Upper Shannon (Mid Shannon) Catchment Assessment 2010-2015 (HA 26G)

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 Upper Shannon (Mid Shannon) 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 small catchment covers an area of 383km² and is comprised of the catchment area from Athlone to Shannonbridge. The catchment is characterised by flat topography and expanses of bogs and flood prone areas. The area of the catchment located northwest of Athlone is underlain by highly karstified rock with surface and groundwater drainage closely connected in this region.

The Shannon flows into the catchment through Athlone, heading south before being joined from the west by the Cross River. This river drains the karstified part of the catchment from Lough Funshinagh to Athlone. Lough Funshinagh is located north of Curraghboy and does not have a surface outflow channel. Underground flow has been identified from this lake to the Cross River near Brideswell.

Continuing south, the Shannon is then joined from the east by the westerly flowing Cloonbonny and Boor Rivers, which drain the eastern part of the catchment. The Shannon then veers southwest and is joined from the west by a series of small tributaries, the largest of which is the Ballydangan River, before flowing out of the catchment at Shannonbridge.

The Upper Shannon (Mid Shannon) catchment comprises three subcatchments with 13 river water bodies and eight groundwater bodies (Table 1, Figure 1). There are no transitional and coastal water bodies in the catchment.

Table 1. List of subcatchments in the Upper Shannon (Mid Shannon) catchment

Subcatchment ID	Subcatchment Name
26G_1	Shannon[Lower]_SC_020
26G_2	Shannon[Upper]_SC_100
26G_3	Shannon[Lower]_SC_010

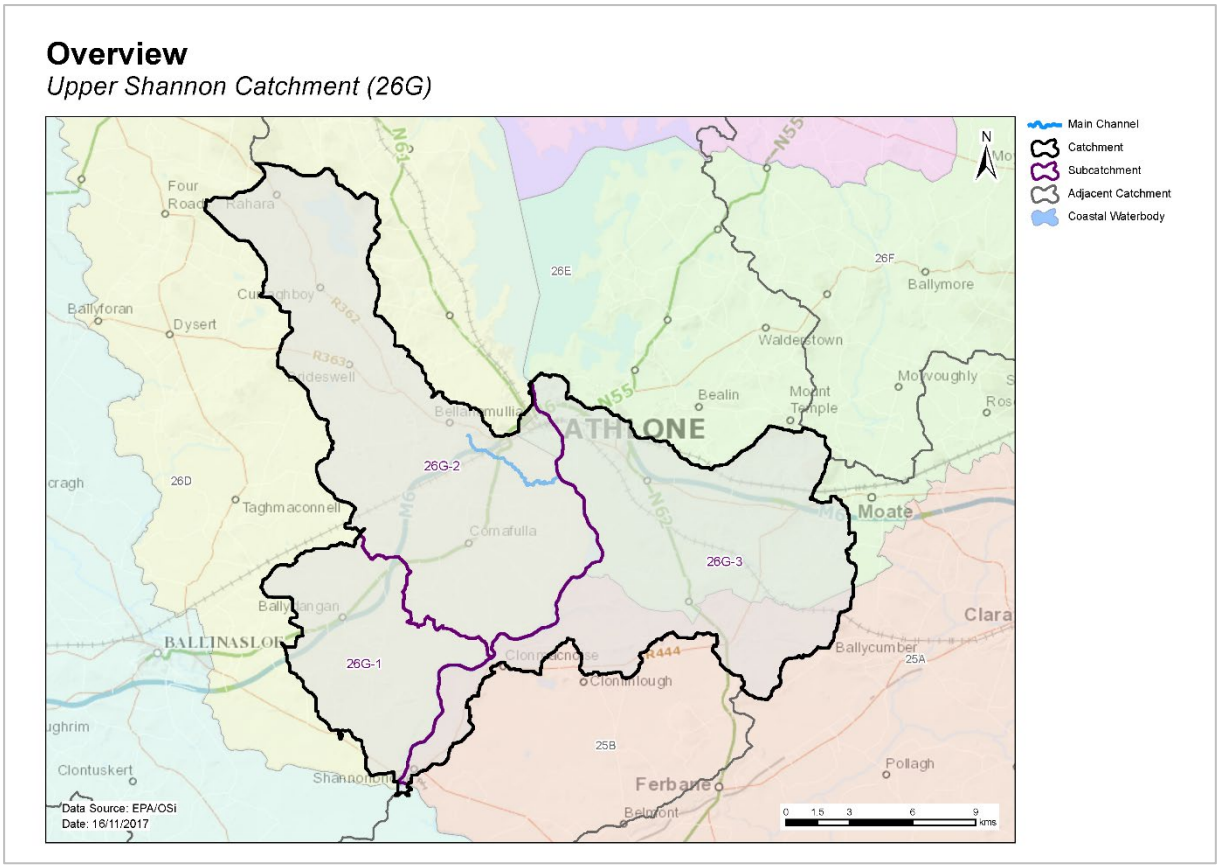


Figure 1. Subcatchments in the Upper Shannon (Mid Shannon) catchment

2 Water body status and risk of not meeting environmental objectives

2.1 Surface water ecological status

2.1.1 Rivers

- There were four (31%) river water bodies at Good or High status, and six (46%) at less than Good status in 2015 (Table 2, Figure 2). Three (23%) river water bodies are unassigned.
- There are no water bodies and sites that have a high ecological status objective.
- The number of water bodies at each status class in 2007-09 and 2010-15 are shown in Figure 3.
- Three water bodies have an improved status and one has deteriorated since 2007-09 (Figure 4).
- The variation in nutrient concentrations and loads in the Cross River main channel is illustrated in Appendix 1.

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	13	0	4	3	3	0	3	5	2	6

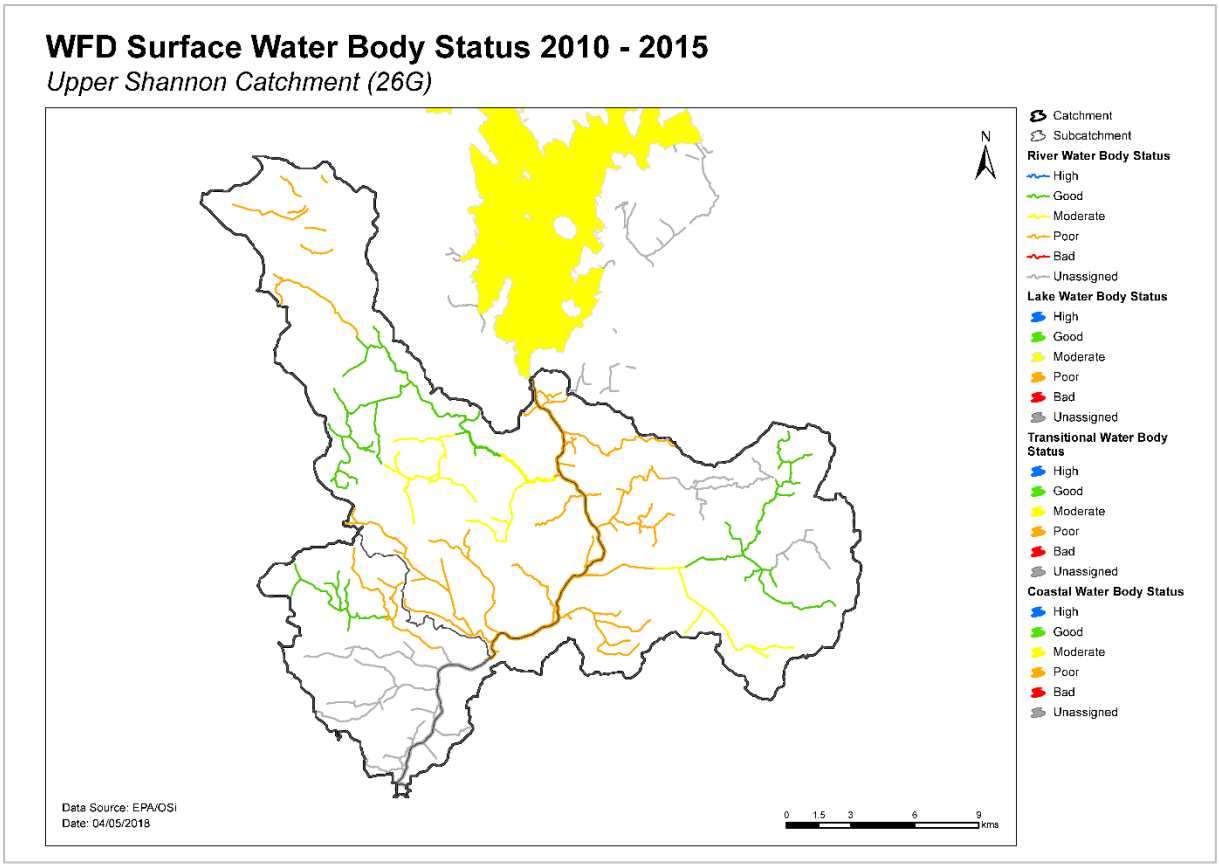


Figure 2. Surface water ecological status

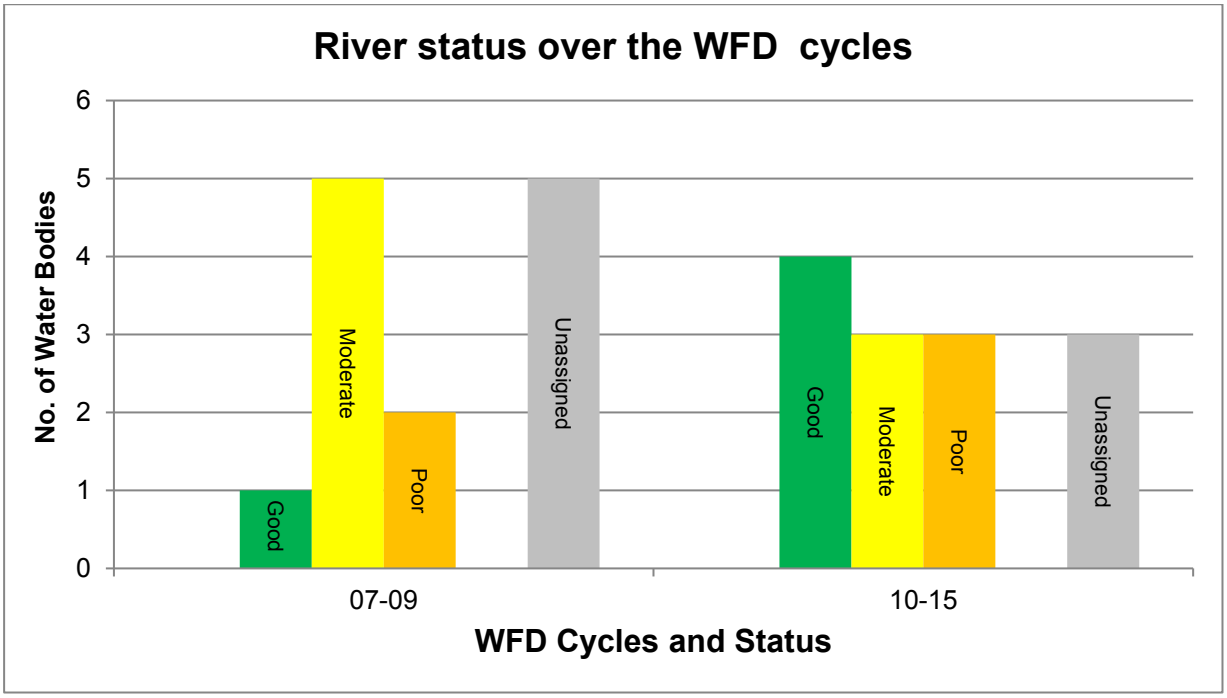


Figure 3. Number of rivers at each status class in 2007-09 and 2010-15

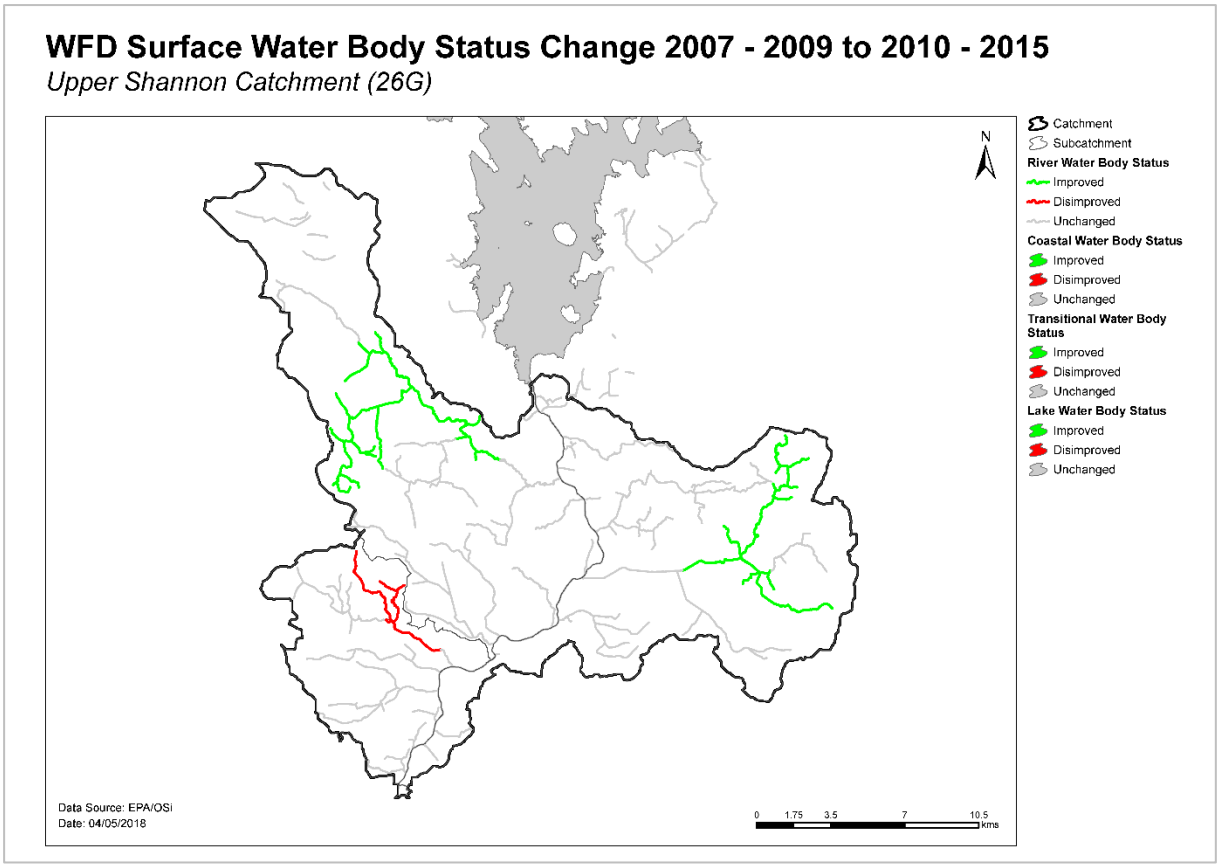


Figure 4. Surface water body status changes from 2007-09 to 2010-15.

2.2 Groundwater status

- All eight groundwater bodies were at Good status in 2015 (Table 3).

Table 3. Summary of ground water body status and risk

	Number of water bodies	2010-15 Status		Risk Categories		
		Good	Poor	*Not at Risk*	*Review*	*At Risk*
Groundwater	8	8	0	2	6	0

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers

- There are five *Not at Risk* river water bodies (Figure 5, Table 2) which require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- There are two river water bodies in *Review*. This includes one water body where more information is required and one water body where measures have recently been implemented and improvements have not yet been realised.
- Six river 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 2.

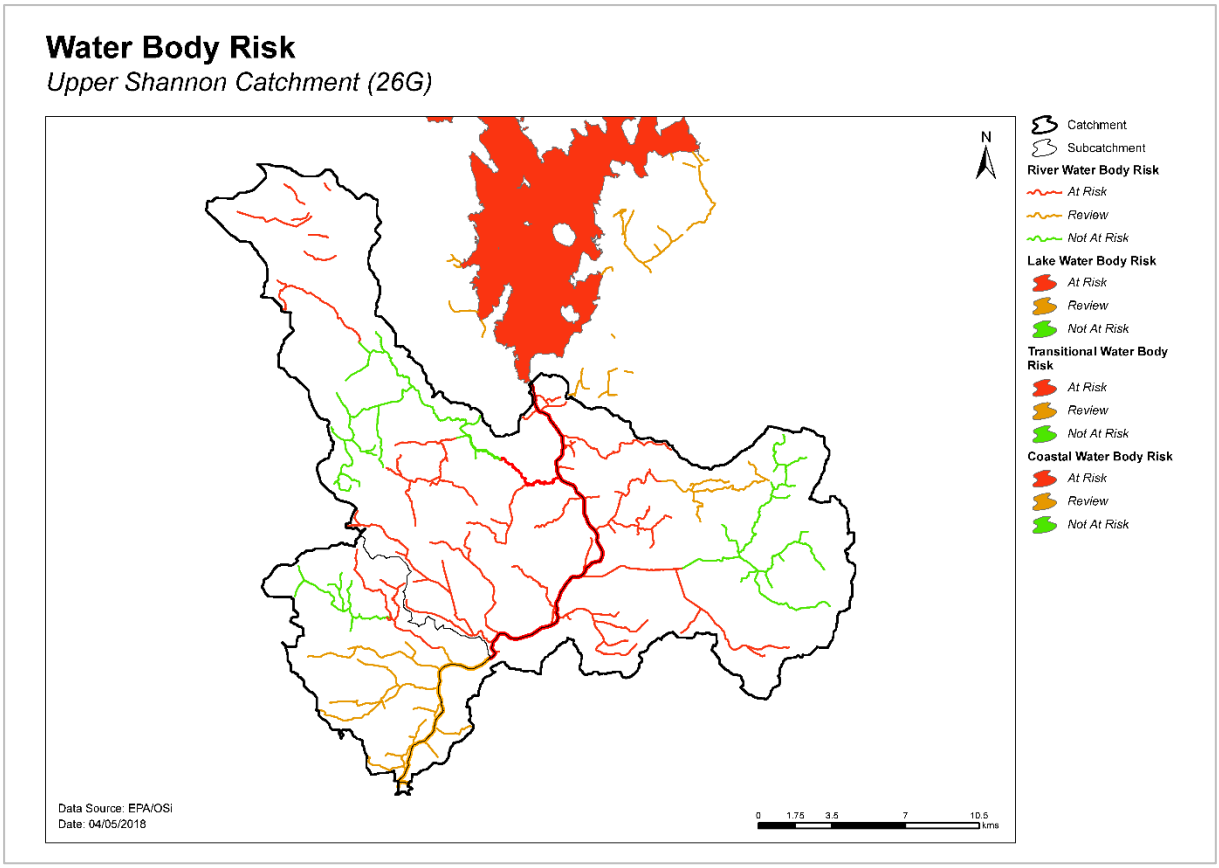


Figure 5. Surface water body risk

2.4 Risk of not meeting groundwater environmental objectives

- Two groundwater bodies are *Not at Risk* (Figure 6, Table 3) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Six groundwater bodies are in *Review* (Figure 6). Funshinagh, Inny and Suck South groundwater bodies 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. Athlone Gravels, Gageborogh-Brosna Gravels Group 2 and Boor Gravels are in *Review* due to elevated nitrate concentrations.
- There are no *At Risk* groundwater bodies in the catchment.

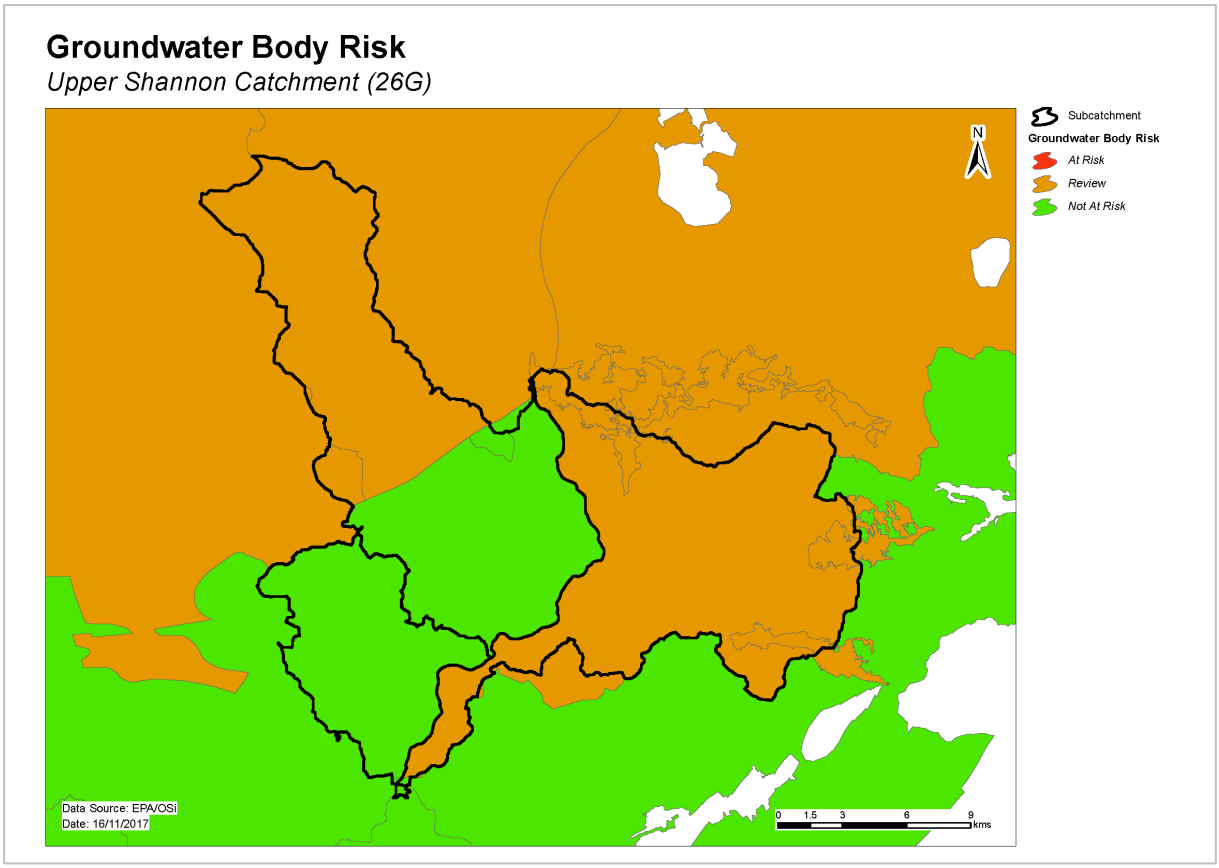


Figure 6. Groundwater body risk

2.5 Protected areas

2.5.1 Drinking water abstractions

- There are 11 abstractions in the Upper Shannon (Mid Shannon) catchment comprising four public supplies (Tullamore P.W.S., SRRWSS, Athlone WSS and Ballinahowen WSS) (Appendix 3).
- Nine of the abstractions are from groundwater bodies (Inny and Funshinagh) and two are from two river water bodies (Shannon (Upper)_120 and Boor_020). The list of the public supplies and the associated water bodies is provided in Appendix 3.
- All sources were compliant with the standard for nitrate in 2015.
- All sources were compliant for pesticides in 2015.

2.5.2 Bathing waters

- There are no designated bathing waters in the catchment.

2.5.3 Shellfish areas

- There are no designated shellfish areas in the catchment.

2.5.4 Nutrient Sensitive Areas

- There is one designated Nutrient Sensitive Area (NSA) (Shannon (River)) in the catchment.
- The NSA is associated with Athlone waste water treatment plant which has tertiary treatment and, therefore, is compliant with environmental objectives for NSAs.
- The details of the NSA, associated agglomeration and intersecting water bodies are provided in Table 4.

Table 4. Nutrient sensitive areas in the catchment

Nutrient Sensitive Area		Agglomeration		Intersecting water body		Objective met?		Comment
Name	Code	Name	Code	Name	Code	Yes	No	
Shannon (River)	IERI_SH_2010_0002	Athlone	D0007	SHANNON (Upper)_120	IE_SH_26S021800	✓		Tertiary treatment is in place.
				SHANNON (Upper)_130	IE_SH_26S021920			

2.5.5 Natura 2000 Sites

- There are eight Special Areas of Conservation (SACs) in the catchment (Appendix 4), not all of which have water quality and/or quantity conservation objectives for their qualifying interests.
- All three water bodies (Funshinagh GWB, Inny GWB and Athlone Gravels GWB) with water dependent qualifying interests within these SACs have met their WFD Protected area objectives (Appendix 4).
- There are three Special Protected Areas (SPAs) in the catchment:
  - Middle Shannon Callows SPA
  - Mongan Bog SPA
  - Mongan Bog 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 heavily modified water bodies (HMWBs) in the catchment.
- There are no artificially modified water bodies (AWBs) in the catchment.

3 Significant issues in *At Risk* water bodies

- Alteration of hydromorphological (or physical) conditions is one of the most significant issues in rivers in the Upper Shannon (Mid Shannon) 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 peat harvesting or quarries.
- Elevated concentrations of ammonia are also an issue; however, they are only of concern in several water bodies.
- There are no *At Risk* groundwater bodies within the catchment.

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 7 shows a breakdown of the number of *At Risk* water bodies in each significant pressure category for rivers.

4.1.1 Rivers

- Significant pressures have been identified through the initial characterisation process in seven river water bodies, six of which have multiple pressures. These significant pressures will be refined as further characterisation is carried out.
- The significant pressure affecting the greatest number of water bodies are hydromorphological pressures and peat, followed by agriculture and industry.

4.1.2 Groundwater

- There are no groundwater bodies *At Risk* in the catchment.

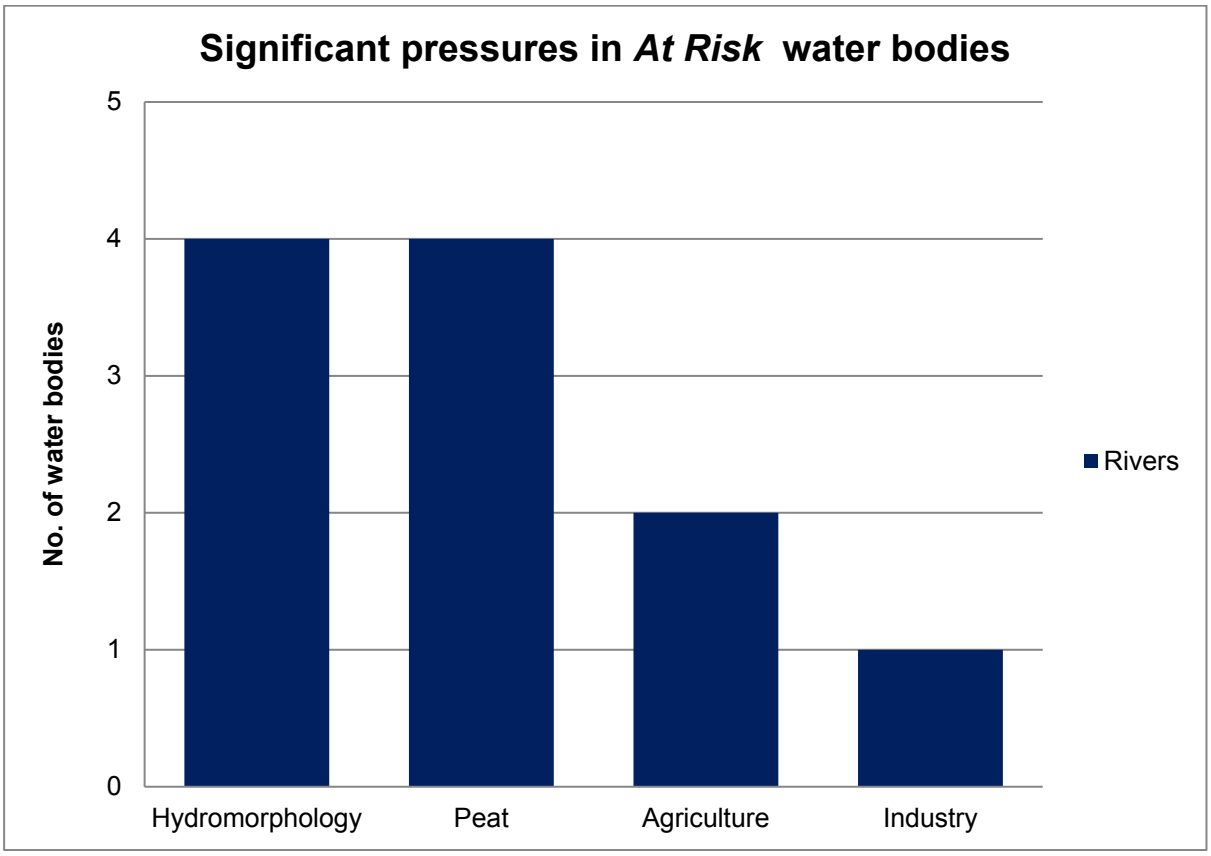


Figure 7. Significant pressures impacting on *At Risk* water bodies

4.2 Pressure type

4.2.1 Hydromorphology

- A number of river water bodies (four) within the Shannon [Upper] (SC26G_2), Shannon [Lower] (SC26G_1) and Shannon [Lower] (SC26G_3) subcatchments are subject to extensive modification which has led to habitat degradation. A weir exists within a river water body shared with subcatchments Shannon [Upper] (SC26G_2) and Shannon [Lower] (SC26G_3) and it may be impacting both fish habitat and hydromorphological conditions. See Figure 8 and Appendix 2 for information on these water bodies.

4.2.2 Extractive industry

- *Peat*

  Peat drainage and extraction has been identified as a significant pressure in four river water bodies – Cross (Roscommon)_040, Mihanboy_010, Shannon (Upper)_120 and Boor_020 (Figure 9, Appendix 2). This has resulted in increased sediment loads, which alters habitats, morphology and hydrology.

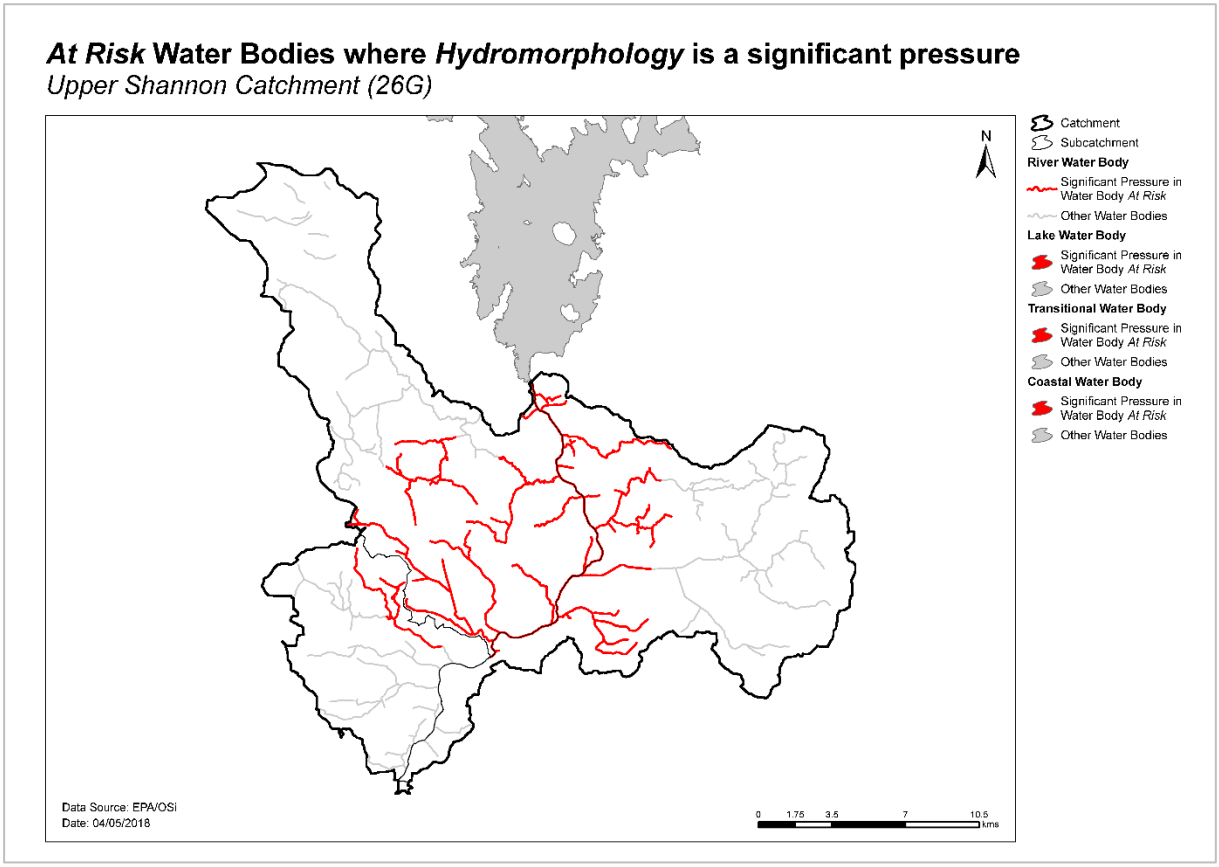


Figure 8. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

4.2.3 Agriculture

- Agriculture is a significant pressure in Cross (Roscommon)_010 and Boor_020 river water bodies (Figure 10, Appendix 2). The issues related to farming in this catchment are predominantly due to sediment from land drainage works, bank erosion from animal access or stream crossings. Although phosphorus concentrations instream are low there may be inpact of phosphorus and the pollution impact potential map showing areas of relative risk for phosphorus loss from agriculture to surface water is given in Appendix 5.

4.2.4 Industry

- An industrial discharge has been identified as a significant pressure impacting Ballydangan_020 (Appendix 2). Elevated total ammonia concentrations is the main issue of concern in respect to this discharge.

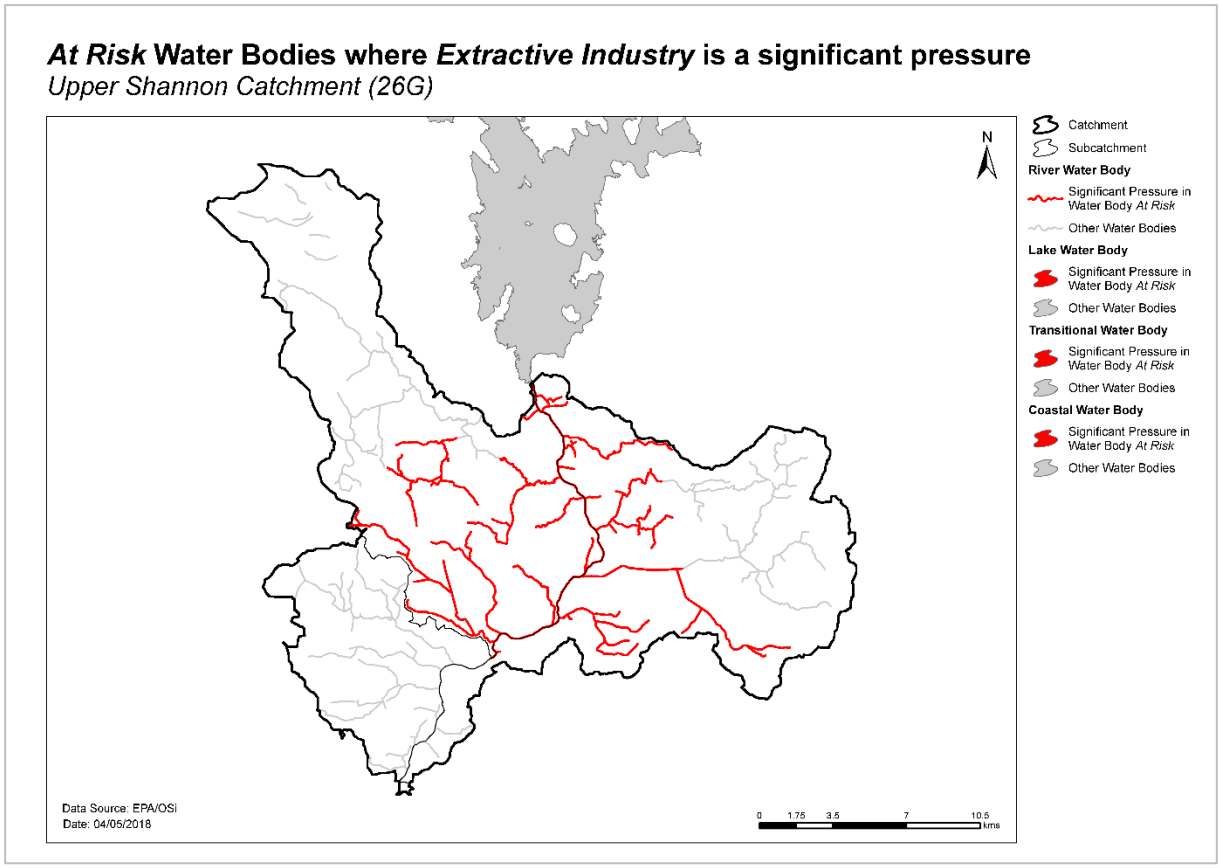


Figure 9. Water bodies that are *At Risk* and are impacted by extractive industries

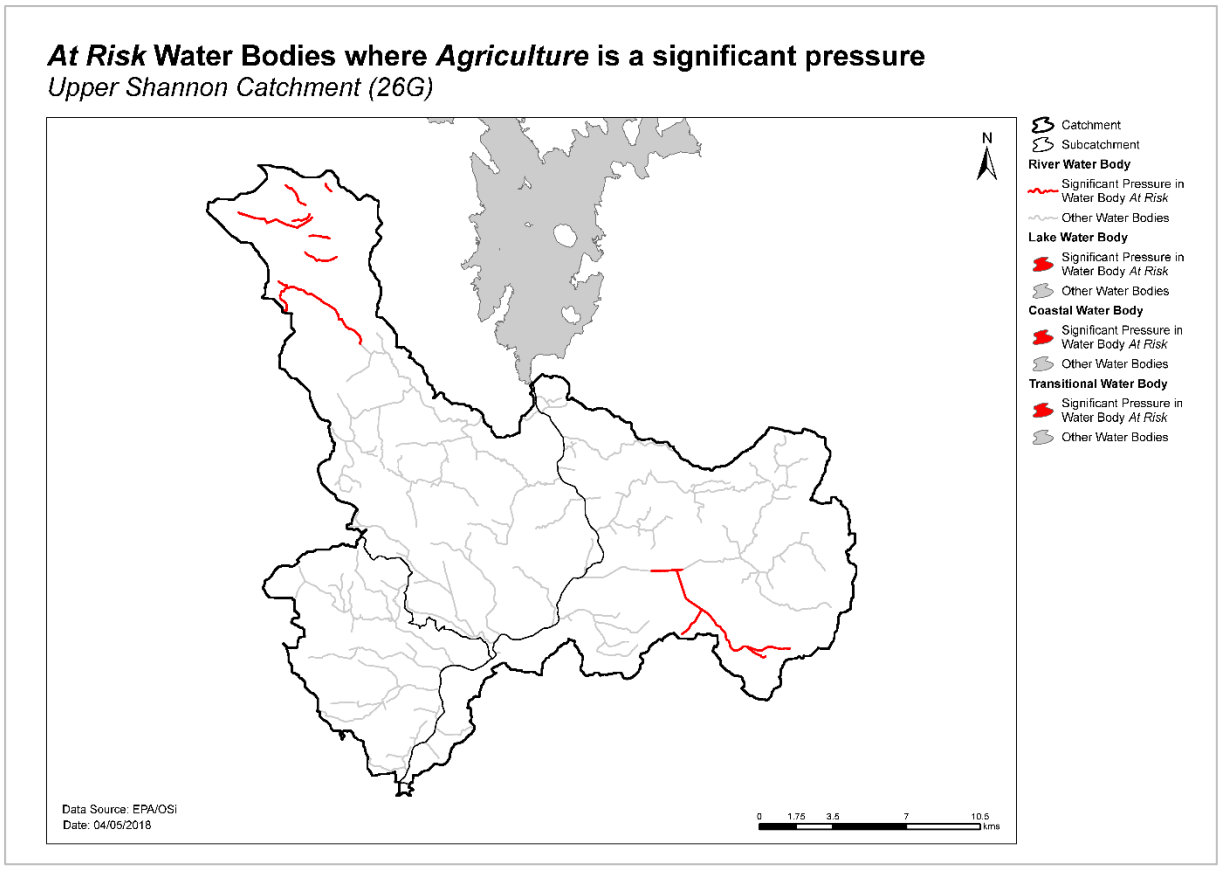


Figure 10. Water bodies that are *At Risk* and are impacted by agricultural activities

5 Load reduction assessment

5.1 River water body load reductions

- Phosphate is not a significant parameter influencing water quality in rivers in the catchment and therefore there is no load reduction requirement.

6 Further Characterisation and Local Catchment Assessments

- Further characterisation through local catchment assessments is needed in six of the *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 two *Review* water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.
- Brief definitions on the 10 IA assessment scenarios are given in Appendix 6 and the number of IAs required for each scenario are given in Table 5.

Table 5. Local catchment assessment allocation for *At Risk* and *Review* river water bodies

Risk	IA 1	IA 2	IA 3	IA 4	IA 5	IA 6	IA 7	IA 8	IA 9	IA 10	Total
At Risk	4	0	0	0	0	0	2	0	0	0	6
Review	1	0	1	0	0	0	0	0	0	0	2
Note water bodies may have multiple categories of Local Catchment Assessments											

7 Catchment summary

- Of the 13 surface water bodies, six are *At Risk* of not meeting their WFD objectives.
- Hydromorphological (or physical) conditions (including the input of excessive fine sediment) and poor habitat quality are major issues for several surface water bodies, arising from significant pressures which include peat extraction and agriculture.
- There are no *At Risk* groundwater bodies within the catchment.

8 Areas for Action

The characterisation outcomes described above have highlighted that there is significant work to do in the catchment to protect and restore water quality, and meet the objectives of the WFD. During the development of the draft river basin management plan it became apparent that there would be a need to prioritise areas for collective action so that the best return on investment could be achieved. 190 Areas for action have been selected nationally in a process as described below. There are no areas for action in the Upper Shannon (Mid) 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 Upper Shannon (Mid Shannon) catchment are summarised below.

- There are no recommended areas for actions for this catchment.

A remaining eight *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 11. These include:

- eight river water bodies – six *At Risk* and two *Review*, and

9 Environmental Objectives

9.1 Surface Water

- Five water bodies have met their 2015 environmental objective.
- As action is not yet planned to be taken in the remaining six *At Risk* surface water bodies, a 2027 date is applied to these water bodies. For the two *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 7.

Table 7. Environmental objectives dates in the *At Risk* and *Review* surface water bodies

Risk Category	No. of Water Bodies	No. of WBs for 2021 Improvement	No. of WBs for 2027 Status Improvement
Rivers			
At Risk	6	0	6
Review	2	0	2
Total	8	0	8

9.2 Groundwater

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

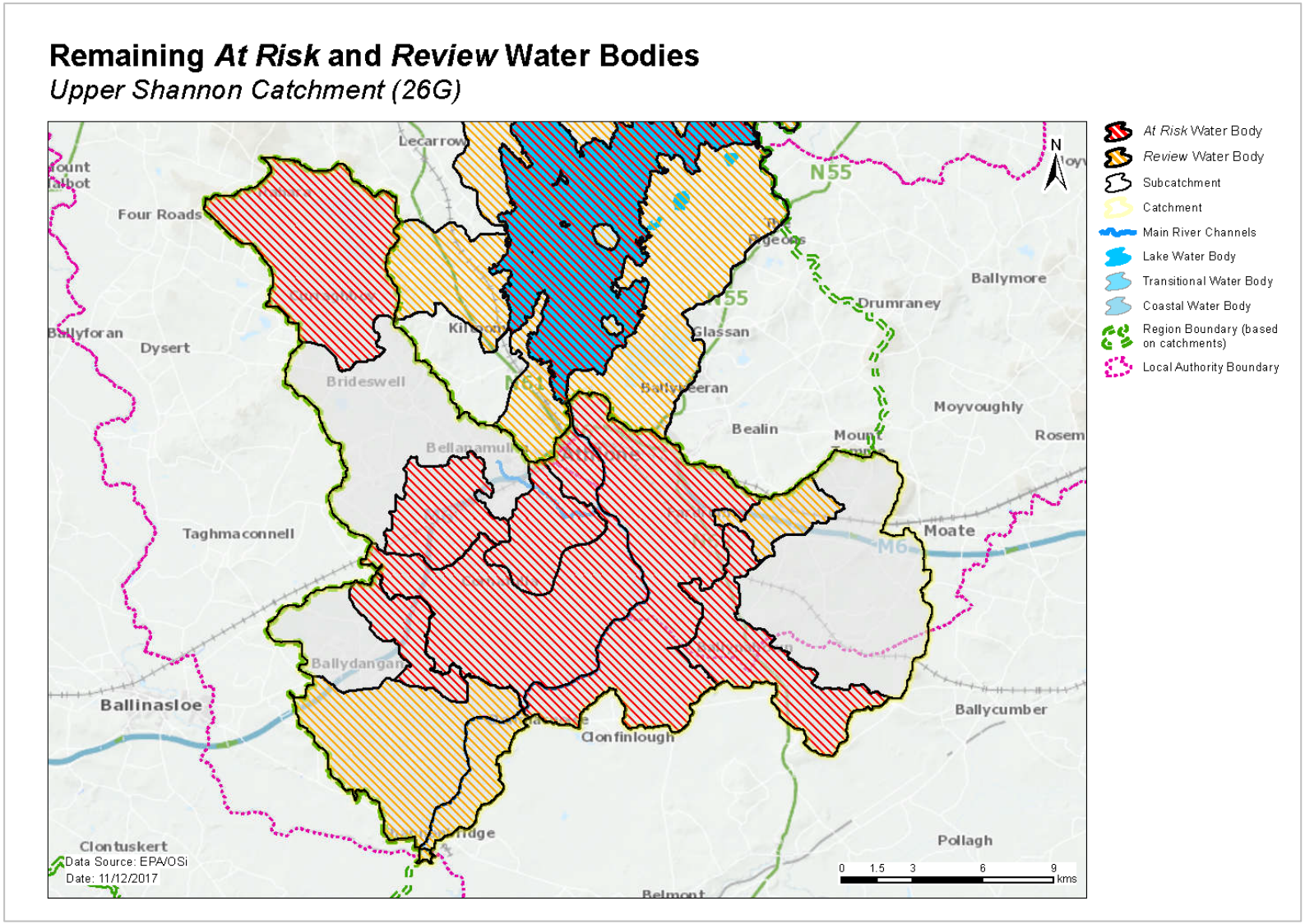


Figure 11. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Upper Shannon (Mid Shannon) Catchment

10 Acknowledgements

This Upper Shannon (Mid Shannon) Catchment (Version 3) has been produced by the Catchment Science & Management Unit, EPA, with the assistance of the following:

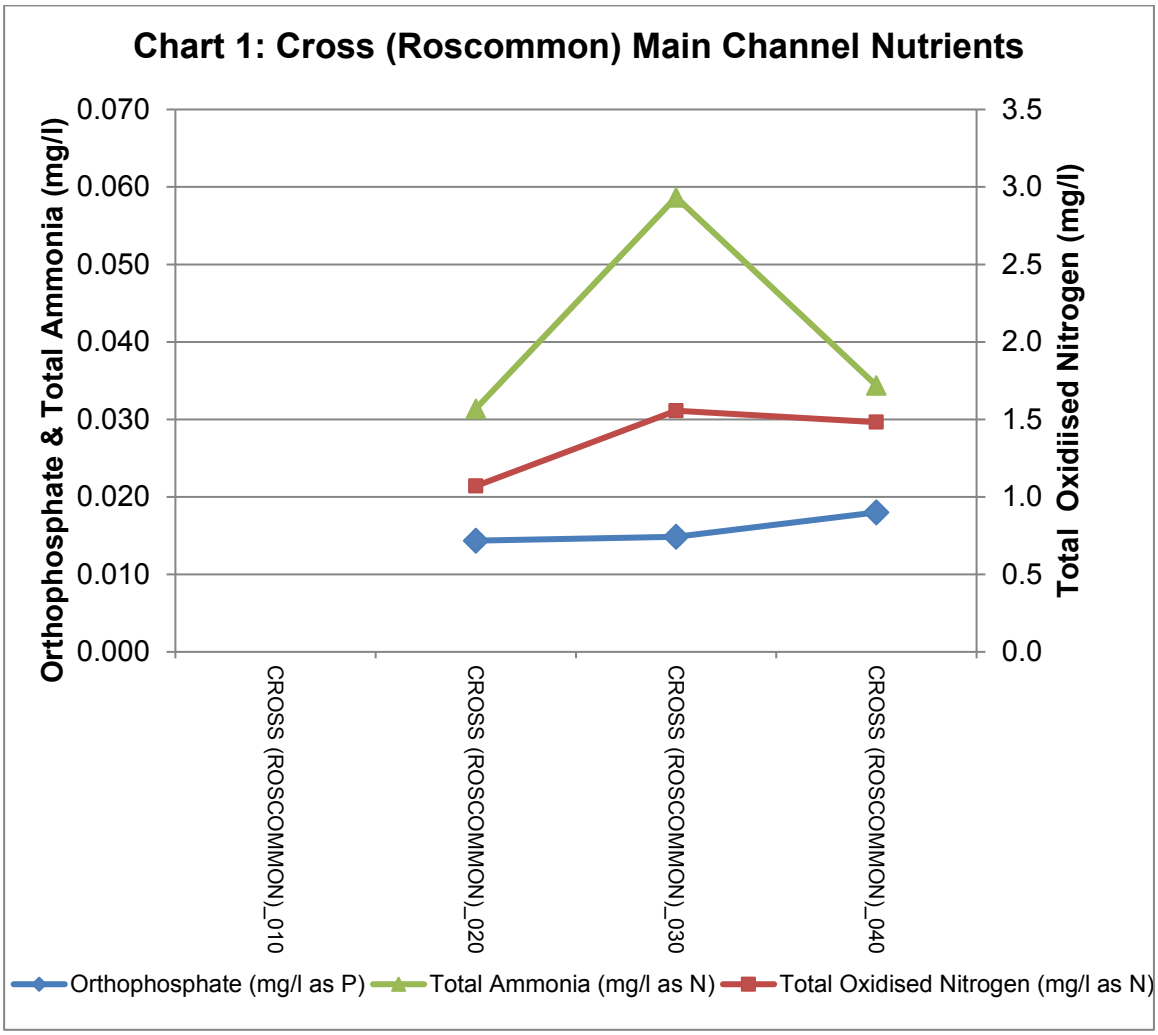
- Roscommon County Council.
- Offaly County Council.
- Westmeath County Council.
- Inland Fisheries Ireland.
- Local Authorities Waters & Communities Office.
- Irish Water.
- RPS Group.
- Ecological Monitoring & Assessment Unit, EPA.
- Hydrometric & Groundwater Section, EPA.
- Informatics Section, EPA.
- Laboratories, EPA.
- Office of Environmental Enforcement, EPA.
- Department of Housing, Planning and Local Government.
- DAFM Forest Service.
- DAFM Agriculture.
- Bord Na Mona.
- Coillte.
- Teagasc.
- Geological Survey Ireland.
- National Federation of Group Water Schemes.
- National Parks and Wildlife Service.
- National Water Forum.
- Waterways Ireland.

Appendix 1 Catchment scale nutrient concentrations and in-stream loads

The Cross River is the main river in the 26G Upper Shannon catchment which flows into the SHANNON (UPPER)_120. The SHANNON (UPPER)_120 is also the receiving water for the SHANNON (UPPER)_110, the CLOONBONNY STREAM_010 and the BOOR_020 water bodies. The results for the Cross River water quality trend assessment are presented in Chart 1.

Average orthophosphate concentrations along the Cross River are relatively low with values of 0.014, 0.015 and 0.018mg/l at CROSS (ROSCOMMON)_020, CROSS (ROSCOMMON)_030 and CROSS (ROSCOMMON)_040 respectively. The Environmental Quality Standard (EQS) of 0.035mg/l is not exceeded at any of the main channel monitoring points where water chemistry data is available.

Total oxidised nitrogen (TON) concentrations are low and remain below the 2.6mg/l threshold at each monitoring point. A moderate spike in ammonia is apparent at CROSS (ROSCOMMON)_030, however the EQS (0.065mg/l) is not exceeded. Similarly, ammonia concentrations at CROSS (ROSCOMMON)_020 and CROSS (ROSCOMMON)_040 are below the EQS. There is no water chemistry data available for CROSS (ROSCOMMON)_010.



Appendix 2 Summary information on *At Risk* and Review river 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
26G_1	IE_SH_26B140200	BALLYDANGAN_020	River	At Risk	Moderate	Poor	N	Hymo,Ind	2027	
26G_1	IE_SH_26S021920	SHANNON (Upper)_130	River	Review	Unassigned	Unassigned	N		2027	
26G_2	IE_SH_26C100060	CROSS (ROSCOMMON)_010	River	At Risk	Poor	Poor	N	Ag	2027	
26G_2	IE_SH_26C100400	CROSS (ROSCOMMON)_040	River	At Risk	Moderate	Moderate	N	Hymo,Peat	2027	
26G_2	IE_SH_26M040200	MIHANBOY_010	River	At Risk	Unassigned	Moderate	N	Hymo,Peat	2027	
26G_2	IE_SH_26S021800	SHANNON (Upper)_120	River	At Risk	Poor	Poor	N	Hymo,Peat	2027	
26G_3	IE_SH_26B071200	BOOR_020	River	At Risk	Unassigned	Moderate	N	Ag,Peat	2027	
26G_3	IE_SH_26C460200	CLOONBONNY STREAM_010	River	Review	Unassigned	Unassigned	N		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 3 Drinking water supplies in the catchment

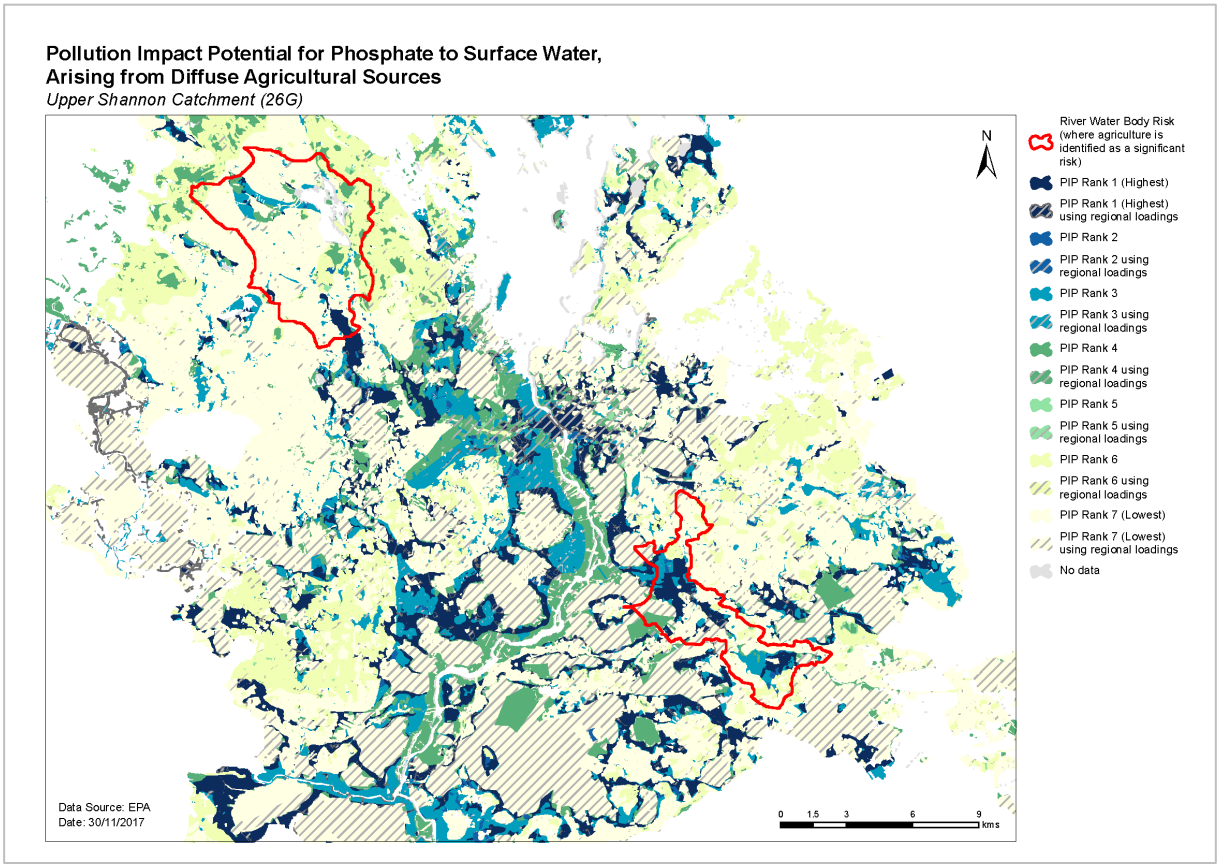
Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes /No	Reason why not met
2500PUB1020	Tullamore P.W.S.	Inny	IE_SH_G_110	Yes	N/A
2600PUB1004	SRRWSS - Lisbrock 1	Funshinagh	IE_SH_G_091	Yes	N/A
	SRRWSS - Lisbrock 2	Funshinagh	IE_SH_G_091	Yes	N/A
	SRRWSS - Lisbrock 3	Funshinagh	IE_SH_G_091	Yes	N/A
	SRRWSS - Lisbrock 4	Funshinagh	IE_SH_G_091	Yes	N/A
	SRRWSS - Lisbrock 5	Funshinagh	IE_SH_G_091	Yes	N/A
	SRRWSS - Lisbrock 6	Funshinagh	IE_SH_G_091	Yes	N/A
	SRRWSS - Lisbrock 7	Funshinagh	IE_SH_G_091	Yes	N/A
	SRRWSS - Lisbrock 8	Funshinagh	IE_SH_G_091	Yes	N/A
3200PUB1001	Athlone WSS	SHANNON (Upper)_120	IE_SH_26S021800	Yes	N/A
3200PUB1002	Ballinahowen WSS	BOOR_020	IE_SH_26B071200	Yes	N/A

Appendix 4 Prioritisation of water bodies with Natura 2000 site qualifying interests

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Ballynamona Bog and Corkip Lough SAC 002339	3180	Good GW level/quality	Groundwater	Funshinagh GWB	Good (R)	No	IE_SH_G_091	Yes
Castlesampson Esker SAC 001625	none							
Crosswood Bog SAC 002337	none							
Lough Funshinagh SAC 000611	3180	Good GW level/quality	Groundwater	Funshinagh GWB	Good (R)	No	IE_SH_G_091	No
Lough Ree SAC 000440	7230	Good GW level/quality	Groundwater	Funshinagh GWB	Good (R)	No	IE_SH_G_091	No
			Groundwater	Inny GWB	Good (NAR)	No	IE_SH_G_110	No
			Groundwater	Athlone Gravels GWB	Good (R)	No	IE_SH_G_246	No
Mongan Bog SAC 000580	none							
Pilgrim's Road Esker SAC 001776	none							
River Shannon Callows SAC 000216	none							

Appendix 5 Pollution Impact Potential (PIP) Map for Phosphate

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 phosphate to surface water. The risk of phosphate 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