Blackwater (*Lough Neagh-Lower Bann*) Catchment 2010-2015 Assessment (HA 03)

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 Blackwater (Lough Neagh-Lower Bann) 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 Bann and by all streams entering tidal water between the Barmouth and Ballyaghran Point, Co. Derry. This is a cross border catchment with a surface area of 5,787km², 374km² of which is located within the Republic of Ireland (RoI). The largest urban centre in the catchment is Monaghan town. There are no other large towns in this catchment and the total population (in the RoI) is approximately 20,500 with a population density of 55 people per km².

The Annaghroe Blackwater River rises in County Tyrone flowing southeast along the border. The Mountain Water River drains the northern part of this catchment in County Monaghan, flowing past Emy Vale and Glaslough, before joining the Annaghroe Blackwater at the border of Tyrone and Monaghan. The Monaghan Blackwater flows east from the border near Scotstown, after which it is joined by the Conawary and the Shambles Rivers, the latter of which drains the area around Monaghan Town.

The Monaghan Blackwater then joins the Cor River south of Glaslough. An arterial drainage scheme was completed on the Monaghan Blackwater by the OPW between 1984 and 1992. The Cor River is fed from the south by the Clontibret, Six Mile Lake and Greaghglass Rivers and by the Mullamurphy River which drains the area east of Monaghan Town and which forms part of the Ulster Canal. The Cor River crosses the border and flows into the Annaghroe Blackwater east of Glaslough which then continues towards Lough Neagh, Ireland's largest lake, from where the River Bann outflows to the sea from the northern end of the lough to the sea at Castlerock to the north of Coleraine on the northern Irish coast.

Groundwater in the catchment flows through a range of aquifer types, from poorly to moderately productive, with the central part of the catchment underlain by a karst limestone. Due to the relatively thick glacial deposits covering the bedrock in the catchment, groundwater and surface water interactions are well buffered and the groundwater resource is well protected.

The Blackwater catchment comprises six subcatchments (Tabel 1, Figure 1) with 27 river water bodies, six lakes and six groundwater bodies. There are no Transitional and Coastal (TraCs) in this catchment. There are no designated heavily modified or artificial water bodies in the catchment.

Table1 List of subcatchments in the Blackwater catchment

Subcatchment ID	Subcatchment Name
03_1	CallanRiver[Tassagh]_SC_010
03_2	Mountain[Water]_SC_010
03_3	BlackwaterTrib_SC_010
03_4	BlackwaterTrib_SC_020
03_5	Clontibret[Stream]_SC_010
03_6	Blackwater[Monaghan]_SC_010

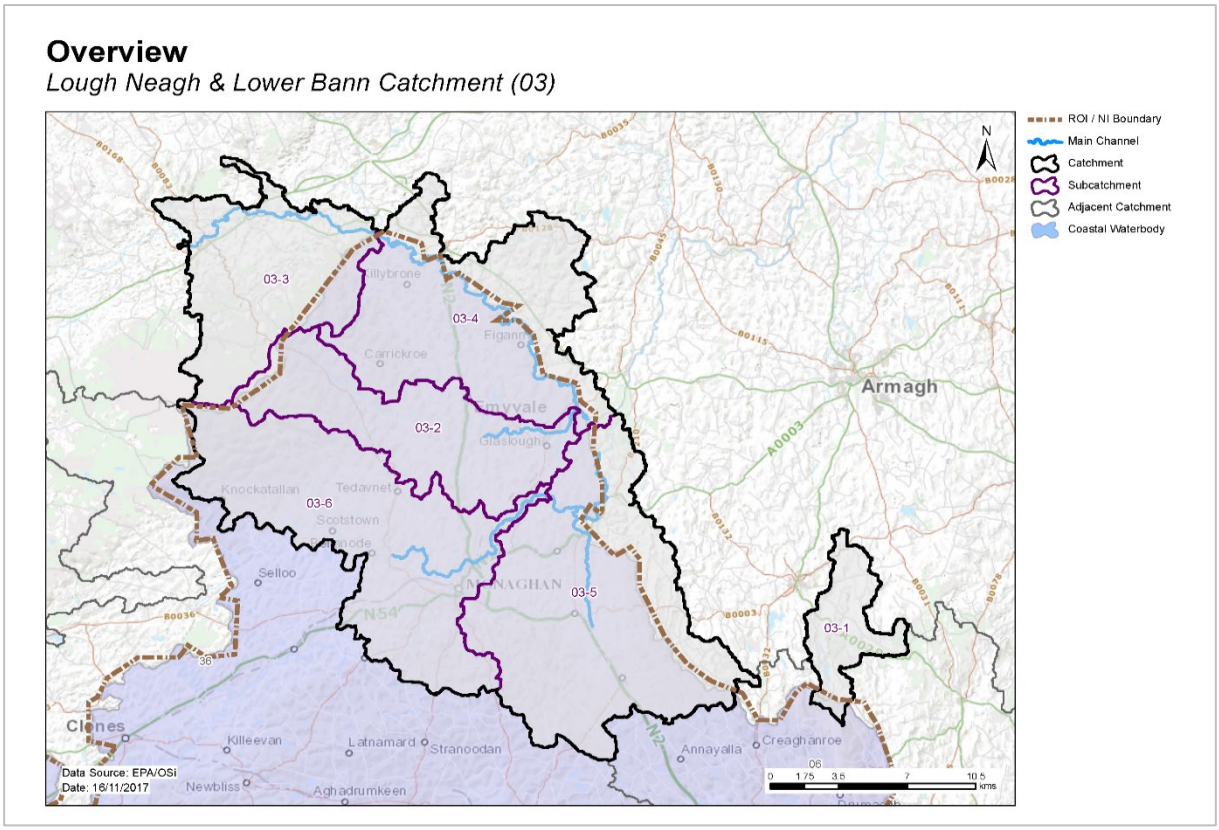


Figure 1. Subcatchments in the Blackwater catchment

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 nine (27%) water bodies at Good or High status, and nine (27 %) at less than Good status in 2015 (Table 2 and Figure 2). Fifteen (46%) water bodies are unassigned.
- There is one river water body the Mountain Water_010, which has a high status environmental objective and which achieved this objective in 2015 (Appendix 1).
- The numbers of water bodies at each status class in 2007-09 and 2010-2015 are shown in Figure 3 for rivers and Figure 4 for lakes.
- Since 2007-09 when WFD monitoring began, seven river water bodies have improved and one river water body has deteriorated. One lake water body improved also (Figure 5).
- The variation in nutrient concentrations and loads in the Blackwater (Monaghan) and Mountain Water main channel is illustrated in Appendix 2.

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

	Number of water bodies	2010-2015 Status						Risk		
		High	Good	Mod	Poor	Bad	Un-monitored	*Not at Risk*	*Review*	*At Risk*
Rivers	27	4	4	1	7	0	11	10	6	11
Lakes	6	0	1	1	0	0	4	1	4	1

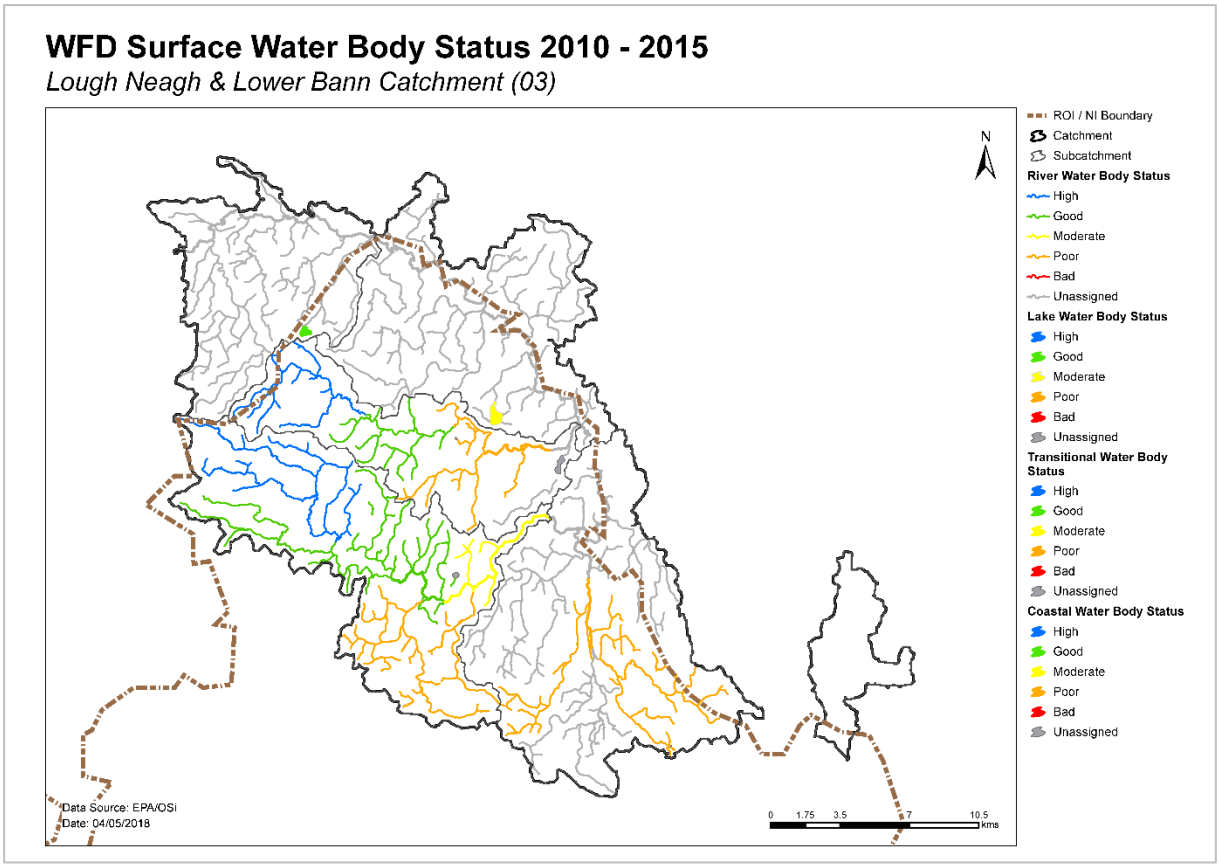


Figure 2. Surface water ecological status.

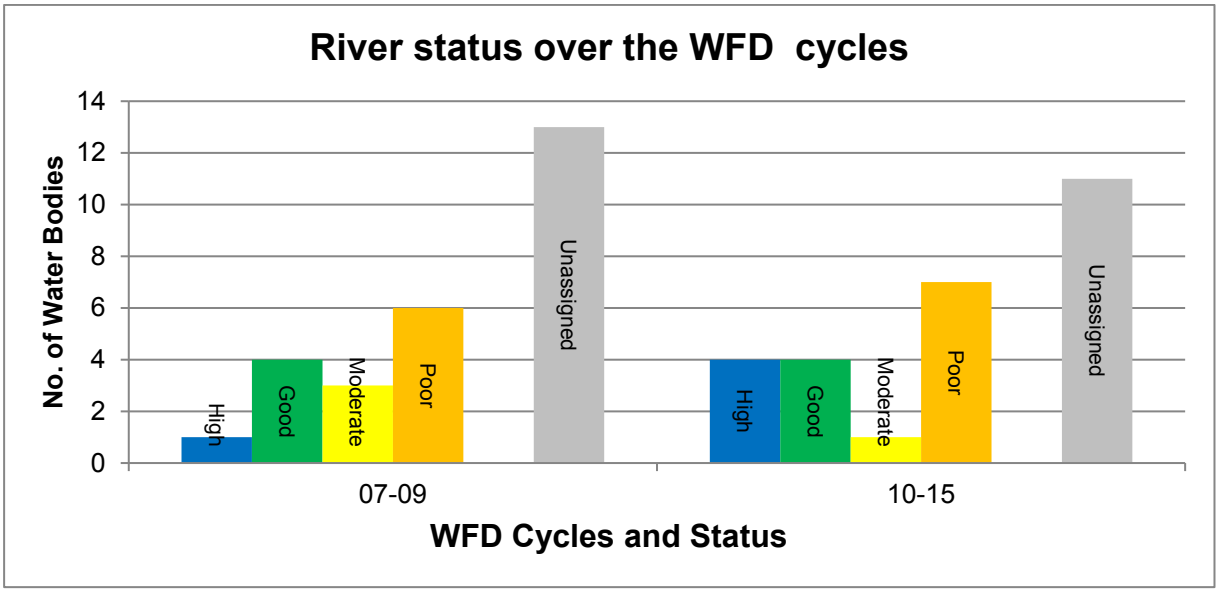


Figure 3. Number of rivers at each status class in 2007-09 and 2010-2015

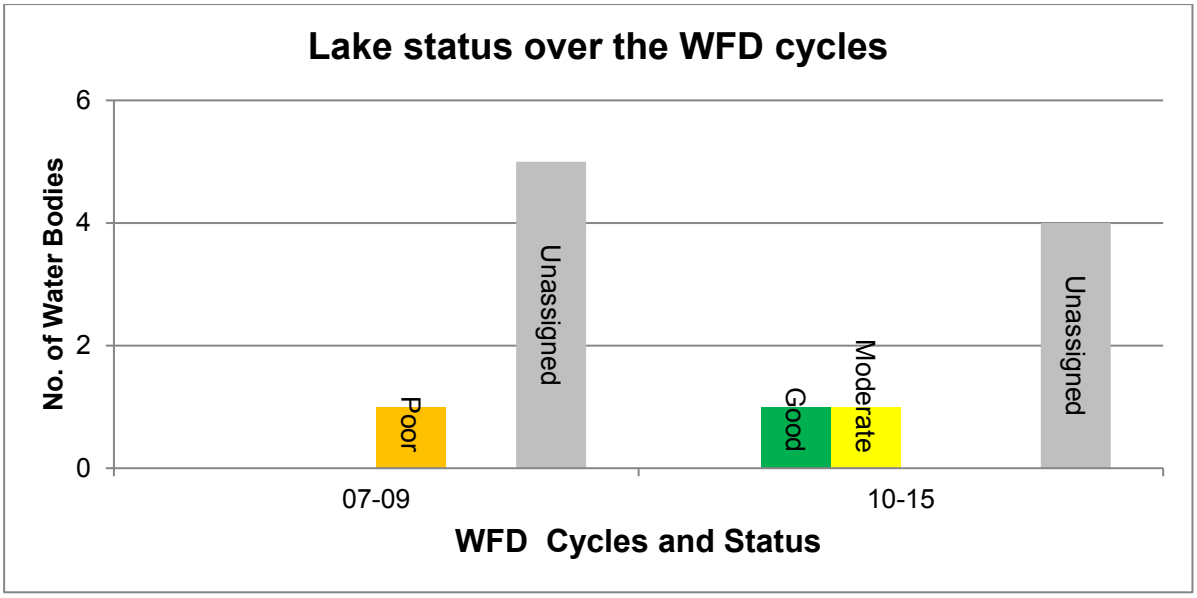


Figure 4. Number of lakes at each status class in 2007-09 and 2010-2015

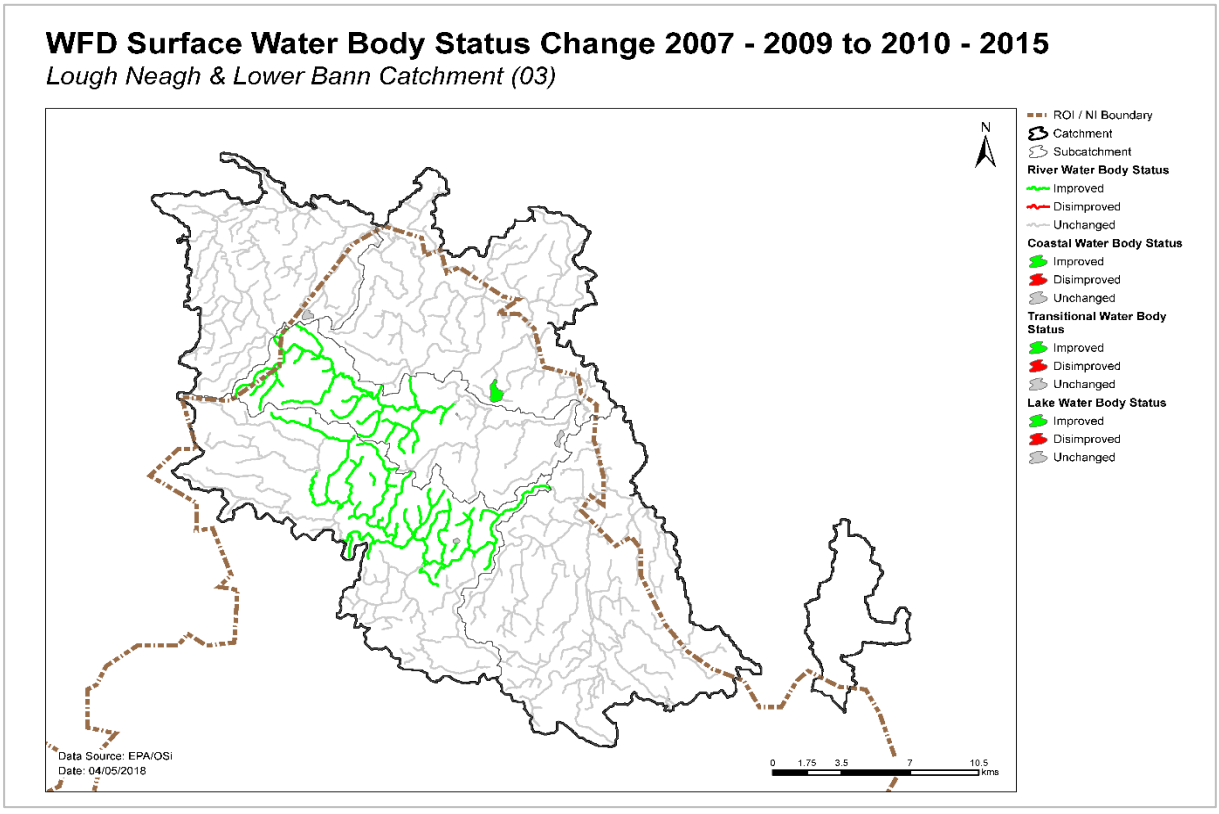


Figure 5. Surface water body status change from 2007-09 to 2010-15.

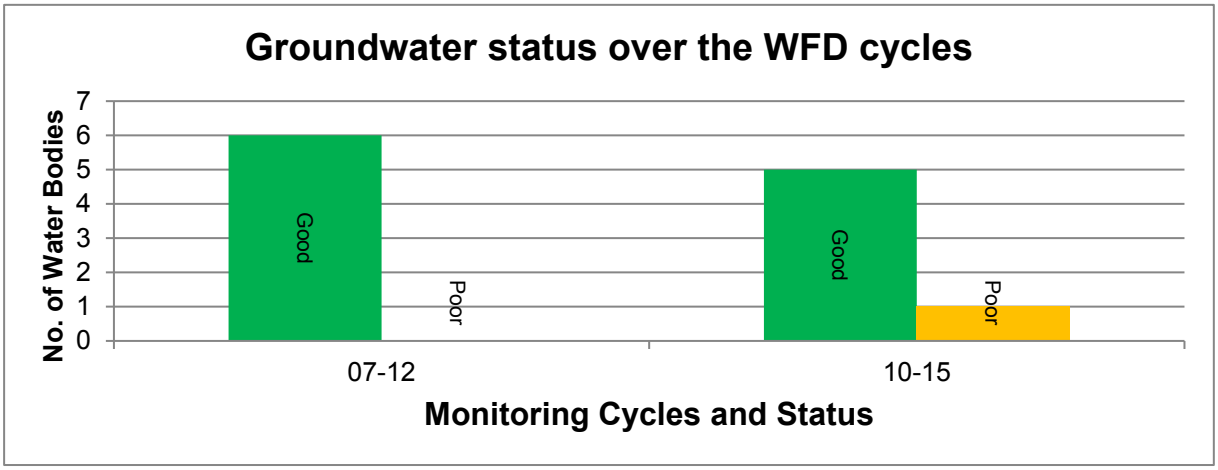
2.2 Groundwater Status

- There were five (83%) groundwater bodies at Good status, and one (17%) at Poor status in 2015 (Table 3 and Figure 6 and 7).

Table 3. Summary of groundwater body status and risk

	Number of water bodies	2010-2015 Status		Risk		
		Good	Poor	*Not at Risk*	*Review*	*At Risk*
Groundwater	6	5	1	4	1	1

Figure 6. Number of groundwater bodies at each status class in 2007-12 and 2010-2015



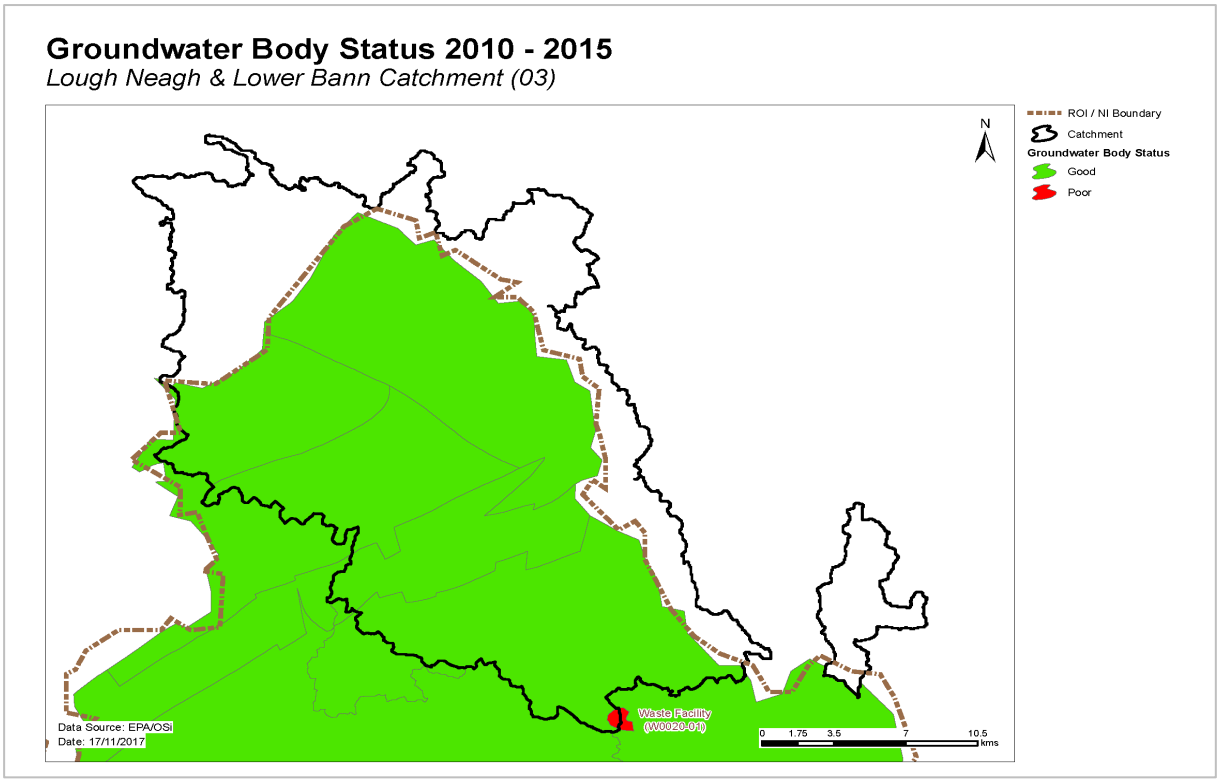


Figure 7. Groundwater body status

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and Lakes

- Ten river water bodies and one lake water body 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.
- Six river water bodies and four lake water bodies are in *Review*. This applies to five river water bodies where more information is required and two where measures have recently been implemented and improvements have not yet been realised. In the case of lakes there are four where more information is required.
- Eleven 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. Summary information for the *At Risk* water bodies is given in Appendix 3.

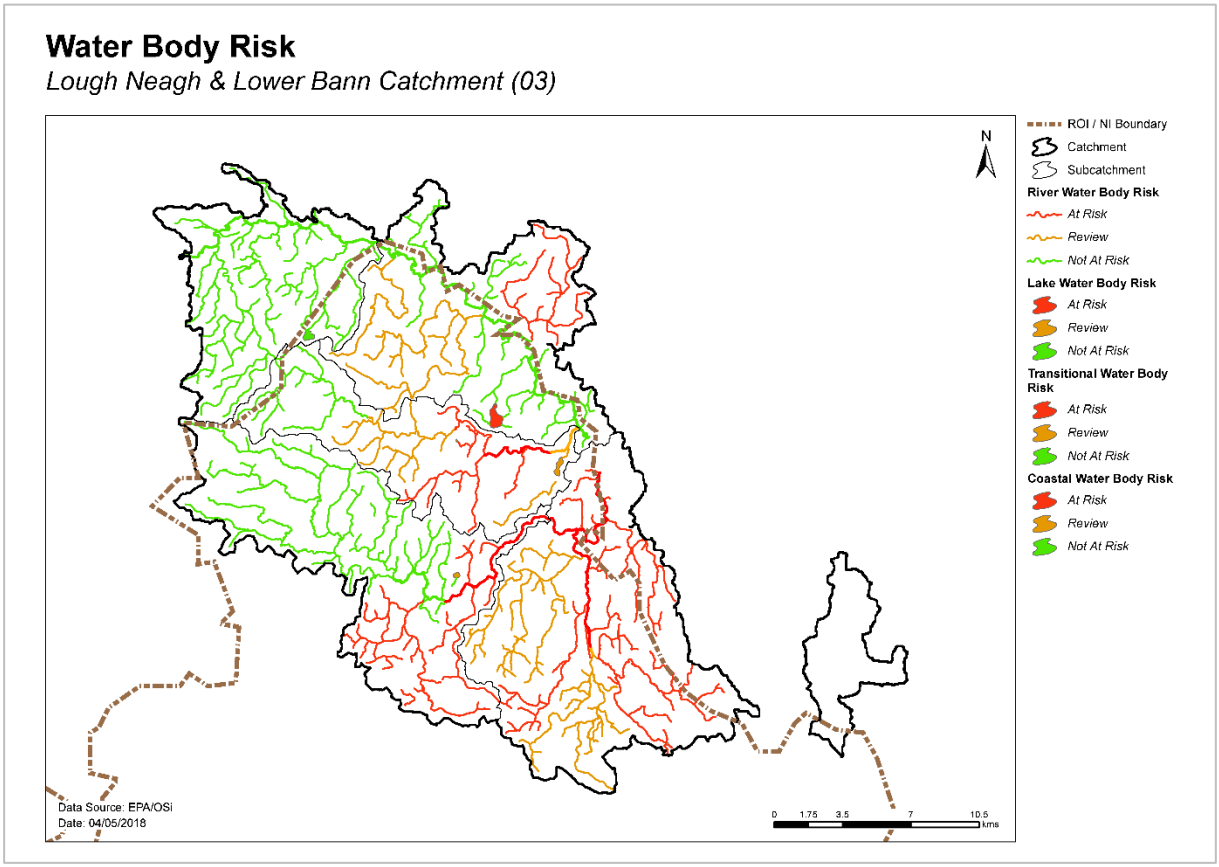


Figure 8. Surface water body risk.

2.4 Risk of not meeting groundwater body environmental objectives

- Four 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.
- One groundwater body are in *Review* because they are hydrologically linked to surface waters that are not meeting water quality objectives where it is considered likely that groundwater is a contributing source of nutrients; three have elevated nitrates and one is considered to be contributing to surface water phosphate concentrations.

- There is one groundwater body IE_NB_G_026 Waste Facility (W0020-01) which is *At Risk* of not meeting its water quality objectives due to ammonia issues. Measures will be needed in this water body to improve the water quality outcomes.

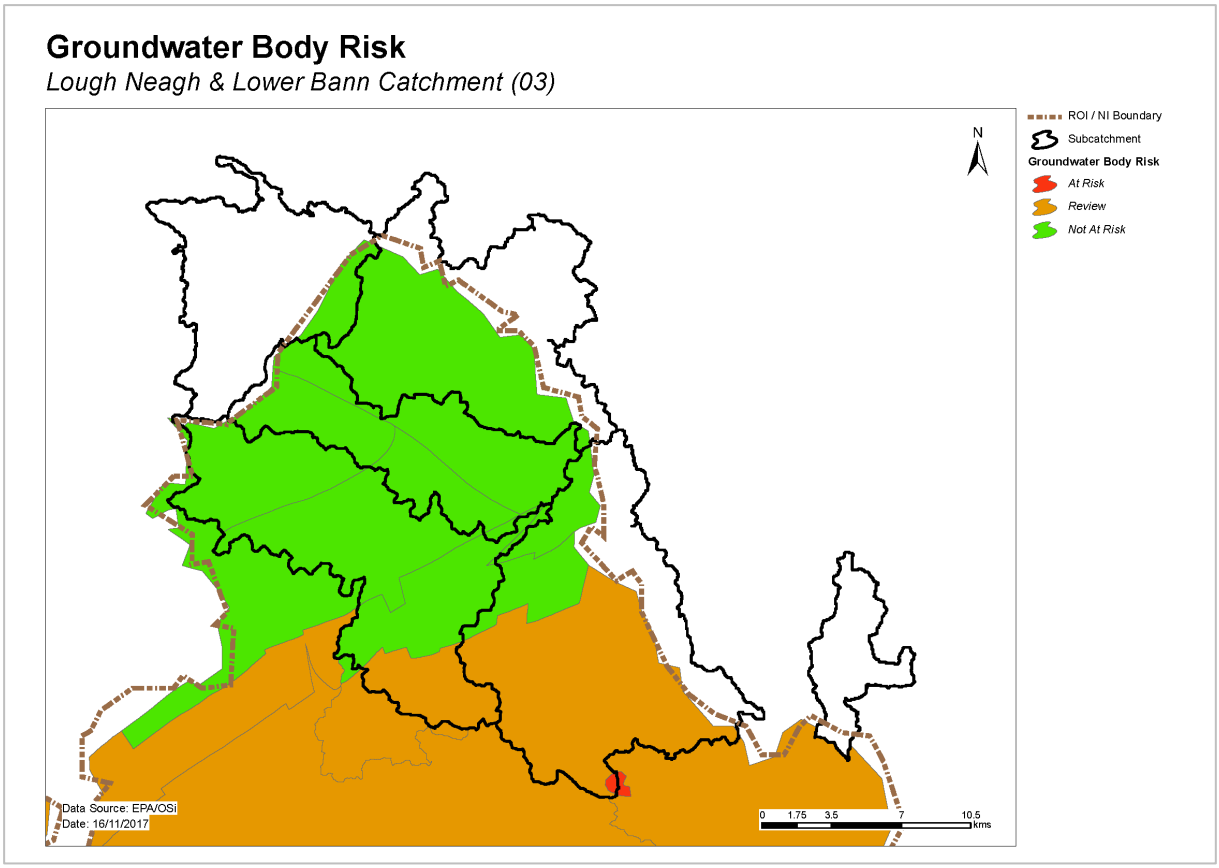


Figure 9. Groundwater body risk

2.5 Protected Areas

2.5.1 Drinking Water Protected Areas

- There are 19 abstractions in the Blackwater Monaghan Catchment comprising three group water schemes (Glaslough and Tyholland GWSS, Truagh GWSS and Tydavnet GWSS) and the Monaghan public supply.
- Sixteen of the abstractions are from three groundwater bodies (Tydavnet GWB, Knockatallon GWB and Monaghan Town GWB), two are from lakes (Emy Lough and Lough More), and one is from a very small lake (Lough Antraicer) at the headwaters of the Scotstown_010 river water body. 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 sources were compliant with the standards for pesticides in 2015.
- All six-drinking water protected areas had therefore met their objectives in 2015.

2.5.2 Bathing Waters

- There are no designated bathing waters in the catchment.

2.5.3 Shellfish Waters

- There are no designated shellfish areas in the catchment.

2.5.4 Nutrient Sensitive Areas

- There is one designated (in 2010) nutrient sensitive area (NSA) in the Blackwater catchment. The NSA is meeting its environmental objective because tertiary treatment is in place at the relevant waste water treatment plant. The NSA and its associated waste water agglomeration is summarised in Table 4.

Table 4. Nutrient Sensitive Areas in the catchment

Nutrient Sensitive Area		Agglomeration		Objective met?		Comment
Name	Code	Name	Code	Yes	No	
Blackwater (River)	IEGBNIRI_NB_2001_0011	Monaghan	D0061	✓		Tertiary treatment is already in place.

2.5.5 Natura 2000 Sites

- There are no Special Areas of Conservation (SACs) in the catchment.
- There is one Special Protected Areas (SPA) in the catchment:
    - Slieve Beagh SPA

As there are no specific water quality and quantity supporting conditions identified in the site-specific conservation objectives for this SPA, the intersecting water bodies are not assigned priority action for WFD protected area purposes in the second cycle.

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 (AWB) in the catchment.

3 Significant issues in *At Risk* water bodies

- Excess phosphorus is the dominant issue in rivers and lakes for the catchment. Excess ammonium is also a concern in a limited number of water bodies. Hydromorphological issues are noted for a limited number of rivers, arising from activities such as channelisation and drainage. The consequences are poor habitat quality including the impact of high levels of fine sediment.
- High ammonia is present in one groundwater body IE_NB_G_026.

4 Significant pressures

4.1 Water bodies

- Where water bodies have been classed as *At Risk*, based on 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 River and lakes

- Significant pressures have been identified by the initial characterisation process in 11 river water bodies, nine of which have multiple pressures. Significant pressures have also been identified for

one lake water body, which has 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 hydromorphological pressures, diffuse urban, domestic waste water, urban waste water and other.

4.1.2 Groundwater

- The significant pressure affecting the IE_NB_G_026 groundwater water body is a waste facility. The key parameter of concern is ammonia.

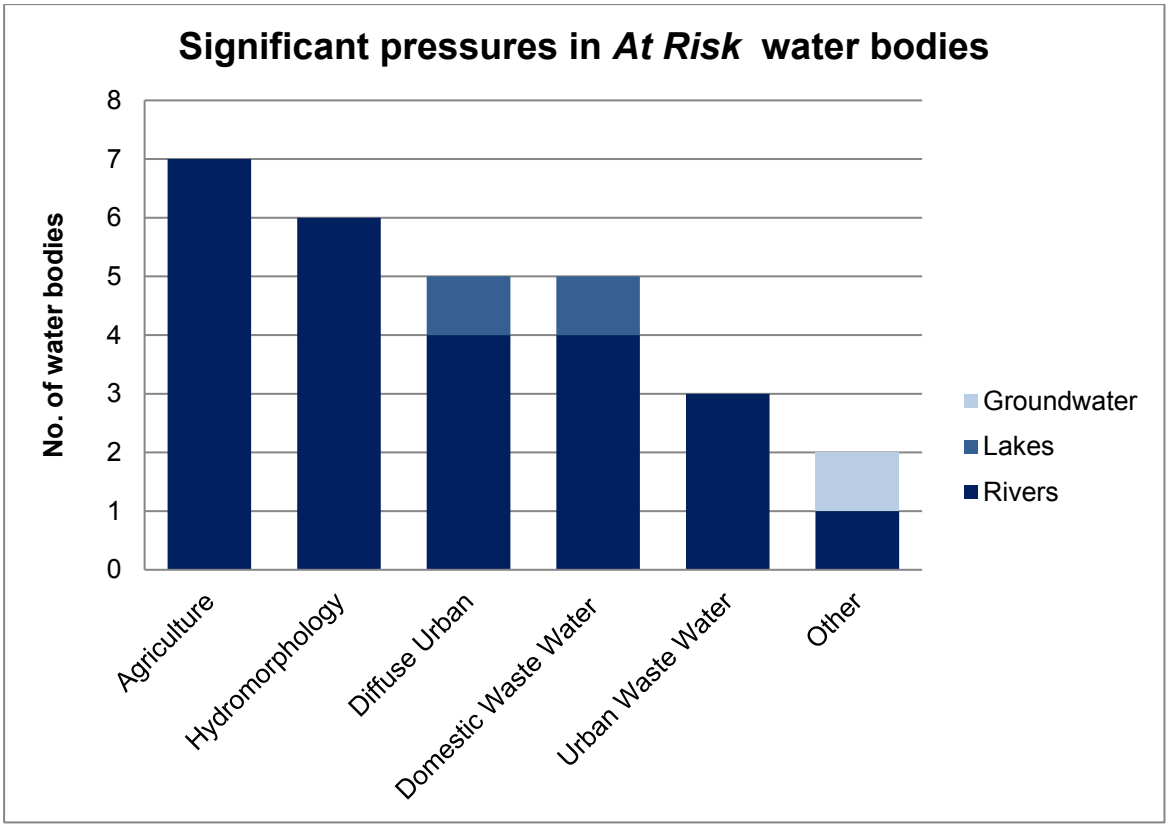


Figure 10. Significant pressures impacting on *At Risk* water bodies.

4.2 Pressure type

4.2.1 Agriculture

Agriculture is a significant pressure in seven river water bodies; the water bodies affected by farming are shown in Figure 11. The impact of the pressure includes 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. The pollution impact potential map showing areas of relative risk for phosphorus loss from agriculture to surface water is given in Appendix 5.

4.2.2 Hydromorphology

- River water bodies within the Mountain Water, Clontibret Stream and Blackwater [Monaghan] subcatchments are subject to extensive modification (Figure 12 and Table 4a). Drainage schemes exist which have led to altered flow, high levels of siltation and habitat degradation. A weir was

recorded on a river water body within the Mountain Water subcatchment which impacts on hydromorphological conditions downstream.

Table 4a – Water bodies impacted by hydromorphological pressures

Pressure	Sub-Catchment	Water body Code
Modification due to Drainage Schemes (Channelisation)	Mountain[Water]_SC_010	Mountain Water_040
	Mountain[Water]_SC_010	Mountain Water_050
	Clontibret[Stream]_SC_010	Clontribet Stream_030
	Clontibret[Stream]_SC_010	Clontribet Stream_010
	Clontibret[Stream]_SC_010	Cor River
	Blackwater[Monaghan]_SC_010	Conawary(lower)_010
In River Structures	Mountain[Water]_SC_010	Mountain Water_040

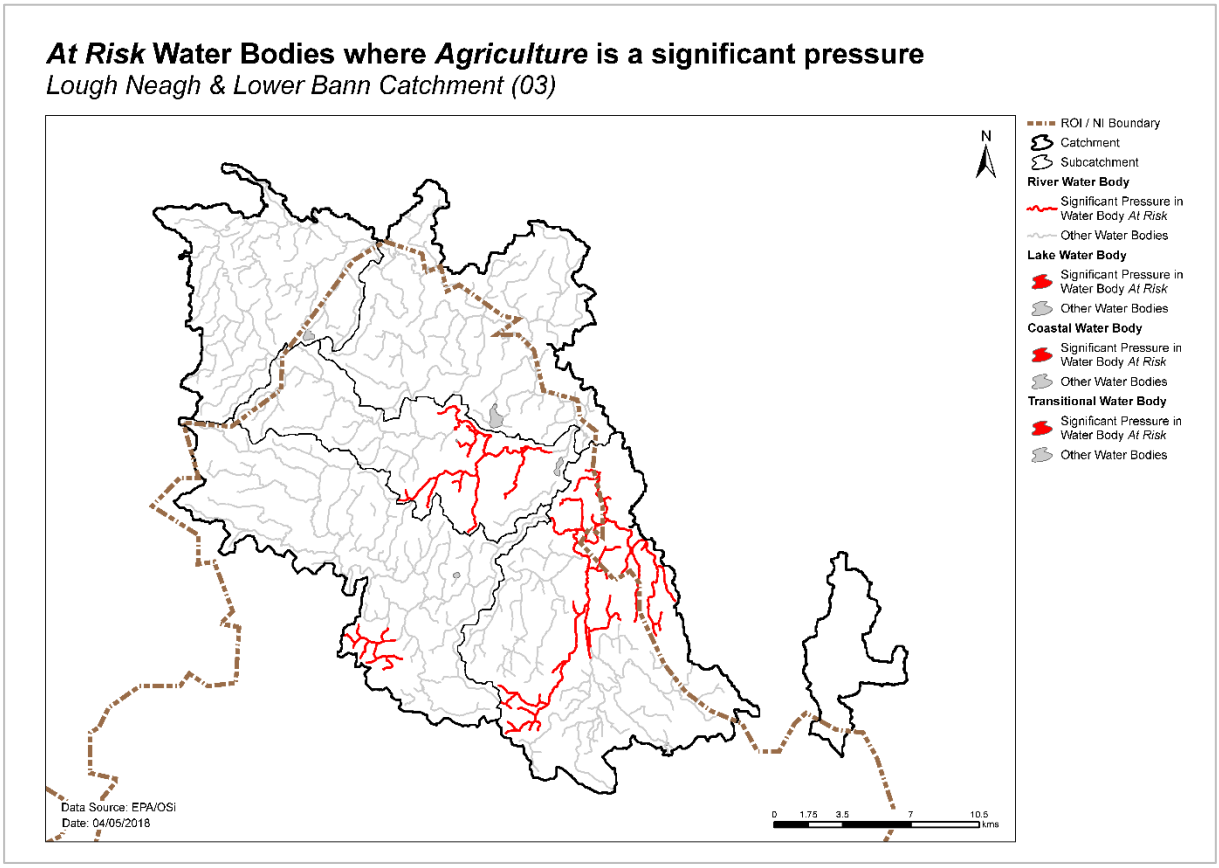


Figure 11. Water bodies that are *At Risk* and are impacted by agricultural activities

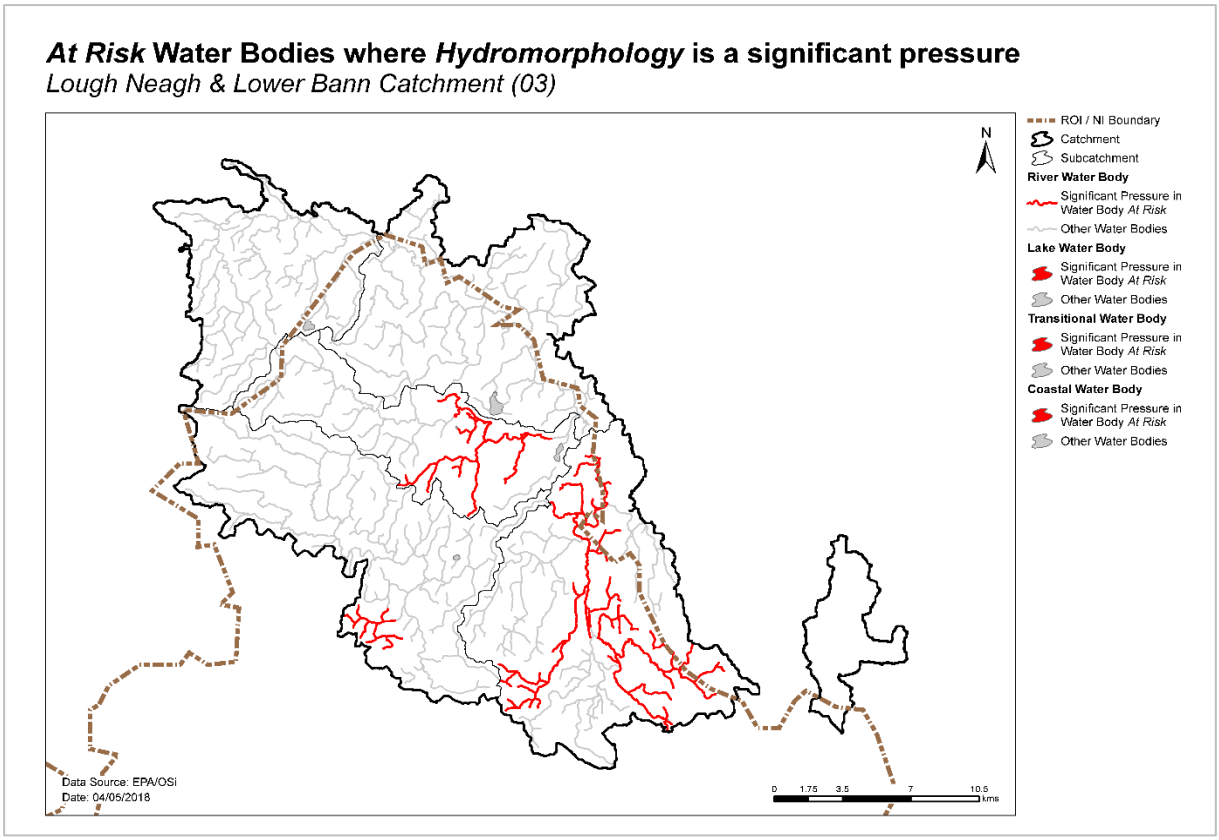


Figure 12. Water bodies that are *At Risk* and are impacted by hydromorphological impacts

4.2.3 Diffuse urban

- Diffuse urban pressures (resulting from misconnections, leaky sewers and runoff from paved and unpaved areas) have been identified as significant for one lake and four river water bodies (Figure 13).

4.2.4 Domestic Waste water

- Domestic waste water has been identified as a significant pressure in four rivers and one lake (Figure 14). The impacts are associated with inadequate treatment systems, and unsuitable percolation areas and/or direct pipe discharges, usually in areas of poorly draining soils and subsoils, resulting in elevated nutrient concentrations.

4.2.5 Urban Waste water Treatment Plants

- Urban Waste Water Treatment Plants (WWTPs) have been identified as a significant pressure in three *At Risk* water bodies, Blackwater (Monaghan)_040, Shambles_010 and Mountain Water_040; details are given in Table 5 and Figure 15. The two WWTPs impacting these three water bodies, Monaghan and Emyvale, are currently not specified in improvement plans.

Table 5. Waste Water Treatment Plants identified as Significant Pressures in *At Risk* water bodies.

Facility name	Facility Type	Water body	10-15 Ecological Status	Expected Completion Date
Monaghan D0061	> 10,000 p.e.	Blackwater (Monaghan)_040	Moderate	N/A
Monaghan D0061	> 10,000 p.e.	Shambles_010	Poor	N/A
Emyvale D0346	1,001 to 2,000 p.e.	Mountain Water_040	Poor	N/A

4.2.6 Other Significant Pressure

- *Waste*
- Waste (poultry litter) has been identified as a significant pressure in one river water body – Clontibret Stream_010. Elevated organics and phosphorous are the significant issues arising from waste.
- One groundwater body IE_NB_G_026, is impacted by a waste facility.

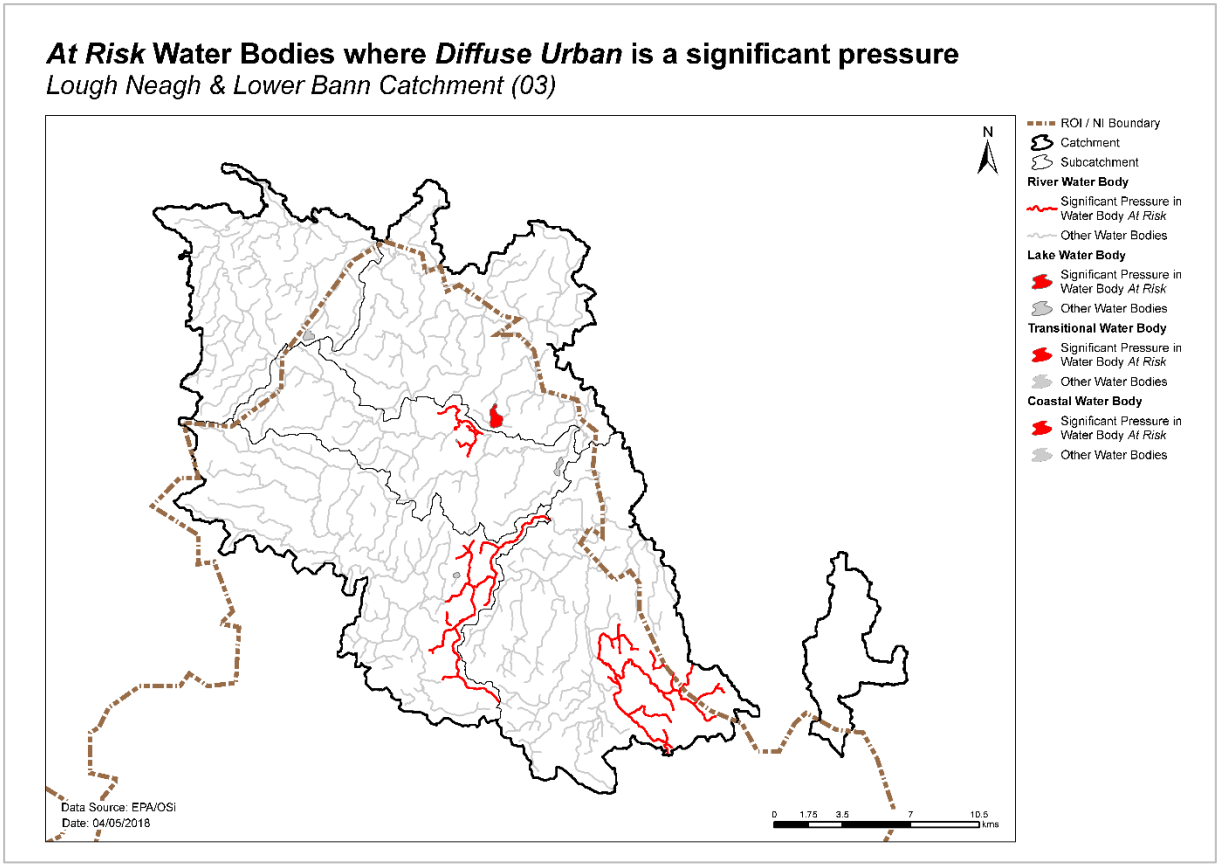


Figure 13. Water bodies that are *At Risk* and are impacted by diffuse urban pressures

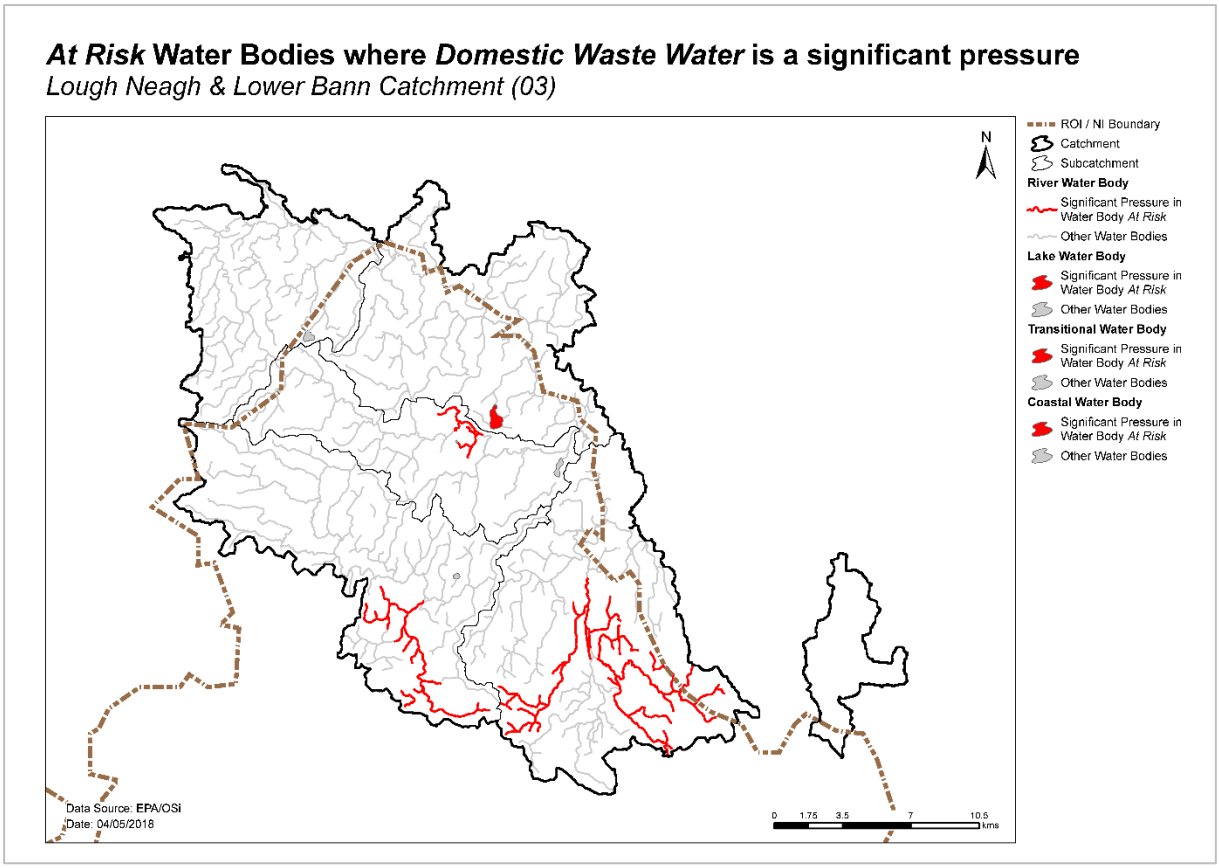


Figure 14. Water bodies that are *At Risk* and are impacted by domestic waste water pressures

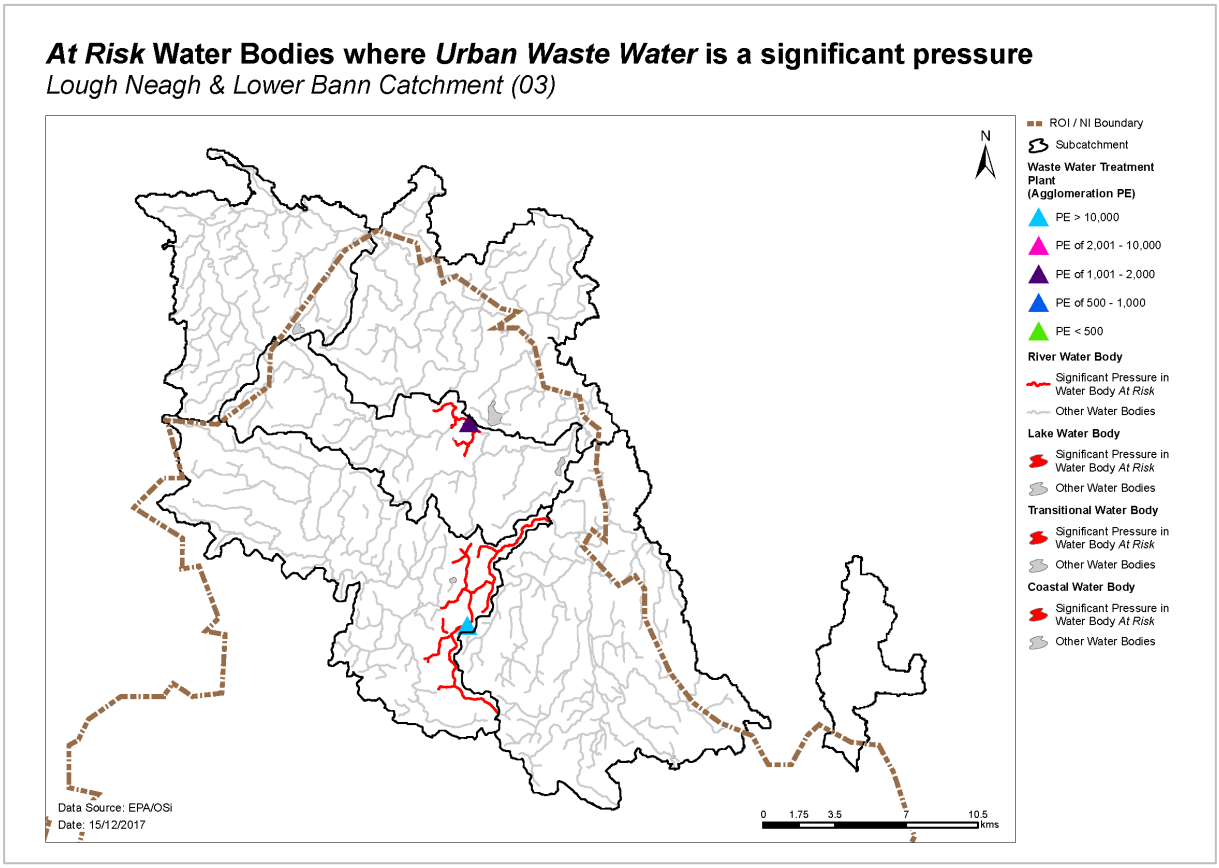


Figure 15. Water bodies that are *At Risk* and are impacted by urban waste water pressures

5 Load reduction assessment

5.1 River water body load reductions

- Phosphorus is the main parameter influencing water quality in rivers in the catchment.
- 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.
- Based on the available water chemistry data, load reductions are required in at least four river water bodies (Table 6). The largest reductions will be needed in the Clontibret Stream_030, Blackwater (Monaghan)_040 and Shambles_010 water bodies. The load reduction needed in the Mountain water_050 is low.

Table 6. Relative load reductions required in monitored water bodies that are *At Risk*.

WATER BODY	P Load Reduction Required
CLONTIBRET STREAM_030	High
BLACKWATER (MONAGHAN)_040	High
SHAMBLES_010	High
MOUNTAIN WATER_050	Low

6 Further characterisation and local catchment assessments

- Further characterisation through local catchment assessments is needed in 12 *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.
- Further characterisation through local catchment assessments is needed in 10 of the water bodies in *Review* to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.

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

Risk	IA 1	IA 2	IA 3	IA 5	IA 7	Total
At Risk	8	2	3	2	5	21
Review	2	0	6	0	1	13
Note water bodies may have multiple categories of Local Catchment Assessments						

7 Catchment summary

- Of the 27 river water bodies in the catchment, 11 are *At Risk* of not meeting their WFD objective.
- Only one out of six lake water bodies is *At Risk* of not meeting their WFD objective.
- One of the *At Risk* water bodies is a High Ecological Status (HES) objective water body that is failing to meet High status.
- The significant issue in the surface water bodies is excess nutrient loss, mainly phosphorus, leading to eutrophication. The significant pressures relating to excess nutrients are primarily agricultural (diffuse and point), but also diffuse urban and waste water (urban and domestic).
- One of the groundwater bodies in the catchment is *At Risk*. The significant pressure in this groundwater body is a waste facility.

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 one area for action in the Blackwater (Neagh-Bann) 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 Blackwater (Lough Neagh-Lower Bann) catchment are summarised below.

- One recommended area for actions (Table 8, Figure 16) was selected.
- It is Mountain (water) & Emy Lake.
- This includes three *At Risk* and four *Review* river and lake water bodies.
- There are no groundwater bodies that are *At Risk* or *Review* due to groundwater contribution of nutrients to surface water bodies.

A remaining fifteen *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 17.
These include fifteen river and lake water bodies, nine *At Risk* and six *Review*.

Table 8. Recommended Areas for Action in the Blackwater (Lough Neagh-Lower Bann) Catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Mountain (water) & Emy Lake	7	3_2 3_4	Monaghan	• Build on improvements in two water bodies. • Rivers Trust in operation. • Group water scheme present. • Communities project in Mountain Water _040 which is looking at the hydromorphology issue.

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 three *At Risk* surface water bodies, it is predicted that all three (100%) 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	2	0	2
Review	2	0	2
Lakes			
At Risk	1	0	1
Review	2	0	2
Total	7	0	7

- Eleven water bodies have met their 2015 environmental objective.
- As action is not yet planned to be taken in the remaining nine *At Risk* surface water bodies, a 2027 date is applied to all nine water bodies.
- For the six *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 9.

Table 9. 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	9	0	9
Review	4	0	4
Lakes			
At Risk	0	0	0
Review	2	0	2
Total	15	0	15

9.2 Groundwater

- Five of the six groundwater bodies are currently Good status and, therefore, have met their environmental objectives.
- The one groundwater body, IE_NB_G_026 in the Blackwater catchment that is less than Good status has an environmental objective date of 2027.

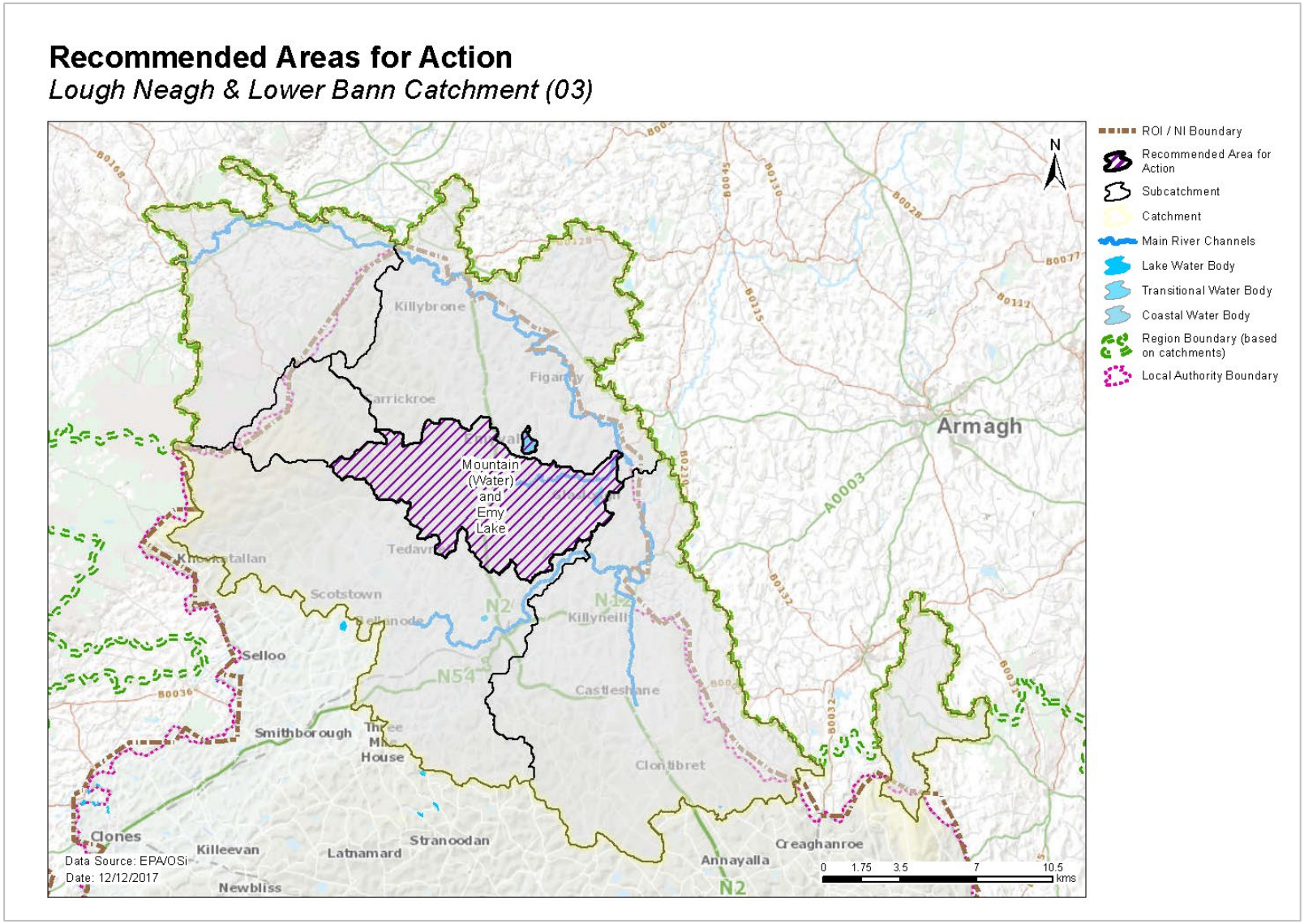


Figure 16. Location of Recommended Areas for Action in the Blackwater Catchment

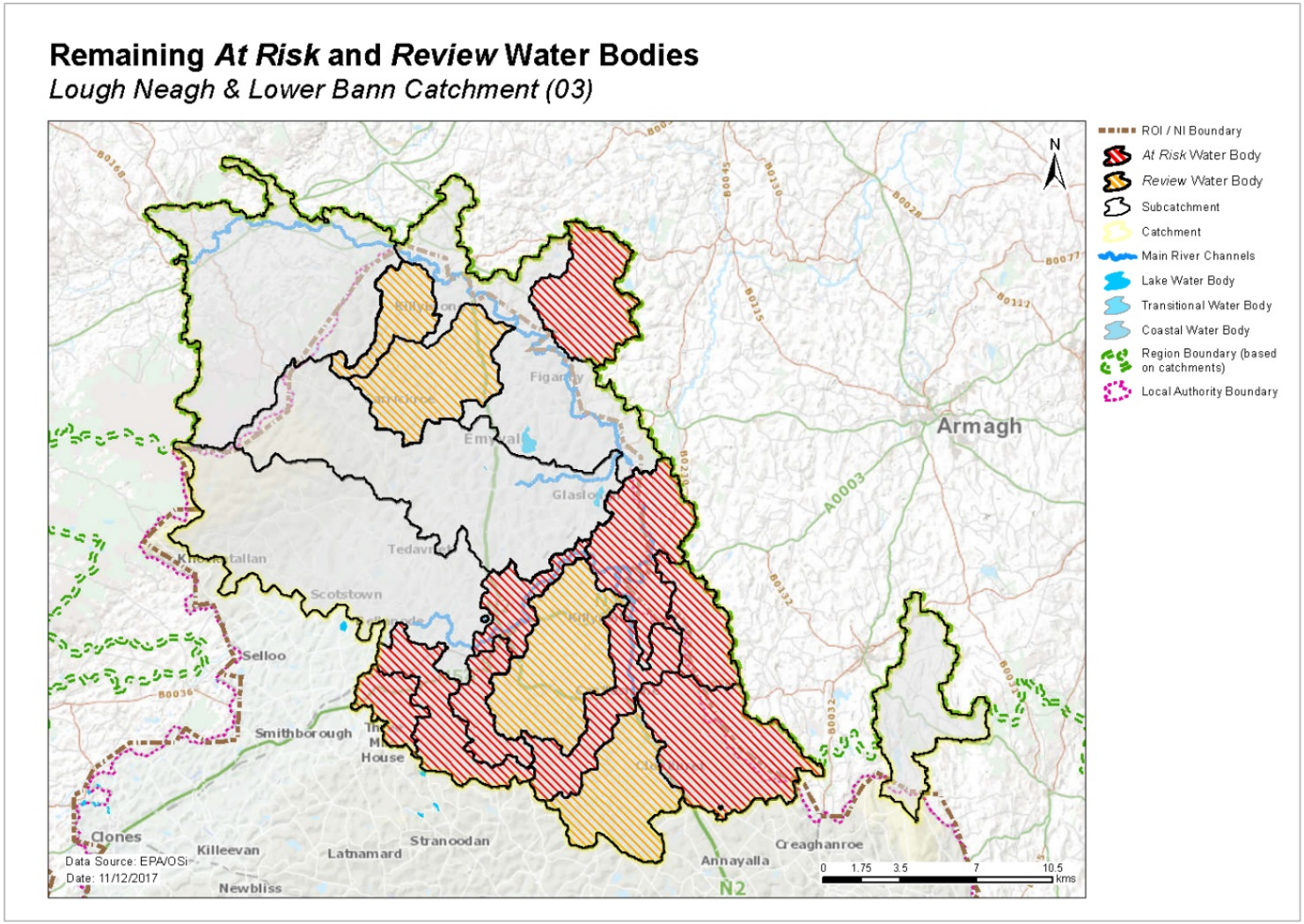


Figure 17. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Blackwater Catchment

10 Acknowledgements

This Blackwater (Lough Neagh-Lower Bann) Catchment Assessment (Version 3) has been produced by the Catchment Science & Management Unit, EPA, with the assistance of the following:

- Monaghan County Council.
- Inland Fisheries Ireland.
- Local Authorities Waters & Communities Office.
- Irish Water.
- RPS Group.
- Northern Ireland Environment Agency.
- Ecological Monitoring & Assessment Unit, EPA.
- Hydrometric & Groundwater Section, EPA.
- Informatics Section, EPA.
- Laboratories, EPA.
- Office of Environmental Enforcement, EPA.
- 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.

Appendix 1 High ecological status objective water bodies

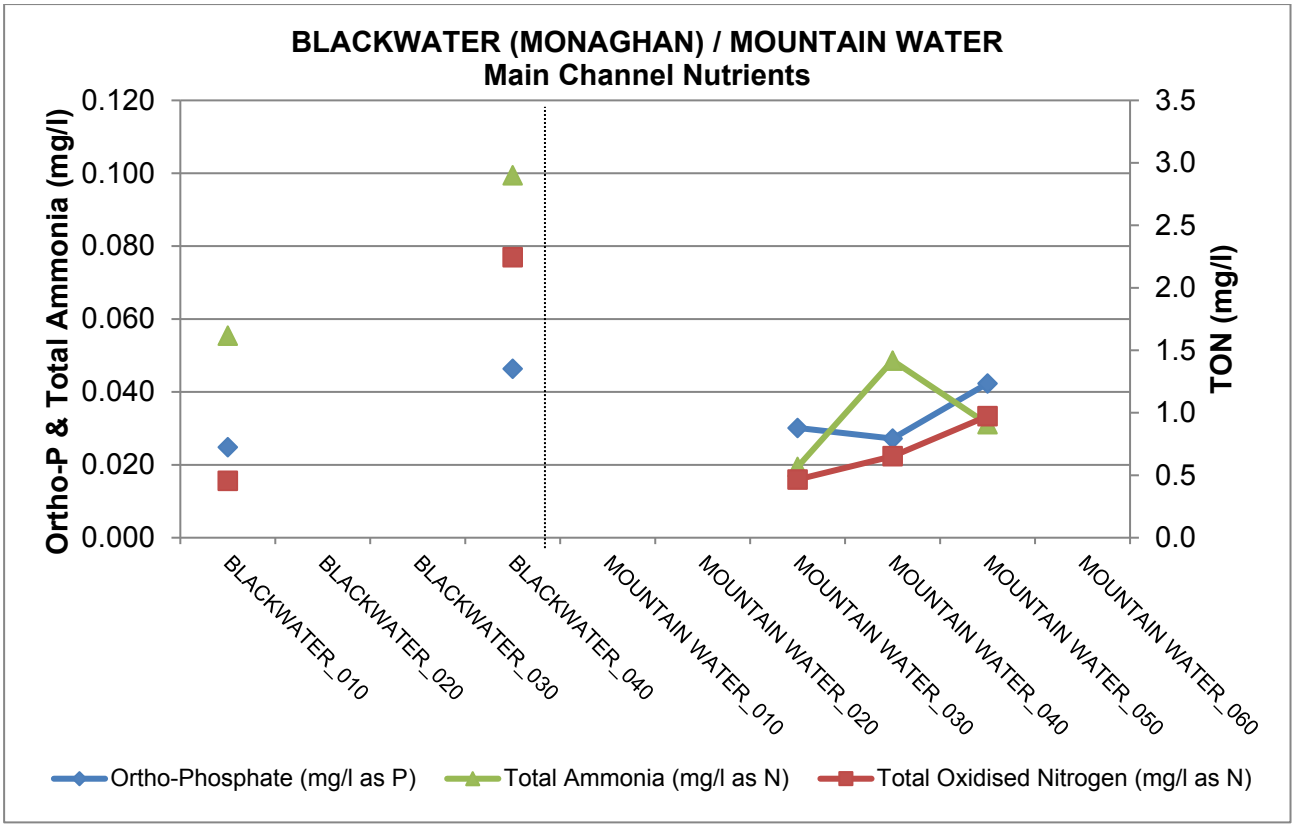
Water body/ Site	Type	Codes	2015 Status
Mountain water_010	River	UKGBNI1NB030308254	High

Appendix 2 Catchment Scale Nutrient concentrations and in-stream loads

The results of the water quality assessment for the Blackwater (Monaghan) and the Mountain Water channels are illustrated in Chart 1. For the Blackwater (Monaghan) monitoring data are available for the Blackwater (Monaghan)_010 and Blackwater (Monaghan)_040. The 2010-2015 baseline orthophosphate concentrations increased along the main channel ranging from 0.025 to 0.046 mg/l. An exceedance of the Environmental Quality Standard (EQS) for good status (0.035mg/l) was evident at Blackwater (Monaghan)_040. Similarly, ammonia concentrations increased from 0.055mg/l to 0.099mgl, the latter exceeding the EQS for good status (0.065mg/l). Total oxidised nitrogen (TON) concentrations in the river headwaters (Blackwater (Monaghan)_010) were relatively low (0.46mg/l). TON however increased markedly downstream to a concentration of 2.24 mg/l in Blackwater (Monaghan)_040.

The increase in orthophosphate, ammonia and TON concentrations in Blackwater (Monaghan)_040 may relate to the emergency overflow from the Monaghan Town WWTP (PE >10,000) and the primary discharge from the Knockaconny WWTP (PE 500-1,000). Given that no water chemistry data is available for Blackwater (Monaghan)_020 and 030, it is likely that the Ballinode and Tydavnet WWTP's also contributed to the general increase in nitrogen (N) and P progressing downstream. Other significant pressures affecting the river are urban runoff from Monaghan Town and licenced discharges from the Monaghan Co-op.

The Mountain Water has data available for three monitoring locations along its course which show an increase in the concentration of all parameters moving downstream. TON and total ammonia were below relevant EQS standards, whereas the EQS for orthophosphate was marginally exceeded at Mountain Water_050. Upstream of Mountain Water_050, Mountain Water_040 receives the primary discharge from the Emmyvale WWTP (PE 2000). At Mountain Water_050, intensive agriculture is the dominant pressure with pasture (91%) making up the bulk of the total P load. N & P stream concentration maxima are likely related to a combination of agricultural practises and upstream urban waste water discharge.


BLACKWATER (MONAGHAN) / MOUNTAIN WATER
Main Channel Nutrients
Ortho-P & Total Ammonia (mg/l)
TON (mg/l)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
BLACKWATER_010
BLACKWATER_020
BLACKWATER_030
BLACKWATER_040
MOUNTAIN WATER_010
MOUNTAIN WATER_020
MOUNTAIN WATER_030
MOUNTAIN WATER_040
MOUNTAIN WATER_050
MOUNTAIN WATER_060
Ortho-Phosphate (mg/l as P)
Total Ammonia (mg/l as N)
Total Oxidised Nitrogen (mg/l as N)

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
03_2	IE_NB_03_3	Grove	Lake	Review	Unassigned	Unassigned	N		2027	Mountain (water) & Emy Lake
03_2	IE_NB_03_79	Glaslough	Lake	Review	Unassigned	Unassigned	N		2027	Mountain (water) & Emy Lake
03_2	IE_NB_03M010700	Mountain Water_060	River	Review	Unassigned	Unassigned	N		2027	Mountain (water) & Emy Lake
03_2	IE_NB_03M010400	Mountain Water_030	River	Review	Moderate	Good	N		2027	Mountain (water) & Emy Lake
03_2	IE_NB_03M010500	Mountain Water_040	River	At risk	Poor	Poor	N	Ag,DU,DWW,Hymo, UWW	2027	Mountain (water) & Emy Lake
03_2	IE_NB_03M010650	Mountain Water_050	River	At risk	Unassigned	Poor	N	Ag,Hymo	2027	Mountain (water) & Emy Lake
03_4	IE_NB_03L100990	Lisavargy_010	River	Review	Unassigned	Unassigned	N		2027	
03_4	IE_NB_03T170930	Tireran_010	River	Review	Unassigned	Unassigned	N		2027	
03_4	UKGBNI1NB030307042	Crilly Feeder	River	At risk	Unassigned	Unassigned	N	Other	2027	
03_4	IE_NB_03_102	Emy	Lake	At risk	Poor	Moderate	N	DU,DWW	2027	Mountain (water) & Emy Lake
03_5	IE_NB_03_86	White Annayalla	Lake	Review	Unassigned	Unassigned	N		2027	
03_5	IE_NB_03C011200	Clontibret Stream_020	River	Review	Unassigned	Unassigned	N		2027	
03_5	IE_NB_03M050960	Mullamurphy_010	River	Review	Unassigned	Unassigned	N		2027	
03_5	UKGBNI1NB030307096	Cor River Tributary	River	At risk	Unassigned	Unassigned	N	Ag	2027	
03_5	UKGBNI1NB030308245	Cor River	River	At risk	Unassigned	Unassigned	N	Ag,Hymo	2027	
03_5	IE_NB_03C011400	Clontibret Stream_030	River	At risk	Poor	Poor	N	Ag,DWW,Hymo	2027	
03_5	UKGBNI1NB030308202	Clontibret Stream_010	River	At risk	Poor	Poor	N	DU,DWW,Hymo	2027	
03_6	IE_NB_03_90	Lambs	Lake	Review	Unassigned	Unassigned	N		2027	
03_6	IE_NB_03B010800	Blackwater (Monaghan)_040	River	At risk	Poor	Moderate	N	DU,UWW	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
03_6	IE_NB_03C021100	Conawary (Lower)_010	River	At risk	Unassigned	Poor	N	Ag,Hymo	2027	
03_6	IE_NB_03C021300	Conawary (Lower)_020	River	At risk	Poor	Poor	N	Ag,DWW	2027	
03_6	IE_NB_03S010500	Shambles_010	River	At risk	Poor	Poor	N	DU,UWW	2027	

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.

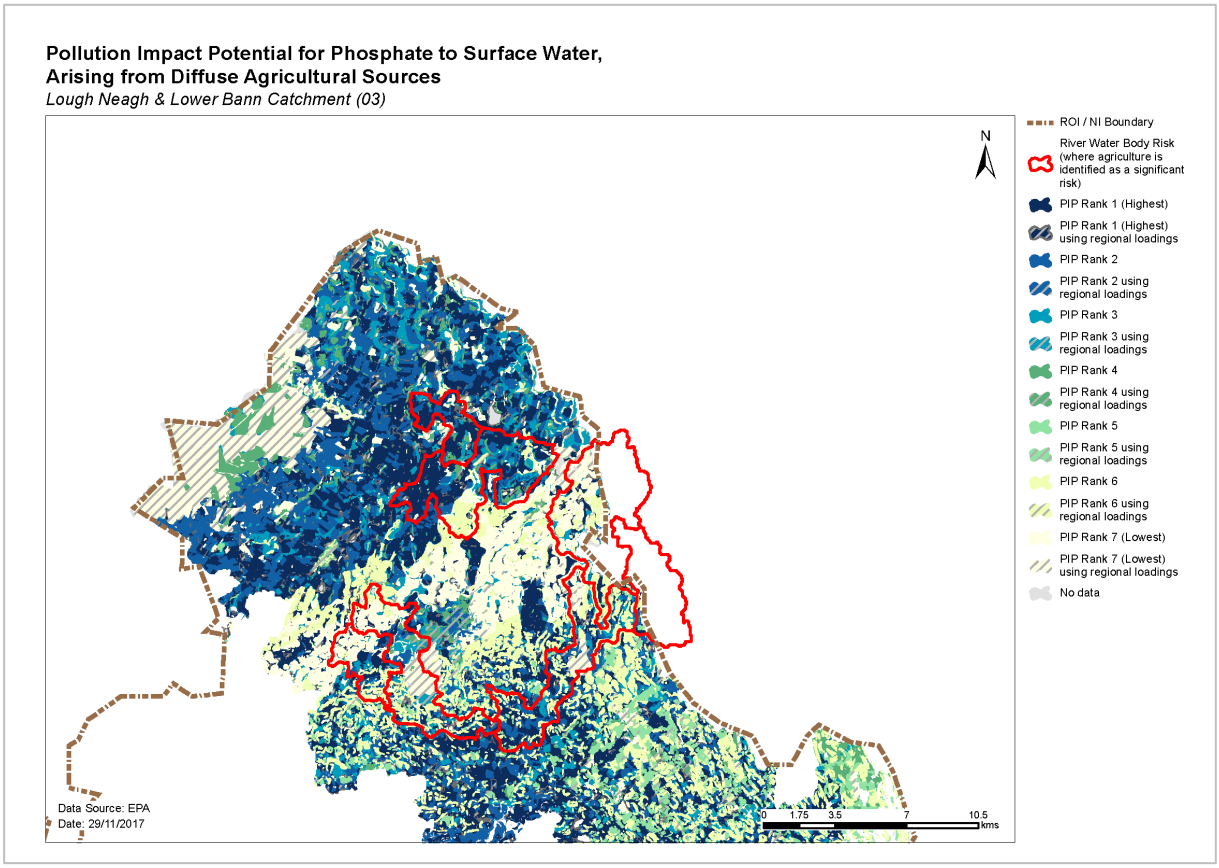
Protected Area: If a water body is one or more of the following: Drinking Water Protected Area; Bathing Water; Shellfish Area; Nutrient Sensitive Area or; a Natura 2000 site with a water dependent qualifying interest with a water quality and/or quantity conservation objective, then it has been highlighted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

Appendix 4 Drinking water supplies in the catchment

Scheme Code	Scheme Name	Water body	Water body Code
2400PRI2017	Glaslough & Tyholland GWSS	Emy Lough	IE_NB_03_102
2400PRI2022	Truagh GWSS	Lough More	IE_NB_03_87
2400PRI2023	Tydavnet GWSS Well No 1 Corlat Borehole	Knockatallon GWB	IEGBNI_NB_G_014
	Tydavnet GWSS Well No 2 Barrytoppy Borehole	Knockatallon GWB	IEGBNI_NB_G_014
	Tydavnet GWSS Well No 3 Vinny McCaffreys	Knockatallon GWB	IEGBNI_NB_G_014
	Tydavnet GWSS Well No 4 Jimmy McElwins	Knockatallon GWB	IEGBNI_NB_G_014
	Tydavnet GWSS Well No 5 Eddie McKennas	Knockatallon GWB	IEGBNI_NB_G_014
	Tydavnet GWSS Lough Antraicer	Scotstown_010	UKGBNI1NB030308255
2400PUB1024	Monaghan Kilnadreen Borehole	Tydavnet GWB	IE_NB_G_013
	Monaghan Drumreask Borehole	Tydavnet GWB	IE_NB_G_013
	Monaghan Crosses Borehole	Monaghan Town GWB	IEGBNI_NB_G_012
	Monaghan Telaydan Borehole	Monaghan Town GWB	IEGBNI_NB_G_012
	Monaghan Mullaghmore East Borehole	Monaghan Town GWB	IEGBNI_NB_G_012
	Monaghan Knockaconny Borehole	Monaghan Town GWB	IEGBNI_NB_G_012
	Monaghan Coolkill East Borehole	Monaghan Town GWB	IEGBNI_NB_G_012
	Monaghan Roosky No 1 Borehole	Monaghan Town GWB	IEGBNI_NB_G_012
	Monaghan Roosky No 2 Borehole	Monaghan Town GWB	IEGBNI_NB_G_012
	Monaghan Drumbenagh Borehole	Monaghan Town GWB	IEGBNI_NB_G_012
	Monaghan Cavanreagh Borehole	Monaghan Town GWB	IEGBNI_NB_G_012

Appendix 5 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 6 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