

Blacksod-Broadhaven Catchment Assessment 2010-2015 (HA33)



Catchment Science & Management Unit

Environmental Protection Agency

December 2018

Version no. 3

Preface

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

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

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

Table of contents

1	Introduction.....	1
2	Water body status and risk of not meeting environmental objectives.....	3
2.1	Surface water ecological status.....	3
2.1.1	Rivers and lakes.....	3
2.1.2	Transitional and Coastal (TraC).....	3
2.2	Groundwater status.....	6
2.3	Risk of not meeting surface water environmental objectives.....	6
2.3.1	Rivers and lakes.....	6
2.3.2	Transitional and Coastal (TraC).....	7
2.4	Risk of not meeting groundwater environmental objectives	7
2.5	Protected areas	8
2.5.1	Drinking water abstractions.....	8
2.5.2	Bathing waters	8
2.5.3	Shellfish areas	8
2.5.4	Nutrient Sensitive Areas	9
2.5.5	Natura 2000 Sites.....	10
2.6	Heavily modified water bodies.....	10
3	Significant issues in At Risk water bodies	10
4	Significant pressures.....	10
4.1	Water bodies	10
4.1.1	Rivers, lakes, transitional and coastal (TraC)	10
4.1.2	Groundwater	10
4.2	Pressure type	11
4.2.1	Agriculture.....	11
4.2.2	Hydromorphology.....	11
4.2.3	Forestry	11
4.2.4	Urban waste water treatment plants	12
4.2.5	Other significant pressures	12
	Anthropogenic unknown	12
4.2.6	Industry	12
5	Load reduction assessment.....	15
5.1	River water body load reductions	15
5.2	TraC load reductions.....	15
6	Further Characterisation and Local Catchment Assessments.....	16
7	Catchment summary	16
8	Areas for Action.....	16
8.1	Process of Selection.....	16

8.2	Outcomes of process	17
9	Environmental Objectives	18
9.1	Surface Water	18
9.2	Groundwater	19
10	Acknowledgements	20

1 Introduction

This catchment includes the area drained by all streams entering tidal water in Blacksod and Broadhaven Bays and between Corraun Point and Benwee Head, Co. Mayo, draining a total area of 1,302km². The largest urban centre in the catchment is Belmullet. The other main urban centres are Bangor and Keel. The total population of the catchment is approximately 12,549 with a population density of 10 people per km². The catchment contains many upland areas including the north Mayo coast and the northern part of the Nephin Beg range. The catchment is underlain mostly by metamorphic rocks with sandstones and shales underlying the flat expanses to the east of Bangor.

This catchment includes part of mainland County Mayo, the Belmullet Peninsula and Achill Island. On Achill, several small streams drain the slopes of the four mountains that dominate the Island, Croaghan, Slievemore, Minaun and Knockmore. The largest river system on the island comprises the Dookinelly, Keel Rivers and Keel Lough drains the central basin of the Island.

The Belmullet Peninsula is separated from Achill and the mainland by Blacksod Bay to the south and from the mainland by Broad Haven Bay to the north and is drained by a series of small streams and rivers, the largest of which is the Clooneen River.

The mainland part of this catchment area encompasses the northern ridges of the Nephin Beg Mountains and the flat wide expanses of Atlantic blanket bog landscape that makes up much of the land area in west County Mayo. The Owen Duff River drains the western slopes of the Nephin Beg Mountains, flowing out to sea at Tullaghan Bay and via Blacksod Bay to the Atlantic.

The Owenmore River rises on the southern slopes of Maumakeogh, flowing south to Bellacorick where it is joined by the Altnabrocky. The Owenmore then turns west and is joined by the Munhin River flowing from Carrowmore Lake. The Owenmore then flows southwest, entering the northern end of Tullaghan Bay from where it makes its way out to sea at Blacksod Bay.

The Doolough and Glencastle Rivers drain the coastal area between Gweesalia and Belmullet, flowing into Blacksod Bay. The Glenamoy River drains the north-western corner of County Mayo, being joined by the Rathavisteen River and the Baroosky River. The Glenamoy continues west, flowing into the eastern end of Sruwaddacon Bay.

The Muingnabo River flows from the cliff tops of the north County Mayo Coast, before entering Sruwaddacon Bay north of the Glenamoy River and out to sea via Broad Haven Bay. The Gweedaney River drains the area to the north of the Rosspoint Peninsula, flowing south and into estuarine waters along the north side of the Rosspoint Peninsula.

The Ballinglen River drains the uplands in the north-eastern part of the catchment. The Glencullin and Gortmore Streams to the west and east of the Ballinglen drain much of the surrounding area. The jagged northern coast between Benwee Head and Killala Bay is drained by a series of northerly flowing small coastal rivers and streams.

The Blacksod-Broadhaven catchment comprises 11 subcatchments (Table 1, Figure1) with 58 river water bodies, 13 lakes, four transitional, six coastal water bodies, and five groundwater bodies.

Table 1. List of subcatchments in the Blacksod-Broadhaven catchment

Subcatchment ID	Subcatchment Name
33_1	Owenmore[Mayo]_SC_010
33_2	Glencastle_SC_010
33_3	Munhin_SC_010
33_4	Owenmore[Mayo]_SC_020
33_5	TóIN_AN_MHáSA_SC_010
33_6	Owenduff[Blacksod]_SC_010
33_7	KEEL_EAST_SC_010
33_8	Glenamoy_SC_010
33_9	Glencullin [North Mayo] _SC_010
33_10	Belderg_SC_010
33_11	Owenmore[Mayo]_SC_030

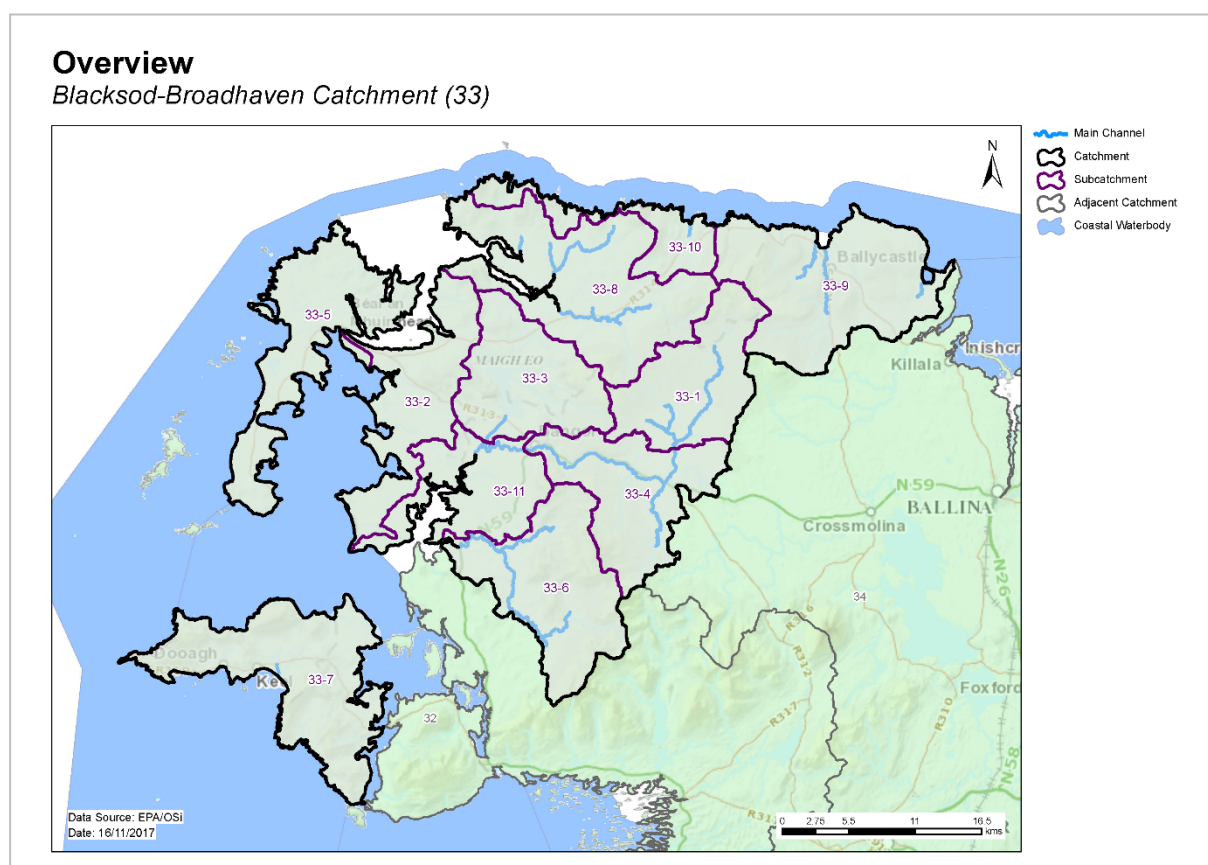


Figure 1. Subcatchments in the Blacksod-Broadhaven catchment

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 32 (45%) river and lake water bodies at Good or High status, and 7 (10%) at less than Good status in 2015 (Table 2, Figure 2). Thirty-two (45%) river and lake water bodies are unassigned.
- ◆ Eight river water bodies have a high ecological status objective. In 2015, all eight of these water bodies were at High 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).
- ◆ Five water bodies have improved and three have deteriorated since 2007-09 (Figure 7).
- ◆ The variation in nutrient concentrations and loads in the Owenmore (Mayo) main channel is illustrated in Appendix 2.

2.1.2 Transitional and Coastal (TraC)

- ◆ Of the nine TraC water bodies, two were at High status and two were at Good status in 2015 (Table 2). Six TraC water bodies are unassigned.
- ◆ Three TraC water bodies have a high ecological status objective. In 2015, two of these water bodies were at High status and one at Good status (Figure 3, Appendix 1).
- ◆ The numbers of TraC water bodies in each status class in 2007-09 and 2010-15 is shown in Figure 6.
- ◆ Note coastal water bodies Aran Islands, Galway Bay, Connemara (HAs 29;31) and Western Atlantic Seaboard (HAs 32;33;34) are 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	<i>Not at Risk</i>	<i>Review</i>	<i>At Risk</i>
Rivers	58	8	22	4	1	0	23	30	23	5
Lakes	13	0	2	2	0	0	9	7	4	2
TraC	10	2	2	0	0	0	6	8	2	0

WFD Surface Water Body Status 2010 - 2015

Blacksod-Broadhaven Catchment (33)

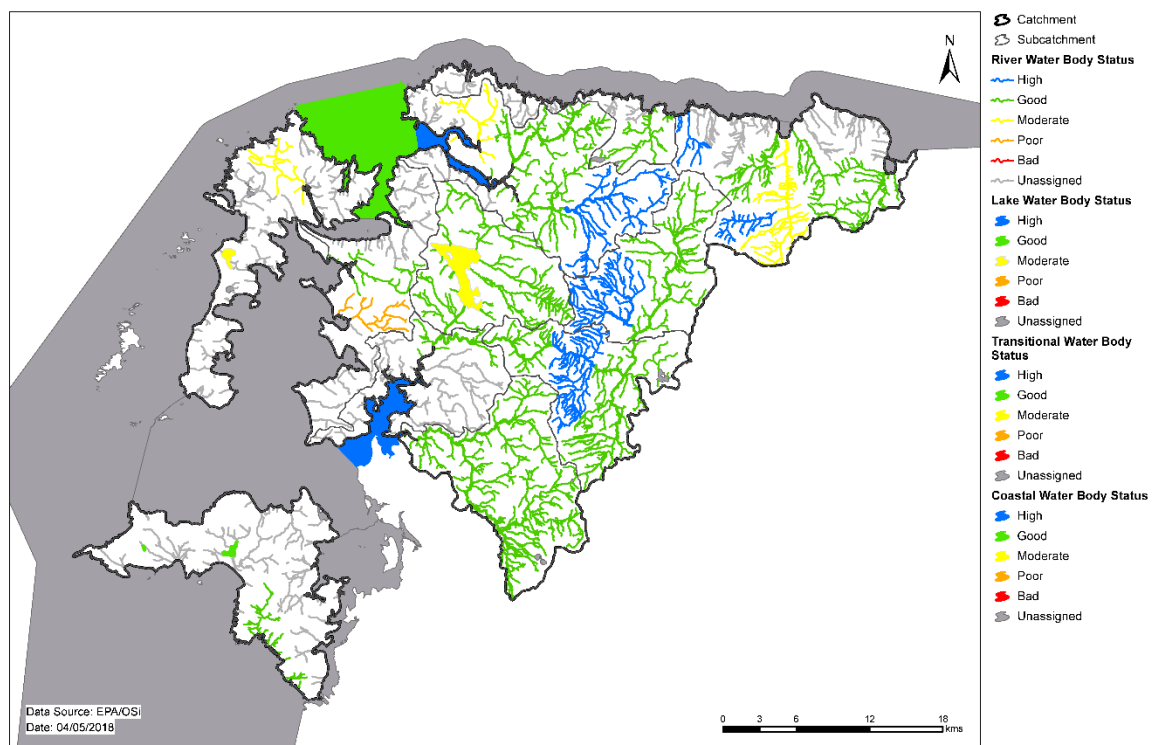


Figure 2. Surface water ecological status

High Status Objective Water Bodies and Sites

Blacksod-Broadhaven Catchment (33)

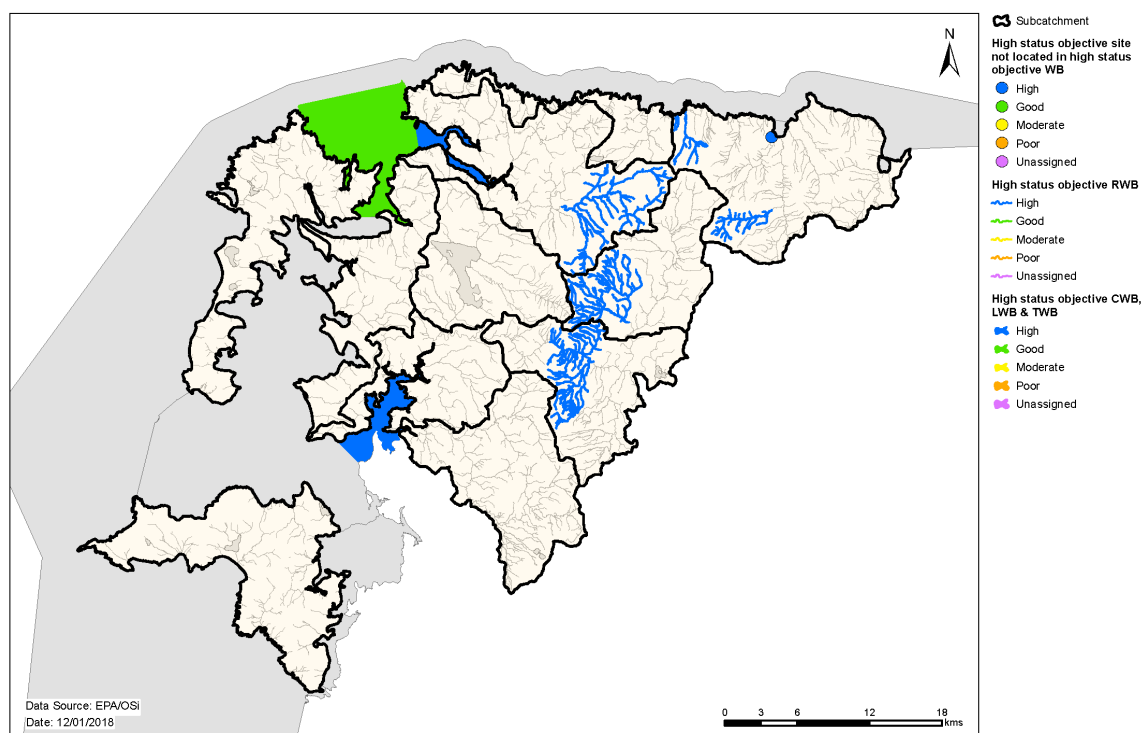


Figure 3. High ecological status objective water bodies and sites

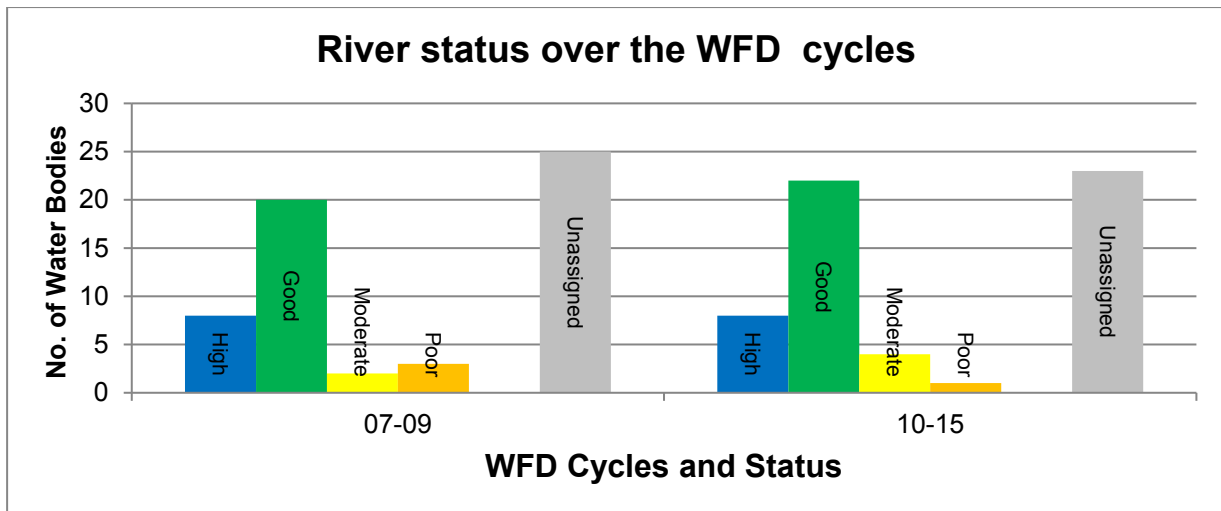


Figure 4. Number of rivers at each status class in 2007-09 and 2010-15

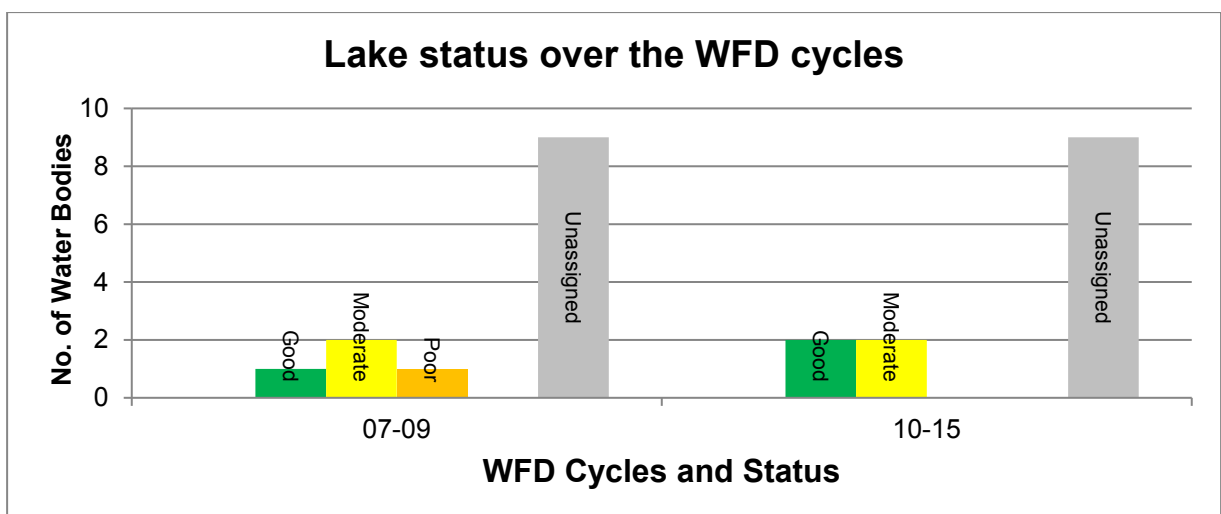


Figure 5. Number of lakes at each status class in 2007-09 and 2010-15

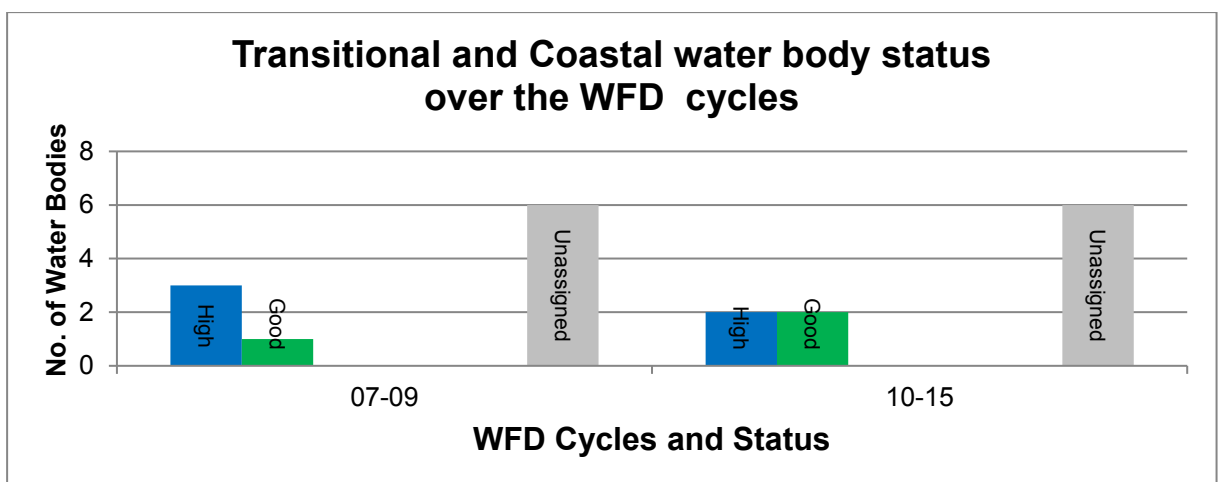


Figure 6. Number of transitional and coastal water bodies at each status class in 2007-09* and 2010-15.¹

¹*Not all elements were included in this assessment so changes between periods may not reflect ecological change.

WFD Surface Water Body Status Change 2007 - 2009 to 2010 - 2015

Blacksod-Broadhaven Catchment (33)

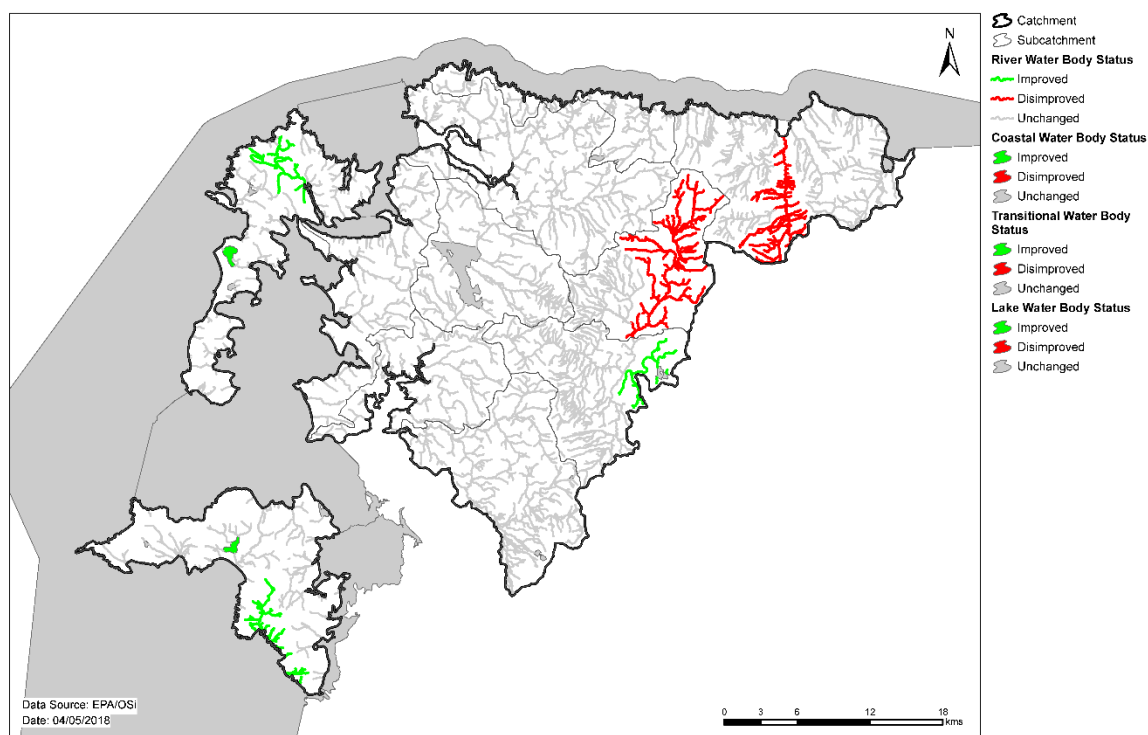


Figure 7. Surface water body status changes from 2007-09 to 2010-15.

2.2 Groundwater status

- ◆ All five 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	5	5	0	3	2	0

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and lakes

- ◆ There are 30 river and seven lake water bodies that are *Not at Risk* (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 23 river and four lake water bodies in *Review*. This applies to 14 water bodies where more information is required and 13 water bodies where measures have recently been implemented and improvements have not yet been realised.

- ◆ Five river and two 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)

- ◆ Eight 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 (coastal water bodies Broadhaven and Killala Bay) are in *Review* where more information is required.

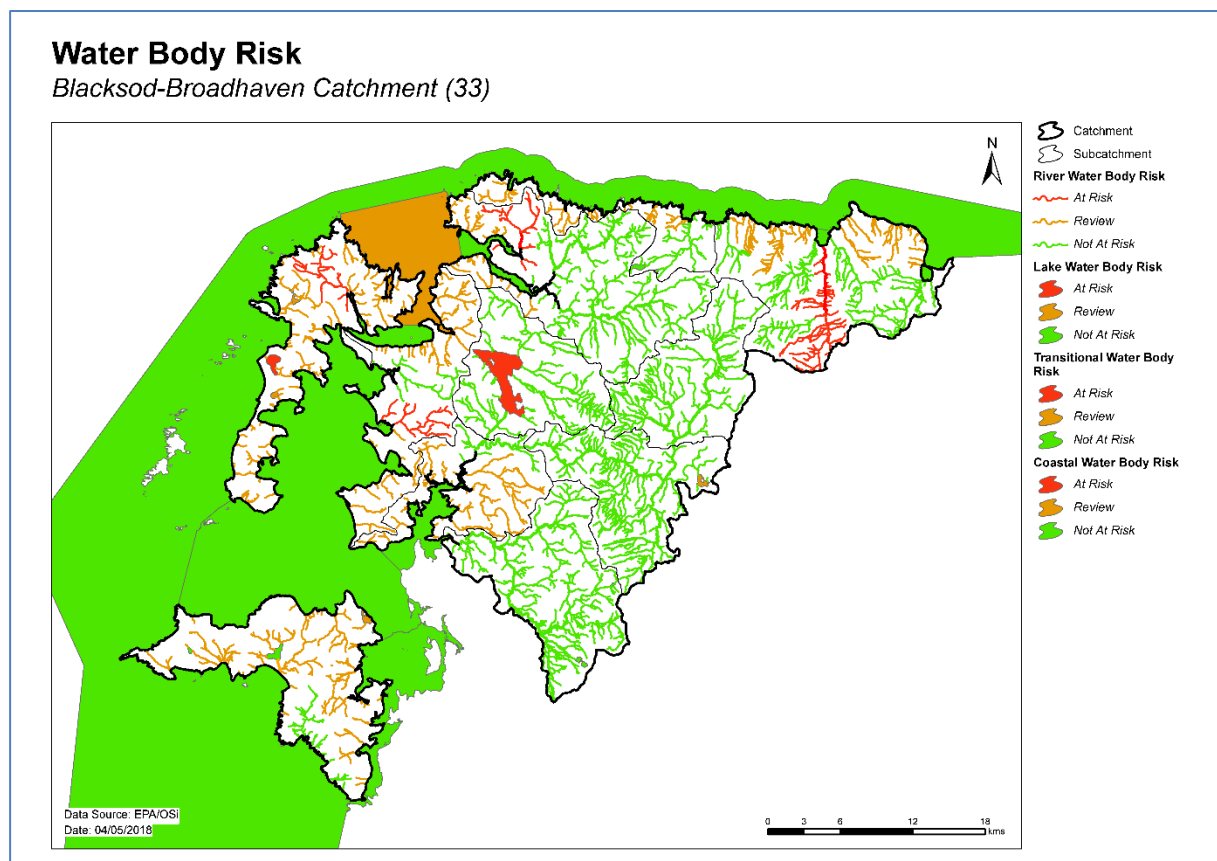


Figure 8. Surface water body risk

2.4 Risk of not meeting groundwater environmental objectives

- ◆ Three 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.
- ◆ Two groundwater bodies are in *Review* (Figure 9, Belmullet and Belmullet Gravels) because they are hydrologically linked to surface waters that are not meeting water quality objectives where it is considered likely that groundwater is a contributing source of phosphorus.
- ◆ There are no *At Risk* groundwater bodies.

2.5 Protected areas

2.5.1 Drinking water abstractions

- ◆ There are 10 abstractions in the Blacksod-Broadhaven Catchment comprising five group water schemes (Roy Bingham, Belderrig, Cornboy, Drum/Binghamstown and Kilgalligan), two regional water supply schemes (Achill and Erris), two public supply schemes (Ballycastle and Ceide Fields) and one private supply (Rossport) (Appendix 4).
- ◆ Eight of the abstractions are from two groundwater bodies (Belmullet GWB and Belmullet Gravels GWB), with the remaining two from lakes linked to river water bodies (Lake Acorrymore linked to Keel East_010 and Carrowmore Lake linked to Munhin_010). 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.
- ◆ One source (Erris RWSS) was non-compliant for pesticides in 2015 – the abstraction is from Carrowmore Lake. The key issue in this source was MCPA. All other sources were compliant.

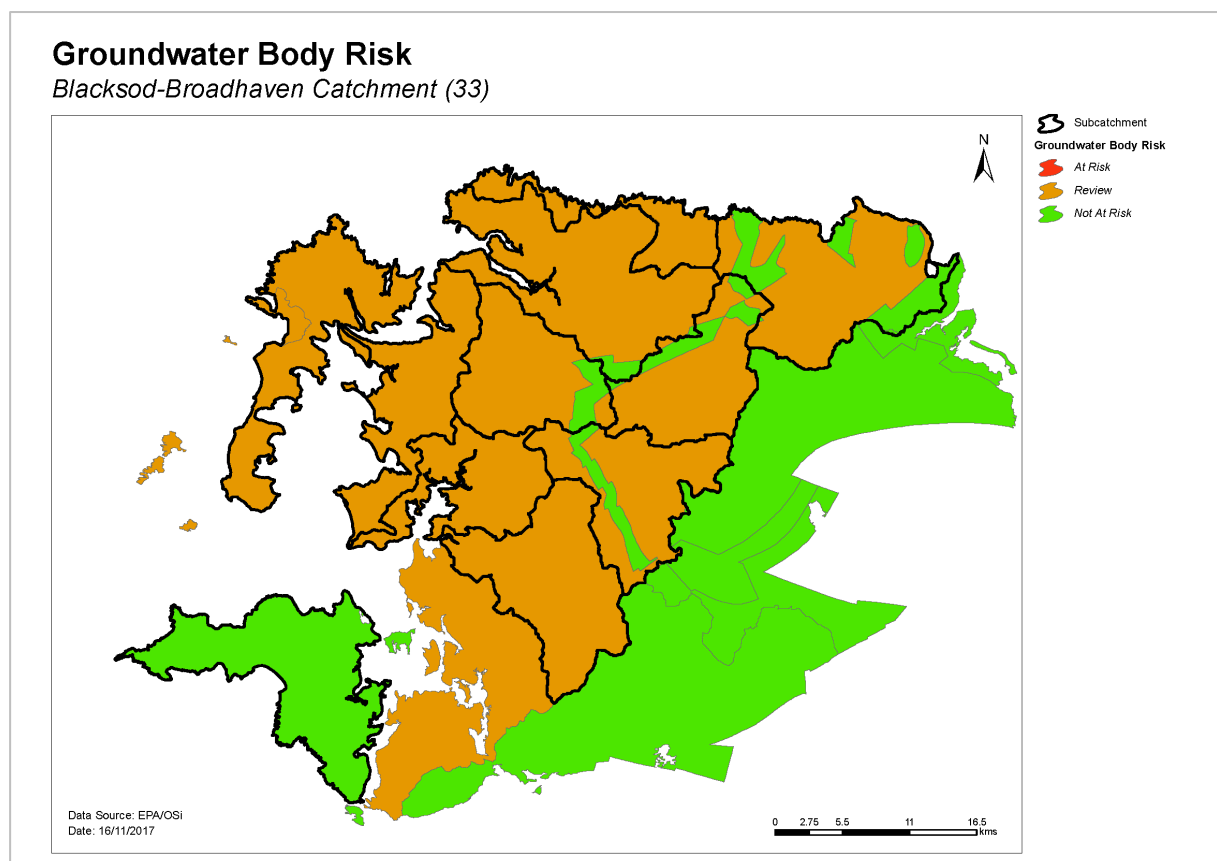


Figure 9. Groundwater body risk

2.5.2 Bathing waters

- ◆ There are eight marine bathing waters in the Blacksod-Broadhaven catchment. All eight were in satisfactory condition and no water quality issues were recorded for 2010-15.
- ◆ The list of bathing waters and the associated water bodies is provided in Table 4.

2.5.3 Shellfish areas

- ◆ There are two designated shellfish areas in the catchment. These are compliant with the relevant standards and there are 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
Dooega Beach, Achill Island	IEWEBWC250_0000_0300	Western Atlantic Seaboard (HAs 32;33;34)	IE_WE_250_0000	✓	
Keel Beach, Achill Island	IEWEBWC250_0000_0200	Western Atlantic Seaboard (HAs 32;33;34)	IE_WE_250_0000	✓	
Keem Beach, Achill Island	IEWEBWC250_0000_0100	Western Atlantic Seaboard (HAs 32;33;34)	IE_WE_250_0000	✓	
Dugort Beach, Achill Island	IEWEBWC360_0000_0400	Blacksod Bay	IE_WE_360_0000	✓	
Golden Strand, Achill Island	IEWEBWC360_0000_0300	Blacksod Bay	IE_WE_360_0000	✓	
Mullaghroe Beach, Belmullet	IEWEBWC360_0000_0100	Blacksod Bay	IE_WE_360_0000	✓	
Elly Bay, Belmullet	IEWEBWC360_0000_0200	Blacksod Bay	IE_WE_360_0000	✓	
Rinroe Beach, Carrowtigue	IEWEBWC400_0000_0100	Broadhaven	IE_WE_400_0000	✓	

Table 5. Designated shellfish areas in the catchment

Shellfish Area		Water Body Intersection		Objective met?	
Name	Code	Name	Code	Yes	No
		Blacksod Bay SW / Achill Sound	IE_WE_370_0000	✓	
		Western Atlantic Seaboard (HAs 32;33;34)	IE_WE_250_0000		
		Western Atlantic Seaboard (HAs 32;33;34)	IE_WE_250_0000		
		Bellacragher Bay	IE_WE_380_0000		
		Bellacragher Bay	IE_WE_380_0000		
		Blacksod Bay SW / Achill Sound	IE_WE_370_0000		
		Blacksod Bay SW / Achill Sound	IE_WE_370_0000		
		Blacksod Bay	IE_WE_360_0000		
		Blacksod Bay	IE_WE_360_0000		
		Blacksod Bay	IE_WE_360_0000		
		Blacksod Bay SW / Achill Sound	IE_WE_370_0000		
		Blacksod Bay SW / Achill Sound	IE_WE_370_0000		
		Western Atlantic Seaboard (HAs 32;33;34)	IE_WE_250_0000		
Blacksod Bay	IEPA2_0031	Blacksod Bay	IE_WE_360_0000	✓	

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 16 Special Areas of Conservation (SACs) in the catchment (Appendix 5), not all of which have water quality and/or quantity conservation objectives for their qualifying interests.
- ◆ One lake water body (Cross) has been prioritised for action as the water conservation objectives for their habitats and/or species are not being supported by ecological status (Appendix 5).
- ◆ There are eight Special Protected Areas (SPAs) in the catchment:
 - Blacksod Bay/Broadhaven SPA
 - Carrowmore Lake SPA
 - Doogort Machair SPA
 - Illanmaster SPA
 - Killala Bay/Moy Estuary SPA
 - Mullet Peninsula SPA
 - Owenduff/Nephin Complex SPA
 - Termoncarragh Lake and Annagh Machair SPA

As there are no specific water quality and quantity supporting conditions identified in the site-specific conservation objectives for these SPAs, the intersecting water bodies are not assigned priority action for WFD protected area purposes in the second cycle.

2.6 Heavily modified water bodies

- ◆ There are no heavily modified water bodies (HMWBs) in the catchment.
- ◆ There are no artificially modified water bodies (AMWBs) in the catchment.

3 Significant issues in *At Risk* water bodies

- ◆ Excess phosphate leading to eutrophication is the dominant issue in the rivers and lakes.
- ◆ High levels of fine sediment resulting in poor habitat quality is also a concern. Such impacts have altered the morphology of water bodies and, in turn, altered habitat conditions.

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, lakes, transitional and coastal (TraC)

- ◆ Significant pressures have been identified through the initial characterisation process in seven water bodies, four of which have multiple pressures. The significant pressures will be refined as further characterisation is carried out.
- ◆ The significant pressure affecting the greatest number of water bodies is agriculture, followed by hydromorphological pressures, forestry, urban waste water, other (anthropogenic unknown) and peat.

4.1.2 Groundwater

There are no *At Risk* groundwater bodies.

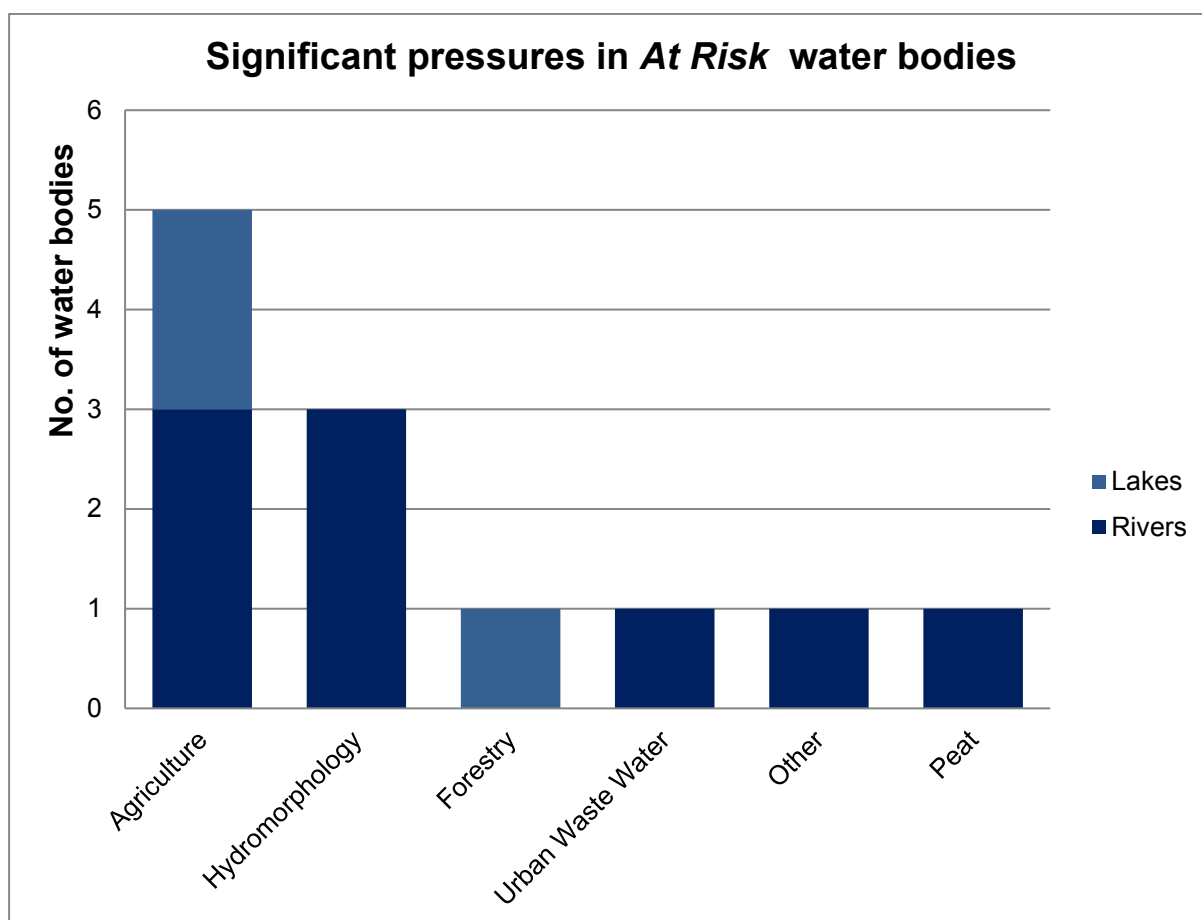


Figure 10. Significant pressures impacting on *At Risk* water bodies

4.2 Pressure type

4.2.1 Agriculture

- ◆ Agriculture is a significant pressure in three river and two lake water bodies (Figure 11, Appendix 3). The issues related to farming in this catchment are 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 phosphate loss from agriculture to surface water is given in Appendix 6.

4.2.2 Hydromorphology

- ◆ Hydromorphology is a significant pressure in three river water bodies. River water bodies within the Tóin an Mhása (33_5) and Glencullin [North Mayo] (33_9) subcatchments are subject to extensive modification. Drainage schemes exist which has led to high levels of siltation, particularly within the Tóin an Mhása subcatchment. Erosion on steep slopes within a river water body of the Glenamoy (33_8) subcatchment is also contributing to excessive levels of siltation. Water bodies that are *At Risk* and impacted by hydromorphological pressures are shown in Figure 12 and listed in Appendix 3.

4.2.3 Forestry

- ◆ Forestry has been identified as a significant pressure in one lake water body, Carrowmore (Figure 13, Appendix 3). The pressures relate to impacts from landslides because of ground instability and nutrient inputs from aerial fertilising.

4.2.4 Urban waste water treatment plants

- ◆ Urban Waste Water Treatment Plants (WWTPs) have been identified as a significant pressure in one *At Risk* water body, Ballinglen_020; details are given in Table 6 and Figure 14. Ballycastle WWTP, which impacts Ballinglen_020, is currently not specified in improvement plans.

Table 6. Waste water Treatment Plants identified as significant pressures in *At Risk* water bodies and expected completion dates of capital works, where applicable.

Facility name	Facility Type	Water Body	2010-15 Ecological Status	Expected Completion Date
Ballycastle D0356	500 to 1,000 p.e.	Ballinglen_020	Moderate	NA ²

4.2.5 Other significant pressures

Anthropogenic unknown

- ◆ Fish status is driving the Moderate ecological status in Ballinglen_010 and the pressure is unknown (Figure 15).

4.2.6 Industry

- ◆ Industry has been identified as a significant pressure in one water body (Doolough Stream_010, Figure 16). The primary significant issues were identified as extensive land drainage which is causing a hydromorphological and fine sediment issue.

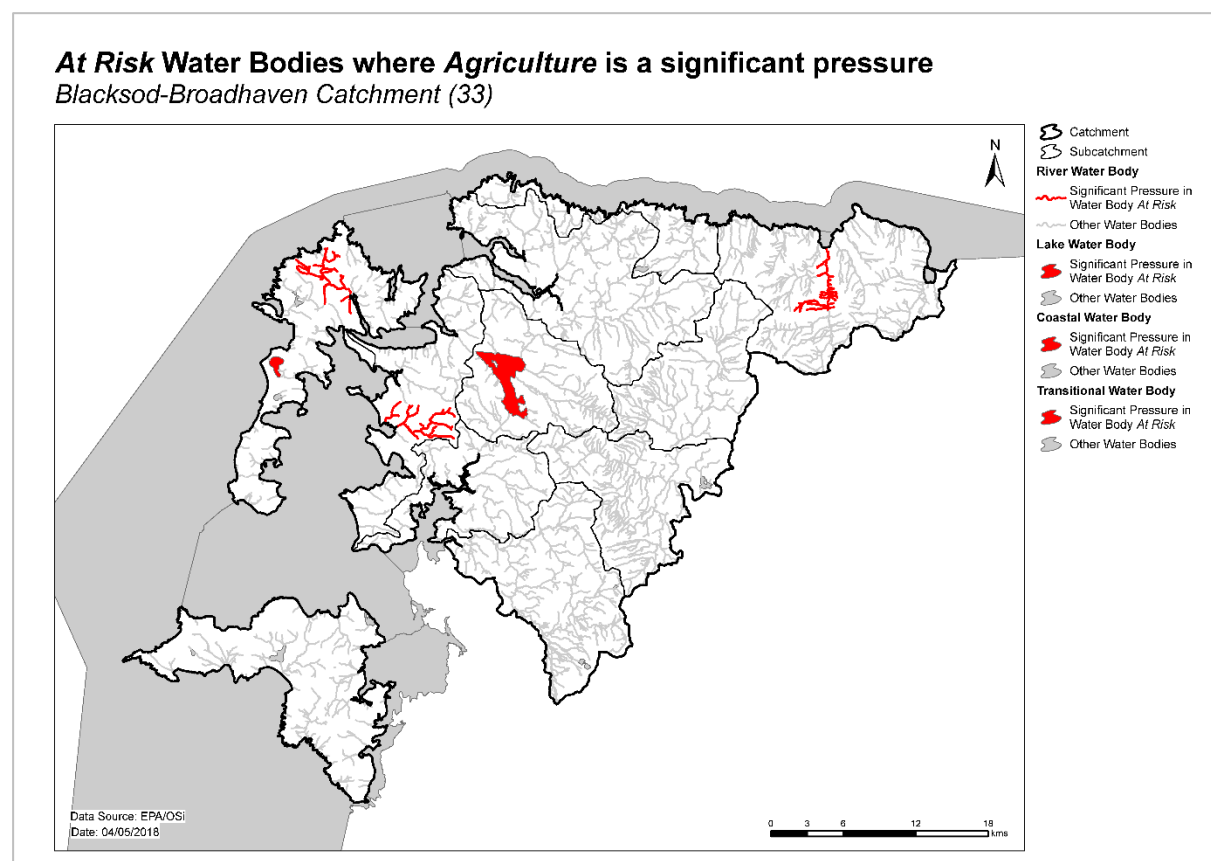


Figure 11. Water bodies that are *At Risk* and are impacted by agricultural activities

² Currently not specified in improvement plans.

At Risk Water Bodies where Hydromorphology is a significant pressure
Blacksod-Broadhaven Catchment (33)

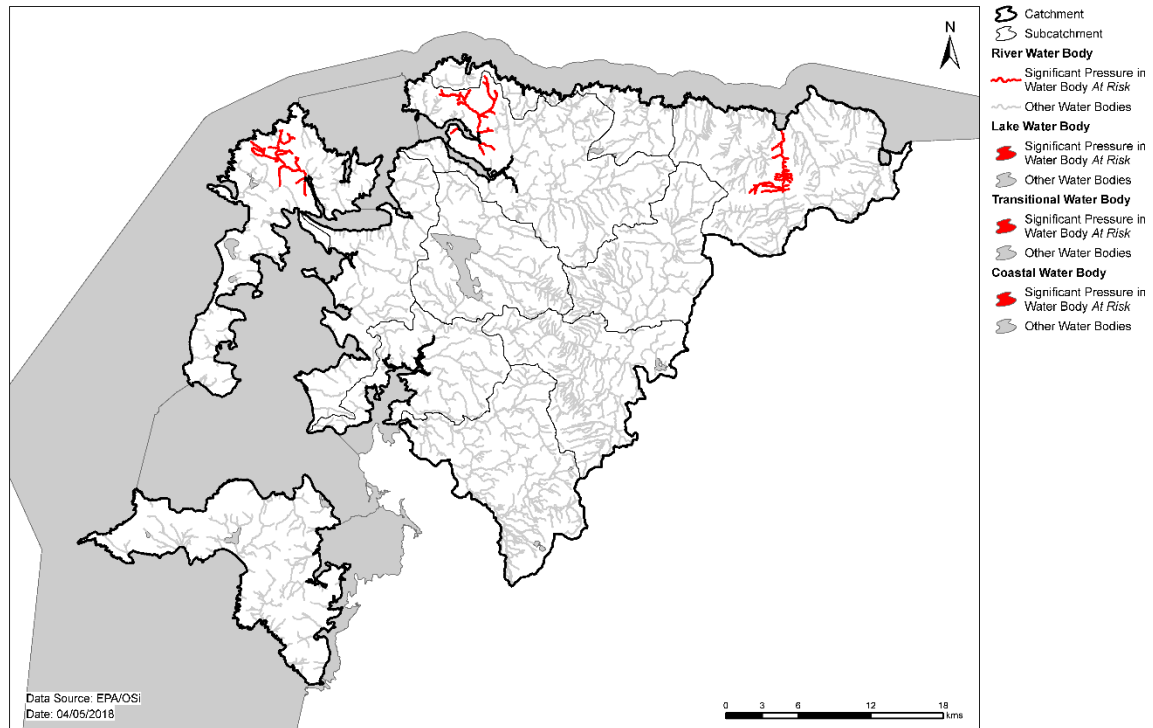


Figure 12. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

At Risk Water Bodies where Forestry is a significant pressure
Blacksod-Broadhaven Catchment (33)

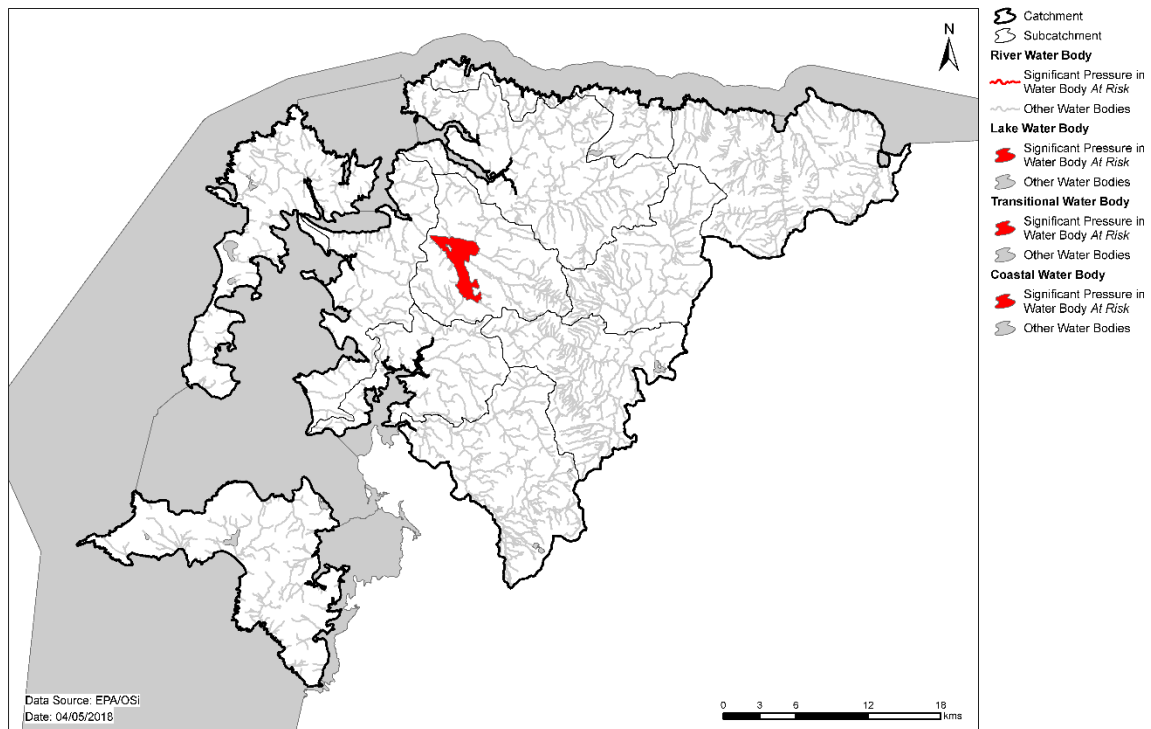


Figure 13. Water bodies that are *At Risk* and are impacted by forestry

At Risk Water Bodies where *Urban Waste Water* is a significant pressure
Blacksod-Broadhaven Catchment (33)

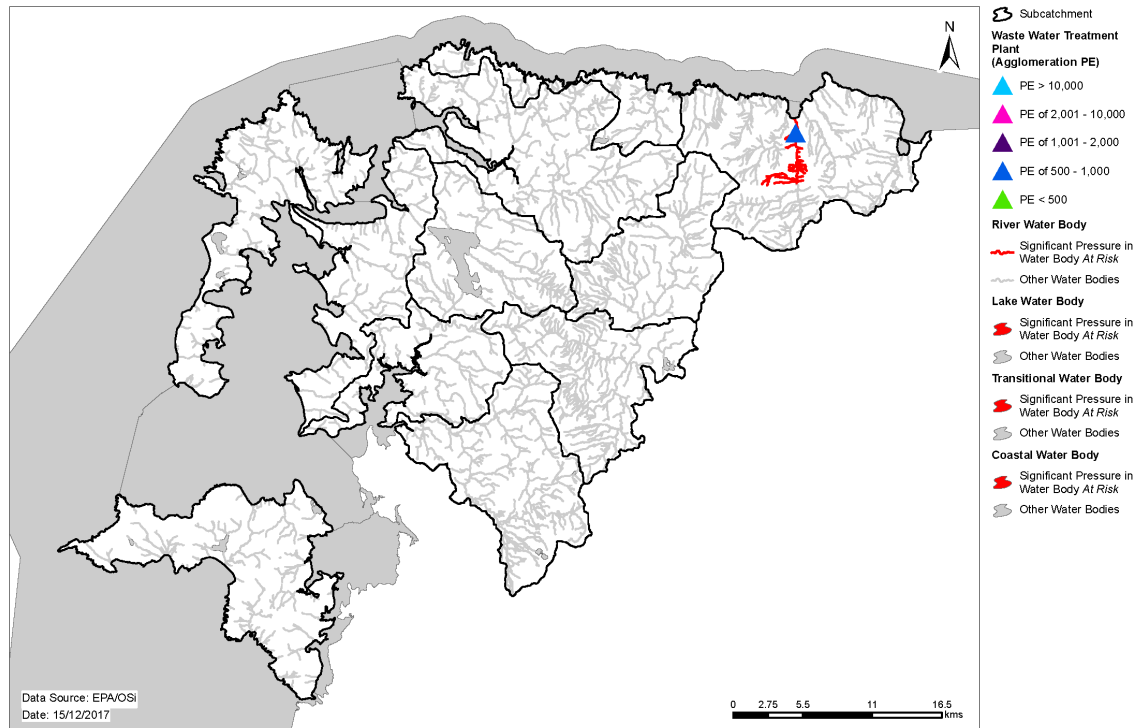


Figure 14. Water bodies that are *At Risk* and are impacted by urban waste water

At Risk Water Bodies where *Other Anthropogenic Pressures* is a significant pressure
Blacksod-Broadhaven Catchment (33)

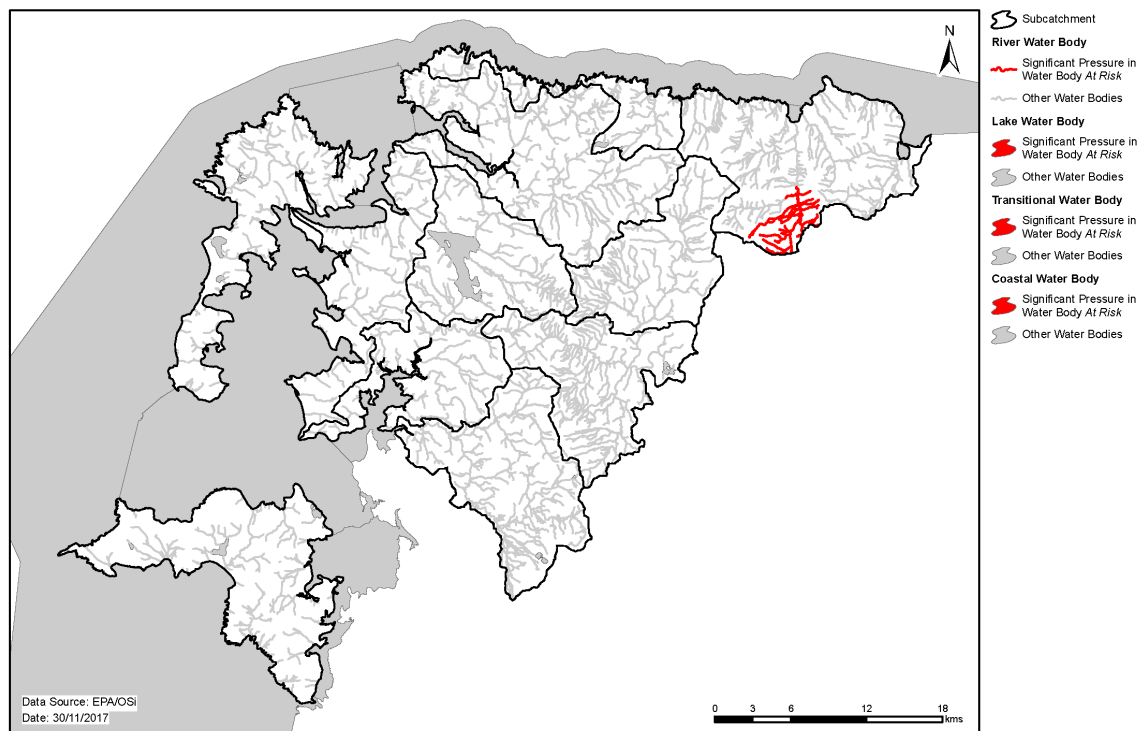


Figure 15. Water bodies that are *At Risk* and are impacted by anthropogenic pressures

At Risk Water Bodies where Extractive Industry is a significant pressure
Blacksod-Broadhaven Catchment (33)

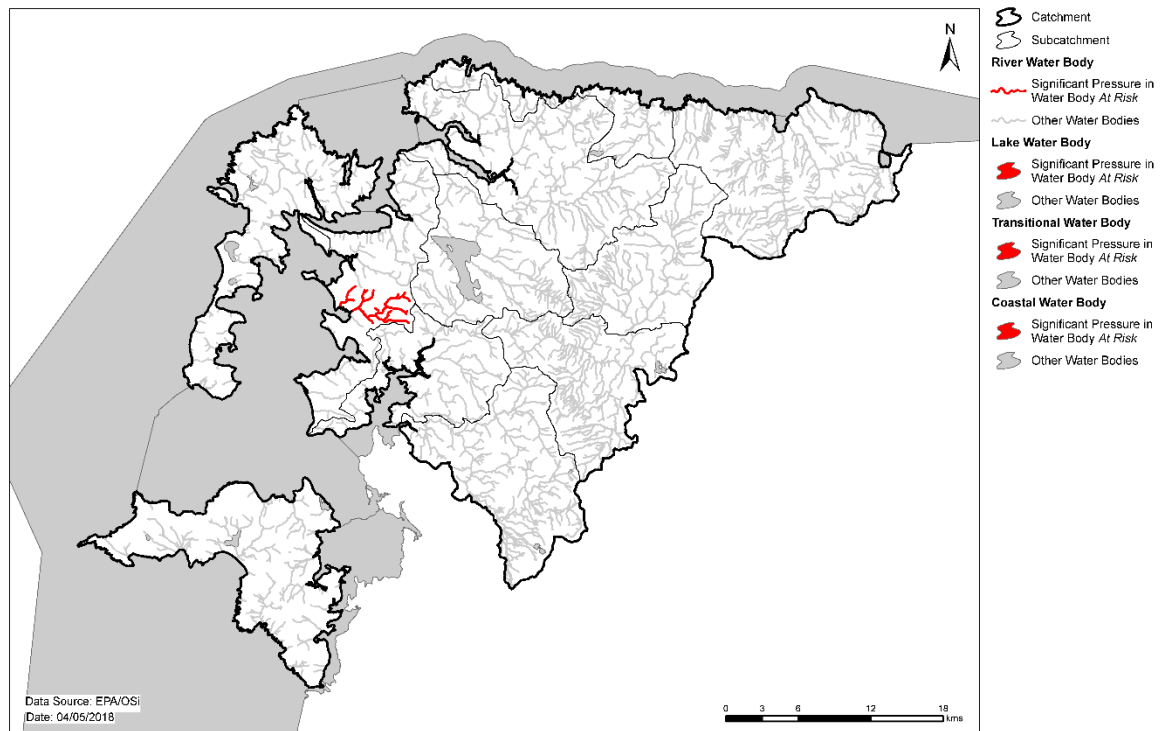


Figure 16. Water bodies that are *At Risk* and are impacted by extractive industries

5 Load reduction assessment

5.1 River water body load reductions

- ◆ Two of the five *At Risk* water bodies in the Blacksod & Broadhaven catchment had baseline data for orthophosphate. In both, the concentrations were low, ranging from below detection limit (0.01mg/l) to 0.011mg/l. The assessment indicated that there is no load reduction requirement in these water bodies.

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 is 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.

- ◆ None of the TraC water bodies are N limited therefore no N load reductions are required.

6 Further Characterisation and Local Catchment Assessments

- ◆ Further characterisation through local catchment assessments is needed in seven 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 (Table 8).
- ◆ Further characterisation through local catchment assessments is needed in 27 *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 (Table 8).
- ◆ Brief details on the 10 IA assessment scenarios are given in Appendix 7.

Table 8. 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
<i>At Risk</i>	7	0	0	0	0	0	2	0	1	0	10
<i>Review</i>	15	0	14	0	0	0	0	0	0	0	29
Note water bodies may have multiple categories of Local Catchment Assessments											

7 Catchment summary

- ◆ Of the 58 river water bodies, five are *At Risk* of not meeting their WFD objectives.
- ◆ Two of 13 lake water bodies are *At Risk* of not meeting their WFD objectives.
- ◆ Excess nutrient loss, mainly phosphate, leading to eutrophication is the major issue for rivers and lakes in the catchment. The significant pressures relating to excess nutrients are primarily agricultural (diffuse and point), but also forestry activity, peat working and urban waste water.
- ◆ Hydromorphological (or physical) conditions (including the input of high levels of fine sediment) and poor habitat quality are an issue for a number of surface water bodies due to drainage schemes and erosion on steep slopes.
- ◆ There are no *At Risk* TraC water bodies.
- ◆ There are no *At Risk* Groundwater bodies.

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 two areas for action in the Blacksod-Broadhaven 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 Blacksod-Broadhaven catchment are summarised below.

- ◆ Two recommended areas for actions (Table 9, Figure 17) were selected.
- ◆ These are the Carrowmore and Ballinglen.
- ◆ These include three *At Risk* and three *Review* river water bodies.
- ◆ One groundwater bodies, which is in *Review* due to groundwater contribution of nutrients to surface water bodies, intersects with two of the recommended areas for action, see Table 10. Actions taken to improve surface water will need to take account of the groundwater contribution to surface water.

A remaining 30 *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 18. These include:

- ◆ twenty-eight river and lake water bodies – four *At Risk* and 24 *Review*, and
- ◆ two coastal water bodies – both in *Review*.

Table 9. Recommended Areas for Action in the Blacksod-Broadhaven Catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Carrowmore	1	33_3	Mayo	<ul style="list-style-type: none"> • Important for Inland Fisheries Ireland. • Important for Mayo CoCo: fishery, tourism amenity, drinking water abstraction. • Building upon previous work: farm inspections and improving forestry practices. • One water is failing to meet its protected area objective for drinking water.
Ballinglen	5	33_9	Mayo	<ul style="list-style-type: none"> • Important non-designated bathing water area. • Important non-designated salmonid area. • Two deteriorated water bodies. • Headwaters.

Table 10. Groundwater bodies intersecting with surface water bodies in recommended areas for action

Groundwater bodies			Intersecting surface water bodies		Recommended Area for Action
Code	Name	Risk	Code	Name	
IE_WE_G_0057	Belmullet	Review	IE_WE_33B010100	BALLINGLEN_010	Ballinglen
			IE_WE_33B010200	BALLINGLEN_020	
			IE_WE_33C520880	CABINTOWN_010	
			IE_WE_33K030830	KNOCKBOHA_010	
			IE_WE_33K100650	KILLERDUFF_010	
			IE_WE_33_1914	Carrowmore	Carrowmore

9 Environmental Objectives

9.1 Surface Water

- ◆ Assuming resources are available and actions are taken in the recommended areas for action, of the three *At Risk* river water bodies, it is predicted that all will achieve their objective by 2027. For the three *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 11.

Table 11. 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
<i>At Risk</i>	3	0	3
<i>Review</i>	3	0	3
<i>Not at Risk</i>	0	0	0
<i>Total</i>	6	0	6

- ◆ Forty-five water bodies have met their 2015 environmental objective.
- ◆ As action is not yet planned to be taken in the remaining four *At Risk* surface water bodies, a 2027 date is applied to all four water bodies.
- ◆ For the 26 *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 12.

Table 12. 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			
<i>At Risk</i>	3	0	3
<i>Review</i>	20	0	20
Lakes			
<i>At Risk</i>	1	0	1
<i>Review</i>	4	0	4
TraCs			
<i>At Risk</i>	0	0	0
<i>Review</i>	2	0	2
Total	30	0	30

9.2 Groundwater

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

10 Acknowledgements

This Blacksod-Broadhaven Catchment Assessment (Version 3) has been produced by the Catchment Science & Management Unit, EPA, with the assistance of the following:

- Mayo 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.

Recommended Areas for Action

Blacksod-Broadhaven Catchment (33)

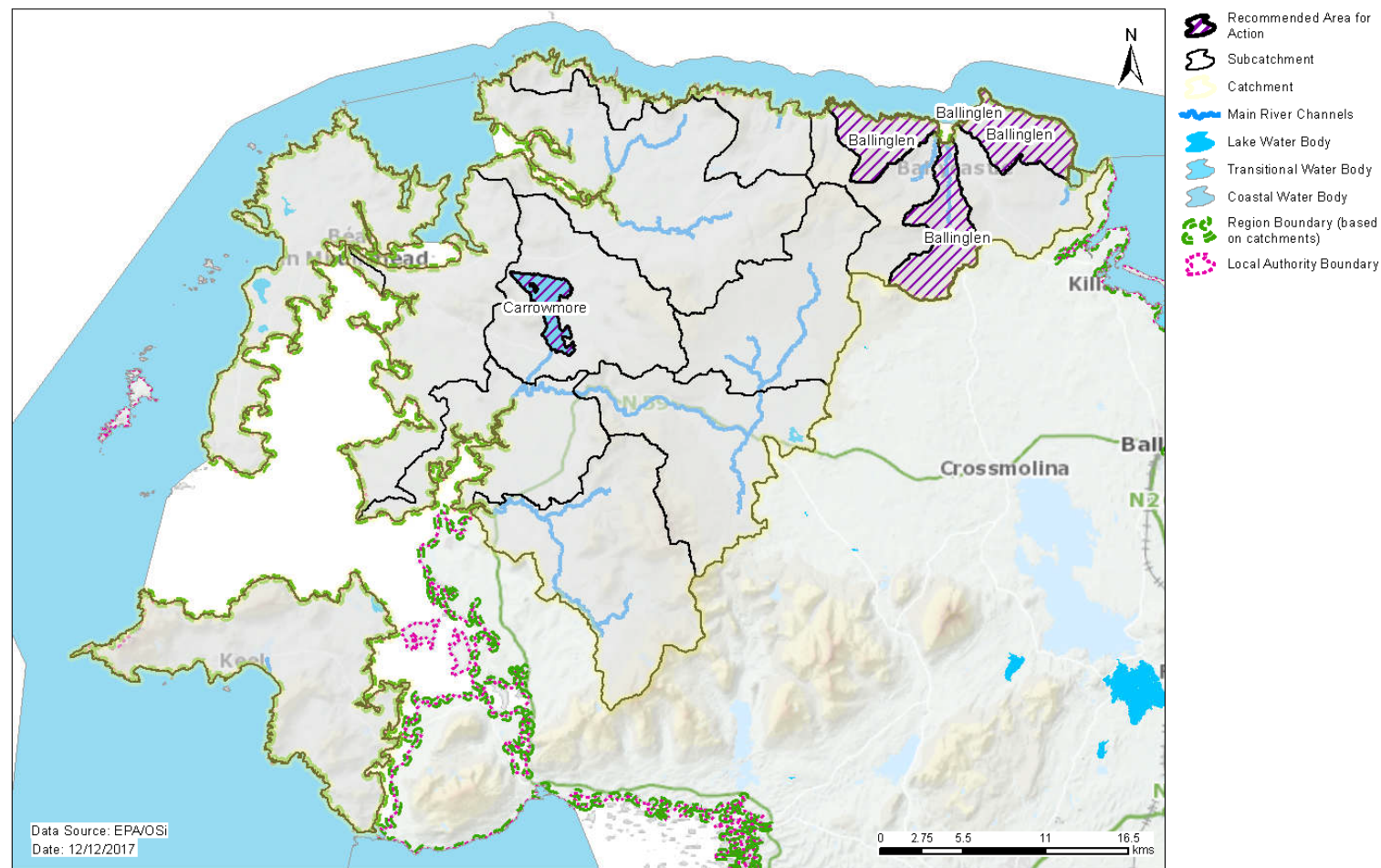


Figure 17. Location of Recommended Areas for Action in the Blacksod-Broadhaven Catchment

Remaining *At Risk* and *Review* Water Bodies

Blacksod-Broadhaven Catchment (33)

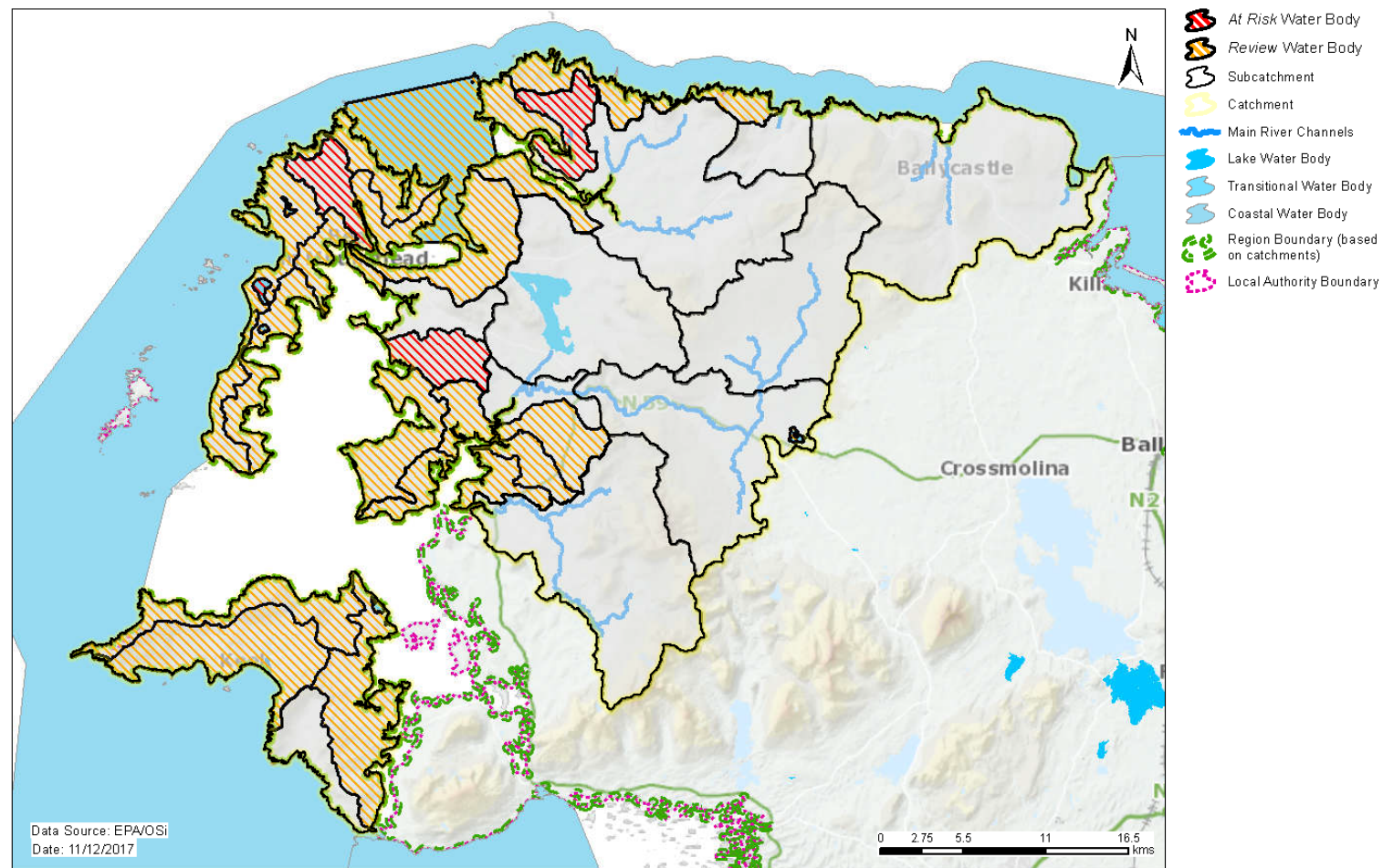


Figure 18. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Blacksod-Broadhaven Catchment

Appendix 1 High ecological status objective water bodies

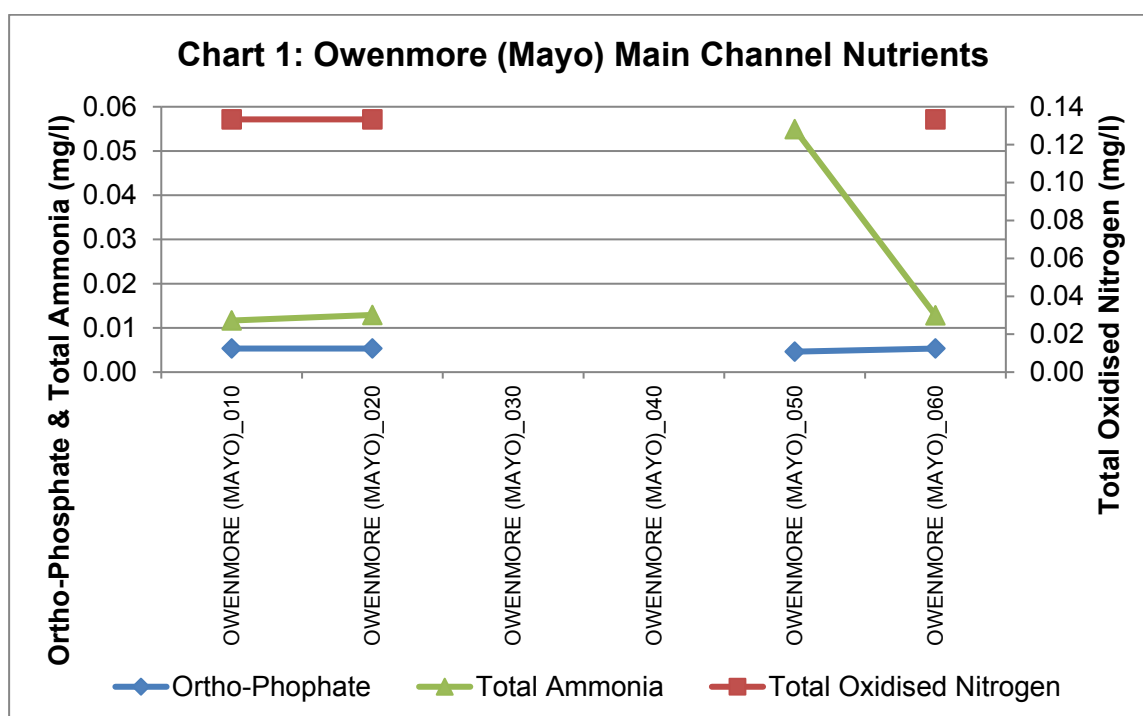
Water body/Site	Type	Codes	2015 Status
Sheskin Stream_010	River	IE_WE_33S030150	High
Owenmore (Mayo)_030	River	IE_WE_33O040250	High
Owenmore (Mayo)_040	River	IE_WE_33O040270	High
Barroosky_010	River	IE_WE_33B080400	High
Glenamoy_010	River	IE_WE_33G010020	High
Glenamoy_020	River	IE_WE_33G010050	High
Glenglassera_010	River	IE_WE_33G050100	High
Keerglen 33_010	River	IE_WE_33K010200	High
Tullaghan Bay	Transitional	IE_WE_390_0100	High
Sruwaddacon Bay	Transitional	IE_WE_400_0200	High
Broadhaven	Coastal	IE_WE_400_0000	Good

Appendix 2 Catchment scale nutrient concentrations and in-stream loads

The results of the water quality assessment for the Owenmore (Mayo) main channel are illustrated in Chart 1. This shows the 2013-2015 average that all nutrient concentrations along the main channels are low. Note there is no chemistry data for the middle reaches of the Owenmore (Mayo) River.

Concentrations of orthophosphate and Total Oxidised Nitrogen (TON) along the main channel remain below detection limits of <0.01mg/l and <0.2mg/l, respectively.

The ammonia concentrations in the Owenmore (Mayo) main channel remain below the EQS for good status (0.065mg/l) at all monitoring locations. The highest concentrations of ammonia is observed in the Owenmore (Mayo)_050 at 0.055mg/l, downstream of which concentration decrease again. The Owenmore (Mayo)_050 is the receiving water body for the Bangor Erris waste water treatment plant.



Appendix 3 Summary information on *At Risk* and *Review* surface water bodies

Subcatchment code	Water body code	Water body name	Water body type	Risk	Ecological Status 07-09	Ecological Status 10-15	High Ecological Status Objective Water Body Y/N	Significant Pressures	Date to Meet Environmental Objective	Recommended Area for Action Name
33_2	IE_WE_33R010800	AN_Ráith_010	River	Review	Unassigned	Unassigned	N		2027	
33_2	IE_WE_33R020920	Rinn_Na_Sionnach_010	River	Review	Unassigned	Unassigned	N		2027	
33_2	IE_WE_33D020100	Doolough Stream_010	River	At Risk	Poor	Poor	N	Ag,Peat	2027	
33_2	IE_WE_400_0000	Broadhaven	Coastal	Review	Good	Good	Y		2027	
33_3	IE_WE_33_1914	Carrowmore	Lake	At Risk	Moderate	Moderate	N	Ag,For	2027	Carrowmore
33_4	IE_WE_33_1912	Dahybaun	Lake	Review	Unassigned	Unassigned	N		2027	
33_5	IE_WE_33_1893	Leam	Lake	Review	Unassigned	Unassigned	N		2027	
33_5	IE_WE_33_1903	Termoncarragh	Lake	Review	Unassigned	Unassigned	N		2027	
33_5	IE_WE_33A040520	Achadh_Ghlaisín_010	River	Review	Unassigned	Unassigned	N		2027	
33_5	IE_WE_33_1889	Cross	Lake	At Risk	Poor	Moderate	N	Ag	2027	
33_5	IE_WE_33C040710	Coimáin_An_Mhása_010	River	Review	Unassigned	Unassigned	N		2027	
33_5	IE_WE_33F010370	An_Fál_Mór_010	River	Review	Unassigned	Unassigned	N		2027	
33_5	IE_WE_33I010620	Imleach_Beag_Thuaidh_010	River	Review	Unassigned	Unassigned	N		2027	
33_5	IE_WE_33C030050	Clooneen (Mayo)_010	River	At Risk	Poor	Moderate	N	Ag,Hymo	2027	
33_5	IE_WE_33M080640	An_Mullach_Rua_010	River	Review	Unassigned	Unassigned	N		2027	
33_5	IE_WE_33M090470	Moyrahan_010	River	Review	Unassigned	Unassigned	N		2027	
33_7	IE_WE_33_1919	Dooniver Sruhíll	Lake	Review	Unassigned	Unassigned	N		2027	
33_7	IE_WE_33B030960	Barnynagappul Stream 33_010	River	Review	Unassigned	Unassigned	N		2027	
33_7	IE_WE_33G400250	Glendarary 33_010	River	Review	Unassigned	Unassigned	N		2027	
33_7	IE_WE_33K020760	Keel_East_010	River	Review	Unassigned	Unassigned	N		2027	
33_8	IE_WE_33B140620	Barr_Na_Coilleadh_010	River	Review	Unassigned	Unassigned	N		2027	
33_8	IE_WE_33K180130	Kilgalligan 33_010	River	Review	Unassigned	Unassigned	N		2027	
33_8	IE_WE_33G060100	Gweedaney_010	River	At Risk	Moderate	Moderate	N	Hymo	2027	
33_9	IE_WE_33C520880	Cabintown_010	River	Review	Unassigned	Unassigned	N		2027	Ballinglen
33_9	IE_WE_33K030830	Knockboha_010	River	Review	Unassigned	Unassigned	N		2027	Ballinglen
33_9	IE_WE_33K100650	Killerduff_010	River	Review	Unassigned	Unassigned	N		2027	Ballinglen
33_9	IE_WE_33B010100	Ballinglen_010	River	At Risk	Good	Moderate	N	Other	2027	Ballinglen
33_9	IE_WE_33B010200	Ballinglen_020	River	At Risk	Good	Moderate	N	Ag,Hymo,UWW	2027	Ballinglen
33_9	IE_WE_420_0000	Killala Bay	Coastal	Review	High	Good	N		2027	
33_10	IE_WE_33B050810	Ballinapark 33_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
33_10	IE_WE_33P020900	Port_Durlainne_010	River	Review	Unassigned	Unassigned	N		2027	
33_11	IE_WE_33M190620	Muingnahalloona_010	River	Review	Unassigned	Unassigned	N		2027	
33_11	IE_WE_33T070130	Tristia 33_010	River	Review	Unassigned	Unassigned	N		2027	
33_11	IE_WE_33T130850	Tulacháin_Dubh_010	River	Review	Unassigned	Unassigned	N		2027	
33_11	IE_WE_33T210290	Tullaghaunnashammer_010	River	Review	Unassigned	Unassigned	N		2027	
33_11	IE_WE_33T280770	Tullaghan_33_010	River	Review	Unassigned	Unassigned	N		2027	

Ag: Agriculture

M+Q: Mines and Quarries

DWW: Domestic Waste water

Peat: Peat Drainage and Extraction

For: Forestry

DU: Diffuse Urban

Hymo: Hydromorphology

UWW: Urban Waste water

Ind: Industry

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	Objectives met?	Reason why not met?
2200PRI2103	Roy Bingham GWS	Belmullet (GWB)	IE_WE_G_0057	Y	N/A
2200PRI2014	Belderrig GWS	Belmullet (GWB)	IE_WE_G_0057	Y	N/A
2200PRI2035	Cornboy GWS	Belmullet (GWB)	IE_WE_G_0057	Y	N/A
2200PRI2047	Drum/Binghamstown GWS	Belmullet Gravels (GWB)	IE_WE_G_0065	Y	N/A
2200PRI2070	Kilgalligan GWS	Belmullet (GWB)	IE_WE_G_0057	Y	N/A
2200PRI2324	Rossport	Belmullet (GWB)	IE_WE_G_0057	Y	N/A
2200PUB1005	Ballycastle WSS	Belmullet (GWB)	IE_WE_G_0057	Y	N/A
2200PUB1037	Ceide Fields WSS	Belmullet (GWB)	IE_WE_G_0057	Y	N/A
2200PUB1001	Achill RWSS	Lake Acorrymore	IE_WE_33_1892	Y	N/A
2200PUB1007	Erris RWSS	Carrowmore Lake	IE_WE_33_1914	N	MCPA

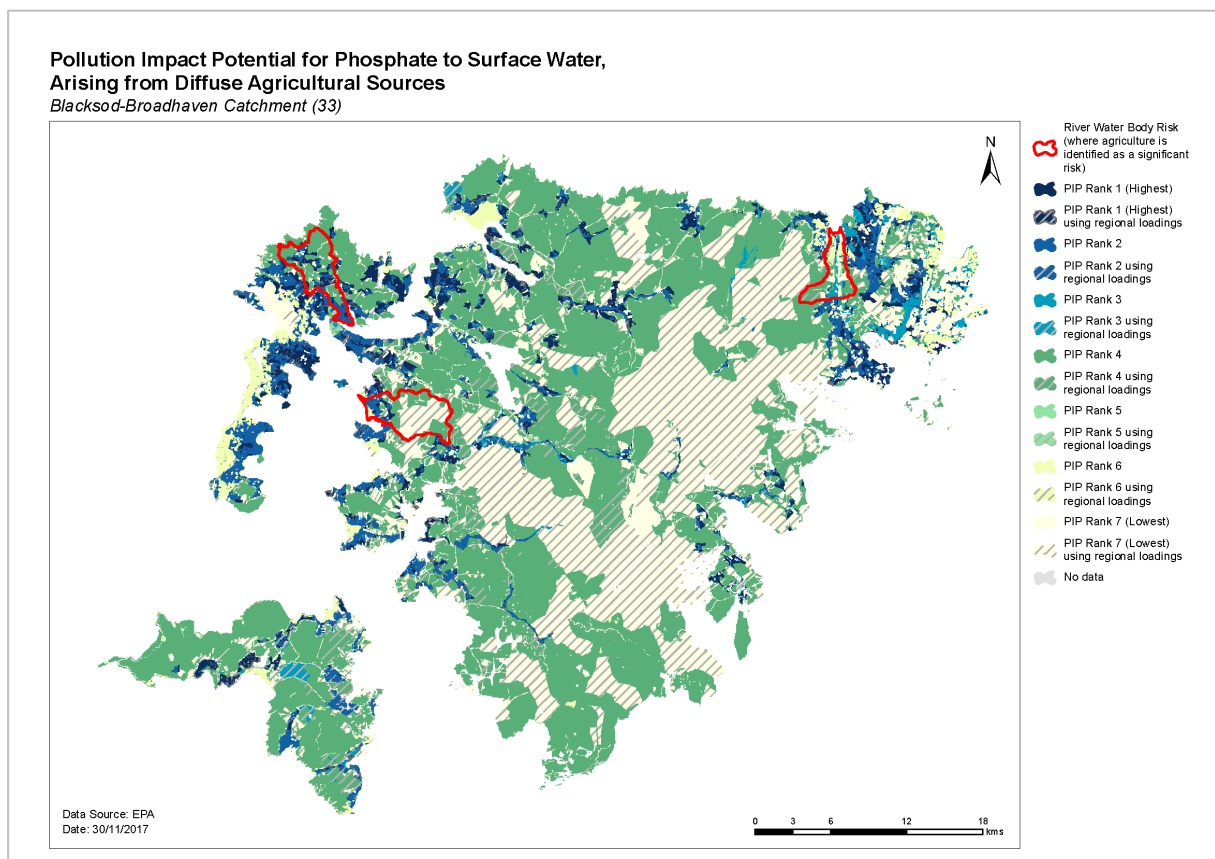
Appendix 5 Prioritisation of water bodies with Natura 2000 site qualifying interests

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Achill Head SAC 002268	none							
Bellacorick Bog Complex SAC 001922	7230	Good GW level	Groundwater	Bangor GWB	Good (NAR)	No	IE_WE_G_0052	No
			Groundwater	Belmullet GWB	Good (R)	No	IE_WE_G_0057	No
Bellacorick Iron Flush SAC 000466	none							
Broadhaven Bay SAC 000472	none							
Carrowmore Lake Complex SAC 000476	none							
Croaghaun/Slievemore SAC 001955	none							
Doogort Machair/Lough Doo SAC 001497	21A0	Good GW level	Groundwater	Achill	Good (NAR)	No	IE_WE_G_0026	No
Erris Head SAC 001501	none							
Glenamoy Bog Complex SAC 000500	21A0	Good GW level	Groundwater	Belmullet GWB	Good (R)	No	IE_WE_G_0057	No
	3160	High/Good?	Lakes	Lougherglass	Unassigned (NAR)	No	IE_WE_33_1906	No
			Lakes	South of Cregganmore	Unassigned (NAR)	No	IE_WE_33_1804	No
	1106	Good	River	Glenamoy_010	High (NAR-HES obj)	No	IE_WE_33G010020	No
			River	Glenamoy_020	High (NAR-HES obj)	No	IE_WE_33G010050	No
			River	Glenamoy_030	Good (NAR)	No	IE_WE_33G010100	No
Keel Machair/Menaun Cliffs SAC 001513	21A0	Good GW level	Groundwater	Achill	Good (NAR)	No	IE_WE_G_0026	No
Lackan Saltmarsh And Kilcummin Head SAC 000516	none							
Lough Dahybaun SAC 002177	1833	At least Good	Lake	Dahybaun	Unassigned (R)	No	IE_WE_33_1912	No
Mullet/Blacksod Bay Complex SAC 000470	21A0	Good GW level	Groundwater	Belmullet GWB	Good (R)	No	IE_WE_G_0057	Yes
	3150	Good	Lake	Cross	Moderate (AT RISK)	Yes	IE_WE_33_1889	Yes
	7230	Good GW level	Groundwater	Belmullet GWB	Good (R)	No	IE_WE_G_0057	No

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Owenduff/Nephin Complex SAC 000534	3110/3160	At least Good	Lake	Corryaphuil North	Unassigned (NAR)	No	IE_WE_33_1803	No
			Lake	Corryaphuil South	Unassigned (NAR)	No	IE_WE_33_1876	No
			Lake	Scardaun	Unassigned (NAR)	No	IE_WE_33_1872	No
	1106	Good	River	Tarsaghaunmore_010	Good (NAR)	No	IE_WE_33T010100	No
			River	Owenduff (Blacksod)_010	Good (NAR)	No	IE_WE_33O010010	No
			River	Owenduff (Blacksod)_020	Good (NAR)	No	IE_WE_33O010030	No
			River	Owenduff (Blacksod)_030	Good (NAR)	No	IE_WE_33O010100	No
Slieve Fyagh Bog SAC 000542	none							
West Connacht Coast SAC 002998	none							

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