Lough Swilly Catchment Assessment 2010-2015 (HA 39)

Catchment Science & Management Unit

Environmental Protection Agency

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Preface

This document provides a summary of the characterisation outcomes for the water resources of the Lough Swilly Catchment, which have been compiled and assessed by the EPA, with the assistance of local authorities and RPS consultants. The information presented includes status and risk categories of all water bodies, details on protected areas, significant issues, significant pressures, load reduction assessments, recommendations on future investigative assessments, areas for actions and environmental objectives. The characterisation assessments are based on information available to the end of 2015. Additional, more detailed characterisation information is available to public bodies on the EPA WFD Application via the EDEN portal, and more widely on the catchments.ie website. The purpose of this document is to provide an overview of the situation in the catchment and help inform further action and analysis of appropriate measures and management strategies.

This document is supported by, and can be read in conjunction with, a series of other documents which provide explanations of the elements it contains:

1. An explanatory document setting out the full characterisation process, including water body, subcatchment and catchment characterisation.
2. The Final River Basin Management Plan, which can be accessed on: www.catchments.ie.
3. A published paper on Source Load Apportionment Modelling, which can be accessed at: http://www.jstor.org/stable/10.3318/bioe.2016.22
4. A published paper on the role of pathways in transferring nutrients to streams and the relevance to water quality management strategies, which can be accessed at: http://www.jstor.org/stable/pdf/10.3318/bioe.2016.19.pdf
5. An article on Investigative Assessments which can be accessed at: https://www.catchments.ie/download/catchments-newsletter-sharing-science-stories-june-2016/

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1 Introduction

This catchment includes the area drained by the River Donagh and all streams entering tidal water between Dunaff Head and Culmore Point, Co. Derry, draining a total area of 507 km². The largest urban centre in the catchment is Carndonagh. The other main urban centre is Moville. The total population of the catchment is approximately 18,300 with a population density of 36 people per km². The catchment is largely mountainous and is entirely underlain by metamorphic rocks that provide limited groundwater resources.

This catchment comprises the northern and eastern parts of the Inishowen Peninsula and is drained by several relatively small rivers which flow from the mountains in the centre of the peninsula. The Clonmany River drains the northern slopes of Raghtin More and Bulbin, flowing into the sea at Tullagh Bay.

The River Straid drains the northern flanks of Slieve Snaght, flowing into the western side of Trawbreaga Bay. The Donagh and Glennagannon Rivers flow north through the centre of the catchment past Carndonagh and into the eastern side of Trawbreaga Bay.

The Malin Peninsula is drained by the Keenagh River flowing northwest and into the sea south of Malin Head. Much of the north-eastern part of the Inishowen Peninsula is drained by the Culduff River, which flows in a clockwise spiral past Gleneely and into the sea at Culdaff bay. The southeastern part of the catchment is drained by a series of small rivers including the Aught, Cabry, Drung, Fad, Breedagh and Greencastle Rivers that run southeast from an upland ridge oriented parallel to the shoreline of Lough Foyle.

The Donagh Moville catchment comprises 6 sub-catchments (Table 1, Figure 1) with 51 river water bodies, nine lake water bodies, four transitional and three coastal water bodies. There are three groundwater bodies. There are no heavily modified water bodies in the catchment. The catchment has several shared water bodies with Northern Ireland.

Table 1. List of subcatchments in the Lough Swilly catchment

Subcatchment ID	Subcatchment Name
39_1	Crana_SC_010
39_2	Burnfoot_SC_010
39_3	CASHELPREAGHAN_SC_010
39_4	LeslieHill[Stream]_SC_010
39_5	Leannan_SC_020
39_6	Swilly_SC_010
39_7	Leannan_SC_010

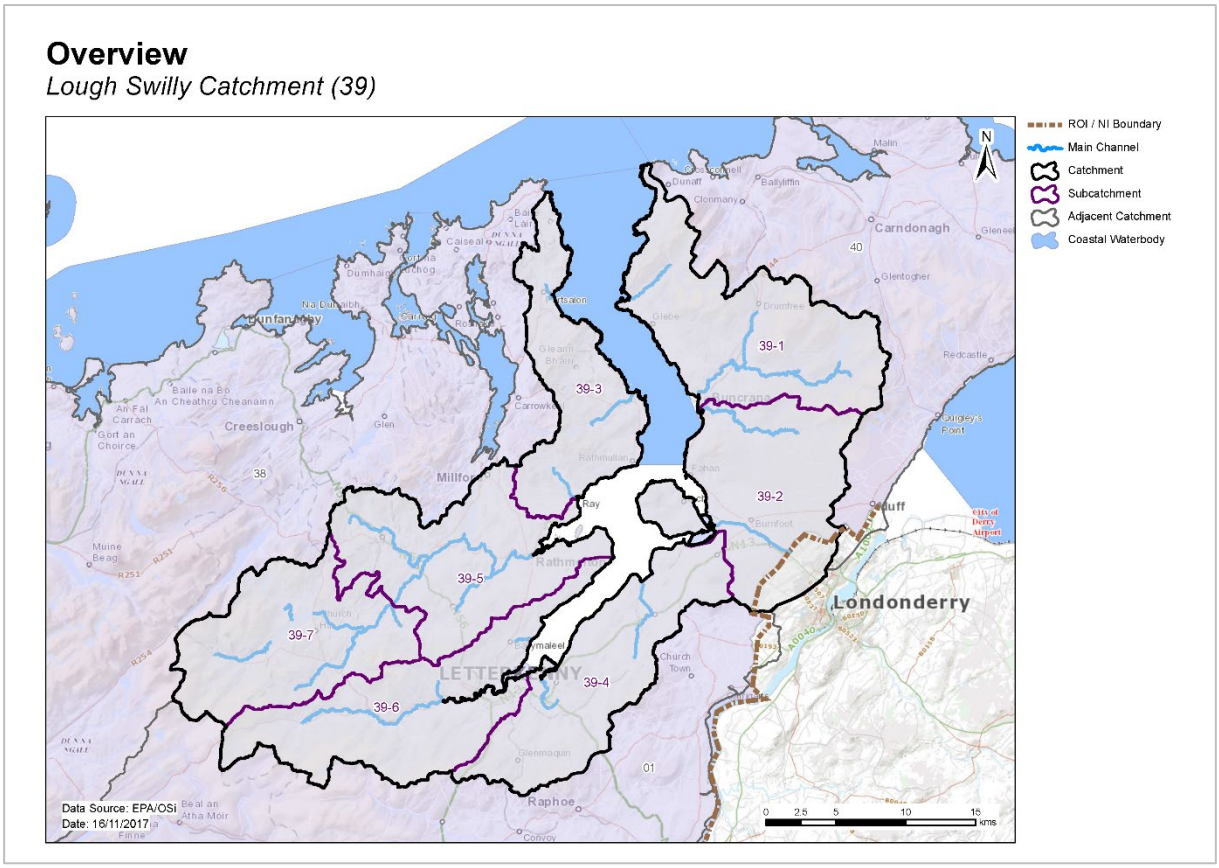


Figure 1. Location and subcatchments in the Lough Swilly catchment

2 Water body status and risk of not meeting environmental objectives

2.1 Surface water ecological status

2.1.1 Rivers and Lakes

- There were 24 (40%) river and lake water bodies at Good or High status, and 18 (30%) at less than Good status in 2015 (Table 1 and Figure 2). Eighteen (30%) river and lakes water bodies were unmonitored.
- Six water bodies (5 rivers, 1 lake) have a High Ecological Status objective. In 2015, four of these water bodies were at High status and two were at Good (Appendix 1, Figure 3).
- The numbers of water bodies at each status class in 2007-09 and 2010-2015 are shown in Figure 4 (Rivers) and Figure 5 (Lakes).
- Since 2007-09 when WFD monitoring began, 10 river water bodies and two lake water bodies have improved and six river water bodies have deteriorated Summary information for the *At Risk* water bodies is given in Appendix 3.

2.1.2 Transitional and Coastal (TraC)

- Of the seven TraC water bodies in the catchment, two (29%) were at High status, two (29%) were less than Good status in 2015 with the remaining three (42%) are unmonitored (Table 2, Figure 2).
- Two of the TraC water bodies have a High Ecological Status objective, North-western Atlantic Seaboard and Lough Swilly. In 2015, two of these water bodies were at High status (Appendix 1, Figure 3).

- The numbers of TraC water bodies at each status class in 2007-09 and 2010-2015 are shown in Figure 6.
- The variation in nutrient concentrations and loads in the Leannan and Carn_Low rivers, the main channels in the catchment, is illustrated in Appendix 2.

	Number of water bodies	2010-2015 Status						Risk Categories		
		High	Good	Mod	Poor	Bad	Un-assigned	*Not at Risk*	*Review*	*At Risk*
Rivers	51	3	19	6	11	0	12	21	11	19
Lakes	9	1	1	0	1	0	6	5	3	1
TraCs	7	2	0	1	1	0	3	4	1	2

Table 2. Summary of surface water body status and risk categories

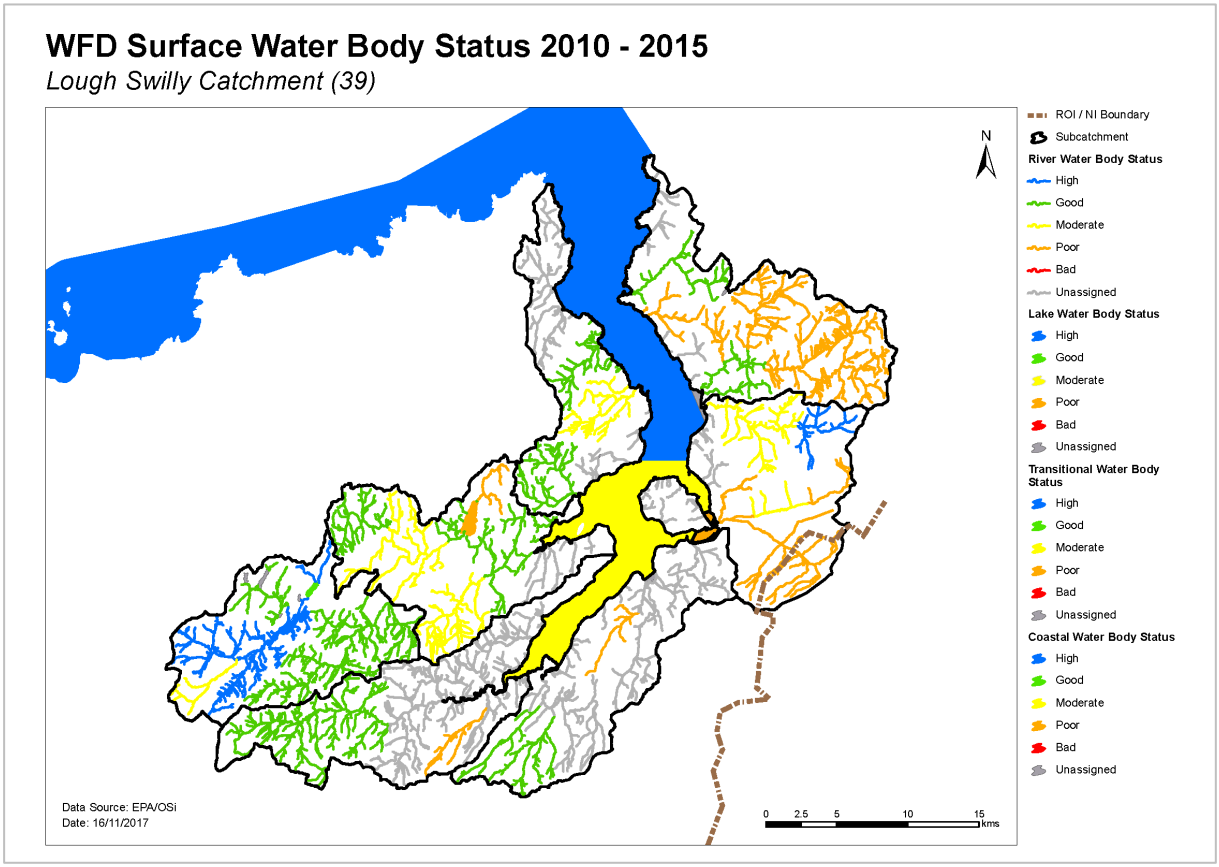


Figure 2. Surface water ecological status.

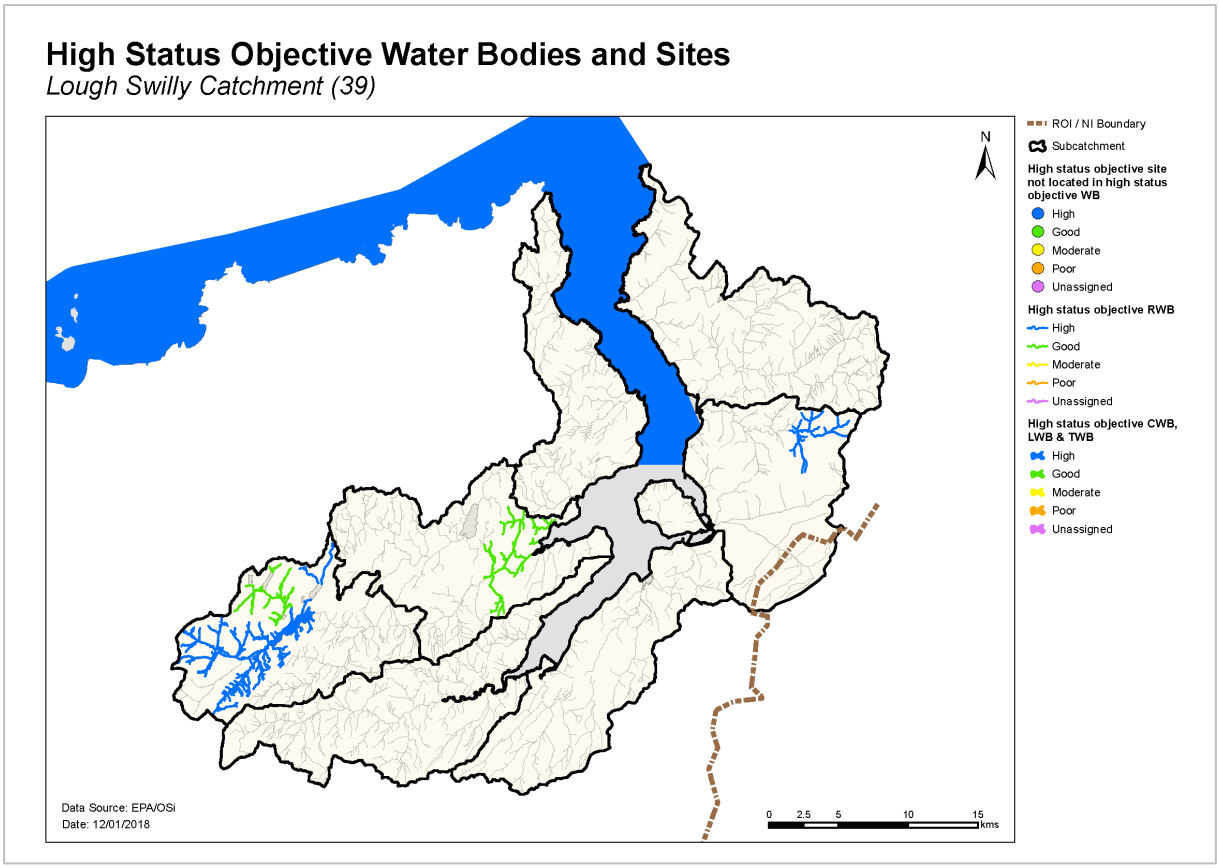


Figure 3. High ecological status objective water bodies and sites.

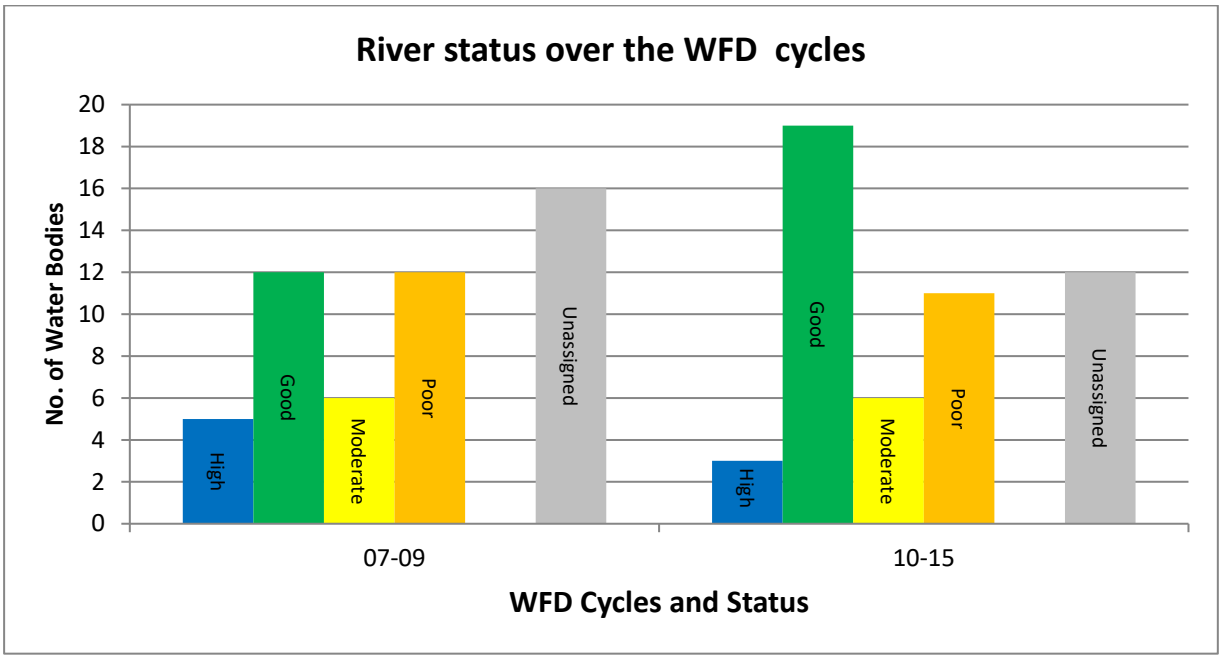


Figure 4. Number of rivers at each status class in 2007-09 and 2010-2015

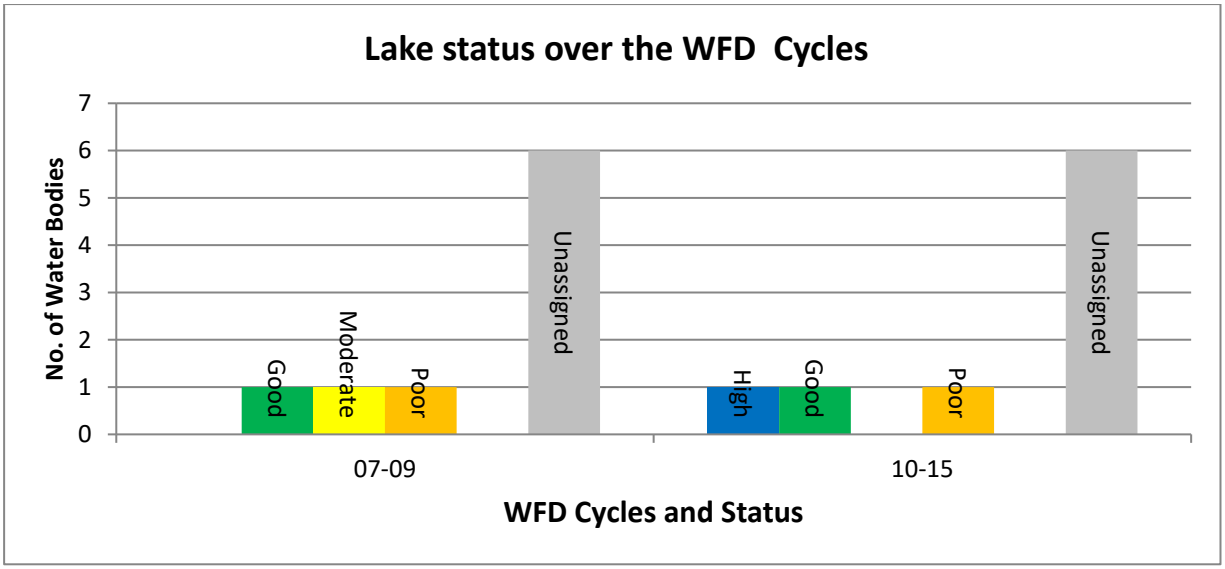


Figure 5. Number of lakes at each status class in 2007-09 and 2010-2015

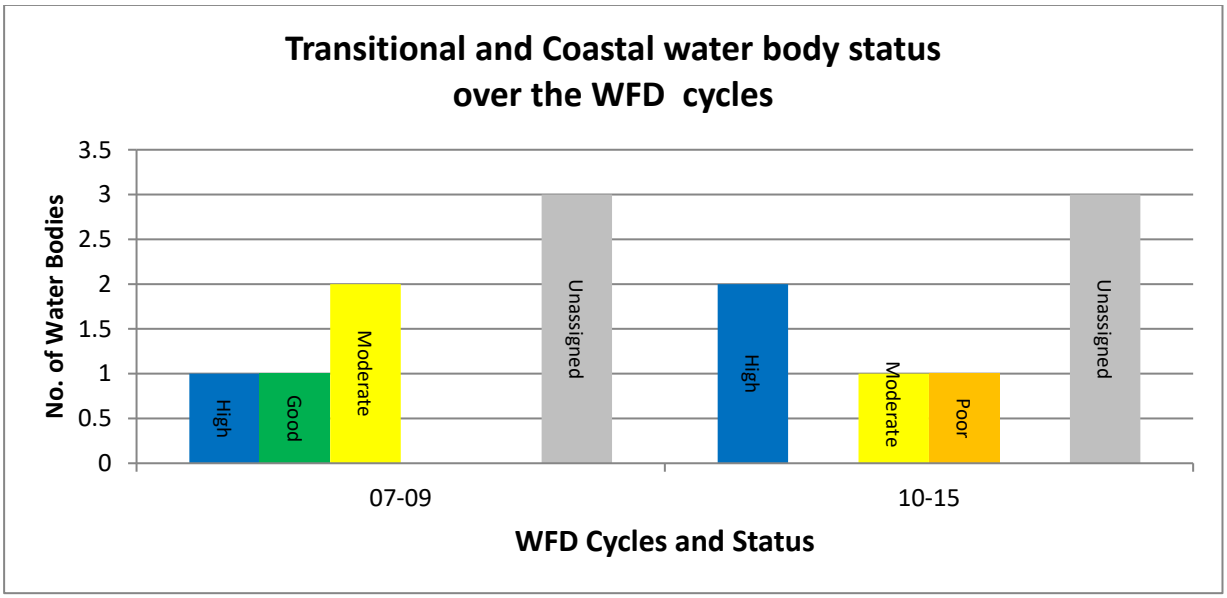


Figure 6. Number of transitional and coastal water bodies at each status class in 2007-09 and 2010-15

2.2 Groundwater status

- All three groundwater bodies in the catchment are classed as Good status and no changes occurred during the last WFD cycle (Table 3, Figure 7).

Table 3. Summary of groundwater body status and risk

	Number of water bodies	2010-2015 Status		Risk Category		
		Good	Poor	*Not at Risk*	*Review*	*At Risk*
Groundwater	3	3	0	3	0	0

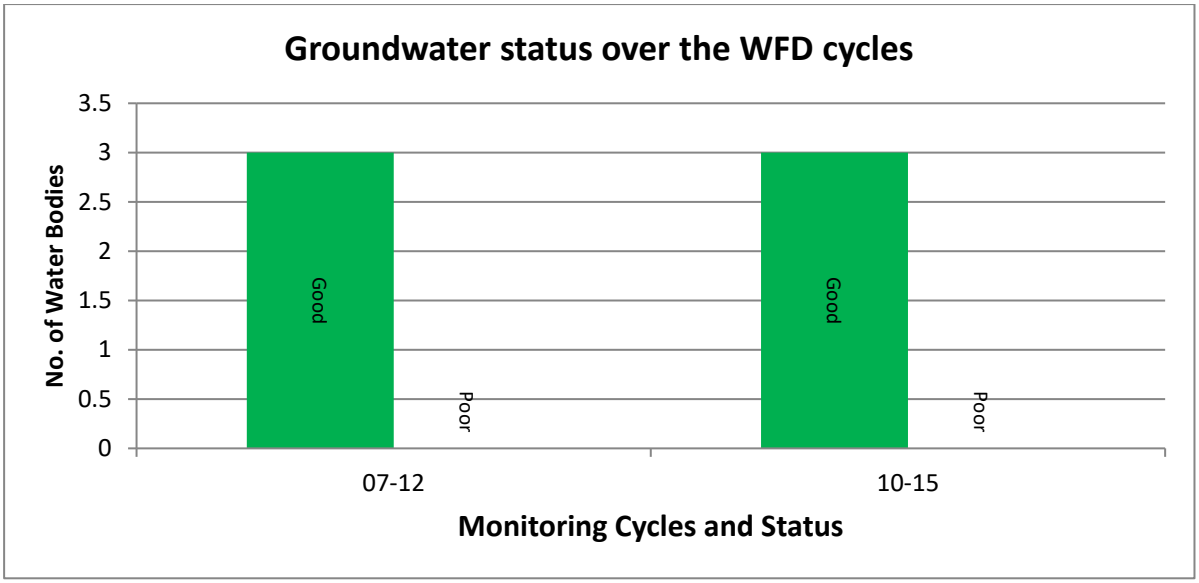


Figure 7. Number of Groundwater at each status class in 2007-12 and 2010-15

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and Lakes

- Twenty-one river water bodies and five lake water bodies are *Not at Risk* (Figure 8, Table 2) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Eleven river water bodies and three lake water bodies are in *Review*. This includes eight river water bodies where more information is required and one river water body where measures have recently been implemented and improvements have not yet been realised. With regard lakes, three of these require further information.
- Nineteen river water bodies and one lake water body in the catchment are *At Risk* of not meeting their water quality objectives. Measures will be needed in these water bodies to improve the water quality outcomes.

2.3.2 Transitional and Coastal (TraC)

- Four water bodies are *Not at Risk* (Figure 8, Table 2) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- One water body the Crana Estuary is in *Review*.
- Two water bodies are *At Risk* of not meeting their water quality objectives. Measures will be needed in these water bodies to improve the water quality outcomes.

2.4 Risk of not meeting groundwater body environmental objectives

- All three groundwater bodies are *Not at Risk* (Figure 9, Table 3) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.

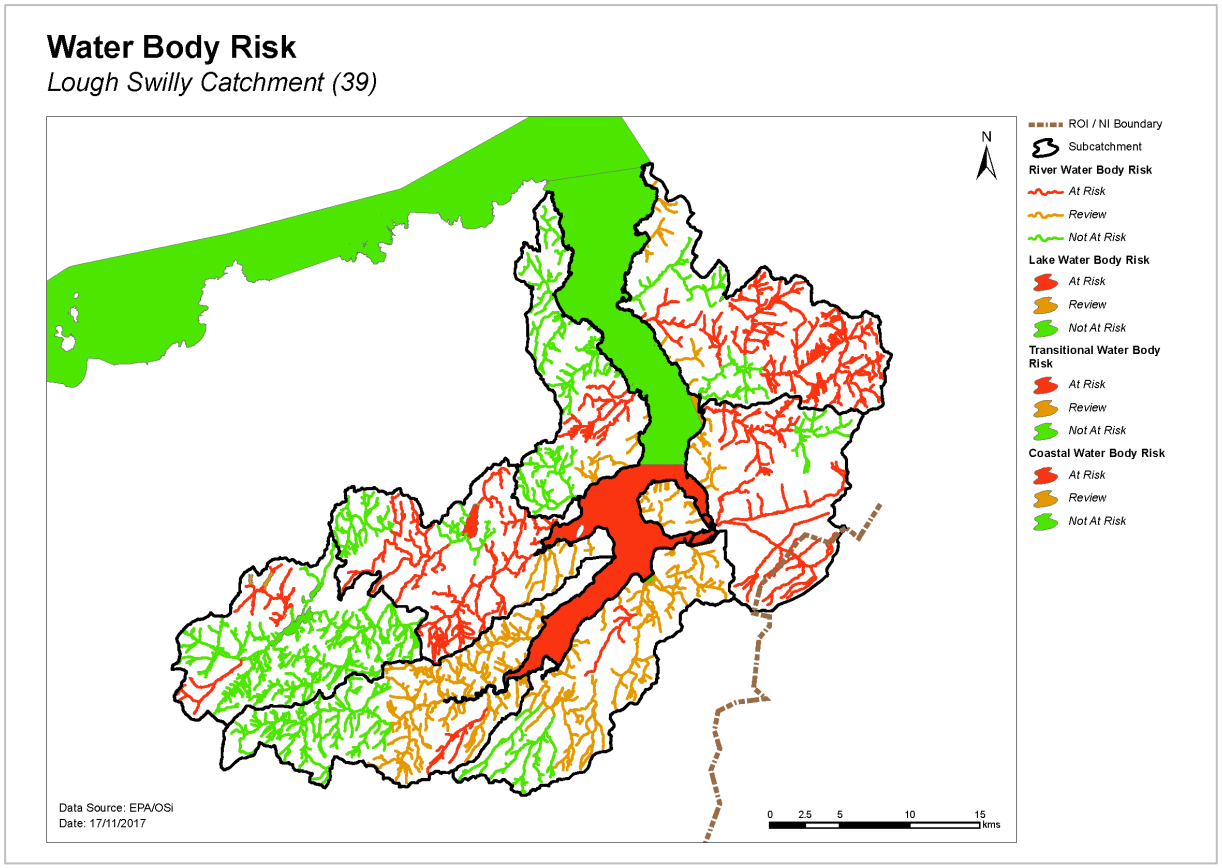


Figure 8. Surface water body risk.

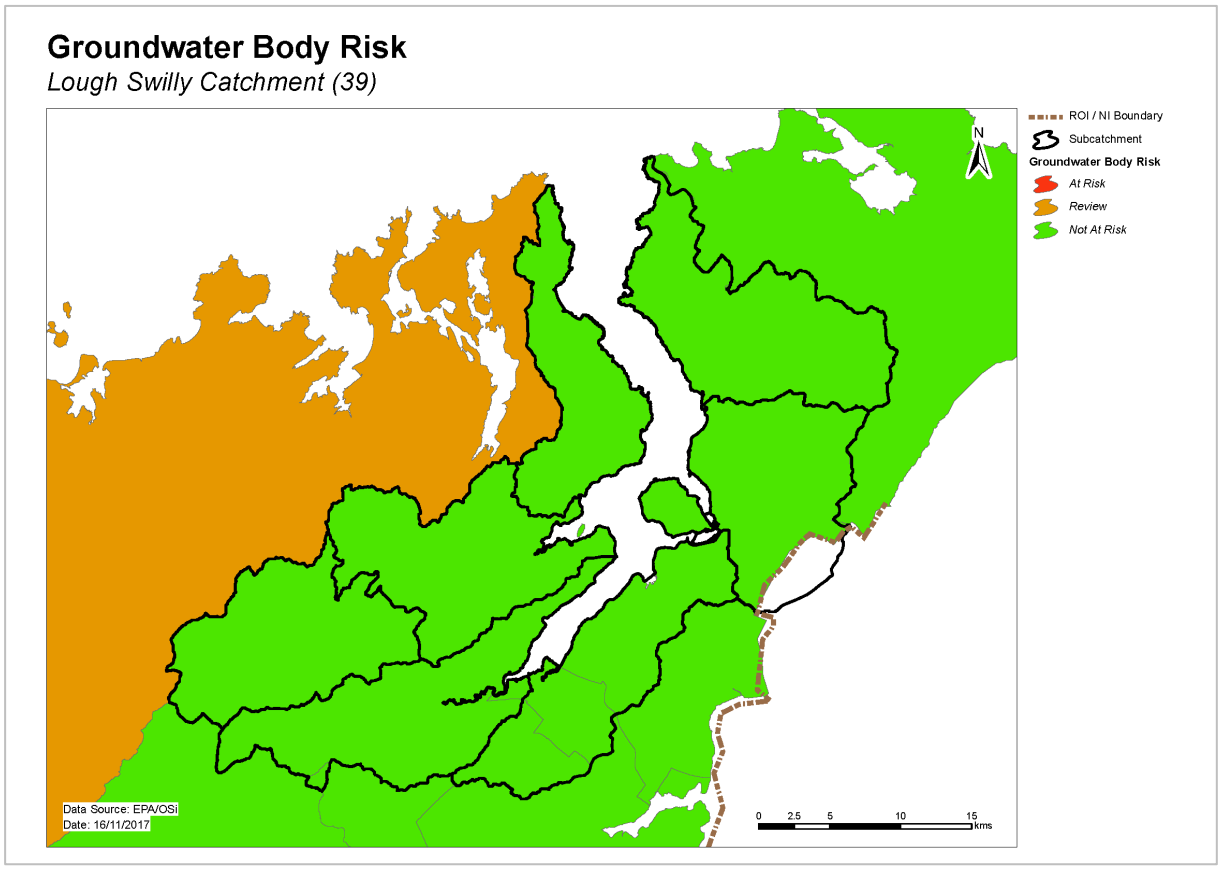


Figure 9. Groundwater body risk

2.5 Protected Areas

2.5.1 Drinking Water Protected Areas

- There are five drinking water schemes in total with seven abstractions in the catchment comprising the Buncrana, Fullerton Pollan Dam, Milford Pub, Rathmullan Pub and Letterkenny Mixed supplies all owned by Irish Water. There are no group water schemes.

- Three of the drinking water abstractions are from one groundwater body, three are from lakes Lough Doo, Gort Lough, Lough Columbcille and one from the outlet of Pollan Dam Reservoir on the Crana River. The list of the public supplies and the associated water bodies is provided in Appendix 4.

- All sources were compliant with the standards for nitrate in 2015.

- All public sources were compliant with the standards for pesticides in 2015.

- Therefore, all five-drinking water protected areas had met their objectives in 2015.

2.5.2 Bathing Waters

- There are four designated marine bathing waters in the Lough Swilly catchment. Three of the bathing waters are in satisfactory condition and one (Lady's Bay, Buncrana) is in 'sufficient' condition only. The bathing water profile indicates that Buncrana WWTP is the significant pressure impacting Lady's Bay, Buncrana bathing water. Table 4 list the bathing waters in the catchment.

Table 4. Bathing Waters in the catchment

Bathing Water		Water Body Intersection		Objective met?		Comment
Name	Code	Name	Code	Yes	No	
Portsalon	IENWBWC220_0000_0300	Lough Swilly	IE_NW_220_0000	✓		
Rathmullan	IENWBWC220_0000_0200	Lough Swilly	IE_NW_220_0000	✓		
Lisfannon	IENWBWC220_0000_0100	Swilly Estuary	IE_NW_220_0100	✓		
		Lough Swilly	IE_NW_220_0000			
Lady's Bay, Buncrana	IENWBWT220_0400_0100	Crana Estuary	IE_NW_220_0400		✓	Buncrana WWTP is the significant pressure.

2.5.3 Shellfish Waters

There is one designated shellfish area in the Lough Swilly estuary. The shellfish area is compliant with the relevant standards and there no water quality issues of concern. Table 5 list the bathing waters in the catchment.

Table 5. Shellfish Waters in the catchment

Shellfish Area		Water Body Intersection		Objective met?	
Name	Code	Name	Code	Yes	No
Lough Swilly	IEPA2_0042	Swilly Estuary	IE_NW_220_0100	✓	
		Lough Swilly	IE_NW_220_0000		

2.5.4 Nutrient Sensitive Areas

- There are no designated Nutrient Sensitive Areas in the Lough Swilly catchment.

2.5.5 Natura 2000 Sites

- There are six Special Areas of Conservation (SACs) in the catchment, not all of which have water quality and/or quantity conservation objectives for their qualifying interests.
- Six water bodies (3 rivers, 1 lake, 2 transitional) have been prioritised for action as the water conservation objectives for their habitats and/or species are not being supported by ecological status (Appendix 5).
- There are five Special Protected Areas (SPAs) in the catchment:
    - Derryveagh And Glendowan Mountains SPA
    - Fanad Head SPA
    - Horn Head to Fanad Head SPA
    - Lough Fern SPA
    - Lough Swilly SPA

  As there are no specific water quality and quantity supporting conditions identified in the site-specific conservation objectives for these SPAs, the intersecting water bodies are not assigned priority action for WFD protected area purposes in the second cycle.
- There are seven river water bodies that are designated as salmonid rivers (under Salmonid Regulations (S.I. 293 / 1988)) but are not located within SACs. Three of these water bodies (Glashagh (Lower)_010, Maggy's Burn_010 and Swilly 39_010) have been prioritised for action as the water conservation objectives for this species are not being supported by ecological status (Appendix 5).
- There are two river water bodies (Glashagh (Lower)_010 and Maggy's Burn_010) that are designated as Freshwater Pearl Mussel rivers (under Freshwater pearl mussel regulations (S.I. 296 2009)) but are not located within SACs. Both water bodies have been prioritised for action as the water conservation objectives for this species are not being supported by ecological status (Appendix 5).

2.6 Heavily modified water bodies

- There are no designated heavily modified water bodies (HMWBs) in the catchment.
- There are no designated artificial water bodies (AWBs) in the catchment.

3 Significant issues in *At Risk* water bodies

- Excess nutrients, mainly phosphorus but in some cases ammonia, are the dominant issues in the catchment.
- Cypermethrin arising from sheep dipping is a recurring problem.
- Hydromorphological issues affecting siltation and channel modification are significant, and this is exacerbated by peaky nature of the river flows in the subcatchment.
- There are no groundwater water bodies *At Risk* and therefore no associated significant issues.

4 Significant pressures

4.1 Water bodies

- Where water bodies have been classed as *At Risk*, by water quality or survey data, significant pressures have been identified.
- Figure 10 shows a breakdown of the number of *At Risk* water bodies in each significant pressure category.

4.1.1 Rivers, lakes, transitional and coastal (TraC)

- Significant pressures have been identified by the initial characterisation process in 22 water bodies, thirteen of which have multiple pressures. The significant pressures will be refined as further characterisation is carried out.
- The significant pressure affecting the greatest number of water bodies is agriculture, followed by urban waste water, domestic waste water, hydromorphology, forestry, peat and extractive industry including mines and quarries, diffuse urban and other (Figure 10).

- In the case of lake water bodies that are *At Risk* only one significant pressure namely Urban Waste Water has been identified.
- The significant pressures affecting Inch Lough is agriculture and hydromorphology, and Swilly Estuary is impacted by diffuse urban and waste water in the Letterkenny agglomeration.

4.1.2 Groundwater

There are no Groundwater water bodies *At Risk* and therefore no associated significant pressures.

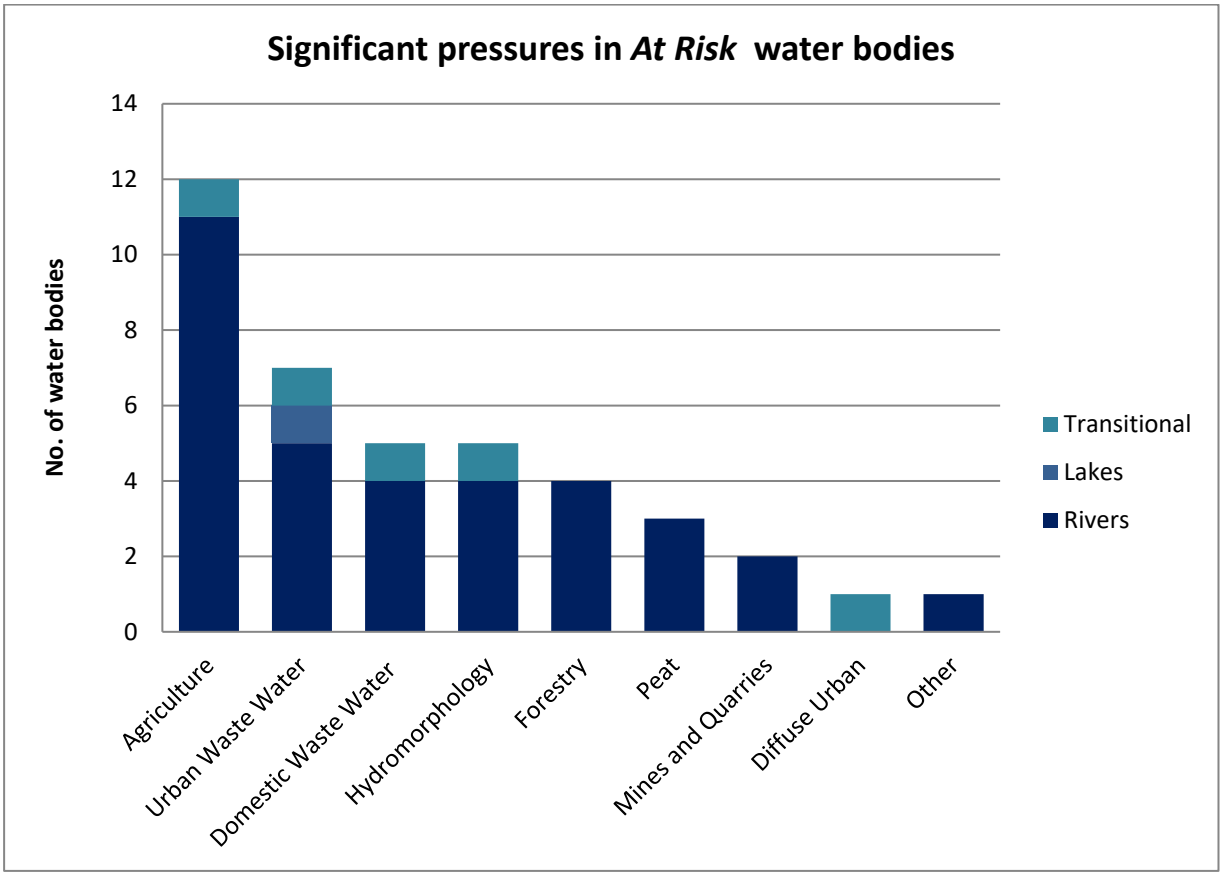


Figure 10. Significant pressures impacting on *At Risk* water bodies.

4.2 Pressure Type

4.2.1 Agriculture

- Agriculture is a significant pressure in 11 river water bodies and one transitional water body Inch Lough IE_NW_220_0300 Figure 11. The impacts related to farming in this catchment are overland phosphorus loss to surface waters from, for example, direct discharges; or runoff from yards, roadways or other compacted surfaces, or runoff from poorly draining soils. Sediment can also be a problem from land drainage works, bank erosion from animal access or stream crossings. There may also be issues with agricultural pesticides such as sheep dip entering water bodies.
  The pollution impact potential map showing areas of relative risk for phosphorus loss from agriculture to surface water is given in Appendix 6.

4.2.2 Urban Waste Water Treatment Plants

- Urban Waste Water Treatment Plants (WWTPs) and agglomeration networks have been identified as significant pressures in seven *At Risk* water bodies; details are given in Table 6 and Figure 12. Six of these *At Risk* water bodies are impacted by WWTPs and agglomeration networks that are scheduled to be upgraded.

Table 6. Waste Water Treatment Plants and agglomerations identified as Significant Pressures in *At Risk* water bodies and expected completion dates for associated upgrade works, where applicable.

Facility name	Facility Type	Water Body	10-15 Ecological Status	Expected Completion Date
Milford D0342	1,001 to 2,000 p.e.	Fern	Poor	2021
Milford D0342	1,001 to 2,000 p.e.	Maggy's Burn_010	Poor	2021
Burnfoot D0531	500 to 1,000 p.e.	Burnfoot_020	Moderate	2024
Termon Housing Scheme A0489	< 500 p.e.	Leannan_050	Moderate	*NA* [1]
Kilmacrennan D0513	500 to 1,000 p.e.	Leannan_050	Moderate	2022
Ramelton D0341	1,001 to 2,000 p.e.	*Carn_Low_010* [2]	*Good*	2021
Bridgend D0532	500 to 1,000 p.e.	Skeoge_010	Poor	2024
Letterkenny D0009	> 10,000 p.e.	*Swilly Estuary* [3]	Moderate	*2020* [3]
Buncrana				*2025*

[1] *Currently not specified in improvement plans.*
[2] *Carn_Low_010 is a high status environmental objective water body.*
[3] *Letterkenny WWTP upgrade works are complete, however, the agglomeration network, which has a scheduled upgrade completion date of 2020, has been identified as a significant pressure impacting Swilly Estuary.*

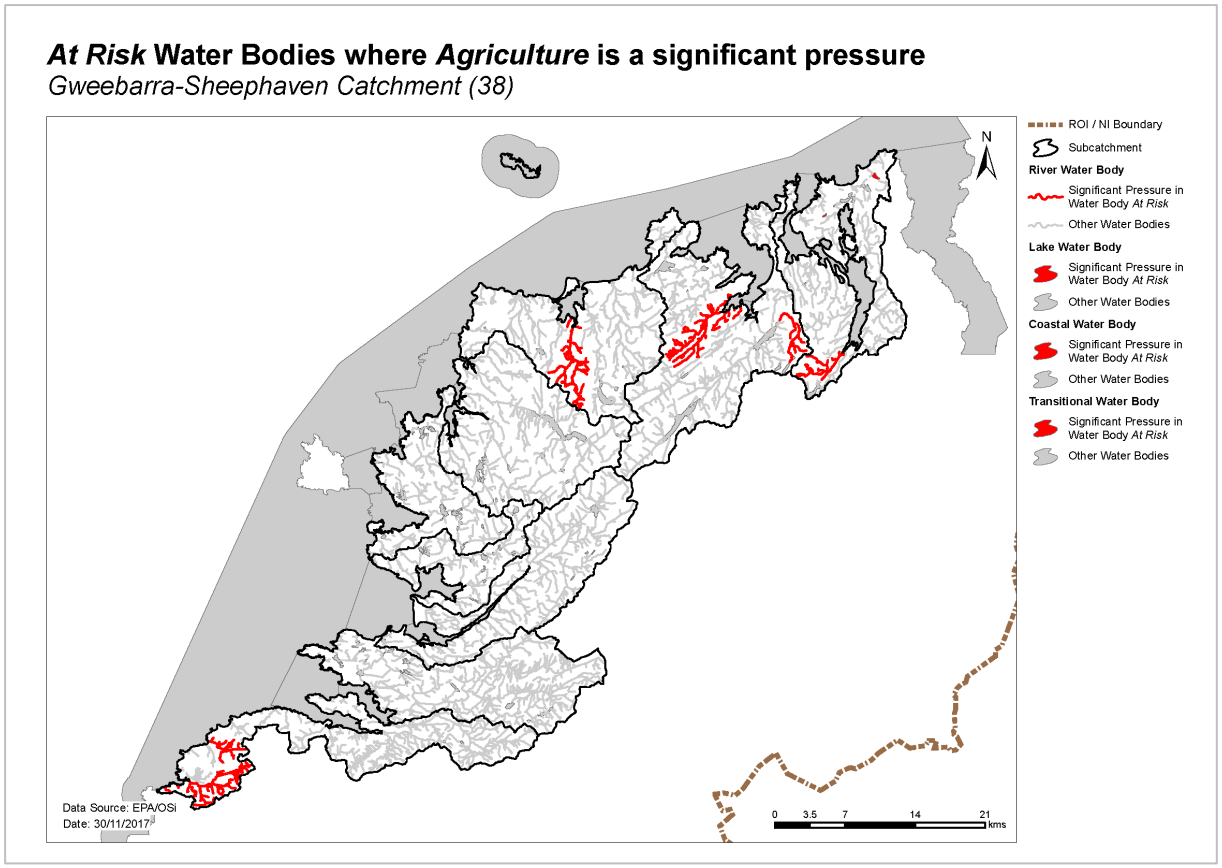


Figure 11. Water bodies that are *At Risk* and are impacted by agricultural activities

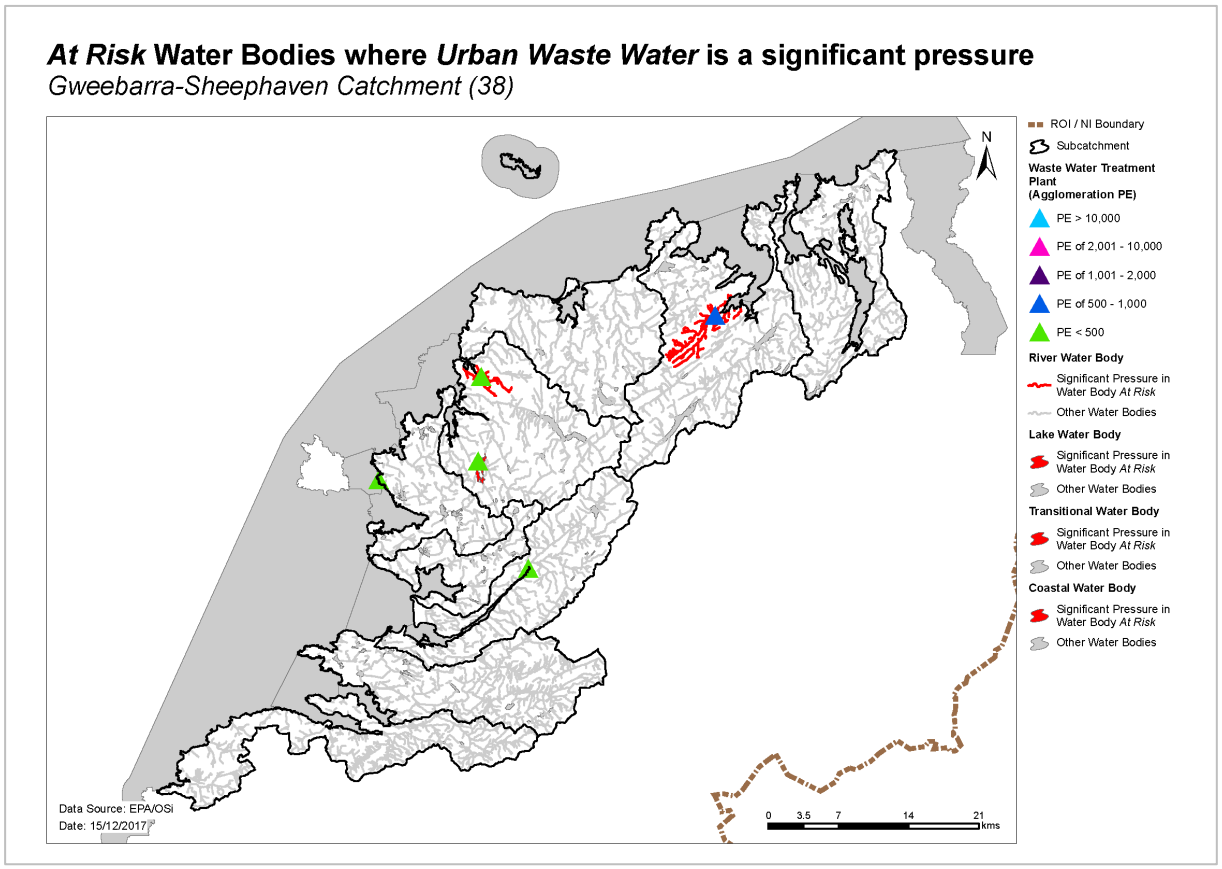


Figure 12. Water bodies that are *At Risk* and are impacted by Urban waste water

4.2.3 Domestic Waste Water

- Domestic waste water has been identified as a significant pressure in four river water bodies Aghaweel_010, Cashelnacor_010, Owenboy(Crana)_010, Glashagh (Lower)_010 and one transitional water body Swilly Estuary. The impacts relate to inadequate and poorly sited domestic waste water treatment systems This situation arises typically in areas with poorly draining soils and subsoils, and shallow bedrock areas, and results in elevated nutrient concentrations in nearby streams. Figure 13.

4.2.4 Hydromorphology

- A river water body within the Leslie Hill subcatchment is subject to extensive modification. Barriers were identified within river water bodies of the Crana and Burnfoot /Leslie Hill subcatchments. It was also highlighted that the topography and intense rainfall events within a river water body of the Leannan subcatchment have contributed to excessive levels of siltation. Inch Lough is also impacted by barriers and weirs. Figure 15 and Table 6a.

Table 6a – Hydromorphological pressures in the Lough Swilly Catchment

Pressure	Sub-Catchment	Water body Code
Modification due to Drainage Schemes (Channelisation)	LeslieHill Stream_010	Drumbarnet Stream_010
Land Drainage	Leannan_010	Owenwee_010
In River Structures	Crana_010	Owennasop_010
	Burnfoot_010	Mill_020

4.2.5 Forestry

- Forestry has been identified as a significant pressure in four water bodies. (Figure 16). The types of problems encountered include for example: losses of sediment and/or nutrients during afforestation, tree felling and abstraction; losses of sediment from access roads and during road construction; losses of nutrients during aerial fertilisation and impacts from public access.

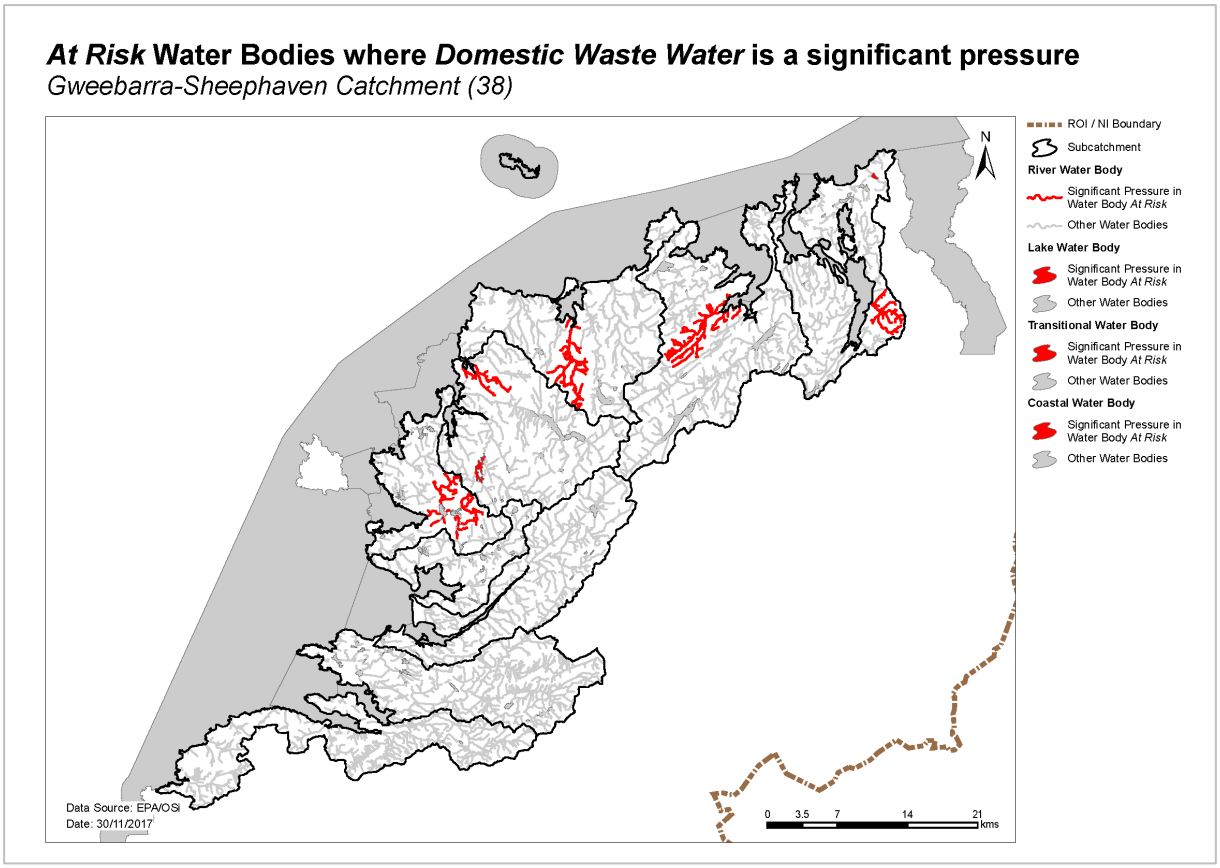


Figure 13. Water bodies that are *At Risk* and are impacted by Domestic Waste Water

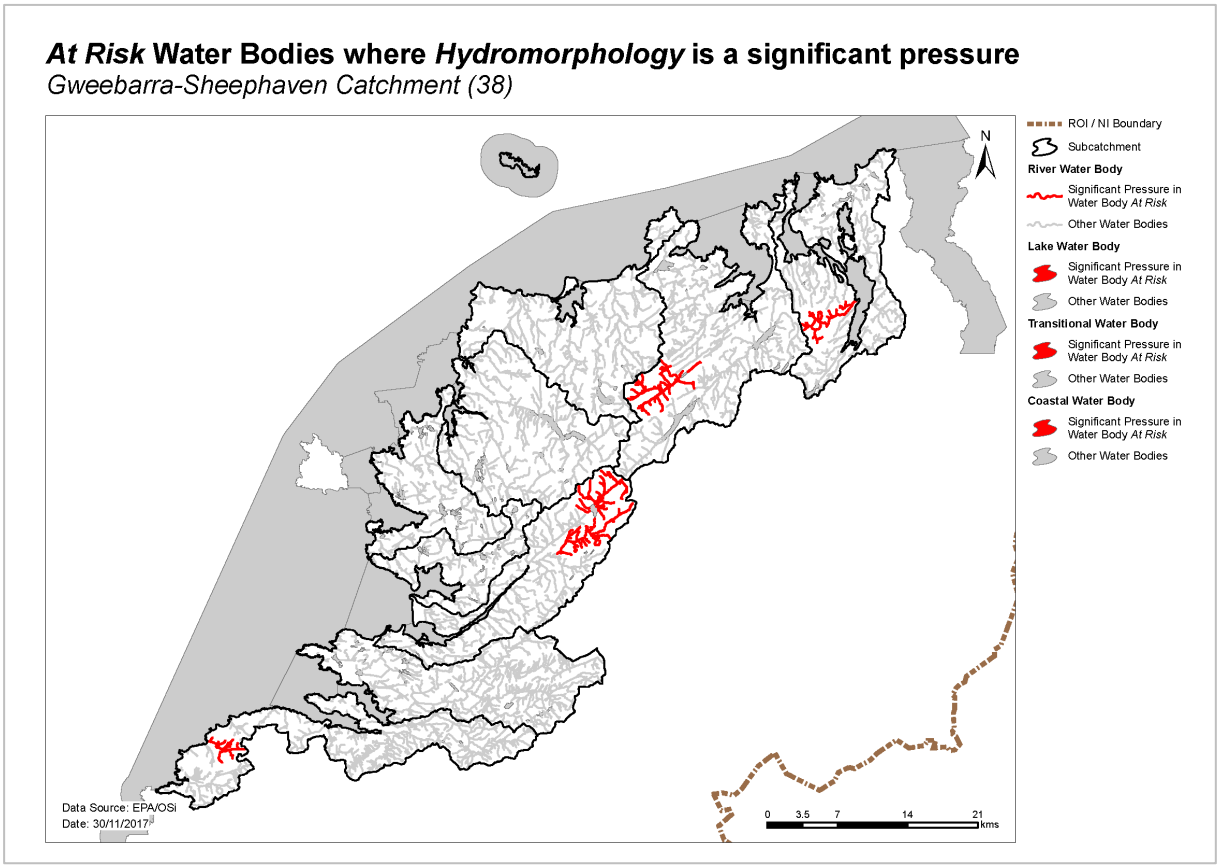


Figure 14. Water bodies that are *At Risk* and are impacted by Hydromorphology

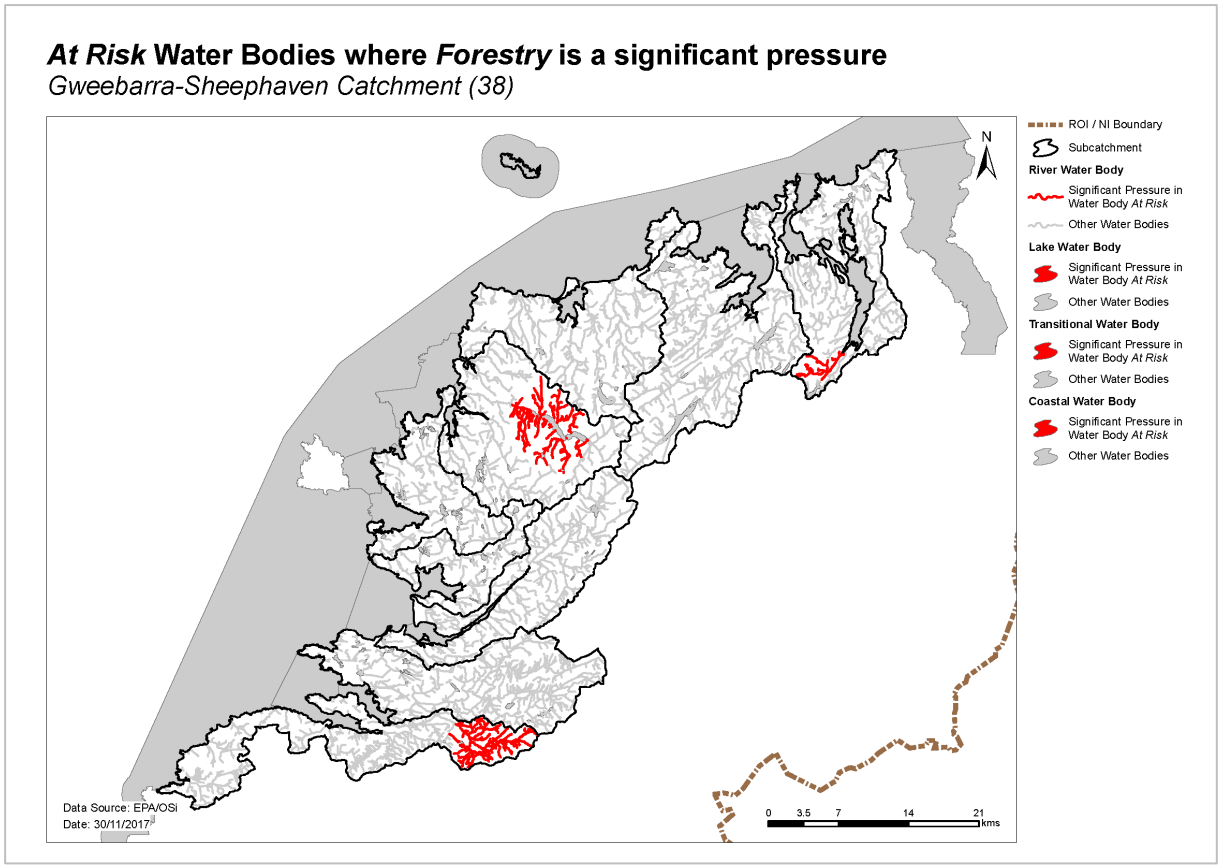


Figure 15. Water bodies that are *At Risk* and are impacted by Forestry

4.2.6 Extractive Industry

Peat

- Peat drainage and extraction has been identified as a significant pressure in three river water bodies in the Glaskeelan and Crana subcatchments.. This is an extensive area of bogland.

Mines and Quarries

- Mines and Quarries, with sediment impacts have been identified in two river water bodies in Corravaddy Burn and Burnfoot as having an impact Figure 16.

4.2.7 Diffuse Urban

Diffuse urban pressures, caused by misconnections, leaking sewers and runoff from paved and unpaved areas, have been identified as a significant pressure in the Swilly Estuary. Figure 17.

4.2.8 Other significant pressures

Waste

- One *At Risk* river water body Owenboy (Crana)_010 is impacted by illegal waste dumping Figure 18.

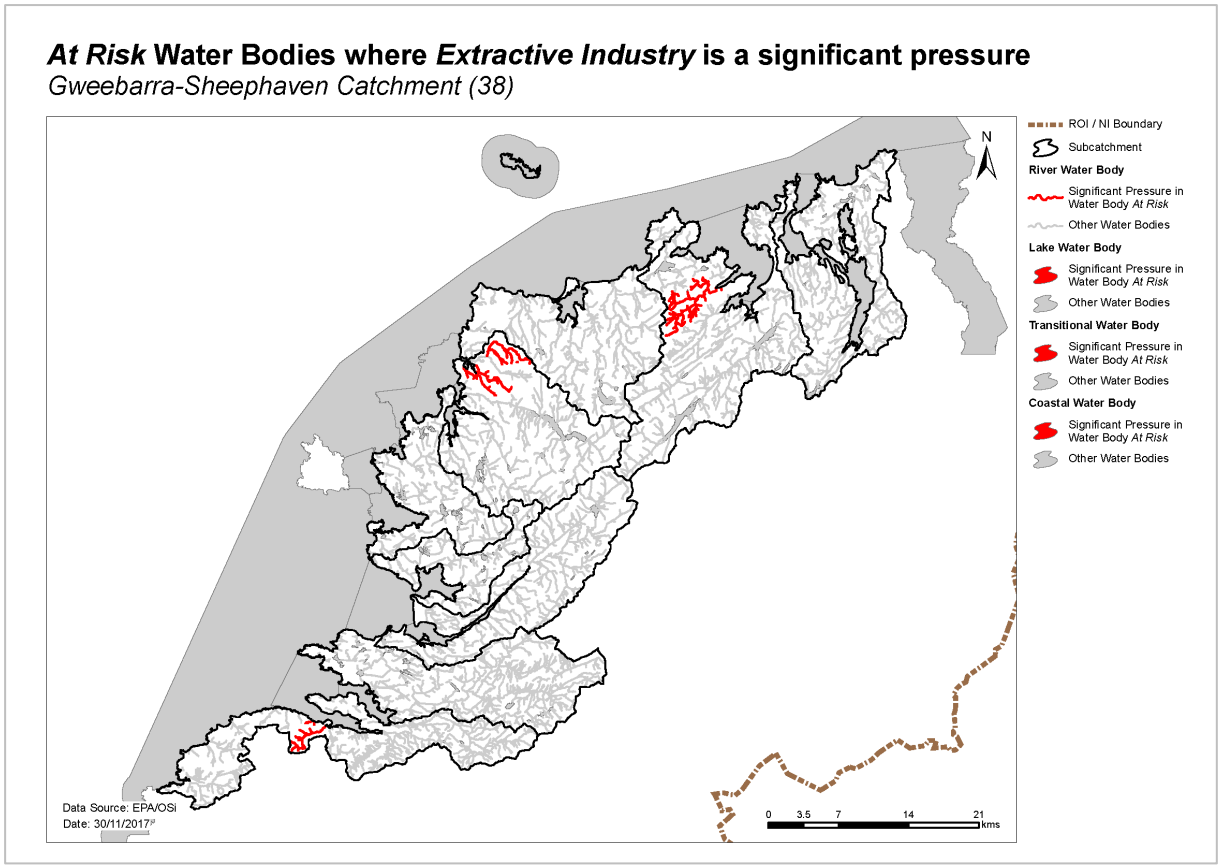


Figure 16. Water bodies that are At *Risk* and are impacted by Extractive industries

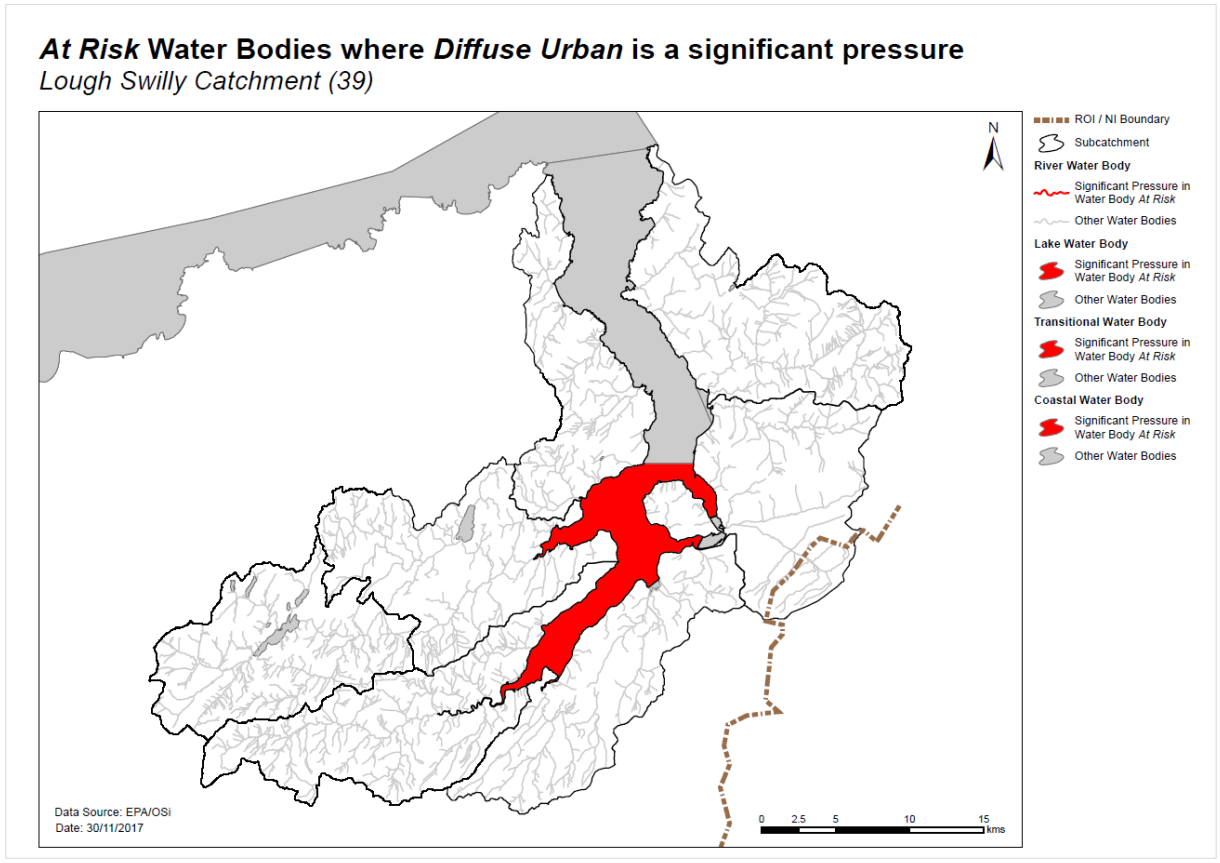


Figure 17. Water bodies that are *At Risk* and are impacted by diffuse urban

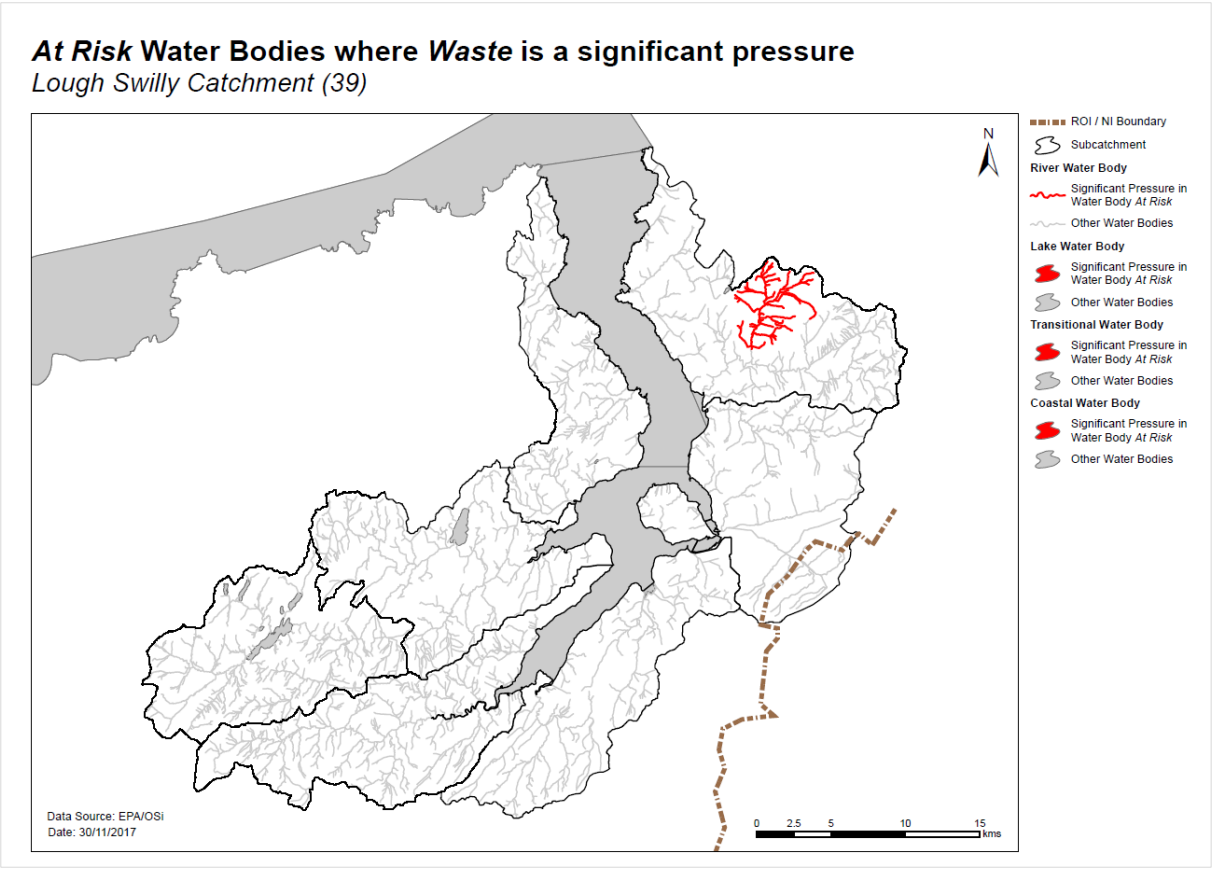


Figure 18. Water bodies that are At *Risk* and are impacted by waste

5 Load reduction assessment

5.1 River water body load reductions

- For water bodies where phosphorus monitoring data are available, the reduction in P load that would be required to bring the mean concentration back to the EQS of 0.035 mg/l as P, can be estimated using a simple method based on the average 2013 to 2015 concentration and the average flow, or the estimated 30th percentile flow (Q30) where flow data are not available. The relative load reductions are ranked on a national scale from Very High (>1 kg/Ha/y), to High (0.5-1 kg/Ha/y), to Medium (0.25-0.5 kg/Ha/y) to Low (<0.25 kg/Ha/y). Note that P load reductions may also be required in other water bodies, but without chemistry monitoring data a quantitative estimate cannot be calculated.
- Where monitored, orthophosphate concentrations are typically low in the Lough Swilly catchment. Of the water bodies with chemistry data, only one water body (Maggy's Burn_010) requires a low P load reduction.

5.2 TraC load reductions

Some 18 estuaries in Ireland have been monitored on a continual basis since 1990 as part of Ireland's commitment under the Convention for the Protection of the Marine Environment of the North-East Atlantic (the Ospar Convention). This has shown that generally over the long term, nutrients have decreased but further reduction will be required in many cases to support Good Ecological Status. However, many estuaries have not been monitored to the same degree, and

where monitoring data in insufficient, an ongoing programme of modelling has been undertaken to estimate potential nutrient load removal from contributing sub-catchments.

Different estuaries may require reductions in different nutrients. Further modelling work is required to determine precisely what load reductions are required in Inch Lough and the Lough Swilly Estuary, but in the interim, further monitoring will be carried out to assess the improvements resulting from various planned measures, and to confirm the nature of the issues. ~~The load reductions required in Inch Lough and the Lough Swilly Estuary are unknown.~~

6 Further characterisation and local catchment assessments

- Further characterisation through local catchment assessments is needed in 20 *At Risk* water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified (Table 7).
- Further characterisation through local catchment assessments is needed in 14 *Review* water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.
- Brief definitions on the 10 assessment scenarios are given in Appendix 7.

Table 7. Local Catchment Assessment Allocation for *At Risk* and *Review* River and Lake water bodies in the Catchment.

Risk	IA 1	IA 3	IA 5	IA 7	IA 8	Total
At Risk	19	2	5	1	2	29
Review	5	11	0	0	0	16
Note water bodies may have multiple categories of Local Catchment Assessments						

7 Catchment summary

- Of the 51 river water bodies in this catchment, 19 are *At Risk* of not meeting their WFD objective.
- One lake water body Fern is *At Risk* of not meeting their WFD objective.
- The Swilly estuary transitional water body is *At Risk* due to its Moderate ecological status. The metrics driving ecological status are dissolved oxygen, BOD and phytoplankton. The phytoplankton biomass and bloom frequency are driven by excess nutrients (both phosphorus and nitrogen) in the estuary. The significant pressure is Letterkenny town, where misconnections in the urban waste water agglomeration and septic tank systems, which serve half the population of the town, are the primary source of nutrients. Inch Lough transitional water body is *At Risk* due to Poor fish status.
- In the river and lake water bodies excess nutrients, mainly phosphorus but in some cases ammonia, is the significant issue. The corresponding significant pressures are agriculture followed by urban waste water.
- Cypermethrin toxicity from sheep dip is also a recurring problem across the catchment.
- There are no *At Risk* Groundwater bodies in the catchment.

8 Areas for Action

The characterisation outcomes described above have highlighted that there is significant work to do in the catchment to protect and restore water quality, and meet the objectives of the WFD. During the development of the draft river basin management plan it became apparent that there would be a need to prioritise areas for collective action so that the best return on investment could be achieved. 190 Areas for action have been selected nationally in a process as described below. There is 1 area for action in the Lough Swilly catchment.

8.1 Process of Selection

Following the publication of the draft river basin management plan in early 2017, the EPA and the Local Authority Waters and Communities Office (LAWCO) jointly led a collaborative regional workshop process to determine where, from a technical and scientific perspective, actions should be prioritised in the second cycle. The prioritisation process was based on the priorities in the draft river basin management plan, the evidence from the characterisation process, and the expertise, data and knowledge of public body staff with responsibilities for water and the different pressure types. The recommended areas for action selected during the workshops were then agreed by the Water and Environmental Regional Committees.

The recommended areas for action are an initial list of areas where action will be carried out in the second cycle. All water bodies that are *At Risk* still however, need to be addressed. As issues are resolved, areas for action will be removed from the list and new areas will be added. If additional monitoring shows that new issues have arisen, new areas may become a priority and may need to be added to the work programme.

The initial list of areas for action is not therefore considered as a closed or finite list; it simply represents the initial areas where work will be carried out during the second WFD planning cycle from 2018 to 2021.

8.2 Outcomes of process

The outcomes for the Lough Swilly catchment are summarised below.

- One recommended area for action (Table 8, Figure 19) was selected.
- This is the Leannan recommended area for action and includes: seven *At Risk* and four *Review* river and lake water bodies.
- There are no *At Risk* or *Review* groundwater bodies in this catchment.

A remaining twenty-six *At Risk* and *Review* surface water bodies were not included in the recommended areas for action for the second cycle. The distribution of these is presented in Figure 20. These include:

- twenty-three river water bodies – 13 *At Risk* and 10 *Review*, and
- three transitional water bodies – two *At Risk* and one *Review.*

Table 8. Recommended Areas for Action in the Lough Swilly Catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Leannan	11	39_5, 39_7	Donegal	• Two Deteriorated water bodies, one of which is a High Ecological status objective water body. • Four At Risk water bodies are not meeting their Protected Area objective. • Freshwater Pearl Mussel and salmonid catchment. • Build on Ramelton and Milford WWTP planned upgrades as well as forestry and agricultural improvements. • Opportunity for community engagement. • Starting at the Headwaters • Incorporating three unassigned lakes and one unassigned river water bodies. • Multiple pressures that can be investigated at the same time. • Build on status improvements of two of the tributaries. • Supports improvement of the Swilly estuary.

9 Environmental Objectives

The environmental objectives are the target status for each At Risk or Review water body and the date by which that status is expected to be achieved (Appendix 3). Where a water body is Not at Risk and is already at its target status, the environmental objective is deemed to have been met.

9.1 Surface Water

- Assuming resources are available and actions are taken in the recommended areas for action, of the seven *At Risk* surface water bodies, it is predicted that one (33%) will improve by 2021 and six (86%) will achieve their objective by 2027.
- For the four *Review* surface water bodies, the absence of information on these water bodies means that there is no scientific basis to quantify an environmental objective date, and therefore a 2027 date is set for these water bodies, see Table 9.

Table 9. Environmental objective dates for water bodies in the Areas for Action

Risk Category	No. of Water Bodies	No. of WBs for 2021 Improvement	No. of WBs for 2027 Status Improvement
Rivers			
At Risk	6	1	5
Review	1	0	1
Lakes			
At Risk	1	0	1
Review	3	0	3
Total	11	1	10

- Thirty surface water bodies have met their 2015 environmental objective.
- As action is not yet planned to be taken in the remaining 15 *At Risk* surface water bodies, a 2027 date is applied to all 15 water bodies. For the 11 *Review* surface water bodies, the absence of information on these water bodies means that there is no scientific basis to quantify an environmental objective date and therefore a 2027 date is applied, see Table 10.

Table 10. Environmental objectives dates in the *At Risk* and *Review* surface water bodies not included in Areas for Action

Risk Category	No. of Water Bodies	No. of WBs for 2021 Improvement	No. of WBs for 2027 Status Improvement
Rivers			
At Risk	13	0	13
Review	10	0	10
Lakes			
At Risk	0	0	0
Review	0	0	0
TraCs			
At Risk	2	0	2
Review	1	0	1
Total	26	0	26

9.2 Groundwater

- All three groundwater bodies in the catchment are Good status and, therefore, have met their environmental objectives.

10 Acknowledgements

This Lough Swilly Catchment Assessment (Version 2) has been produced by the Catchment Science & Management Unit, EPA, with the assistance of the following:

- Donegal County Council.
- Inland Fisheries Ireland.
- Local Authorities Waters & Communities Office.
- Irish Water.
- RPS Group.
- Ecological Monitoring & Assessment Unit, EPA.
- Hydrometric & Groundwater Section, EPA.
- Informatics Section, EPA.
- Laboratories, EPA.
- Office of Environmental Enforcement, EPA.
- Loughs Agency.
- Northern Ireland Environment Agency.
- DAFM Agriculture.
- DAFM Forest Service.
- Coillte.
- Teagasc.
- Health Service Executive.
- National Parks and Wildlife Service.
- Loughs Agency.
- National Federation of Group Water Schemes.
- Office of Public Works.

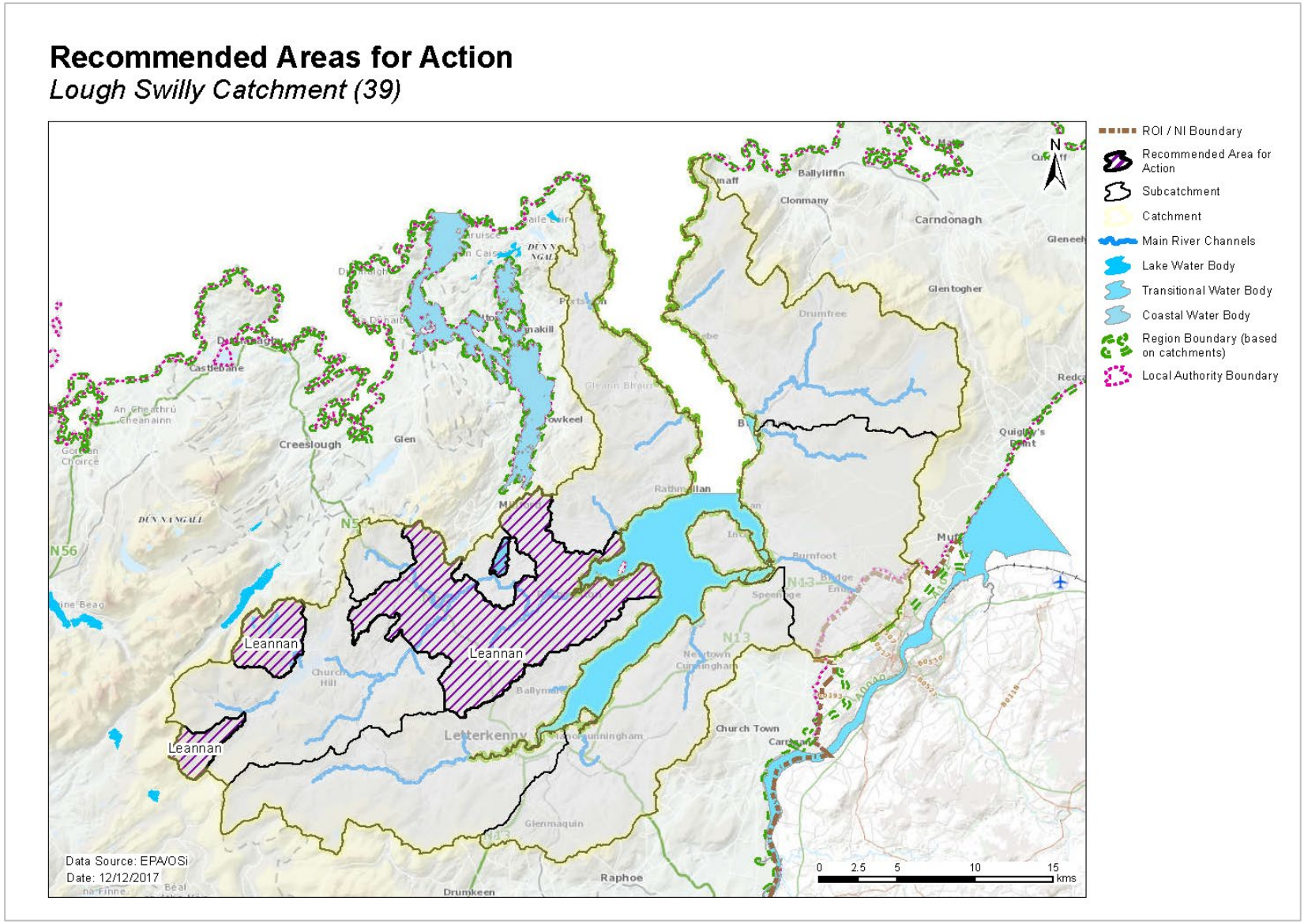


Figure 19. Location of Recommended Areas for Action in the Lough Swilly Catchment

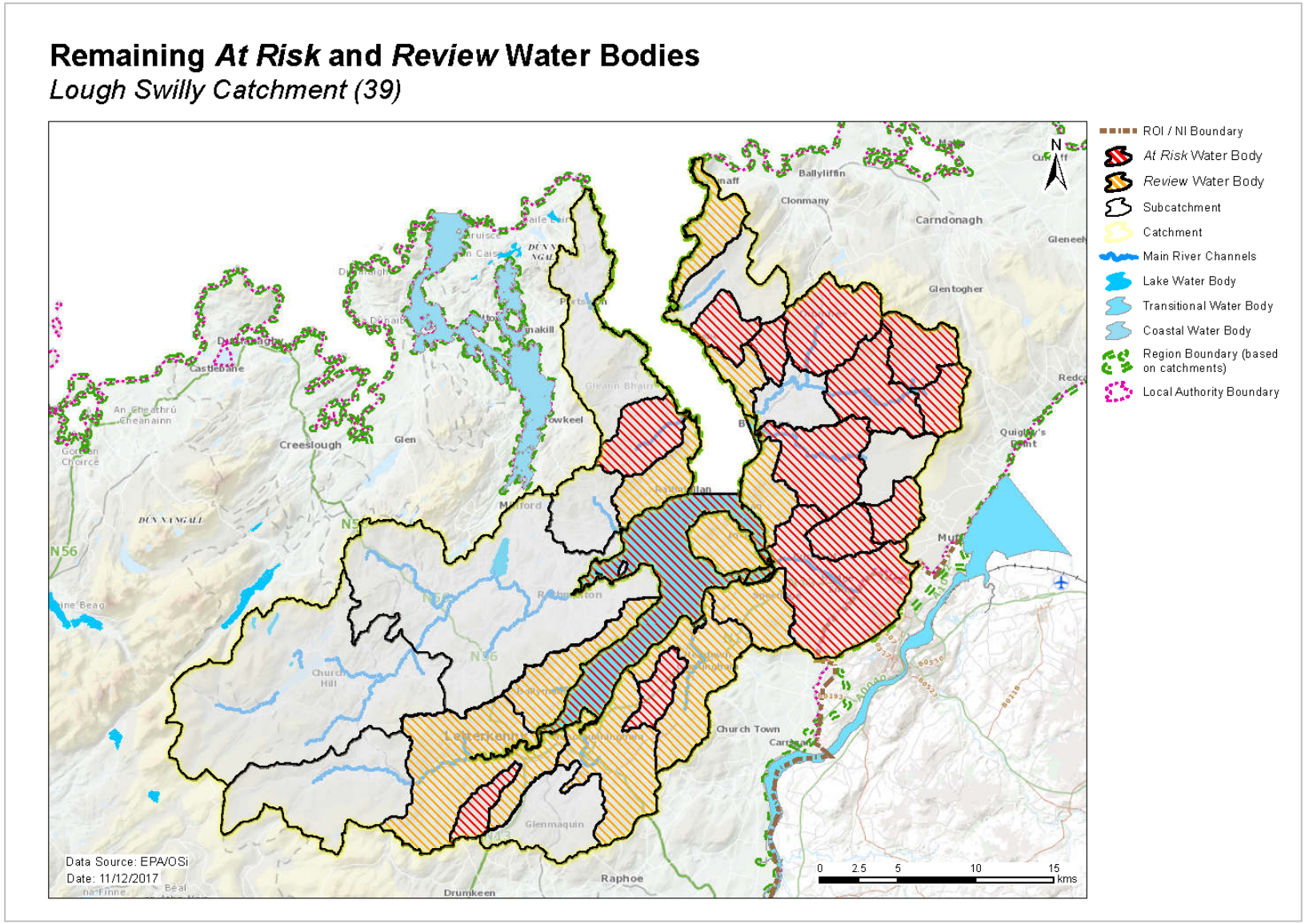


Figure20. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Lough Swilly Catchment

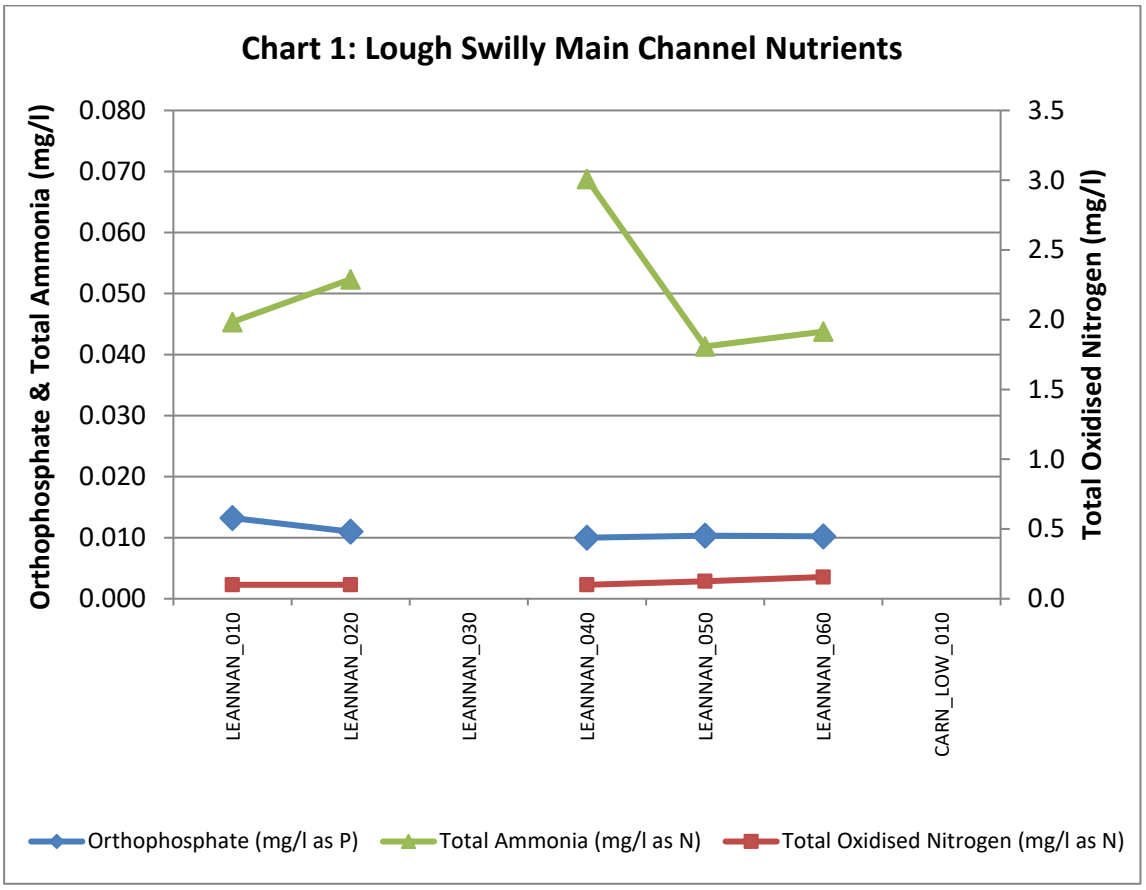
Appendix 1 High ecological status objective water bodies

Water body/ Site	Type	Codes	2015 Status
MILL (DONEGAL)_010	River	IE_NW_39M020050	High
CARN_LOW_010	River	IE_NW_39L012000	Good
BULLABA_010	River	IE_NW_39B010100	High
GLASKEELAN_010	River	IE_NW_39G050100	Good
LEANNAN_010	River	IE_NW_39L010100	High
Gartan	Lake	IE_NW_39_12	High
North-western Atlantic Seaboard (HAs 37;38)	Coastal	IE_NW_100_0000	High
Lough Swilly	Coastal	IE_NW_220_0000	High

Appendix 2 Catchment Scale Nutrient concentrations and in-stream loads

The results of the water quality assessment for the Lough Swilly catchment main channel are illustrated in Chart 1 and Chart 2. In the Leanann River, orthophosphate concentrations range from 0.01 to 0.013mg/l and remain well below the EQS threshold (0.035mg/l).

Total oxidised nitrogen (TON) concentrations only marginally exceed the limits of detection at all water bodies along the main channel. The TON threshold (2.6mg/l) is not exceeded at any of the main channel water bodies where data is available. Ammonia concentrations are moderately low along the main channel, except for LEANNAN_040 which marginally exceeds the EQS (0.065mg/l).



In the Leannan River, orthophosphate, TON and ammonia loads typically increase downstream corresponding to increasing flow. The highest ammonia load at LEANNAN_040 is consistent with a spike in concentration.

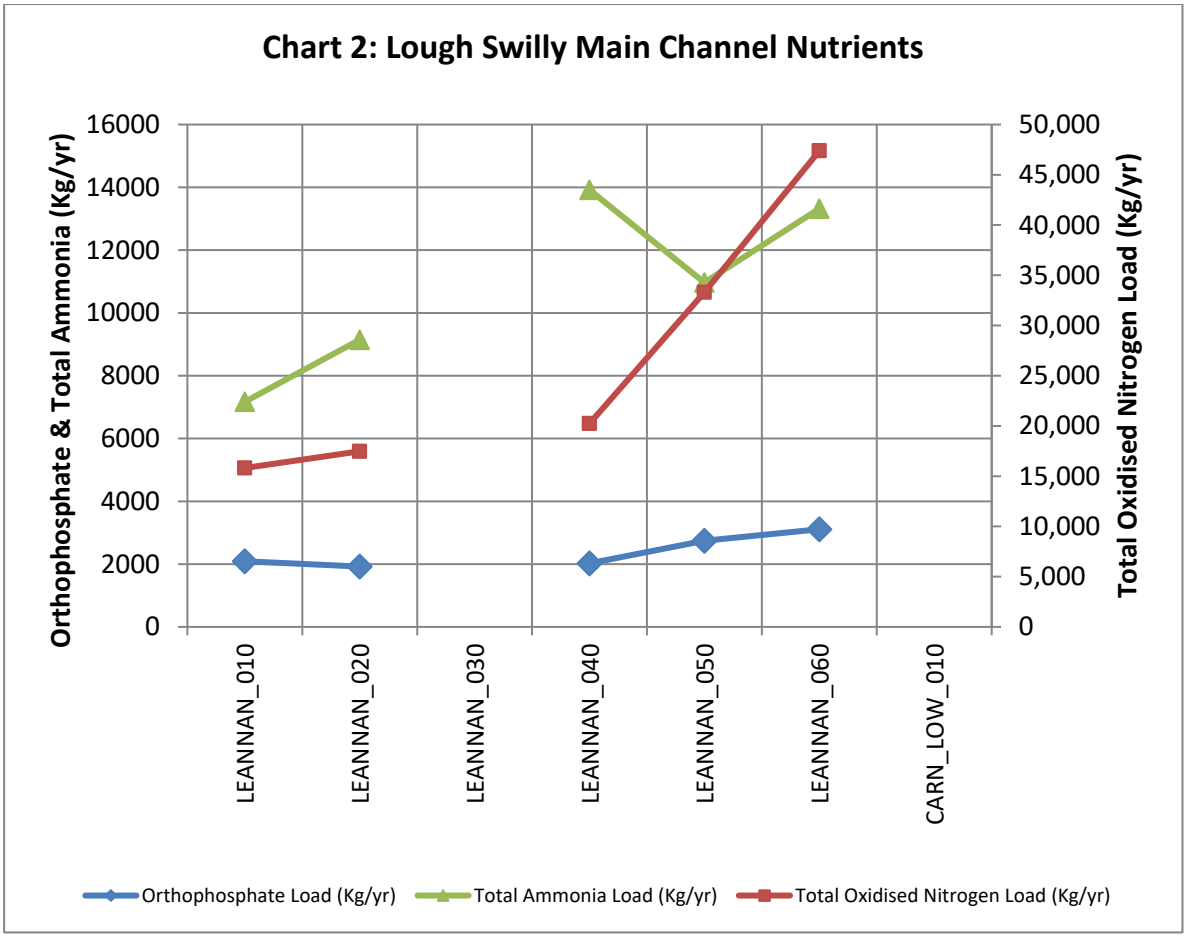


Chart 2: Lough Swilly Main Channel Nutrients
Orthophosphate & Total Ammonia (Kg/yr)
16000
14000
12000
10000
8000
6000
4000
2000
0
Total Oxidised Nitrogen Load (Kg/yr)
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
LEANNAN_010
LEANNAN_020
LEANNAN_030
LEANNAN_040
LEANNAN_050
LEANNAN_060
CARN_LOW_010
Orthophosphate Load (Kg/yr)
Total Ammonia Load (Kg/yr)
Total Oxidised Nitrogen Load (Kg/yr)

Appendix 3 Summary information on *At Risk* and *Review* surface water bodies

Subcatchment code	Water body code	Water body name	Water body type	Risk	Ecological Status 07-09	Ecological Status 10-15	High Ecological Status Objective Water Body Y/N	Significant Pressures	Date to Meet Environmental Objective	Recommended Area for Action Name
39_1	IE_NW_39G110630	Gortyarrigan_010	River	Review	Unassigned	Unassigned	N		2027	
39_1	IE_NW_39L120930	Lenan_010	River	Review	Unassigned	Unassigned	N		2027	
39_1	IE_NW_39A010400	Aghaweel_010	River	At Risk	Good	Poor	N	Ag,DWW	2027	
39_1	IE_NW_39C010200	Cashelnacor_010	River	At Risk	Good	Poor	N	Ag,DWW	2027	
39_1	IE_NW_39C020100	Crana_010	River	At Risk	Poor	Poor	N	Ag,For,Peat	2027	
39_1	IE_NW_39C020300	Crana_020	River	At Risk	Poor	Poor	N	Ag,For,Peat	2027	
39_1	IE_NW_39O040400	Owenboy (Crana)_010	River	At Risk	Moderate	Poor	N	Ag,DWW,Other	2027	
39_1	IE_NW_39O050100	Owennasop_010	River	At Risk	Poor	Poor	N	Ag,Hymo	2027	
39_1	IE_NW_220_0400	Crana Estuary	Transitional	Review	Unassigned	Unassigned	N		2027	
39_2	IE_NW_39G170760	GLACK_Or_BOHULLION_010	River	Review	Unassigned	Unassigned	N		2027	
39_2	IE_NW_39L170710	Lisfannan_010	River	Review	Unassigned	Unassigned	N		2027	
39_2	IE_NW_39B020200	Burnfoot_010	River	At Risk	Unassigned	Poor	N	M+Q	2027	
39_2	IE_NW_39B020600	Burnfoot_020	River	At Risk	Moderate	Moderate	N	UWW	2027	
39_2	IE_NW_39M020300	Mill (Donegal)_020	River	At Risk	Poor	Moderate	N	Hymo	2027	
39_2	UKGBNI1NW393901002	Skeoge_010	River	At Risk	Poor	Poor	N	UWW	2027	
39_2	IE_NW_220_0100	Swilly Estuary	Transitional	At Risk	Moderate	Moderate	N	DU,DWW,UWW	2027	
39_2	IE_NW_220_0300	Inch Lough	Transitional	At Risk	Moderate	Poor	N	Ag,Hymo	2027	
39_3	IE_NW_39M130990	Mill_Brook_010	River	Review	Unassigned	Unassigned	N		2027	
39_3	IE_NW_39D010500	Drumhallagh_010	River	At Risk	Moderate	Moderate	N	Ag	2027	
39_4	IE_NW_39C910930	Carrowen_010	River	Review	Unassigned	Unassigned	N		2027	
39_4	IE_NW_39G380790	Glar_010	River	Review	Unassigned	Unassigned	N		2027	
39_4	IE_NW_39L050660	Leslie Hill Stream_020	River	Review	Unassigned	Unassigned	N		2027	
39_4	IE_NW_39D030600	Drumbarnet Stream_010	River	At Risk	Poor	Poor	N	Ag,Hymo	2027	
39_5	IE_NW_39N050990	Newmill_010	River	Review	Unassigned	Unassigned	N		2027	Leannan
39_5	IE_NW_39_13	Fern	Lake	At Risk	Poor	Poor	N	UWW	2027	Leannan
39_5	IE_NW_39G020200	Glashagh (Lower)_010	River	At Risk	Unassigned	Moderate	N	Ag,DWW	2021	Leannan
39_5	IE_NW_39L010500	Leannan_050	River	At Risk	Poor	Moderate	N	UWW	2027	Leannan
39_5	IE_NW_39L012000	Carn_Low_010	River	At Risk	High	Good	Y	Ag,UWW	2027	Leannan
39_5	IE_NW_39M010300	Maggy's Burn_010	River	At Risk	Poor	Poor	N	UWW	2027	Leannan
39_6	IE_NW_39K240610	Knockybrin_010	River	Review	Unassigned	Unassigned	N		2027	

Subcatchment code	Water body code	Water body name	Water body type	Risk	Ecological Status 07-09	Ecological Status 10-15	High Ecological Status Objective Water Body Y/N	Significant Pressures	Date to Meet Environmental Objective	Recommended Area for Action Name
39_6	IE_NW_39S020300	Swilly 39_010	River	Review	Unassigned	Unassigned	N		2027	
39_6	IE_NW_39C030250	Corravaddy Burn_010	River	At Risk	Poor	Poor	N	Ag,For,M+Q	2027	
39_7	IE_NW_39_10	Inshagh	Lake	Review	Unassigned	Unassigned	N		2027	Leannan
39_7	IE_NW_39_47	Nambraddan	Lake	Review	Unassigned	Unassigned	N		2027	Leannan
39_7	IE_NW_39_51	Claggan	Lake	Review	Unassigned	Unassigned	N		2027	Leannan
39_7	IE_NW_39G050100	Glaskeelan_010	River	At Risk	Moderate	Good	Y	For,Peat	2027	Leannan
39_7	IE_NW_39O030100	Owenwee (Lough Gartan)_010	River	At Risk	Good	Moderate	N	Hymo	2027	Leannan

Ag: Agriculture

DWW: Domestic Waste Water

For: Forestry

Hymo: Hydromorphology

Ind: Industry

M+Q: Mines and Quarries

Peat: Peat Drainage and Extraction

DU: Diffuse Urban

UWW: Urban Waste Water

Note: Significant Pressures for Review water bodies have not been included as they will need to be confirmed as part of an Investigative Assessment.

Protected Area: If a water body is one or more of the following: Drinking Water Protected Area; Bathing Water; Shellfish Area; Nutrient Sensitive Area or; a Natura 2000 site with a water dependent qualifying interest with a water quality and/or quantity conservation objective, then it has been highlighted as a protected area in this table.

Appendix 4. Drinking water supplies in the catchment

Scheme Code	Scheme Name	Water Body	Water Body Code
0600PUB1018	Buncrana	Lough Doo	IE_EA_07_190
0600PUB1020	Fullerton Pollan Dam	Pollan Dam Reservoir	IE_NW_39C020100
0600PUB1050	Milford Pub	LoughColumbcille (Milford)	IE_NW_39M010300
0600PUB1128	Letterkenny Mixed Borehole TW5	Letterkenny Mixed	IEGBNI_NW_G_059
0600PUB1128	Letterkenny Mixed Borehole P3	Letterkenny Mixed	IEGBNI_NW_G_059
0600PUB1128	Letterkenny Mixed Borehole P10	Letterkenny Mixed	IEGBNI_NW_G_059
0600PUB1053	Rathmullan Pub	Gort Lough	IE_NW_39_44

Appendix 5 Prioritisation of water bodies with Natura 2000 site qualifying interests

Note that additional water dependent species have been added that are not qualifying interests within the SACs (i.e. Arctic char (Salvelinus alpinus) has been added to Leannan River SAC). River water bodies that are designated as both Freshwater Pearl Mussel rivers (under Freshwater pearl mussel regulations (S.I. 296 2009)) and salmonid rivers (under Salmonid Regulations (S.I. 293 / 1988)) but that are not located within SACs have also been listed.

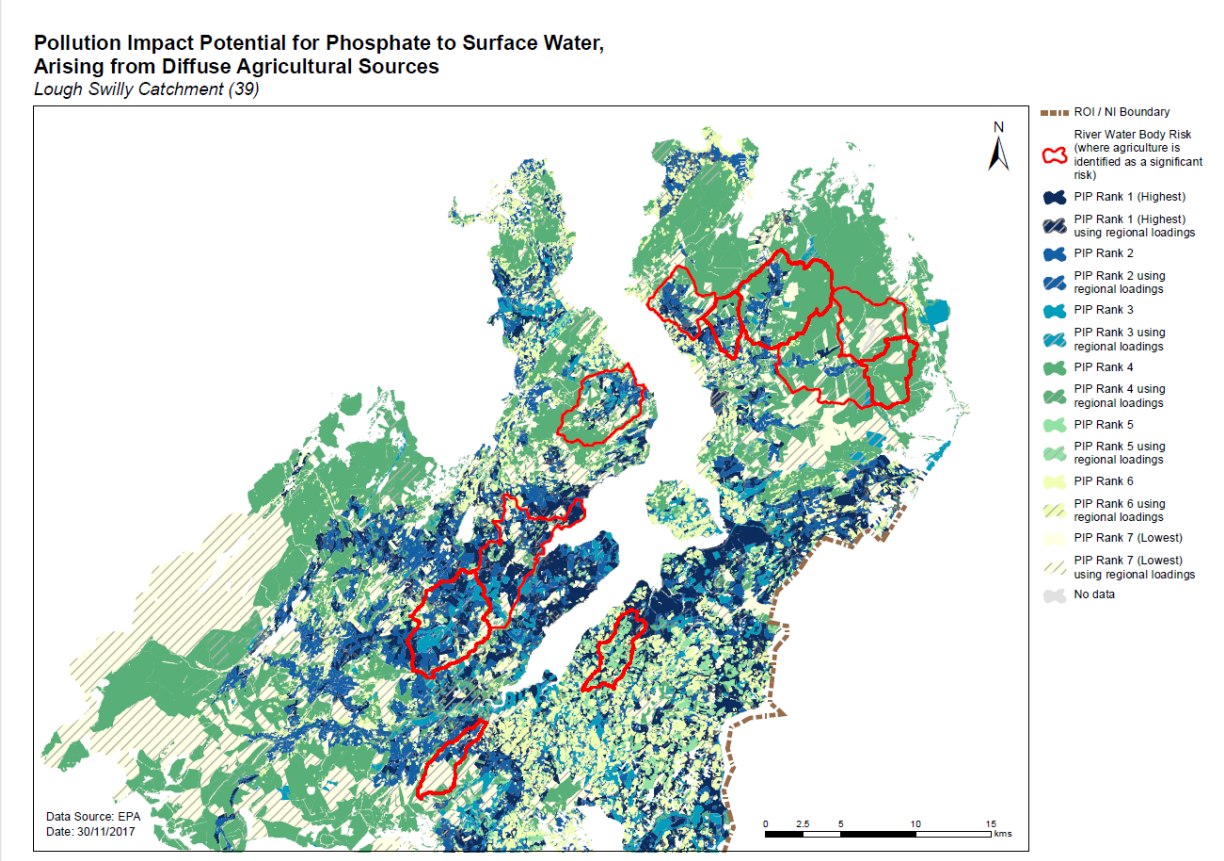
SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
North Inishowen Coast SAC 002012	21A0	Good GW level	Groundwater	East Inishowen GWB	Good (NAR)	No	IEGBNI_NW_G_050	Yes
			Groundwater	Lough Swilly	Good (NAR)	No	IEGBNI_NW_G_059	Yes
Ballyhoorisky Point To Fanad Head SAC 001975	none							
Lough Swilly SAC 002287	1150	Good	Transitional	Inch Lough	Poor (AT RISK)	Yes	IE_NW_220_0300	Yes
			Transitional	Blanket Nook Lough	Unassigned (R)	Yes	IE_NW_220_0200	Yes
Ballyarr Wood SAC 000116	none							
Leannan River SAC 002176	3110	At least Good	Lake	Gartan	High (NAR - HES obj)	No	IE_NW_39_12	No
			Lake	Akibbon	Good (NAR)	No	IE_NW_39_11	No
	3130	At least Good	Lake	Fern	Poor (AT RISK)	Yes	IE_NW_39_13	No
	1833	At least Good	Lake	Akibbon	Good (NAR)	No	IE_NW_39_11	No
	1029 (8 priority catchments)	High	River	Leannan_010	High (NAR - HES obj)	No	IE_NW_39L010100	Yes
	1029 (19 of 27 catchments of S.I. 296 2009)	Good	River	Carn_Low_010	Good (AT RISK - HES obj)	No	IE_NW_39L012000	Yes
			River	Leannan_010	High (NAR - HES obj)	No	IE_NW_39L010100	Yes
			River	Leannan_020	Good (NAR)	No	IE_NW_39L010200	Yes
			River	Leannan_030	Good (NAR)	No	IE_NW_39L010250	Yes
			River	Leannan_040	Good (NAR)	No	IE_NW_39L010300	Yes
			River	Leannan_050	Moderate (AT RISK)	Yes	IE_NW_39L010500	Yes
			River	Leannan_060	Good (NAR)	No	IE_NW_39L010600	Yes

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
			River	Glashagh (Upper)_010	Good (NAR)	No	IE_NW_39G010200	Yes
			River	Glashagh (Upper)_020	Good (NAR)	No	IE_NW_39G010400	Yes
	1106	At least Good	River	Leannan_020	Good (NAR)	No	IE_NW_39L010200	Yes
			River	Leannan_030	Good (NAR)	No	IE_NW_39L010250	Yes
			River	Leannan_040	Good (NAR)	No	IE_NW_39L010300	Yes
			River	Leannan_050	Moderate (AT RISK)	Yes	IE_NW_39L010500	Yes
			River	Leannan_060	Good (NAR)	No	IE_NW_39L010600	Yes
			River	Glashagh (Upper)_010	Good (NAR)	No	IE_NW_39G010200	Yes
			River	Glashagh (Upper)_020	Good (NAR)	No	IE_NW_39G010400	Yes
			River	Carn_Low_010	Good (AT RISK - HES obj)	No	IE_NW_39L012000	Yes
	Arctic char (not listed)	Good	Lake	Gartan	High (NAR - HES obj)	No	IE_NW_39_12	No
Cloghernagore Bog And Glenveagh National Park SAC 002047	3110	At least Good	Lake	Inshagh	Unassigned (R)	No	IE_NW_39_10	No
			Lake	Nambraddan	Unassigned (R)	No	IE_NW_39_47	No
			Lake	Claggan	Unassigned (R)	No	IE_NW_39_51	No
	1029 (8 priority catchments)	High	River	Glaskeelan_010	Good (AT RISK - HES obj)	Yes	IE_NW_39G050100	Yes
			River	Leannan_010	High (NAR - HES obj)	No	IE_NW_39L010100	Yes
	1029 (19 of 27 catchments of S.I. 296 2009)	Good	River	Owenwee (Lough Gartan)_010	Moderate (AT RISK)	Yes	IE_NW_39O030100	Yes
			River	Bullaba_010	High (NAR - HES obj)	No	IE_NW_39B010100	Yes
			River	Leannan_010	High (NAR - HES obj)	No	IE_NW_39L010100	Yes

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
			River	Lurgy 39_010	Good (NAR)	No	IE_NW_39L020100	Yes
Salmonids (outside SACs)	1106	Good	River	Glashagh (Lower)_010	Moderate (AT RISK)	Yes	IE_NW_39G020200	Yes
			River	Maggy's Burn_010	Poor (AT RISK)	Yes	IE_NW_39M010300	Yes
			River	Lurgy 39_010	Good (NAR)	No	IE_NW_39L020100	Yes
			River	Swilly_010	Good (NAR)	No	IE_NW_39S020050	Yes
			River	Swilly_020	Good (NAR)	No	IE_NW_39S020100	Yes
			River	Swilly_030	Good (NAR)	No	IE_NW_39S020200	Yes
			River	Swilly 39_010	Unassigned (R)	Yes	IE_NW_39S020300	Yes
Freshwater pearl mussels (outside SACs)	1029 (19 of 27 catchments of S.I. 296 2009)	Good	River	Glashagh (Lower)_010	Moderate (AT RISK)	Yes	IE_NW_39G020200	Yes
			River	Maggy's Burn_010	Poor (AT RISK)	Yes	IE_NW_39M010300	Yes

Appendix 6 Pollution Impact Potential (PIP) Map for Phosphorus

For areas where agriculture is deemed as the significant pressure, areas of high risk to surface water can be targeted. The map below shows relative risk of loss of phosphorus to surface water. The risk of phosphorus losses is strongly correlated on whether the land is poorly draining or free draining and the loadings applied i.e. significant loadings applied on poorly draining areas result in a high potential risk to surface water. However, this figure does not imply that actual losses from these areas are occurring but is a useful tool for informing where resources should be focused (i.e. by allowing high risk areas to be identified and prioritised for further investigation). PIP maps are available online at a scale of 1:20,000 and can be accessed by public bodies via the EDEN process.



Appendix 7 Local Catchment Assessment Categories

Category	Assessment & Measures Evaluation Details
IA1	Further information provision (e.g. from IFI, LAs, EPA)
IA2	Point source desk-based assessment
IA3	Assessment of unassigned status water bodies, requiring field visit(s)
IA4	Regulated point sources, requiring field visit/s
IA5	Stream (catchment) walk to evaluate multiple sources in a defined (1 km) river stretch (used as the basis for estimating resource requirements)
IA6	Stream (catchment) walk in urban areas
IA7	Stream (catchment) walk along >1 km river stretches
IA8	Stream (catchment) walk along high ecological status (HES) objective rivers
IA9	Lakes assessment, requiring field visits
IA10	Groundwater assessments, requiring field visits