in a manner to avoid this risk.

The TII Guidelines recommend the following:

'Chemical control

Foliar application of herbicide is capable of providing control with young plants and small infestations, but should be followed up at six-monthly intervals as regrowth is common.

Physical control

Removal of the flower heads before seed set (June or even July) is an important control method as it reduces the volume of seeds that are available to spread. Hand-picking of young plants will provide control but it is very tedious and should be undertaken with care to avoid soil disturbance, which can give rise to a flush of new seedling.

Digging out plants is only practical with relatively minor infestations, at the initial stage of invasion, or where a site is to be excavated for development or road construction purposes. Mowing of young plants does not provide effective control as they re-sprout with vigour. The physical removal of mature stands is not recommended for the same reason. After uprooting, it is essential to plant the ground in order to prevent a flush of new seedling growth. When Buddleia plants are cut, regrowth from the stump can be very vigorous.

Combined chemical and physical control

Effective control can be achieved by cutting Buddleia plants to a basal stump during active growth (late spring to early summer) and immediately treating the total cut surface with herbicide concentrate. Monitoring will be required and retreatment, as necessary. Do not leave cut stems and branches on the ground as they will reroot and produce new plants'.

5.7.6 Montbretia (*Crocasmia x crocosmiiflora*)

Montbretia is easily recognised when in flower by the distinct shape and colour of the flower head with relatively short stems and orange flowers. When not in flower, Montbretia is more difficult to identify. Look for rusty brown dead leaves and remains of previous years flowering heads.

The TII Guidelines recommend the following methods for control/eradication:

'Chemical control

Infestations of Montbretia can be effectively treated with herbicide during the active growing season. Due to the potential for re-infestation from seeds, corms and/or rhizome fragments, regular monitoring and follow-up treatment, as dictated by the monitoring, will be required over a number of years.

Physical control

Physical control of Montbretia is difficult as individual corms easily break from their chains and can result in ready re-infestation or further spread. Where infestations are limited in extent, the entire stand can be excavated and buried or disposed of to a licensed landfill or incineration facility under licence. The most effective time to remove Montbretia is before the flowering/seeding season. The corms are very hardy and are not suitable for composting. Due to the potential for re-infestation from corms, regular follow-up will be required over a number of years to deal with any regrowth'.

5.7.7 Old Man's beard (*Clematis vitalba*)

As reported by TII:

'Old man's beard, also known as Traveller's joy, is a member of the Ranunculaceae family. It is a vigorous, fast-growing deciduous climber that produces characteristic feathery seed heads in the late summer, from which it derives its common name. It is a native of central and southern Europe, but has established itself throughout much of Europe, North America and New Zealand, where it has become a major weed of woodlands. In Ireland, its distribution is mainly in the eastern and southern half of the country, where it is found in hedgerows,

roadsides, rail corridors, river banks and along forest edges. The vines can form dense thickets (growing up to 10m in a season), blanketing trees and shrubs and ultimately depriving them of light. They can break tree limbs or cause their collapse from the sheer weight and mass. The blanketing growth of the plant also prevents growth and regeneration of native flora by blocking light and physically excluding plants. Hanging vines will set root at any node that comes into contact with the ground and produce new plants’.

Old man’s beard can be controlled both mechanically and using herbicides, although typically its control relies on a combination of both, i.e. cut-stump application. The TII Guidelines recommend the following methods for control/eradication:

‘Chemical control

A number of chemicals have been used effectively against Old man’s beard, including glyphosate and triclopyr, although control invariably takes more than one year. Foliar application of herbicides should be undertaken while the plant is actively growing. Due to the sheer biomass of vegetation that the plant can produce, it may be difficult to access infested sites to implement control measures. For large, extensive infestations of Old man’s beard, chemical treatment should be carried out in June or July when the plant is growing vigorously and in full leaf, using specialised spraying equipment to target the tall canopy layer. The purpose of this is to minimise the amount of herbicide that will reach the host tree or shrubs underneath.

Physical control

At newly infested sites, small seedlings can be manually pulled, preferably during damp conditions (i.e. during winter or spring). The seedlings should be collected for composting, adopting the biosecurity measures outlined in GE-ENV-01104. Where isolated mature aerial vegetation is present, the vines should be manually pulled and bagged. The thin stems that remain rooted in the soil may now be manually pulled and removed for composting in a biosecure manner, along with the aerial vegetation. Where Old man’s beard has only recently invaded an area and not yet produced dense foliage, the aerial vegetation may be cut and left to die. The roots and seedlings left in the ground may then be removed manually or treated with herbicide.

Combined chemical and physical control

For combined treatment of dense infestations of mature aerial Old man’s beard vegetation, the vines should be cut back to around 10cm above ground level and the cut stems that remain in the ground immediately painted with a concentrated dose of approved herbicide. They may also be dug from the ground and removed for composting, if this is practicable. The aerial vines can be left hanging to die naturally. This method will minimise the impact on the host plant that the plant is covering. For large old specimens, the stem or trunk can be cut at the base with a straight horizontal cut and herbicide applied immediately to the cut stump. The aerial vegetation should be left *in situ* until it is dead. Cut and treated stumps can resprout and must be monitored and retreated, as necessary’.

5.7.8 Other species recorded

A number of other species were recorded during the survey. These can be grouped into shrub species and herbaceous plants.

Seedlings of Sycamore (*Acer pseudoplatanus*) can be hand pulled.

Herbaceous species such as Alexanders (*Smyrniium olusatrum*) and Pendulous sedge (*Carex pendula*) should be treated by either digging up and removing, hand pulling, or strimming prior to flowering and seed production.

5.8 Water Quality Monitoring - Citizen Science

Water quality can be monitored using macro-invertebrates (the freshwater invertebrates that live on the river bed and in plants) to indicate what water quality is like in a particular river or stream.

There are various different types of invertebrates living within a stream of river, and all of these have different tolerances to water pollution. Some species are highly sensitive to pollution while others are not and can endure quite polluted waters.

By taking a 'kick sample' of these species and examining them we can tell a lot about the health of a river or water body. Samples are collected using a pond net with 1mm mesh and examined in a white tray with water. As was done as part of this study three sampling areas should be chosen within the environs of the village and can be monitored annually by the community to establish any patterns of change, good or bad inter-annually.

The newly-developed Citizen Science Stream Index (CSSI) is based on the presence or absence of six key aquatic invertebrates (**Figure 26**). There are three pollution-sensitive invertebrates ('good guys') which are commonly found in clean streams and three pollution-tolerant invertebrates ('bad guys') which are commonly found in polluted streams.

A pond net is used to take three 30-second kick-samples (the three samples should be a few metres apart) from a shallow (<20cm), gravelly, fast-flowing part of the stream at each sampling location. The invertebrates captured in each sample are then examined in a white tray on the bankside. The six key invertebrates can be easily spotted amongst the many other species that may be caught, by their characteristic shape, colour or movement. Each sample is then scored depending on which, if any, of the six key invertebrates occur in the tray. The three 'good guys' have a score of +1 each and the three 'bad guys' have a score of -1 each. The score for each kick-sample can range from +3 (all three good guys and no bad guys) to -3 (all three bad guys and no good guys). When the scores from all three samples are added together, the CSSI ranges from +9 to -9, with water quality scored under a 'traffic light' system (**Figure 27**).

The CSSI has been purposely developed for a non-technical audience and is easily taught and explained across age groups, greatly increasing its potential in monitoring water quality.

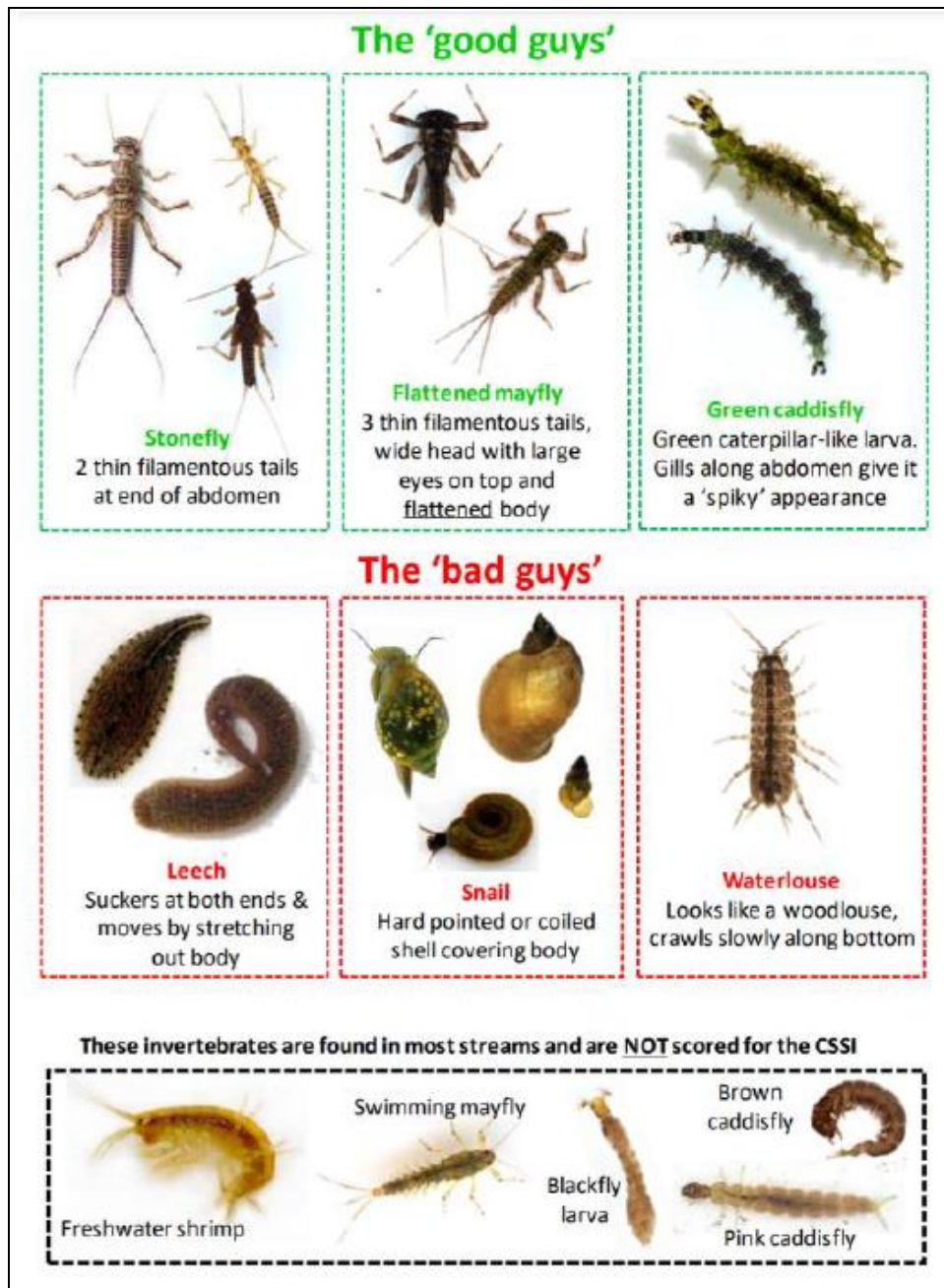


Figure 26. Photographic guide to the invertebrates used in the scoring.


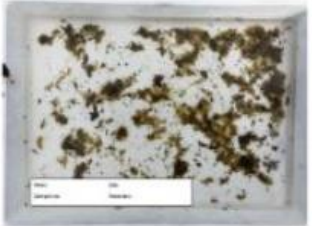






		Sample 1	Sample 2	Sample 3	
Stonefly (+1)		<input type="text"/>	<input type="text"/>	<input type="text"/>	<p>Citizens should also take a good, clear photo of one of the 3 samples, including a label in the tray, with information on the date, stream name, location and recorder.</p> 
Flattened mayfly (+1)		<input type="text"/>	<input type="text"/>	<input type="text"/>	
Green caddisfly (+1)		<input type="text"/>	<input type="text"/>	<input type="text"/>	
Snail (-1)		<input type="text"/>	<input type="text"/>	<input type="text"/>	<p>CSSI Scores can be a 'traffic light' for water quality</p> <p>CSSI score -9 to -5 Poor</p> <p>CSSI Score -4 to +4 Moderate</p> <p>CSSI Score +5 to +9 Good</p> 
Leech (-1)		<input type="text"/>	<input type="text"/>	<input type="text"/>	
Waterlouse (-1)		<input type="text"/>	<input type="text"/>	<input type="text"/>	
		Sum of scores 1	Sum of scores 2	Sum of scores 3	
		<input type="text"/>	<input type="text"/>	<input type="text"/>	<p><input type="text"/> Total score for the 3 samples = CSSI Score</p>

Figure 27. Scoring system for the Citizen Science Stream Index (CSSI).

5.9 Community Awareness and Engagement

It is recommended that a Newcastle Wild River's day is run to engage the local community with the river and to disseminate the findings of this study.

5.10 Household Check - Are You Part of the Problem?

Everyone in the community can make a difference by checking their own home to see if it too could be contributing to poor water quality in the Newcastle River. This is known as a misconnection survey.

A property is typically serviced by two types of drains namely **foul** and **surface water**.

The **foul** drain conveys wastewater from foul appliances such as washing machines, dishwashers and toilets to the wastewater treatment plant.

The **surface water** drain conveys "clean" rainwater from your roof and hard standing to local rivers and streams.

When correctly plumbed the foul water does not enter a local drain or watercourse and goes to the waste water treatment plant, which once it has capacity and is properly operated ensures that the waste is treated before discharge as shown on **Figure 28**.

A misconnection occurs when a foul drain is incorrectly plumbed to the surface water network, causing pollution of nearby surface waters.

During construction or following renovations or repairs a misconnection can occur where a foul drain is incorrectly plumbed into a surface water drain as shown on **Figure 29** below. It can also commonly occur if an existing foul appliance is moved to a new location i.e. moving a washing machine from a kitchen to an outbuilding.

A good place to start is to inspect your rainwater downpipes. If there is any additional pipework connected to the downpipe, this could indicate a misconnection.

Shampoos, soaps, chemicals & detergents can have a detrimental effect on the flora & fauna in our rivers.

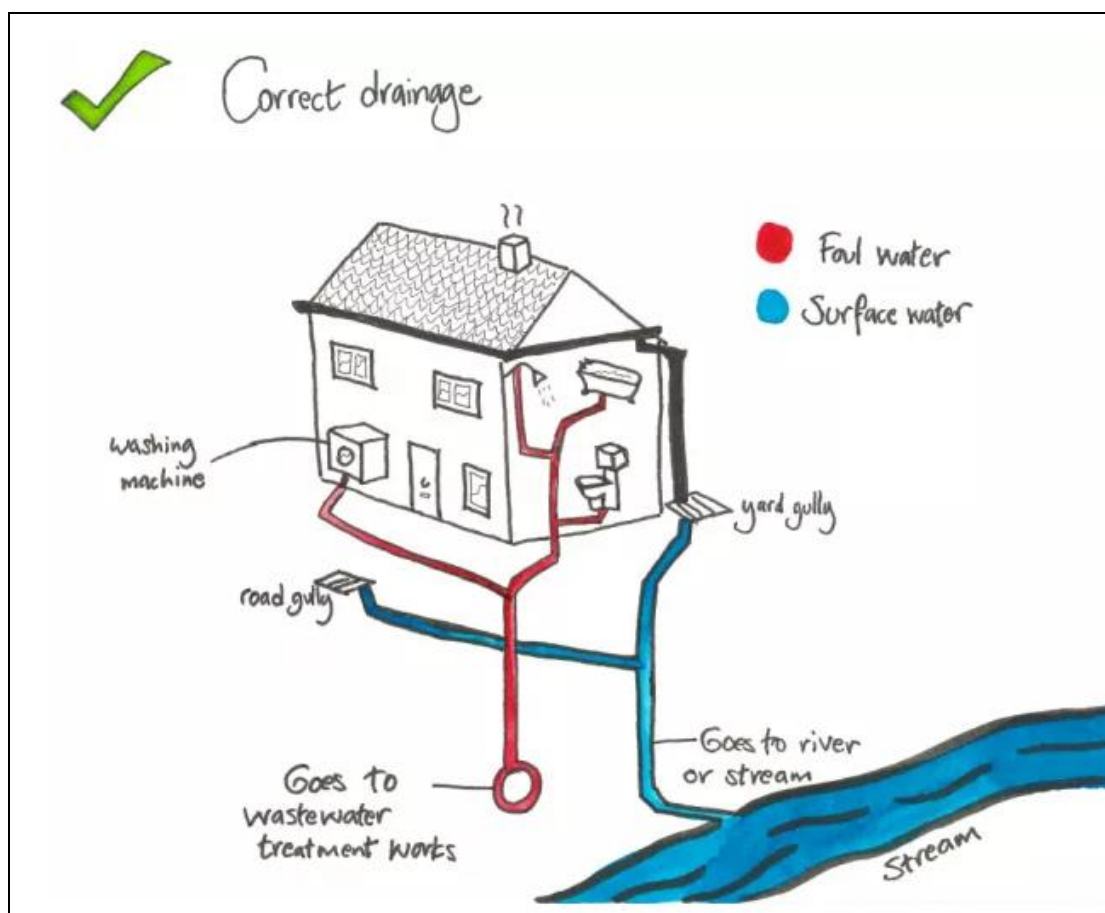


Figure 28. Correctly plumbed house where only clean surface water enters the river.

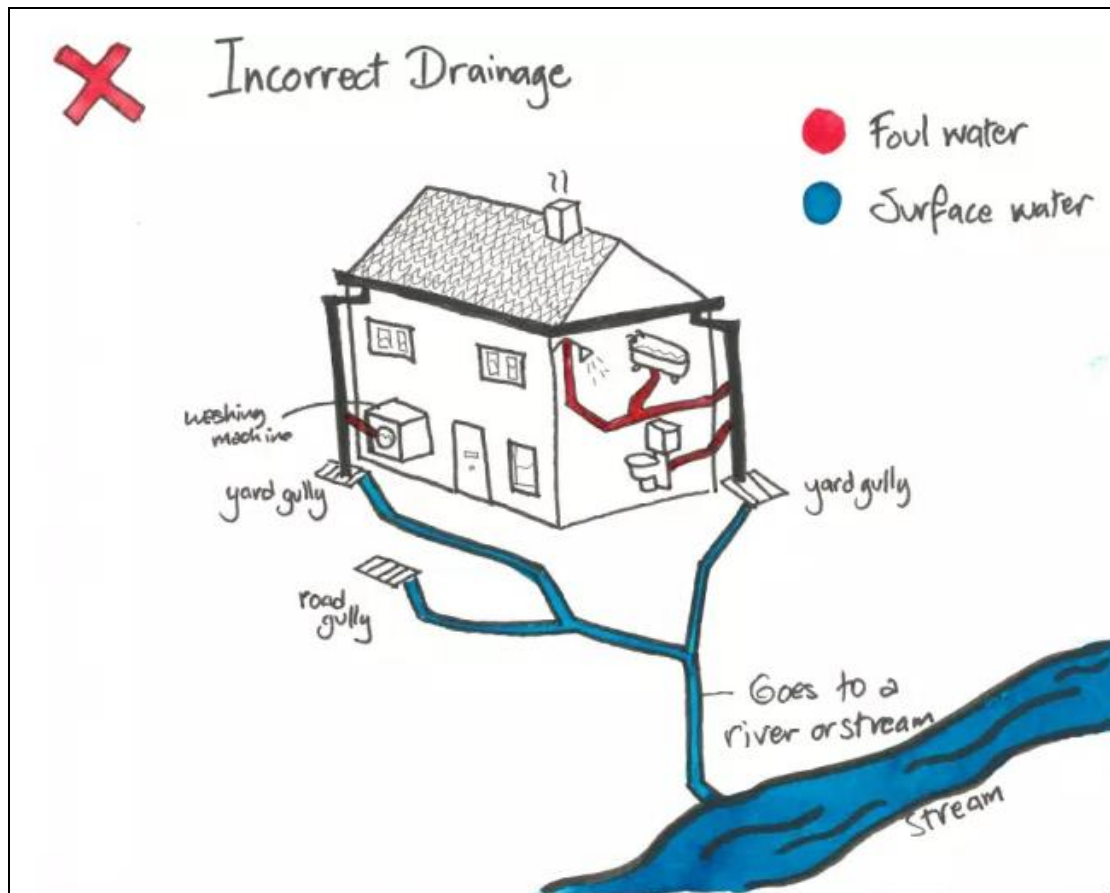


Figure 29. Incorrect drainage showing possible misconnections from washing machines, baths and toilets which can enter surface water systems.

Take a look at the pipework at your home or business and see if anything is going where it shouldn't and get it fixed!



Figure 30. Correctly plumbed premises.

5.11 Restoration of River Habitat

In stream habitat restoration in the sections of the river which have previously been straightened, dredged and canalised as shown on **Plate 22** should be considered.

Engineering actions such as these result in uniform flow and depth within the river and the loss of river complex habitats such as pools, riffles and glides due to the straightened nature of the channel.

In the section of the river downstream of the Village adjoining Sea Road there is limited opportunity to reprofile the banks, but increasing substrate roughness through the placement of boulders and gravels in the river bed would help to create more varied habitats such as riffle, glides and pools which are characteristic of a natural channel. This will also allow the development of the slow silty margins that are important for lamprey larvae and foraging birds.

Any remediation works should be made in consultation with Inland Fisheries Ireland and other relevant authorities. The appropriate planning process should be adhered to following relevant guidance and legislation.

6. REFERENCES

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7. APPENDICES

7.1 Appendix 1 – Site Synopsis for The Murrough SAC

Site Name: The Murrough Wetlands SAC

Site Code: 002249

The Murrough is a coastal wetland complex which stretches for 15 km from Ballygannon to north of Wicklow town, and in parts, extends inland for up to 1 km. A shingle ridge stretches the length of the site and carries the mainline Dublin-Wexford railway.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- [1210] Annual Vegetation of Drift Lines
- [1220] Perennial Vegetation of Stony Banks
- [1330] Atlantic Salt Meadows
- [1410] Mediterranean Salt Meadows
- [7210] *Cladium* Fens*
- [7230] Alkaline Fens

On the seaward side of the shingle bank which runs along The Murrough Wetlands SAC site drift line vegetation includes species such as Sea Rocket (*Cakile maritima*), Sea Sandwort (*Honkenya peploides*), Sea-holly (*Eryngium maritimum*) and Yellow Horned-poppy (*Glaucium flavum*). The rare and legally protected Oysterplant (*Mertensia maritima*) (Flora (Protection) Order, 1999) has been recorded on the gravelly shore in the past but is now considered to be extinct from this locality.

Low sand hills occur at Kilcoole, with Marram (*Ammophila arenaria*) and Lyme-grass (*Leymus arenarius*). In other areas and further inland a rich grassy sward, which is most extensive at the south of the site, has developed. Typical species include Sweet Vernal-grass (*Anthoxanthum odoratum*), Crested Dog's-tail (*Cynosurus cristatus*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Burnet Rose (*Rosa pimpinellifolia*) and Pyramidal Orchid (*Anacamptis pyramidalis*). A community dominated by Silverweed (*Potentilla anserina*) and Strawberry Clover (*Trifolium fragiferum*) occurs in some of the wetter, grassy areas. In some places, particularly at the south of the site, a gorse (*Ulex* sp.) heath has developed on the stony ridge.

Saltmarsh is present within the site in two distinct areas. At the southern end of the site is found Broad Lough. This is a brackish, partly tidal lake, and has a well developed saltmarsh community which includes Saltmarsh Rush (*Juncus gerardi*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Sea Purslane (*Halimione portulacoides*) and Common Scurvygrass (*Cochlearia officinalis*).

Common Reed (*Phragmites australis*) is abundant along the western shore, along with some Sea Club-rush (*Scirpus maritimus*). Saltmarsh is also present

in the northern end of the site in the vicinity of The Breaches. Though this has been greatly affected by drainage in the late 1980s and early 1990s, localised Sea Couch (*Elymus pycnanthus*) still occurs. The grassland which was created and improved as a result of the drainage is now influenced by seepage and flooding of saline waters.

Fen vegetation is well developed in the Murrrough wetlands, with both alkaline and calcareous fen with Great Fen-sedge (*Cladium mariscus*) represented. The fens occur mostly between Five Mile Point and Six Mile Point, especially in the townland of Blackditch and also in the Leamore and Grange areas. The alkaline fen is dominated by Black Bog-rush (*Schoenus nigricans*), with Marsh Pennywort (*Hydrocotyle vulgaris*), Purple Moor-grass (*Molinia caerulea*), Devil's-bit Scabious (*Succisa pratensis*), Heather (*Calluna vulgaris*), Cross-leaved heath (*Erica tetralix*), and a wide variety of orchids also present. The rare, Narrow-leaved Marsh-orchid (*Dactylorhiza traunsteineri*) has also been recorded here. Great Fen-sedge occurs in mosaic with several vegetational elements but chiefly with alkaline fen. Its many forms can range from pure stands of Great Fen-sedge, through to occurring as a dominant with Greater Tussock-sedge (*Carex paniculata*) and Blunt-flowered Rush (*Juncus subnodulosus*). *Cladium* fen also occurs at Blackditch within stretches of swamp woodland or fen carr dominated by Rusty Willow (*Salix cinerea* subsp. *oleifolia*) and Downy Birch (*Betula pubescens*).

A fine wet woodland occurs at Blackditch. Downy Birch is the dominant species, with some Alder (*Alnus glutinosa*), willows (*Salix* spp.) and Ash (*Fraxinus excelsior*) also present. The ground flora of this wooded area is often quite dense. This wood also contains a rich invertebrate community with at least eight rare or notable species of fly (Order Diptera) occurring, including *Syntormon setosus*, a species unknown elsewhere in Britain or Ireland.

A wide range of freshwater and brackish marsh habitats occur within the site. These vary from reed-marsh dominated by reeds and rushes (*Juncus* spp.), to those of sedges (*Carex* spp.), with other areas supporting a mixture of sedges and Yellow Iris (*Iris pseudacorus*). A wide variety of grasses and herbs are also found. These include Meadowsweet (*Filipendula ulmaria*), Silverweed and Common Spike-rush (*Eleocharis palustris*). The scarce Red Data Book species Marsh Pea (*Lathyrus palustris*) occurs in one area. The marshes merge into wet grassland in many areas. Where grazing pressure is low, a herb-rich sward occurs with species such as Ragged-Robin (*Lychnis flos-cuculi*), Cuckooflower (*Cardamine pratensis*), Meadowsweet and Heath Spotted-orchid (*Dactylorhiza maculata*) occurring. Sedges are abundant in the wetter areas. Where drains have been cut, there are many other species such as Greater Spearwort (*Ranunculus lingua*), Bogbean (*Menyanthes trifoliata*) and the scarce Reed Sweet-grass (*Glyceria maxima*).

The Murrrough is an important site for wintering waterfowl and breeding birds. Species listed on Annex I of the E.U. Birds Directive include Little Egret, Whooper Swan, Greenland White-fronted Goose, Golden Plover, Kingfisher and Little Tern. Average peak winter counts from 1994/95 - 1997/98 showed the site to have an internationally important population of Brent Goose (1,318, higher than in the early 1990s), nationally important

populations of Wigeon (1,518), Teal (772) and Lapwing (3,140), and regionally or locally important populations of Whooper Swan (80), Little Grebe (22), Shelduck (95), Gadwall (9), Mallard (391), Shoveler (22), Golden Plover (615), Curlew (605) and Redshank (181). Greylag Goose numbers were nationally important in the early 1990s but these numbers have dropped off. The average peak is now 213.

Little Tern breed on the shingle beach near The Breaches and this is the largest colony on the east coast (approx. 50 pairs in 1993, an average of 37 pairs over the ten year period 1988-1998). Redshank, Oystercatcher, Ringed Plover and Water Rail also breed. The reedbeds at Broad Lough provide habitat for Reed Warbler and the rare Bearded Tit has bred here.

Otter has been reported regularly from the Murrough. This is a Red Data Book Species, and is also listed on Annex II of the Habitats Directive.

Recent farming and drainage practices and afforestation have greatly reduced the area and quality of the wetlands habitats - the area between Kilcoole and Newcastle is particularly affected. In 1997 there was some levelling of the sand hills below Killoughter station. Pollution, reclamation and further drainage would adversely affect this site. A section of the wetlands at Blackditch, which includes alkaline and *Cladium* fen, has been acquired by BirdWatch Ireland and is being managed for nature conservation.

This site is of importance as it is the largest coastal wetland complex on the east coast of Ireland. Although much affected by drainage, it still contains a wide range of coastal and freshwater habitats, including six listed on Annex I of the E.U. Habitats Directive, some of which contain threatened plants. Areas on the site contain a rich invertebrate fauna, including several rarities. It is an important site for both wintering and breeding birds and supports a variety of species listed on Annex I of the E.U. Birds Directive.

4.01.2014

7.2 Appendix 2 – Site Synopsis for The Murrough SPA

SITE SYNOPSIS

SITE NAME: THE MURROUGH SPA

SITE CODE: 004186

The Murrough SPA comprises a coastal wetland complex that stretches for 13 km from Kilcoole Station, east of Kilcoole village in the north to Wicklow town in the south, and extends inland for up to 1 km in places. The site includes an area of marine water to a distance of 200m from the low water mark. A shingle ridge runs along the length of the site and carries the Dublin-Wexford railway line.

Beside the shingle shore is a stony ridge supporting perennial vegetation. Driftline vegetation on the seaward side includes species such as Sea Rocket (*Cakile maritima*), Sea Sandwort (*Honkenya peploides*), Sea Holly (*Eryngium maritimum*) and Yellowhorned Poppy (*Glaucium flavum*). Low sand hills occur at Kilcoole, with Marram (*Ammophila arenaria*) and Lyme-grass (*Leymus arenarius*). In other areas and further inland a rich grassy sward, which is most extensive in the south end of the site, has developed. A community dominated by Silverweed (*Potentilla anserina*) and Strawberry Clover (*Trifolium fragiferum*) occurs in some of the wetter, grassy areas. In some places, particularly at the south of the site, a Gorse (*Ulex*) heath has developed on the stony ridge.

At the southern end of the site, Broad Lough, a brackish, partly tidal lake, has a well developed saltmarsh community. Common Reed (*Phragmites australis*) is abundant along the western shore, along with some Sea Club-rush (*Scirpus maritimus*). Saltmarsh is also present in the northern end of the site in the vicinity of the Breaches. An area of fen occurs at Five Mile Point. Here, Black Bog-rush (*Schoenus nigricans*) is dominant. Fen Sedge (*Cladium mariscus*) is present where the ground is wetter. This merges into areas dominated by Common Reed. A wide range of freshwater and brackish marsh habitats occur within the site. These vary from reed-marsh dominated by reeds and rushes (*Juncus* spp.), to those of sedges (*Carex* spp.) with other areas supporting a mixture of sedges and Yellow Iris (*Iris pseudacorus*) also occurring. The marshes merge into wet grassland in many areas and where grazing pressure is low, a herb-rich sward occurs. Sedges are abundant in the wetter areas. Where drains have been cut, there are many other species such as Greater Spearwort (*Ranunculus lingua*), Bogbean (*Menyanthes trifoliata*) and Reed Sweet-grass (*Glyceria maxima*).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Red-throated Diver, Greylag Goose, Light-bellied Brent Goose, Wigeon, Teal, Black-headed Gull, Herring Gull and Little Tern. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its

associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The shingle ridge at Kilcoole is a traditional nesting area for Little Tern, and the site now supports one of the largest colonies in the country. Numbers vary between years, with 36 pairs recorded in 1995 and 106 pairs in 2006. A tern protection scheme and research programme, co-ordinated by BirdWatch Ireland and the National Parks and Wildlife Service, has been in operation since 1985. Breeding success varies from year to year, largely due to predation by foxes, crows and other species.

During the winter this site is important for a number of waterbirds - all population sizes are the mean of peak counts for the 5 years, 1995/96 - 1999/2000. Light-bellied Brent Goose occurs here in internationally important numbers (859). Other species that visit here in nationally important numbers are Red-throated Diver (32), Greylag Goose (300), Wigeon (1,209), Teal (644), Black-headed Gull (997) and Herring Gull (506). Other species that are known to occur here are Little Grebe, Grey Heron, Cormorant, Mute Swan, Whooper Swan, Greenland White-fronted Goose, Shelduck, Gadwall, Shoveler, Mallard, Golden Plover, Ringed Plover, Lapwing, Dunlin, Curlew, Greenshank and Redshank.

Short-eared Owl is recorded here during the winter. Little Egret has bred locally in recent years and this site is a main feeding area, with several birds present regularly. While formerly a rare bird in Ireland, Little Egret is now well-established with most birds occurring in the south-east and south (Counties Wexford, Waterford and Cork). The Murrough is presently at the edge of the species' range. This site is one of the few sites in Ireland where Reed Warbler breeds regularly. It is considered that 1-4 pairs bred each year during the 1980s and early 1990s, with a minimum of 6 birds in song in 1993. An absence of records since 1996 may be due to under-recording. Kingfisher regularly uses the site. Sandwich Tern are recorded from the site during the autumn.

The Murrough SPA is an important site for wintering waterbirds, being internationally important for Light-bellied Brent Goose and nationally important for Red-throated Diver, Greylag Goose, Wigeon, Teal, Black-headed Gull and Herring Gull. It is probably the most important site in the country for nesting Little Tern. The regular occurrence of Red-throated Diver, Little Egret, Whooper Swan, Greenland White-fronted Goose, Golden Plover, Little Tern, Sandwich Tern, Short-eared Owl and Kingfisher is of note as these species are listed on Annex I of the E.U. Birds Directive. Part of the Murrough SPA is a Wildfowl Sanctuary.

15.5.2015

7.3 Appendix 3 - Records held by the National Biodiversity Data Centre

Table 1. Records held by the National Biodiversity Data Centre from the study area.

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
acarine (Acari)	Acari	1	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
annelid	Lumbriculidae	1	17/07/2009	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
annelid	Tubificidae	3	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
bird	Black-billed Magpie (<i>Pica pica</i>)	2	31/03/2012	Birds of Ireland	
bird	Chaffinch (<i>Fringilla coelebs</i>)	1	11/12/2020	Birds of Ireland	
bird	Coal Tit (<i>Parus ater</i>)	1	15/03/2012	Birds of Ireland	
bird	Common Blackbird (<i>Turdus merula</i>)	2	11/12/2020	Birds of Ireland	
bird	Common Buzzard (<i>Buteo buteo</i>)	1	26/05/2019	Birds of Ireland	
bird	Common Chiffchaff (<i>Phylloscopus collybita</i>)	1	02/04/2012	Birds of Ireland	
bird	Common Swift (<i>Apus apus</i>)	1	29/05/2012	Birds of Ireland	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Eurasian Collared Dove (<i>Streptopelia decaocto</i>)	5	10/08/2012	Birds of Ireland	
bird	Eurasian Jackdaw (<i>Corvus monedula</i>)	5	25/12/2012	Birds of Ireland	
bird	Eurasian Treecreeper (<i>Certhia familiaris</i>)	1	02/04/2012	Birds of Ireland	
bird	European Goldfinch (<i>Carduelis carduelis</i>)	1	31/03/2012	Birds of Ireland	

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
bird	European Greenfinch (<i>Carduelis chloris</i>)	4	11/12/2020	Birds of Ireland	
bird	Great Spotted Woodpecker (<i>Dendrocopos major</i>)	1	26/05/2019	Birds of Ireland	
bird	Great Tit (<i>Parus major</i>)	1	11/12/2020	Birds of Ireland	
bird	Grey Heron (<i>Ardea cinerea</i>)	1	10/07/2012	Birds of Ireland	
bird	Hedge Accentor (<i>Prunella modularis</i>)	1	10/07/2012	Birds of Ireland	
bird	House Sparrow (<i>Passer domesticus</i>)	1	02/04/2012	Birds of Ireland	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Long-tailed Tit (<i>Aegithalos caudatus</i>)	1	15/03/2012	Birds of Ireland	
bird	Mistle Thrush (<i>Turdus viscivorus</i>)	3	02/04/2012	Birds of Ireland	
bird	Rook (<i>Corvus frugilegus</i>)	5	11/04/2012	Birds of Ireland	
bird	White-throated Dipper (<i>Cinclus cinclus</i>)	2	11/12/2020	Birds of Ireland	
bird	Yellowhammer (<i>Emberiza citrinella</i>)	1	09/03/2012	Birds of Ireland	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bony fish (<i>Actinopterygii</i>)	Brown Trout (<i>Salmo trutta</i> subsp. <i>fario</i>)	1	03/06/2016	General Biodiversity Records from Ireland	
crustacean	Asellus	1	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
crustacean	Gammarus	1	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
crustacean	Gammarus duebeni	3	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
flatworm (Turbellaria)	flatworms (Tricladida)	1	30/05/2012	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
flowering plant	Winter Heliotrope (Petasites fragrans)	2	03/02/2018	National Invasive Species Database	
insect - beetle (Coleoptera)	Dytiscidae	1	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - beetle (Coleoptera)	Elmis aenea	1	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - beetle (Coleoptera)	Hydrophilidae	1	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - beetle (Coleoptera)	Limnius volckmari	4	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - beetle (Coleoptera)	Silpha tristis	3	02/07/1932	Carrion Beetles of Ireland	
insect - butterfly	Comma (Polygonia c-album)	4	25/10/2020	Butterflies of Ireland	
insect - butterfly	Common Blue (Polyommatus icarus)	1	01/09/2013	Butterflies of Ireland	
insect - butterfly	Green-veined White (Pieris napi)	7	26/09/2018	Irish Butterfly Monitoring Scheme	
insect - butterfly	Holly Blue (Celastrina argiolus)	3	23/07/2017	Butterflies of Ireland	
insect - butterfly	Large White (Pieris brassicae)	28	01/10/2018	Butterflies of Ireland	
insect - butterfly	Orange-tip (Anthocharis cardamines)	5	26/04/2021	Butterflies of Ireland	
insect - butterfly	Painted Lady (Vanessa cardui)	3	20/09/2019	Butterflies of Ireland	
insect - butterfly	Peacock (Inachis io)	2	23/09/2013	Butterflies of Ireland	
insect - butterfly	Red Admiral (Vanessa atalanta)	12	06/08/2019	Butterflies of Ireland	
insect - butterfly	Ringlet (Aphantopus hyperantus)	1	07/07/2019	Butterflies of Ireland	
insect - butterfly	Small Tortoiseshell (Aglais urticae)	28	14/04/2020	Butterflies of Ireland	
insect - butterfly	Small White (Pieris rapae)	11	18/08/2018	Irish Butterfly Monitoring Scheme	
insect - butterfly	Speckled Wood (Pararge aegeria)	14	26/04/2021	Butterflies of Ireland	
insect - caddis fly (Trichoptera)	Drusus annulatus	1	30/05/2012	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	

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insect - caddis fly (Trichoptera)	Glossosomatidae	3	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - caddis fly (Trichoptera)	Goeridae	2	30/05/2012	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - caddis fly (Trichoptera)	Hydropsyche	3	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - caddis fly (Trichoptera)	Limnephilidae	4	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - caddis fly (Trichoptera)	Odontocerum albicorne	1	30/05/2012	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - caddis fly (Trichoptera)	Rhyacophila	1	17/07/2009	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - caddis fly (Trichoptera)	Rhyacophila dorsalis	2	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - caddis fly (Trichoptera)	Sericostoma	3	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - dragonfly (Odonata)	Common Darter (Sympetrum striolatum)	4	29/09/2012	Dragonfly Records	
insect - hymenopteran	Bombus (Bombus) lucorum	3	15/03/2014	Bees of Ireland	
insect - mayfly (Ephemeroptera)	Alainites muticus	2	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - mayfly (Ephemeroptera)	Baetidae	1	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - mayfly (Ephemeroptera)	Baetis	4	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	

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insect - mayfly (Ephemeroptera)	Ecdyonurus	4	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - mayfly (Ephemeroptera)	Rhithrogena	2	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - mayfly (Ephemeroptera)	Serratella ignita	4	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - moth	Flounced Rustic (<i>Luperina testacea</i>)	1	07/09/1997	Moths Ireland	
insect - stonefly (Plecoptera)	Chloroperlidae	1	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - stonefly (Plecoptera)	Leuctra	1	17/07/2009	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - true bug (Hemiptera)	Velia	1	30/05/2012	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - true fly (Diptera)	Chironomidae	3	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - true fly (Diptera)	Dicranota	3	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - true fly (Diptera)	Diptera larva (Diptera)	1	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
insect - true fly (Diptera)	Simuliidae	3	23/06/2015	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
mollusc	<i>Ancylus fluviatilis</i>	1	30/05/2012	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
mollusc	Jenkins' Spire Snail (<i>Potamopyrgus antipodarum</i>)	4	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species

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mollusc	Physella	1	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
mollusc	Wandering Snail (<i>Radix balthica</i>)	1	26/07/2018	A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007-2018 (EPA)	
terrestrial mammal	Eastern Grey Squirrel (<i>Sciurus carolinensis</i>)	3	26/09/2015	Atlas of Mammals in Ireland 2010-2015	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> EU Regulation No. 1143/2014 Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
terrestrial mammal	Eurasian Badger (<i>Meles meles</i>)	1	02/04/2014	Atlas of Mammals in Ireland 2010-2015	Protected Species: Wildlife Acts
terrestrial mammal	Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	1	18/06/2011	National Bat Database of Ireland	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts