Upper Shannon (Suck) Catchment Assessment 2010-2015 (HA 26D)

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 (Suck) 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 covers an area of 1,598 km² and is underlain by limestone, most of which is karstified, apart from small areas of sandstones. The catchment is dominated by a flat undulating topography and the groundwater and surface water drainage systems are highly interlinked throughout the catchment.

The Suck rises northwest of Ballinlough and flows through Lough O'Flynn before it is joined from the northeast by the Francis River. Continuing southeast, the Suck is joined from the west by the Island River at Ballymoe. The Suck moves onward towards Dunamon, where the Smaghraan River flows in from the north. The Suck flows past Athleague and Ballygar, and is joined by the Shiven River, which drains the area from Moylough, Mountbellew Bridge and Castleblakeney to the Suck.

The River Suck continues southwards past Ballyforan and towards Ballinasloe, before which it is joined by the Ahascragh and Derrymullen Rivers. The Suck is joined next by the Ballinure River which drains the southwestern corner of the catchment. It then flows into the Shannon 1km downstream of Shannonbridge.

The Upper Shannon (Suck) catchment comprises 11 subcatchments (Table 1, Figure 1), with 58 river water bodies, one lake and eight groundwater bodies. There are no heavily modified or artificial water bodies in the Upper Shannon (Suck) Catchment.

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

Subcatchment ID	Subcatchment Name
26D_1	Suck_SC_070
26D_2	Suck_SC_080
26D_3	Suck_SC_100
26D_4	Suck_SC_040
26D_5	Suck_SC_090
26D_6	Suck_SC_060
26D_7	Suck_SC_030
26D_8	Suck_SC_020
26D_9	Suck_SC_010
26D_10	Suck_SC_050
26D_11	Castlegar_SC_010

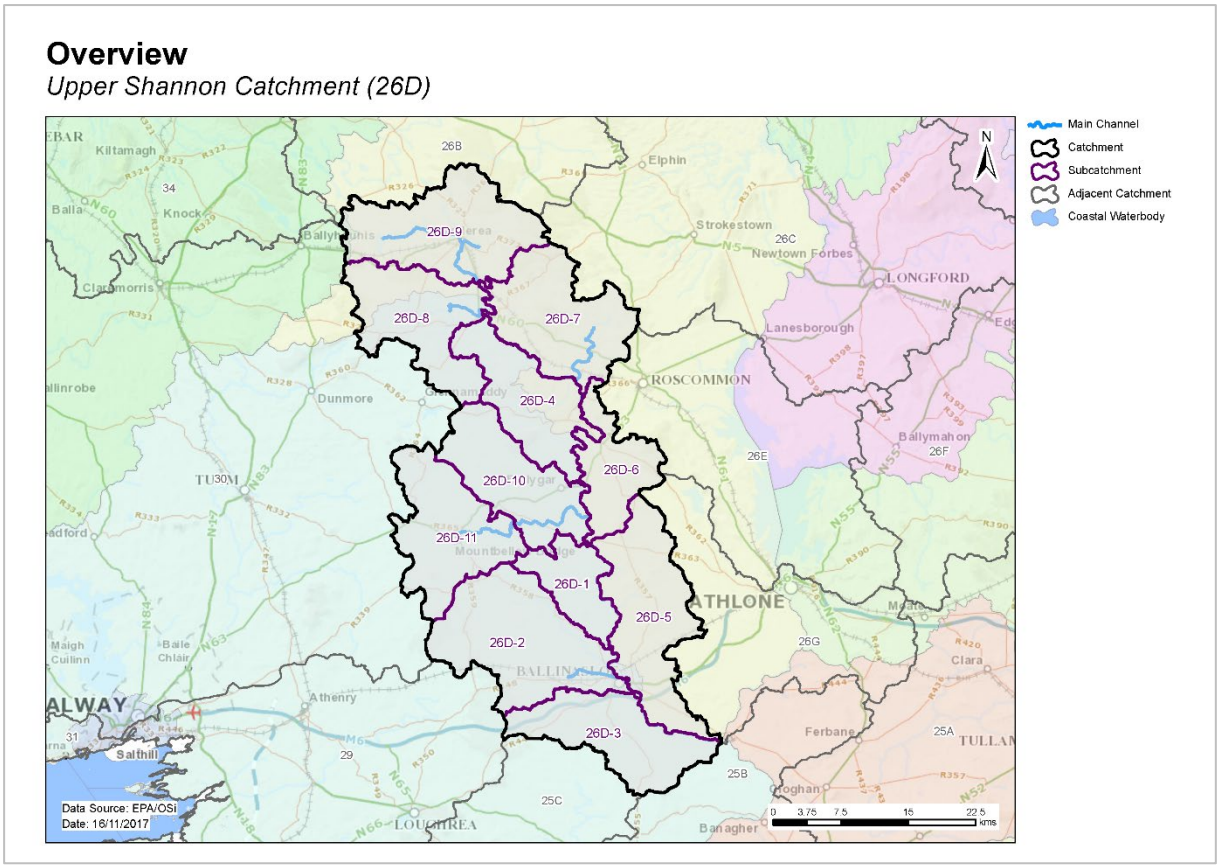


Figure 1. Subcatchments in the Upper Shannon (Suck) catchment

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 31 (53%) river and lake water bodies at Good or High status, and 18 (30%) at less than Good status in 2015 (Table 2, Figure 2). Ten (17%) river and lakes water bodies are unassigned.
- Five river water bodies and sites have a high ecological status objective. In 2015, two of these water bodies were at High status, and three were at Good (Figure 3, Appendix 1).
- The numbers of water bodies at each status class in 2007-09 and 2010-15 are shown in Figure 4 (rivers). The lake water body within the Upper Shannon (Suck) catchment deteriorated from Good to Poor status in 2010-15.
- Status for nine water bodies have improved and eight have deteriorated since the 2007-2009 WFD monitoring cycle (Figure 5).
- The variation in nutrient concentrations and loads in the River Shannon and Suck main channels are illustrated in Appendix 2.

Table 2. Summary of water body status and risk for rivers and lakes in subcatchments

	Number of water bodies	2010-15 Status						Risk Categories		
		High	Good	Mod	Poor	Bad	Unassigned	*Not at Risk*	*Review*	*At Risk*
Rivers	58	2	29	12	4	1	10	30	8	20
Lakes	1	0	0	0	1	0	0	0	0	1

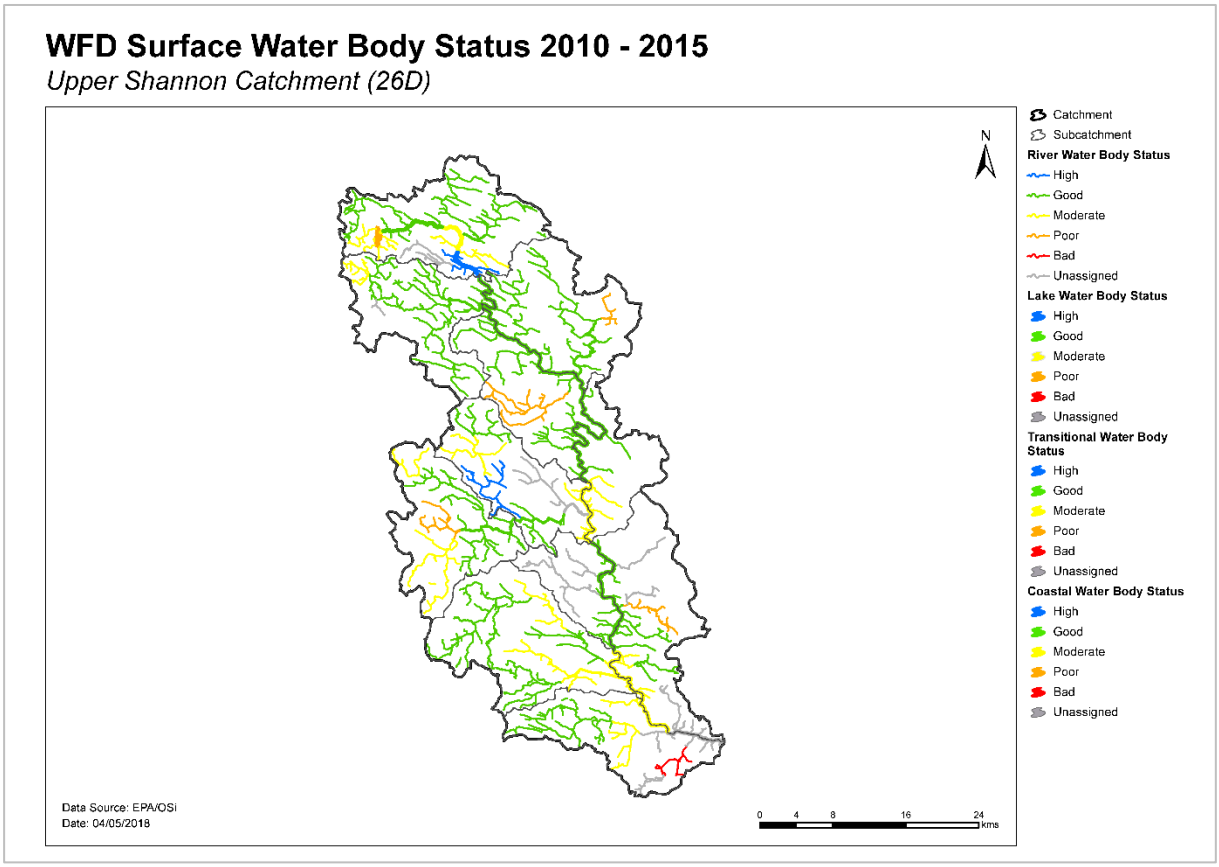


Figure 2. Surface water ecological status

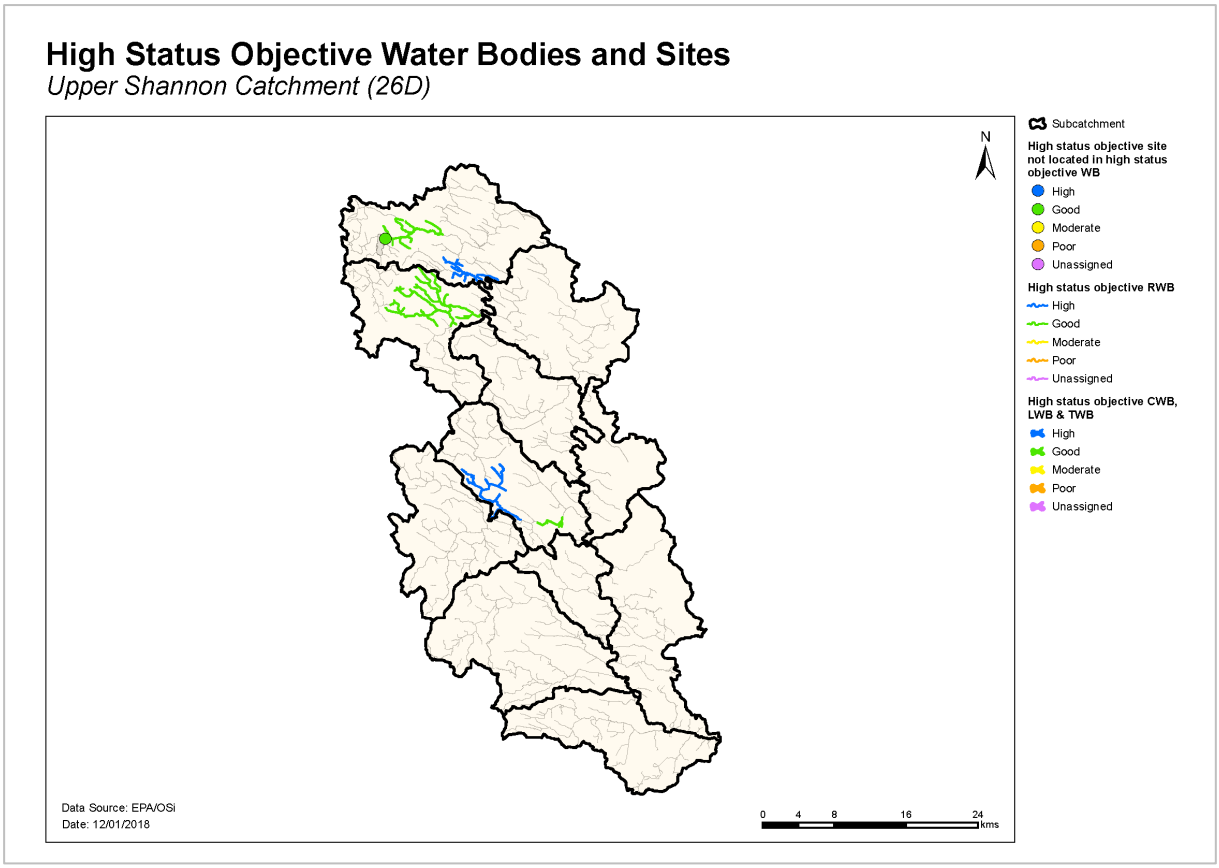


Figure 3. High ecological status objective water bodies and sites

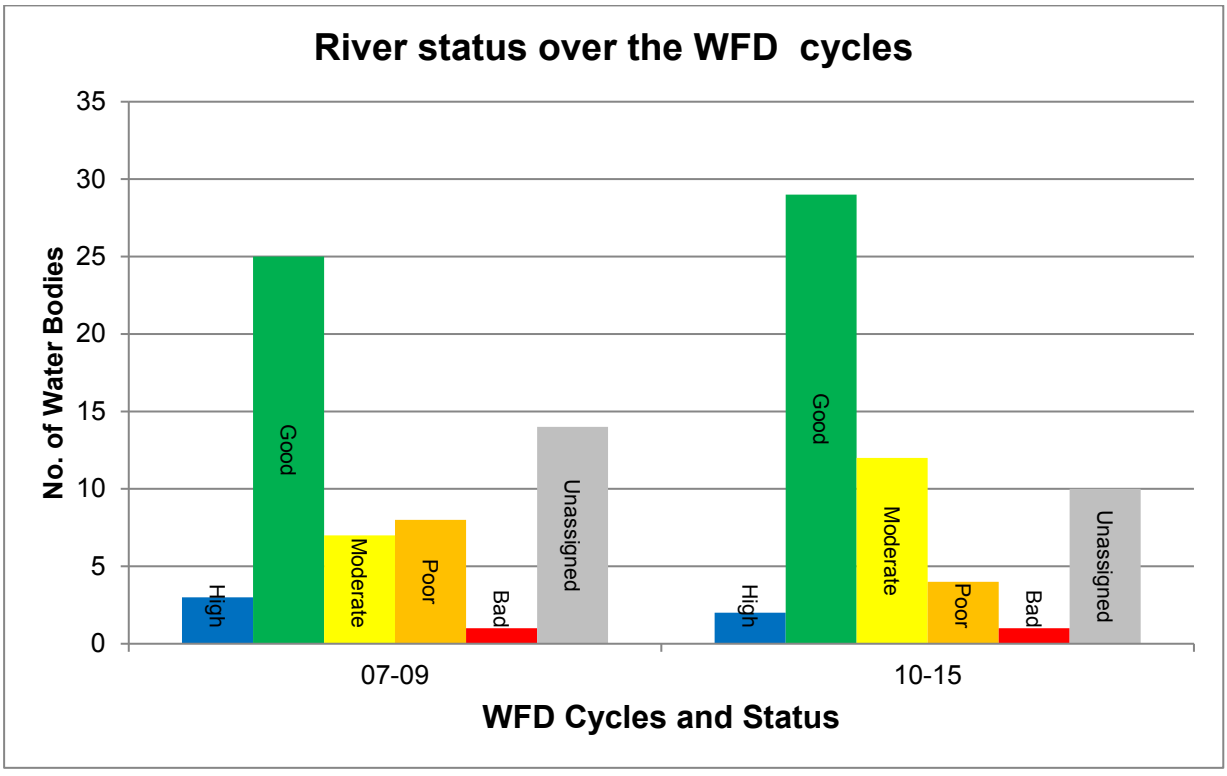


Figure 4. Number of rivers at each status class in 2007-09 and 2010-15

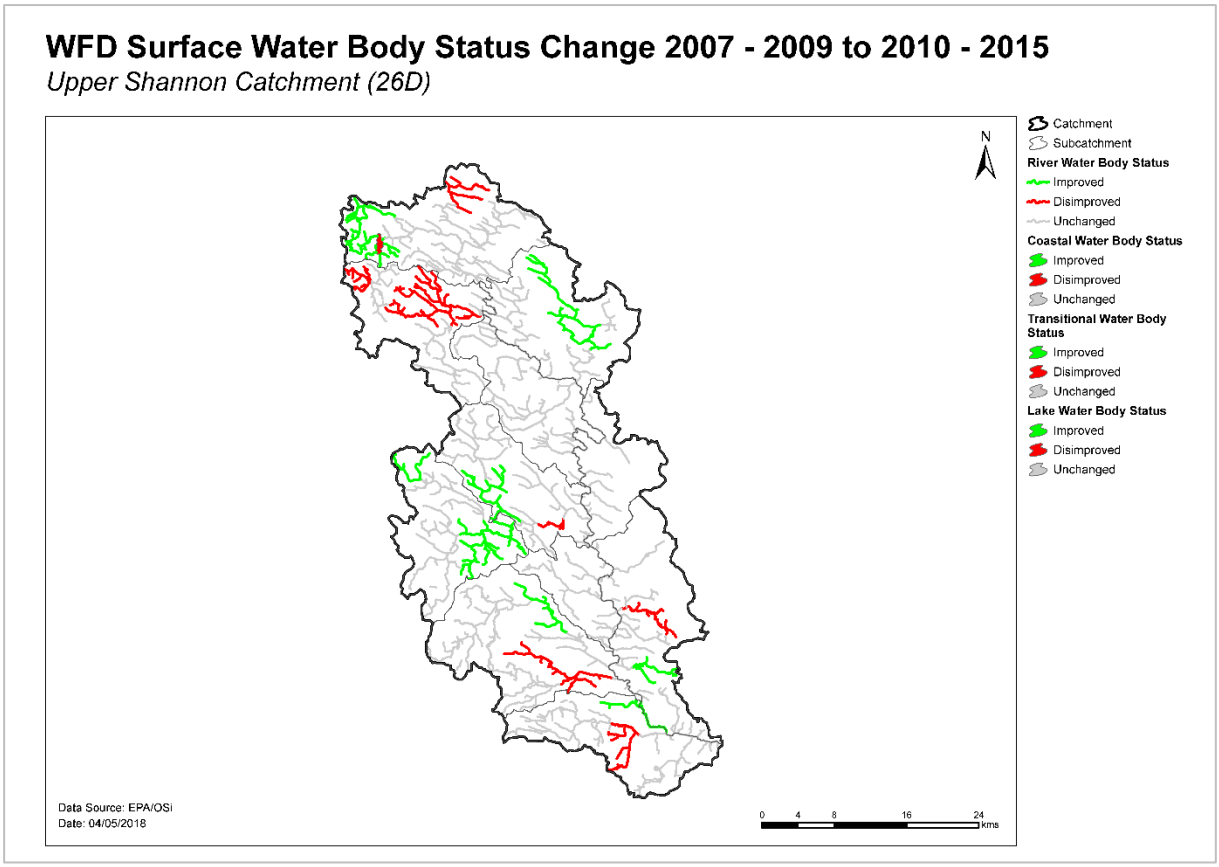


Figure 5. Surface water body status change from 2007-2009 to 2010-15

2.2 Groundwater status

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

Table 3. Summary of water body status and risk for ground waters

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

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and lakes

- There are 30 *Not at Risk* river water bodies (Figure 6, Table 2) and they require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Eight river water bodies are in *Review*. This applies to seven water bodies where more information is required.
- Twenty 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.

2.4 Risk of not meeting groundwater environmental objectives

- There are six groundwater bodies *Not at Risk* (Figure 7, Table 3) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Two groundwater bodies are in *Review*. The Suck South groundwater body is in *Review* as it is hydrologically linked to surface waters that are not meeting water quality objectives where it is considered likely that groundwater is a contributing source of phosphorus (Figure 7), while GWDTE-Bellanagare Bog (SAC000592) has drainage identified as an issue that needs further consideration.

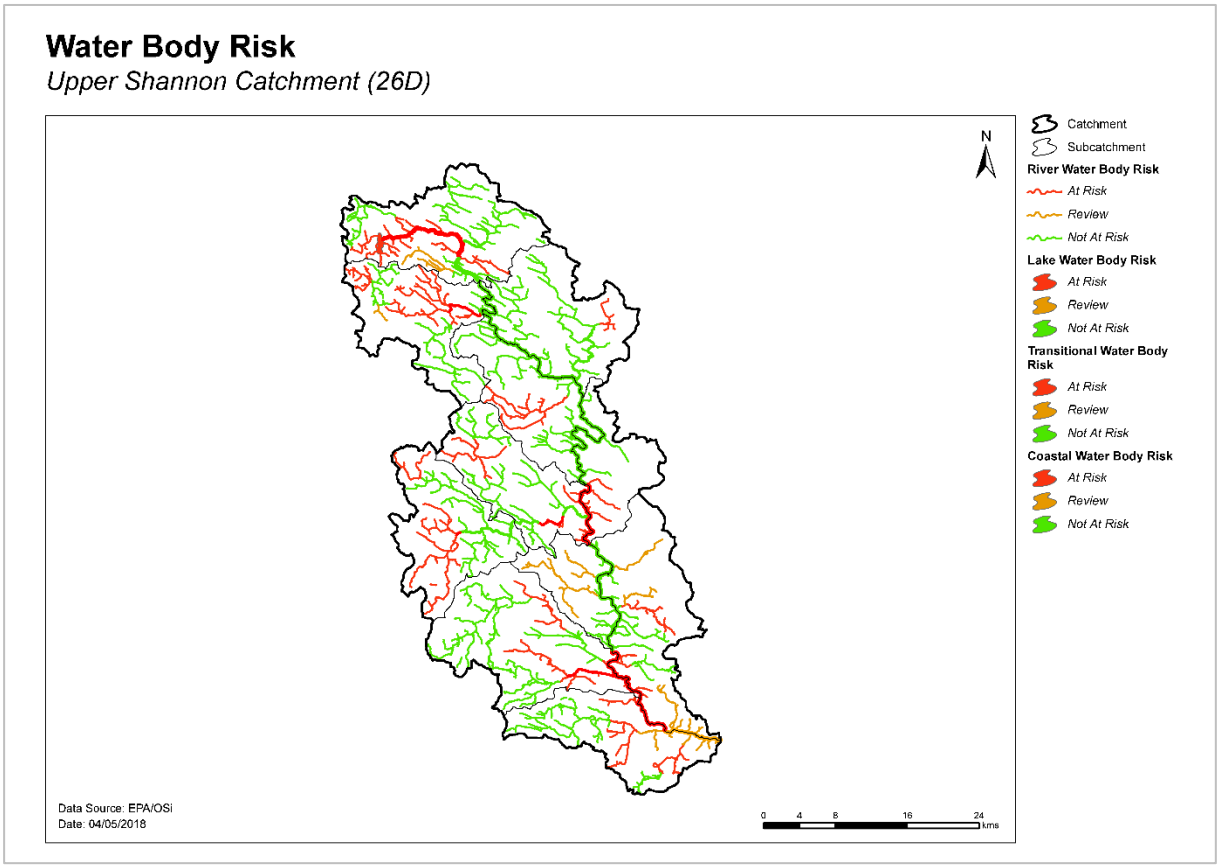


Figure 6. Surface water body risk

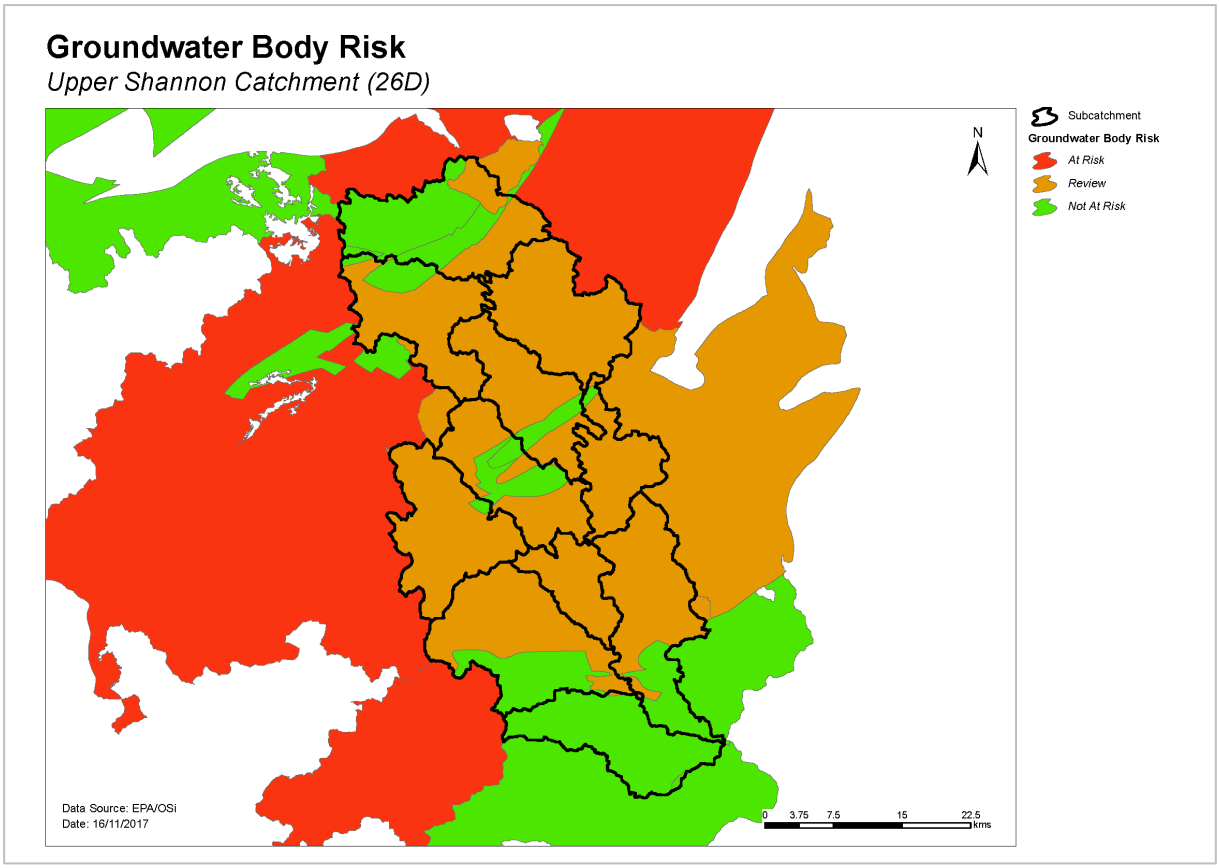


Figure 7. Groundwater Body Risk

2.5 Protected areas

2.5.1 Drinking water protected areas

- There are 42 abstractions in the Upper Shannon (Suck) Catchment comprising 10 group water schemes, 13 public supply schemes and eight other schemes (Appendix 4).
- Thirty-eight of the abstractions are from four groundwater bodies (Suck South, Aughrim, Ballygar and Castlerea); three are from river water bodies (Ballinure_010, Shiven (South)_060, and Suck_140); and one is from a very small lake (Lough Loung) that is on a channel of the Suck_060 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.
- One source was non-compliant for pesticides in 2015. Suck_140, for scheme 1200PUB1004, had an exceedance of MCPA.
- Seven of the eight 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 areas

- There are no designated shellfish areas in the catchment.

2.5.4 Nutrient sensitive areas

- There are no designated nutrient sensitive areas in the catchment.

2.5.5 Natura 2000 sites

- There are 23 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.
- The two groundwater bodies (South Suck GWB and GWDTE-Glenamaddy Turlough (SAC000301)) with water dependent qualifying interests within these SACs have met their WFD Protected area objectives (Appendix 5).
- There are four Special Protected Areas (SPAs) in the catchment:
    - Four Roads Turlough SPA
    - Lough Croan Turlough SPA
    - Middle Shannon Callows SPA
    - River Suck Callows 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 designated artificial water bodies (AWB) in the catchment.

3 Significant issues in *At Risk* water bodies

- Excess phosphates leading to eutrophication is one of the dominant issues in the river water bodies. Excess ammonia is also a concern in a limited number of water bodies, and invasive species are impacting the *At Risk* lake water body in the Upper Shannon (Suck) Catchment.
- Alteration of hydromorphological (or physical) conditions is a significant issue in rivers in the Suck 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 as a result of, for example, implementing river and field drainage schemes, forestry activities, animal access, and discharge from quarries.

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.

4.1.1 Rivers and lakes

- Figure 8 shows a breakdown of the number of *At Risk* water bodies in each significant pressure category. Significant pressures have been identified, through the initial characterisation process, in 21 water bodies, 10 of which have multiple pressures. The significant pressures will be refined as further characterisation is carried out.
- The significant pressure affecting the greatest number of water bodies is agriculture, followed by hydromorphological pressures, domestic waste water, peat, forestry, urban waste water, other and industry (Figure 8).

4.1.2 Groundwater

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

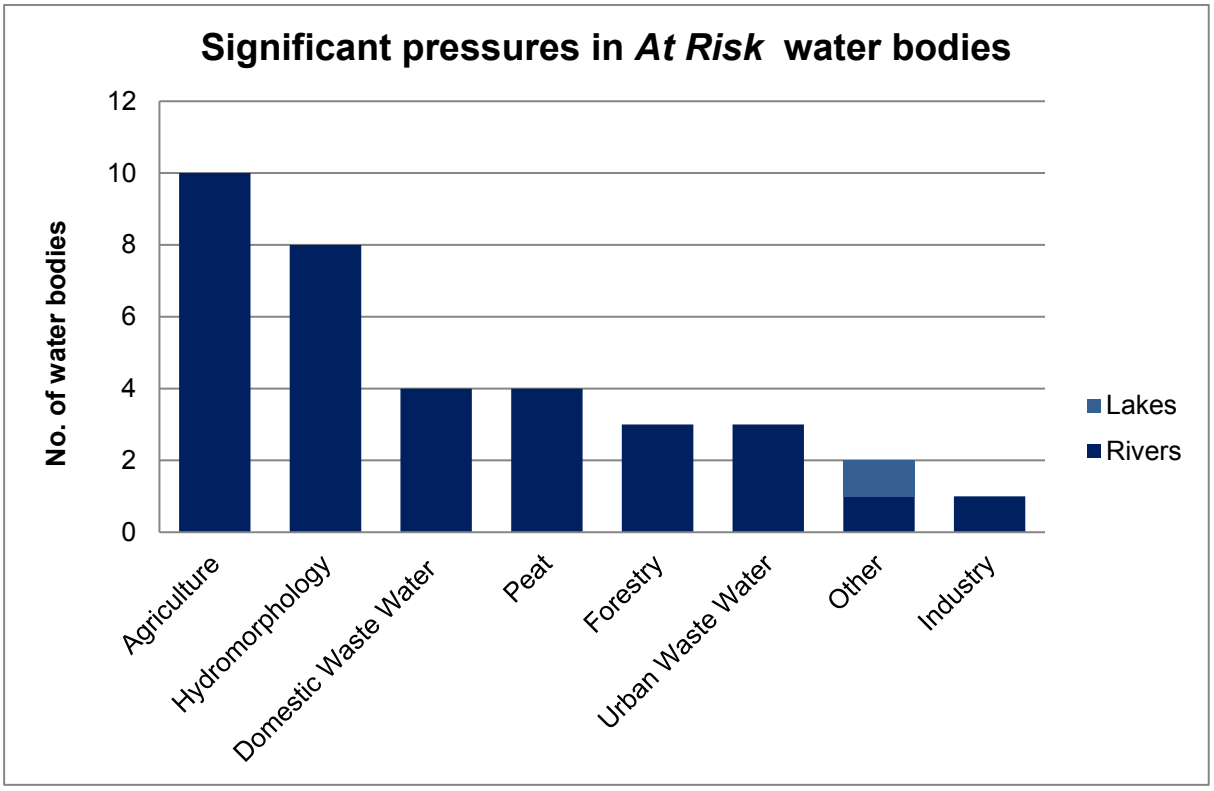


Figure 8. Significant pressures impacting on *At Risk* water bodies

4.2 Pressure type

4.2.1 Agriculture

- Agriculture is a significant pressure in 10 river water bodies; the water bodies affected by farming are shown in Figure 9. The issue related to farming in this catchment are diffuse and point source phosphorous loss to surface waters in two contrasting scenarios – 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. In addition, this catchment has outcropping and extremely vulnerable karstified limestone areas which introduces groundwater based interactions with phosphorus. 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 Hydromorphology

- Several river water bodies (eight) within the Suck and Castlegar subcatchments are subject to extensive modification by arterial drainage schemes. See Figure 10 and Appendix 3 for information on these water bodies.

Table 3a – Hydromorphological Pressures on the Shannon (Suck) Catchment

Pressure	Sub-Catchment	Waterbody Code
Modification due to Drainage Schemes (Channelisation)	Suck__080 Suck_100	Suck_140 Suck_150
	Suck_040	Derryhippoo_010
	Suck_060	Suck_120
	Suck_010	Suck_030
	Suck_050	Shiven (South)_050
	Castlegar_010	Castlegar_010
Land Drainage	Suck_020	Island_010
	Suck_010	Suck_030

4.2.3 Domestic waste water

- Domestic waste water has been identified as a significant pressure in four river water bodies (Killian_020, Shiven (South)_010, Ahascragh_030 and Ballinure_020). This is due to a concentration of inadequate septic tank systems being located on areas of poorly draining soils and subsoils or on shallow bedrock, where soil percolation is unable to mitigate the discharge. The significant issue associated with this is excess nutrients (Figure 11).

4.2.4 Extractive industry

- *Peat*

  Peat extraction and drainage has been identified as a significant pressure in four water bodies (Suck_150, Derryhippoo_010, Killeglan_010 and Suck_020). Impacts are due to sediment and/or high ammonium concentrations. In addition, high phosphate concentrations can arise from peaty soils areas where sources of phosphate are present, such as from agriculture or septic tank systems. The water bodies affected by peat extraction and drainage are shown in Figure 12.

4.2.5 Forestry

- Forestry has been identified as a significant pressure in three water bodies (Killian_020, Derryhippoo_010 and Smaghraan 26_010) (Figure 13). Forestry related impacts include sedimentation and nutrient inputs following clearfell, road building or afforestation.

4.2.6 Urban waste water treatment plants

- Urban Waste Water Treatment Plants (WWTPs) have been identified as a significant pressure in three *At Risk* water bodies; details are given in and Table 4 and Figure 14. Mountbellew WWTP, which impacts Castlegar_020, and Ahascragh WWTP, which impacts Ahascragh_030, are both scheduled to be upgraded by 2021.

Table 4. 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
Mountbellew D0219	1,001 to 2,000 p.e.	Castlegar_020	Poor	2021
Ahascragh A0548	< 500 p.e.	Ahascragh_030	Moderate	2021
Ballymoe A0105	< 500 p.e.	Island_030	*Good* [1]	*NA* [2]

4.2.7 Other significant pressures

- *Invasive species*
  Zebra Mussels are present in O'Flynn lake (IE_SH_26_693).

- *Anthropogenic unknown*
  Derymullan Stream_020 has deteriorated in status from High to Moderate, however there are no indications of nutrient or siltation issues, and therefore the specific pressure that has driven the biology status requires further investigation.

4.2.8 Industry

- An industrial discharge, resulting in elevated nutrient and organic concentrations, has been identified as a significant pressure impacting Laurencetown Stream_020.

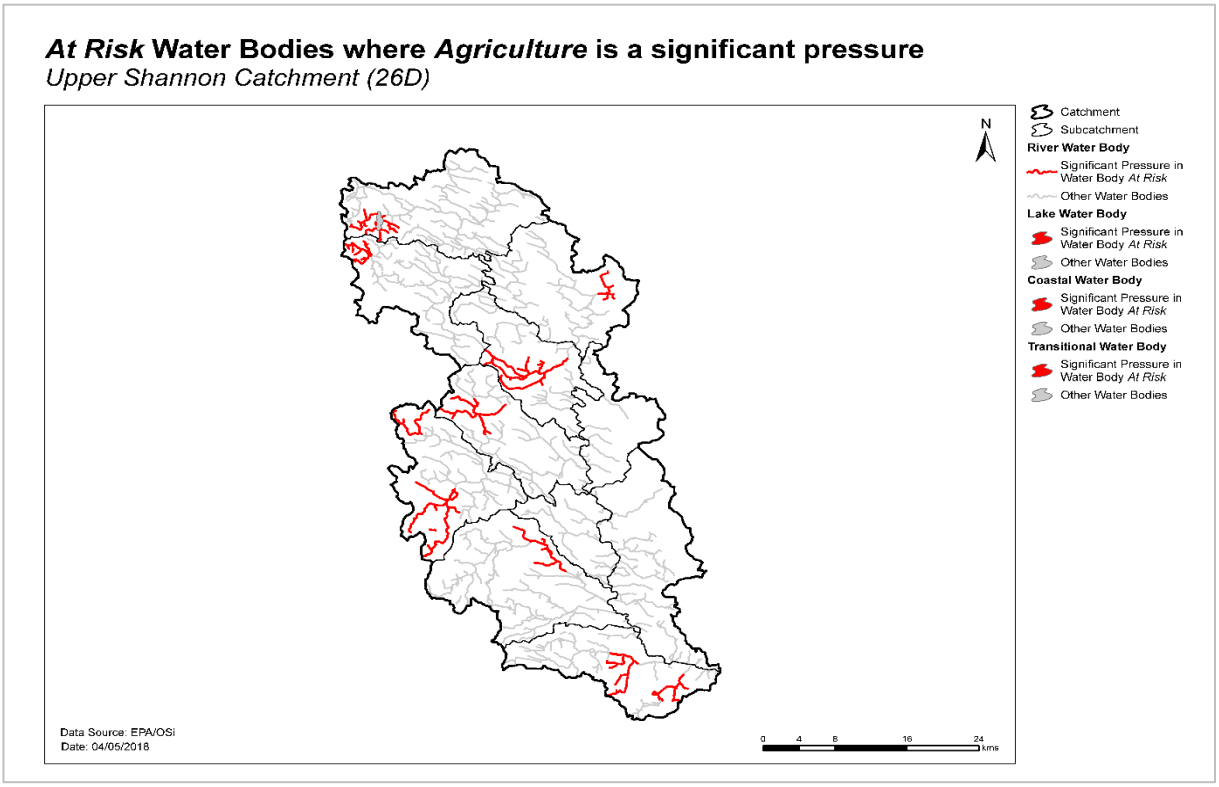


Figure 9. Water bodies that are *At Risk* and are impacted by agricultural activities

[1] *Island_030 is High Status Environmental Objective Water Body.*
[2] *Currently not specified in improvement plans.*

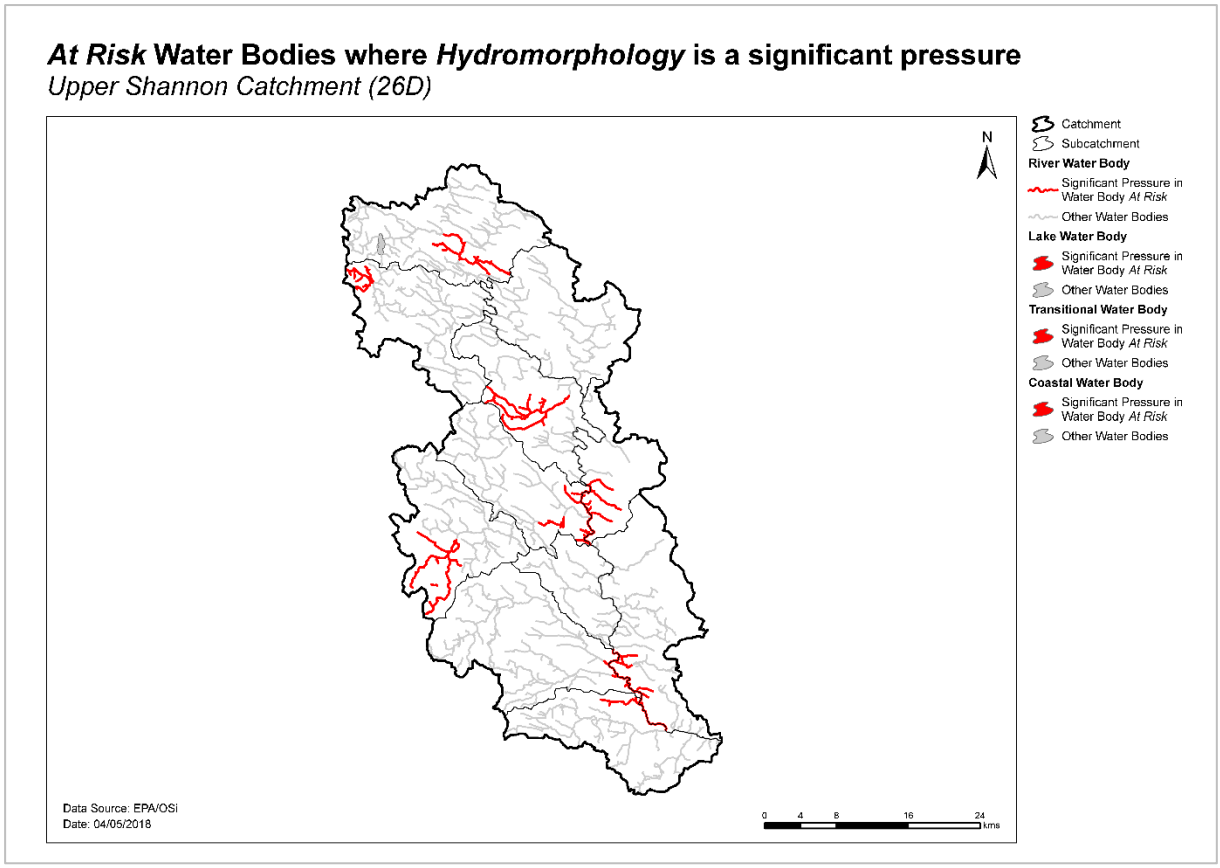


Figure 10. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

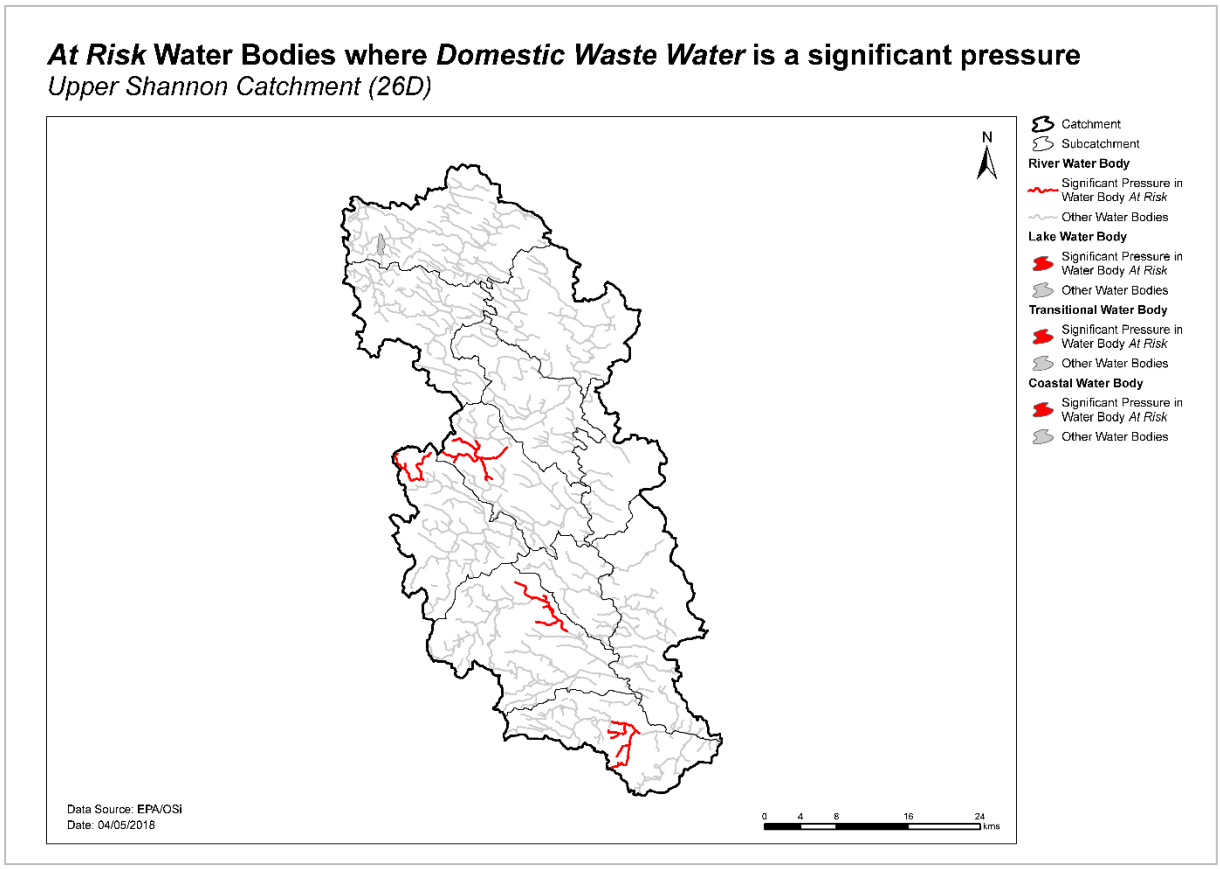


Figure 11. Water bodies that are *At Risk* and are impacted by domestic waste water

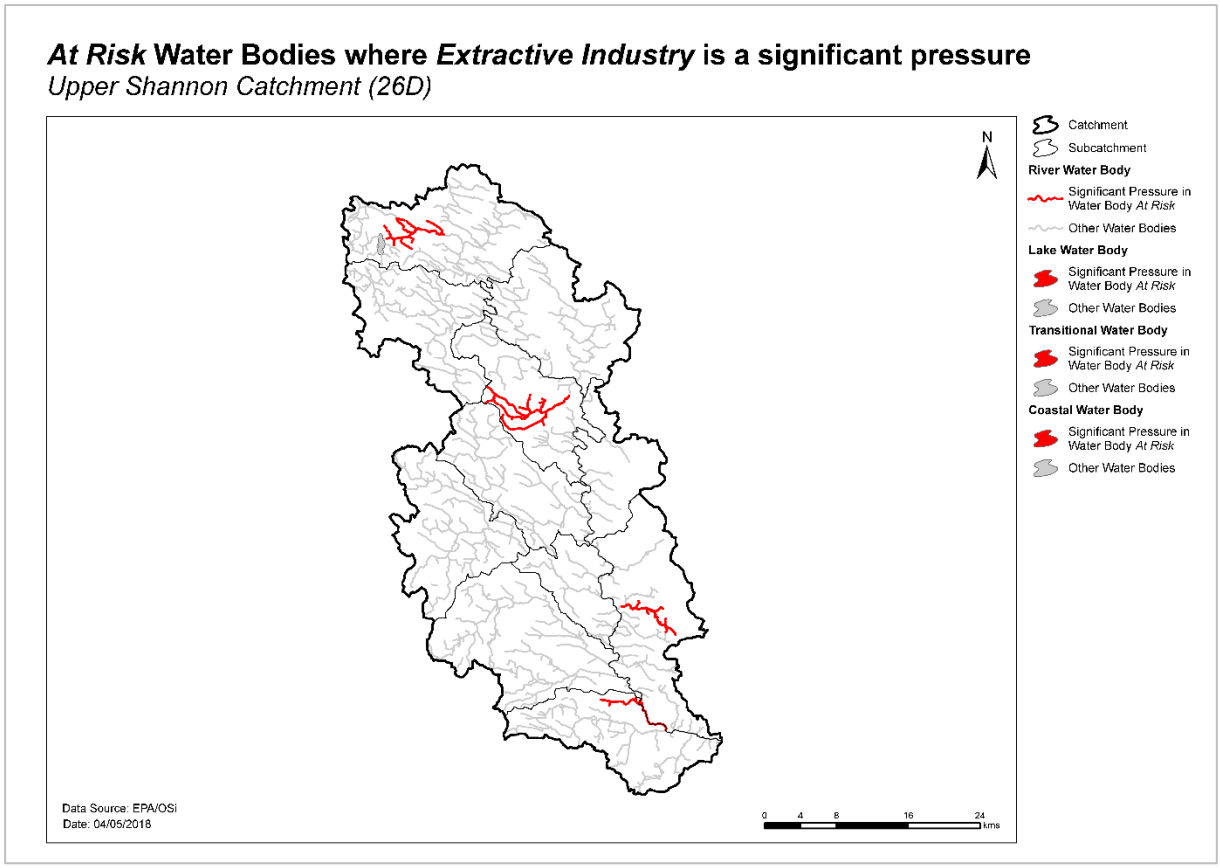


Figure 12. Water bodies that are *At Risk* and are impacted by peat

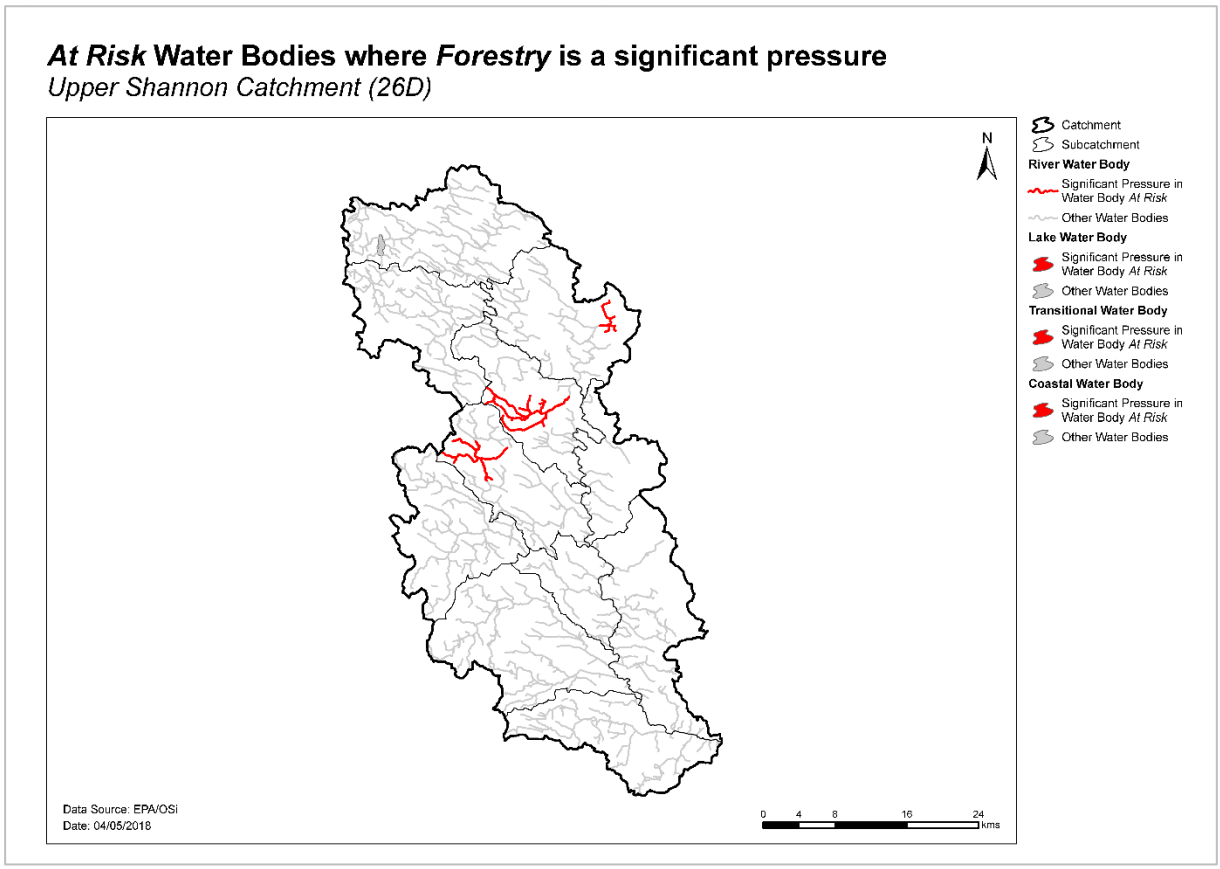


Figure 13. Water bodies that are *At Risk* and are impacted by Forestry

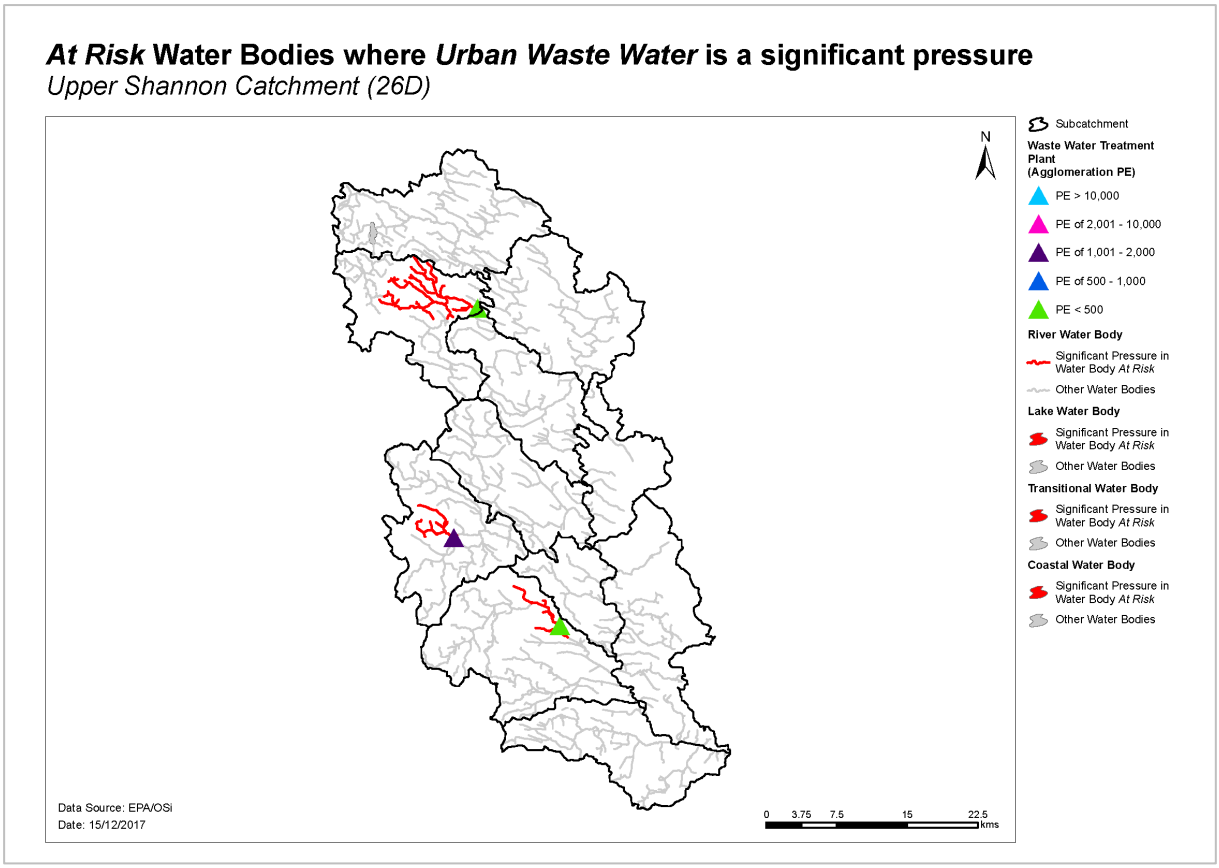


Figure 14. Water bodies that are *At Risk* and are impacted urban waste water

5 Load reduction assessment

5.1 River water body load reductions

- Phosphate is one of 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.
- In the Upper Shannon (Suck) catchment, water chemistry is available for 16 of the 58 water bodies. The available data indicate that load reductions are required in two river water bodies (Table 6).

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

Water Body	P Load Reduction Required
CASTLEGAR_020	Med
ISLAND_030	Low

6 Further characterisation and local catchment assessments

- Further characterisation through local catchment assessments is needed in 21 of the water bodies *At Risk* 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 Investigative Assessments is needed in eight of the water bodies *At Review* 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 7. Local Catchment Assessment Allocation for *At Risk* and *Review* River and Lake Water Bodies in the Catchment

Risk	IA 1	IA2	IA 3	IA4	IA5	IA6	IA 7	IA 8	1A9	1A10	Total
At Risk	17	0	1	0	0	0	12	2	0	0	32
Review	2	0	8	0	0	0	0	0	0	0	10
Note water bodies may have multiple categories of Local Catchment Assessments											

7 Catchment summary

- Of the 58 river water bodies, 20 are *At Risk* of not meeting their WFD objectives while the one lake water body within the catchment is also *At Risk* of not meeting its WFD objectives.
- Excess nutrient loss, mainly phosphorus, leading to eutrophication is one of the dominant issues in the rivers and lakes in the catchment. The significant pressures relating to excess nutrients are primarily agricultural (diffuse and point), but also peat extraction and waste water (domestic).
- Hydromorphological (or physical) conditions (including the input of high levels of fine sediment) and poor habitat quality is also a major issue for several surface water bodies.
- There are no groundwater bodies that are *At Risk*.

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 4 areas for action in the Shannon (Suck) 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 (Suck) catchment are summarised below.

- Four recommended areas for actions (Table 8, Figure 15) were selected.
- These are the Island, Castlegar, Suck and Ballinure.
- These include 15 *At Risk* and five *Review* river water bodies.
- One groundwater body, which is in *Review* due to groundwater contribution of nutrients to surface water bodies, intersects with three of the recommended areas for action, see Table 9. Actions taken to improve surface water will need to take account of the groundwater contribution to surface water.

A remaining nine *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 16. These include:

- nine river and lake water bodies – six *At Risk* and three *Review*.

Table 8. Recommended Areas for Action in the Upper Shannon (Suck) Catchment

Recommended area for action	Number of water bodies	SCs	Local authority	reason for selection
Island	3	26D_8	Galway	• Two recently deteriorated water bodies. • One At Risk High Ecological Status objective water body. • Building on recent incident response work by Inland Fisheries Ireland. • GSI source protection report is available. • Subcatchment headwaters.
Castlegar	6	26D_11, 26D_10	Galway	• Building on proposed improvements at Mountbellew WWTP. • One deteriorated water body.
Suck	7	26D_2, 26D_5	Galway	• MCPA issue at the drinking water abstraction on Suck_140. Need to rule out tribs before entering Suck to identify sources of MCPA. • Two deteriorated water bodies.
Ballinure	4	26D_3	Galway	• Recent deterioration. • Potential quick win. • Manageable area.

Table 9. Groundwater bodies intersecting with surface water bodies in recommended areas for action

Groundwater body			Intersecting surface water body		Recommended Areas for Action
Code	Name	Risk	Code	Name	
IE_SH_G_225	Suck South	Review	IE_SH_26C030100	CASTLEGAR_010	Castlegar
			IE_SH_26C030200	CASTLEGAR_020	
			IE_SH_26K010100	KILLIAN_020	
			IE_SH_26S030040	SHIVEN (SOUTH)_010	
			IE_SH_26S030400	SHIVEN (SOUTH)_050	
			IE_SH_26S071100	SUCK_120	
			IE_SH_26I030040	ISLAND_010	Island
			IE_SH_26I030400	ISLAND_030	
			IE_SH_26P040810	POLLYNOON_010	
			IE_SH_26A010400	AHASCRAGH_030	Suck
			IE_SH_26B150840	Ballyglass 26_010	
			IE_SH_26D070700	DERRYMULLAN STREAM_020	
			IE_SH_26K040200	KILLEGLAN_010	
			IE_SH_26K080460	KILLEGAN TRIB NORTH_010	
			IE_SH_26S071400	SUCK_140	

9 Environmental Objectives

9.1 Surface Water

- Assuming resources are available and actions are taken in the recommended areas for action, of the 15 *At Risk* river water bodies, it is predicted that three (20%) will improve by 2021, and twelve (80%) will achieve their objective by 2027. For the five *Review* river 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 all five water bodies, see Table 10.

Table 10. 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
At Risk	15	3	12
Review	5	0	5
Not at Risk	0	0	0
Total	20	3	17

- Thirty-one 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 three *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 11.

Table 11. 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	5	0	5
Review	3	0	3
Lakes			
At Risk	1	0	1
Review	0	0	0
Total	9	0	9

9.2 Groundwater

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

10 Acknowledgements

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

- Roscommon 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.
- DAFM Agriculture.
- DAFM Forest Service.
- Coillte.
- Teagasc.
- Geological Survey Ireland.
- National Parks and Wildlife Service.
- Marine Institute.

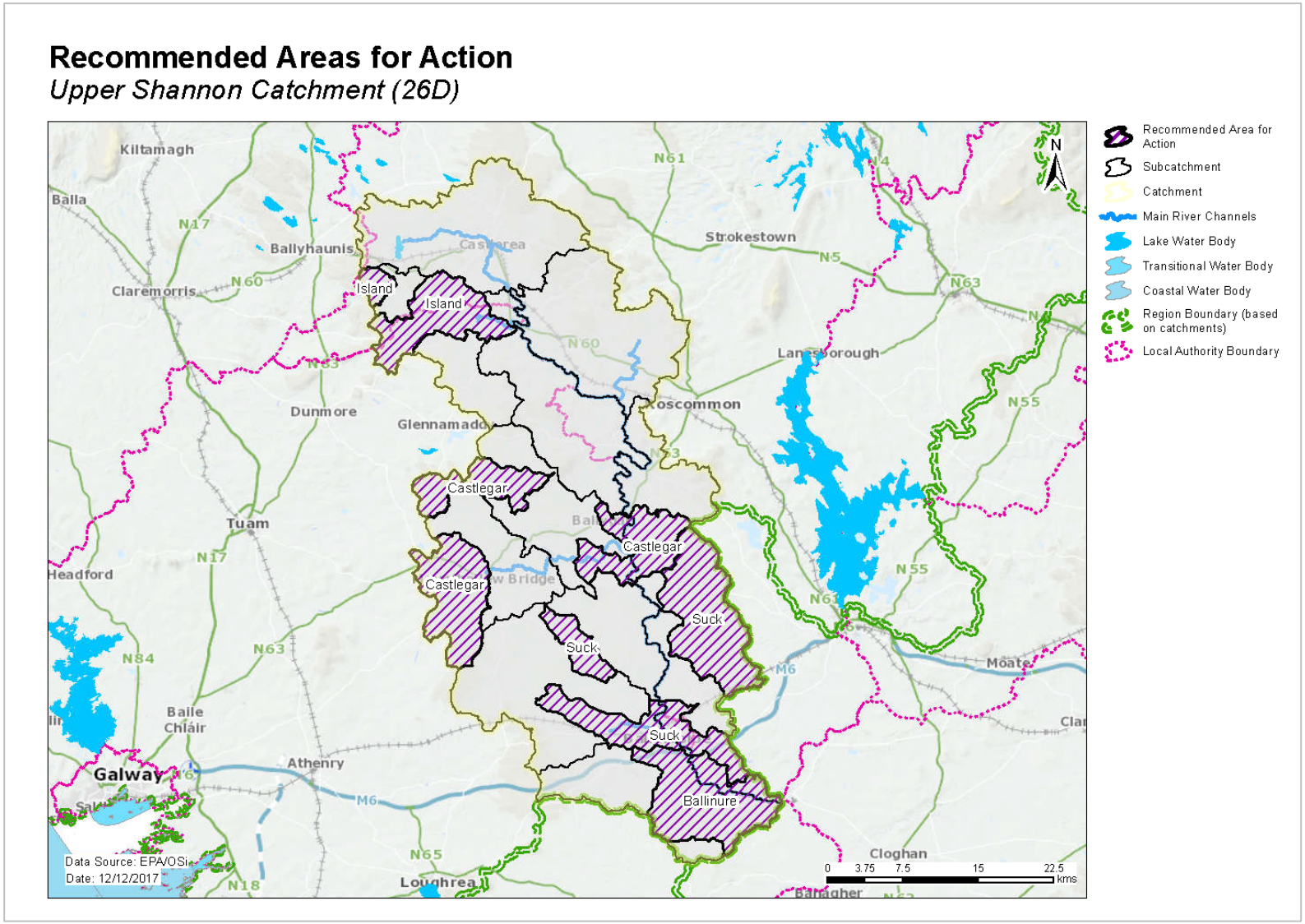


Figure 15. Location of Recommended Areas for Action in the Upper Shannon (Suck) Catchment

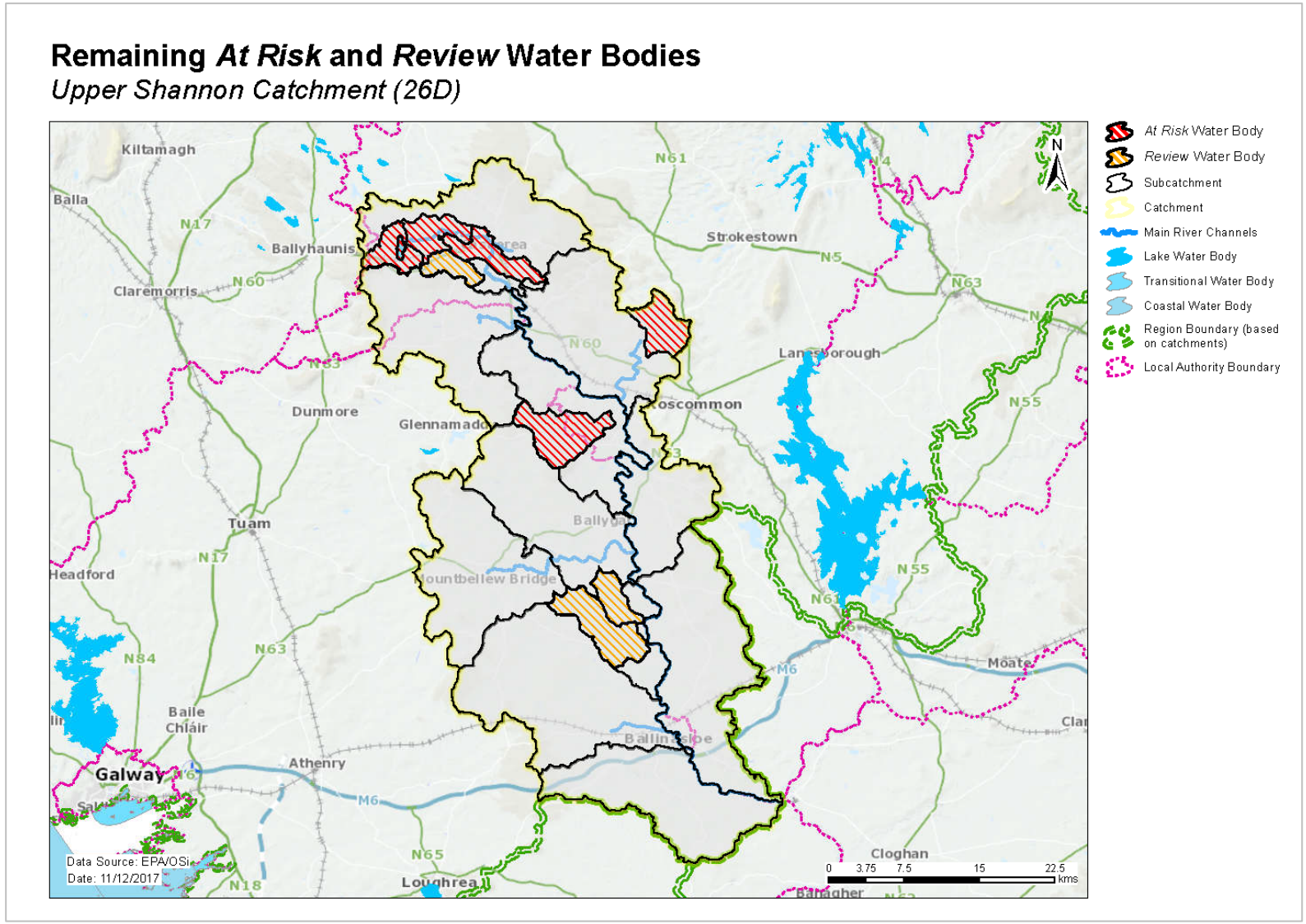


Figure 16. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Upper Shannon (Suck) Catchment

Appendix 1 High ecological status objective water bodies

Water body/ Site	Type	Codes	2015 Status
KILLIAN_030	River	IE_SH_26K010300	High
SHIVEN (SOUTH)_050	River	IE_SH_26S030400	Good
ISLAND_030	River	IE_SH_26I030400	Good
SUCK_020	River	IE_SH_26S070100	Good
SUCK_040	River	IE_SH_26S070400	High

Appendix 2 Catchment Scale Nutrient concentrations and in-stream loads

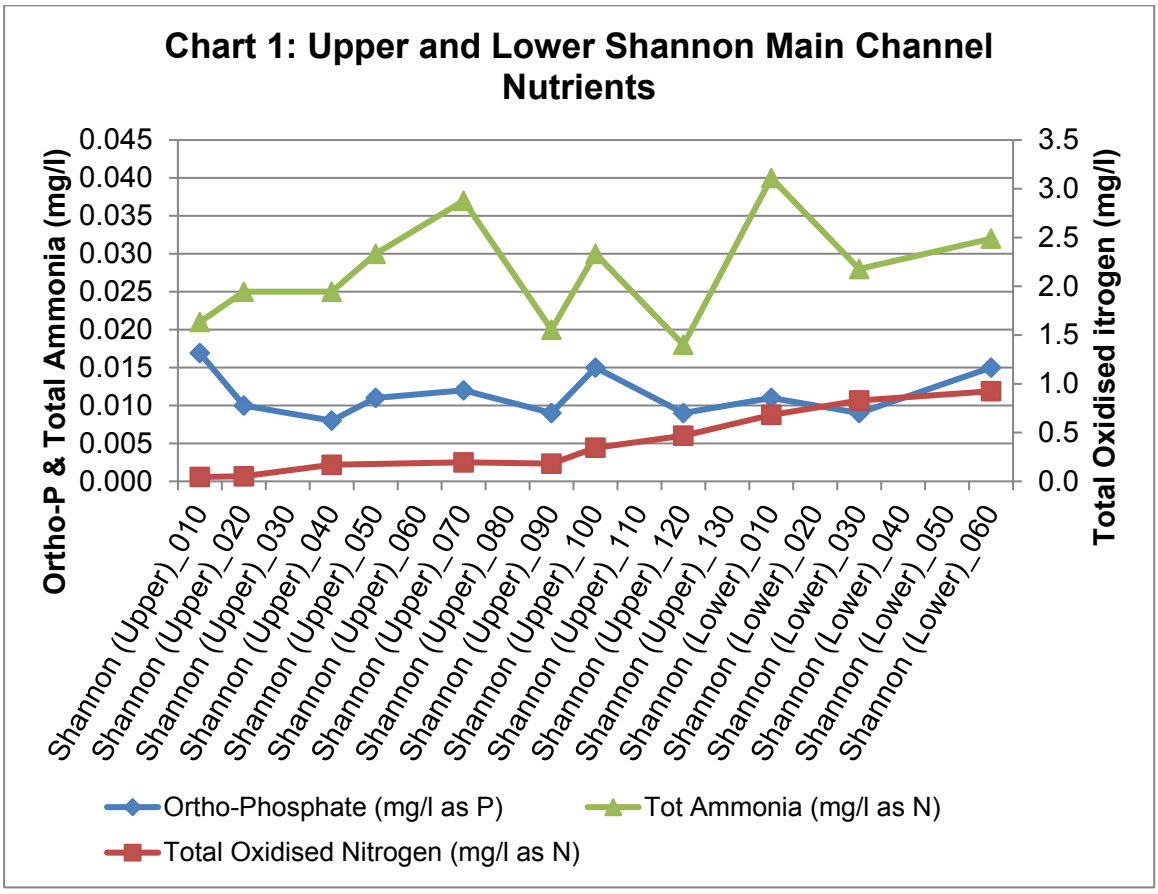
River Shannon Main Channel

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

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 drinking water threshold value throughout the channel.

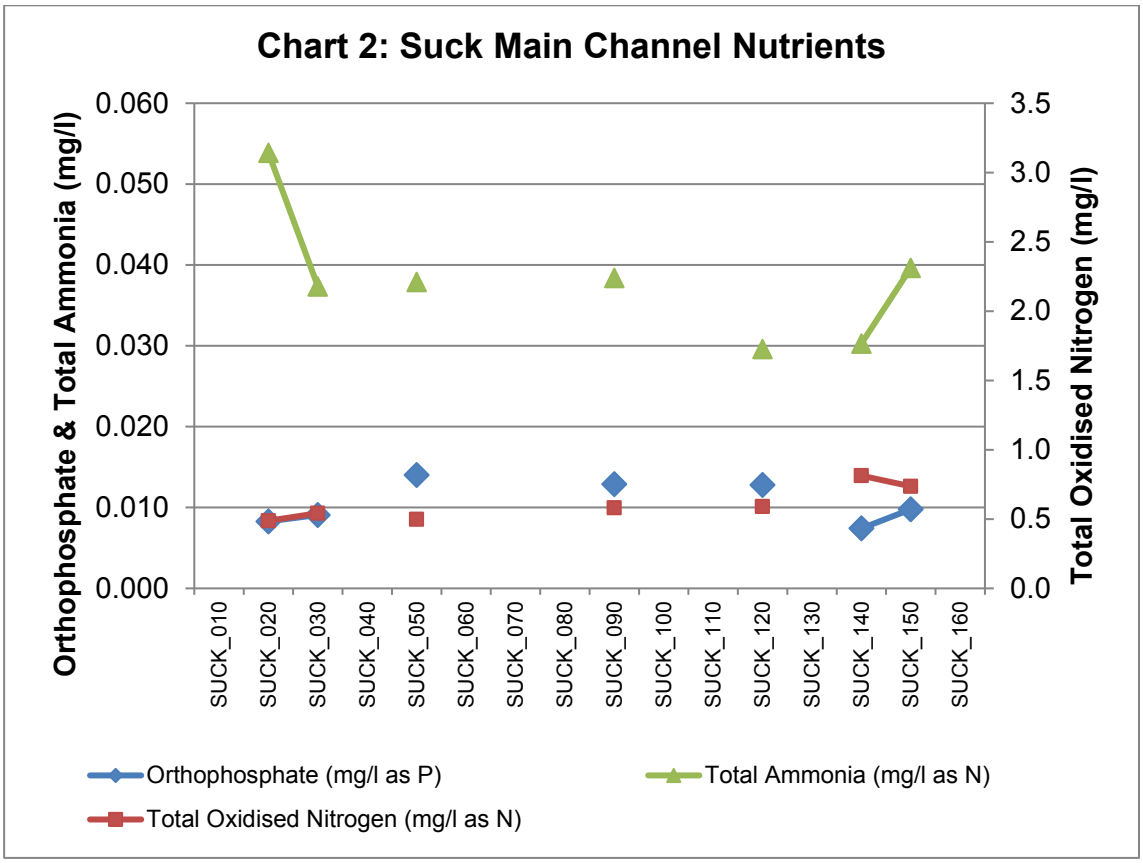


26D –Shannon Suck River Main Channel

The Suck River is the main river in the 26D Upper Shannon catchment which flows into the SHANNON (UPPER)_130. SHANNON (UPPER)_130 is also the receiving water body for SHANNON (UPPER)_120 and BALLYDANGAN_020 and flows into SHANNON (LOWER)_010

The results of the water quality assessment for the Suck main channel are illustrated in Chart 2 and Chart 3. Orthophosphate concentrations are consistently low throughout the main channel, ranging from 0.008 to 0.014mg/l. The EQS (0.035mg/l) is not exceeded at any of the main channel water bodies where data is available.

TON concentrations are very low, exhibiting no observable spatial trend, and remain below the TON threshold (2.6mg/L). A relative peak in ammonia occurs at SUCK_020 (0.054mg/l), downstream of which concentrations range from 0.030 to 0.040mg/l. The EQS (0.065mg/l) is not exceeded.



Average Q30 flows increased from 0.5m^3/s at the headwaters to 39.3m^3/s at SUCK_160. Orthophosphate, TON and ammonia loads typically increased downstream, corresponding to increasing flow.

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
26D_1	IE_SH_26K050940	Killaderry Stream_010	River	Review	Unassigned	Unassigned	N		2027	
26D_1	IE_SH_26L530780	Lughanagh_010	River	Review	Unassigned	Unassigned	N		2027	
26D_10	IE_SH_26K010100	Killian_020	River	At Risk	Unassigned	Moderate	N	Ag,DWW,For	2027	Castlegar
26D_10	IE_SH_26S030400	Shiven (South)_050	River	At Risk	High	Good	Y	Hymo	2021	Castlegar
26D_10	IE_SH_26S071100	Suck_120	River	At Risk	Moderate	Moderate	N	Hymo	2027	Castlegar
26D_11	IE_SH_26C030100	Castlegar_010	River	At Risk	Moderate	Moderate	N	Ag,Hymo	2027	Castlegar
26D_11	IE_SH_26C030200	Castlegar_020	River	At Risk	Poor	Poor	N	UWW	2027	Castlegar
26D_11	IE_SH_26S030040	Shiven (South)_010	River	At Risk	Poor	Moderate	N	Ag,DWW	2027	Castlegar
26D_2	IE_SH_26A010400	Ahascragh_030	River	At Risk	Poor	Moderate	N	Ag,DWW,UWW	2027	Suck
26D_2	IE_SH_26D070700	Derrymullan Stream_020	River	At Risk	Good	Moderate	N	Other	2027	Suck
26D_2	IE_SH_26S071400	Suck_140	River	At Risk	Moderate	Moderate	N	Hymo	2027	Suck
26D_3	IE_SH_26B010400	Ballinure_020	River	At Risk	Good	Moderate	N	Ag,DWW	2021	Ballinure
26D_3	IE_SH_26L070500	Laurencetown Stream_020	River	At Risk	Bad	Bad	N	Ag,Ind	2027	Ballinure
26D_3	IE_SH_26S071500	Suck_150	River	At Risk	Poor	Moderate	N	Hymo,Peat	2027	Ballinure
26D_3	IE_SH_26S071550	Suck_160	River	Review	Unassigned	Unassigned	N		2027	Ballinure
26D_4	IE_SH_26D010200	Derryhippoo_010	River	At Risk	Poor	Poor	N	Ag,For,Hymo,Peat	2027	
26D_5	IE_SH_26B150840	Ballyglass 26_010	River	Review	Unassigned	Unassigned	N		2027	Suck
26D_5	IE_SH_26C090740	Culliaghbeg_010	River	Review	Unassigned	Unassigned	N		2027	Suck
26D_5	IE_SH_26K040200	Killeglan_010	River	At Risk	Good	Poor	N	Peat	2027	Suck
26D_5	IE_SH_26K080460	Killegan Trib North_010	River	Review	Unassigned	Unassigned	N		2027	Suck
26D_7	IE_SH_26S040100	Smaghraan 26_010	River	At Risk	Poor	Poor	N	Ag,For	2027	
26D_8	IE_SH_26I030040	Island_010	River	At Risk	Good	Moderate	N	Ag,Hymo	2021	Island
26D_8	IE_SH_26I030400	Island_030	River	At Risk	High	Good	Y	UWW	2027	Island
26D_8	IE_SH_26P040810	Pollynoon_010	River	Review	Unassigned	Unassigned	N		2027	Island
26D_9	IE_SH_26_693	Oflynn	Lake	At Risk	Good	Poor	N	Other	2027	
26D_9	IE_SH_26C520790	Cloonroughan_010	River	Review	Unassigned	Unassigned	N		2027	

Subcatchment code	Water body code	Water body name	Water body type	Risk	Ecological Status 07-09	Ecological Status 10-15	High Ecological Status Objective Water Body Y/N	Significant Pressures	Date to Meet Environmental Objective	Recommended Area for Action Name
26D_9	IE_SH_26S070050	Suck_010	River	At Risk	Poor	Moderate	N	Ag	2027	
26D_9	IE_SH_26S070100	Suck_020	River	At Risk	Unassigned	Good	Y	Peat	2027	
26D_9	IE_SH_26S070300	Suck_030	River	At Risk	Moderate	Moderate	N	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 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	Objective met? Yes /No	Reason why not met
1200PRI1068	CBC GWS	Suck South	IE_SH_G_225	Yes	N/A
1200PRI0365	Keelogues/Kilcolum GWS	Suck South	IE_SH_G_225	Yes	N/A
1200PRI0371	Killasmuggaun GWS	Suck South	IE_SH_G_225	Yes	N/A
1200PRI0390	Knockauns GWS	Suck South	IE_SH_G_225	Yes	N/A
1200PRI0441	Menlough/Skehana GWS Spring	Suck South	IE_SH_G_225	Yes	N/A
	Menlough/Skehana GWS Borehole	Suck South	IE_SH_G_225	Yes	N/A
1200PRI1049	Cappataggle and District GWS Co-op	Aughrim	IE_SH_G_019	Yes	N/A
1200PRI1065	Ballinabanaba GWS	Suck South	IE_SH_G_225	Yes	N/A
1200PRI0236	Cloonkeen/Toomard GWS	Ballygar	IE_SH_G_028	Yes	N/A
1200PRI0248	Cluide,Cahermorris GWS	Aughrim	IE_SH_G_019	Yes	N/A
1200PRI0492	Newcastle GWS	Ballinure_010	IE_SH_26B010300	Yes	N/A
2600PUB1026	Castlerea Regional Longford Springs	Suck South	IE_SH_G_225	Yes	N/A
	Castlerea Regional Borehole	Suck South To be brought into use	IE_SH_G_225	Yes	N/A
1200PUB1049	Williamstown Springfield spring	Suck South	IE_SH_G_225	Yes	N/A
1200PUB1001	Ahascragh Well	Suck South	IE_SH_G_225	Yes	N/A
	Ahascragh Well	Suck South	IE_SH_G_225	Yes	N/A
1200PUB1006	Ballygar Back up well	Ballygar	IE_SH_G_028	Yes	N/A
	Ballygar Cloonlyon River	Shiven (South)_060	IE_SH_26S030820	Yes	N/A
1200PUB1007	Ballymoe Spring	Suck South	IE_SH_G_225	Yes	N/A
	Ballymoe Back up spring	Suck South	IE_SH_G_225	Yes	N/A
1200PUB1030	Kilconnell Surface spring	Aughrim	IE_SH_G_019	Yes	N/A
	Kilconnell Borehole	Aughrim	IE_SH_G_019	Yes	N/A
1200PUB1031	KilkerrinMoylough	Suck South	IE_SH_G_225	Yes	N/A
1200PUB1039	Mountbellew	Suck South	IE_SH_G_225	Yes	N/A
2600PUB1004	SRRWSS – Killeglan Killeglan Springs	Suck South	IE_SH_G_225	Yes	N/A
	SRRWSS – Killeglan Borehole	Suck South	IE_SH_G_225	Yes	N/A
	SRRWSS – Killeglan BH	Suck South	IE_SH_G_225	Yes	N/A

Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes /No	Reason why not met
2600PUB1014	Ballinlough/Loughglynn Borehole	Suck South	IE_SH_G_225	Yes	N/A
	Ballinlough/Loughglynn Ballybane Springs	Suck South	IE_SH_G_225	Yes	N/A
2600PUB1016	Castlerea Urban	Castlerea	IE_SH_G_053	Yes	N/A
2600PUB1001	Mount Talbot/Four Roads Mount Talbot Springs	Suck South	IE_SH_G_225	Yes	N/A
	Mount Talbot/Four Roads Mount Talbot Springs	Suck South	IE_SH_G_225	Yes	N/A
	Mount Talbot/Four Roads Mount Talbot Springs	Suck South	IE_SH_G_225	Yes	N/A
1200PUB1004	Ballinasloe	Suck_140	IE_SH_26S071400	No	MCPA
2600PRI3010	Carane/Ballintubber	Suck South	IE_SH_G_225[3]	Yes	N/A
2600PRI3038	Donamon	Suck South	IE_SH_G_225	Yes	N/A
1200PRI0428	Lowville no1	Suck South	IE_SH_G_225	Yes	N/A
2600PRI3007	Ballymacurley/Kiltultoge	Suck South	IE_SH_G_225	Yes	N/A
2600PRI3023	Clooneygrasson	Suck South	IE_SH_G_225	Yes	N/A
2600PRI3053	Rathcarren	Suck South	IE_SH_G_225	Yes	N/A
1200PRI0228	Cloonatleva	Suck South	IE_SH_G_225	Yes	N/A
1200PRI0335	Glinsk/Creggs Lough Loung	Small lake water body within Suck_060 sub-basin	IE_SH_26S070600	Yes	N/A

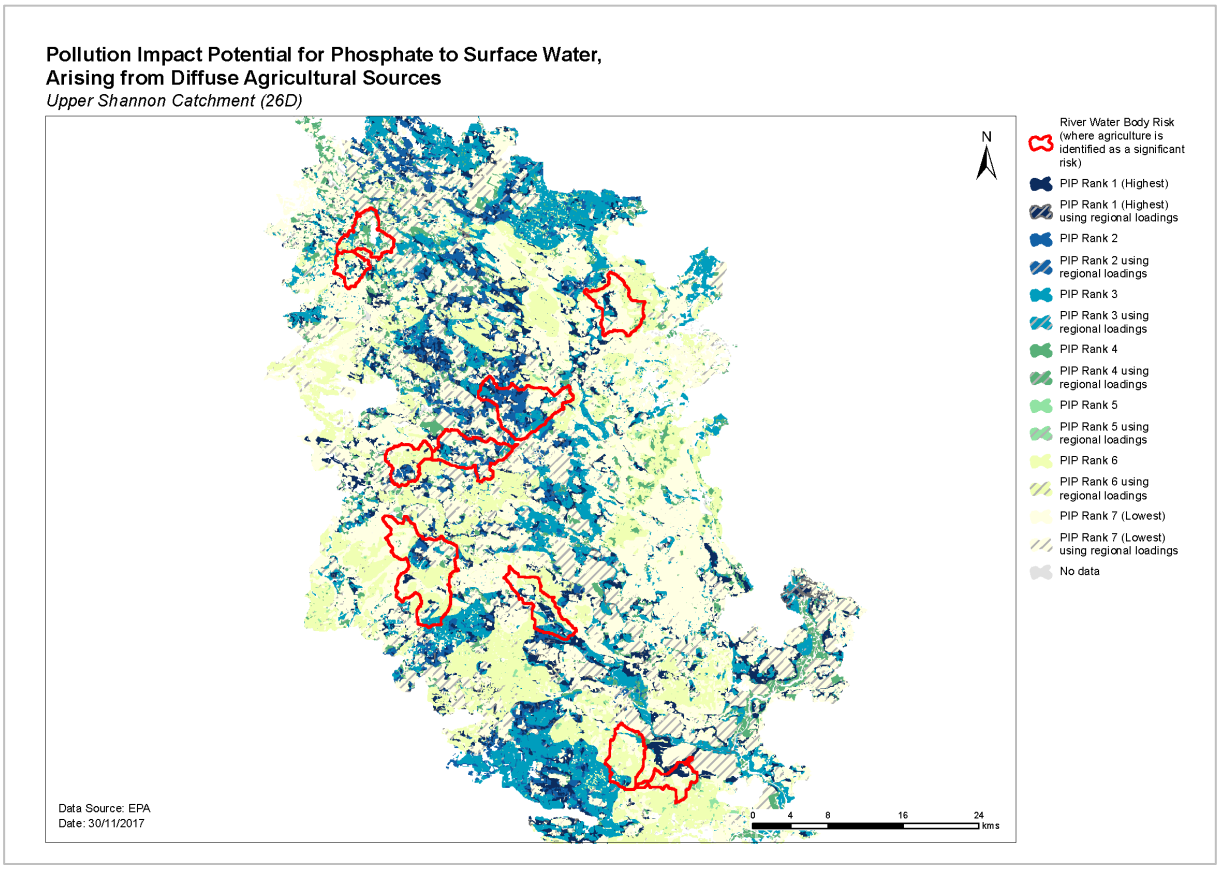
[3] From this scheme, onwards, there is no Abstraction type or reference to a group scheme but does have DW Scheme Private Supply Code

Appendix 5 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?
Ballinturly Turlough SAC 000588	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_SH_G_225	No
Bellanagare Bog SAC 000592	none							
Camderry Bog SAC 002347	none							
Carrowbehy/Caher Bog SAC 000597	none							
Carrownagappul Bog SAC 001242	none							
Castlesampson Esker SAC 001625	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_SH_G_225	No
Cloonchambers Bog SAC 000600	none							
Coolcam Turlough SAC 000218	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_SH_G_225	No
Corliskea/Trien/Cloonfelliv Bog SAC 002110	none							
Croaghill Turlough SAC 000255	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_SH_G_225	No
Curraghlehanagh Bog SAC 002350	none							
Drumalough Bog SAC 002338	none							
Four Roads Turlough SAC 001637	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_SH_G_225	No
Glenloughaun Esker SAC 002213	none							
Killeglan Grassland SAC 002214	none							
Kilsallagh Bog SAC 000285	none							
Lisduff Turlough SAC 000609	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_SH_G_225	No
Lisnageeragh Bog and Ballinastack Turlough SAC 000296	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_SH_G_225	Yes
Lough Croan Turlough SAC 000610	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_SH_G_225	No
Lough Lurgeen Bog/Glenamaddy Turlough SAC 000301	3180	Good GW level/quality	Groundwater	GWDTE-Glenamaddy Turlough (SAC000301)	Good (R)	No	IE_WE_G_0094	Yes
River Shannon Callows SAC 000216	none							
Shankill West Bog SAC 000326	none							
Williamstown Turloughs SAC 002296	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_SH_G_225	No

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