Upper Shannon (Inny)
Catchment Assessment 2010-2015
(HA 26F)

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 (Inny) 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.
3. The Final River Basin Management Plan, which can be accessed on: www.catchments.ie.
4. A published paper on Source Load Apportionment Modelling, which can be accessed at: http://www.jstor.org/stable/10.3318/bioe.2016.22
5. 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
6. 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 1,229 km² and is characterised by a flat southwestern region, interspersed with bogs, an eastern region containing swarms of isolated relatively steep-sided hills and a northern section composed of more undulating topography entering the southern part of the drumlin belt. The north-eastern part of the catchment contains Loughs Sheelin and Derravaragh two of the large midland lakes not located on the main Shannon channel. There is a large and productive sand and gravel aquifer located southeast of Lough Sheelin in the catchment. An arterial drainage scheme was completed on the River Inny by the OPW between 1959 and 1963.

The Mountnugent River drains the drumlin landscape around Ballyjamesduff and flows south until it is joined by the Old Tully River from the southeast. The river then flows through Mount Nugent and into the north-eastern end of Lough Sheelin.

The Inny flows out of Sheelin near Finnea and through Lough Kinale. Downstream of Kinale, the Inny is joined by the Glore River. The Glore River receives large volumes of spring flow derived from Lough Lene and White Lough in the Boyne catchment and is a good example of an karst inter-catchment water transfer. The Inny then makes its way south to Lough Derravaragh. Much of the area around Derravaragh is drained by its tributaries – the Gaine and Yellow Rivers. Downstream of Derravaragh, the Inny flows southwest and is joined by the Riffey and Black Rivers which drain the region from Edgeworthstown to the Inny.

The Inny passes through Lough Iron, which has been much reduced in size because of drainage schemes completed over the past 170 years. Lough Iron also receives inter-catchment inflow from Lough Owel in the Brosna catchment under high water conditions. Continuing southwest, the Inny is joined by the Mill and Irishtown Rivers which drain the area around Ballynacarrigy. As the Inny then makes its way towards Ballymahon, it is joined by numerous small streams by the Rath River. Downstream of Ballymahon, the Inny is joined by the Tang River and then flows into Lough Ree via a channel known locally as the Owenacharra River.

The Upper Shannon (Inny) catchment comprises ten subcatchments with 41 river water bodies, six lakes, and eight groundwater bodies (Table 1, Figure1). There are no transitional and coastal water bodies.

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

Subcatchment ID	Subcatchment Name
26F_1	Inny[Shannon]_SC_070
26F_2	Inny[Shannon]_SC_060
26F_3	Mountnugent_SC_010
26F_4	Inny[Shannon]_SC_040
26F_5	Inny[Shannon]_SC_090
26F_6	Inny[Shannon]_SC_010
26F_7	Inny[Shannon]_SC_020
26F_8	Inny[Shannon]_SC_050
26F_9	Inny[Shannon]_SC_030
26F_10	Inny[Shannon]_SC_080

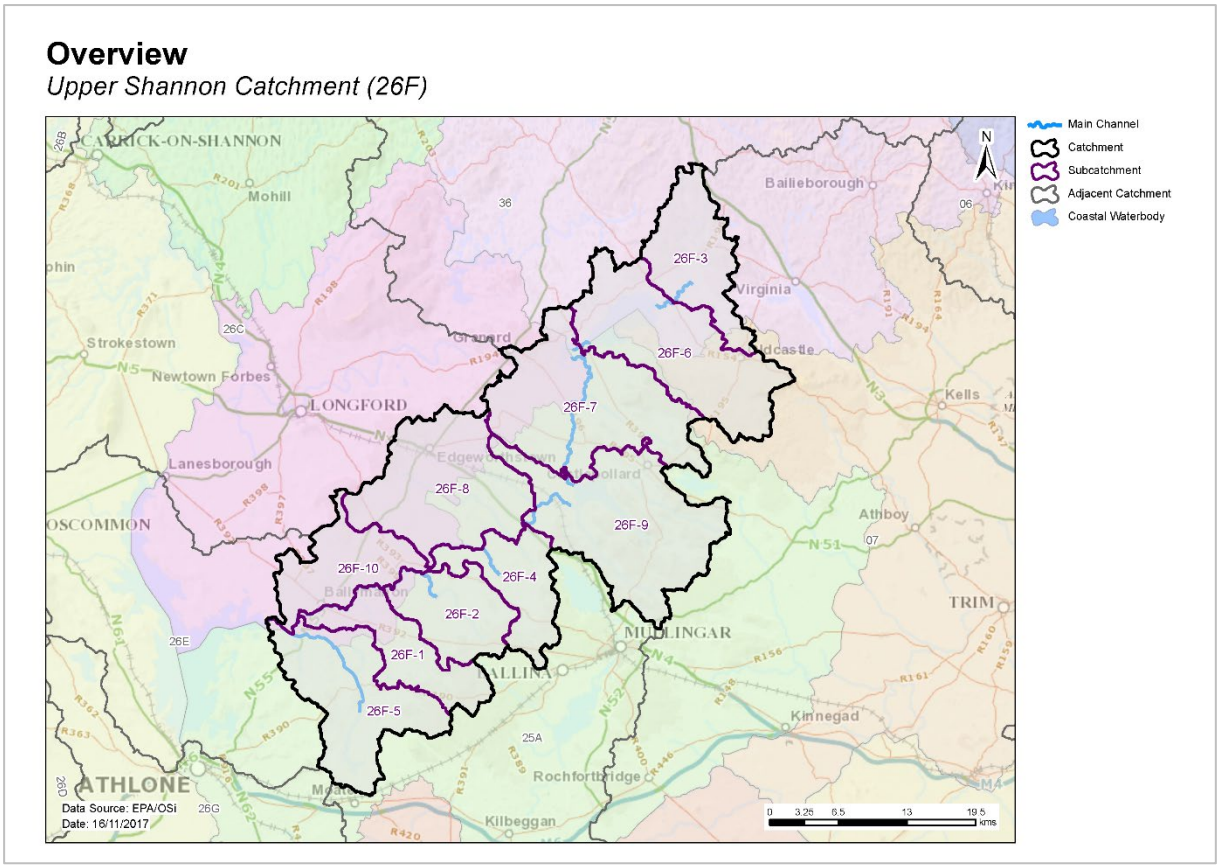

Figure 1. Subcatchments in the Upper Shannon (Inny) catchment

2 Water body status and risk of not meeting environmental objectives

2.1 Surface water ecological status

2.1.1 Rivers and Lakes

- There were nine (19%) river and lake water bodies at Good or High status, and 25 (53%) at less than Good status in 2015 (Table 2, Figure 2). Thirteen (28%) river and lakes water bodies are unassigned.
- There are no water bodies and sites that have a high ecological status objective.
- The numbers of water bodies at each status class in 2007-09 and 2010-15 are shown in Figures 3 (rivers) and 4 (lakes).
- Four water bodies have improved and eight have deteriorated since 2007-09 (Figure 5).
- The variation in nutrient concentrations and loads in the Inny 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	41	0	8	12	10	0	11	9	11	21
Lakes	6	0	1	2	1	0	2	1	2	03

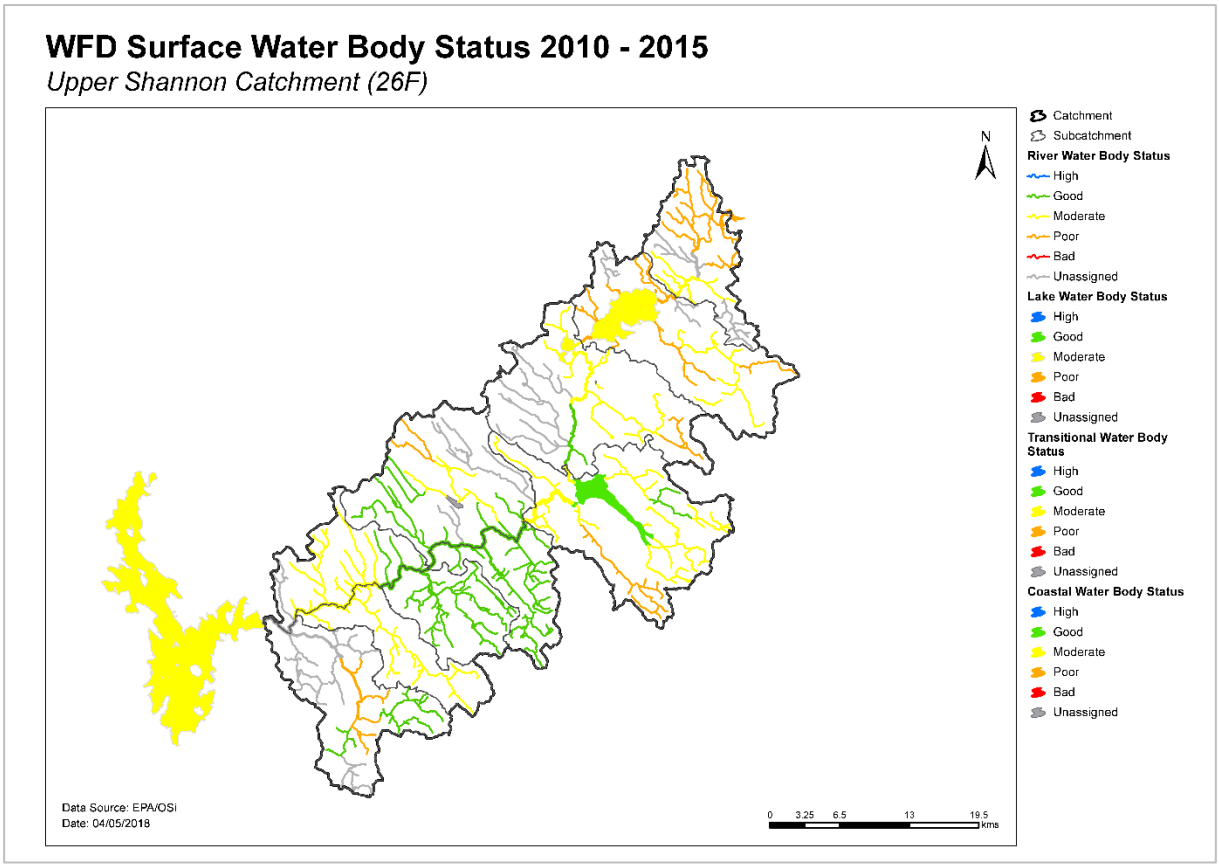

Figure 2. Surface water ecological status

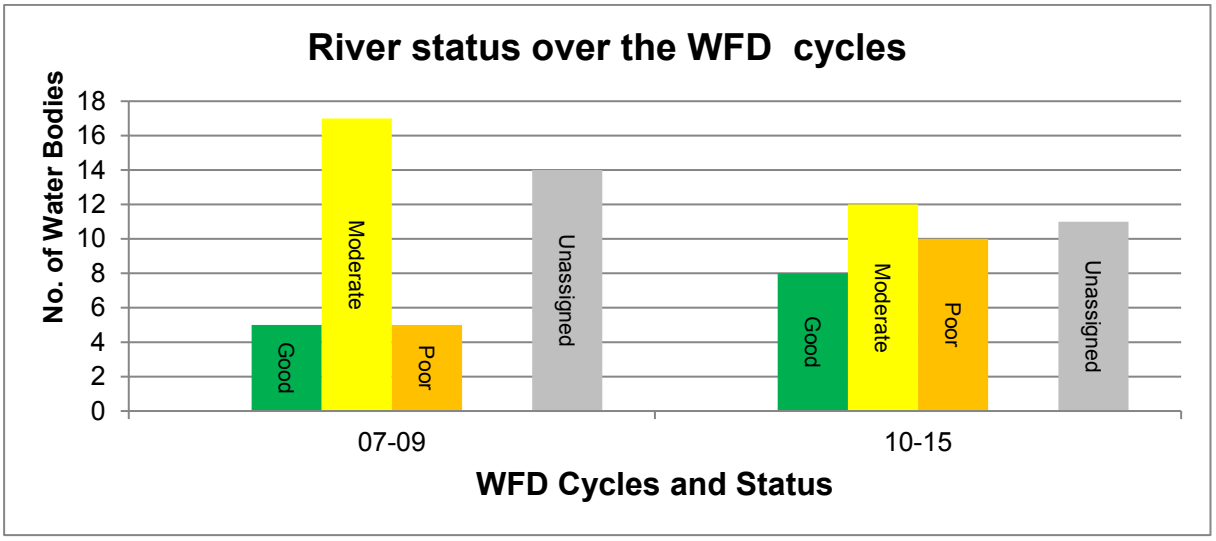

Figure 3. Number of rivers at each status class in 2007-09 and 2010-15

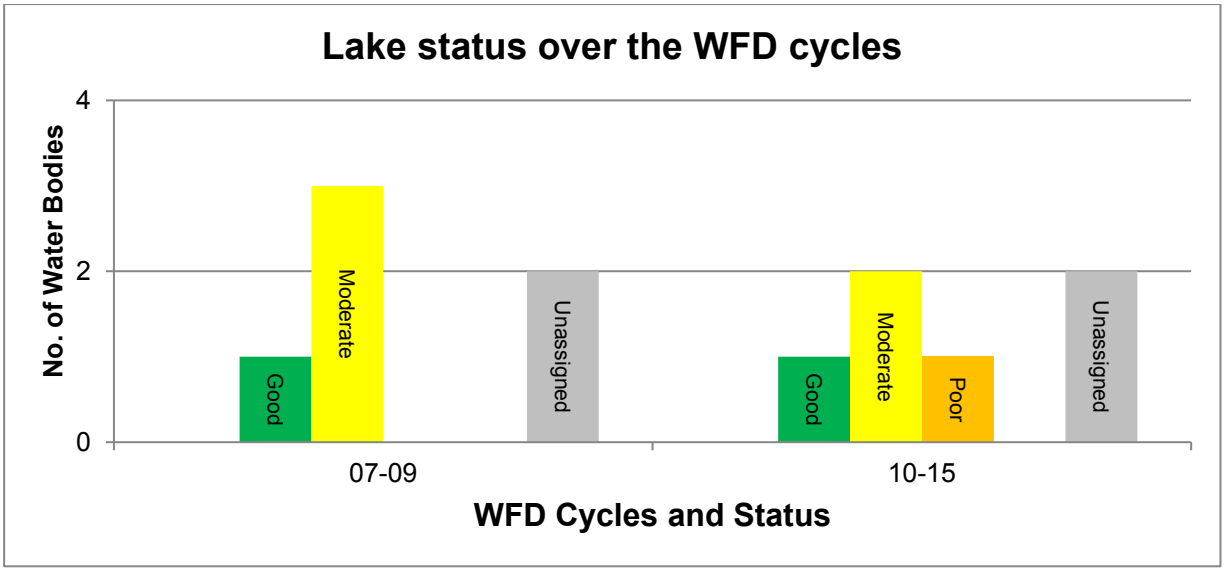

Figure 4. Number of lakes at each status class in 2007-09 and 2010-15

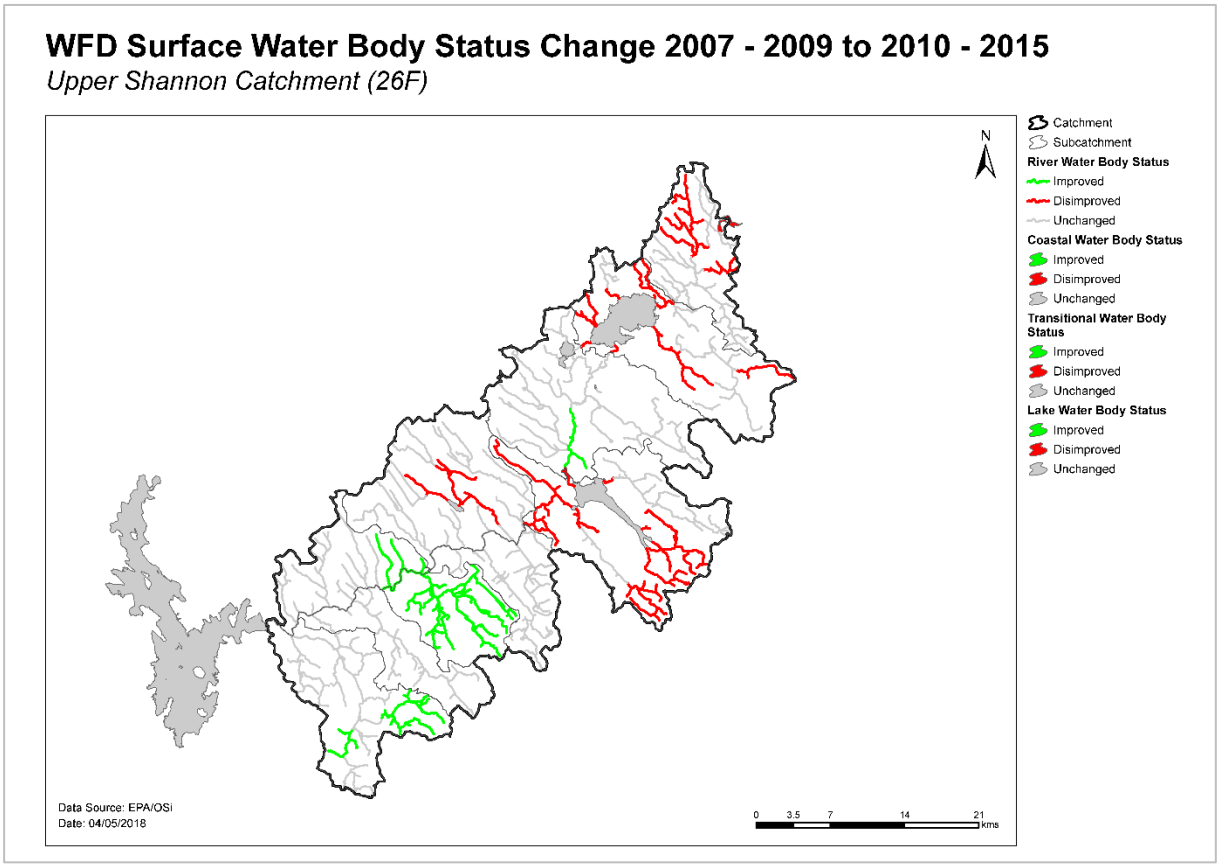

Figure 5. Surface water body status changes from 2007-09 to 2010-15.

2.2 Groundwater status

Seven groundwater bodies were at Good status in 2015 and one was at Poor status (Industrial Facility (P0690-01) IE_SH_G_261) (Table 3, Figures 6-7).

Table 3. Summary of groundwater body status and risk

	Number of water bodies	2010-15 Status		Risk Categories		
		Good	Poor	*Not at Risk*	*Review*	*At Risk*
Groundwater	8	7	1	1	5	2

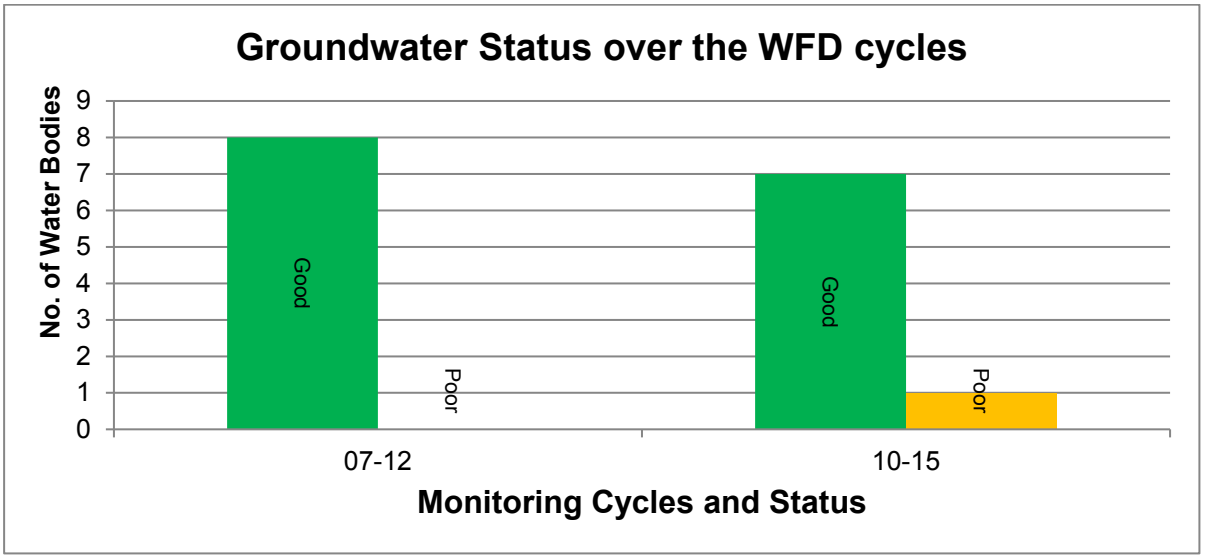

Figure 6. Number of groundwater bodies at each status class in 2007-12 and 2010-15

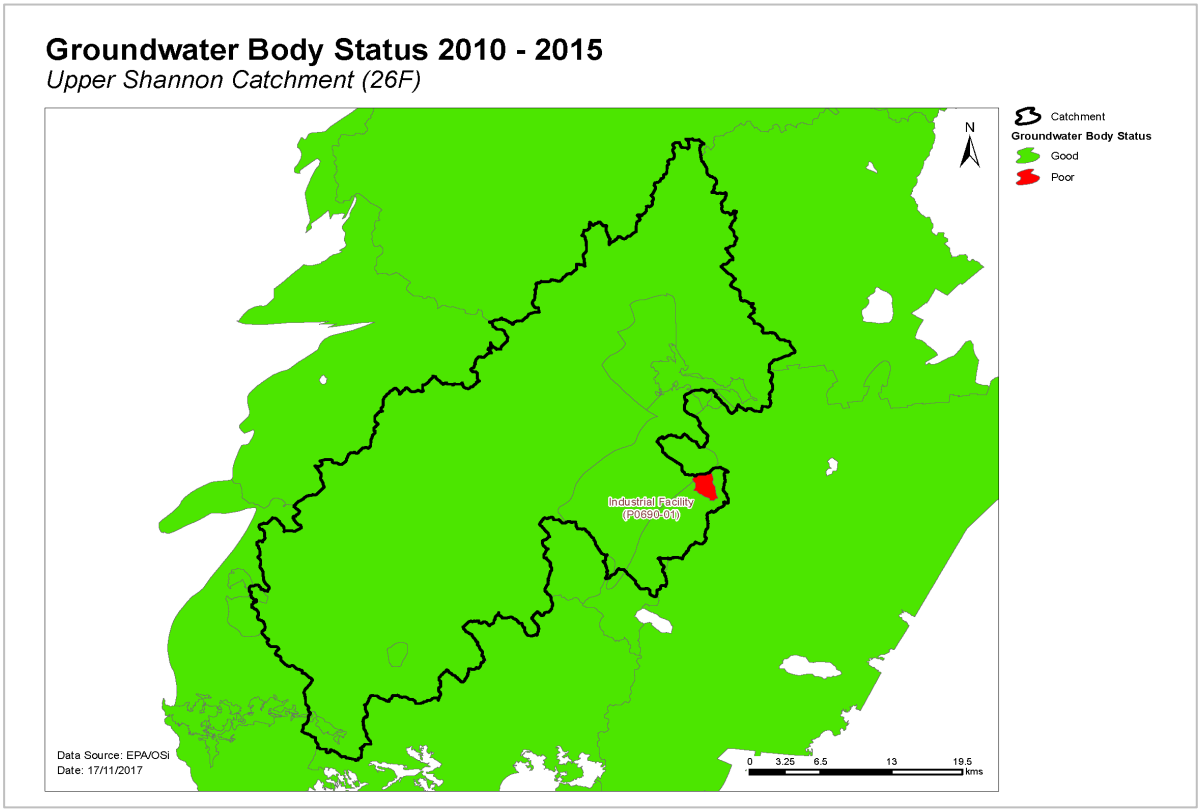

Figure 7. Groundwater body status 2010-15

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and lakes

- There are nine *Not at Risk* river water bodies and two lake water bodies (Figure 8, Table 2) which require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- There are 11 river water bodies and two lake water bodies in *Review*. This includes 12 water bodies where more information is required and one water body where measures have recently been implemented and improvements have not yet been realised.
- Twenty-one river water bodies and 3 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 2.

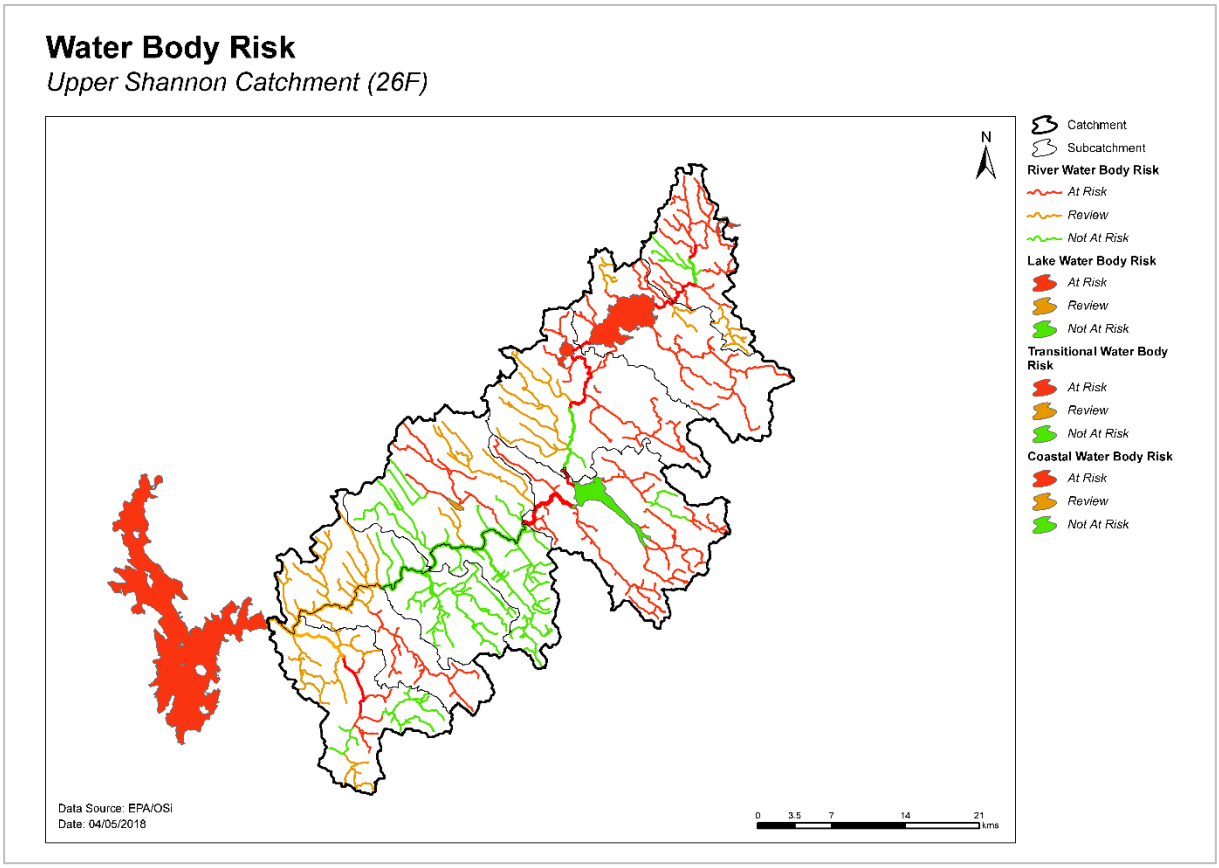

Figure 8. Surface water body risk

2.4 Risk of not meeting groundwater environmental objectives

- One groundwater body is *Not at Risk* (Figure 9, Table 3) and requires no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Five groundwater bodies are in *Review* (Figure 9) (Ballymanus, Inny, Tynagh, Athlone Gravels and GWDTE-Lough Ree Fen 10 (SAC000440)). Ballymanus, Inny and Tynagh Gravels are in *Review* due to phosphate concentrations. Athlone gravels is in *Review* due to elevated nitrate concentrations while GWDTE-Lough Ree Fen 10 (SAC000440) has drainage issues.
- Two groundwater bodies are *At Risk*, and measures will be needed in these water bodies to improve the water quality outcomes. Derravarragh groundwater body is *At Risk* because it is hydrologically

linked to *At Risk* surface water bodies that are not meeting their water quality objectives where it is considered likely that groundwater is a contributing source of nutrients (Table 4). Industrial Facility (P0690-01) IE_SH_G_261 is *At Risk* because of PCE issues.

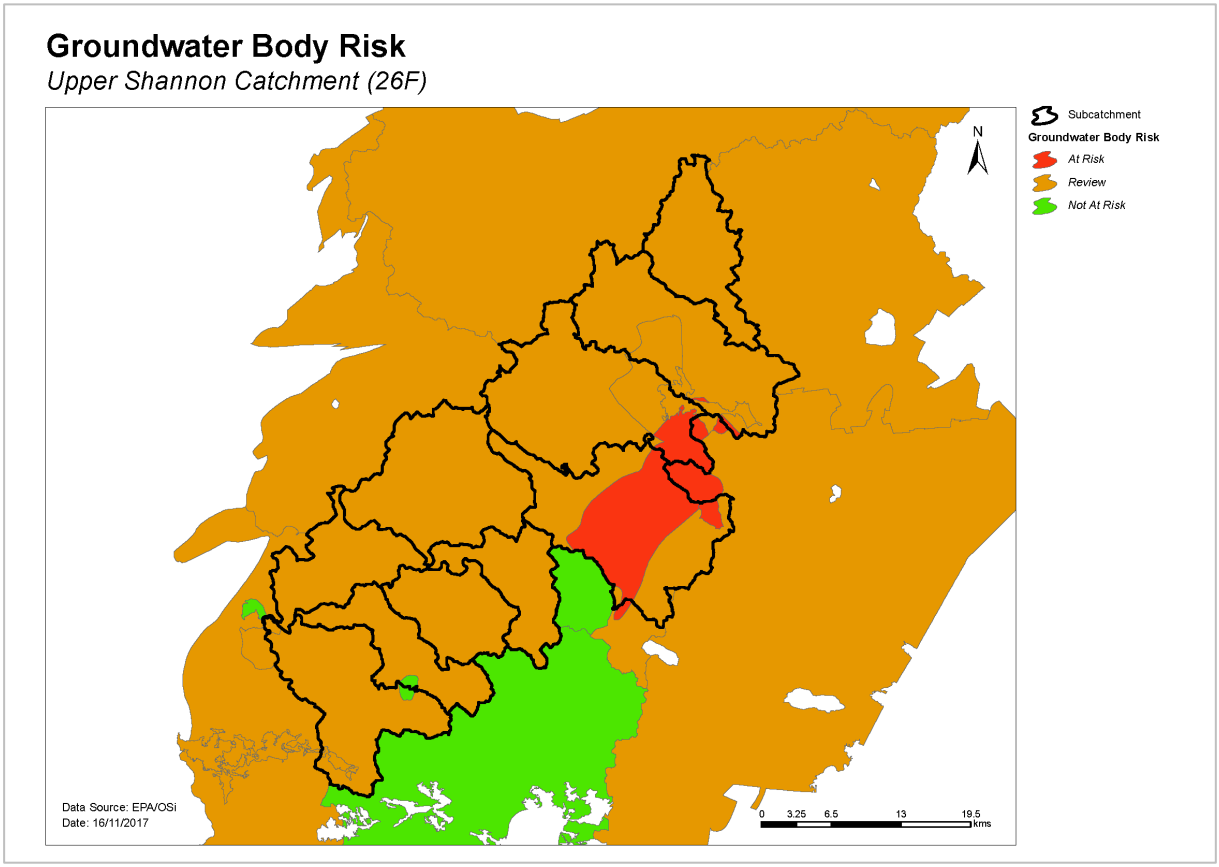

Figure 9. Groundwater body risk

Table 4. Summary of *At Risk* surface water bodies where phosphate from groundwater may contribute to an impact.

Groundwater body name	Receiving water body code	Receiving water body name
Derravarragh	IE_SH_26G010100	GAINE_010
Derravarragh	IE_SH_26G020100	GLORE (WESTMEATH)_010
Derravarragh	IE_SH_26I010800	INNY_070
Derravarragh	IE_SH_26Y020060	YELLOW (CASTLEPOLLARD)_010
Derravarragh	IE_SH_26Y020250	YELLOW (CASTLEPOLLARD)_030

2.5 Protected areas

2.5.1 Drinking water abstractions

- There are 12 abstractions in the Upper Shannon (Inny) Catchment comprising three group water schemes, eight public supplies and one private supply (Appendix 3).
- Nine of the abstractions are from four groundwater bodies (Inny, Derravarragh, Tynagh Gravels and Ballymanus), two are from two lakes (Lough Kinale and Lough Nadregeel), and one is from Inny_090 river water body. The list of the public supplies and the associated water bodies is provided in Appendix 3.

- Where information is available, all sources were compliant with the standard for nitrate in 2015.
- Two sources were non-compliant for pesticides in 2015 (Granard and Ballymahon), which are abstracted from Lough Kinale and Inny_090 respectively. The key issue in both sources was MCPA, with Granard abstraction also having mecoprop issues from Lough Kinale. Where information is available, all other sources were compliant.
- Eight of the abstractions from five sources (Inny, Derravarragh, Tynagh Gravels and Ballymanus groundwater bodies, and Nadrageel Lough) did not have water quality information available.

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 (NSAs) in the catchment.

2.5.5 Natura 2000 Sites

- There are five 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.
- The one water body (GWDTE-Lough Ree Fen 10 (SAC000440)) with water dependent qualifying interests within these SACs has met its WFD Protected area objective (Appendix 4).
- There are seven Special Protected Areas (SPAs) in the catchment:
    - Garriskil Bog SPA
    - Glen Lough SPA
    - Lough Derravaragh SPA
    - Lough Iron SPA
    - Lough Kinale and Derragh Lough SPA
    - Lough Ree SPA
    - Lough Sheelin 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 is one designated artificial water body (AWB) in the catchment – Royal Canal (West of Lough Owel feeder). It is at Good Ecological Potential.

3 Significant issues in *At Risk* water bodies

- Excess phosphorus leading to eutrophication is the dominant issue in the rivers and lakes. Excess ammonia is also of concern for a limited number of water bodies.
- Alteration of hydromorphological (or physical) conditions is an issue in some rivers in the Upper Shannon (Inny) 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. However, this is only of concern for a small number of water bodies.

- Groundwater bodies act as a pathway to surface waters and may be contributing some of the phosphate in places. A review of the pathway links is ongoing. There is also an issue in relation to chemistry for one particular groundwater body – PCE in IE_SH_G_261.

4 Significant pressures

4.1 Water bodies

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

4.1.1 Rivers and lakes

- Significant pressures have been identified through the initial characterisation process in 24 surface water bodies, 11 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 is agriculture, followed by urban waste water, hydromorphological pressures, peat, industry, diffuse urban and forestry (Figure 10).

4.1.2 Groundwater

- There is a *At Risk* groundwater body Derravarragh (IE_SH_G_077) which is potentially being impacted by agriculture; and another groundwater body Industrial Facility (P0690-01) IE_SH_G_261 which is *At Risk* and being impacted by industry.

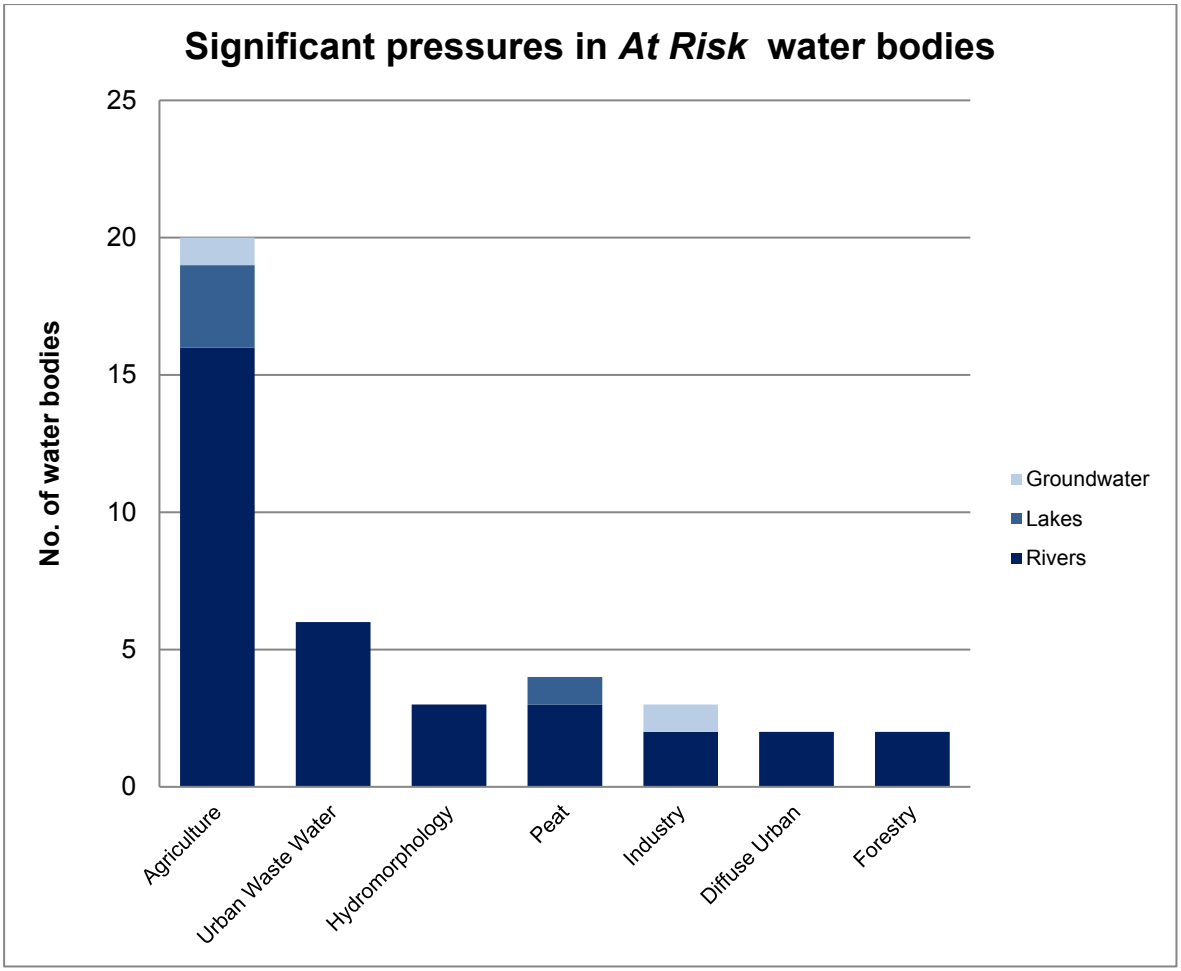

Figure 10. Significant pressures impacting on *At Risk* water bodies

4.2 Pressure type

4.2.1 Agriculture

- Agriculture is a significant pressure in 20 water bodies (16 rivers, three lakes and one groundwater) (Figure 11, Appendix 2). The issues related to farming in this catchment are predominantly due to 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 5.

4.2.2 Urban waste water treatment plants

- Urban Waste Water Treatment Plants (WWTPs) and agglomeration networks have been identified as a significant pressure in six *At Risk* water bodies; details are given in Table 5 and Figure 12. Ballymore WWTP, which impacts Dungolman_030, is scheduled to be upgraded by 2018. Mountnugent_020, is impacted by the Ballyjamesduff WWTP, which is scheduled to be upgraded by 2024, however, Mountnugent_010 is impacted by the Ballyjamesduff agglomeration network, which is currently not specified in improvement plans.

Table 5. Waste Water Treatment Plants and agglomerations identified as Significant Pressures in *At Risk* water bodies and expected completion dates for associated upgrade works, where applicable.

Facility name	Facility Type	Water Body	2010-15 Ecological Status	Expected Completion Date
Ballyjamesduff D0256	2,001 to 10,000 p.e.	*Mountnugent_010* [1]	Poor	*N/A* [1]
Ballyjamesduff D0256	2,001 to 10,000 p.e	Mountnugent_020	Poor	2024
Ballymore D0509	500 to 1,000 p.e.	Dungolman_030	Poor	2018
Edgeworthstown D0098	2,001 to 10,000 p.e.	Black (Westmeath)_010	Poor	*N/A* [2]
Collinstown D0485	500 to 1,000 p.e.	Yellow (Castlepollard)_010	Moderate	*N/A* [2]
Multyfarnham D0510	500 to 1,000 p.e.	Gaine_020	Poor	*N/A* [2]

4.2.3 Hydromorphology

- Two river water bodies (Glore (Westmeath)_020 and Gaine_010) within the Inny subcatchment are subject to extensive modification. An impoundment is also impacting a river water body (Inny_040) within the Inny subcatchment. See Figure 13 and Appendix 2 for further information.

4.2.4 Extractive industry

- *Peat*

  Peat extraction has been identified as a significant pressure in three river water bodies (Rath 26_020, Inny_050 and Inny_070) and lake Sheelin (Figure 14). This has resulted in increased sediment loads due to the peat cutting, which alters habitats, morphology and hydrology.

4.2.5 Industry

- Industrial discharges have been identified as significant pressures in Pound (Mountnugent)_010 and Yellow (Castlepollard)_010 (Figure 15, Appendix 2). Two industrial facilities have been identified as significant pressures impacting Pound (Mountnugent)_010, while Yellow (Castlepollard)_010 is impacted by one industrial facility. Elevated concentrations of orthophosphate and total ammonia are the significant issues related to these industrial discharges. An industrial site is identified as a significant pressure on groundwater body IE_SH_G_261.

4.2.6 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 Mountnugent_010 and Black (Westmeath)_010 around Ballyjamesduff town and Edgesworthtown respectively (Figure 16, Appendix 2). The significant issues are elevated ammonia concentrations.

4.2.7 Forestry

- Forestry has been identified as a significant pressure in Rath 26_020 and Black (Westmeath)_020 water bodies (Figure 17, Appendix 2). The significant issues are arising primarily through afforestation, road construction and clearfelling, which results in increased sediment and nutrient loads.

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[1] *Ballyjamesduff WWTP is scheduled to be upgraded by 2024, however, the agglomeration network, which is currently not specified in improvement plans, has been identified as a significant pressure impacting Mountnugent_010.*

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

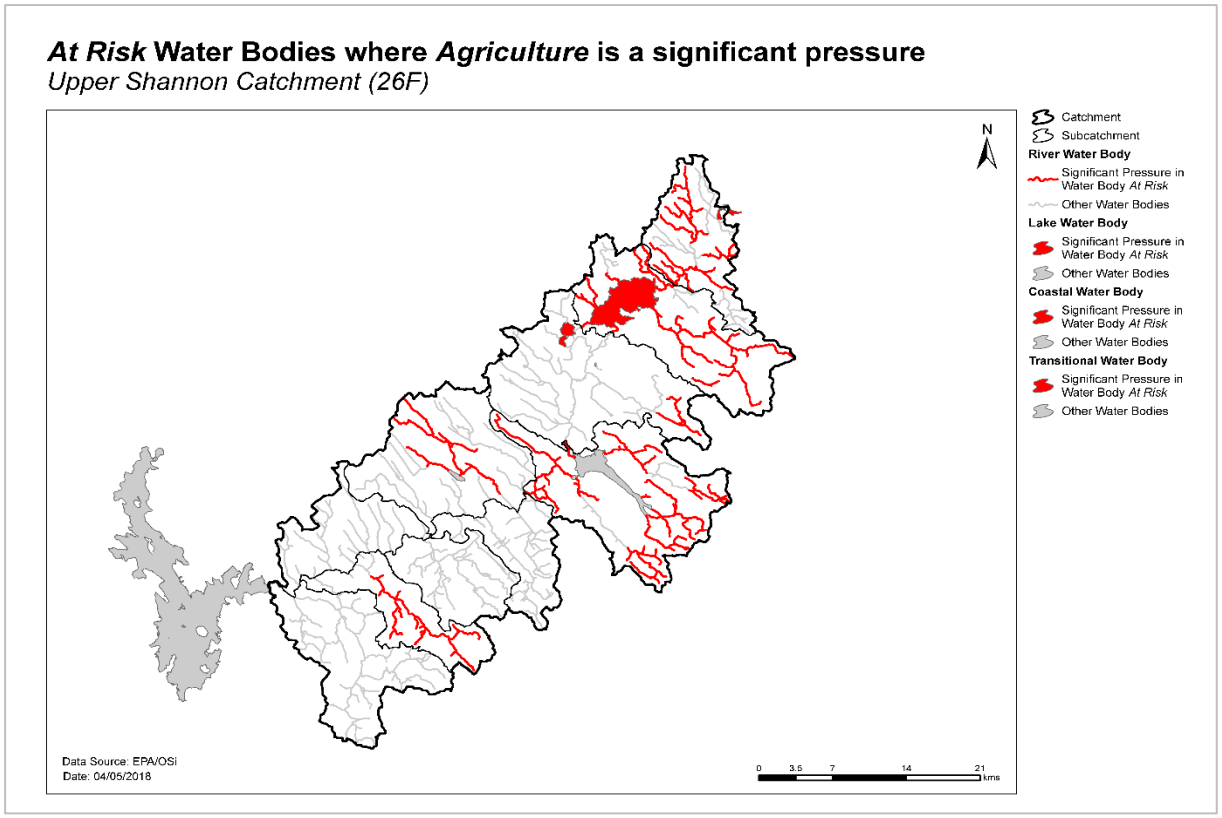


Figure 11. Water bodies that are *At Risk* and are impacted by agricultural activities

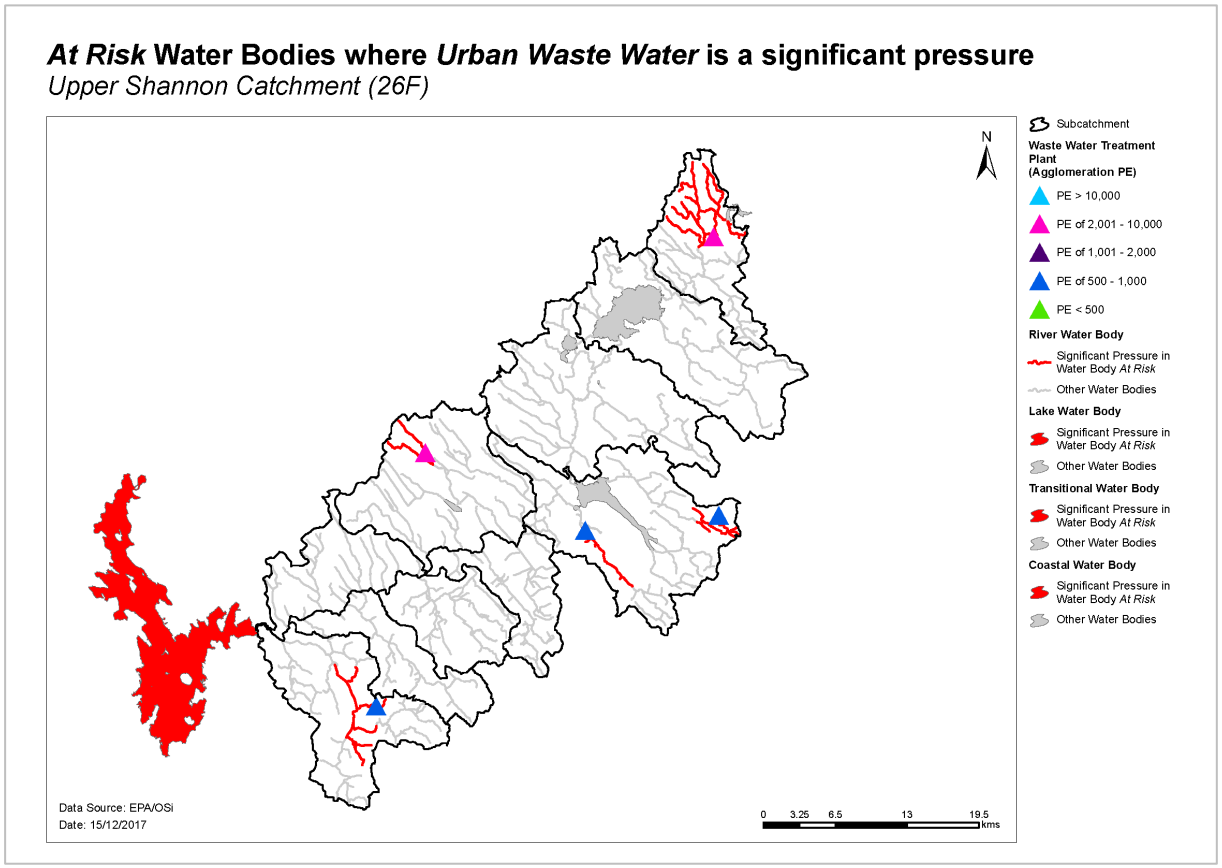


Figure 12. Water bodies that are *At Risk* and are impacted by urban waste water

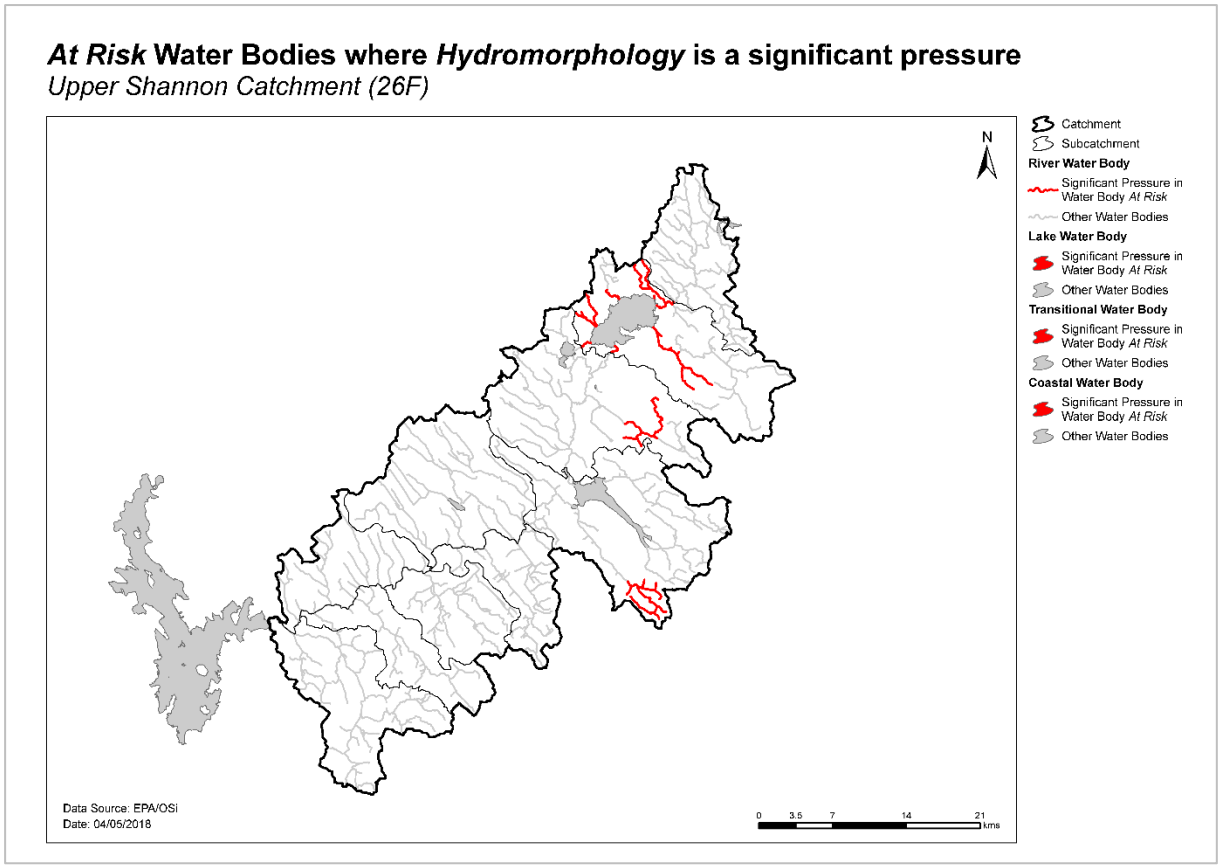


Figure 13. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

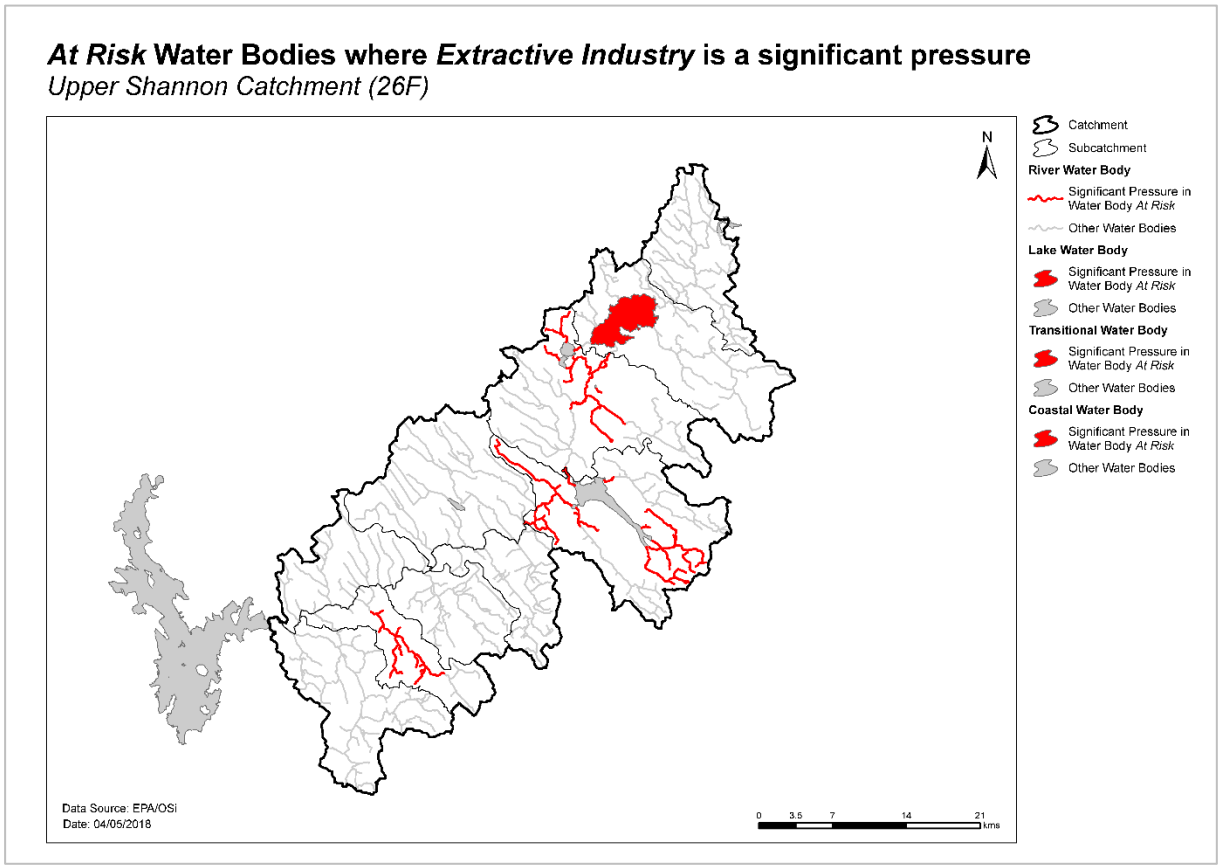


Figure 14. Water bodies that are *At Risk* and are impacted by extractive industries

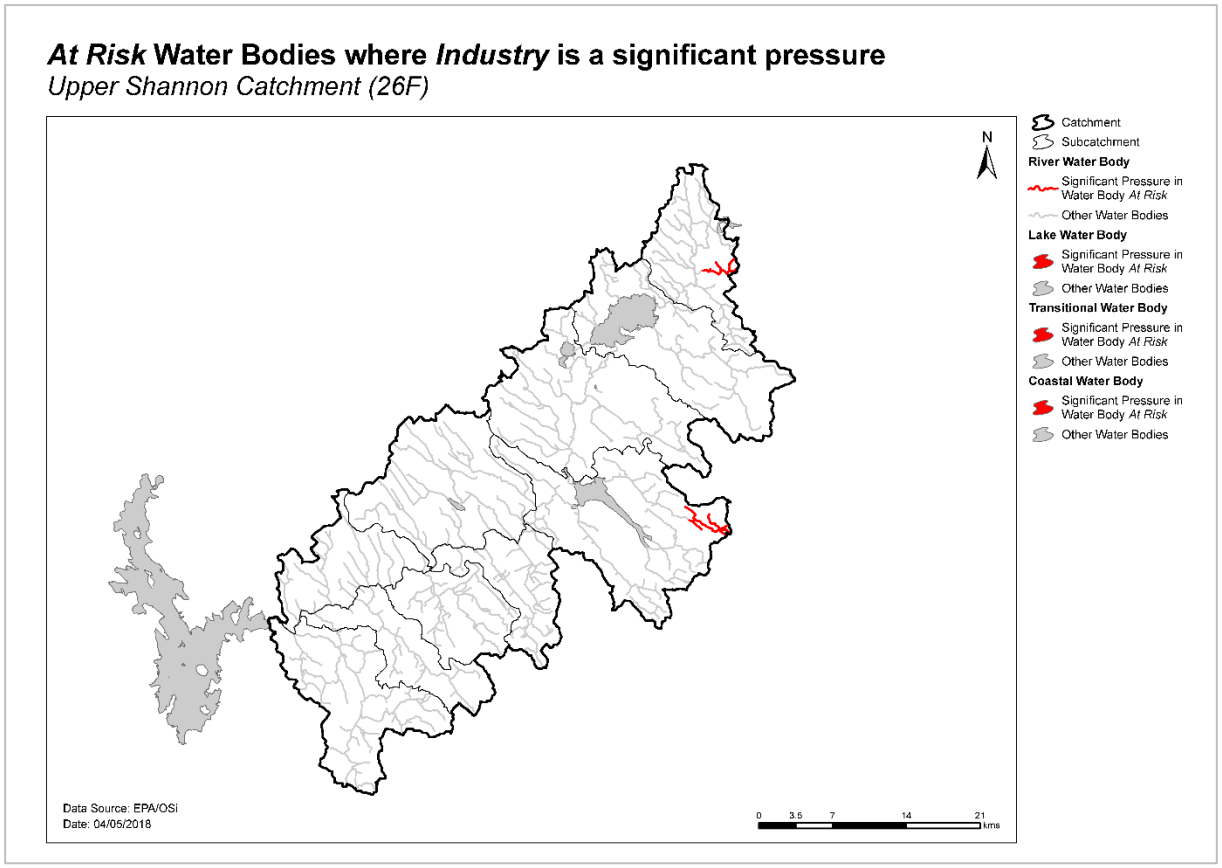


Figure 15. Water bodies that are *At Risk* and are impacted by industry

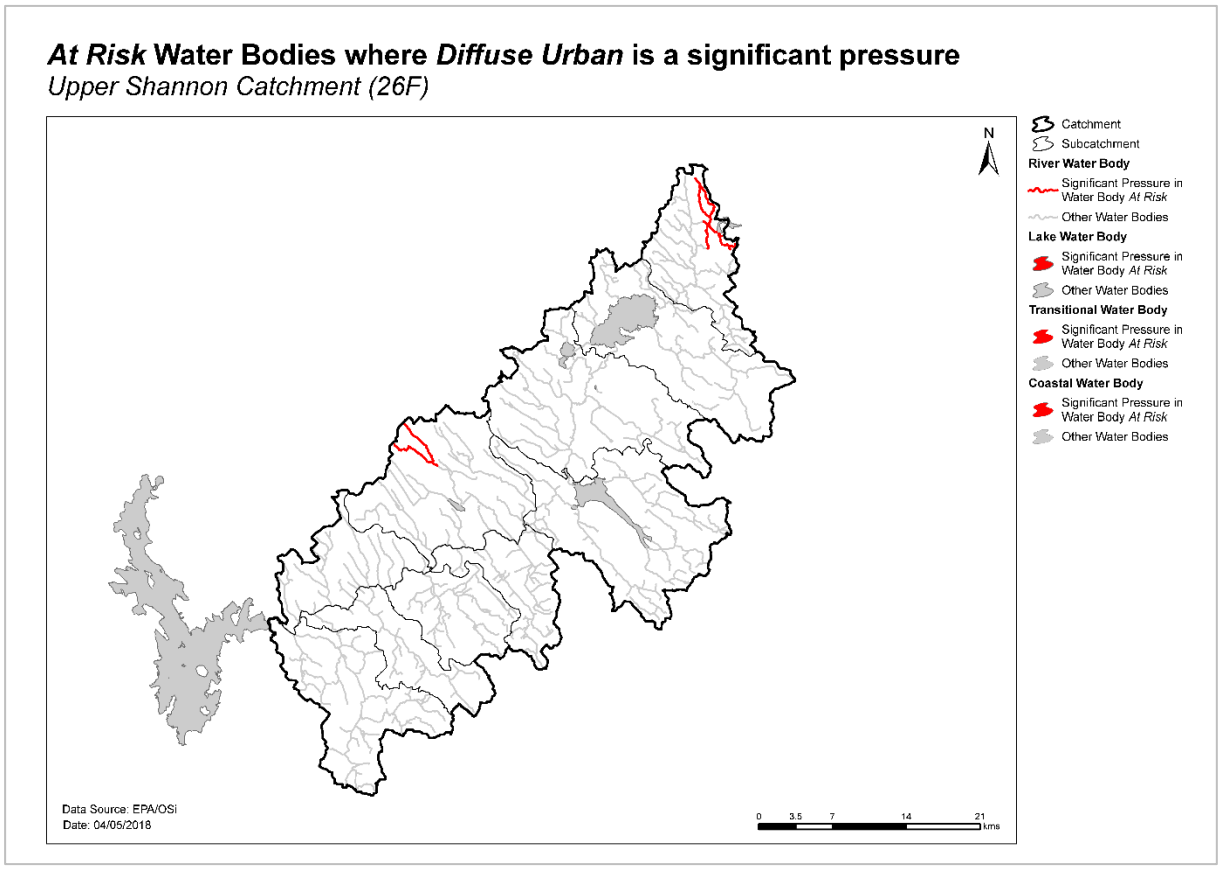


Figure 16. Water bodies that are *At Risk* and are impacted by diffuse urban

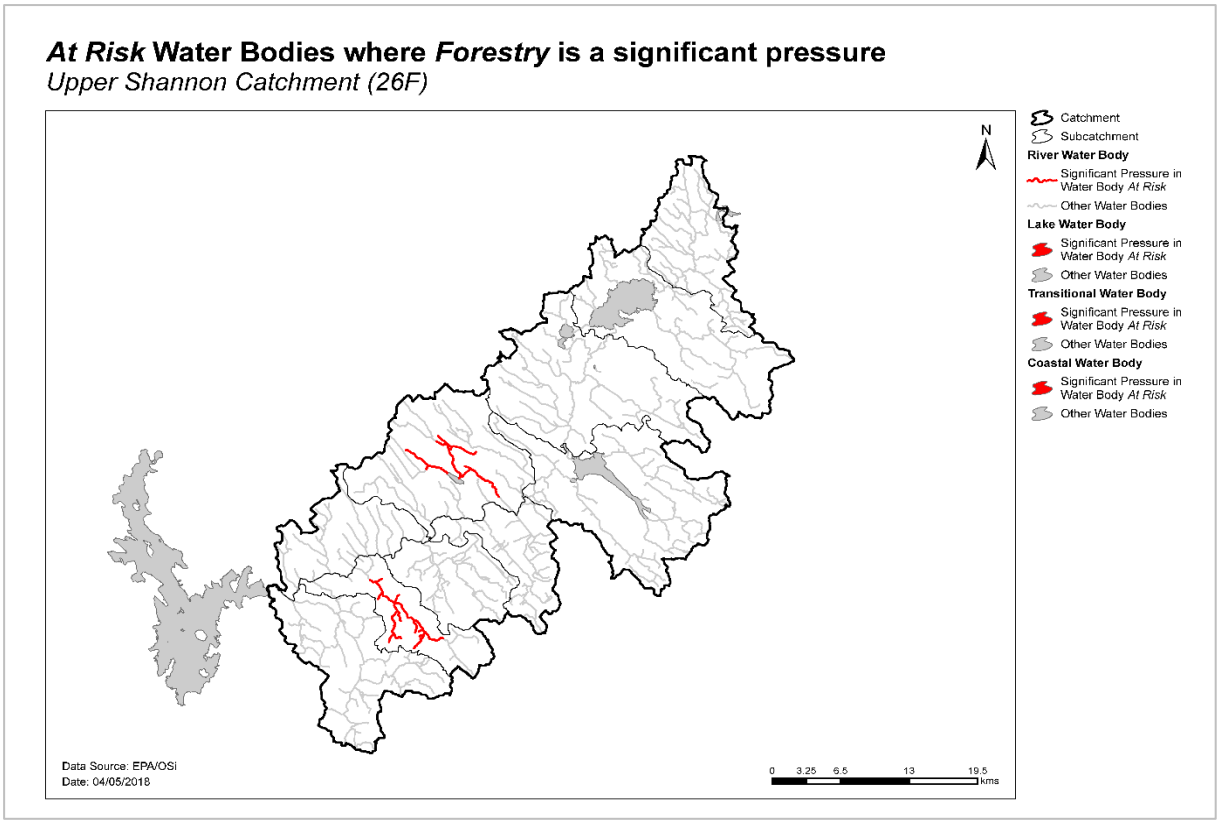


Figure 17. Water bodies that are *At Risk* and are impacted by forestry

5 Load reduction assessment

5.1 River water body load reductions

- Phosphate is the main parameter influencing water quality in rivers in the catchment.
- For water bodies where phosphorus monitoring data are available, the reduction in P load that would be required to bring the mean concentration back to the EQS of 0.035 mg/l as P, can be estimated using a simple method based on the average 2013 to 2015 concentration and the average flow, or the estimated 30th percentile flow (Q30) where flow data are not available. The relative load reductions are ranked on a national scale from Very High (>1 kg/Ha/y), to High (0.5-1 kg/Ha/y), to Medium (0.25-0.5 kg/Ha/y) to Low (<0.25 kg/Ha/y). Note that P load reductions may also be required in other water bodies, but without chemistry monitoring data a quantitative estimate cannot be calculated.In the Upper Shannon (Inny) catchment, the available water chemistry data indicate that load reductions are required in six of the 41 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
GAINE_020	High
MOUNTNUGENT_010	High
BLACK (WESTMEATH)_010	High
YELLOW (CASTLEPOLLARD)_010	Med
MOUNTNUGENT_020	Low
Pound (Mountnugent)_010	Low

6 Further Characterisation and Local Catchment Assessments

- Further characterisation through local catchment assessments is needed in 24 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 13 *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 7.

Table 7. Local catchment assessment allocation for *At Risk* and *Review* river and lake 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	10	0	1	1	2	2	10	0	3	0	29
Review	5	0	10	0	0	0	1	0	2	0	18
Note water bodies may have multiple categories of Local Catchment Assessments											

7 Catchment summary

- Of the 41 river water bodies, 21 are *At Risk* of not meeting their WFD objectives.
- Three of the six lake water bodies are *At Risk* of not meeting their WFD objectives.
- Excess nutrient loss, mainly phosphate, leading to eutrophication is a major issue for rivers and lakes in the catchment. The significant pressures relating to excess nutrients are primarily agricultural (diffuse and point), but also waste water (urban) and diffuse urban.
- Hydromorphological (or physical) conditions (including the input of excessive fine sediment) and poor habitat quality is also a major issue for several surface water bodies. The significant pressures which relate to changes in hydromorphology are agriculture (animal access and land drainage), forestry and channel modifications.
- There are two *At Risk* groundwater bodies in the catchment - Derravarragh (IE_SH_G_077) and Industrial Facility (P0690-01) IE_SH_G_261. The significant pressures identified are agriculture and industry respectively.

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 3 areas for action in the Upper Shannon (Inny) 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 (Inny) catchment are summarised below.

- Three recommended areas for actions (Table 8, Figure 18) were selected.
- These are the Sheelin (with Inny), Derravaragh and Nadreegeal.
- These include ten *At Risk* and two *Review* river water bodies.
- Four groundwater bodies, that are *At Risk* or *Review* due to groundwater contribution of nutrients to surface water bodies, intersect with two 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 25 *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 19. These include:

- twenty-five river and lake water bodies – 14 *At Risk* and 11 *Review*.

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

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Sheelin (with Inny)	7	26F_6 26F_9	Meath	• Subcatchment project • Headwaters of the River Inny. • One potential 'quick win'. • Building on improvements completed at Oldcastle WWTP. • Building on improvement works completed by Meath County Council - nutrient concentrations have declined in the last few years. • Building on IFI Lough Sheelin project. The lake is one of 13 wild brown trout fisheries in Europe and IFI. • The River Inny and Lough Sheelin are important for tourism & heritage. • Two deteriorated water bodies.
Derravaragh	4	26F_9	Westmeath	• Three potential quick wins. • Building on existing work completed by Westmeath County Council in Multyfarnham. • Headwaters to Derravaragh lake. • Important fishery -– one of 13 wild brown trout fisheries in Europe. • Potential to build on work completed by IFI. • The underlying groundwater body is At Risk - potential to build on previous karst research. • Important for tourism & heritage. • Two deteriorated water bodies.
Nadreegeel	2	26F_3 07_10	Cavan	• Cavan/Monaghan lakes scenario project. • Headwaters to Nadreegeel Lough. • Potential 'quick win'. • Building on existing work completed by Cavan Co Co. • Will provide insight into question regarding river monitoring stations downstream of failing lakes. • A group water scheme here abstracts immediately upstream. • Public water abstraction. • One deteriorated water body.

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

Groundwater bodies			Intersecting surface water bodies		Recommended Areas for Action
Code	Name	Risk	Code	Name	
IE_SH_G_077	Derravarragh	At risk	IE_SH_26G010100	GAINE_010	Derravaragh Project
			IE_SH_26G010270	GAINE_020	
			IE_SH_26Y020060	YELLOW (CASTLEPOLLARD)_010	
			IE_SH_26Y020250	YELLOW (CASTLEPOLLARD)_030	
IE_SH_G_110	Inny	Review	IE_SH_26G010100	GAINE_010	
			IE_SH_26Y020060	YELLOW (CASTLEPOLLARD)_010	
			IE_SH_26Y020250	YELLOW (CASTLEPOLLARD)_030	
			IE_SH_26_709	Sheelin	Sheelin (with Inny)
			IE_SH_26A140100	AGHAWONAN_010	
			IE_SH_26B240400	BELLSGROVE (Ballyheelan) STREAM_010	
			IE_SH_26I010100	INNY_010	
			IE_SH_26I010200	INNY_020	
			IE_SH_26I010300	INNY_030	
			IE_SH_26I010500	INNY_040	
IE_SH_G_035	Ballymanus	Review	IE_SH_26_709	Sheelin	
			IE_SH_26I010300	INNY_030	
			IE_SH_26I010500	INNY_040	
IE_SH_G_238	Tynagh Gravels	Review	IE_SH_26I010200	INNY_020	
			IE_SH_26I010500	INNY_040	

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 10 *At Risk* river water bodies, it is predicted that four (40%) will improve by 2021 and six (60%) will achieve their objective by 2027.
- For the two *Review* river water bodies, the absence of information on this water body means that there is no scientific basis to quantify an environmental objective date, and therefore a 2027 date is set for this water body, 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
Rivers			
At Risk	8	4	4
Review	2	0	2
Lakes			
At Risk	2	0	2
Review	0	0	0
Total	12	4	8

- Ten water bodies have met their 2015 environmental objective. One of the ten water bodies met their environmental objective for ecological status but failed to meet their protected area objectives.
- Due to planned upgrade works at an urban waste water treatment plant, a 2021 objective is applied to the one of the remaining 14 *At Risk* water bodies. As action is not yet planned to be taken in the remaining 13 *At Risk* surface water bodies, a 2027 date is applied to the remaining 13 water bodies.
- For the 11 *Review* surface water bodies, the absence of information on these water bodies means that there is no scientific basis to quantify an environmental objective date and therefore a 2027 date is applied, see Table 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	13	1	12
Review	9	0	9
Lakes			
At Risk	1	0	1
Review	2	0	2
Total	25	1	24

9.2 Groundwater

- Seven of the eight groundwater bodies are currently Good status and, therefore, have met their environmental objectives.
- The one groundwater body, Industrial Facility (P0690-01), in the Upper Shannon catchment that is less than Good status has an environmental objective date of 2027.

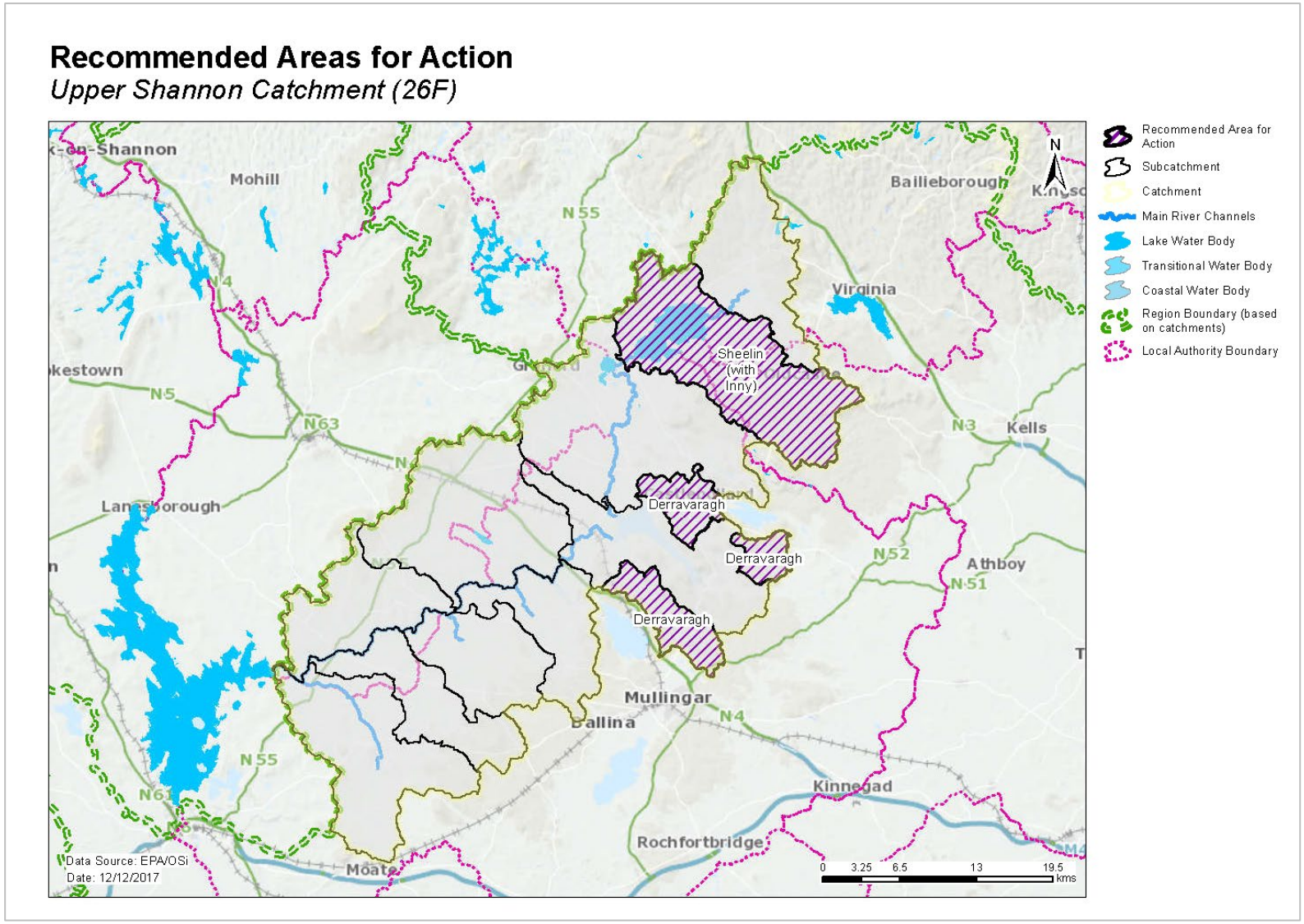


Figure 18. Location of Recommended Areas for Action in the Upper Shannon (Inny) Catchment

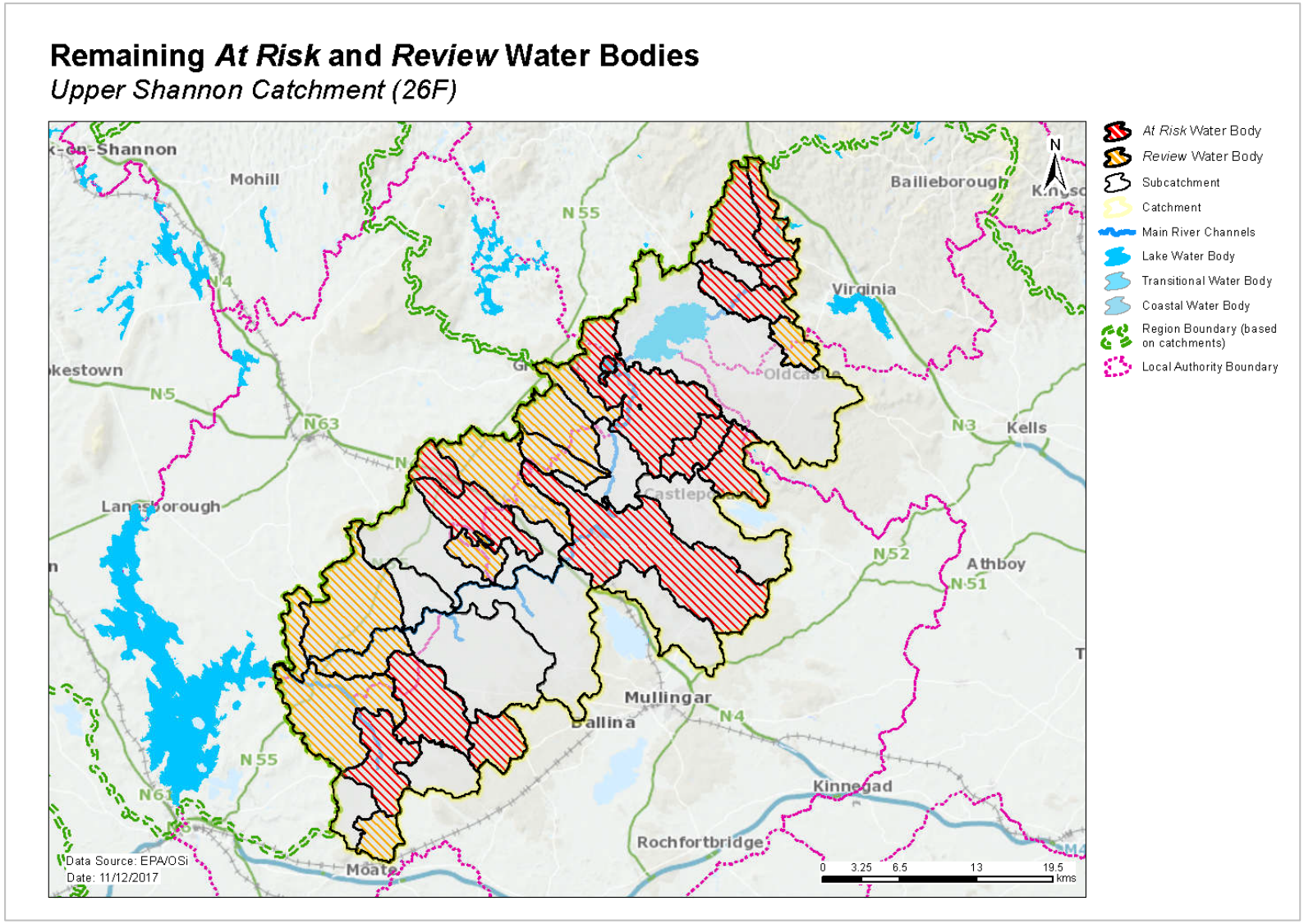


Figure 19 Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Upper Shannon (Inny) Catchment

10 Acknowledgements

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

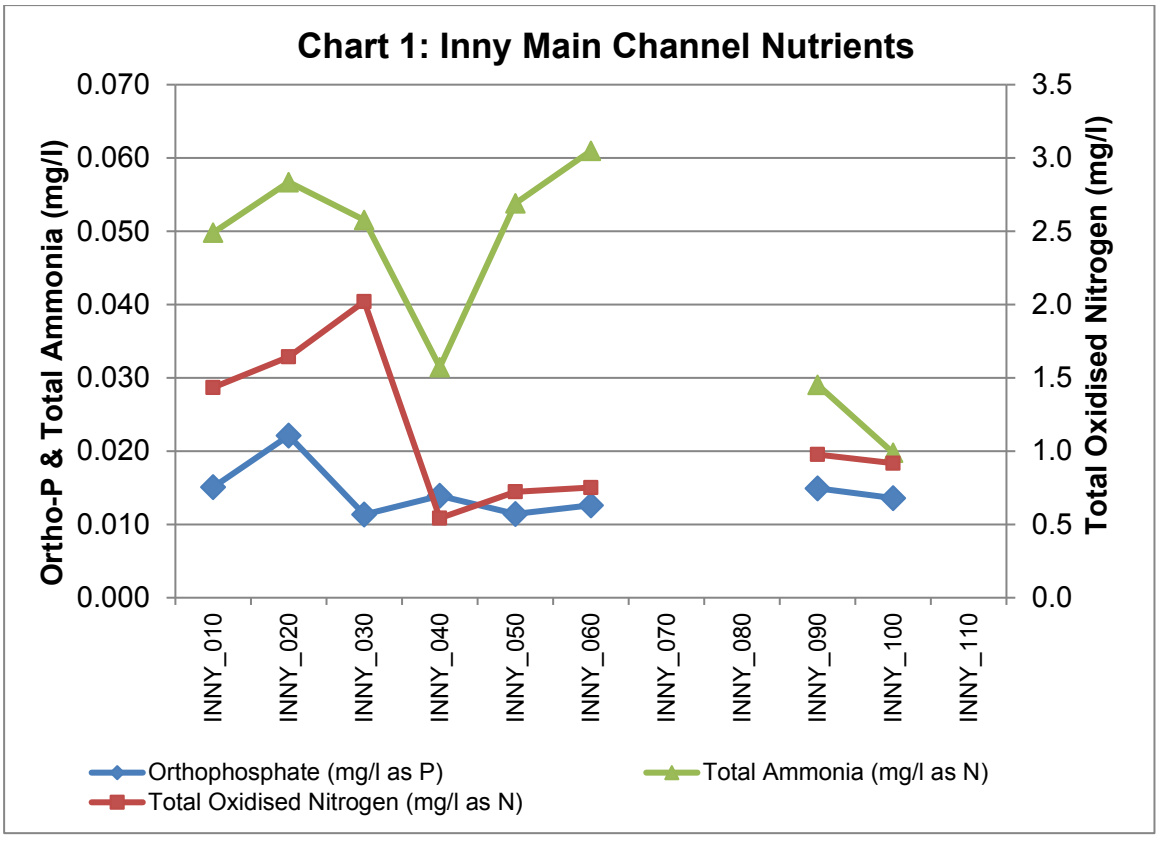
- Westmeath County Council.
- Longford County Council.
- Cavan County Council.
- Meath County Council.
- Inland Fisheries Ireland.
- Local Authorities Waters & Communities Office.
- Irish Water.
- RPS Group.
- Ecological Monitoring & Assessment Unit, EPA.
- Hydrometric & Groundwater Section, EPA.
- Informatics 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.

Appendix 1 Catchment scale nutrient concentrations and in-stream loads

The results of the instream water quality assessment for the Inny main channel are illustrated in Chart and 2. The assessment is based on the mean concentrations between 2013 and 2015 at each site for which there is monitoring data. Orthophosphate concentrations are moderately low throughout the main channel, ranging from 0.011 to 0.022mg/l. A low level spike occurs at INNY_020, however the EQS (0.035mg/l) is not exceeded at any of the main channel water bodies where data is available.

TON concentrations are highest in the upper reaches of the river, with a spike of 2mg/l occurring at INNY_030. Concentrations drop sharply downstream of INNY_030, ranging from 0.5 to 1mg/l, without exceeding the threshold (2.6mg/l).

Total ammonia concentrations are moderately high along the main channel; ranging from 0.20 to 0.61mg/l. The EQS (0.065mg/l) is not exceeded at any of the water bodies where data is available. Peaks in ammonia concentration occur at INNY_020 and INNY_060, with values of 0.057 and 0.061mg/l at INNY_020 and INNY_060, respectively.



Average Q30 flows increased from 0.34m^3/s at the headwaters to 32.9m^3/s at INNY_110. Orthophosphate, TON and ammonia loads typically increased downstream, corresponding to increasing flow.

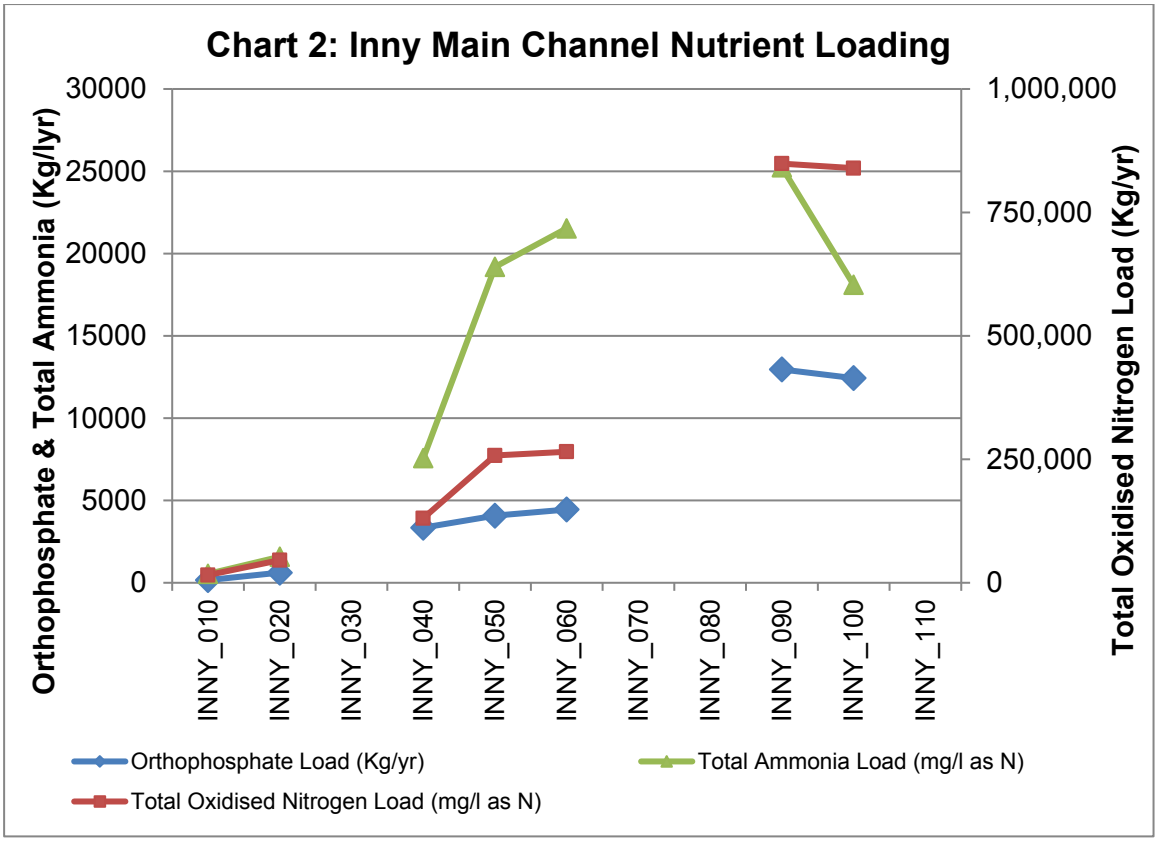


Chart 2: Inny Main Channel Nutrient Loading
Orthophosphate & Total Ammonia (Kg/lyr)
Total Oxidised Nitrogen Load (Kg/yr)
30000
25000
20000
15000
10000
5000
0
1,000,000
750,000
500,000
250,000
0
INNY_010
INNY_020
INNY_030
INNY_040
INNY_050
INNY_060
INNY_070
INNY_080
INNY_090
INNY_100
INNY_110
Orthophosphate Load (Kg/yr)
Total Ammonia Load (mg/l as N)
Total Oxidised Nitrogen Load (mg/l as N)

Appendix 2 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
26F_1	IE_SH_26I011350	Inny_100	River	Review	Moderate	Moderate	N		2027	
26F_1	IE_SH_26R010030	Rath 26_010	River	At Risk	Moderate	Moderate	N	Ag	2027	
26F_1	IE_SH_26R010300	Rath 26_020	River	At Risk	Moderate	Moderate	N	Ag,For,Peat	2027	
26F_3	IE_EA_07_273	Nadreegeal	Lake	At Risk	Moderate	Poor	N	Ag	2027	Nadreegeel
26F_3	IE_SH_26J050300	Pound (Mountnugent)_010	River	At Risk	Moderate	Poor	N	Ag,Ind	2027	
26F_3	IE_SH_26M020120	Mountnugent_010	River	At Risk	Poor	Poor	N	DU,UWW	2027	
26F_3	IE_SH_26M020200	Mountnugent_020	River	At Risk	Moderate	Poor	N	Ag,UWW	2027	
26F_3	IE_SH_26M020500	Mountnugent_040	River	At Risk	Moderate	Moderate	N	Ag	2027	
26F_3	IE_SH_26O110580	Oldtully_010	River	Review	Unassigned	Unassigned	N		2027	
26F_5	IE_SH_26D060100	Dungolman_010	River	Review	Unassigned	Unassigned	N		2027	
26F_5	IE_SH_26D060400	Dungolman_030	River	At Risk	Poor	Poor	N	UWW	2021 (measures planned)	
26F_6	IE_SH_26_709	Sheelin	Lake	At Risk	Moderate	Moderate	N	Ag,Peat	2027	Sheelin (with Inny)
26F_6	IE_SH_26A140100	Aghawonan_010	River	Review	Unassigned	Unassigned	N		2027	Sheelin (with Inny)
26F_6	IE_SH_26B240400	Bellsgrove (Ballyheelan) Stream_010	River	Review	Unassigned	Unassigned	N		2027	Sheelin (with Inny)
26F_6	IE_SH_26I010100	Inny_010	River	At Risk	Moderate	Poor	N	Ag	2021	Sheelin (with Inny)
26F_6	IE_SH_26I010200	Inny_020	River	At Risk	Moderate	Moderate	N	Ag	2027	Sheelin (with Inny)
26F_6	IE_SH_26I010300	Inny_030	River	At Risk	Moderate	Moderate	N	Ag	2027	Sheelin (with Inny)
26F_6	IE_SH_26I010500	Inny_040	River	At Risk	Moderate	Poor	N	Ag,Hymo	2027	Sheelin (with Inny)
26F_7	IE_SH_26_622	Bane Clonsura	Lake	Review	Unassigned	Unassigned	N		2027	
26F_7	IE_SH_26_678	Kinale	Lake	At Risk	Moderate	Moderate	N	Ag	2027	
26F_7	IE_SH_26C080860	Coolnagun Stream_010	River	Review	Unassigned	Unassigned	N		2027	
26F_7	IE_SH_26F370890	Ferskill_010	River	Review	Unassigned	Unassigned	N		2027	
26F_7	IE_SH_26G020100	Glore (Westmeath)_010	River	At Risk	Poor	Poor	N	Ag	2027	
26F_7	IE_SH_26G020200	Glore (Westmeath)_020	River	At Risk	Moderate	Moderate	N	Hymo	2027	
26F_7	IE_SH_26I010600	Inny_050	River	At Risk	Unassigned	Moderate	N	Peat	2027	
26F_7	IE_SH_26R630830	Rathcronan_010	River	Review	Unassigned	Unassigned	N		2027	
26F_8	IE_SH_26_468	Glen LD	Lake	Review	Unassigned	Unassigned	N		2027	
26F_8	IE_SH_26B050100	Black (Westmeath)_010	River	At Risk	Unassigned	Poor	N	Ag,DU,UWW	2027	
26F_8	IE_SH_26B050180	Black (Westmeath)_020	River	At Risk	Good	Moderate	N	Ag,For	2027	
26F_8	IE_SH_26C250420	Clontymullan_26_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
26F_8	IE_SH_26R030100	Riffey_010	River	Review	Unassigned	Unassigned	N		2027	
26F_9	IE_SH_26G010100	Gaine_010	River	At Risk	Moderate	Poor	N	Ag,Hymo	2021	Derravaragh
26F_9	IE_SH_26G010270	Gaine_020	River	At Risk	Poor	Poor	N	UWW	2021	Derravaragh
26F_9	IE_SH_26I010800	Inny_070	River	At Risk	Good	Moderate	N	Ag,Peat	2027	
26F_9	IE_SH_26Y020060	Yellow (Castlepollard)_010	River	At Risk	Moderate	Moderate	N	Ag,Ind,UWW	2027	Derravaragh
26F_9	IE_SH_26Y020250	Yellow (Castlepollard)_030	River	At Risk	Moderate	Moderate	N	Ag	2021	Derravaragh
26F_10	IE_SH_26I011400	Inny_110	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

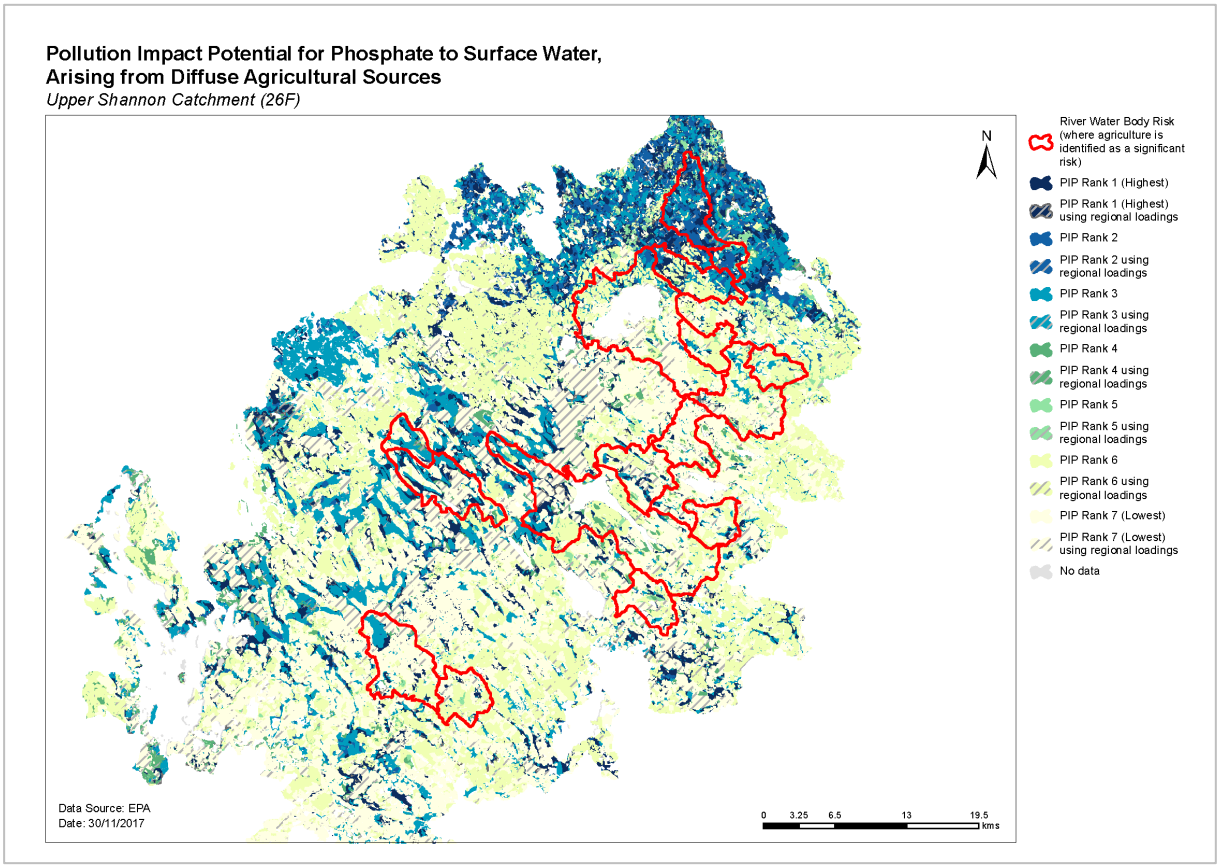
Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes /No	Reason why not met
2000PRI1047	Forgney	Inny	IE_SH_G_110	No data	N/A
3200PRI9098	Tober Group Water Scheme	Derravarragh	IE_SH_G_077	No data	N/A
0200PRI2022	Lavagh Ballyheelan GWS	Inny	IE_SH_G_110	Yes	N/A
3200PRI2002	Multyfarnham GWS	Derravarragh	IE_SH_G_077	Yes	N/A
2300PUB1090	Springhall Borehole	Tynagh Gravels	IE_SH_G_238	No data	N/A
2300PUB1091	Crossdrum Lower Borehole	Inny	IE_SH_G_110	No data	N/A
2300PUB1092	Ballymeade Borehole	Inny	IE_SH_G_110	No data	N/A
2300PUB1093	Ballymeade Borehole, At L	Inny	IE_SH_G_110	No data	N/A
2300PUB1094	Ross Village Borehole	Ballymanus	IE_SH_G_035	No data	N/A
2000PUB1006	Granard	Lough Kinale	IE_SH_26_678	No	Pesticides (MCOA, mecoprop)
0200PUB1006	Ballyjamesduff PWS	Naddregeel Lough	IE_EA_07_273	No data	N/A
2000PUB1005	Ballymahon	INNY_090	IE_SH_26I011150	No	MCPA

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?
Ardagullion Bog SAC 002341	none							
Ballymore Fen SAC 002313	none							
Garriskil Bog SAC 000679	none							
Lough Ree SAC 000440	7230	Good GW level	Groundwater	GWDTE-Lough Ree Fen 10 (SAC000440)	Good (R)	No	IE_SH_G_163	No
Moneybeg And Clareisland Bogs SAC 002340	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