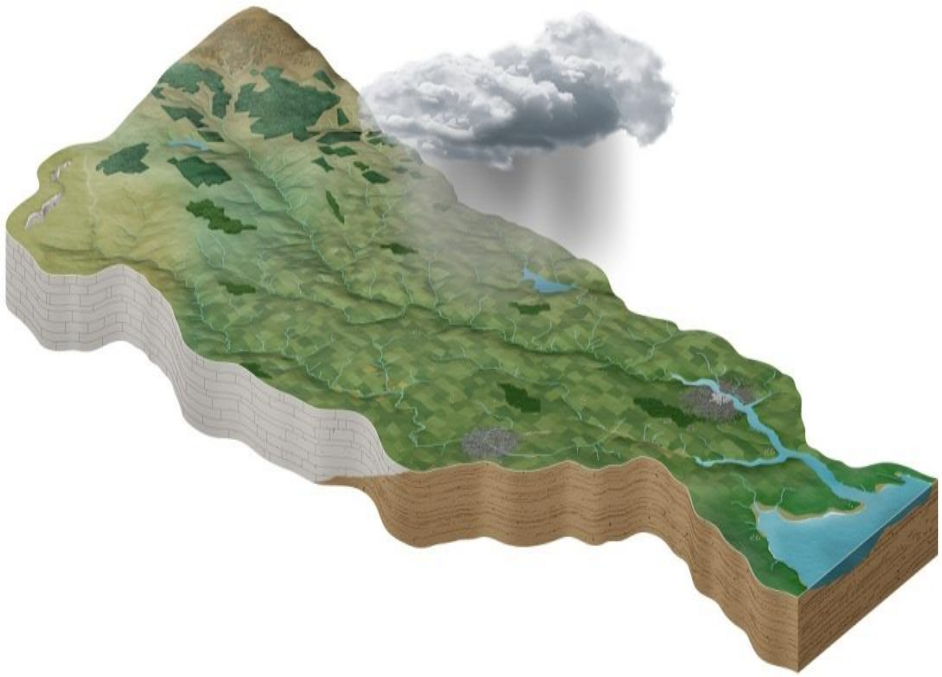
Lower Shannon (Lough Derg) Catchment Assessment 2010-2015 (HA 25C)



Catchment Science & Management Unit

Environmental Protection Agency

September 2018

Version no. 3

epaCatchments
Healthy • Resilient • Productive
Valued water resources supporting vibrant communities

Preface

This document provides a summary of the characterisation outcomes for the water resources of the Lower Shannon (Lough Derg) 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/

Table of contents

1 Introduction

This catchment covers an area of 1,820 km² and comprises Lough Derg and its catchment. The catchment is characterised by flat limestone plains, a small proportion of which are karstified limestone to the east of Lough Derg, and the uplands of the Devil's Bit Hills in the southeast, the Slieve Aughty Mountains in the west and the Slieve Bearnagh and Arra Mountains in the south, between which the Shannon flows to the south from Lough Derg. These upland areas are underlain by red sandstone, with metamorphic and volcanic rocks in the higher summit areas. This catchment can be divided into two regions, the area draining into the western and eastern sides of Lough Derg.

The north-western part of the catchment is drained by the Kilcrow River which rises near Cappataggle and flows past Killimor, where it is joined by the Lisduff River. The Kilcrow continues south being joined by the Cappagh River which drains the north-western slopes of the Slieve Aughty Mountains, and flows into Lough Derg at Stonyisland Bay.

The Woodford River rises in the centre of the Slieve Aughty Mountains and flows through Woodford before entering Lough Derg near Rosmore Pier. The hilly area south to Scarriff is drained by a series of small rivers flowing into the western side of Lough Derg, the largest of which are the Coos, Derrainy and Bow Rivers.

The Bleach River rises on the northern slopes of Scalp Mountain and flows through Lough Atorick and Lough Graney. Now the Graney River, it continues south towards Lough O'Grady, before which it is joined by the Cloghaun River. It then flows east through Scarriff and into Lough Derg at the head of Scarriff Bay.

On the eastern side of the catchment, the Carrigahorrig Stream flows into the northern end of Lough Derg and drains the flat land northwest of Ballingarry.

The Ballyfinboy River rises at Moneygall and flows past Cloughjordan and through Borrisokane. Downstream of here, the river is joined from the north by the Borriswood Stream the Ardcrony Stream. The Ballyfinboy continues northwest past Ballinderry and into Lough Derg south of Drominagh Point.

The Nenagh River rises on the northern slopes of Knocknasreggan in the Silvermines Mountains and flowing north through Templederry. It is then joined from the west by the Ollatrim River before entering Lough Derg at Dromineer Bay. An arterial drainage scheme was completed on the Nenagh River by the OPW between 1955 and 1960.

The flat land west of Nenagh is drained by the Ardgregane Stream and the northern slopes of the Arra Mountains are drained by the Newtown and Youghal Streams, all of which flow into Lough Derg and the head of Youghal Bay.

The Shannon flows out of Lough Derg through the steep-sided gap between the Slieve Bearnagh and Arra Mountains where the towns of Ballina and Killaloe are located on the east and west bank of the river respectively.

The Lower Shannon (Lough Derg) catchment comprises 12 subcatchments (Table 1, Figure 1) with 79 river water bodies, five lakes, no transitional or coastal water bodies, and 10 groundwater bodies. There are no heavily modified or artificial water bodies in the Lower Shannon (Lough Derg) catchment.

Table 1. List of subcatchments in the Lower Shannon (Lough Derg) catchment

Subcatchment ID	Subcatchment Name
25C_1	Youghal[Tipperary]_SC_010
25C_2	LorrhaStream_SC_010
25C_3	Graney[Shannon]_SC_010
25C_4	Ollatrim_SC_010
25C_5	Nenagh_SC_010
25C_6	Cappagh[Galway]_SC_010
25C_7	Bow_SC_010
25C_8	Graney[Shannon]_SC_020
25C_9	Ballyfinboy_SC_010
25C_10	Shannon[Lower]_SC_070
25C_11	Nenagh_SC_020
25C_12	Kilcrow_SC_010

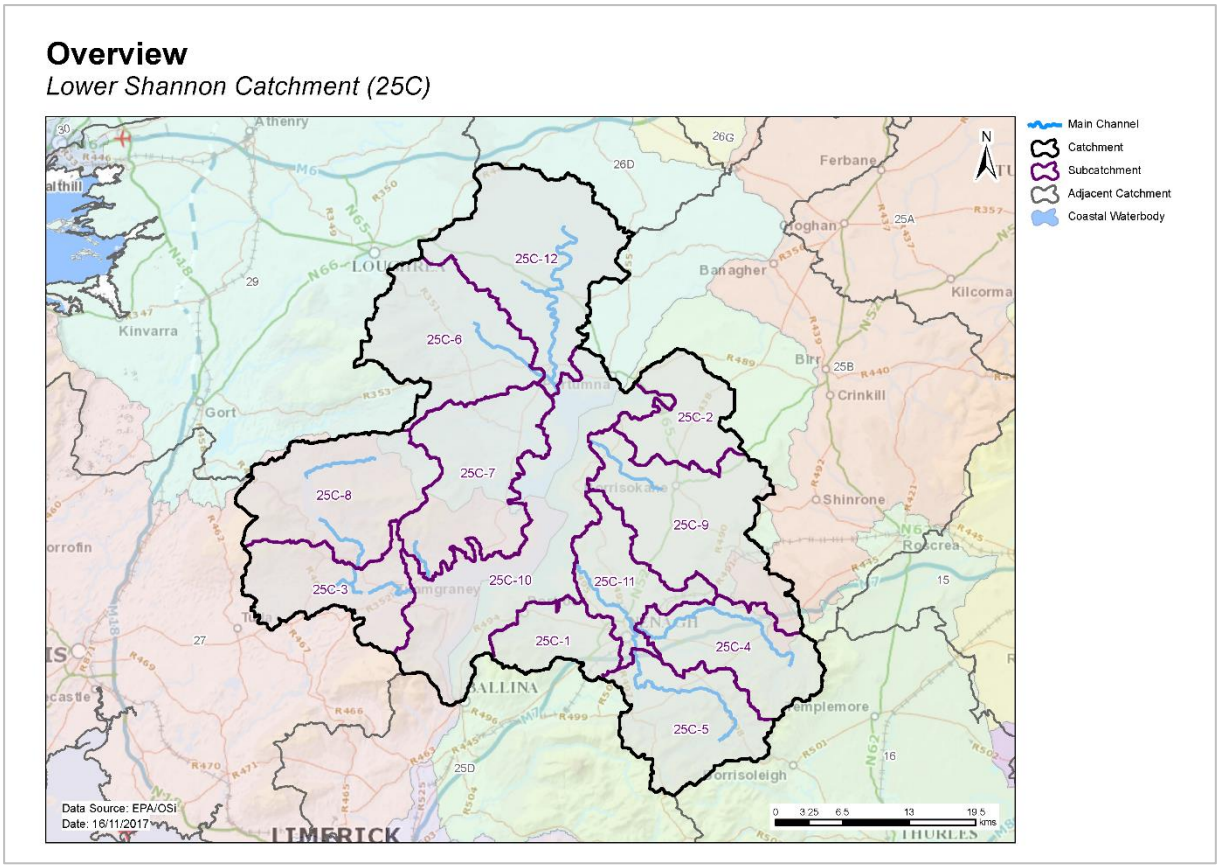


Figure 1. Subcatchments in the Lower Shannon (Lough Derg) catchment

2 Water body status and risk of not meeting environmental objectives

2.1 Surface water ecological status

- There were 38 (45%) river water bodies at Good or High status, and 34 river and lake water bodies (41%) at less than Good status in 2015 (Table 2, Figure 2). Twelve (14%) river and lake water bodies are unassigned.

- Ten river water bodies and sites have a high ecological status objective. In 2015, six (60%) of these water bodies were at High status, three were at Good (30%) and one was at Moderate (10%) (Figure 3, Appendix 1).
- The number of water bodies at each status class in 2007-09 and 2010-15 are shown in Figure 4 (rivers) and 5 (lakes).
- Since 2007-09 when WFD monitoring began, 10 water bodies have an improved status whereas 19 have deteriorated (Figure 6).
- The variation in nutrient concentrations and loads in the Lower Shannon main channels (Nenagh and Kilcrow) are illustrated in Appendix 2.

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

	Number of water bodies	2010-15 Status						Risk Categories		
		High	Good	Mod	Poor	Bad	Unassigned	*Not at Risk*	*Review*	*At Risk*
Rivers	79	6	32	24	7	0	10	34	11	34
Lakes	5	0	0	1	1	1	2	0	2	3

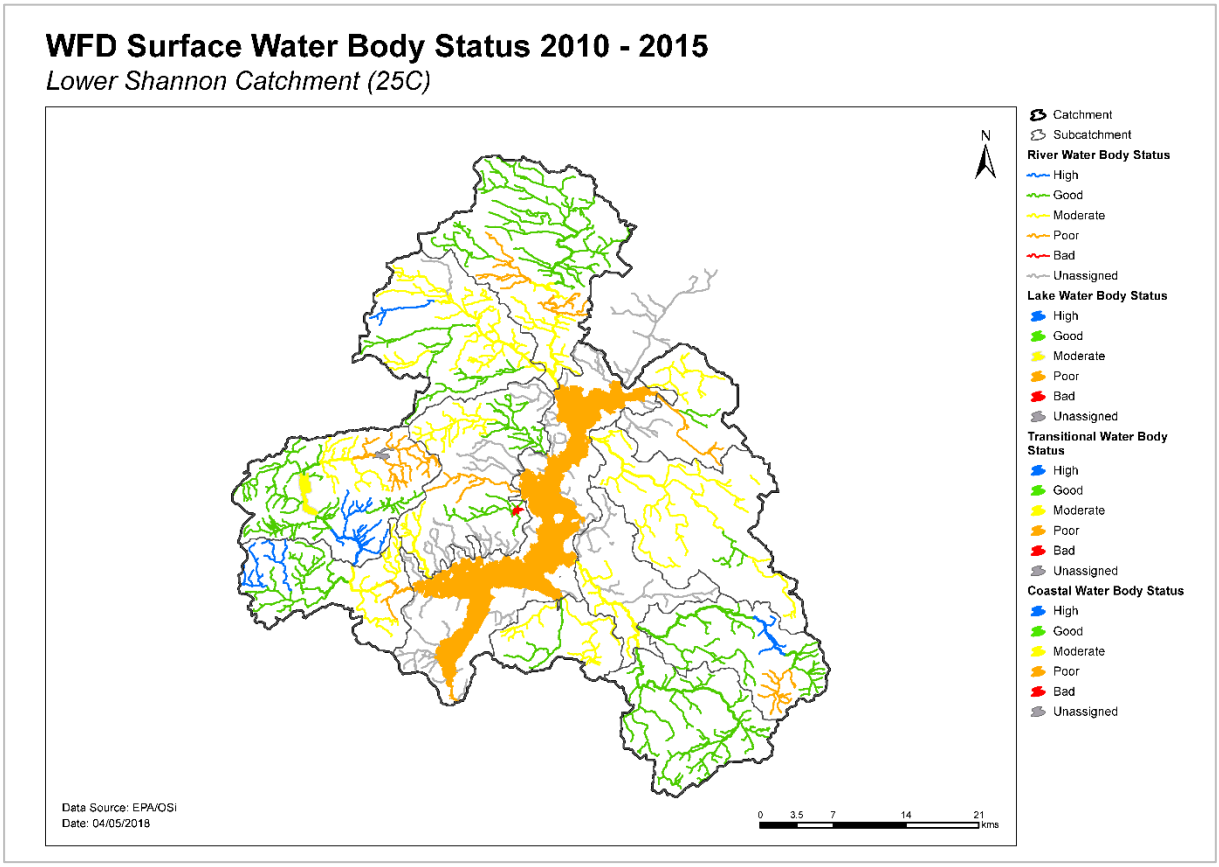


Figure 2. Surface water ecological status

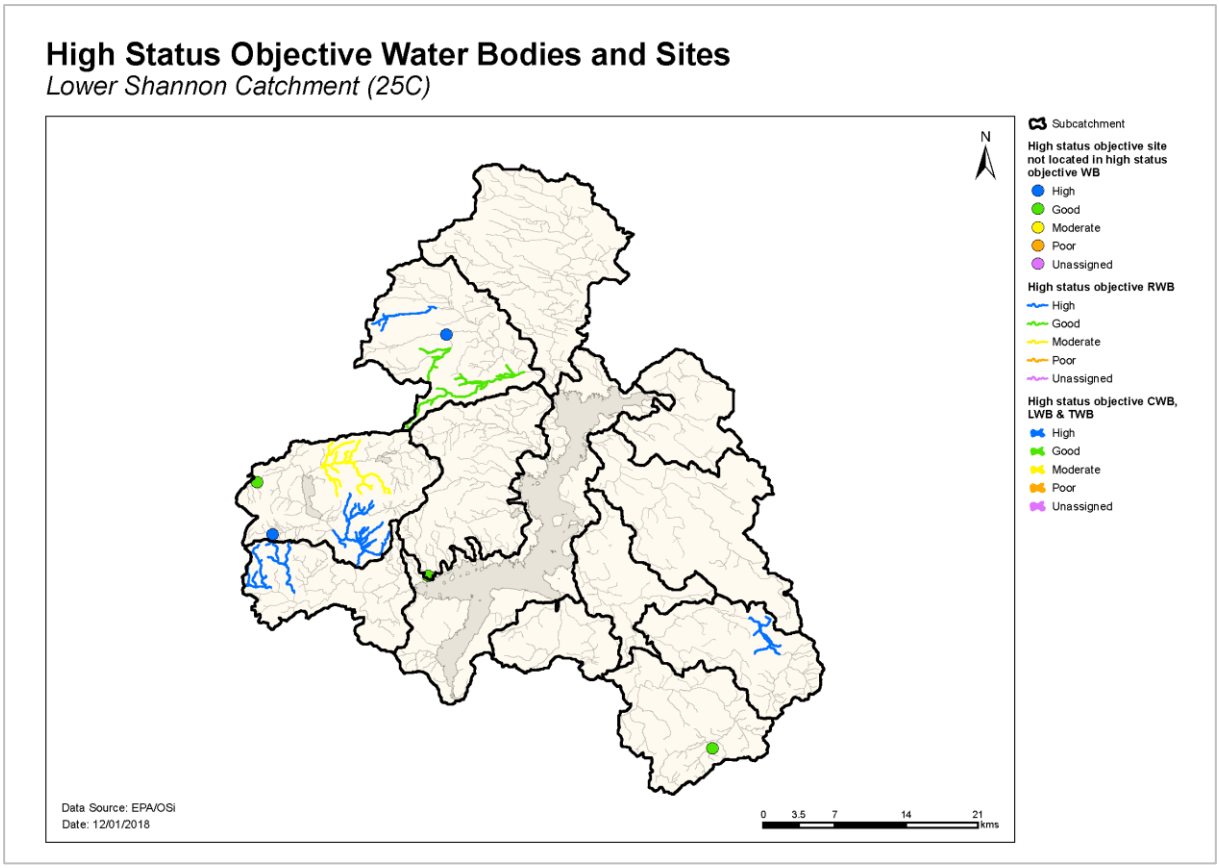


Figure 3. High ecological status objective water bodies and sites

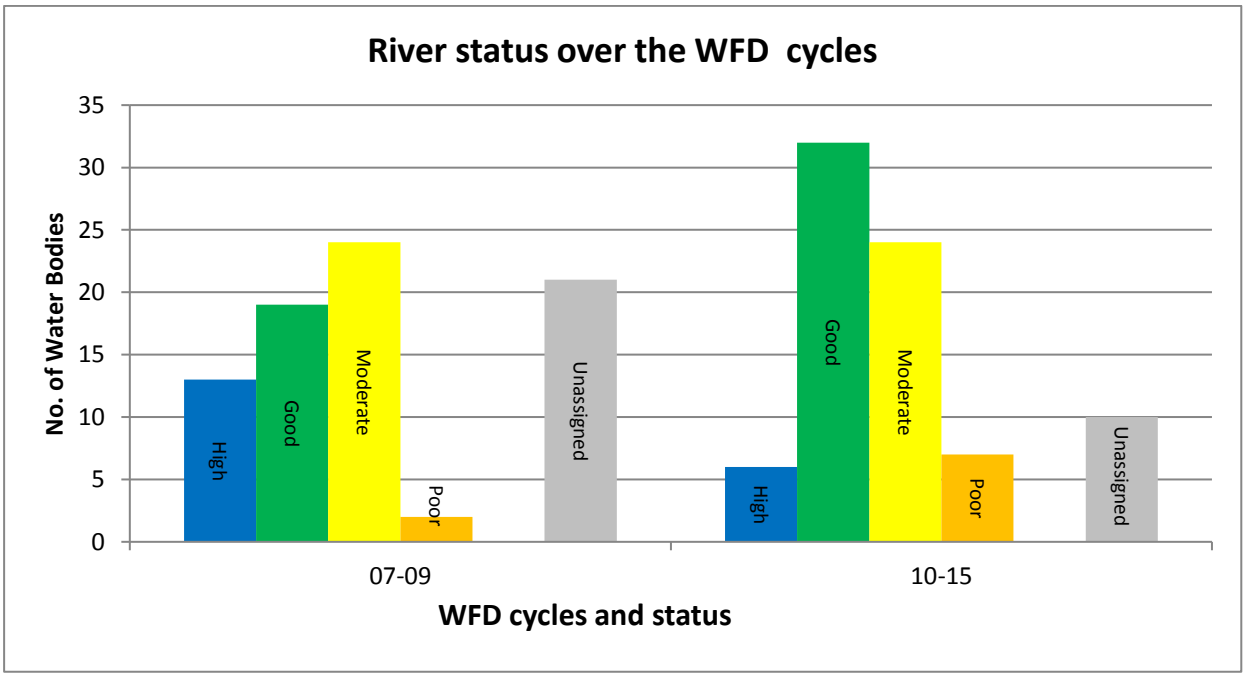


Figure 4. Number of rivers at each status class in 2007-09 and 2010-15

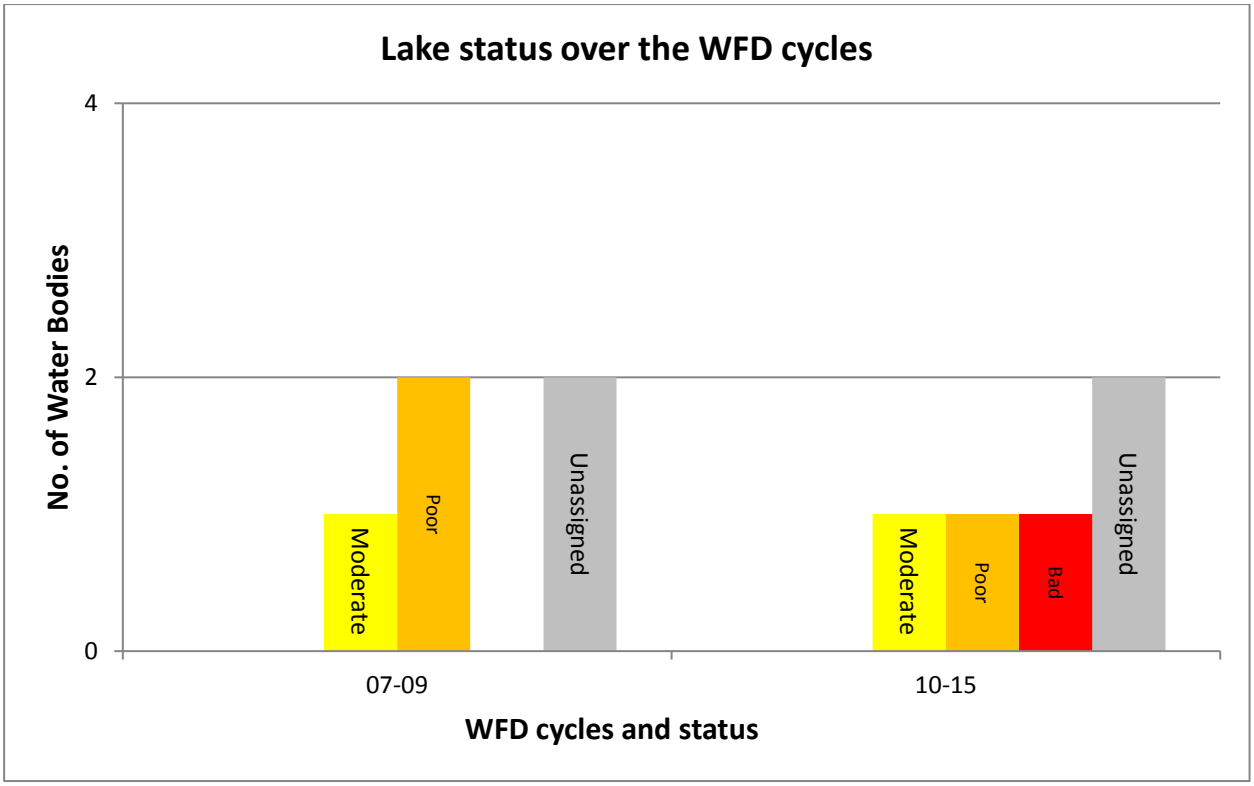


Figure 5. Number of lakes at each status class in 2007-09 and 2010-15

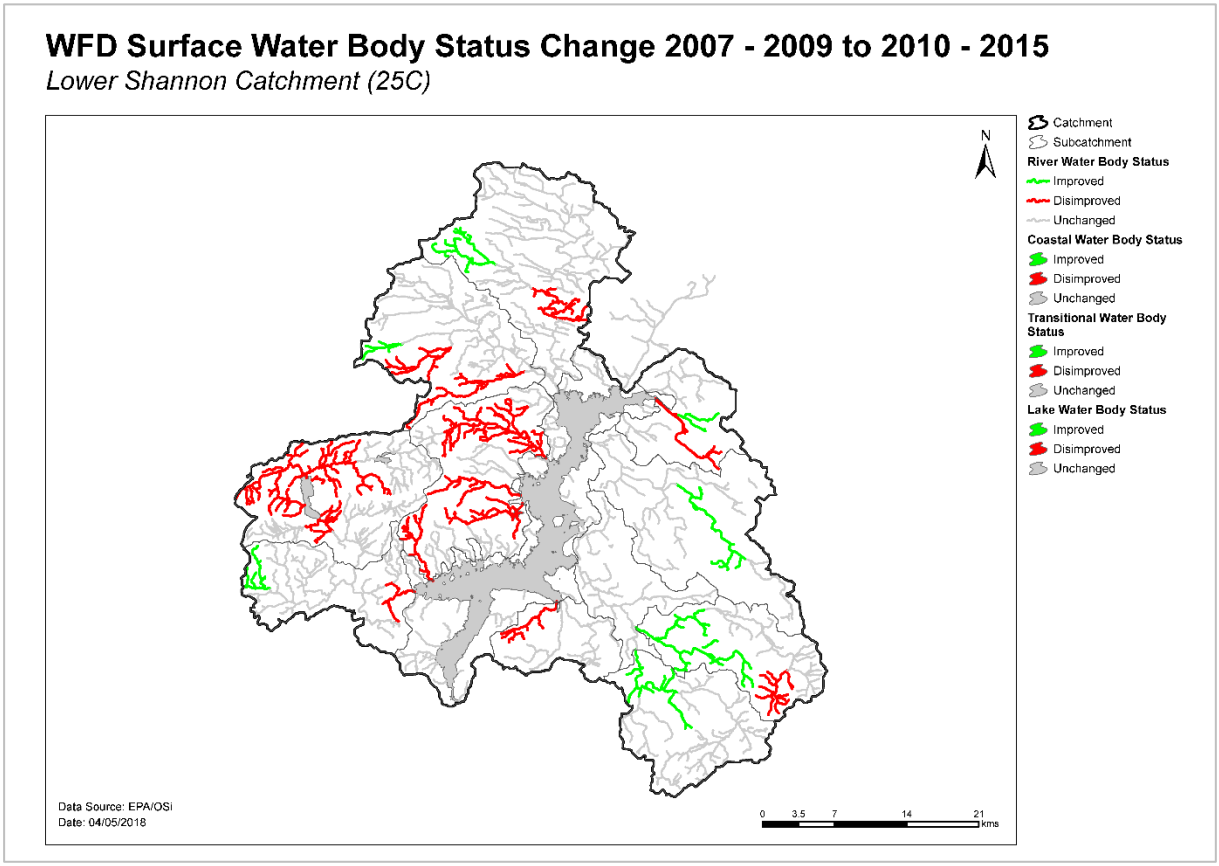


Figure 6. Surface water body status change from 2007-09 to 2010-15

2.2 Groundwater status

- There were nine groundwater bodies at Good status and one at Poor status in 2015 (Table 3).
- There was no change in status between 2007-12 and 2010-15. Nine of the water bodies remained at Good status, and the water body (IE_SH_G_237) remained at Poor status due to the presence of a historic mine (Tynagh) and the associated zinc contamination.

Table 3. Summary of groundwater body status and risk categories

	Number of water bodies	2010-15 Status		Risk Categories		
		Good	Poor	*Not at Risk*	*Review*	*At Risk*
Groundwater	10	9	1	2	7	1

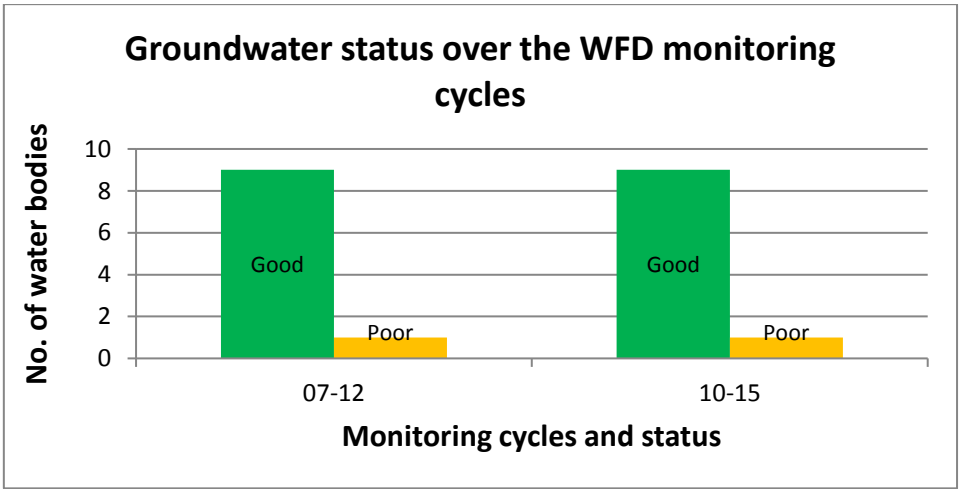


Figure 7. Number of groundwater bodies at each status class in 2007-12 and 2010-15

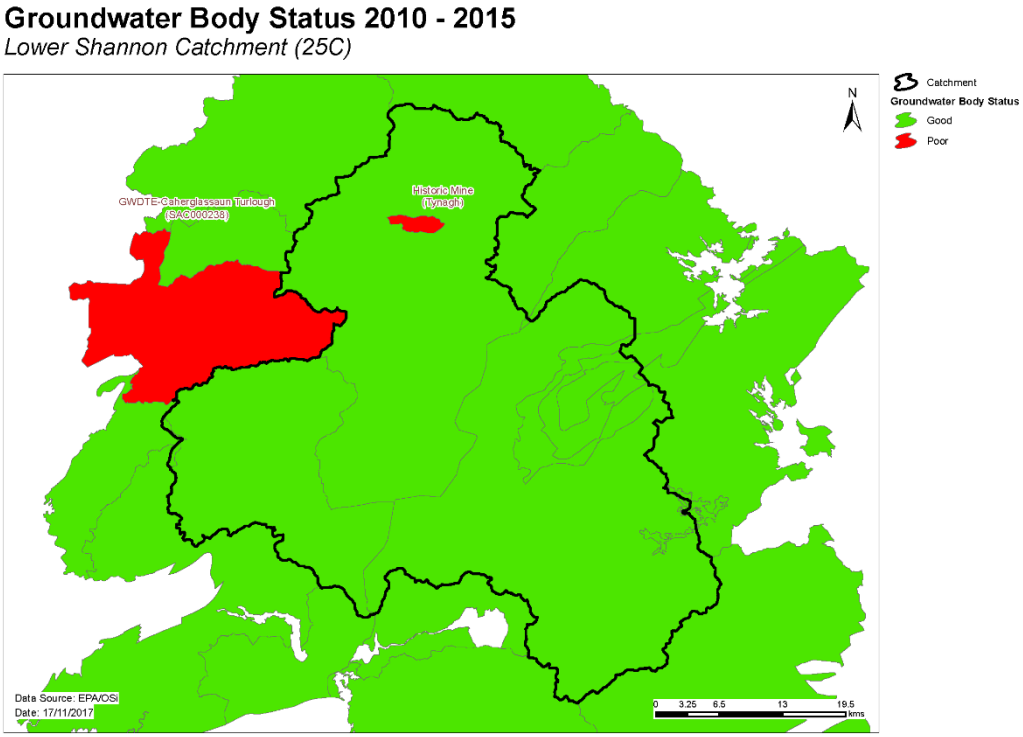


Figure 7b) Groundwater body status

2.3 Risk of not meeting surface water environmental objectives

- There are 34 *Not at Risk* river water bodies (Figure 8, Table 2) and these require no additional investigative assessment or measures to be applied, other than those measures that are already in place. There are no lakes considered as *Not At Risk.*
- There are 11 river water bodies and two lake water bodies in *Review*. This applies to eight water bodies where more information is required and three water bodies where measures have recently been implemented and improvements have not yet been realised.
- Thirty-four river water bodies and three lake water bodies 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.

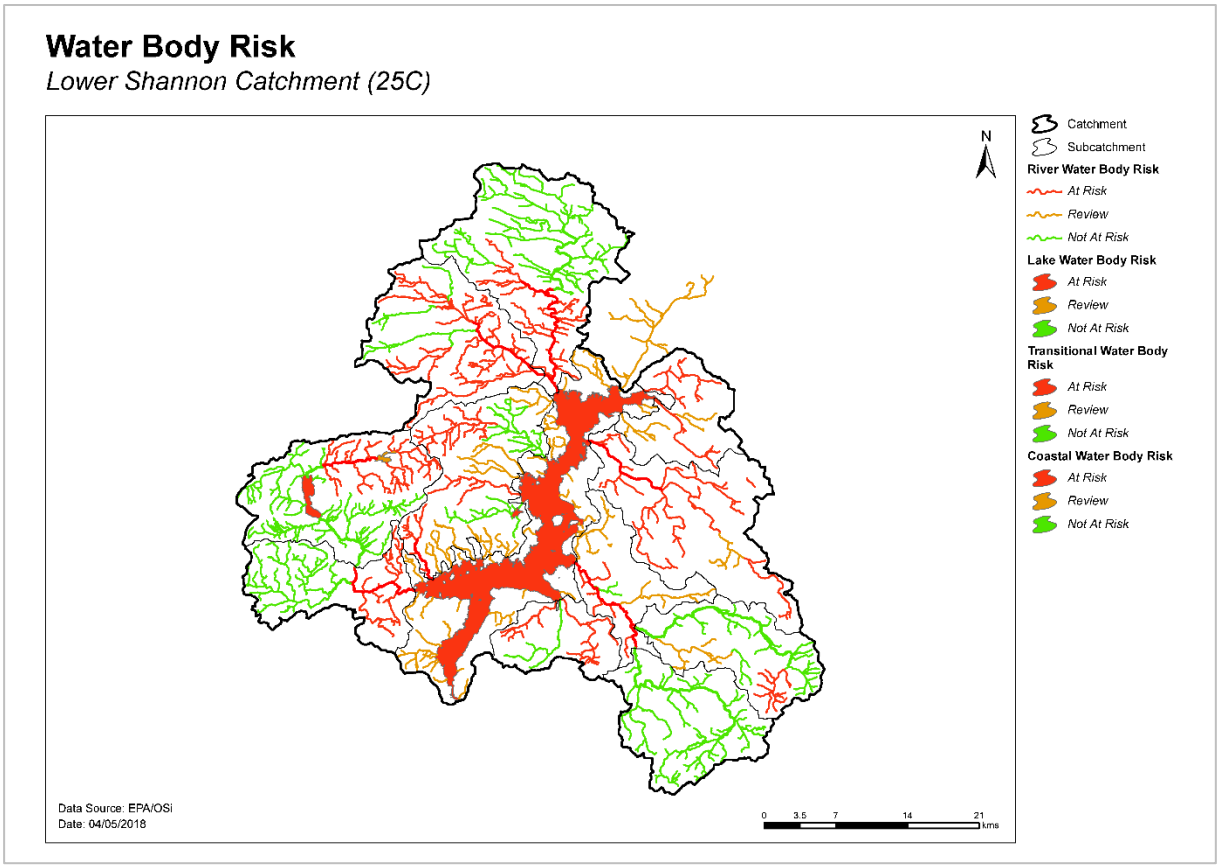


Figure 8. Surface water body risk

2.4 Risk of not meeting groundwater environmental objectives

- Two groundwater bodies are *Not at Risk* (Figure 9) – Tynagh and Lough Graney – and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Seven groundwater bodies are at Good status but are in *Review.* Ballinderry, Crusheen, Lismaline, Nenagh and Tulla-Newmarket on Fergus are in *Review* due to potential groundwater contribution of phosphate to associated surface water bodies that are also in *Review.* Cloughjordan-Moneygall Gravels are in *Review* due to elevated nitrate concentrations and Borrisokane is in *Review* for both reasons. Further characterisation is required.

- There is one *At Risk* groundwater body – Historic Mine (Tynagh) IE_SH_G_237. Measures will be needed in this water body to improve water quality outcomes.

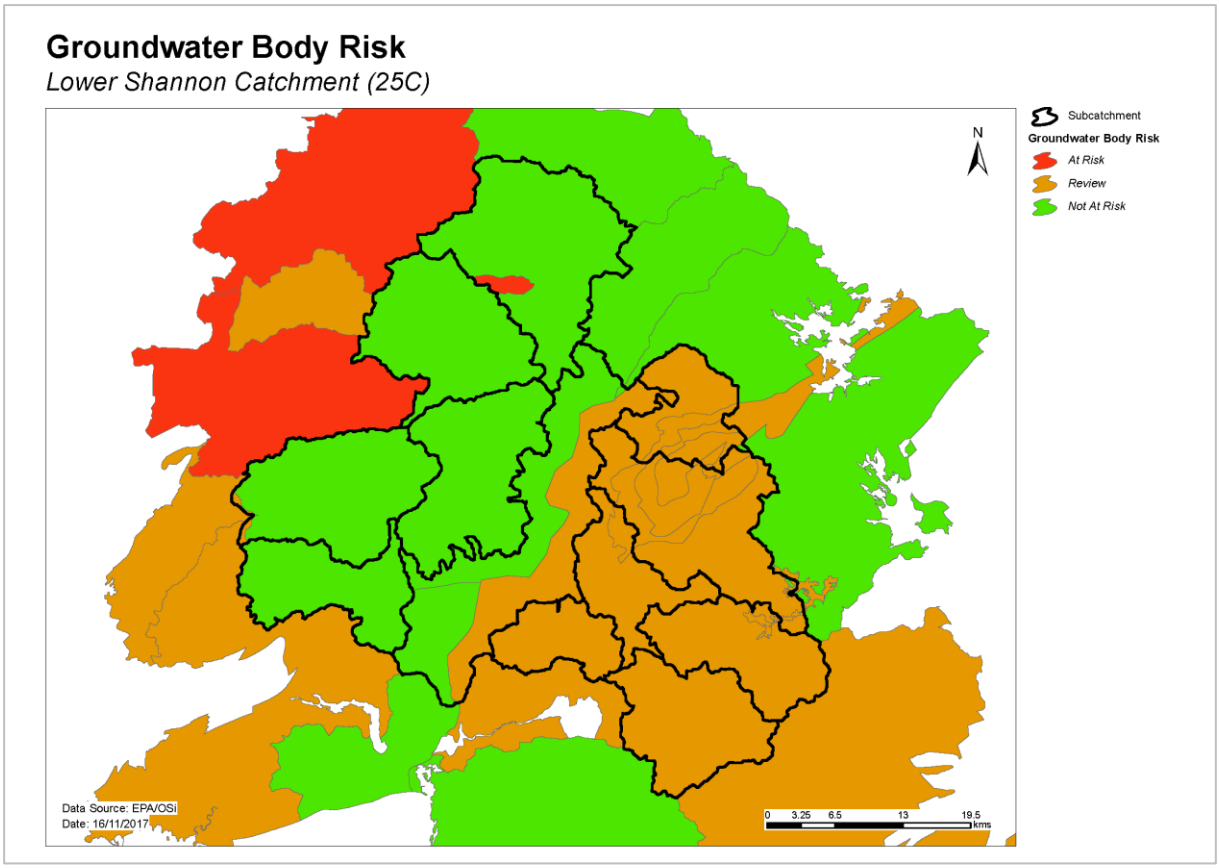


Figure 9. Groundwater body risk

2.5 Protected areas

2.5.1 Drinking water protected areas

- There are 50 abstractions in the Lower Shannon (Lough Derg) catchment comprising 27 private group water schemes and 16 public water supplies (Appendix 4).
- Forty-six of the abstractions are from seven groundwater bodies (Appendix 4); three are from Lough Derg TN (two Portumna abstractions and Nenagh RWSS), and one is from the Graney (Shannon)_020 river water body.
- All drinking water sources were compliant with the standards for nitrate in 2015.
- Portumna water supply (1200PUB1042), which is abstracted from Lough Derg, was non-compliant for pesticides (MCPA) in 2015. All other sources were compliant.

2.5.2 Bathing waters

- There are four designated bathing waters in the catchment (Table 4), all of which meet their water quality objectives.

Table 4. Designated bathing waters in the catchment

Bathing water		Water body intersection		Objective met?	
Name	Code	Name	Code	Yes	No
Lilliput, Lough Ennell	IESHBWL25_188_0100	Derg TN	IE_SH_25_191a	✓	
Bathing Place at Portumna	IESHBWL25_191a_0100	Derg TN	IE_SH_25_191a	✓	
Mountshannon, Lough Derg	IESHBWL25_191a_0200	Derg TN	IE_SH_25_191a	✓	
Ballycuggeran	IESHBWL25_191a_0300	Derg TN	IE_SH_25_191a	✓	

2.5.3 Shellfish areas

- There are no designated shellfish areas in the catchment.

2.5.4 Nutrient sensitive areas

- There are two designated Nutrient Sensitive Areas (NSAs) – Lough Derg on the River Shannon and Nenagh (River)) associated with one waste water treatment plant (Nenagh).
- Nenagh urban waste water treatment plant was compliant with the environmental objective for NSAs.

Table 5. Nutrient sensitive areas in the catchment

Nutrient Sensitive Area		Agglomeration		Intersecting water bodies		Objective met?		Comment
Name	Code	Name	Code	Name	Code	Yes	No	
Lough Derg on the River Shannon	IELK_SH_1994_0007	Nenagh	D0027	Derg TN	IE_SH_25_191a	✓		Tertiary treatment is in place
Nenagh (River)	IERI_SH_1994_0005			NENAGH_060	IE_SH_25N010700			
				NENAGH_070	IE_SH_25N010800			

2.5.5 Natura 2000 sites

- There are 17 Special Areas of Conservation (SACs) in the catchment (Appendix 5), not all of which have water quality and/or quantity conservation objectives for their qualifying interests.
- One lake water body (Derg TN) has been prioritised for action as the water conservation objectives for its species and/or habitats is not being supported by ecological status (Appendix 5).
- There are four Special Protected Areas (SPAs) in the catchment:
  - Lough Derg (Shannon) SPA
  - Middle Shannon Callows SPA
  - Slieve Aughty Mountains SPA
  - Slievefelim to Silvermines Mountains 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.

2.6 Heavily modified water bodies

- There are no designated heavily modified water bodies (HMWB) in the catchment.
- There are no artificially modified water bodies (AWB) in the catchment.

3 Significant issues in *At Risk* water bodies

- Excess phosphate leading to eutrophication is the dominant issue in river and lake water bodies in the Lower Shannon (Lough Derg) catchment. While excess ammonia is also of concern, it is only for a limited number of water bodies.
- Alteration of hydromorphological (or physical) conditions are also a concern in several rivers and lakes in the catchment. This includes inputs of excess fine sediment and alteration of the morphology of the river channel, which in turn alter habitat conditions. This can occur because of, for example, implementing river and field drainage schemes, forestry activities, animal access, and discharge from quarries.
- Of the 10 groundwater bodies, one is *At Risk*, due to heavy metals from the historic Tynagh mine.

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.
- The significant pressure affecting the greatest number of water bodies is agriculture followed by forestry, hydromorphological pressures, mines and quarries, urban waste water, other, diffuse urban, peat, domestic waste water and industry (Figure 10).

4.1.1 Rivers and lakes

- Significant pressures have been identified during the initial characterisation process in 37 surface water bodies, 20 of which have multiple pressures. These significant pressures will be refined as further characterisation is carried out.

4.1.2 Groundwater

- The significant pressure affecting the Historic Mine (Tynagh) IE_SH_G_237 groundwater body is heavy metal contamination, notably zinc.

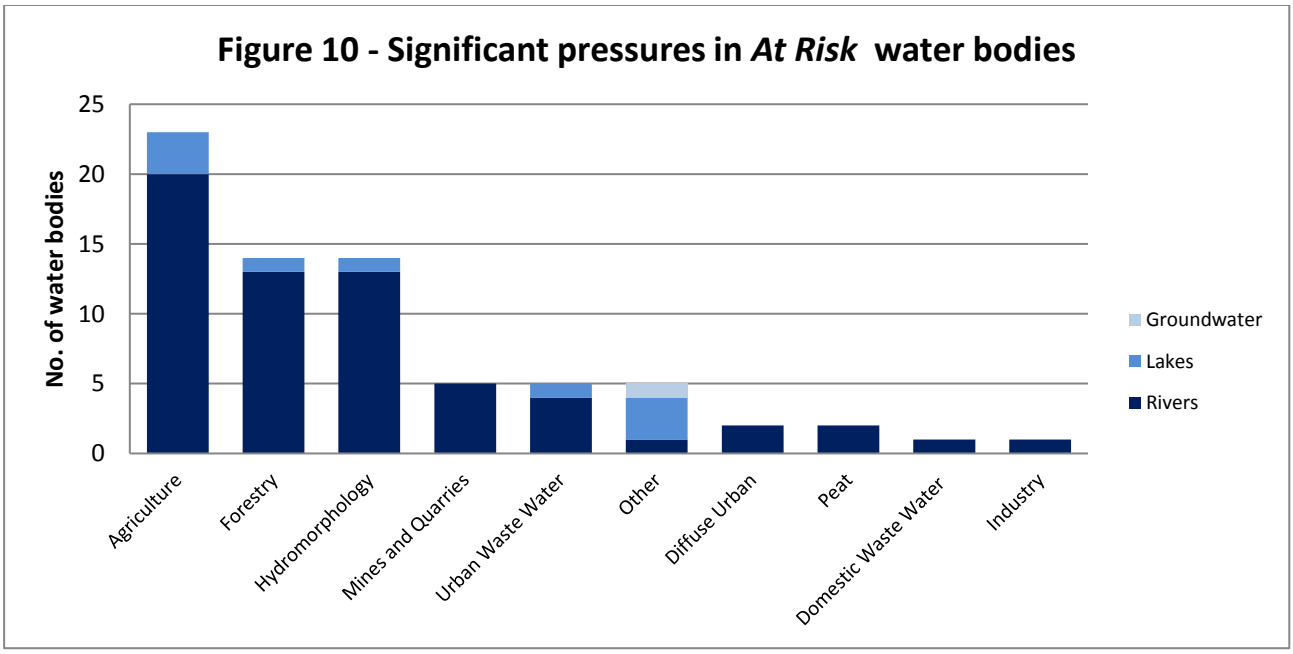


Figure 10. Significant pressures impacting on *At Risk* water bodies

4.2 Pressure type

4.2.1 Agriculture

- Agriculture has been identified as a significant pressure in 20 river water bodies and three lake water bodies (Figure 11).

- The issues related to farming for the lakes in this catchment are diffuse 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 6.

4.2.2 Forestry

- Forestry has been identified as a significant pressure in 13 river water bodies and one lake water body Graney (Figure 12). The significant issues are a combination of general forestry practices which have resulted in heavy siltation and excess nutrients in surface water bodies.

4.2.3 Hydromorphology

- Thirteen river water bodies within the Lower Shannon (Derg) catchment are subject to extensive modification (Table 5a). A barrier is present within a river water body of the Kilcrow subcatchment and is impacting on hydrological conditions. Water levels have been altered within a lake water body shared by the Shannon [Lower] and Nenagh subcatchments. Water bodies impacted by hydromorphological pressures are illustrated in Figure 13.

Table 5(a) – Hydromorphological Pressures in the Lower Shannon (Derg) Catchment

Pressure	Sub-Catchment	Water body Code
Modification due to Drainage Schemes (Channelisation)	Youghal (Tipperary)_010	Ardgregane Stream_010
	Cappagh (Galway)_010	Ballinlough Stream_020
	Ballyfinboy_010	Ballyfinboy_010
	Ballyfinboy_010	Ballyfinboy_040
	Ballyfinboy_010	Ballyfinboy_070
	Nenagh_020	Nenagh_070
Land Drainage	Cappagh (Galway)_010	Cappagh (Galway)_020
	Bow_010	Bow_010
	Ballyfinboy_010	Ardcrony Stream_010
	Ballyfinboy_010	Ballyfinboy_020
	Ballyfinboy_010	Ballyfinboy_040
	Ballyfinboy_010	Ballyfinboy_070
	Kilcrow_010	Kilcrow_050
	Kilcrow_010	Kilcrow_060
In River Structures	Shannon Lower_070	Derg TN
	Kilcrow_010	Lisduff (Kilcrow)_020

4.2.4 Extractive industry

Peat

- Peat drainage and working has been identified as a significant pressure in two river water bodies – Kilcrow_060, Lorrha Stream_020 and Ballinlough Stream_010 (Figure 14). Elevated nutrient concentrations and increased sedimentation are the significant issues.

Mines & Quarries

- The historic Tynagh Mine is a significant pressure on one river Lisduff (Kilcrow)_020 and groundwater IE_SH_G_237 is contaminated. Evidence of toxicity was noted at stations RS25B140100 and RS25L070050 during the biological sampling.

- Quarries are a significant pressure on four water bodies – Ballintotty_020, Ollatrim_010, Ballyfinboy_010, Ballyfinboy_060 and Ardcrony Stream_010 (Figure 14). Further characterisation is required to more precisely establish the full effects of these activities.

4.2.5 Urban waste water treatment plants

- Urban Waste Water Treatment Plants (WWTPs) have been highlighted as a significant pressure in five *At Risk* water bodies; details are given in Table 6 and Figure 15. Ballina WWTP, which impacts Derg TN, is scheduled to be upgraded by 2024 and Woodford WWTP, which impacts Woodford (Galway)_020, is scheduled to be upgraded post 2021.

Table 6. Waste Water Treatment Plants 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	2010-15 Ecological Status	Expected Completion Date
Portroe A0182	< 500 p.e.	Youghal (Tipperary)_010	Moderate	*NA* [1]
Ballina D0016	> 10,000 p.e.	Derg TN	Poor	2024
Woodford A0111	< 500 p.e.	Woodford (Galway)_020	Moderate	Post 2021
Moneygall A0169	< 500 p.e.	Ballyfinboy_010	Moderate	*NA* [1]
Ballingarry A0183	< 500 p.e.	Ballyfinboy_050	Moderate	*NA* [1]
Borrisokane D0326	1,001 to 2,000 p.e.	Ballyfinboy_050	Moderate	*NA* [1]

4.2.6 Other significant pressures

Invasive Species

- Three of the lake water bodies (Derg TN, Alewnaghta and Graney) have zebra mussels present, which have been identified as a significant pressure (Figure 16). In addition, Lough Derg has Asian clams and up to 14 other alien species according to IFI and the Lough Derg Science Group.

[1] *Currently not specified in improvement plans.*

Unknown Anthropogenic

- The significant pressure in one *At Risk* river Kilcrow_070 (Figure 17) is currently unestablished. Fish population is the main driver of status and IFI have confirmed deterioration through survey work.

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 two river water bodies – Ardgregane Stream_020 and Ballyfinboy_040 (Figure 18). Elevated concentrations of phosphates and ammonia are the significant issues.

4.2.8 Domestic waste water

- Domestic waste water has been identified as a significant pressure in one water body – Cappagh (Galway)_020 (Figure19). The significant issue is excess nutrients entering surface waters. Several septic tank systems are mapped on areas of high susceptibility to phosphate transport via near surface pathways.

4.2.9 Industry

- An industrial facility has been identified as a significant pressure impacting Nenagh_060. Elevated orthophosphate and ammonia are the significant issues related to this point source discharge. (Figure 20).

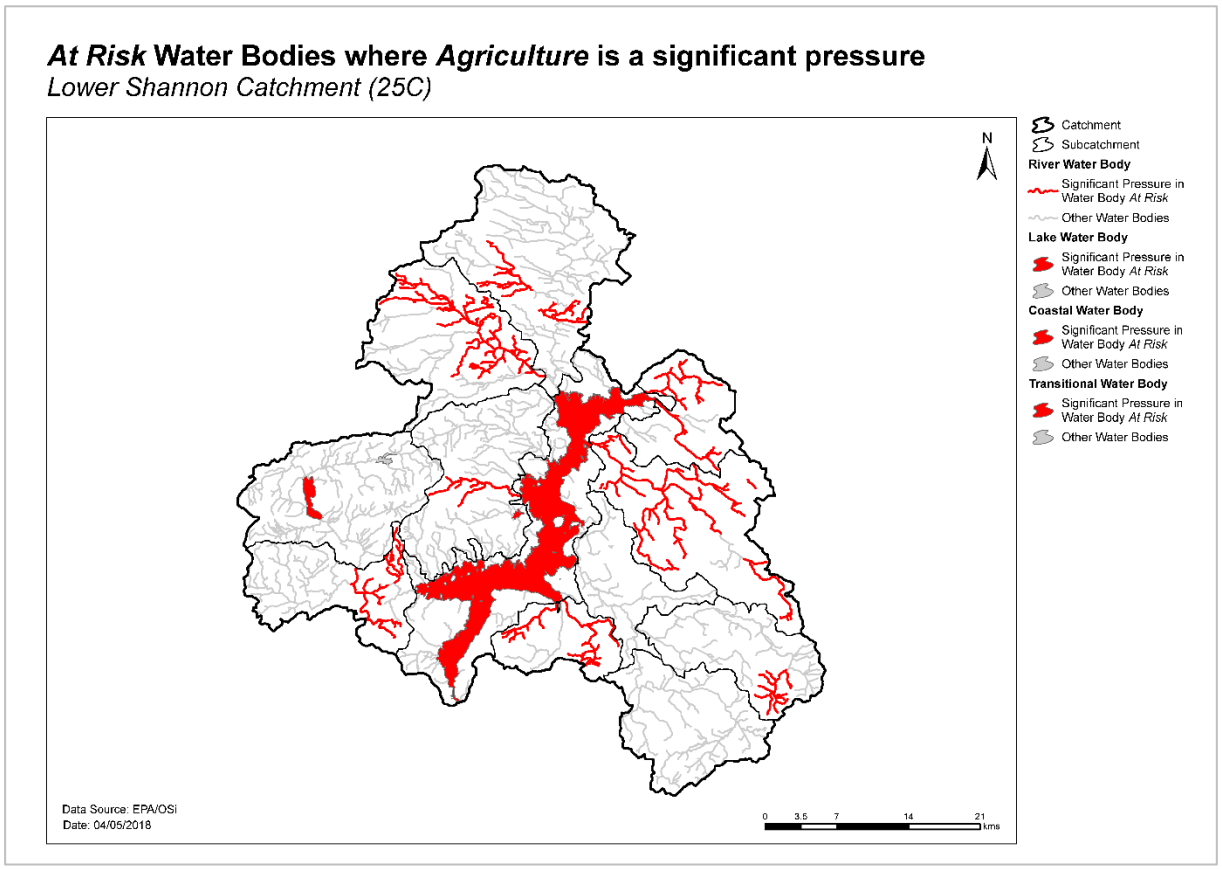


Figure 11. Water bodies that are At *Risk* and are impacted by agricultural activities

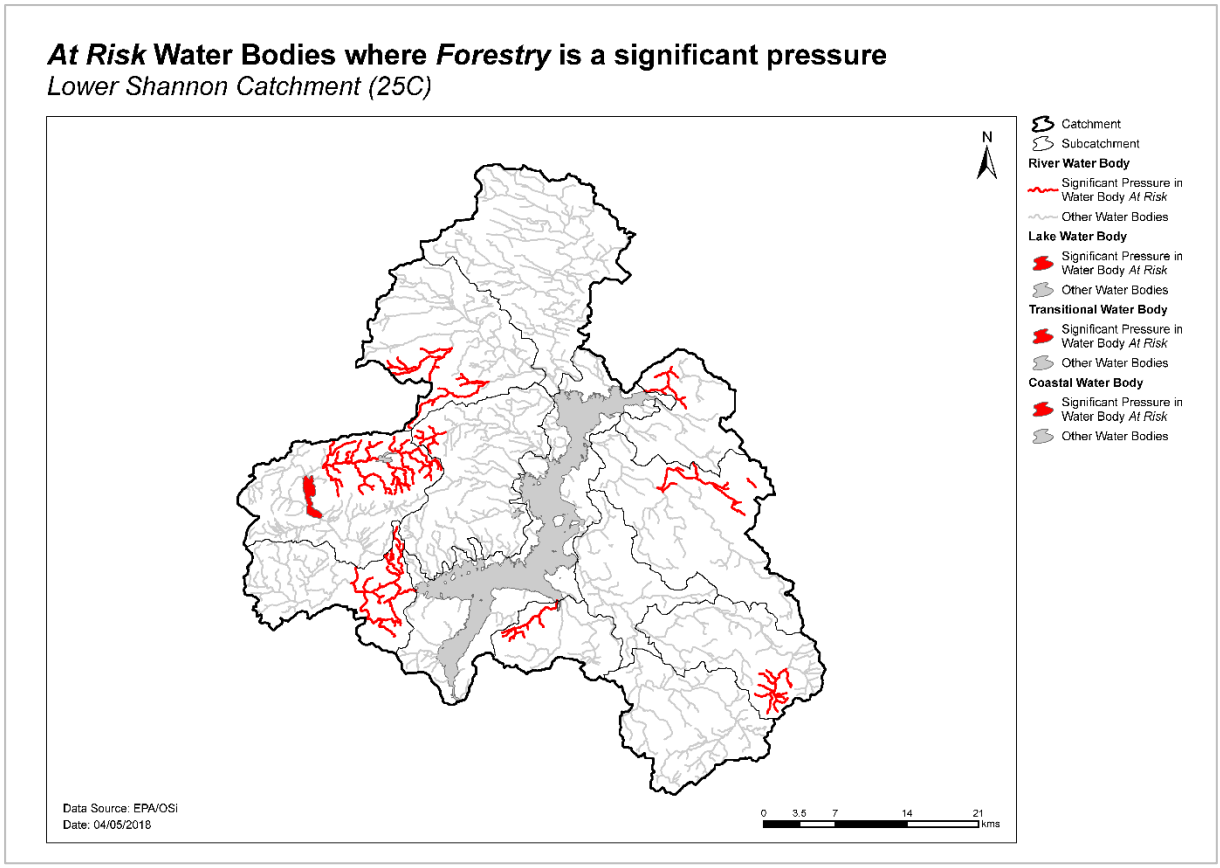


Figure 12. Water bodies that are *At Risk* and are impacted by forestry activities

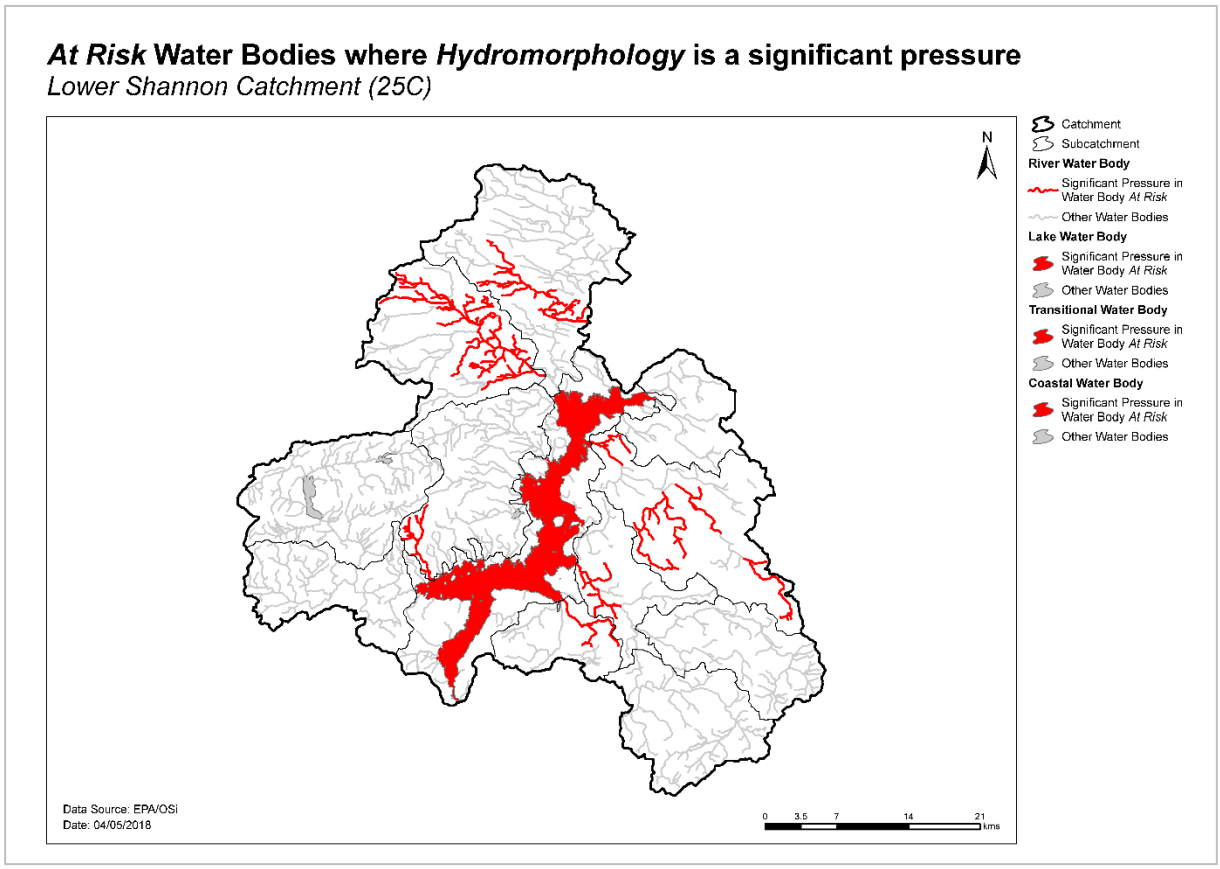


Figure 13. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

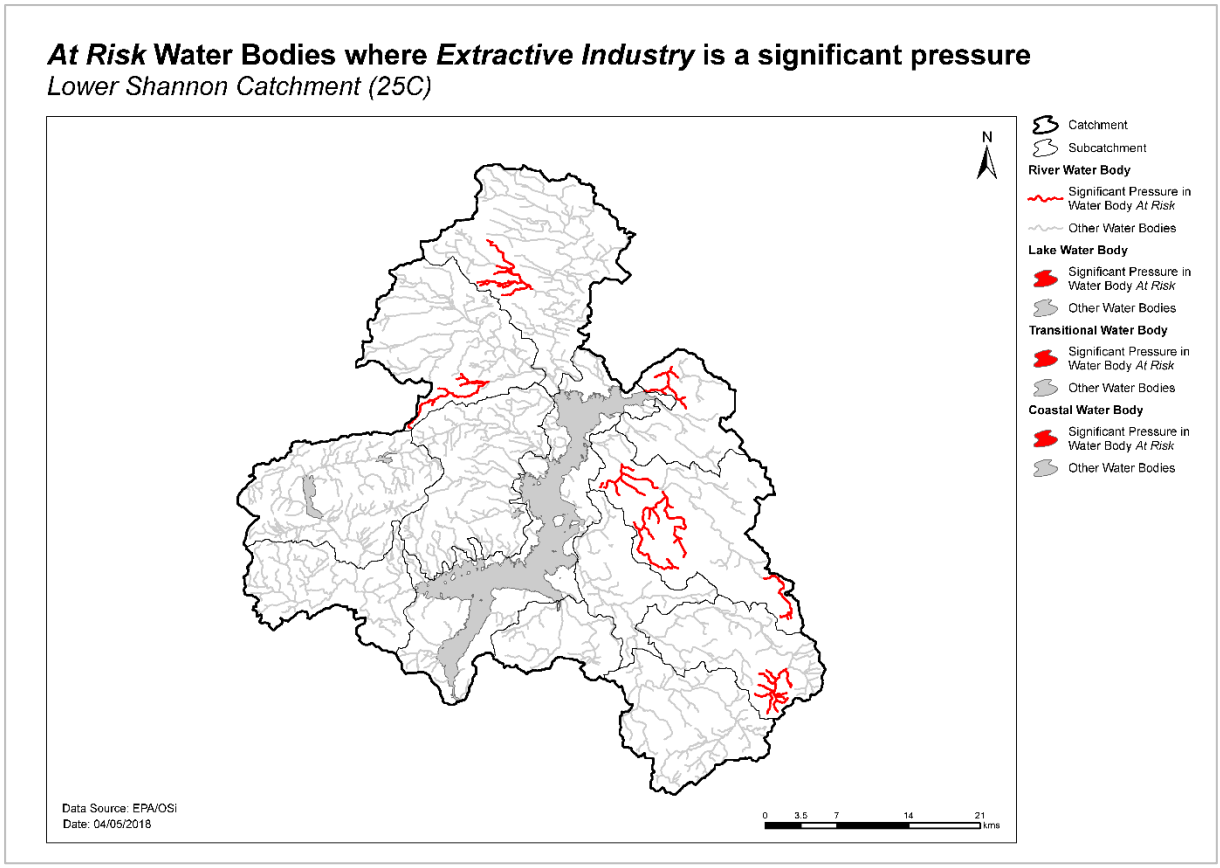


Figure 14. Water bodies that are At *Risk* and are impacted by the extractive industry

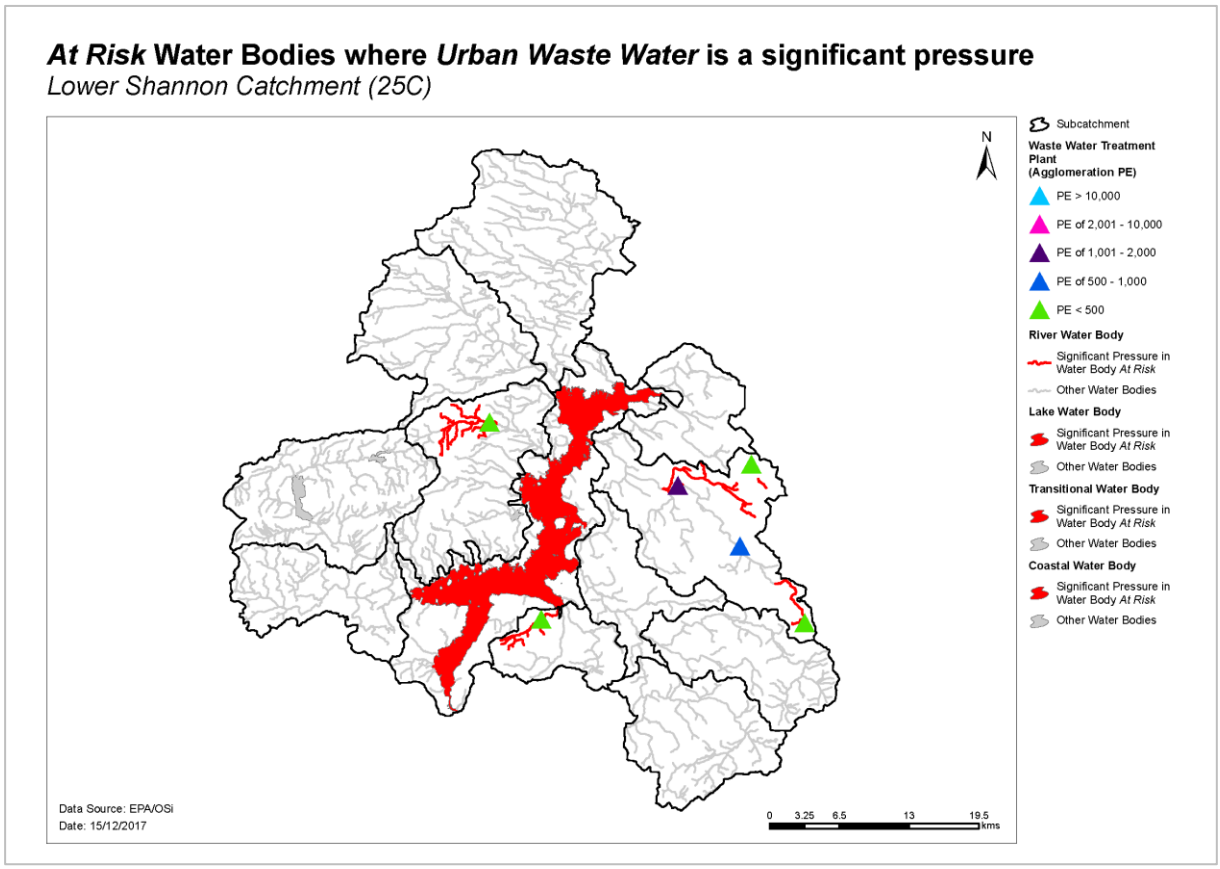


Figure 15. Water bodies that are *At Risk* and are impacted by urban waste water

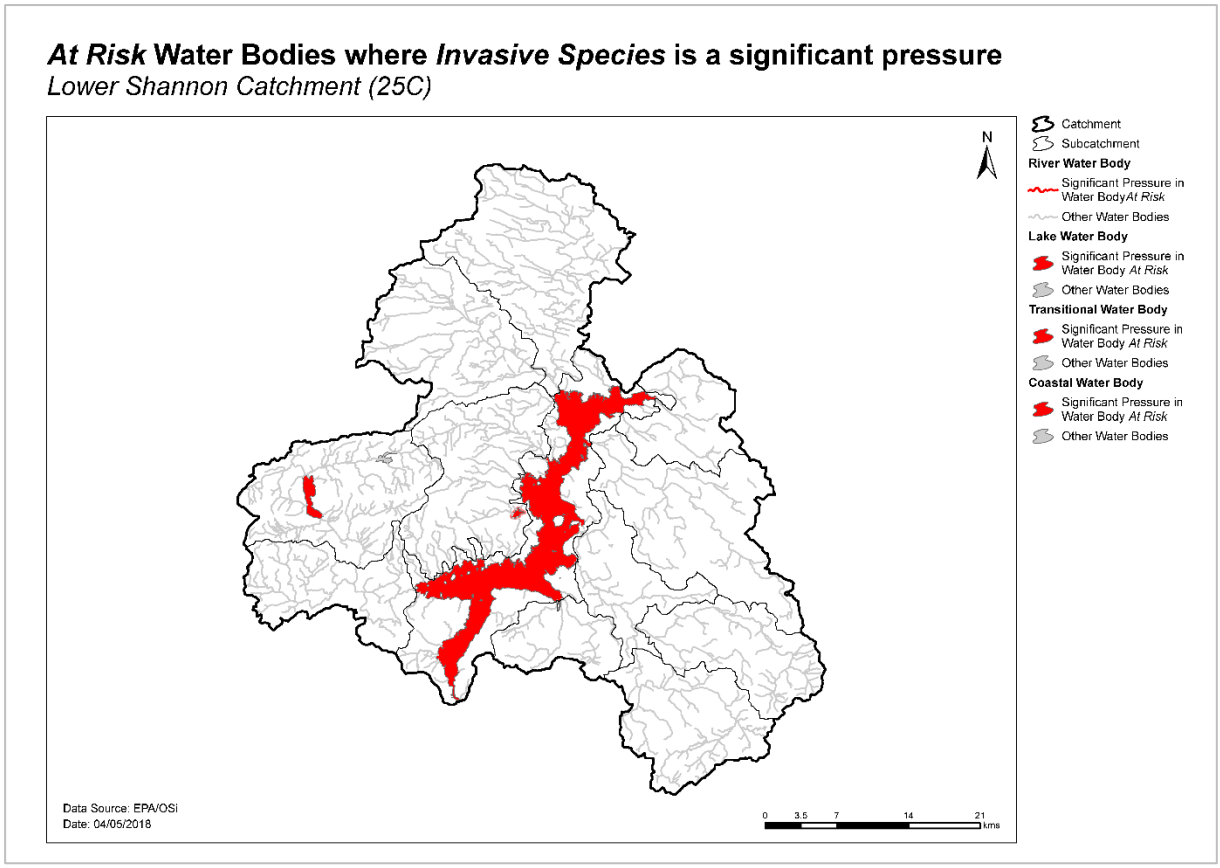


Figure 16. Water bodies that are *At Risk* and are impacted by invasive species

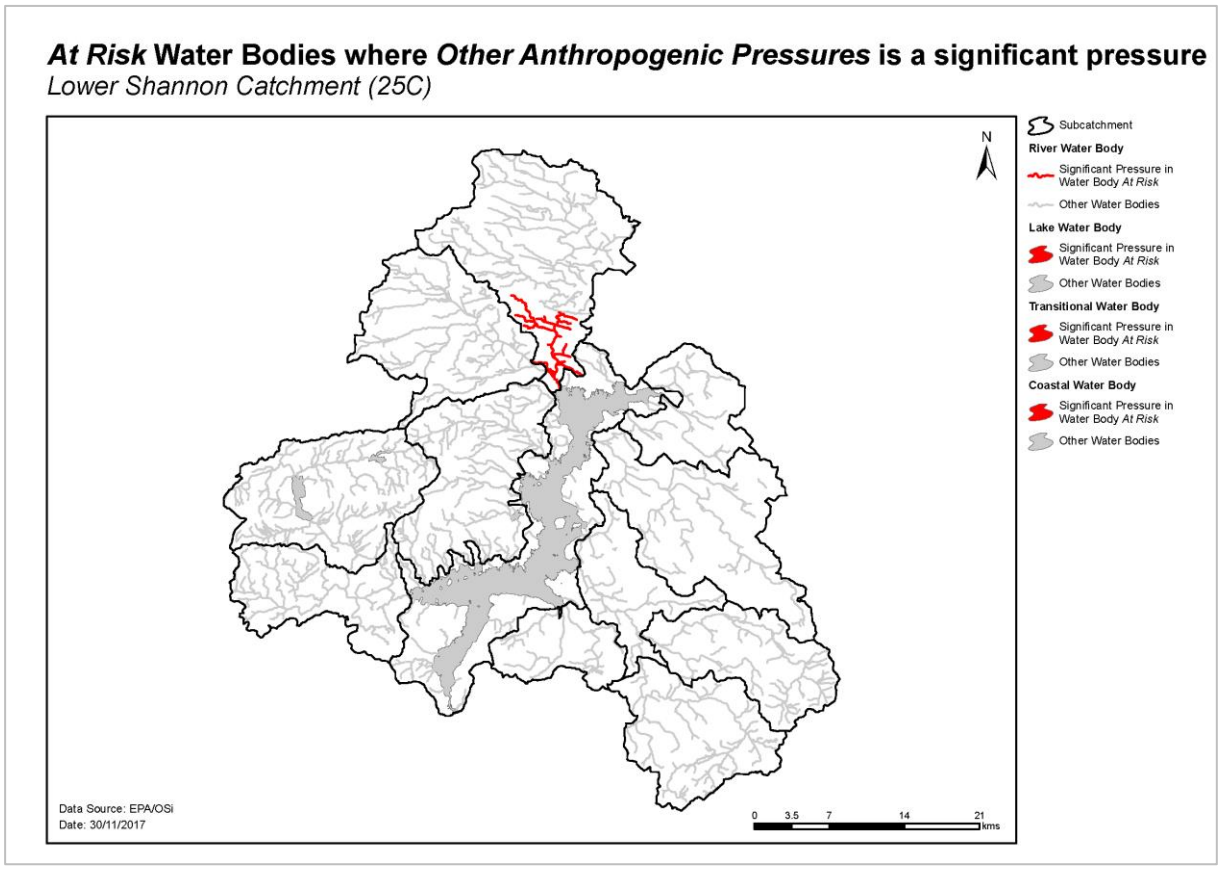


Figure 17. Water bodies that are *At Risk* and are impacted other anthropogenic pressures

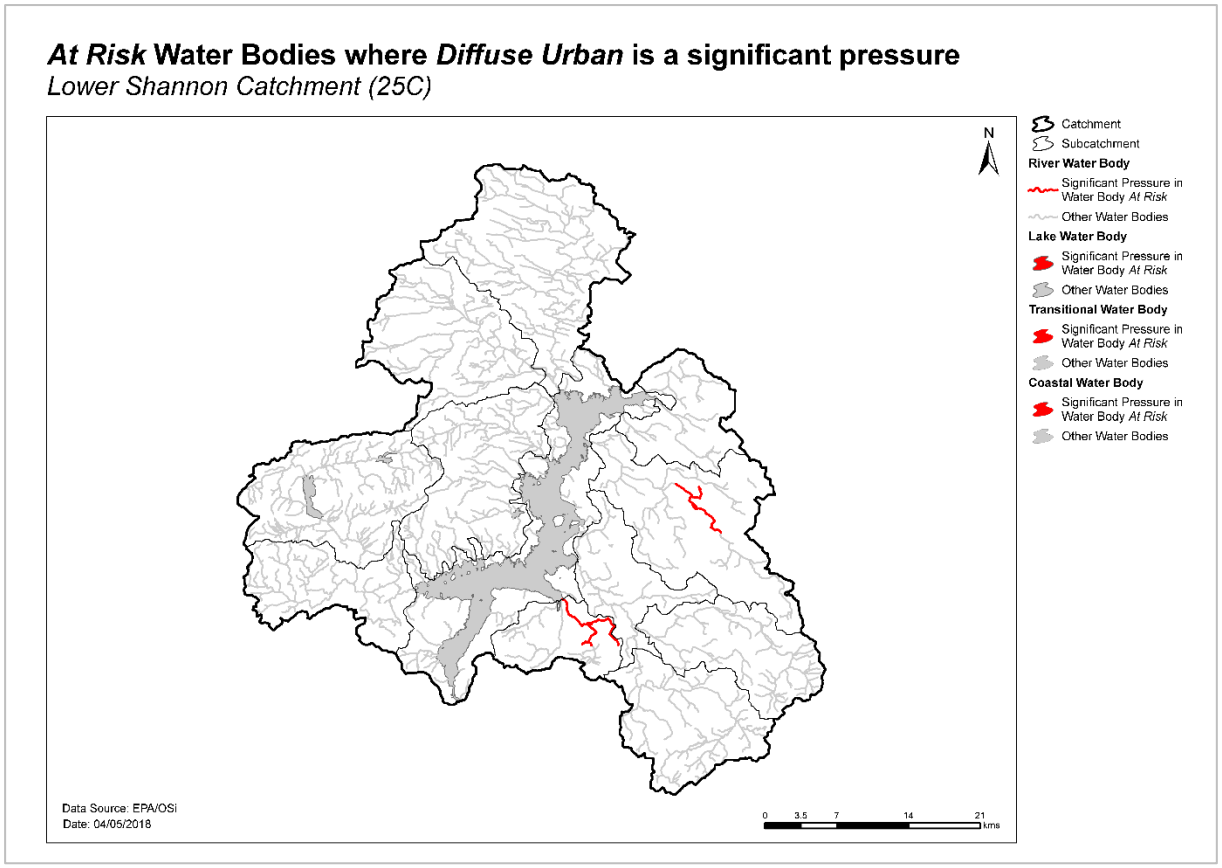


Figure 18. Water bodies that are *At Risk* and are impacted by diffuse urban impacts

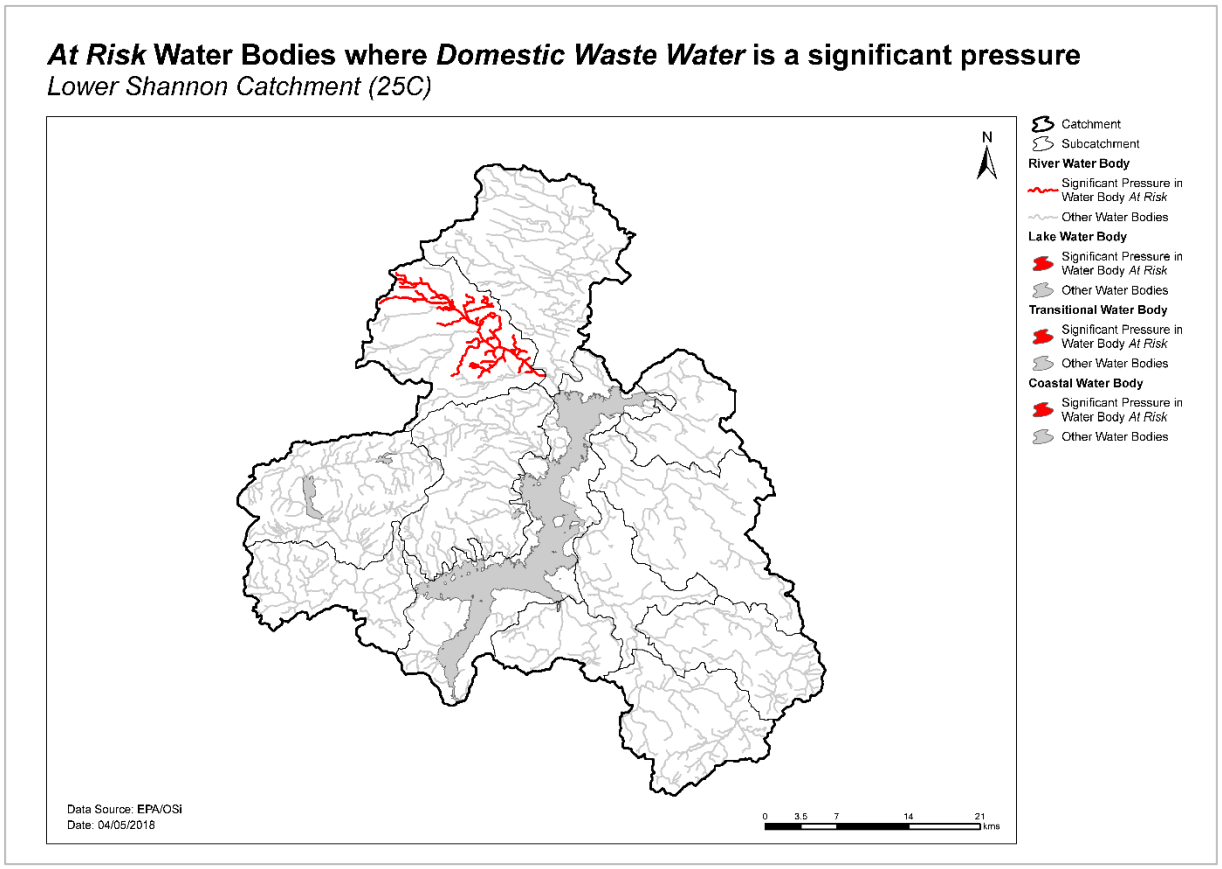


Figure 19. Water bodies that are *At Risk* and are impacted by domestic waste water

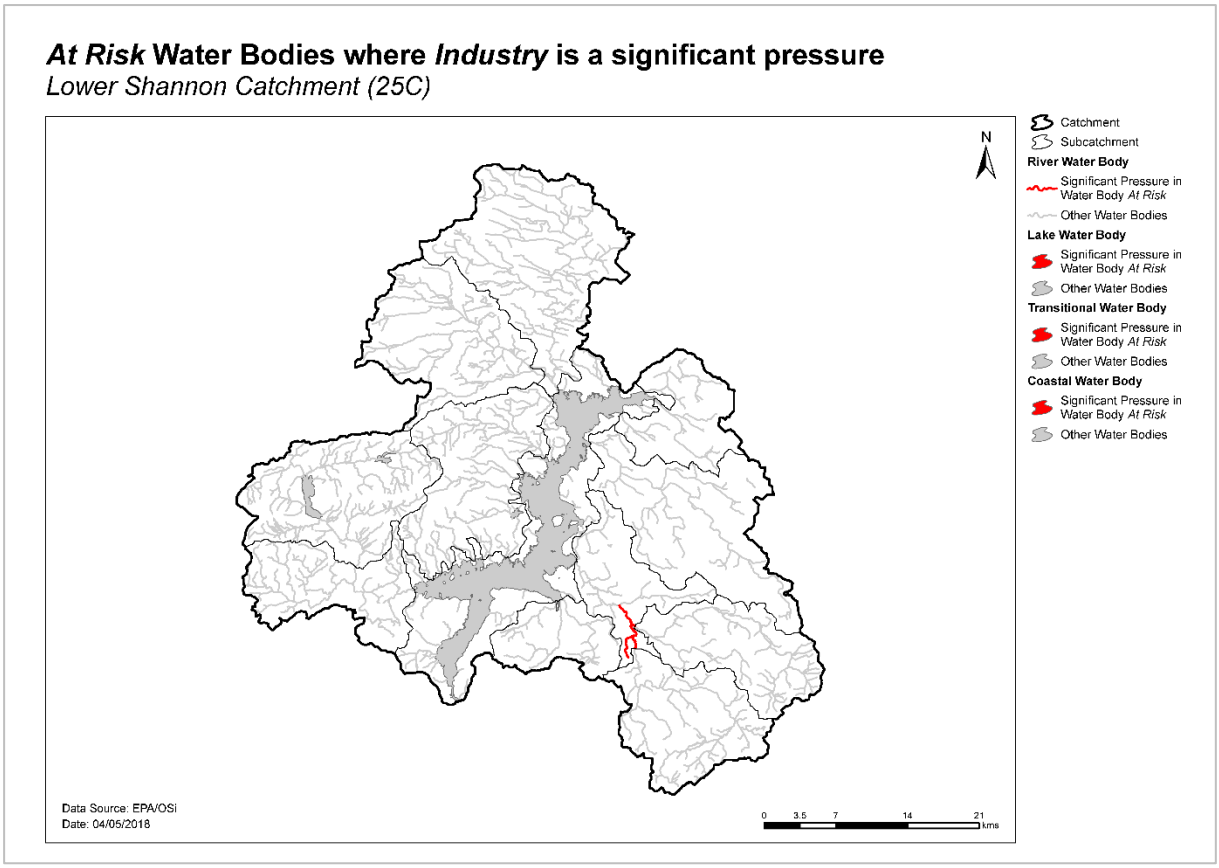


Figure 20. Water bodies that are *At Risk* and are impacted by industrial pressures

5 Load reduction assessment

5.1 River water body load reductions

- The results of the main channel assessment for the Lower Shannon (Nenagh and Kilcrow rivers) indicate that orthophosphate is the parameter of concern (Appendix 2).
- 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.
- In the Lower Shannon (Lough Derg) catchment, the available water chemistry data indicate that load reduction is required in one river water body (Table 8).

Table 8. Relative load reductions required in monitored water bodies that are *At Risk.*

Water body	P Load Reduction Required
Youghal (Tipperary)_010	Low

6 Further characterisation and local catchment assessments

- Further characterisation through local catchment assessments is needed in 37 of the *At Risk* river and lake 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 13 of the *Review* river and lake 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 IA assessment scenarios are given in Appendix 7.

Table 9. Local Catchment Assessment Allocation for *At Risk* and *Review* River and Lake Water Bodies in the Catchment

Risk	IA 1	IA 2	IA 3	IA4	IA 5	IA6	IA 7	IA 8	IA 9	Total
At Risk	23	0	1	0	1	0	22	3	4	**57**
Review	4	0	7	0	0	0	0	0	0	**11**
Note water bodies may have multiple categories of Local Catchment Assessments										

7 Catchment summary

- Of the 79 river water bodies, 34 are *At Risk* of not meeting their WFD objectives.
- Three of the lake water bodies are *At Risk* out of the five.
- Excess phosphorus leading to eutrophication is a major issue for several water bodies. While excess ammonium is also of concern, it is only for a limited number of water bodies.
- Hydromorphological (or physical) conditions (including the input of excessive fine sediment) and poor habitat quality are also a concern for 13 of surface water bodies.
- The significant pressure affecting the Historic Mine (Tynagh) IE_SH_G_237 groundwater body is heavy metal contamination, notably zinc.

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 are 6 areas for action in the Shannon (Lough Derg) 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. Since this selection, the Local Authorities Water and Communities Office (LAWCO) have undertaken public engagement and feedback sessions in each local authority.

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, or when feedback from the public engagement process is assessed, areas for action may 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 Lower Shannon (Lough Derg) catchment are summarised below.

- Six recommended areas for action (Table 10, Figure 21) were selected.
- These are the Lower Graney, Bleach and Lough Graney, Woodford, Lower Nenagh and Clareen, Ballyfinboy (Upper) and Lorrha.
- These include 15 river water bodies – 13 *At Risk* and two *Review.*
- Two groundwater bodies, that are *At Risk* or *Review* due to groundwater contribution of nutrients to surface water bodies, intersect with three of the recommended areas for action, see Table 11. Actions taken to improve surface water will need to take account of the groundwater contribution to surface water.

The remaining 35 *At Risk* and *Review* water bodies were not included in the recommended areas for action for the second cycle. The distribution of these is presented in Figure 22. These include 35 river and lake water bodies – 24 *At Risk* and 11 *Review.*

Table 10. Recommended Areas for Action in the Lower Shannon (Lough Derg) catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Lower Graney	2	25C_3	Clare	• Amenity value in Scariff town. • Biodiversity importance (Whooper Swan). • One deteriorated water body.
Bleach & Lough Graney	3	25C_8	Clare Galway	• Cross county project. • Important for brown trout angling. • Opportunity to work with angling group in Woodford. • Potential to collaborate with forestry. • Would bring entire subcatchment to Good status. • Information on investigative assessment and measures can be extrapolated to similar areas. • One deteriorated High Ecological Status objective water body.
Woodford	2	25C_7	Galway	• Potential test case for community engagement when developing Integrated Constructed Wetlands. • Strong community and angling groups. • Contributes 3% of trout population to Lough Derg • One deteriorated water body.

Lower Nenagh and Clareen	4	25C_11	Tipperary	• Active angling group. • Opportunity to build on work completed by Tipperary County Council. • Important trout fishery, Nenagh trout have very high genetic biodiversity. • One potential 'quick win'.
Ballyfinboy (Upper)	2	25C_9	Tipperary Offaly	• Building on improvement works completed by Inland Fisheries Ireland. • Headwaters of the Ballyfinboy river. • Building on research completed by Queens which looked at genetics of trout in Ballyfinboy. • Drinking water protected area (abstraction from Jones' & Guilfoyle's Well) elevated. • Mixed land use catchment – diffuse urban & agricultural. • Recent upgrade of Moneygall waste water treatment plant (2013) • Recent depleted brown trout stocks
Lorrha Stream	2	25C_2	Tipperary	• Building on existing work by Tipperary County Council. • Manageable area. • Headwaters to Lough Derg. • Two potential 'quick wins'.

Table 11 Groundwater bodies intersecting with surface water bodies in recommended areas for action

Groundwater bodies			Intersecting surface water bodies		Recommended Area for Action
Code	**Name**	**Risk**	**Code**	**Name**	
IE_SH_G_147	Lismaline	Review	IE_SH_25C970950	CLONMAKILLADUFF_ 010	Lower Nenagh and Clareen
IE_SH_G_178	Nenagh	Review	IE_SH_25C970950	CLONMAKILLADUFF_ 010	
			IE_SH_25G200100	GORTADALAUN STREAM_010	
			IE_SH_25N010700	NENAGH_060	
			IE_SH_25N010800	NENAGH_070	
			IE_SH_25B020070	BALLYFINBOY_010	Ballyfinboy (Upper)
			IE_SH_25B020100	BALLYFINBOY_020	
			IE_SH_25L050200	LORRHA STREAM_010	Lorrha Stream
			IE_SH_25L050300	LORRHA STREAM_020	

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 13 *At Risk* water bodies, it is predicted that three (23%) will achieve improvements by 2021 and the remaining ten (77%) will achieve their objective by 2027. For the two *Review* water bodies,

the absence of information on these water bodies means that there is no scientific basis to quantify an environmental objective date. A 2027 date is therefore set for these water bodies (Table 12).

Table 12. Environmental objective dates for water bodies in the Recommended Areas for Action

Risk Category	No. of Water Bodies	No. of WBs for 2021 Improvement	No. of WBs for 2027 Status Improvement
River			
At Risk	12	3	9
Review	2	0	2
Lake			
At Risk	1	0	1
Review	0	0	0
Total	15	3	12

- Twenty-one water bodies have met their 2015 environmental objective
- As action is not yet planned to be taken in the remaining 24 *At Risk* surface water bodies, a 2027 date is applied to all 24 of the water bodies. For the 11 *Review* 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 13.

Table 13. Environmental objectives dates in the *At Risk* and *Review* water bodies not included in Recommended 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	22	0	22
Review	9	0	9
Lake			
At Risk	2	0	2
Review	2	0	2
Total	35	0	35

9.2 Groundwater

- Nine of the ten groundwater bodies are currently Good status and, therefore, have met their environmental objectives.
- The one groundwater body, Historic Mine (Tynagh), in the Lower Shannon (Lough Derg) catchment that is less than Good status has an environmental objective date of 2027.

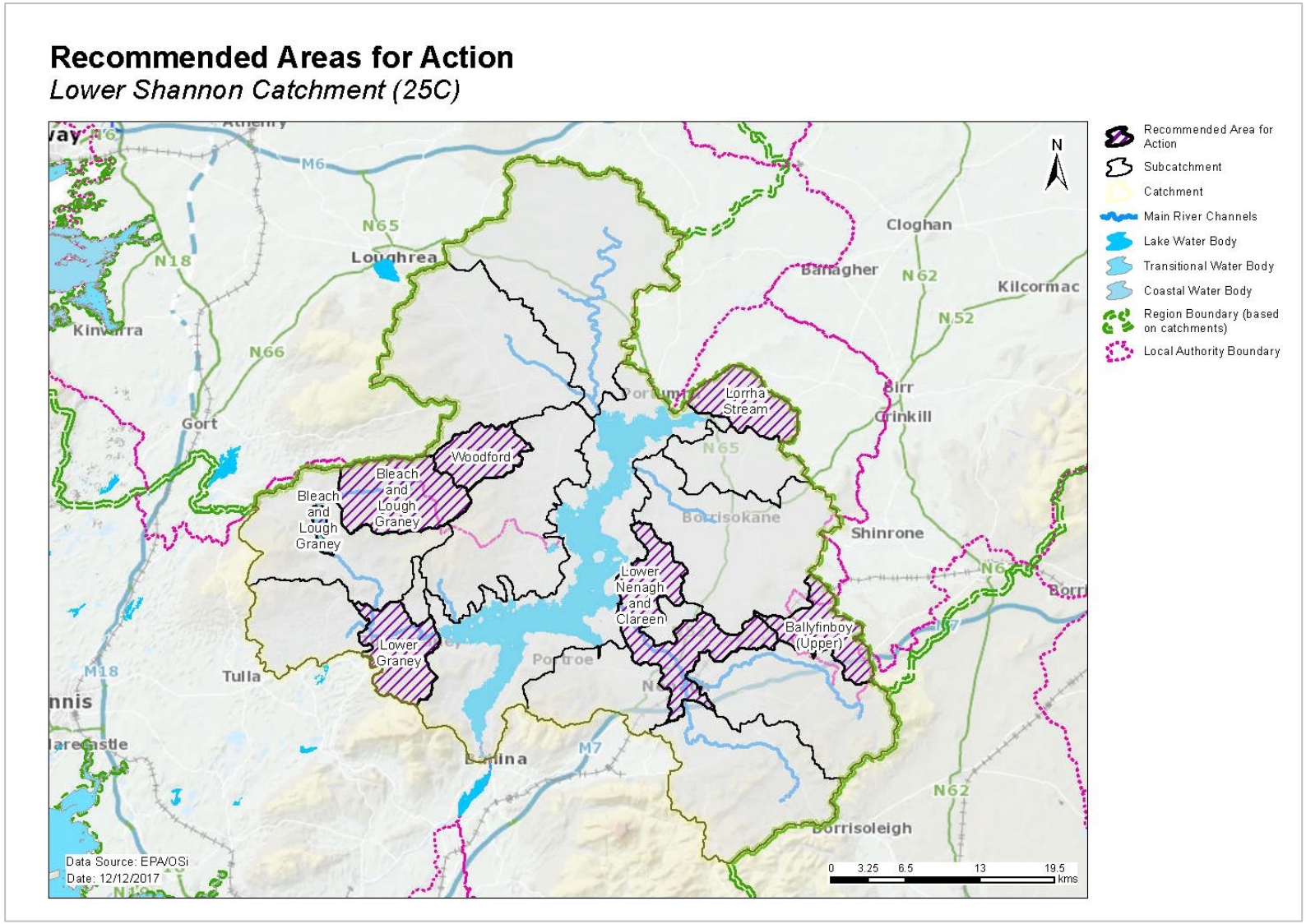


Figure 21. Location of Recommended Areas for Action in the Lower Shannon (Lough Derg) catchment

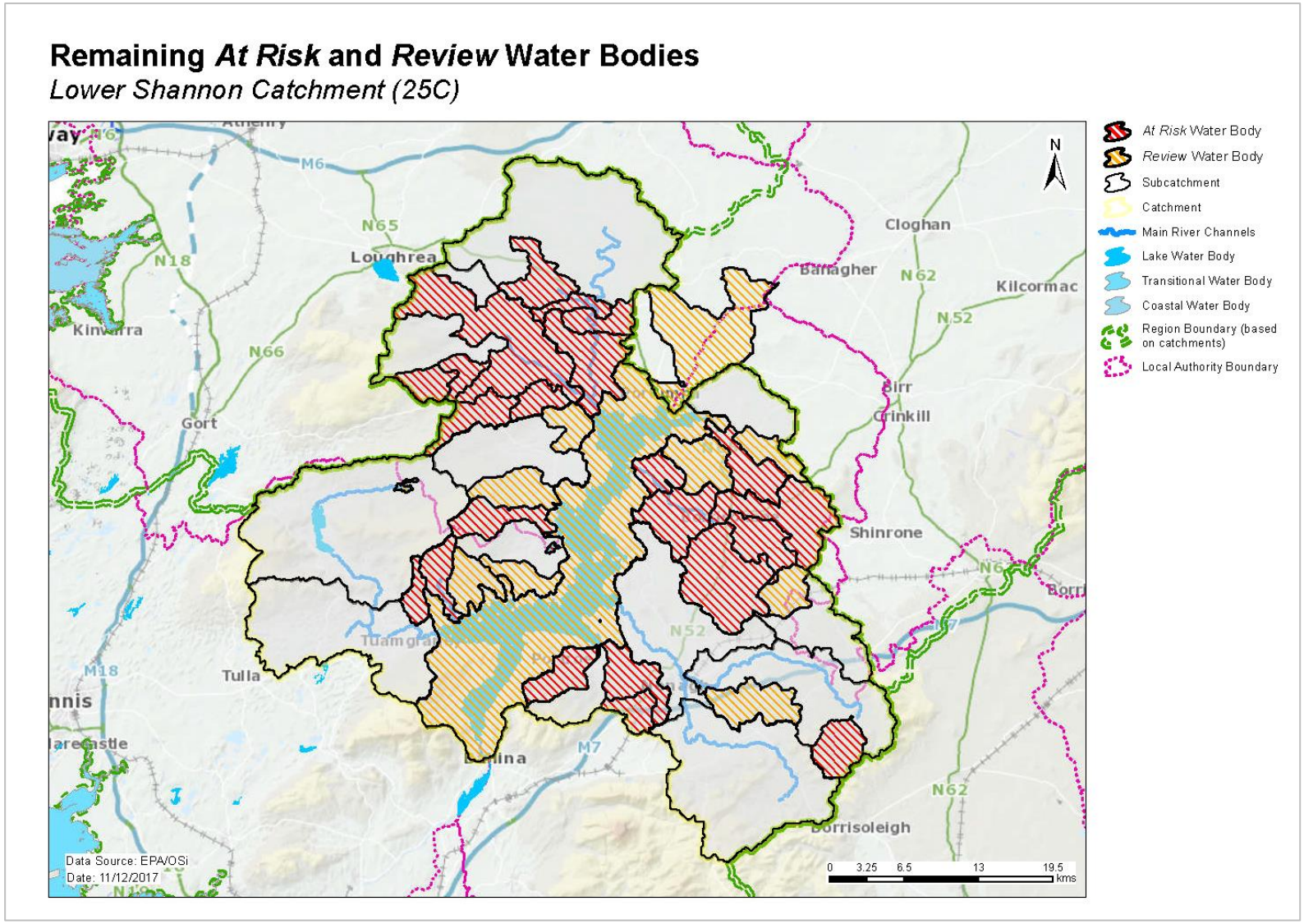


Figure 22. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Lower Shannon (Lough Derg) catchment

10 Acknowledgements

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

- Tipperary County Council
- Clare County Council.
- Galway County Council.
- Offaly 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.
- Department of Housing, Planning and Local Government.
- DAFM Agriculture.
- DAFM Forest Service.
- Coillte.
- Teagasc.
- National Federation of Group Water Schemes.
- National Parks and Wildlife Service.
- Waterways Ireland.

Appendix 1 High ecological status objective water bodies and sites

Water body/ Site	Type	Codes	2015 Status
Ayle_010	River	IE_SH_25A070400	**High**
Cloghaun_010	River	IE_SH_25C070200	**High**
Ollatrim_030	River	IE_SH_25O010150	**High**
Ballinlough Stream_010	River	IE_SH_25B150300	**Good**
Ballinlough Stream_020	River	IE_SH_25B150500	**Good**
Cappagh (Galway)_010	River	IE_SH_25C030100	**High**
Drumkeary Stream_020	River	IE_SH_25D110350	**Good**
Bleach_020	River	IE_SH_25B070200	**Moderate**
Corra_020	River	IE_SH_25C090400	**High**
Graney (Shannon)_030	River	IE_SH_25G040200	**High**

Appendix 2 Catchment scale nutrient concentrations and in-stream loads

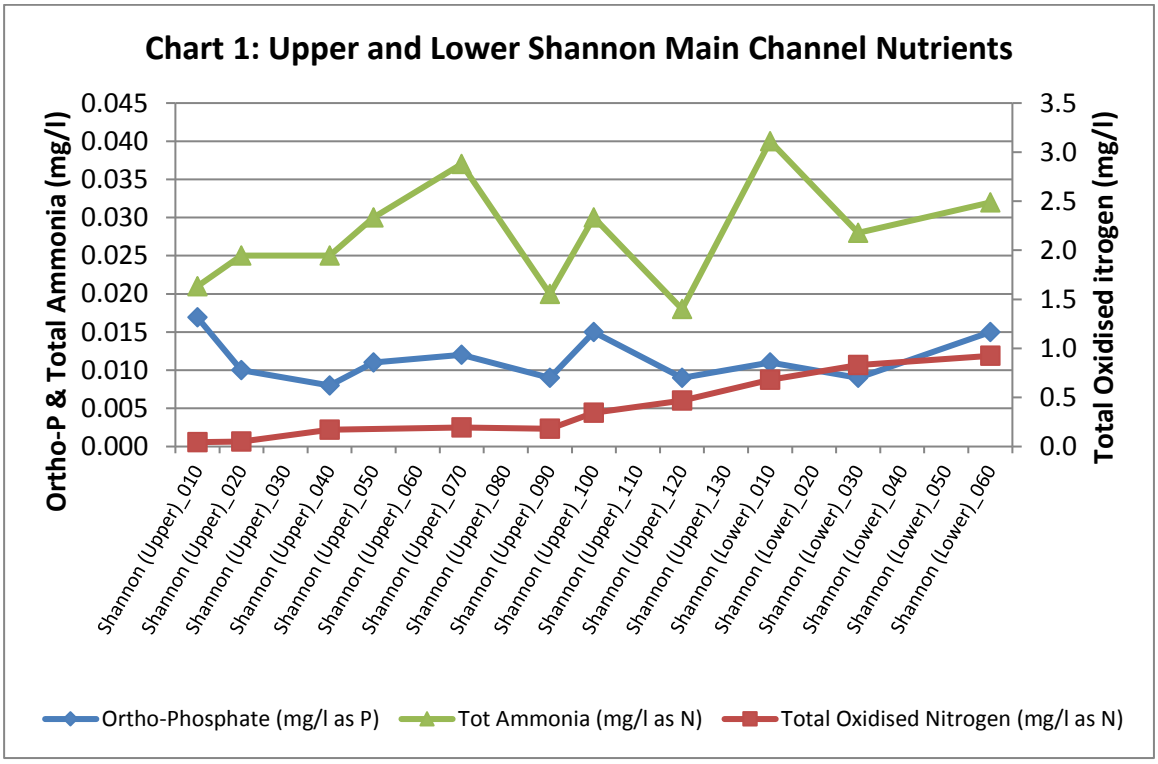
River Shannon Main Channel Nutrient Trends

The results of the instream water quality assessment for the Shannon (Upper and Lower) main channel are illustrated in Chart 1. Only 12 of the 17 main channel water bodies have water quality data associated with them. The assessment is based on the mean concentrations between 2013 and 2015 at each monitoring site available.

The results show that average nutrients concentrations in the Shannon main channel are below their corresponding threshold values. Concentrations of orthophosphate range from 0.008 to 0.017mg/l, with the highest concentration observed in the headwater SHANNON (UPPER)_010. Small spikes of orthophosphates are observed in the SHANNON (UPPER)_100, which receives water from the Feorish (Tarmonbarry)_020 of poor ecological status, and the Shannon (Lower)_060 which is the receives the primary discharge from the Castleroy Waste water Treatment Plant (WWTP).

Ammonia concentrations show no significant trend along the main channel and range from 0.018 to 0.037mg/l. The small concentration spikes of ammonia are observed in SHANNON (UPPER)_070 and SHANNON (LOWER)_010. The SHANNON (UPPER)_070 is the receiving water body for several small WWTPs including Dromod, Drumsna, Jamestown and Roosky & Environs. The SHANNON (LOWER)_010 is the receiving water body for the Banagher WWTP.

Total Oxidised Nitrogen (TON) concentrations are low at the head waters but increase from 0.018mg/l in the SHANNON (UPPER)_090 to 0.92mg/l in the SHANNON (LOWER)_060. TON remains well below the 2.6mg/l threshold value throughout the channel.



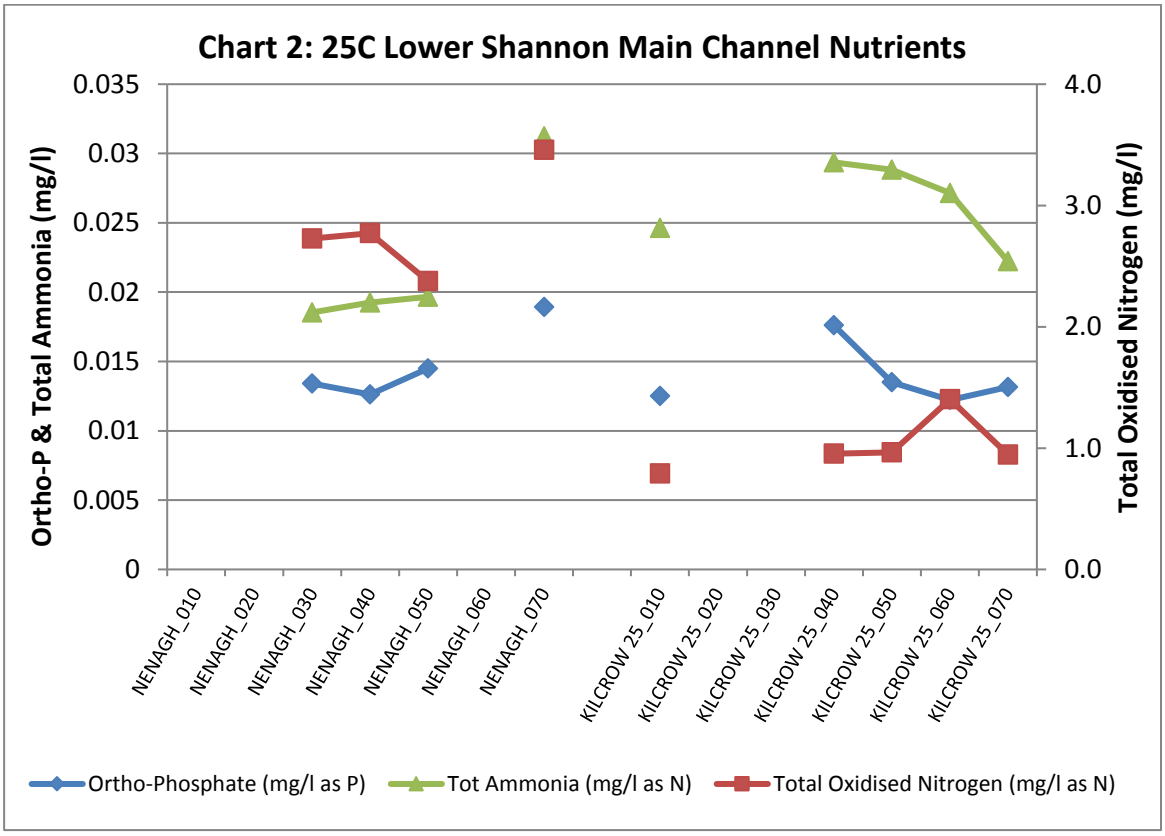
25C Lower Shannon Main Channel Nutrient Trends

Between SHANNON LOWER_030 and SHANNON LOWER_050, the river flows through Lough Derg (SHANNON LOWER_040) which dissects the catchment into south-eastern and north-western halves. The SHANNON (LOWER)_040 (Lough Derg) is also the receiving water body for SHANNON (LOWER)_030 in addition to 20 other river water bodies within the 25C Lower Shannon catchment. The largest of these include GRANEY (SHANNON)_050, KILCROW 25_070 and BALLYFINBOY_070.

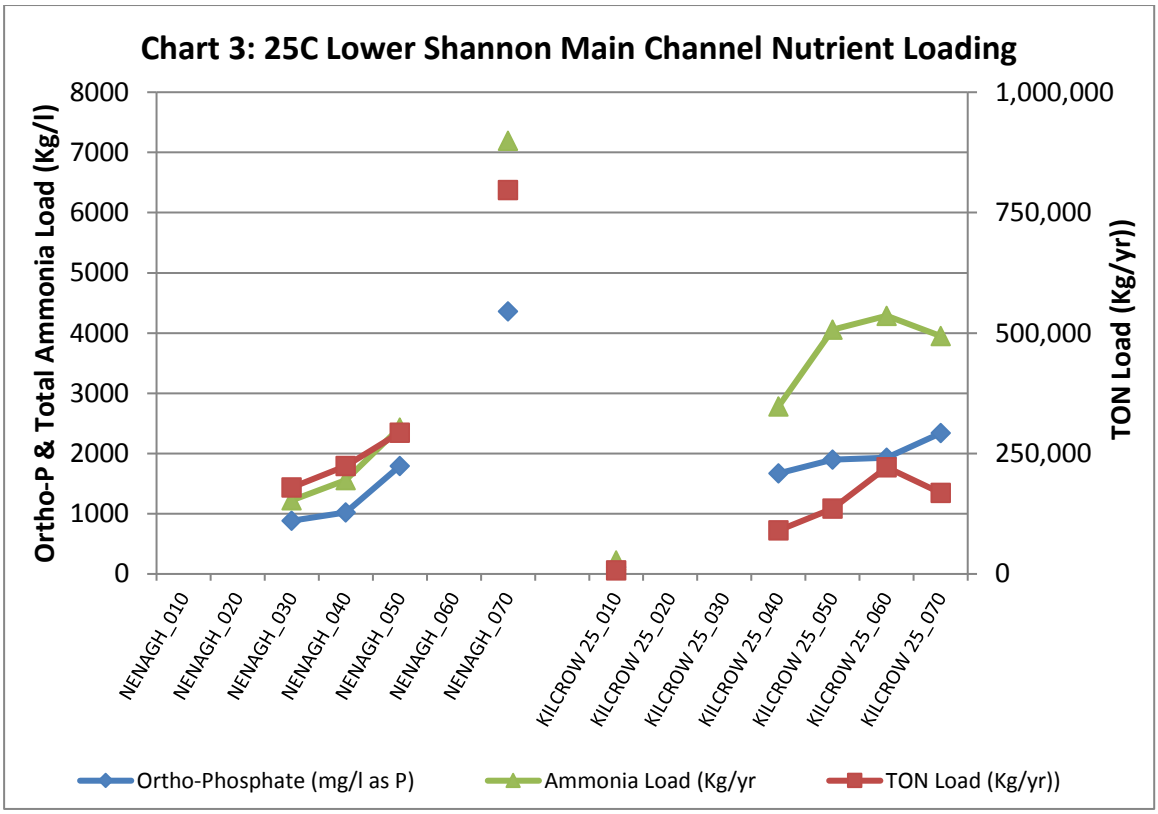
The results for the 25C Lower Shannon water quality trend assessment are presented in Chart 2. This includes the Nenagh River which is south of Lough Derg and the Kilcrow River which is north of Lough Derg.

Average orthophosphate concentrations along the Nenagh main channel are moderately low ranging from 0.011 to 0.019mg/l. The Environmental Quality Standard (EQS) of 0.035mg/l is not exceeded at any of the channel monitoring points where water chemistry data is available. Ammonia concentrations are moderately low, ranging from 0.019 to 0.031mg/l, with increasing concentration towards the outlet. TON concentrations are slightly elevated above the 2.6mg/l threshold, with the highest concentration observed in the Nenagh_070.

Average orthophosphate concentrations along the Kilcrow River range from 0.012 to 0.018mg/l and decrease downstream. The EQS for orthophosphate (0.035mg/l) is not exceeded along the channel. Peak ammonia concentrations occur at KILCROW 25_040, downstream of which values decrease. The EQS for ammonia was not exceeded at any main channel water body where monitoring data is available. TON concentrations are below the threshold (2.6mg/l) with a minor concentration peak at KILCROW 25_050.



In both the Nenagh and Kilcrow Rivers orthophosphate, TON and ammonia loads typically increased downstream, corresponding to increasing stream flow. In the Nenagh River, peaks in nutrient concentrations at NENAGH_070 resulted in significant orthophosphate, TON and ammonia loads. At KILCROW 25_060, a spike in TON load was also apparent.



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
25C_1	IE_SH_25A040100	ARDGREGANE STREAM_010	River	At Risk	Unassigned	Moderate	N	Ag	2027	
25C_1	IE_SH_25A040400	Ardgregane Stream_020	River	At Risk	Moderate	Moderate	N	Ag,DU,Hymo	2027	
25C_1	IE_SH_25Y020200	Youghal (Tipperary)_010	River	At Risk	Good	Moderate	N	Ag,For,UWW	2027	
25C_10	IE_SH_25_191a	Derg TN	Lake	At Risk	Poor	Poor	N	Ag,Hymo,Other,UWW	2027	
25C_10	IE_SH_25_9	Garraunfadda	Lake	Review	Unassigned	Unassigned	N		2027	
25C_10	IE_SH_25A050100	Shannon (Lower)_040	River	Review	Unassigned	Unassigned	N		2027	
25C_11	IE_SH_25C970950	Clonmakilladuff_010	River	Review	Unassigned	Unassigned	N		2027	Lower Nenagh and Clareen
25C_11	IE_SH_25G200100	Gortadalaun Stream_010	River	Review	Unassigned	Unassigned	N		2027	Lower Nenagh and Clareen
25C_11	IE_SH_25N010700	Nenagh_060	River	At Risk	Moderate	Moderate	N	Ind	2021	Lower Nenagh and Clareen
25C_11	IE_SH_25N010800	Nenagh_070	River	At Risk	Moderate	Moderate	N	Hymo	2027	Lower Nenagh and Clareen
25C_12	IE_SH_25K010360	Kilcrow 25_050	River	At Risk	Good	Moderate	N	Hymo	2027	
25C_12	IE_SH_25K010500	Kilcrow 25_060	River	At Risk	Moderate	Poor	N	Ag,Hymo	2027	
25C_12	IE_SH_25K010700	Kilcrow 25_070	River	At Risk	Moderate	Moderate	N	Other	2027	
25C_12	IE_SH_25L060400	Lisduff (Kilcrow)_020	River	At Risk	Poor	Poor	N	Ag,Hymo,M+Q	2027	
25C_2	IE_SH_25C160500	Carrigahorig Stream_010	River	At Risk	Moderate	Poor	N	Ag	2027	
25C_2	IE_SH_25K070600	Kilfadda Castle Stream_010	River	Review	Moderate	Good	N		2027	
25C_2	IE_SH_25L050200	Lorrha Stream_010	River	At Risk	Unassigned	Moderate	N	Ag	2021	Lorrha Stream
25C_2	IE_SH_25L050300	Lorrha Stream_020	River	At Risk	Moderate	Moderate	N	Ag,For,Peat	2021	Lorrha Stream
25C_2	IE_SH_25T650910	Terryglass_010	River	Review	Unassigned	Unassigned	N		2027	
25C_3	IE_SH_25G040300	Graney (Shannon)_040	River	At Risk	Unassigned	Moderate	N	Ag,For	2027	Lower Graney
25C_3	IE_SH_25G040400	Graney (Shannon)_050	River	At Risk	Moderate	Poor	N	For	2027	Lower Graney
25C_3	IE_SH_25S080400	Scarriff Stream_010	River	At Risk	Moderate	Moderate	N	Ag,For	2027	
25C_4	IE_SH_25B010300	Ballintotty_020	River	Review	Moderate	Good	N		2027	
25C_4	IE_SH_25O010040	Ollatrim_010	River	At Risk	Moderate	Poor	N	Ag,For,M+Q	2027	
25C_6	IE_SH_25B150300	Ballinlough Stream_010	River	At Risk	High	Good	Y	For,Peat	2027	
25C_6	IE_SH_25B150500	Ballinlough Stream_020	River	At Risk	High	Good	Y	Hymo	2027	
25C_6	IE_SH_25C030500	Cappagh (Galway)_020	River	At Risk	Moderate	Moderate	N	Ag,DWW,Hymo	2027	
25C_6	IE_SH_25D110300	Drumkeary Stream_010	River	At Risk	Good	Moderate	N	For	2027	
25C_6	IE_SH_25D110350	Drumkeary Stream_020	River	At Risk	High	Good	Y	For	2027	
25C_7	IE_SH_25_189	Alewnaghta	Lake	At Risk	Poor	Bad	N	Ag,Other	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
25C_7	IE_SH_25B100200	Bow_010	River	At Risk	Good	Moderate	N	Hymo	2027	
25C_7	IE_SH_25C080200	Coos_010	River	At Risk	Good	Poor	N	Ag	2027	
25C_7	IE_SH_25K720870	Kilrateera_Upper_010	River	Review	Unassigned	Unassigned	N		2027	
25C_7	IE_SH_25L080081	Lower Village Trib_010	River	Review	Unassigned	Unassigned	N		2027	
25C_7	IE_SH_25M290660	Moannakeeba_East_010	River	Review	Unassigned	Unassigned	N		2027	
25C_7	IE_SH_25S690670	South Boleynagoagh_010	River	Review	Unassigned	Unassigned	N		2027	
25C_7	IE_SH_25W010040	Woodford (Galway)_010	River	At Risk	Moderate	Moderate	N	For	2027	Woodford
25C_7	IE_SH_25W010200	Woodford (Galway)_020	River	At Risk	Good	Moderate	N	UWW	2027	Woodford
25C_8	IE_SH_25_172	Atorick	Lake	Review	Unassigned	Unassigned	N		2027	
25C_8	IE_SH_25_190	Graney	Lake	At Risk	Moderate	Moderate	N	Ag,For,Other	2027	Bleach & Lough Graney
25C_8	IE_SH_25B070100	Bleach_010	River	At Risk	Unassigned	Poor	N	For	2027	Bleach & Lough Graney
25C_8	IE_SH_25B070200	Bleach_020	River	At Risk	High	Moderate	Y	For	2027	Bleach & Lough Graney
25C_9	IE_SH_25A060500	Ardcrony Stream_010	River	At Risk	Moderate	Moderate	N	Ag,Hymo,M+Q	2027	
25C_9	IE_SH_25B020070	Ballyfinboy_010	River	At Risk	Moderate	Moderate	N	Ag,Hymo,M+Q,UWW	2027	Ballyfinboy (Upper)
25C_9	IE_SH_25B020100	Ballyfinboy_020	River	At Risk	Unassigned	Moderate	N	Ag,Hymo	2027	Ballyfinboy (Upper)
25C_9	IE_SH_25B020300	Ballyfinboy_030	River	Review	Moderate	Good	N		2027	
25C_9	IE_SH_25B020550	Ballyfinboy_040	River	At Risk	Poor	Moderate	N	Ag,DU,Hymo	2027	
25C_9	IE_SH_25B020600	Ballyfinboy_050	River	At Risk	Moderate	Moderate	N	Ag,For,UWW	2027	
25C_9	IE_SH_25B020700	Ballyfinboy_060	River	At Risk	Unassigned	Moderate	N	Ag,M+Q	2027	
25C_9	IE_SH_25B020800	Ballyfinboy_070	River	At Risk	Moderate	Moderate	N	Ag,Hymo	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 LCA

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	Objective met? Yes /No	Reason why not met
0300PRI2001_1	Williamstown	Tynagh GWB	IE_SH_G_236	Yes	N/A
0300PRI2003_1	Raheen	Lough Graney GWB	IE_SH_G_157	Yes	N/A
0300PUB1006_1	Scarriff PWS	Tynagh GWB	IE_SH_G_236	Yes	N/A
0300PUB1006_2	Scarriff PWS	Tynagh GWB	IE_SH_G_236	Yes	N/A
0300PUB1006_3	Scarriff PWS	Lough Graney GWB	IE_SH_G_157	Yes	N/A
0300PUB1006_4	Scarriff PWS	Lough Graney GWB	IE_SH_G_157	Yes	N/A
0300PUB1017_1	Feakle PWS	Lough Graney GWB	IE_SH_G_157	Yes	N/A
0300PUB1030_1	Whitegate Springs	Tynagh GWB	IE_SH_G_236	Yes	N/A
0300PUB1035_1	Flagmount PWS	Graney (Shannon)_020	IE_SH_25G040100	Yes	N/A
1200PRI0403_1	Kylemore Abbey	Tynagh GWB	IE_SH_G_236	Yes	N/A
1200PRI0455_1	Moyglass,Kylebrack, Loughrea	Tynagh GWB	IE_SH_G_236	Yes	N/A
1200PRI0690_1	Tynagh	Tynagh GWB	IE_SH_G_236	Yes	N/A
1200PRI0691_1	Tynagh	Tynagh GWB	IE_SH_G_236	Yes	N/A
1200PRI0692_1	Tynagh	Tynagh GWB	IE_SH_G_236	Yes	N/A
1200PRI0693_1	Tynagh	Tynagh GWB	IE_SH_G_236	Yes	N/A
1200PRI0694_1	Tynagh	Tynagh GWB	IE_SH_G_236	Yes	N/A
1200PRI0914_1	Looscaun	Tynagh GWB	IE_SH_G_236	Yes	N/A
1200PRI364_1	Kilcooley (Gurtymadden)	Tynagh GWB	IE_SH_G_236	Yes	N/A
1200PUB1042_1	Portumna	Derg TN LWB	IE_SH_27_191a	No	**2015** MCPA
1200PUB1042_2					
1200PUB1050_1	Woodford	Tynagh GWB	IE_SH_G_236	Yes	N/A
2500PUB1007_3	Dunkerrin P.W.S.	Cloughjordan/Moneygall Gravels GWB	IE_SH_G_251	Yes	N/A
2500PUB1007_5	Dunkerrin P.W.S.	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2001_1	Kilriffith/Kilmore [Bawn/Kilriffith] GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2005_1	Kilbarron GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2009_1	Cunnahurt / Knockalton GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2018_1	Elmhill / Ballymackey GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2021_1	Ballinderry GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2021_2	Ballinderry GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A

Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes /No	Reason why not met
2800PRI2021_3	Ballinderry GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2027_1	Carrigahorrig / Milford GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2034_1	Frolic / Carney GWS	Lismaline GWB	IE_SH_G_147	Yes	N/A
2800PRI2043_1	Ardcroney GWS	Ballinderry GWB	IE_SH_G_021	Yes	N/A
2800PRI2104_1	Luska GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2155_1	Killeen A GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2223_1	Lisheenacloonta GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PRI2243_1	Mota / Coolbawn GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PUB1002_1	Borrisokane PWS	Ballinderry GWB	IE_SH_G_021	Yes	N/A
2800PUB1005_1	Cloughjordan PWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PUB1006_1	Terryglass PWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PUB1006_2	Terryglass PWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PUB1008_1	Nenagh RWSS	Derg TN LWB	IE_SH_25_191a	Yes	N/A
2800PUB1019_1	Templederry PWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PUB1021_1	Toomevara PWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PUB1034_1	LRC PWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
2800PUB1036_1	Kilgarvan Quay PWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
3700PRI9104_1	Kilbiller GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
3700PRI9105_1	Ballycasey GWS	Borrisokane GWB	IE_SH_G_042	Yes	N/A
3700PRI9119_1	The Pike, Ballingarry GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A
3700PRI9126_1	Gurtagarry GWS	Nenagh GWB	IE_SH_G_178	Yes	N/A

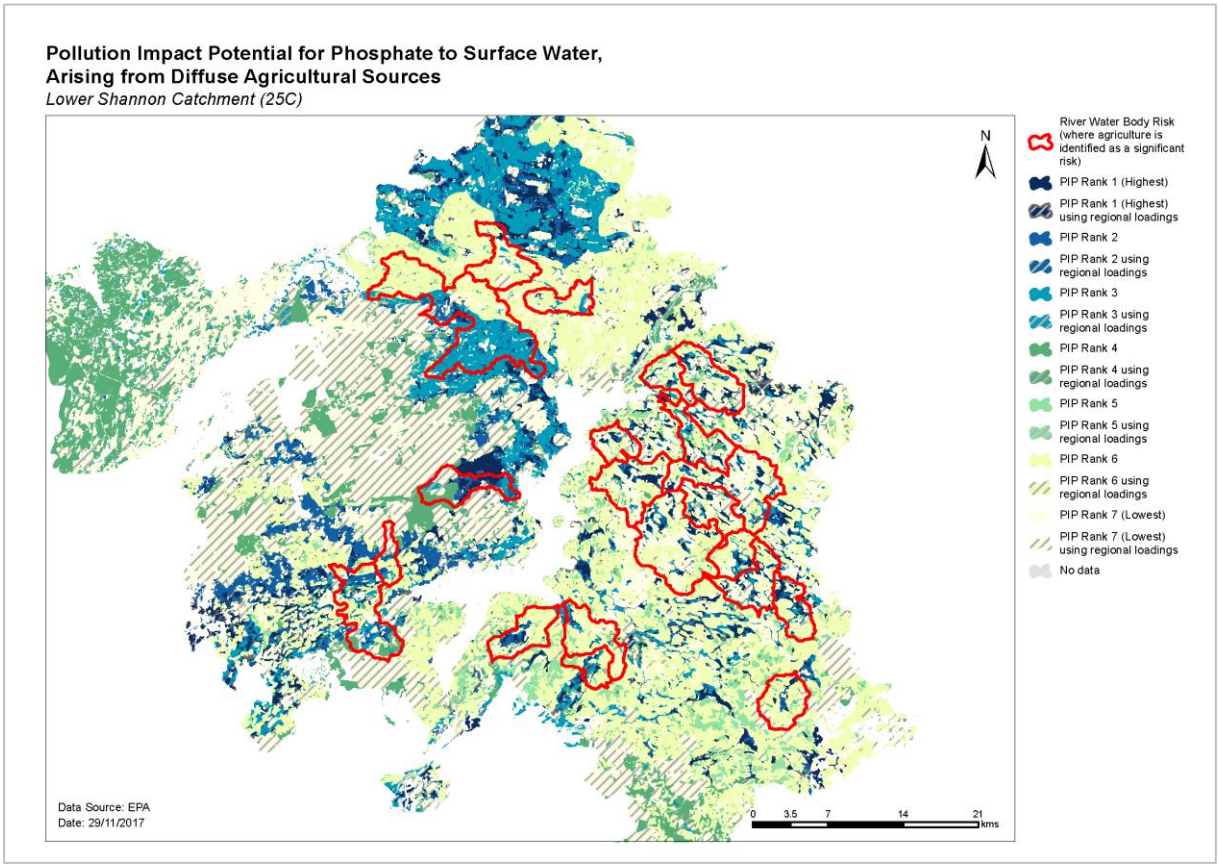
Appendix 5 Prioritisation of water bodies with Natura 2000 site qualifying interests

Note that additional water dependent species have been added that are not qualifying interests within the SACs (i.e. Salmon (Salmo salar; 1106) has been added to Lough Derg, North-East Shore SAC).

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Ardgraigue Bog SAC 002356	none							
Barroughter Bog SAC 000231	none							
Bolingbrook Hill SAC 002124	none							
Cloonmoylan Bog SAC 000248	none							
Derrycrag Wood Nature Reserve SAC 000261	none							
Glendree Bog SAC 001912	none							
Kilcarren-Firville Bog SAC 000647	none							
Kilduff, Devilsbit Mountain SAC 000934	none							
Liskeenan Fen SAC 001683	none							
Loughatorick South Bog SAC 000308	none							
Lough Derg, North-East Shore SAC 002241	7230	Good GW level	Groundwater	Banagher GWB	Good (NAR)	No	IE_SH_G_040	No
			Groundwater	Nenagh GWB	Good (R)	No	IE_SH_G_178	No
			Groundwater	Tynagh GWB	Good (NAR)	No	IE_SH_G_236	No
	1106 (not listed)	Good	Lake	Derg TN	Poor (AT RISK)	Yes	IE_SH_25_191a	No
Lower River Shannon SAC 002165	none							
Pollagoona Bog SAC 002126	none							
Pollnaknockaun Wood Nature Reserve SAC 000319	none							
River Shannon Callows SAC 000216	none							
Rosturra Wood SAC 001313	none							
Slieve Bernagh Bog SAC 002312	none							

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