Moy and Killala Bay Catchment Assessment 2010-2015 (HA 34)

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 Moy and Killala Bay Catchment, which have been compiled and assessed by the EPA, with the assistance of local authorities and RPS consultants. The information presented includes status and risk categories of all water bodies, details on protected areas, significant issues, significant pressures, load reduction assessments, recommendations on future investigative assessments, areas for actions and environmental objectives. The characterisation assessments are based on information available to the end of 2015. Additional, more detailed characterisation information is available to public bodies on the EPA WFD Application via the EDEN portal, and more widely on the catchments.ie website. The purpose of this document is to provide an overview of the situation in the catchment and help inform further action and analysis of appropriate measures and management strategies.

This document is supported by, and can be read in conjunction with, a series of other documents which provide explanations of the elements it contains:

1. An explanatory document setting out the full characterisation process, including water body, subcatchment and catchment characterisation.
2. The Final River Basin Management Plan, which can be accessed on: www.catchments.ie.
3. A published paper on Source Load Apportionment Modelling, which can be accessed at: http://www.jstor.org/stable/10.3318/bioe.2016.22
4. A published paper on the role of pathways in transferring nutrients to streams and the relevance to water quality management strategies, which can be accessed at: http://www.jstor.org/stable/pdf/10.3318/bioe.2016.19.pdf
5. An article on Investigative Assessments which can be accessed at: https://www.catchments.ie/download/catchments-newsletter-sharing-science-stories-june-2016/

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1 Introduction

This catchment includes the area drained by the River Moy and all streams entering tidal water in Killala Bay between Benwee Head and Lenadoon Point, Co. Sligo, draining a total area of 2,345km². The largest urban centre in the catchment is Castlebar. The other main urban centres are Ballina, Tubbercurry, Kiltimagh, Swinford, Foxford, Enniscrone and Crossmolina. The total population of the catchment is approximately 77,260 with a population density of 33 people per km².

The headwaters of the River Moy drain the southern side of Annatoran, then it, and numerous tributaries flows southeast off this high ground, being joined by the Owenaher River south of Cloonacool. The Moy is joined by the Eighnagh River flowing from Lough Talt in the Ox Mountains and then the Owengarve, Mullaghanoe, Sonnagh and Swinford Rivers from the east, which drain the limestone plain between Swinford and Tubbercurry.

The Moy then turns west before being joined by the Gweestion River, which drains a large area of northwest-southeast trending shallow valleys and the towns of Knock, Kiltimagh and Kilkelly. The Strade River flows into the Moy at the point where the river turns north. At this point the Moy is also joined by the outflow from Lough Cullin.

The Lough Cullin and upstream Lough Conn and (Crossmolina) Deel River system drain most of the western part of the Moy catchment. The Deel rises on the flat, lowland Atlantic blanket bog covered plain of west Mayo. The Deel continues east, before flowing over the area around Crossmolina, being joined by the Slieveclau River, and then flowing into the northern end of Lough Conn, which is a large lake with an area of 46km^2 that drains into Lough Cullin.

North of Foxford, the Moy flows through a gap between the southern end of the Ox mountains and the eastern end of the Nephin Beg Mountains and is joined by the Yellow River. The Ballycong River enters the Moy from the east before the Moy becomes tidal near the Ridge Pool, and then flows through Ballina, where it is joined by the Glenree River. From here, the Moy flows north through an indented estuary and out to sea through Killala Bay between Bartra Island and Enniscrone beach. Two drainage schemes were completed on the Deel and Moy Rivers by the OPW during 1962 to 1968 and 1960 to 1971 respectively.

The Cloonaghmore River drains the north-western part of the catchment, flowing into the sea at Killala Bay north of Killala Town. The land on the eastern side of Killala Bay is drained by the Bellawaddy River which flows into the Bay at Enniscrone Beach and the Leaffony River which enters the bay south of Lenadoon Point.

The Moy and Killala Bay catchment comprises 22 subcatchments (Table 1, Figure1) with 115 river water bodies, 21 lakes, four transitional, two coastal water bodies, and 19 groundwater bodies.

Table 1. List of subcatchments in the Moy and Killala Bay catchment

Subcatchment ID	Subcatchment Name
34_4	Glore[Mayo]_SC_010
34_11	Leaffony_SC_010
34_5	Addergoole_SC_010
34_19	Abbeytown_SC_010
34_15	Pollagh_SC_010
34_13	Cloonaghmore_SC_010
34_22	Castlebar_SC_010
34_20	Castlebar_SC_030
34_9	Glenree_SC_010
34_21	Castlebar_SC_020
34_16	Moy_SC_010
34_14	Deel[Crossmolina]_SC_010
34_7	Moy_SC_020
34_8	Deel[Crossmolina]_SC_020
34_18	Moy_SC_030
34_10	Moy_SC_090
34_1	Moy_SC_040
34_3	Moy_SC_060
34_6	Moy_SC_100
34_17	Moy_SC_050
34_12	Moy_SC_080
34_2	Moy_SC_070

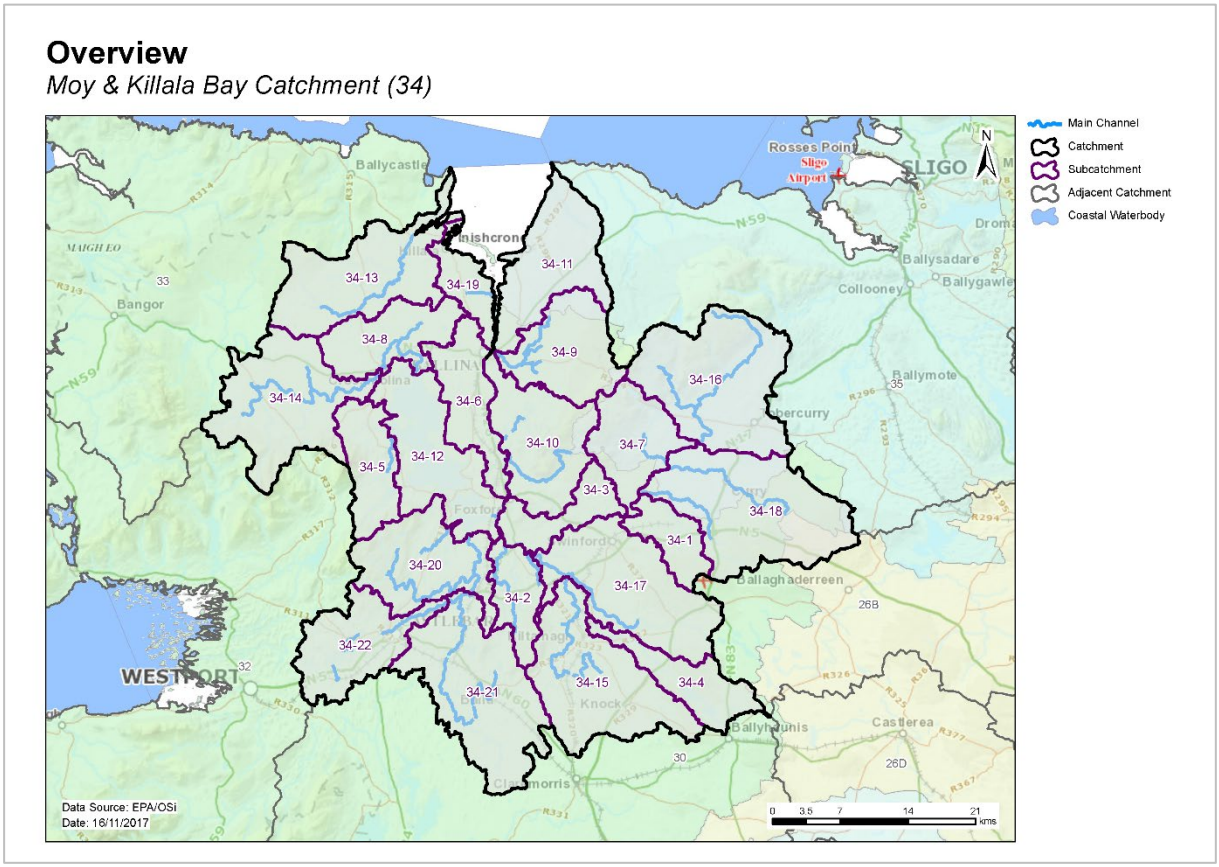


Figure 1. Subcatchments in the Moy and Killala Bay catchment

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 78 (57%) river and lake water bodies at Good or High status, and 25 (19%) at less than Good status in 2015 (Table 2, Figure 2). Thirty-three (24%) river and lake water bodies are unassigned.
- Twenty-five river water bodies and two lakes have a high ecological status objective. In 2015, 19 of these water bodies were at High status, seven were at Good, and one (Cloonlavis_010) was at Moderate status (Figure 3, Appendix 1).
- The numbers of water bodies at each status class in 2007-09 and 2010-15 are shown in Figures 4 (rivers) and 5 (lakes).
- Nineteen water bodies have and improved status since 2007-09; however, the same number have deteriorated (Figure 6).
- The variation in nutrient concentrations and loads in the Moy main channel is illustrated in Appendix 2.

2.1.2 Transitional and Coastal (TraC)

- Of the six TraC water bodies, one was at Good status (Killala Bay) and one was at Moderate status (Moy Estuary) in 2015 (Table 2). Four TraC water bodies are unassigned.
- There are no TraC water bodies with a high ecological status objective.
- The numbers of TraC water bodies in each status class in 2007-09 and 2010-15 is shown in Figure 7.
- Note the coastal water body Western Atlantic Seaboard (HAs 32;33;34), is shared with other catchments.

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	115	22	53	15	7	0	18	74	13	28
Lakes	21	0	3	3	0	0	15	3	13	5
TraC	6	0	1	1	0	0	4	3	2	1

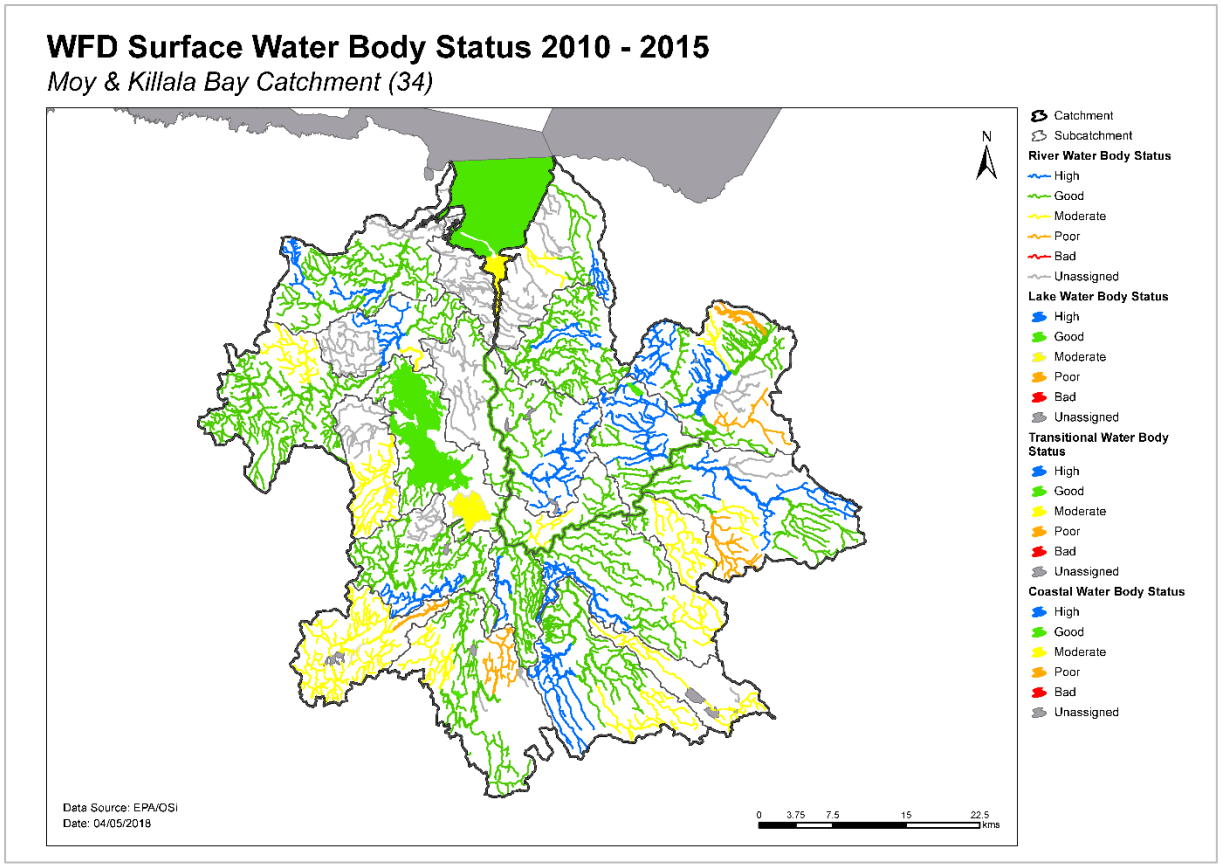


Figure 2. Surface water ecological status

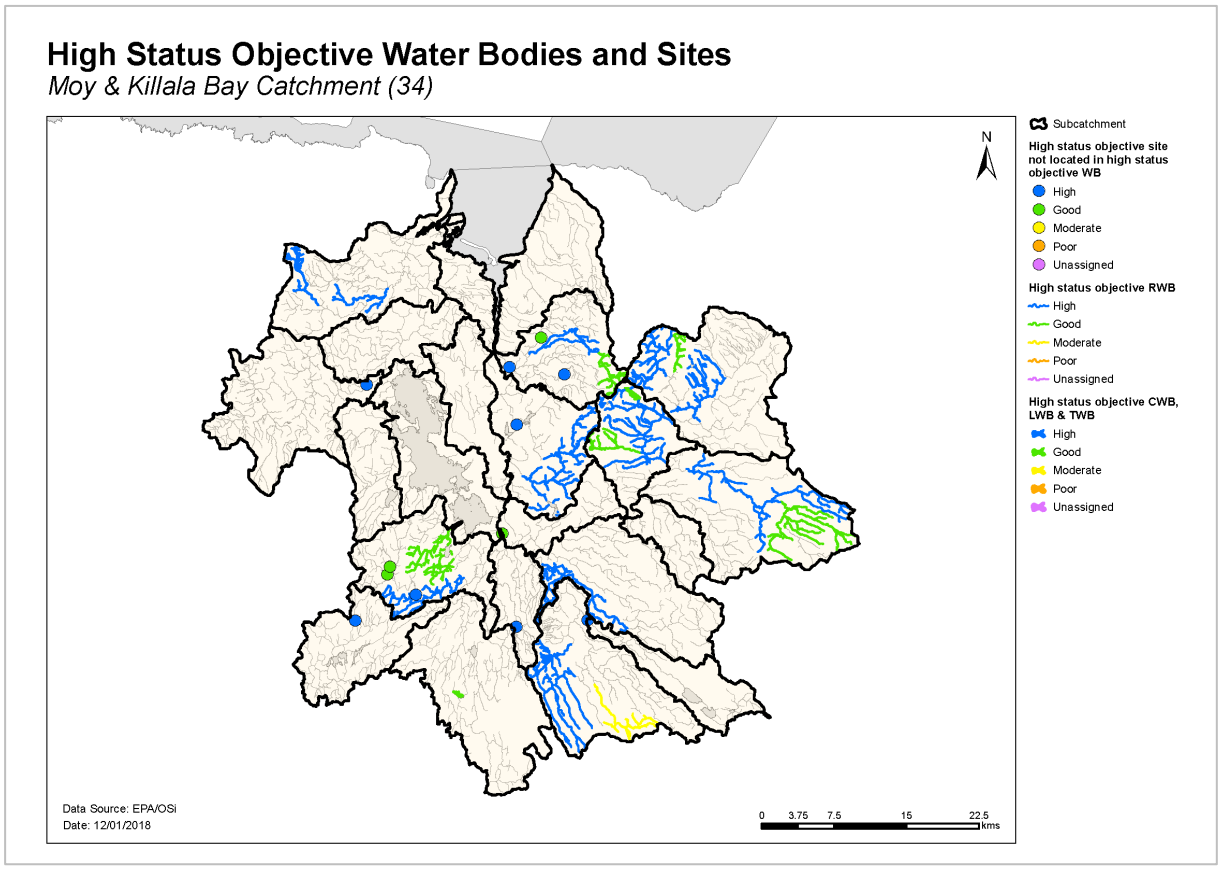


Figure 3. High ecological status objective water bodies and sites

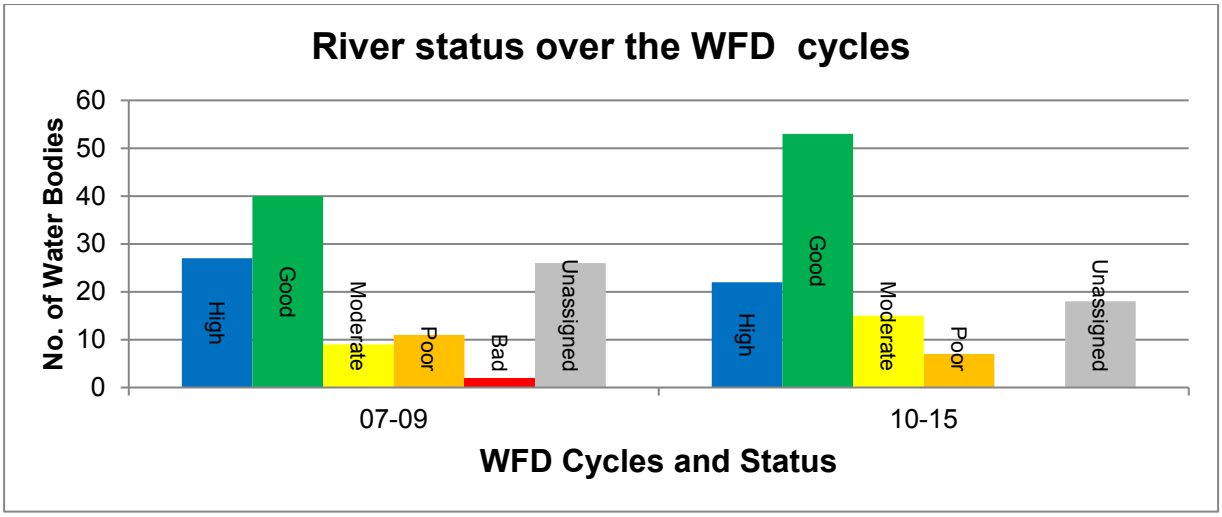


Figure 4. Number of rivers at each status class in 2007-09 and 2010-15

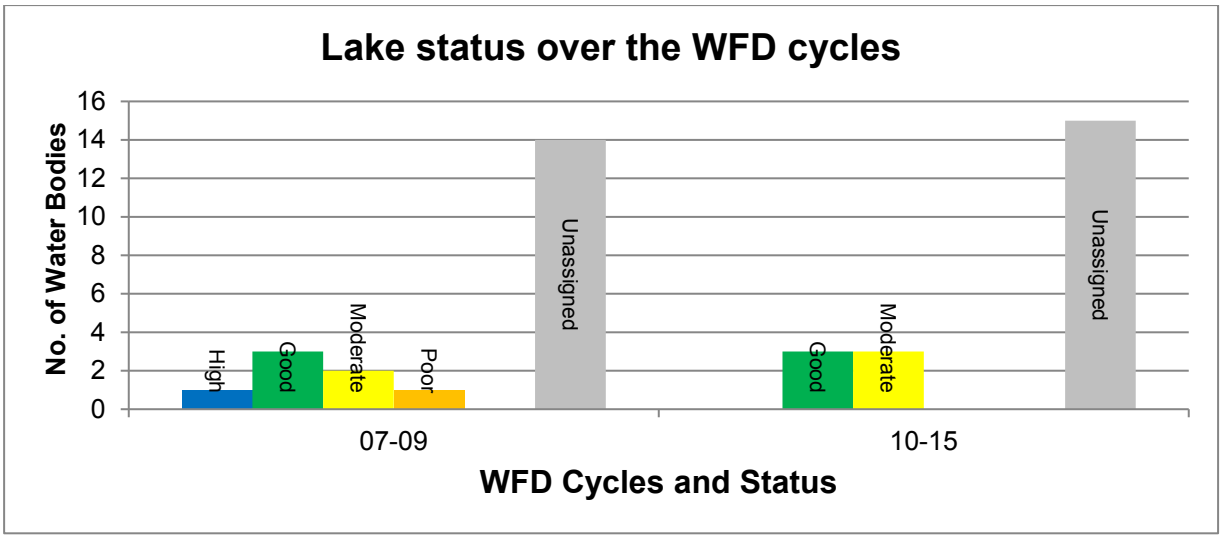


Figure 5. Number of lakes at each status class in 2007-09 and 2010-15

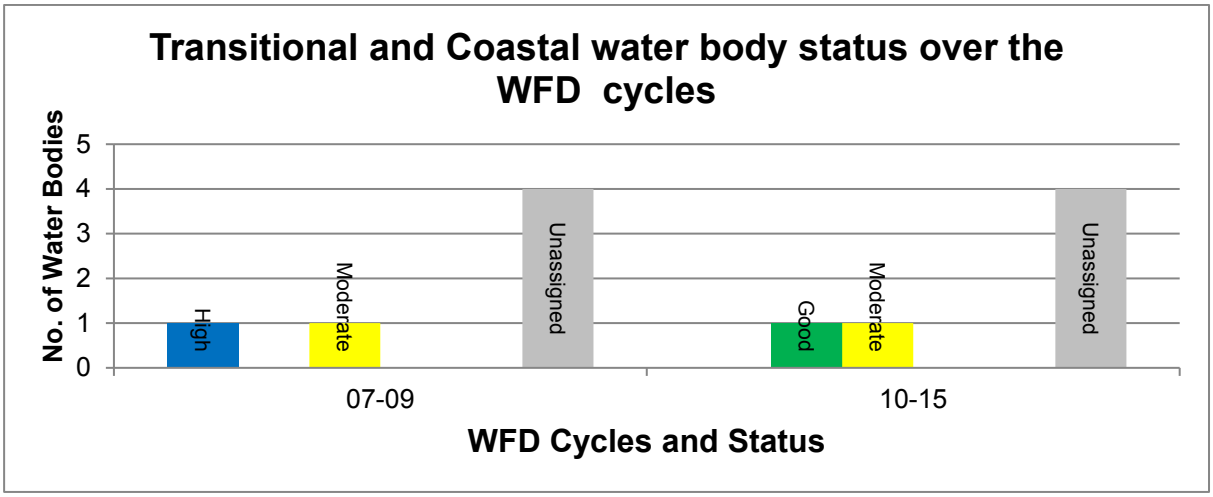


Figure 6. Number of transitional and coastal water bodies at each status class in 2007-09[1] and 2010-15

[1] 2007-09*Not all elements were included in this assessment so changes between periods may not reflect ecological change

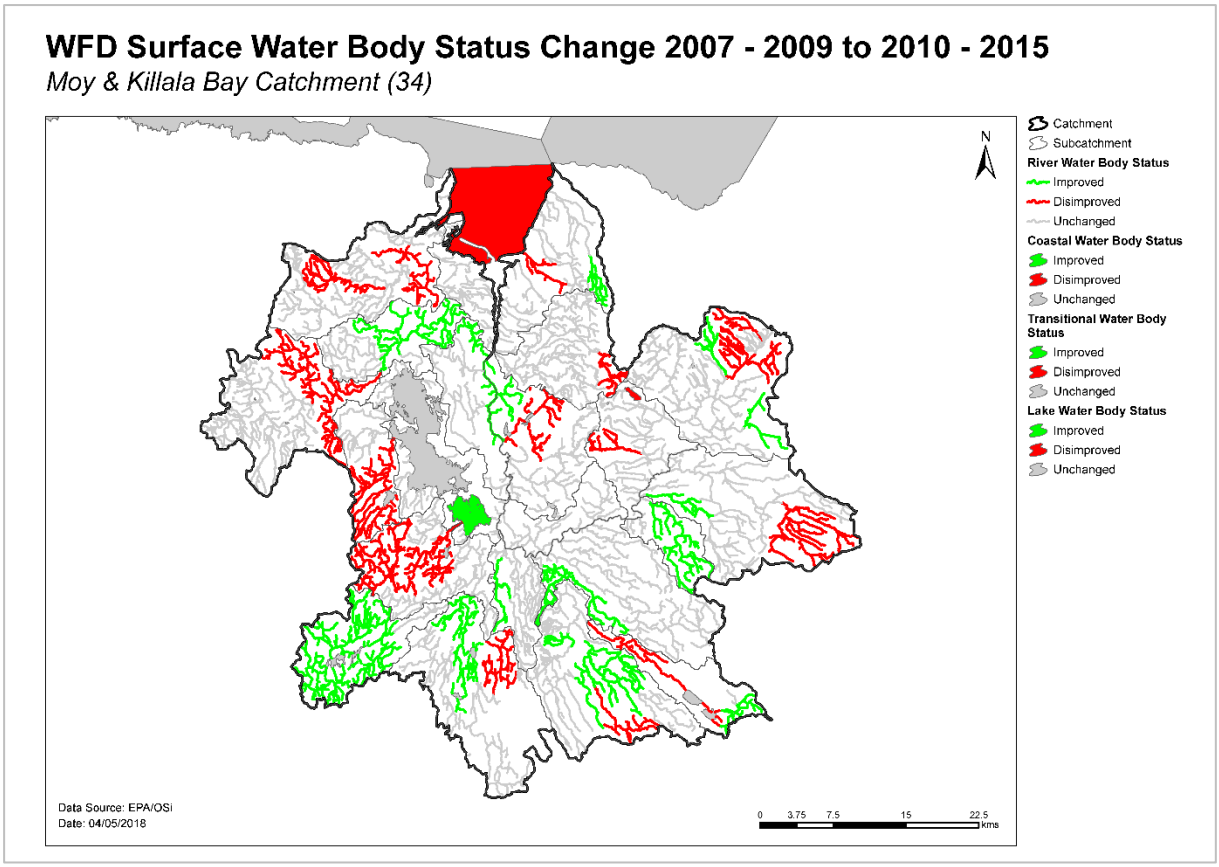


Figure 7. Surface water body status changes from 2007-09 to 2010-15

2.2 Groundwater status

- All 19 groundwater bodies were at Good status in 2015 (Table 3).

Table 3. Summary of groundwater body status and risk categories

	Number of water bodies	2010-15 Status		Risk Categories		
		Good	Poor	*Not at Risk*	*Review*	*At Risk*
Groundwater	19	19	0	19	0	0

2.3 Risk of not meeting surface environmental objectives

2.3.1 Rivers and lakes

- There are 74 *Not at Risk* river water bodies and three 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 13 river and 13 lake water bodies in *Review*. This applies to 20 water bodies where more information is required and six water bodies where measures have recently been implemented and improvements have not yet been realised.

- Thirty-three river and lake water bodies in the catchment are *At Risk* of not meeting their water quality objectives. Measures will be needed in these water bodies to improve the water quality outcomes. Summary information for the *At Risk* water bodies is given in Appendix 3.

2.3.2 Transitional and Coastal (TraC)

- Three TraC water bodies are *Not at Risk* (Figure 8, Table 2) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Two TraC water bodies (Cartoon Lough and Killala Bay) are in *Review* where more information is required.
- One TraC water body (Moy Estuary) in the catchment is *At Risk* of not meeting its water quality objectives. Measures will be needed in this water body to improve the water quality outcomes.

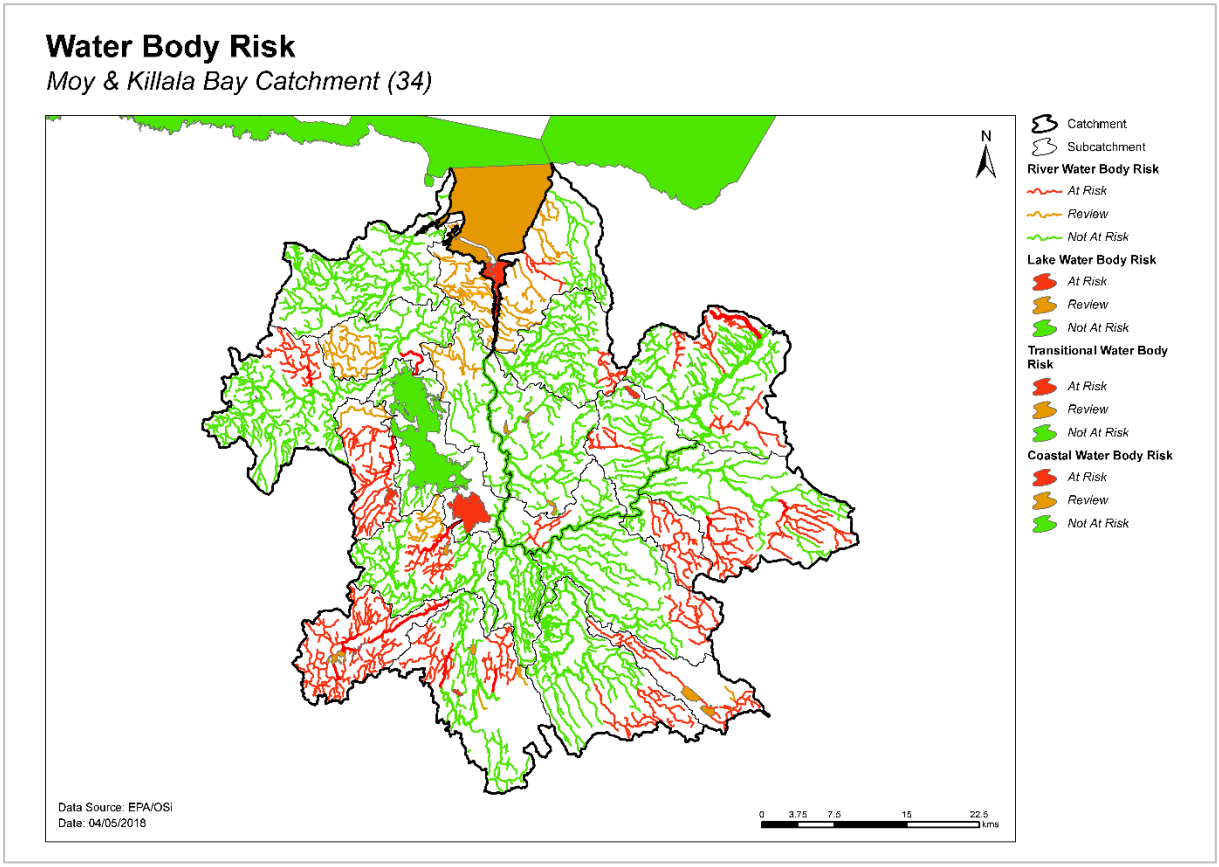


Figure 8. Surface water body risk

2.4 Risk of not meeting groundwater environmental objectives

- Nineteen groundwater bodies are *Not at Risk* (Figure 9, Table 3) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.

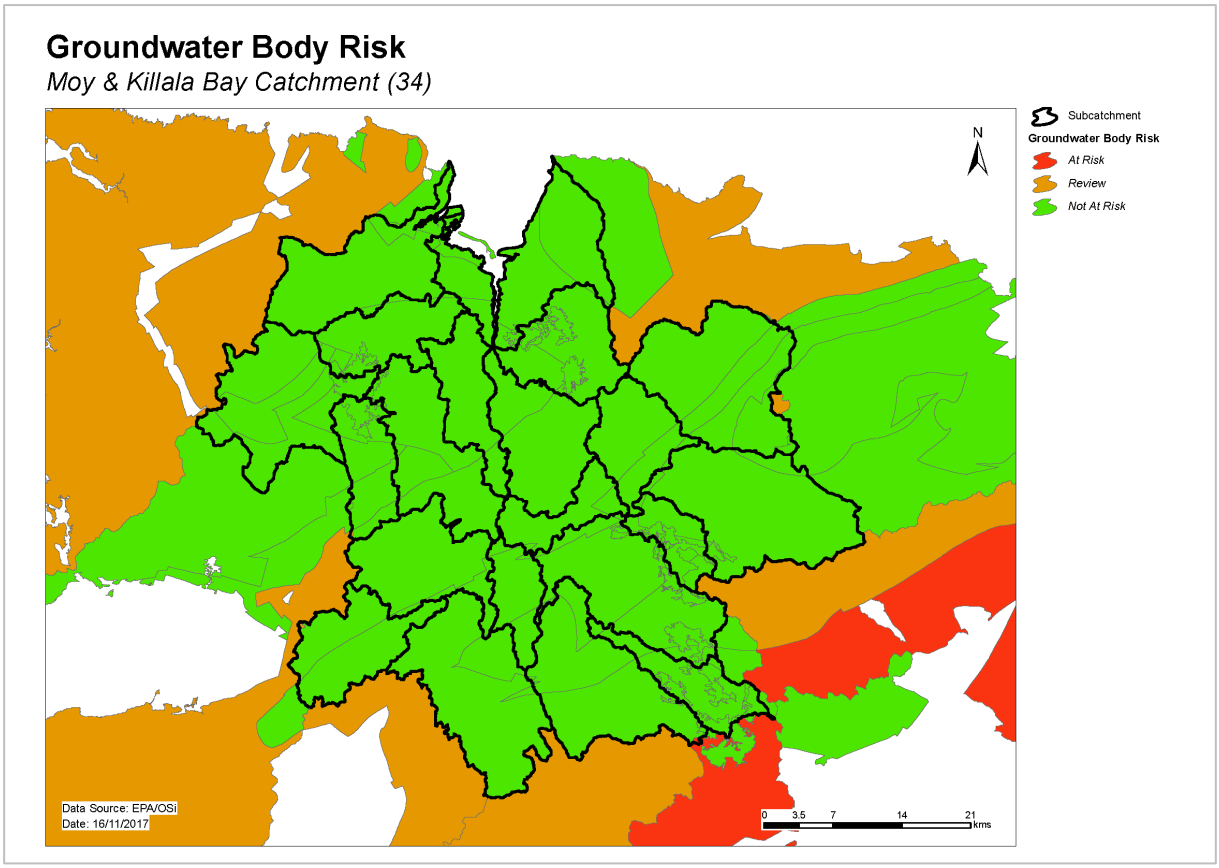


Figure 9. Groundwater body risk

2.5 Protected areas

2.5.1 Drinking water abstractions

- There are 39 abstractions in the Moy & Killala Bay Catchment comprising 12 group water schemes, 11 public supplies and 12 private supplies (Appendix 4).
- Twenty-eight of the abstractions are from seven groundwater bodies, four are from three lakes (Lough Conn, Callow and Carrowmore), and the remainder are from seven river water bodies. The list of the public supplies and the associated water bodies is provided in Appendix 4.
- All sources were compliant with the standard for nitrate in 2015.
- Three sources were non-compliant for pesticides in 2015 – Ballina-Lisglennon, Ballina-Wherrew and Kiltimagh, which are abstracted from Lough Conn, Moy 34_100 and Glore (Mayo)_020, respectively. The key issue in all three sources was MCPA. All other sources were compliant.

2.5.2 Bathing waters

- There are three designated marine bathing waters in the catchment. All three are in satisfactory condition.
- The list of the bathing waters and the associated water bodies is provided in Table 4.

2.5.3 Shellfish areas

- There is one designated shellfish area in the catchment. This is compliant with the relevant standards and there no water quality issues of concern.
- Details on the shellfish area and its associated water body is summarised in Table 5.

Table 4. Designated bathing waters in the catchment

Bathing water		Water body intersection		Objective met?	
Name	Code	Name	Code	Yes	No
Ross Beach, Killala	IEWEBWC420_0000_0200	Killala Bay	IE_WE_420_0000	✓	
Enniscrone Beach	IEWEBWC420_0000_0100	Killala Bay	IE_WE_420_0000	✓	

Table 5. Designated shellfish areas in the catchment

Shellfish area		Water body intersection		Objective met?	
Name	Code	Name	Code	Yes	No
Killala Bay	IEPA2_0060	Killala Bay	IE_WE_420_0000	✓	

2.5.4 Nutrient Sensitive Areas

- There are two designated Nutrient Sensitive Areas (NSAs) in the catchment. The NSAs are associated with Castlebar waste water treatment and both are compliant with their environmental objectives. The list of NSAs and the associated water bodies are provided in Table 6.

Table 6. Nutrient sensitive areas in the catchment

Nutrient Sensitive Area		Agglomeration		Objective met?		Comment
Name	Code	Name	Code	Yes	No	
Castlebar (River)	IERI_WE_1994_0003a	Castlebar	D0047	✓		Tertiary treatment is in place.
Clydagh (River)	IERI_WE_1994_0003b					

2.5.5 Natura 2000 Sites

- There are 10 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.
- Eight river water bodies have been prioritised for action as the water conservation objectives for their habitats and/or species are not being supported by ecological status.
- There are two Special Protected Areas (SPAs) in the catchment:
    - Killala Bay/Moy Estuary SPA
    - Lough Conn and Lough Cullin 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.

- There are five river water bodies that are designated as salmonid rivers (under Salmonid Regulations (S.I. 293 / 1988)) but are not located within SACs. Three of these water bodies (Castlebar_010, Castlebar_020, Glore (Mayo)_010) have been prioritised for action as the water conservation objectives for this species are not being supported by ecological status.

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

- Excess phosphorus leading to eutrophication is the dominant issue in the rivers and lakes.
- Alteration of hydromorphological (or physical) conditions are impacted including the input of high levels of fine sediment. Such impacts have altered the morphology of water bodies and in turn, altered habitat conditions.
- The Moy Estuary (IE_WE_420_0300) is impacted by excess nutrients leading to eutrophication. The estuary is nitrogen limited in spring/summer. The physical conditions in the lower estuary and the coastal water body are such that eutrophication is not an issue in those areas.
- There are no *At Risk* groundwater bodies.

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.
- Figures 10 shows a breakdown of the number of *At Risk* water bodies in each significant pressure category.
- The significant pressure affecting the greatest number of water bodies is hydromorphology, followed by agriculture, urban waste water, forestry, domestic waste water, other, diffuse urban, peat and mines and quarries.

4.1.1 Rivers, lakes, transitional and coastal (TraC)

- Significant pressures have been identified by the initial characterisation process in 34 water bodies, 26 of which have multiple pressures. The significant pressures will be refined as further characterisation is carried out.

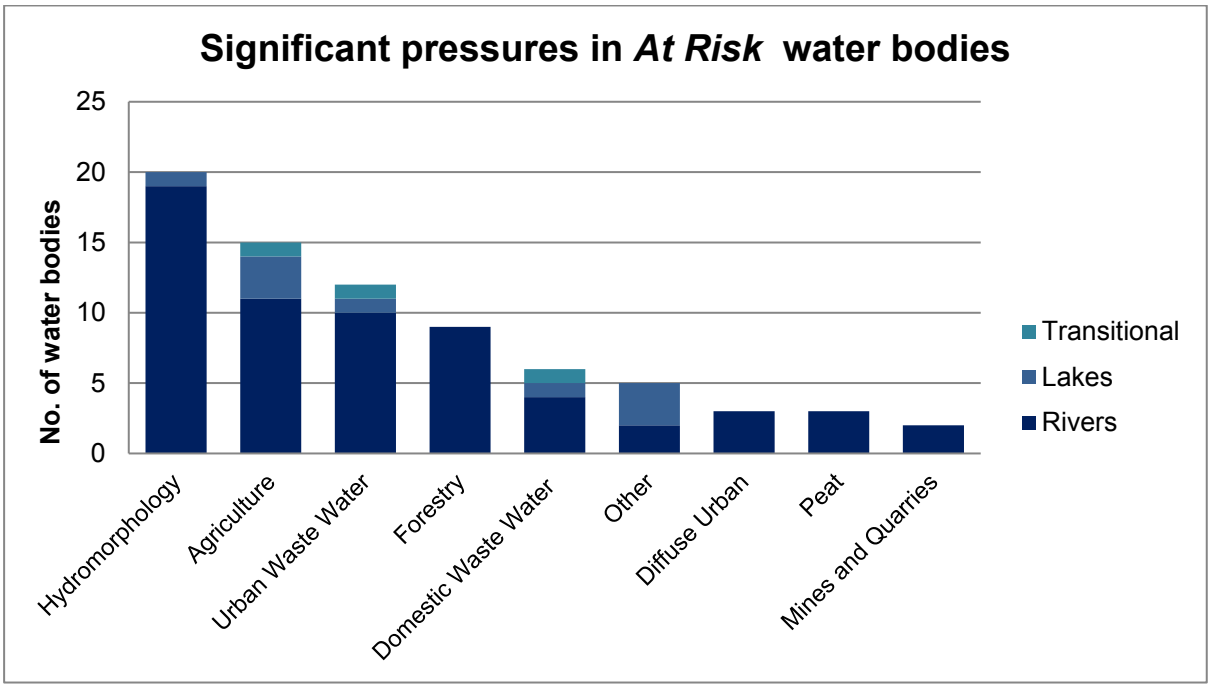


Figure 10. Significant pressures impacting on *At Risk* water bodies

4.2 Pressure type

4.2.1 Hydromorphology

- Hydromorphology is a significant pressure in 19 river water bodies and one lake water body. Several river water bodies within the catchment are subject to extensive modification due to arterial drainage. The channel within a river water body of the Deel subcatchment has undergone extensive modification for peat extraction. Extensive land drainage exists within several river water bodies of the Moy and Pollagh subcatchments in addition to a lake water body within the Castlebar subcatchment. Bank erosion due to animal access within two river water bodies of the Moy subcatchment is also contributing to excessive levels of siltation. Water bodies that are *At Risk* and impacted by hydromorphological pressures are shown in Figure 11, Table 6a and listed in Appendix 3.

Table 6a. – Hydromorphological Pressures in the Moy Killala Bay Catchment

Pressure	Sub-catchment	Water body Code
Modification due to Drainage Schemes (Channelisation)	Glore_010	Glore_010
	Glore_010	Glore_020
	Addergoole_010	Addergoole_010
	Moy_020	Bellanamean_010
	Deel_010	Shanvolahan_010
	Pollagh_010	Cloonlavis_010
	Pollagh_010	Yellow_010
	Moy_030	Black_010
	Moy_030	Charlestown Stream_010
	Moy_030	Owengarve_010
	Castlebar_030	Crumlin (Lough Cullin) _010
	Castlebar_020	LoughNaminoo Stream_010
	Castlebar_020	Manulla_020
	Castlebar_010	Castlebar_010
	Castlebar_010	Castlebar_020
Land Drainage	Moy_040	Sonnagh_010
	Pollagh_010	Cloonlavis_010
	Moy_010	Moy_010
	Moy_030	Black_010
	Castlebar_020	Washpool
Bank Erosion	Moy_010	Loughanaboll_010
	Moy_010	Mad_010

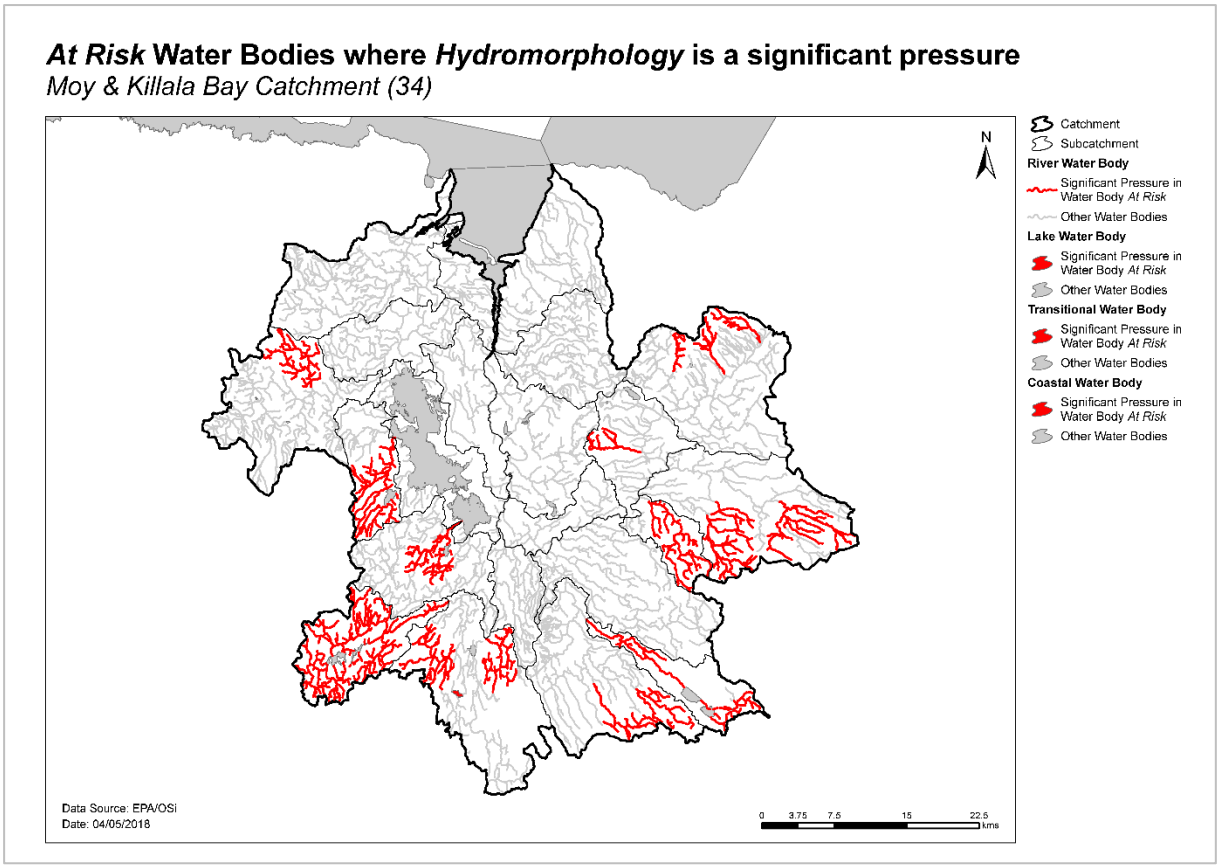


Figure 11. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

4.2.2 Agriculture

- Agriculture is a significant pressure in 11 river and three lake water bodies and the Moy Estuary (Figure 12, Appendix 3). The issues related to farming in this catchment are predominantly due to 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. Pesticides have also been detected in three water bodies, typically associated with grassland management.

- The pollution impact potential map showing areas of relative risk for phosphorus loss from agriculture to surface water is given in Appendix 6.

4.2.3 Urban waste water treatment plants

- Urban Waste Water Treatment Plants (WWTPs) have been identified as a significant pressure in 12 *At Risk* water bodies; details are given in Table 7 and Figure 13. Six of these *At Risk* water bodies are impacted by WWTPs that are scheduled to be upgraded, and Lahardane WWTP, which impacts Castlehill_010, was upgraded in 2017.

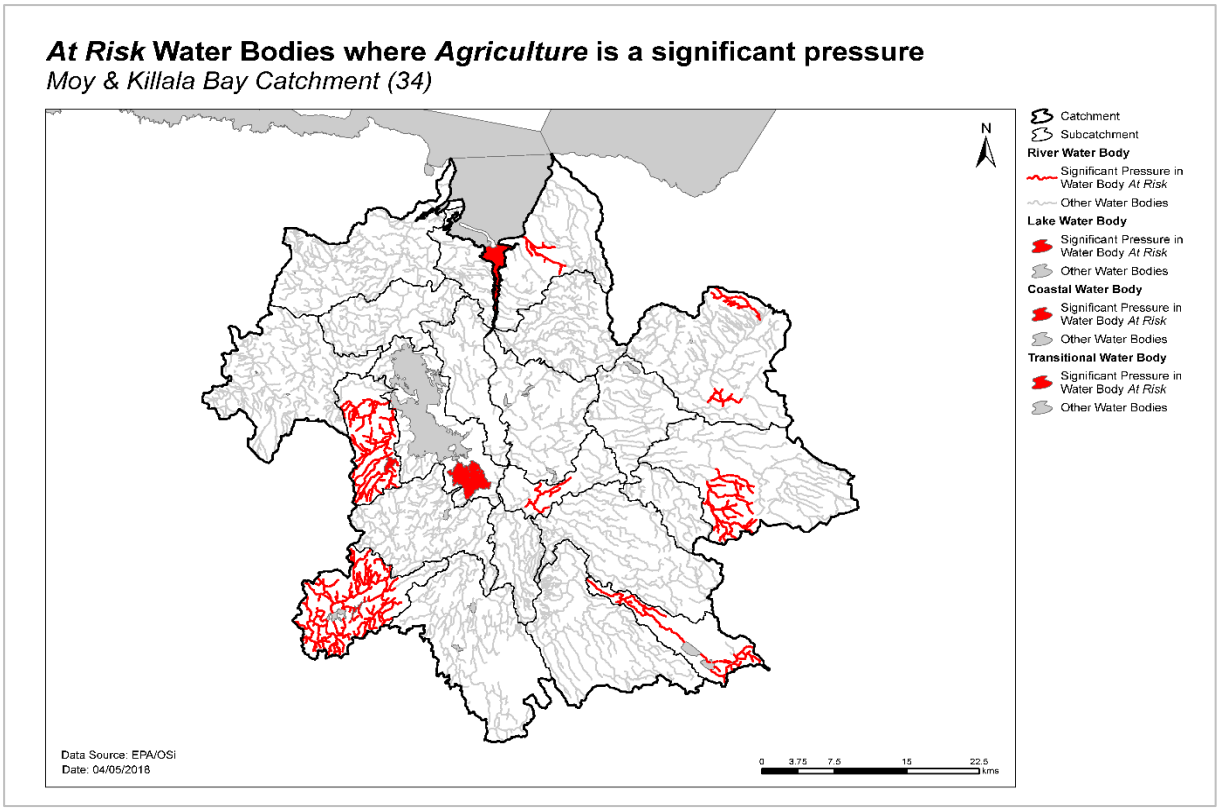


Figure 12. Water bodies that are *At Risk* and are impacted by agricultural activities

Table 7. Waste Water Treatment Plants identified as significant pressures in *At Risk* water bodies

Facility name	Facility Type	Water Body	2010-15 Ecological Status	Expected Completion Date
Knock D0065	2,001 to 10,000 p.e.	Yellow (Knock)_010	*Unassigned* [2]	*NA* [3]
Castlebar D0047	> 10,000 p.e.	Lough Cullin	Moderate	*NA* [3]
Castlebar D0047	> 10,000 p.e.	Castebar_020	Poor	*NA* [3]
Tubbercurry D0092	2,001 to 10,000 p.e.	Tubbercurry Stream_010	Poor	2019
Tubbercurry D0092	2,001 to 10,000 p.e.	Tubbercurry_010	Poor	2019
Tubbercurry D0092	2,001 to 10,000 p.e.	Tubbercurry_020	Poor	2019
Kilkelly D0357	500 to 1,000 p.e.	Trimoge_010	Moderate	*NA* [3]
Charlestown D0214	1,001 to 2,000 p.e.	Charlestown Stream_010	Poor	2020
Balla D0216	1,001 to 2,000 p.e.	Loughnaminoo Stream_010	Poor	2018
Knock Airport D0354	500 to 1,000 p.e.	Sonnagh (Moy)_010	Moderate	*NA* [3]
Lahardane D0380	500 to 1,000 p.e.	Castlehill_010	*Unassigned* [2]	Complete
Ballina D0016	> 10,000 p.e.	Moy Estuary	Moderate	*NA* [3]
Killala D0067	1,001 to 2,000 p.e.	Moy Estuary	Moderate	2019

[2] *Ecological Status is not available for Yellow (Knock)_010 and Castlehill_010, however, following discussions with Mayo County Council, both water bodies was deemed to be At Risk of not meeting their environmental objectives.*
[3] *Currently not specified in improvement plans.*

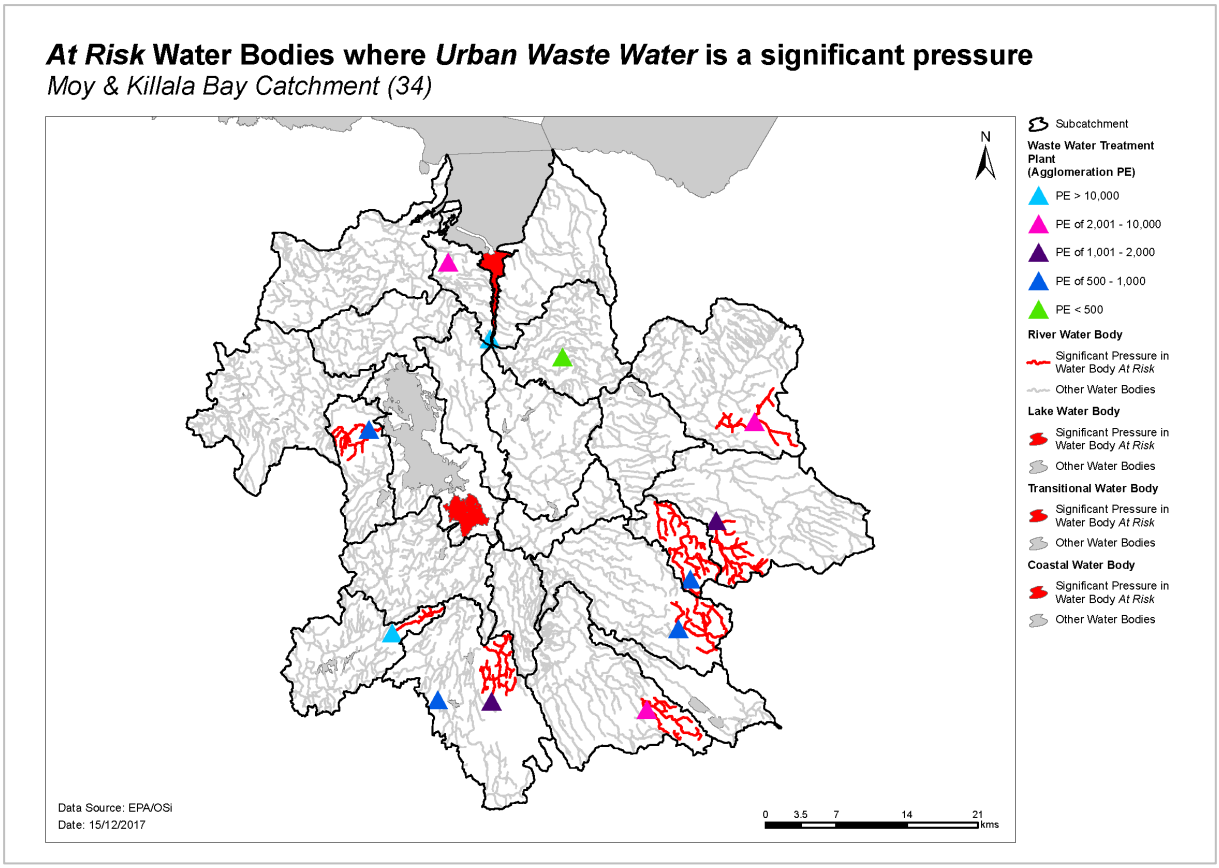


Figure 13. River and lake water bodies that are *At Risk* and are impacted by urban waste water

4.2.4 Forestry

Forestry has been identified as a significant pressure in nine river water bodies (Figure 14, Appendix 3). The significant issues are arising primarily through clearfelling and associated operations, which results in increased sediment and nutrient loads. Afforestation is also a pressure, with drainage and fertilisation as potentially significant pressures at the replanting stage.

4.2.5 Domestic waste water

- Domestic waste water has been identified as a significant pressure in four river water bodies, one lake water body, and the Moy estuary. The significant issues arise from inadequate domestic waste water systems, many of which are sited on areas of high pollution impact potential/poorly draining soils, resulting in enrichment and potential for microbial/organic contamination (Figure 15, Appendix 3).

4.2.6 Other significant pressures

- *Invasive species*
  Invasive species (i.e. zebra mussels) have been identified as a potentially significant pressure in two lake water bodies (Cullin and Castlebar lakes) (Figure 16).

- *Abstraction*
  Lough Talt is *At Risk* as it is failing its High status objective (the 2010-15 ecological status was Good with fish status being the ecological element driving the status). Water abstraction was identified as a potentially significant pressure (Figure 17).

- *Unknown anthropogenic*
  The significant pressure(s) within two river water bodies (Deel (Crossmolina)_060 and Glenree_010) is unknown (Figure 18).

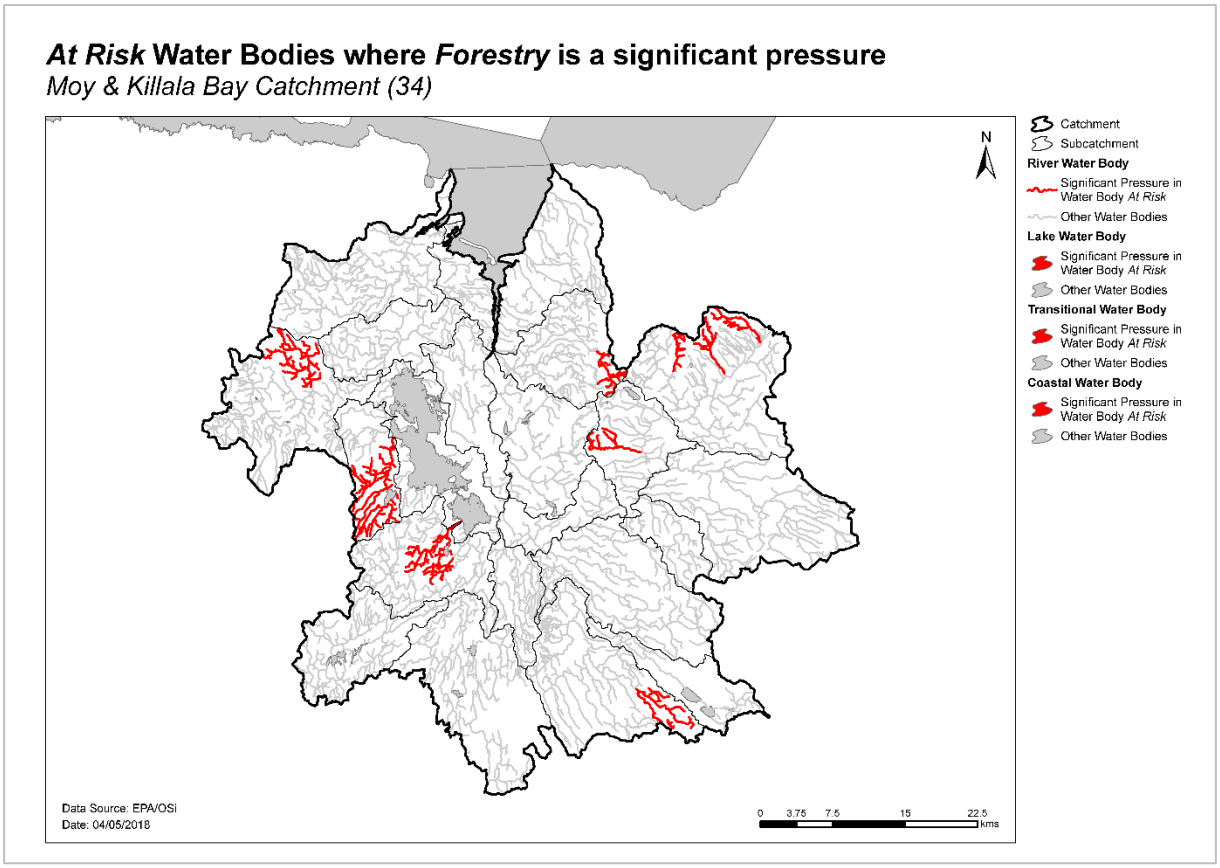


Figure 14. Water bodies that are *At Risk* and are impacted by forestry

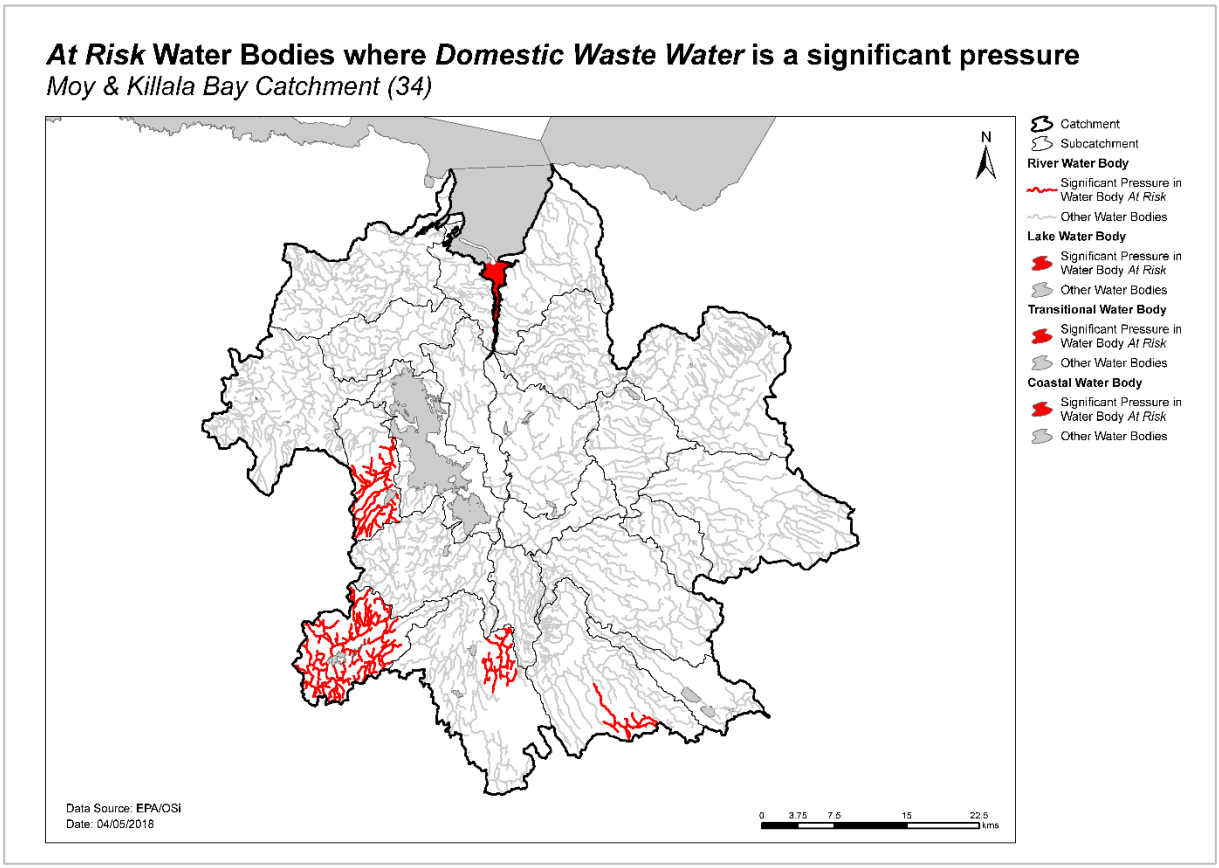


Figure 15. River and lake water bodies that are *At Risk* and are impacted by domestic waste water

4.2.7 Diffuse urban

- Diffuse urban pressures, caused by misconnections, leaking sewers and runoff from paved and unpaved areas, have been identified as a significant pressure in three water bodies from both Castlebar and Iniscrone. The significant issues are a combination of enrichment due to upward orthophosphate and spikes in ammonia concentrations (Figure 19, Appendix 3).

4.2.8 Extractive industry

- *Peat*

  Peat drainage and extraction has been identified as a significant pressure in three river water bodies (Shanvolahan34_010, Lough Muck Stream_010 and Glenree_010). This has resulted in increased sediment loads, which alters habitats, morphology and hydrology. The Bord na Mona Energy Oweninny site on Shanvolahan_34_010 has ceased operation and habitat rehabilitation/regeneration measures have been installed (Figure 20).

- *Mines & Quarries*

  Quarries have been identified as a significant pressure in two water bodies (Trimoge_010 and Castlebar_020). The significant issues are a combination of sediment release and organic pollution (Figure 20).

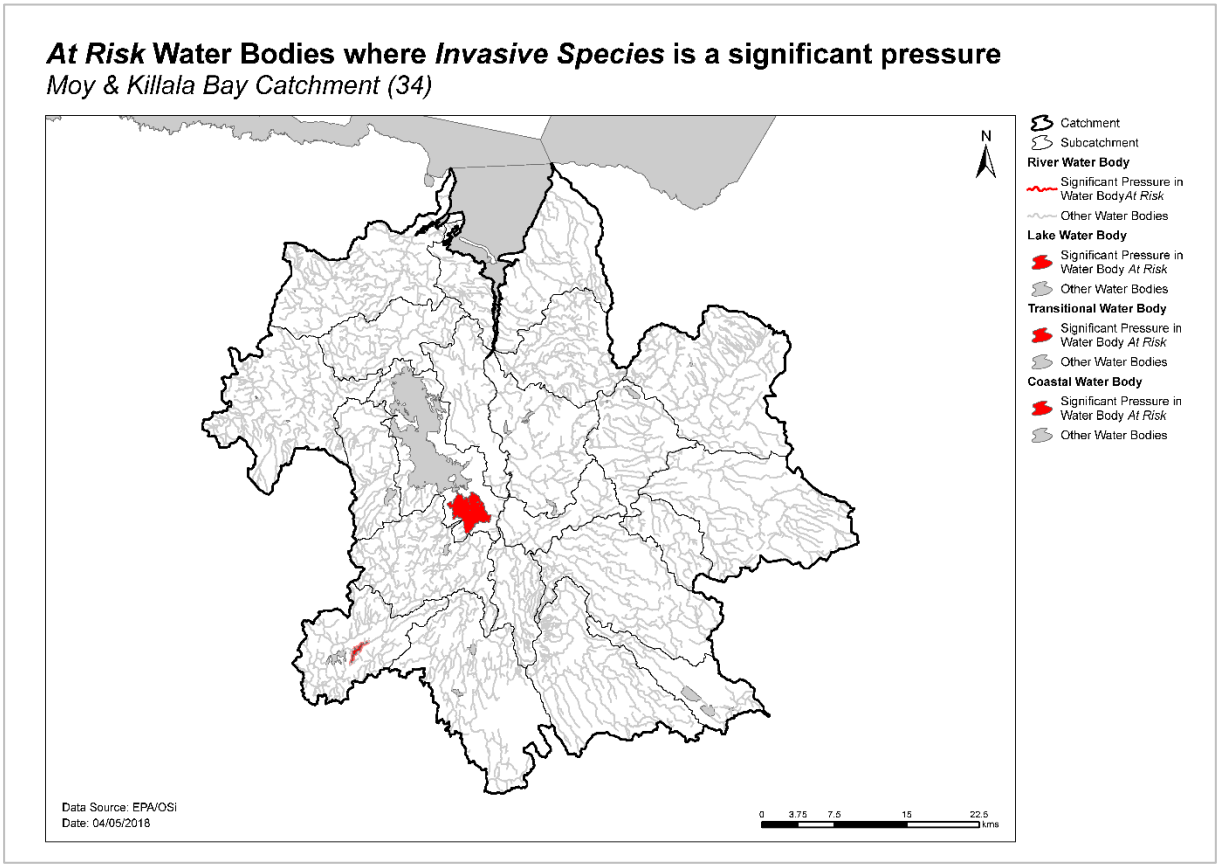


Figure 16. Water bodies that are *At Risk* and are impacted by invasive species

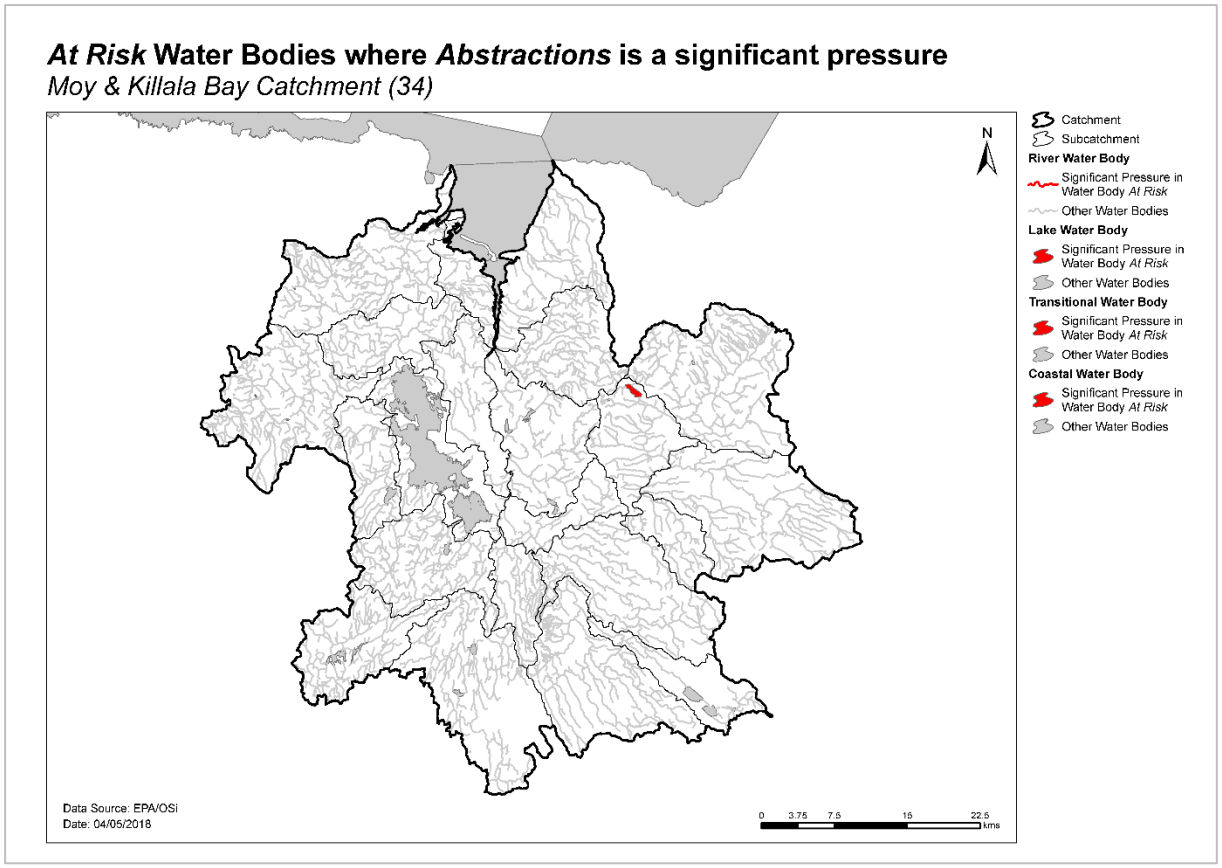


Figure 17. Water bodies that are *At Risk* and are impacted by abstraction

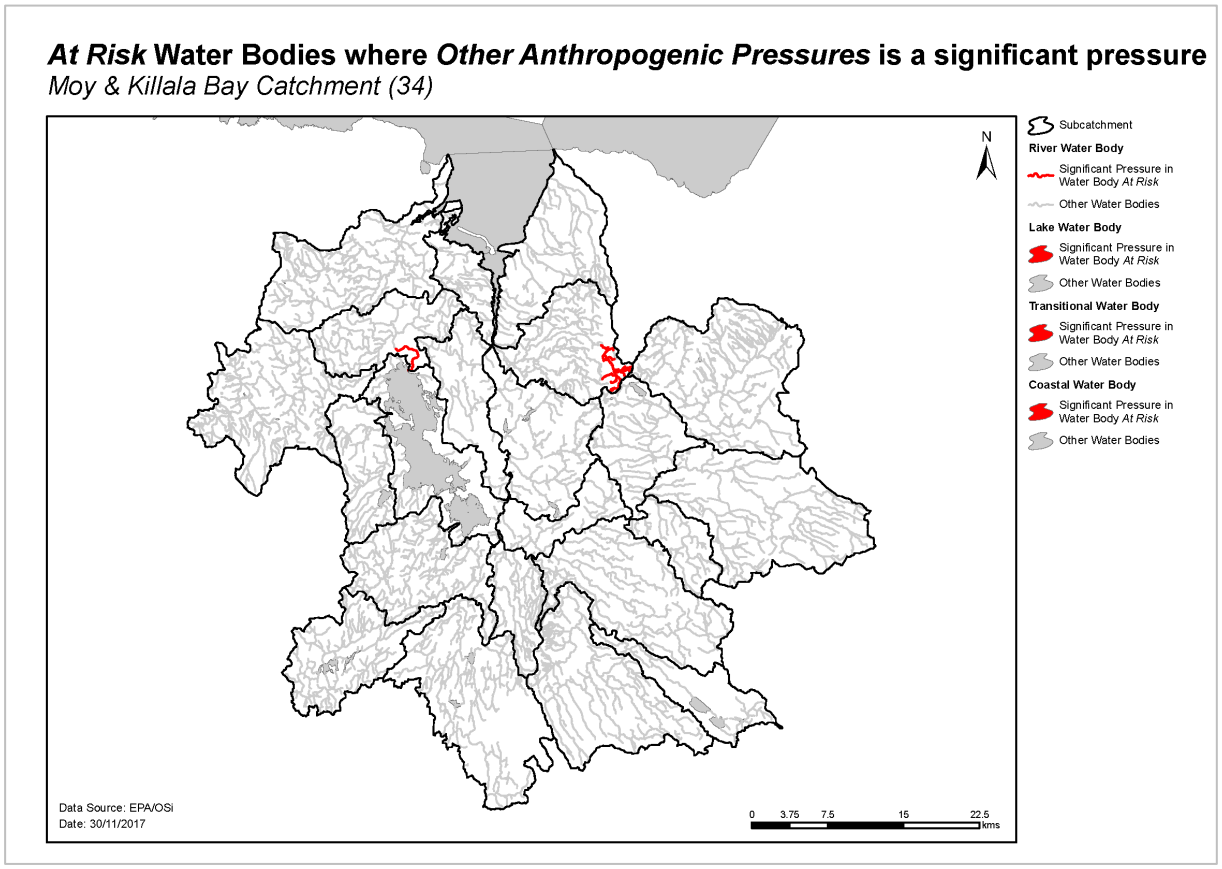


Figure 18. Water bodies that are *At Risk* and are impacted by anthropogenic pressures

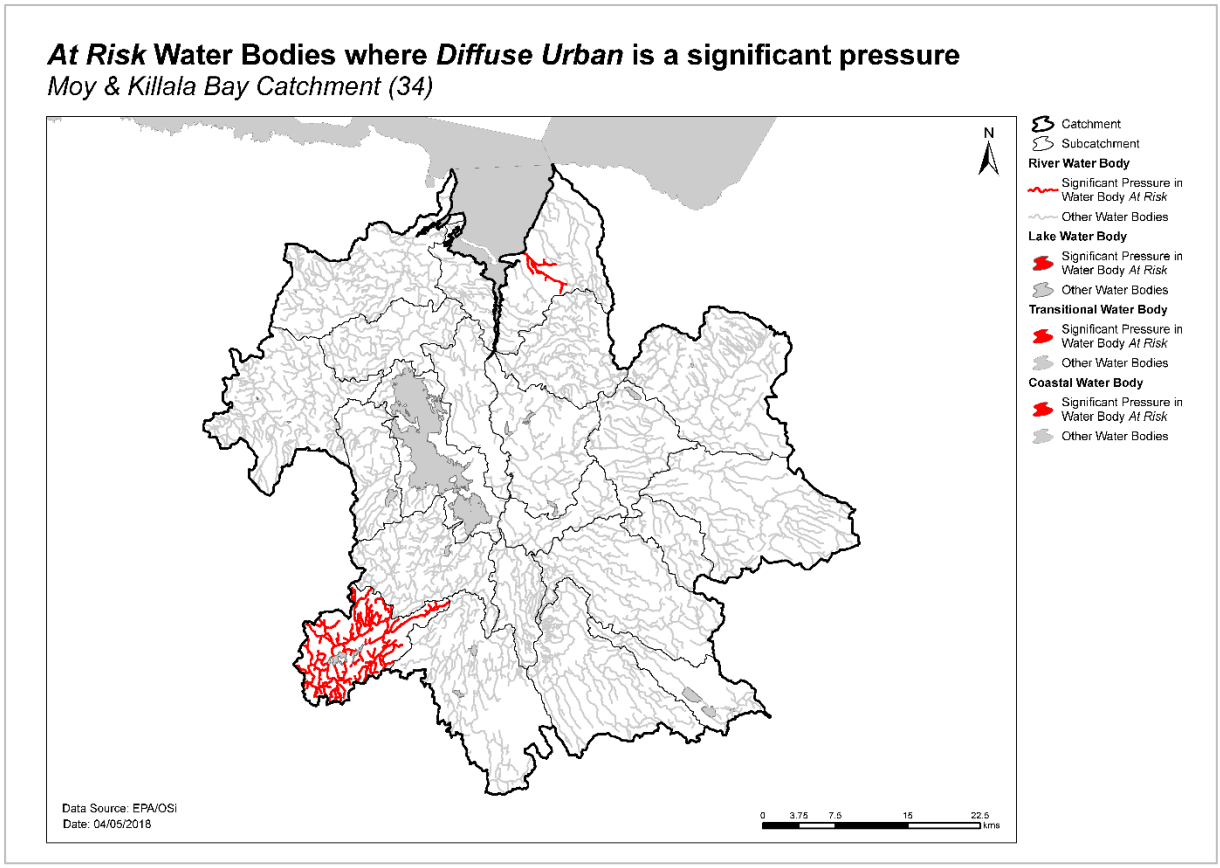


Figure 19. Water bodies that are *At Risk* and are impacted by diffuse urban pressures

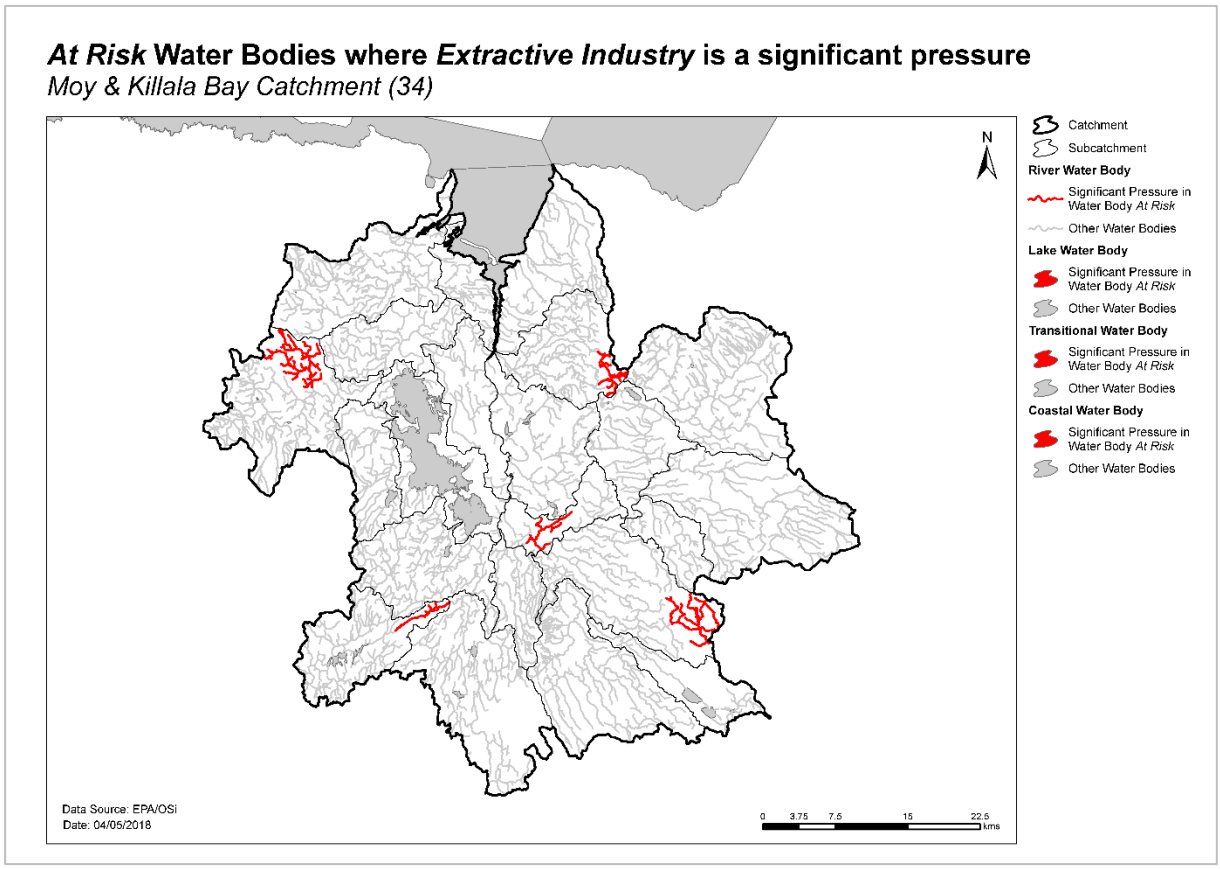


Figure 20. Water bodies that are *At Risk* and are impacted by extractive industries

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 Moy and Killala Bay catchment, water chemistry data are available for 95 stations within the 115 water bodies. The available data indicate that load reductions are required in two of these river water bodies (Table 9).

Table 9. Relative load reductions required in monitored water bodies that are *At Risk*

Water Body	P Load Reduction Required
TUBBERCURRY_020	V. High
TUBBERCURRY STREAM_010	Low

5.2 TraC load reductions

Some 18 estuaries in Ireland have been monitored on a continual basis since 1990 as part of Ireland's commitment under the Convention for the Protection of the Marine Environment of the North-East Atlantic (the Ospar Convention). This has shown that generally over the long term, nutrients have decreased but further reduction will be required in many cases to support Good Ecological Status. However, many estuaries have not been monitored to the same degree, and where monitoring data in insufficient, an ongoing programme of modelling has been undertaken to estimate potential nutrient load removal from contributing sub-catchments.

Different estuaries may require reductions in different nutrients. Further modelling work is required to determine precisely what load reductions are required, but in the interim, further monitoring will be carried out to assess the improvements resulting from various planned measures, and to confirm the nature of the issues.

- Estuarine water quality modelling has been carried out by the EPA for the Moy estuary which is impacted by excess macroalgae. This initial modelling indicates that the Moy Estuary is nitrogen limited during the spring/summer period, and that a 15% reduction in the nitrogen load (or 300 t yr-1 TN) would reduce the macroalgal standing stock in the system by 29%. Further modelling and analyses are required to determine whether a 29% reduction would be sufficient to improve the ecological status.

- The Ballina WWTP discharges into the estuary and is non-compliant with its licence conditions for breaches of nitrogen limits and is a significant pressure. The Killala WWTP is also a significant pressure. The proportion of the N load from these WWTPs is less than 10% of the overall catchment load to the estuary. However, the relatively high bioavailability of nitrogen in urban waste water, and the timing and location of the discharges directly into the estuary all year round, suggest that addressing the urban waste water issues would be an important first step. If this does not result in adequate improvements, additional N load reductions from agriculture and domestic waste water systems from around the catchment will be required.

  As part of the Irelands commitment to the Ospar Convention, nutrient flux or load monitoring has been carried out on the Moy Estuary since 1990 (Figure 20a and 20b). Further analysis of these nutrient load trends is available at http://dx.doi.org/10.3318/BIOE.2016.23.

Figure 20a – Total Nitrogen Load (Tonnes/year) 1990-2015

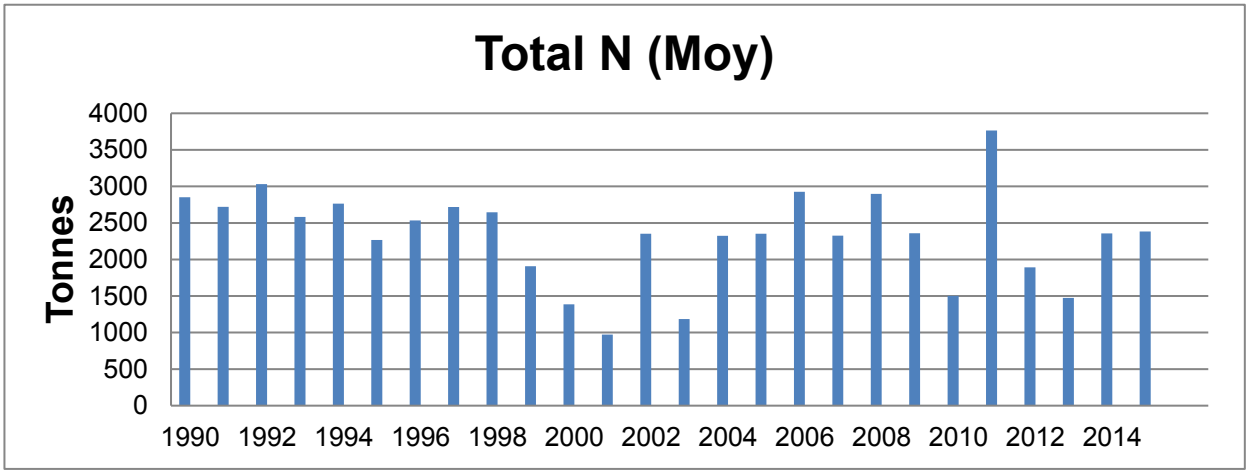
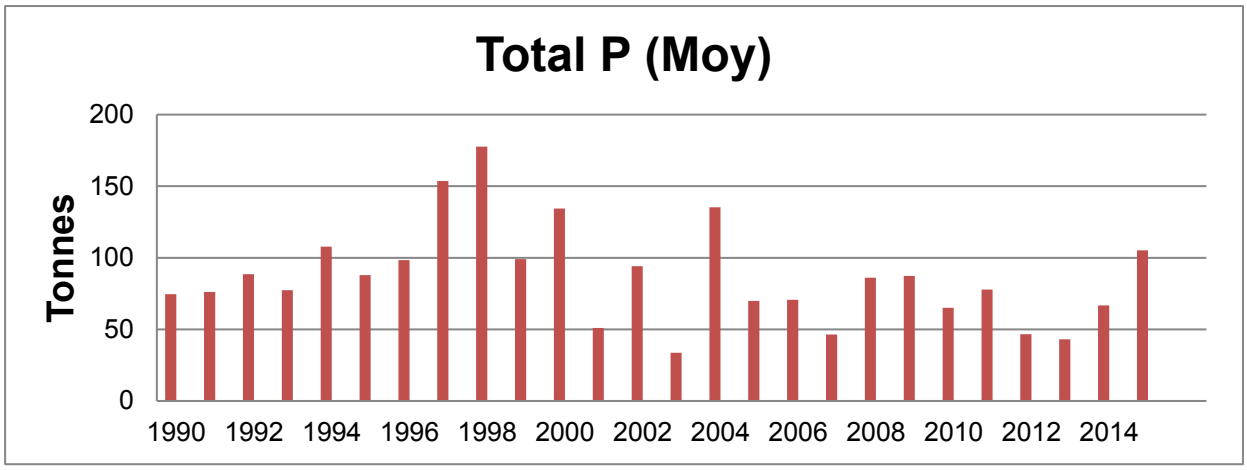


Figure 20b – Total Phosphorus Load (Tonnes/year) 1990-2015



6 Further Characterisation and Local Catchment Assessments

- Further characterisation through local catchment assessments is needed in 33 of the *At Risk* river and lake water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.
- Further characterisation through local catchment assessments is needed in 26 *Review* river and lake water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.
- A specialist assessment will be required to determine the extent of the reduction in agricultural losses of nitrogen that will be required to improve ecological status in the estuary.
- Brief definitions on the 10 IA assessment scenarios are given in Appendix 7.

Table 10. 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	30	2	0	1	0	3	16	6	5	0	**63**
Review	9	0	20	0	0	0	0	0	0	0	**29**

7 Catchment summary

- Of the 115 river water bodies, 28 are *At Risk* of not meeting their WFD objectives.
- Five out of 21 lake water bodies are *At Risk* of not meeting their WFD objectives.
- The Moy Estuary (IE_WE_420_0300) is *At Risk* and is impacted by eutrophication. The estuary is N limited and urban waste water, agriculture and domestic waste water are the significant pressures.
- There are no *At Risk* groundwater bodies.
- Hydromorphological (or physical) conditions (including the input of high levels of fine sediment) and poor habitat quality are major issues for several surface water bodies.
- Excess nutrient loss, mainly phosphate, leading to eutrophication is also 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 domestic).

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 eight areas for action in the Moy Killala Bay 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 process from 2018 to 2021.

8.2 Outcomes of process

The outcomes for the Moy and Killala Bay catchment are summarised below.

- Eight recommended areas for actions (Table 11, Figure 21) were selected.
- These are the Glenree, Owengarve Charleston, Cloonlavis/Glore, Cullin/Crumlin, Castlebar/Lannagh, Upper and Lower Deel, Tubbercurry and Bellawaddy.
- These include 28 *At Risk* and 17 *Review* river water bodies.

A remaining 17 *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 22. These include:

- fourteen river and lake water bodies – five *At Risk* and nine *Review*, and
- three transitional and coastal water bodies – one *At Risk* and two *Review.*

Table 11. Recommended Areas for Action in the Moy and Killala Bay Catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Glenree	1	34_9	Mayo	• It is suspected that deterioration was event based and that focussed efforts should be able to return the water body to high status relatively quickly. • One At Risk High Ecological Status objective deteriorated water body. • Headwater to Not at Risk High Ecological Status objective water body.
Owengarve Charleston	3	34_18	Mayo	• Building on planned improvements at Charlestown WWTP. • One deteriorated water body. • One At Risk High Ecological Status objective water body. • Headwater to Not at Risk High Ecological Status objective water body.
Cloonlavis/Glore	8	34_4, 34_15,	Mayo	• Local authority currently working to address water quality issues associated with agriculture. Two deteriorated water bodies. • One At Risk High Ecological Status objective water body. • One water body failing to meet protected area objectives for drinking water (MCPA). • Two At Risk water bodies with protected area objectives for Salmon. • Subcatchment headwaters.
Cullin/Crumlin	8	34_5, 34_12, 34_20	Mayo	• Lough Cullin is important for both tourism and drinking water. • Two deteriorated water bodies. • One deteriorated High Ecological Status objective water body.
Castlebar/Lannagh	9	34_22, 34_21	Mayo	• Important public amenity. • Building on improvements completed at Castlebar WWTP. • One deteriorated water body. • One At Risk High Ecological Status objective water body. • Two water bodies with Natura designations for salmon. • One water body with Natura designations for crayfish.
Upper and Lower Deel	6	34_8 34_14	Mayo	• High priority for Inland Fisheries Ireland. • Building on peatland restoration. • One deteriorated water body. • Two At Risk water bodies that are failing to meet protected area objectives for crayfish.
Tubbercurry	6	34_16	Sligo	• Building on planned improvements at Tubbercurry WWTP. • Subcatchment headwaters. • One At Risk High Ecological Status objective water body. • One deteriorated water body.
Bellawaddy	4	34_11	Sligo	• One deteriorated water body. • Discharges into designated bathing water (Inishcrone beach). • Important for tourism.

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 28 At Risk surface water bodies, it is predicted that three (10%) will improve by 2021 and 25 (90%) will achieve their objective by 2027. For the 17 Review river water bodies, the absence of information means that there is no scientific basis to quantify an environmental objective date, and therefore a 2027 date is set for these water bodies, see Table 12.

Table 12. 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	24	3	21
Review	9	0	9
Lakes			
At Risk	4	0	4
Review	8	0	8
Total	45	3	42

- Eighty water bodies have met their 2015 environmental objective but three of these water bodies have failed to meet their protected area objective due to drinking water.
- As action is not yet planned to be taken in the remaining six *At Risk* surface water bodies, a 2027 date is applied to all six of these 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 13.

Table 13. 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	4	0	4
Review	4	0	4
Lakes			
At Risk	1	0	1
Review	5	0	5
TraC's			
At Risk	1	0	1
Review	2	0	2
Total	17	0	17

9.2 Groundwater

- All five groundwater bodies in the catchment are Good status and have met their objectives.

10 Acknowledgements

This Moy and Killala Bay Catchment Assessment (Version 3) has been produced by the Catchment Science & Management Unit, EPA, with the assistance of the following:

- Mayo County Council
- Sligo 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.

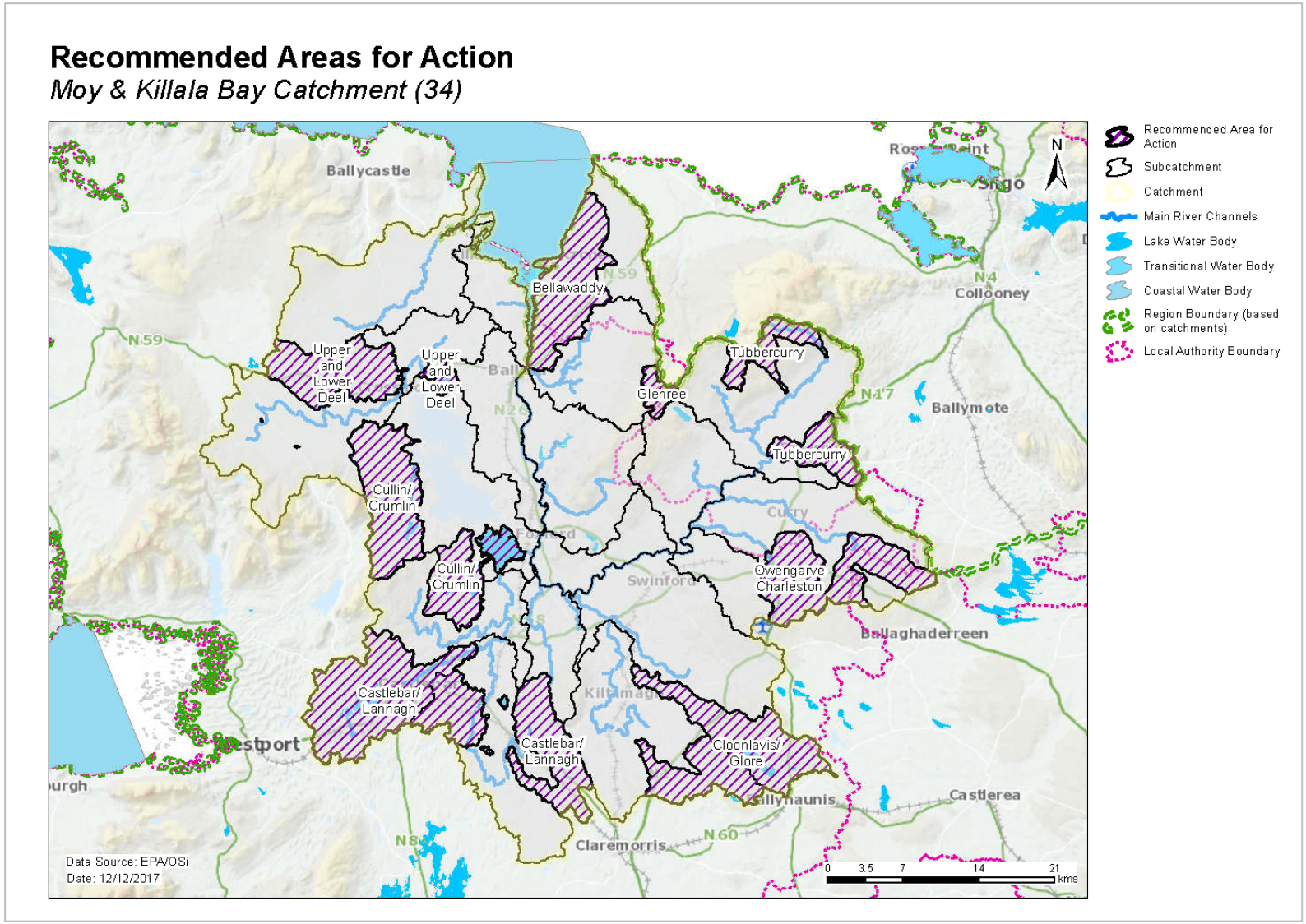


Figure 21. Location of Recommended Areas for Action in the Moy Killala Bay Catchment

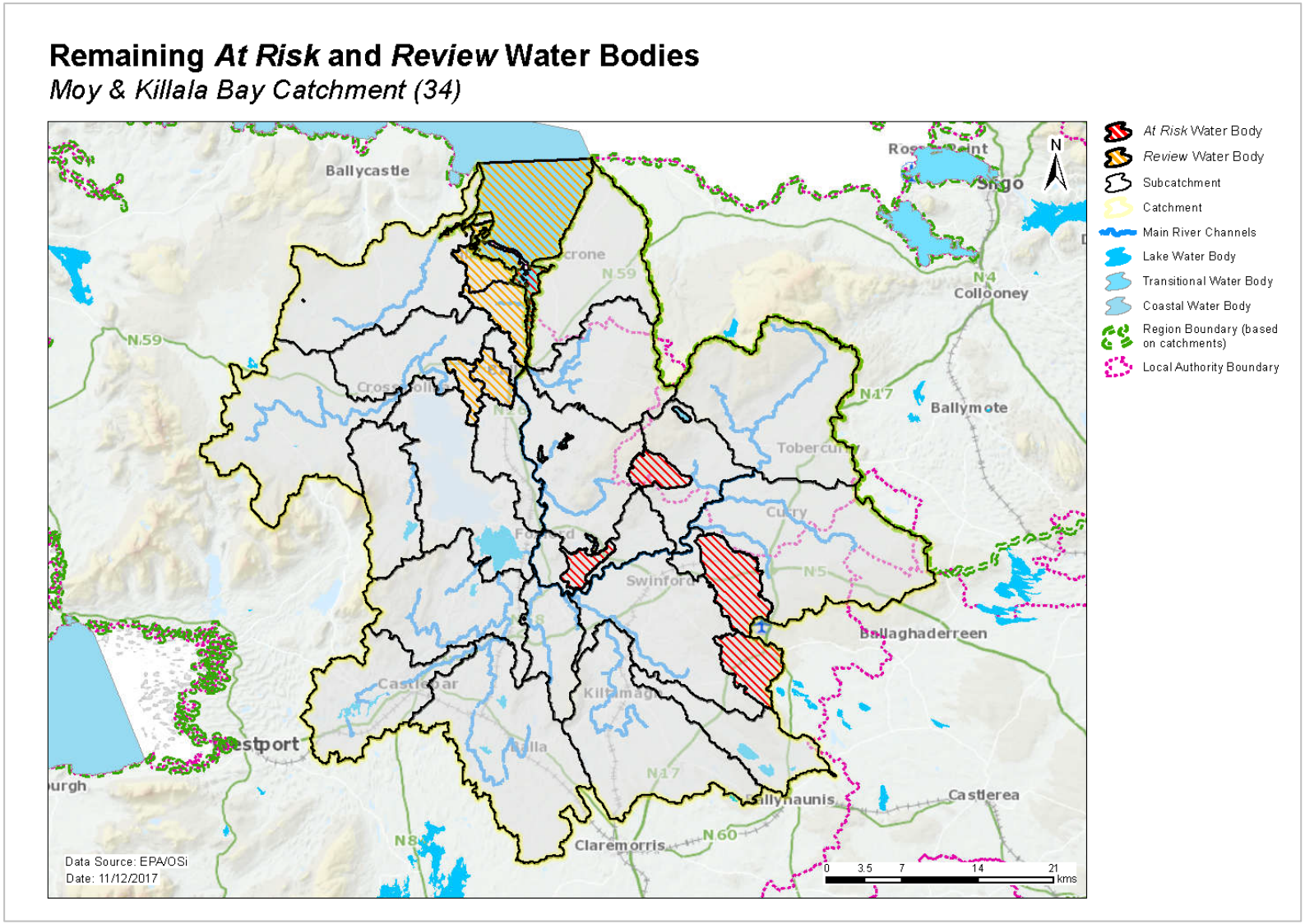


Figure 22. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Moy Killala Bay Catchment

Appendix 1 High ecological status objective water bodies

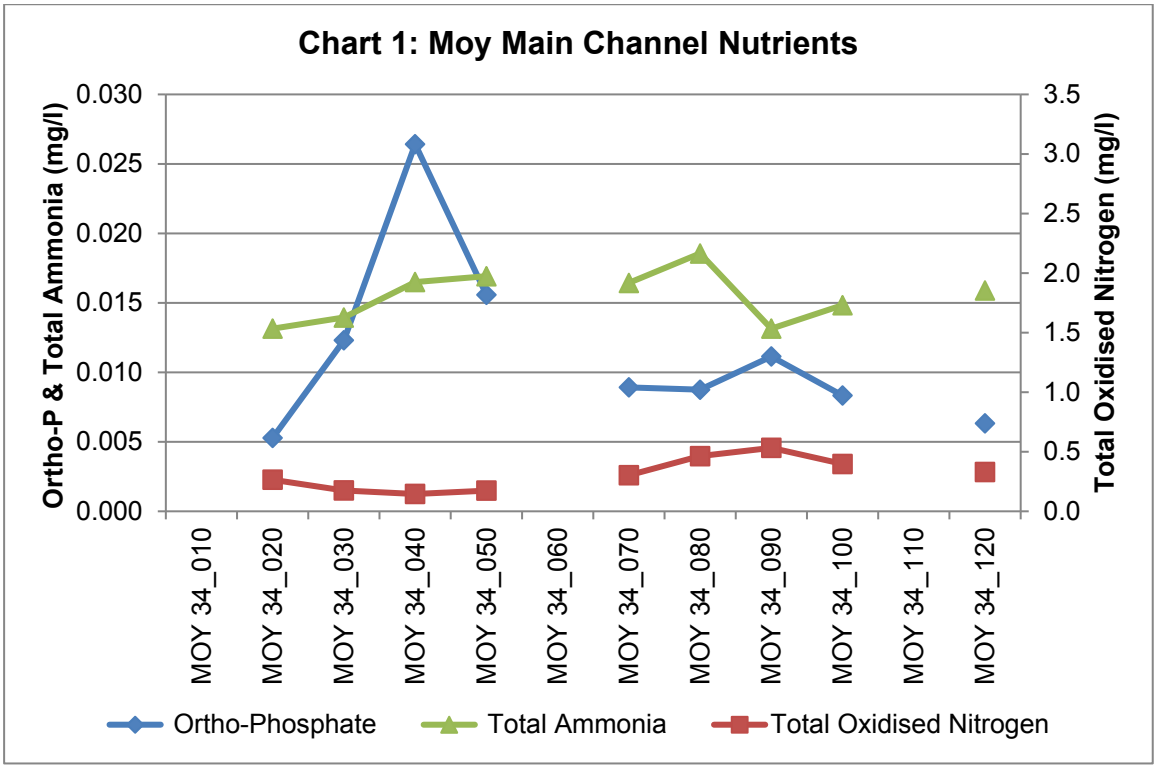
Water body/Site	Type	Codes	2015 Status
Callow Loughs Stream_010	River	IE_WE_34C080300	High
Yellow (Foxford)_010	River	IE_WE_34Y010100	High
Yellow (Foxford)_020	River	IE_WE_34Y010400	High
Cloonaghmore_010	River	IE_WE_34C030030	High
Cloonaghmore_030	River	IE_WE_34C030150	High
Cloonlavis_010	River	IE_WE_34C100300	Moderate
Pollagh_010	River	IE_WE_34P010100	High
Pollagh_020	River	IE_WE_34P010200	High
Lenyvee_010	River	IE_WE_34L060300	High
Loughanaboll_010	River	IE_WE_34L070100	Good
Moy 34_040	River	IE_WE_34M020300	High
Owenaher_010	River	IE_WE_34O010050	High
Gweestion_020	River	IE_WE_34G030200	High
Trimoge_030	River	IE_WE_34T010500	High
Owengarve (Sligo)_010	River	IE_WE_34O030050	Good
Owengarve (Sligo)_020	River	IE_WE_34O030100	High
Owengarve (Sligo)_030	River	IE_WE_34O030200	High
Clydagh (Castlebar)_020	River	IE_WE_34C050200	High
Crumlin (Lough Cullin) _010	River	IE_WE_34C110300	Good
Washpool	Lake	IE_WE_34_402	Good
Talt	Lake	IE_WE_34_405	Good
Bellanamean_010	River	IE_WE_34B040500	Good
Eignagh_010	River	IE_WE_34E010100	High
Eignagh_020	River	IE_WE_34E010200	High
Eignagh_030	River	IE_WE_34E010300	High
Glenree_010	River	IE_WE_34G010020	Good
Glenree_020	River	IE_WE_34G010060	High

Appendix 2 Catchment scale nutrient concentrations and in-stream loads

The results of the instream water quality assessment for the Moy catchment are illustrated in Chart 1. The assessment is based on the mean concentrations between 2013 and 2015 at each site from the headwaters down to the estuary. This shows 2013-2015 average orthophosphate concentrations along the main channel range from 0.005mg/l up to 0.026mg/l. There is a gradual upward spatial trend in the orthophosphate data in the head waters with a small spike at Moy 34_040, which is the receiving water for the Cloonacool and Environs Waste water Treatment Plant (WWTP). After the Moy 34_040, there is a rapid decline in the orthophosphate data after which the concentration appears to remain relatively constant.

The ammonia concentrations remain relatively constant along the main channel between 0.013 to 0.019mg/l and below the Environmental Quality Standard (EQS) for good status (0.065mg/l).

The TON concentrations along the main channel also remain relatively constant at low concentrations between 0.0145 to 0.532mg/l.



Appendix 3 Summary information on *At Risk* and *At Review* river and lake 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
34_1	IE_WE_34S020100	Sonnagh (Moy)_010	River	At Risk	Poor	Moderate	N	Hymo,UWW	2027	
34_2	IE_WE_34_458	Holan	Lake	Review	Good	Unassigned	N		2027	
34_3	IE_WE_34L050600	Lough Muck Stream_010	River	At Risk	Moderate	Moderate	N	Ag,Peat	2027	
34_4	IE_WE_34_315	Caheer	Lake	Review	Unassigned	Unassigned	N		2027	Cloonlavis/Glore
34_4	IE_WE_34_334	Island MO	Lake	Review	Unassigned	Unassigned	N		2027	Cloonlavis/Glore
34_4	IE_WE_34_398	Mannin	Lake	Review	Unassigned	Unassigned	N		2027	Cloonlavis/Glore
34_4	IE_WE_34N190740	North_Coolnaha_010	River	Review	Unassigned	Unassigned	N		2027	Cloonlavis/Glore
34_4	IE_WE_34G020010	Glore (Mayo)_010	River	At Risk	Poor	Moderate	N	Ag,Hymo	2027	Cloonlavis/Glore
34_4	IE_WE_34G020200	Glore (Mayo)_020	River	At Risk	Good	Moderate	N	Ag,Hymo	2027	Cloonlavis/Glore
34_5	IE_WE_34C020460	Castlehill_010	River	At Risk	Unassigned	Unassigned	N	Ag,UWW	2027	Cullin/Crumlin
34_5	IE_WE_34C700920	Creevy 34_010	River	Review	Unassigned	Unassigned	N		2027	Cullin/Crumlin
34_5	IE_WE_34_368	Levally	Lake	At Risk	Moderate	Moderate	N	Ag	2027	Cullin/Crumlin
34_5	IE_WE_34A010600	Addergoole_010	River	At Risk	High	Moderate	N	Ag,DWW,For,Hymo	2027	Cullin/Crumlin
34_6	IE_WE_34B400840	Ballymanagh_010	River	Review	Unassigned	Unassigned	N		2027	
34_6	IE_WE_34T830920	Tullyegan 34_010	River	Review	Unassigned	Unassigned	N		2027	
34_7	IE_WE_34_405	Talt	Lake	At Risk	High	Good	Y	Other	2027	
34_7	IE_WE_34B040500	Bellanamean_010	River	At Risk	High	Good	Y	For,Hymo	2027	
34_8	IE_WE_34A350930	Abbeytown 34_010	River	Review	Unassigned	Unassigned	N		2027	Upper and Lower Deel
34_8	IE_WE_34B180860	Ballaghamuck_010	River	Review	Unassigned	Unassigned	N		2027	Upper and Lower Deel
34_8	IE_WE_34D010400	Deel (Crossmolina)_060	River	At Risk	Moderate	Moderate	N	Other	2027	Upper and Lower Deel
34_9	IE_WE_34G010020	Glenree_010	River	At Risk	High	Good	Y	For,Other,Peat	2021	Glenree
34_10	IE_WE_34_391	Ballymore	Lake	Review	Unassigned	Unassigned	N		2027	
34_10	IE_WE_34_393	Callow	Lake	Review	Unassigned	Unassigned	N		2027	
34_10	IE_WE_34_809	Carrowkeribly	Lake	Review	Unassigned	Unassigned	N		2027	
34_10	IE_WE_420_0300	Moy Estuary	Transitional	At Risk	Moderate	Moderate	N	Ag,DWW,UWW	2027	
34_11	IE_WE_34D310990	DOOYEAGHNY_Or_CLOONLOUGHAN_010	River	Review	Unassigned	Unassigned	N		2027	Bellawaddy
34_11	IE_WE_34Q070710	Quigabar_010	River	Review	Unassigned	Unassigned	N		2027	Bellawaddy
34_11	IE_WE_34S610980	Scurmore_010	River	Review	Unassigned	Unassigned	N		2027	Bellawaddy
34_11	IE_WE_34B050300	Bellawaddy_020	River	At Risk	Good	Moderate	N	Ag,DU	2027	Bellawaddy
34_11	IE_WE_420_0000	Killala Bay	Coastal	Review	High	Good	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
34_12	IE_WE_34_406a	Cullin	Lake	At Risk	Poor	Moderate	N	Ag,Other,UWW	2027	Cullin/Crumlin
34_13	IE_WE_34_355	Doobehy	Lake	Review	Unassigned	Unassigned	N		2027	
34_13	IE_WE_420_0200	Cartoon Lough, Killala Bay	Coastal	Review	Unassigned	Unassigned	N		2027	
34_14	IE_WE_34_251	Derrynaherriva	Lake	Review	Unassigned	Unassigned	N		2027	Upper and Lower Deel
34_14	IE_WE_34_688	Nacapduff	Lake	Review	Unassigned	Unassigned	N		2027	Upper and Lower Deel
34_14	IE_WE_34S010400	Shanvolahan 34_010	River	At Risk	Good	Moderate	N	For,Hymo,Peat	2027	Upper and Lower Deel
34_15	IE_WE_34Y020155	Yellow (Knock)_010	River	At Risk	Unassigned	Moderate	N	For,Hymo,UWW	2027	Cloonlavis/Glore
34_15	IE_WE_34C100300	Cloonlavis_010	River	At Risk	High	Moderate	Y	DWW,Hymo	2027	Cloonlavis/Glore
34_16	IE_WE_34L070100	Loughanaboll_010	River	At Risk	Unassigned	Good	Y	For,Hymo	2027	Tubbercurry
34_16	IE_WE_34M020010	Moy 34_010	River	At Risk	Moderate	Poor	N	Ag,For,Hymo	2027	Tubbercurry
34_16	IE_WE_34M040100	Mad_010	River	At Risk	Poor	Moderate	N	For,Hymo	2027	Tubbercurry
34_16	IE_WE_34T020050	Tubbercurry_010	River	At Risk	Bad	Poor	N	UWW	2027	Tubbercurry
34_16	IE_WE_34T020200	Tubbercurry_020	River	At Risk	Poor	Poor	N	Ag,UWW	2027	Tubbercurry
34_16	IE_WE_34T030400	Tubbercurry Stream_010	River	At Risk	Bad	Poor	N	UWW	2027	Tubbercurry
34_17	IE_WE_34T010200	Trimoge_010	River	At Risk	Moderate	Moderate	N	M+Q,UWW	2027	
34_18	IE_WE_34B120180	Black (Sligo)_010	River	At Risk	Unassigned	Moderate	N	Ag,Hymo	2027	Owengarve Charleston
34_18	IE_WE_34C280100	Charlestown Stream_010	River	At Risk	Poor	Poor	N	Ag,Hymo,UWW	2027	Owengarve Charleston
34_18	IE_WE_34O030050	Owengarve (Sligo)_010	River	At Risk	High	Good	Y	Hymo	2021	Owengarve Charleston
34_19	IE_WE_34M190890	Moyne 34_010	River	Review	Unassigned	Unassigned	N		2027	
34_19	IE_WE_34R010200	Rathroeen Stream_010	River	Review	Unassigned	Unassigned	N		2027	
34_20	IE_WE_34_386	Derryhick	Lake	Review	Unassigned	Unassigned	N		2027	Cullin/Crumlin
34_20	IE_WE_34A120980	Attiappleton_010	River	Review	Unassigned	Unassigned	N		2027	Cullin/Crumlin
34_20	IE_WE_34C110300	Crumlin (Lough Cullin)_010	River	At Risk	High	Good	Y	For,Hymo	2021	Cullin/Crumlin
34_21	IE_WE_34_304	Carrowmore Manulla	Lake	Review	Unassigned	Unassigned	N		2027	Castlebar/Lannagh
34_21	IE_WE_34T560640	Tully_More 34_010	River	Review	Unassigned	Unassigned	N		2027	Castlebar/Lannagh
34_21	IE_WE_34_402	Washpool	Lake	At Risk	Good	Good	Y	Hymo	2027	Castlebar/Lannagh
34_21	IE_WE_34L040200	Loughnaminoo Stream_010	River	At Risk	Moderate	Poor	N	DWW,Hymo,UWW	2027	Castlebar/Lannagh
34_21	IE_WE_34M010300	Manulla_030	River	At Risk	Moderate	Moderate	N	Hymo	2027	Castlebar/Lannagh

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
34_22	IE_WE_34_376	Islandeady	Lake	Review	Unassigned	Unassigned	N		2027	Castlebar/Lannagh
34_22	IE_WE_34_403	Castlebar	Lake	At Risk	Moderate	Moderate	N	Ag,DWW,Other	2027	Castlebar/Lannagh
34_22	IE_WE_34C010180	Castlebar_010	River	At Risk	Poor	Moderate	N	Ag,DU,DWW,Hymo	2027	Castlebar/Lannagh
34_22	IE_WE_34C010300	Castlebar_020	River	At Risk	Poor	Poor	N	DU,Hymo,M+Q,UWW	2027	Castlebar/Lannagh

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
2200PRI2003	Attymass GWS	Foxford (GWB)	IE_WE_G_0034	Yes	N/A
2200PRI2020	Brackloon/Spaddagh	Glore (Mayo)_010 (RWB)	IE_WE_34G020010	Yes	N/A
2200PRI2040	Cullentra GWS	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
2200PRI2050	Moylaw GWS	Laherdaun (GWB)	IE_WE_G_0030	Yes	N/A
2200PRI2071	Kilgarriff GWS	Glore (Mayo)_020 (RWB)	IE_WE_34G020200	Yes	N/A
2200PRI2072	Killasser GWS (Spring Well)	Foxford (GWB)	IE_WE_G_0034	Yes	N/A
	Killasser GWS (Spring)	Foxford (GWB)	IE_WE_G_0034	Yes	N/A
	Killasser GWS (Dugwell)	Foxford (GWB)	IE_WE_G_0034	Yes	N/A
2200PRI2073	Killaturley GWS	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
2200PRI2091	Portagh/Monard GWS	Kilkelly Charlestown (GWB)	IE_WE_G_0032	Yes	N/A
2200PRI2093	Parke GWS	Crumlin (Lough Cullin)_010 (RWB)	IE_WE_34C110300	Yes	N/A
2200PRI2105	Shraheen/Foxford GWS	Lough Conn (LWB)	IE_WE_34_406b	Yes	N/A
2200PRI2111	Toreen/Aghamore GWS	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
2200PRI2117	Carra	Foxford (GWB)	IE_WE_G_0034	Yes	N/A
2200PRI2121	Cloonmore/Rooskey	Kilkelly Charlestown (GWB)	IE_WE_G_0032	Yes	N/A
2200PRI2122	Cloonmore/Cloonlavish	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
2200PRI2126	Derryvohey	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
2200PRI2128	Drumsheen/Newtown	Ballina Gravels Group 2 (GWB)	IE_WE_G_0116	Yes	N/A
2200PRI2130	Errew (Killeen)	Ballina (GWB)	IE_WE_G_0035	Yes	N/A
2200PRI2137	Polavaddy	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
2200PRI2150	Midfield	Kilkelly Charlestown (GWB)	IE_WE_G_0032	Yes	N/A
2200PRI2159	Kilcoman/Facefield	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
2200PRI2557	Callow Lake GWS	Callow Lake (LWB)	IE_WE_34_393	Yes	N/A
2200PRI2559	PBKS GWS	Carrowmore Lake (LWB)	IE_WE_34_304	Yes	N/A
2200PUB1003	Ballina (Wherrew)	Lough Conn (LWB)	IE_WE_34_406b	No	MCPA
2200PUB1004	Ballina (Lisglennon)	Moy 34_100 (RWB)	IE_WE_34M020800	No	MCPA
2200PUB1010	Charlestown WSS	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
2200PUB1011	Bonniconlon WSS	Foxford (GWB)	IE_WE_G_0034	Yes	N/A
2200PUB1013	Crossmolina WSS	Laherdaun (GWB)	IE_WE_G_0030	Yes	N/A
2200PUB1014	Foxford WSS	Moy 34_110 (RWB)	IE_WE_34M020850	Yes	N/A
2200PUB1015	Kilkelly WSS	Kilkelly Charlestown (GWB)	IE_WE_G_0032	Yes	N/A
2200PUB1017	Kiltimagh PWS	Glore (Mayo)_020 (RWB)	IE_WE_34G020200	No	MCPA
2200PUB1024	Swinford WSS	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
	Swinford WSS	Swinford (GWB)	IE_WE_G_0033	Yes	N/A
2200PUB1036	Knock Airport WSS	Swinford Gravels (GWB)	IE_WE_G_0108	Yes	N/A
2600PRI3008	Brosna Spring 1	Kilkelly Charlestown (GWB)	IE_WE_G_0032	Yes	N/A
	Brosna Spring 2	Kilkelly Charlestown (GWB)	IE_WE_G_0032	Yes	N/A
2600PRI3036	Derrinacartha/Cloonlumney	Kilkelly Charlestown (GWB)	IE_WE_G_0032	Yes	N/A
2700PUB2702	Lough Talt Regional Water Supply	Eignagh_010 (RWB)	IE_WE_34E010100	Yes	N/A

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

Note that additional water dependent species have been added that are not qualifying interests within the SACs (i.e. Salmon (Salmo salar; 1106) has been added to Bellacorick Bog Complex SAC and Ox Mountains Bogs SAC while Arctic char (Salvelinus alpinus) has been added to Lough Hoe Bog SAC and River Moy SAC). River water bodies that are designated as salmonid rivers (under Salmonid Regulations (S.I. 293 / 1988)) but that are not located within SACs have also been listed.

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Balla Turlough SAC 000463	3180	Good GW level/quality	Groundwater	Swinford GWB	Good (NAR)	No	IE_WE_G_0033	No
			Groundwater	Kilkelly Charlestown GWB	Good (NAR)	No	IE_WE_G_0032	No
Ballinafad SAC 002081	none							
Bellacorick Bog Complex SAC 001922	7230	Good GW level	Groundwater	Bellacorick-Killala GWB	Good (NAR)	No	IE_WE_G_0041	No
			Groundwater	Ballina GWB	Good (NAR)	No	IE_WE_G_0035	No
			Groundwater	Deel GWB	Good (NAR)	No	IE_WE_G_0031	No
			Groundwater	Laherdaun GWB	Good (NAR)	No	IE_WE_G_0030	No
	3160	High/Good	Lake	Derrynaherriva	Unassigned (R)	No	IE_WE_34_251	No
			Lake	Doobehy	Unassigned (R)	No	IE_WE_34_355	No
	1106 (not listed)	Good	River	Deel (Crossmolina)_030	Good (NAR)	No	IE_WE_34D010025	Yes
Killala Bay/Moy Estuary SAC 000458	2190	Good GW level	Groundwater	Killala South GWB	Good (NAR)	No	IE_WE_G_0047	Yes
Lackan Saltmarsh And Kilcummin Head SAC 000516	none							
Lough Hoe Bog SAC 000633	3110	At least Good	Lake	Talt	Good (AT RISK-HES obj)	No	IE_WE_34_405	No
			Lake	Hoe	Unassigned (NAR)	No	IE_WE_34_773	No
	1092	Moderate	Lake	Talt	Good (AT RISK-HES obj)	No	IE_WE_34_405	No
	Artic char	At least Good	Lake	Talt	Good (AT RISK-HES obj)	No	IE_WE_34_405	No
Lough Nabrickkeagh Bog SAC 000634	none							
Owenduff/Nephin Complex SAC 000534	none							

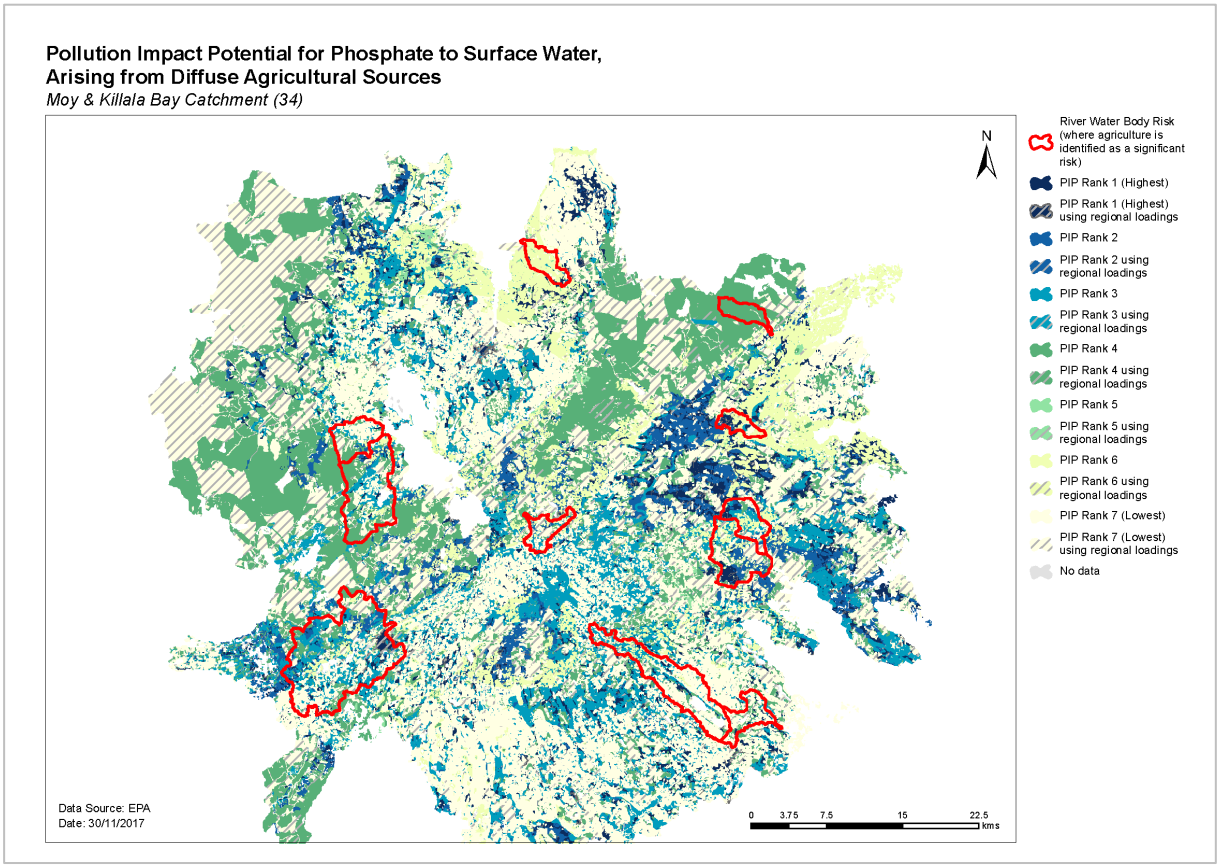
SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Ox Mountains Bogs SAC 002006	Potential 3110	At least Good	Lake	Tullyvellia	Unassigned (NAR)	No	IE_WE_34_297	No
	1106 (not listed)	Good	River	Moy 34_010	Poor (AT RISK)	Yes	IE_WE_34M020010	Yes
River Moy SAC 002298	7230	Good GW level	Groundwater	Swinford GWB	Good (NAR)	No	IE_WE_G_0033	No
			Groundwater	Swinford GWB	Good (NAR)	No	IE_WE_G_0033	No
	1092	Moderate	River	Ballaghamuck_010	Unassigned (R)	Yes	IE_WE_34B180860	Yes
			River	Deel (Crossmolina)_050	High (NAR)	No	IE_WE_34D010300	Yes
			River	Deel (Crossmolina)_060	Moderate (AT RISK)	No	IE_WE_34D010400	Yes
			River	Creevy 34_010	Unassigned (R)	Yes	IE_WE_34C700920	Yes
			River	Addergoole_010	Moderate (AT RISK)	No	IE_WE_34A010600	Yes
			River	Crumlin (Lough Cullin)_010	Good (AT RISK-HES obj)	No	IE_WE_34C110300	Yes
			River	Clydagh (Castlebar)_020	High (NAR-HES obj)	No	IE_WE_34C050200	Yes
			River	Manulla_030	Moderate (AT RISK)	No	IE_WE_34M010300	Yes
			River	Manulla_040	Good (NAR)	No	IE_WE_34M010500	Yes
			River	Gweestion_010	Good (NAR)	No	IE_WE_34G030100	Yes
			River	Pollagh_010	High (NAR-HES obj)	No	IE_WE_34P010100	Yes
			River	Pollagh_020	High (NAR-HES obj)	No	IE_WE_34P010200	Yes
			River	Cloonlavis_010	Moderate (AT RISK-HES obj)	No	IE_WE_34C100300	Yes
			River	Yellow (Knock)_020	Good (NAR)	No	IE_WE_34Y020400	Yes
			River	Moy 34_040	High (NAR-HES obj)	No	IE_WE_34M020300	Yes
			River	Moy 34_070	Good (NAR)	No	IE_WE_34M020500	Yes
			River	Moy 34_080	Good (NAR)	No	IE_WE_34M020650	Yes
			River	Owengarve (Sligo)_010	Good (AT RISK-HES obj)	No	IE_WE_34O030050	Yes
			River	Owengarve (Sligo)_020	High (NAR-HES obj)	No	IE_WE_34O030100	Yes
			River	Owenaher_020	Good (NAR)	No	IE_WE_34O010100	Yes
	1106	Good	River	Deel (Crossmolina)_020	Good (NAR)	No	IE_WE_34D010010	Yes
			River	Deel (Crossmolina)_030	Good (NAR)	No	IE_WE_34D010025	Yes
			River	Deel (Crossmolina)_040	Good (NAR)	No	IE_WE_34D010120	Yes
			River	Deel (Crossmolina)_050	High (NAR)	No	IE_WE_34D010300	Yes
			River	Deel (Crossmolina)_060	Moderate (AT RISK)	Yes	IE_WE_34D010400	Yes
			River	Castlebar_030	Good (NAR)	No	IE_WE_34C010400	Yes
			River	Castlebar_040	Good (NAR)	No	IE_WE_34C010500	Yes
SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?

River Moy SAC 002298	1106	Good	River	Manulla_020	Good (NAR)	No	IE_WE_34M010228	Yes
			River	Manulla_030	Moderate (AT RISK)	Yes	IE_WE_34M010300	Yes
			River	Manulla_040	Good (NAR)	No	IE_WE_34M010500	Yes
			River	Glore (Mayo)_020	Moderate (AT RISK)	Yes	IE_WE_34G020200	Yes
			River	Trimoge_010	Moderate (AT RISK)	Yes	IE_WE_34T010200	Yes
			River	Trimoge_020	Good (NAR)	No	IE_WE_34T010300	Yes
			River	Trimoge_030	High (NAR-HES obj)	No	IE_WE_34T010500	Yes
			River	Gweestion_010	Good (NAR)	No	IE_WE_34G030100	Yes
			River	Gweestion_020	High (NAR-HES obj)	No	IE_WE_34G030200	Yes
			River	Spaddagh 34_010	Good (NAR)	No	IE_WE_34S030200	Yes
			River	Mullaghanoe_010	Good (NAR)	No	IE_WE_34M030300	Yes
			River	Charlestown Stream_010	Poor (AT RISK)	Yes	IE_WE_34C280100	Yes
			River	Owengarve (Sligo)_010	Good (AT RISK-HES obj)	No	IE_WE_34O030050	Yes
			River	Owengarve (Sligo)_020	High (NAR-HES obj)	No	IE_WE_34O030100	Yes
			River	Owengarve (Sligo)_030	High (NAR-HES obj)	No	IE_WE_34O030200	Yes
			River	Yellow (Foxford)_020	High (NAR-HES obj)	No	IE_WE_34Y010400	Yes
			River	Moy 34_020	Good (NAR)	No	IE_WE_34M020050	Yes
			River	Moy 34_030	Good (NAR)	No	IE_WE_34M020100	Yes
			River	Moy 34_040	High (NAR-HES obj)	No	IE_WE_34M020300	Yes
			River	Moy 34_050	Good (NAR)	No	IE_WE_34M020400	Yes
			River	Moy 34_060	Good (NAR)	No	IE_WE_34M020470	Yes
			River	Moy 34_070	Good (NAR)	No	IE_WE_34M020500	Yes
			River	Moy 34_080	Good (NAR)	No	IE_WE_34M020650	Yes
			River	Moy 34_090	Good (NAR)	No	IE_WE_34M020750	Yes
			River	Moy 34_100	Good (NAR)	No	IE_WE_34M020800	Yes
			River	Moy 34_110	Good (NAR)	No	IE_WE_34M020850	Yes
			River	Moy 34_120	Good (NAR)	No	IE_WE_34M021100	Yes
	Artic char (possibly extinct)	Good	Lake	Lough Conn	Good (NAR)	No	IE_WE_34_406b	No

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Salmonid rivers (outside SACs)	1106 (not listed)	Good	River	Castlebar_010	Moderate (AT RISK)	Yes	IE_WE_34C010180	Yes
			River	Castlebar_020	Poor (AT RISK)	Yes	IE_WE_34C010300	Yes
			River	Glore (Mayo)_010	Moderate (AT RISK)	Yes	IE_WE_34G020010	Yes
			River	Yellow (Foxford)_010	High (NAR-HES obj)	No	IE_WE_34Y010100	Yes
			River	Corroy_010	Unassigned (NAR)	No	IE_WE_34C060200	Yes

Appendix 6 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 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