Mal Bay Catchment Assessment 2010-2015 (HA 28)

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 Mal 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 all streams entering tidal water in Mal Bay and between George's Head and Black Head, Co. Clare, draining a total area of 848 km². The largest urban centre in the catchment is Lehinch. The other main urban centres are Milltown Malbay, Inagh, Ennistimon and Lisdoonvarna. The total population of the catchment is approximately 18,590 with a population density of 22 people per km².

This catchment comprises the coastal part of County Clare and is underlain by sandstones and shales except for a small part of the catchment north of Lisdoonvarna which is underlain by highly karstified Burren limestone. In this northern region, nearly all rainfall enters the bedrock aquifer, flowing either to the sea or re-emerging as surface streams when it reaches the impermeable shale and sandstone rocks to the south. Surface drainage in this catchment is dominated by a series of westerly flowing rivers that drain to the Atlantic coast.

The Aille (Clare) River flows west through Lisdoonvearna, where it is joined by numerous large springs draining from the karstic Burren aquifer, and the Ballyvoe River. The Aille then flows into the sea at Fisherstreet.

The Inagh River rises on the south-eastern slopes of Slievecallan, flowing north-east before being joined by the Loughburke River and the Aillenabrockagh River downstream of Inagh. The Inagh then turns northwest and is joined by the Derrymore River which drains the eastern flanks of the hills north of Slievecallan.

Making its way through Ennistimon, the Inagh is then joined by the Ballymacraven River which outflows from Lickeen Lough. The Inagh River then becomes tidal and makes its way to sea via Liscannor Bay between the towns of Lehinch and Liscannor.

The north of Milltown Malbay is drained by the Ballinphonta River, while the area to the south is drained by the Annagh River which flows from the western flanks of Slieve Callan to the sea south of Spanish Point.

The source of the Annageeragh River flows into the eastern end of Doo Lough, before continuing westward from the lake, and into the sea north of Carrowmore Point. To the south, the Creegh River flows west from the uplands north of Kilmihil, onward past Creegh and to sea at the southern end of Doughmore Bay. The Doonbeg River flows from the western slopes of Ben Dash, heading southwest before making its way through Cooraclare and to Doonbeg, where the river becomes tidal. The Doonbeg River then makes its way to sea via Doonbeg Bay.

The Mal Bay catchment comprises 7 subcatchments (Table 1, Figure 1) with 37 river water bodies, four lakes, four transitional and four coastal water bodies, and four groundwater bodies. There is one heavily modified water body and no artificial water bodies in the catchment.

Table 1. List of subcatchments in the Mal Bay catchment

Subcatchment ID	Subcatchment Name
28_1	Inagh [Ennistymon]_SC_010
28_2	Aille [Clare]_SC_010
28_3	Doonbeg_SC_010
28_4	Kiltumper Stream_SC_010
28_5	Annagh [Clare]_SC_010
28_6	Inagh [Ennistymon]_SC_020
28_7	Annageeragh_SC_010

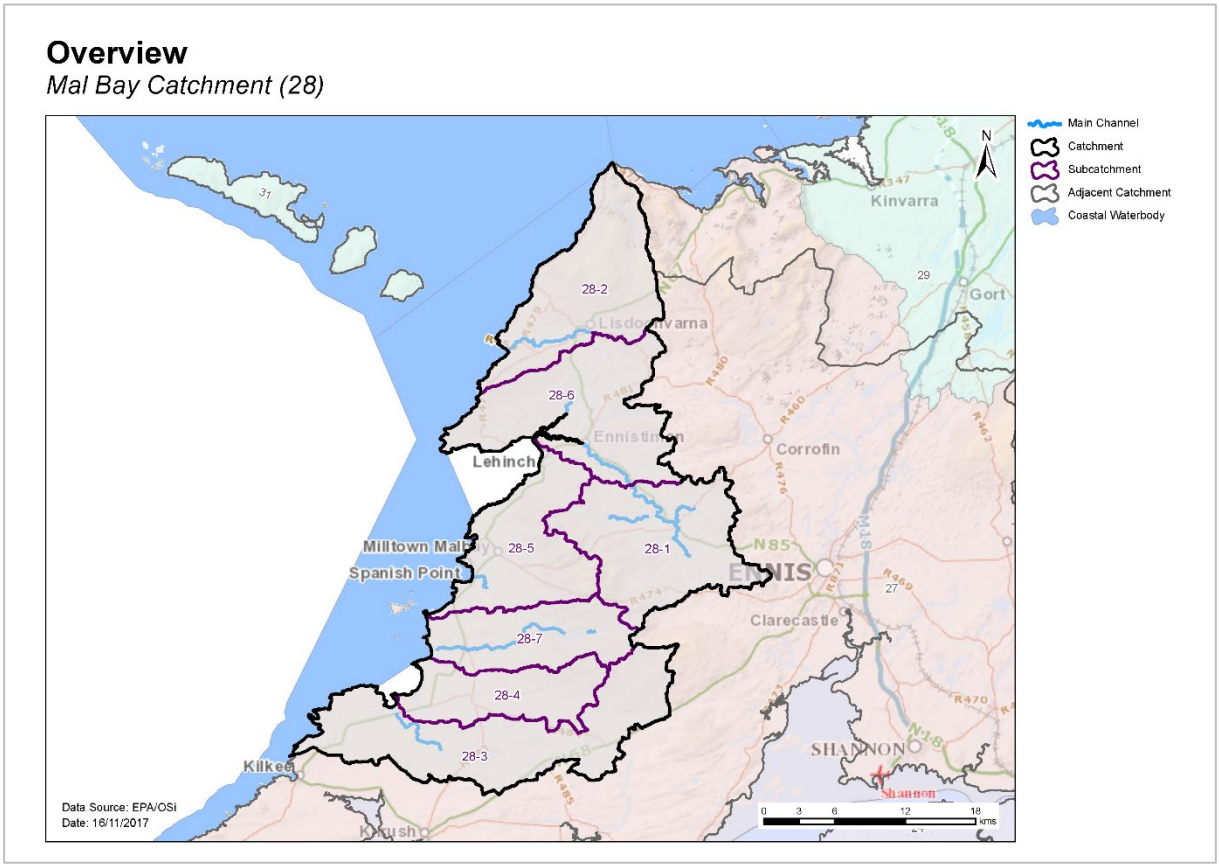


Figure 1. Subcatchments in the Mal Bay catchment

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 23 (56%) river and lake water bodies at Good or High status, and 12 (29%) at less than Good status in 2015 (Table 2, Figure 2). Six (15%) river and lake water bodies are unassigned.

- One river water body has a high ecological status objective (Aughaglanna_010). In 2015, this river was at high status (Figure 3, Appendix 1).
- Since 2007-09 when WFD monitoring began, four water bodies have an improved status whereas six have deteriorated (Figure 7).
- The variation in nutrient concentrations and loads in the Mal Bay main channel (Inagh (Ennistymon), Doonbeg and Creegh) is illustrated in Appendix 2.

2.1.2 Transitional and coastal (TraC)

- There are eight TraC water bodies, one (13%) at less than Good status in 2015 seven (87%) of which are Unassigned (Table 2, Figure 2). These water bodies do not have a high ecological status objective.
- The numbers of water bodies at each status class in 2007-09 and 2010-15 are shown in Figure 4 (rivers) Figure 5 (lakes) and Figure 6 (TraCs).
- Note that these TraC water bodies 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	*Not at Risk*	*Review*	*At Risk*
Rivers	37	1	20	4	6	0	6	20	6	11
Lakes	4	0	2	1	0	1	0	2	0	2
TraCs	8	0	0	0	1	0	7	4	4	0

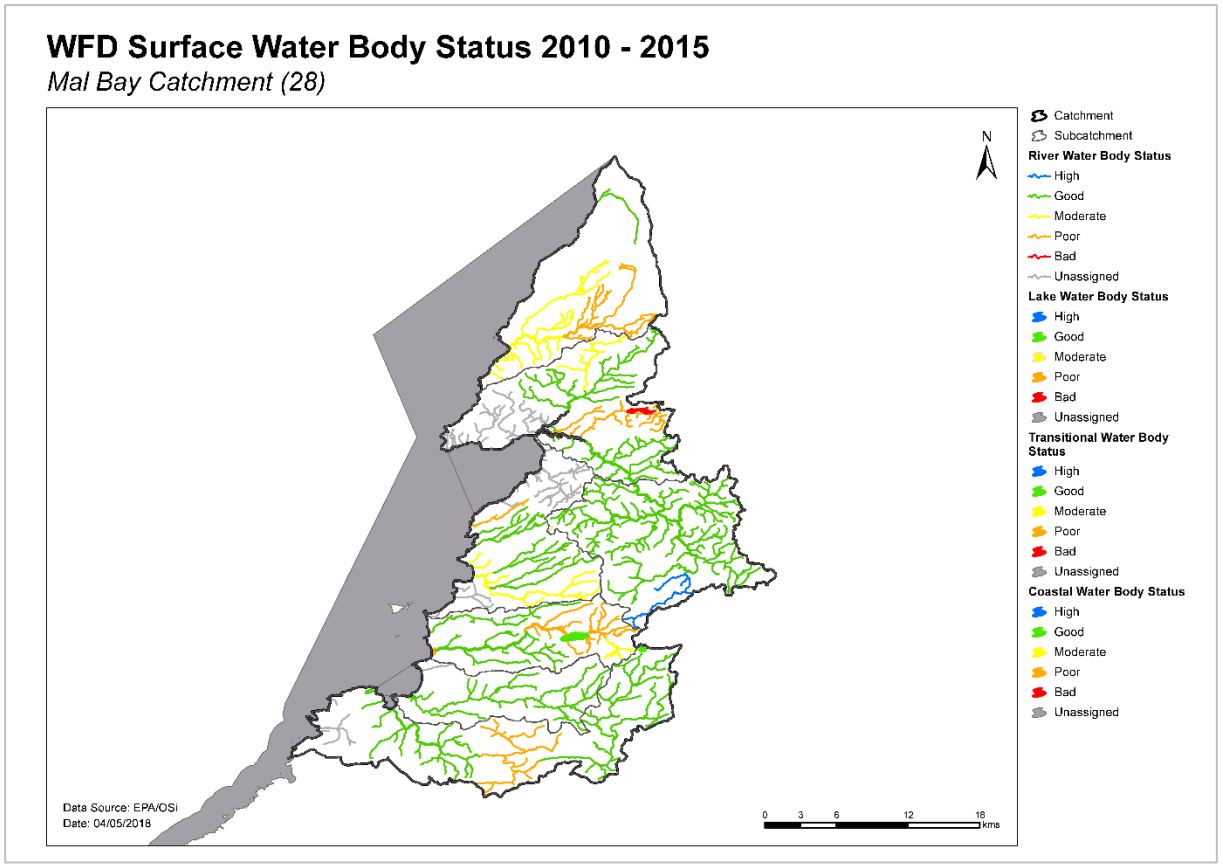


Figure 2. Surface water ecological status

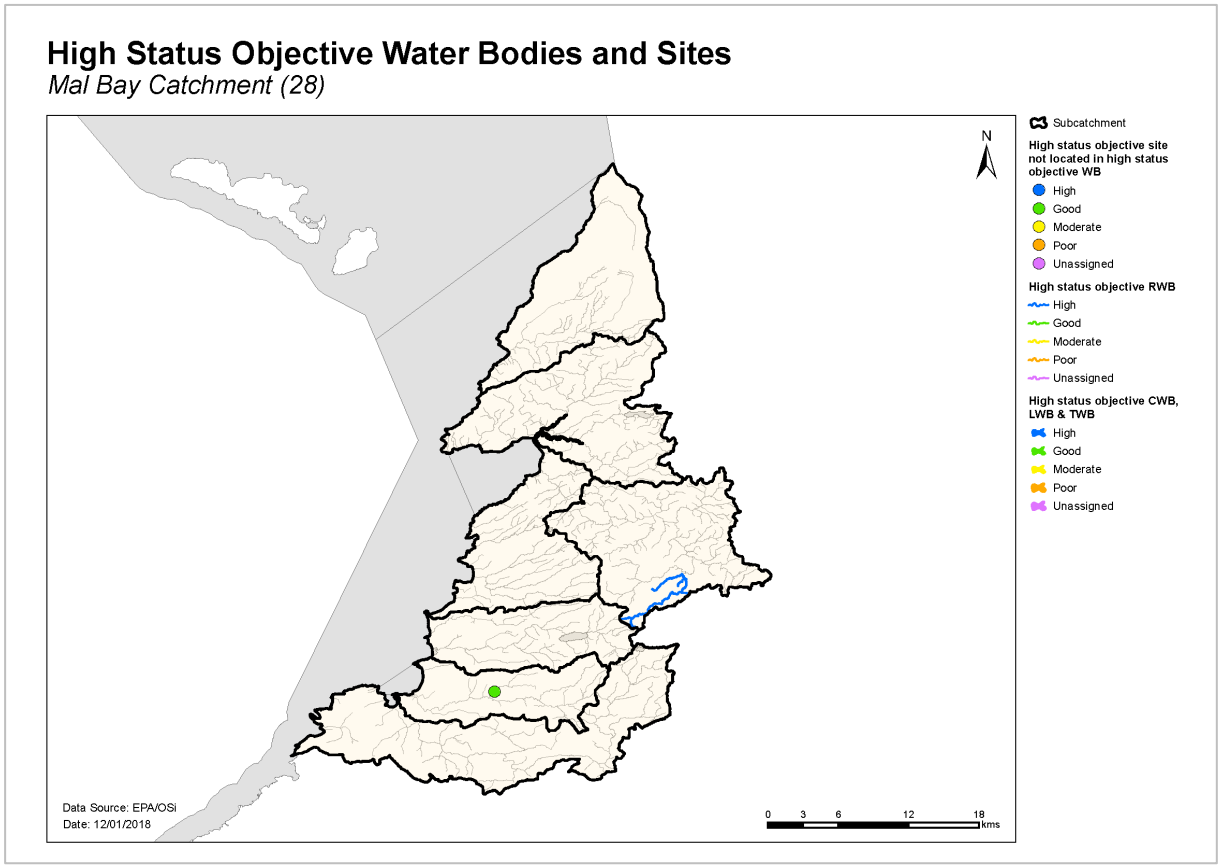


Figure 3. High ecological status objective water bodies and sites

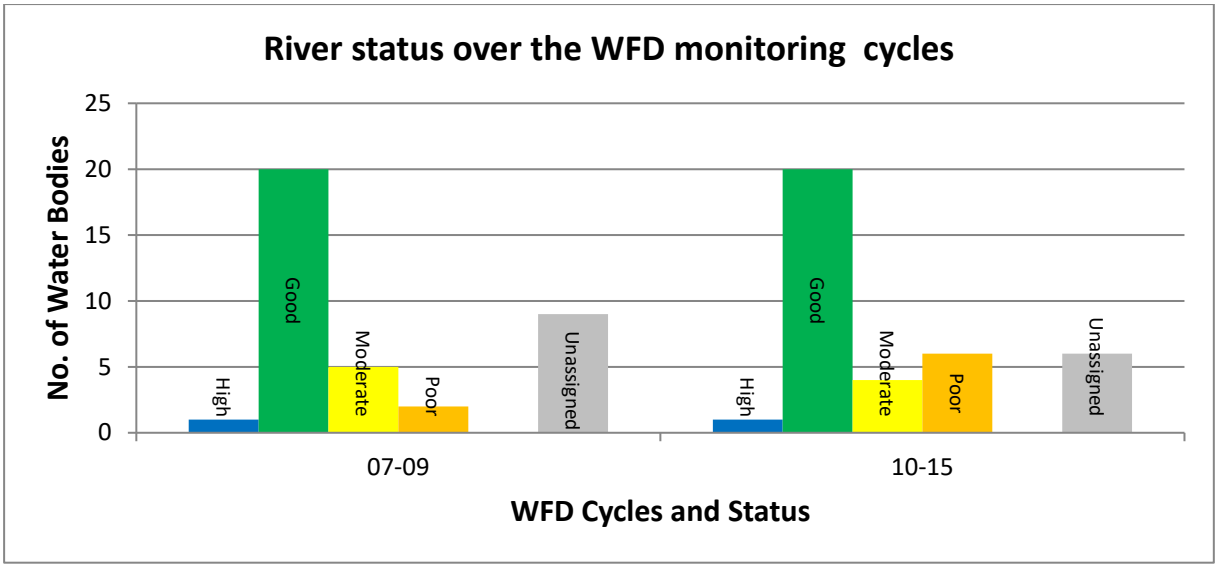


Figure 4. Number of rivers at each status class in 2007-09 and 2010-15

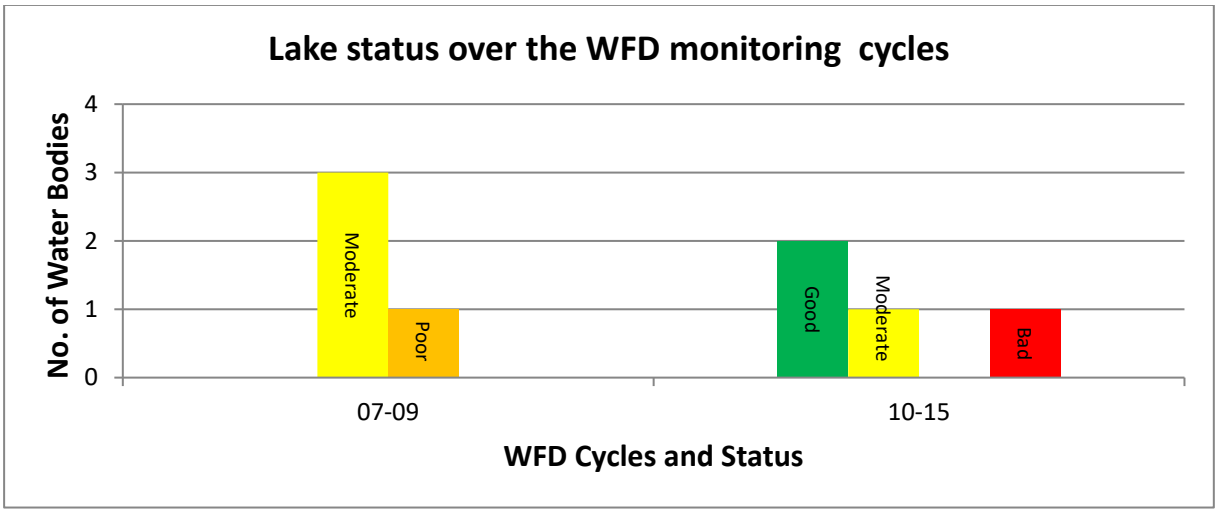


Figure 5. Number of lakes at each status class in 2007-09 and 2010-15

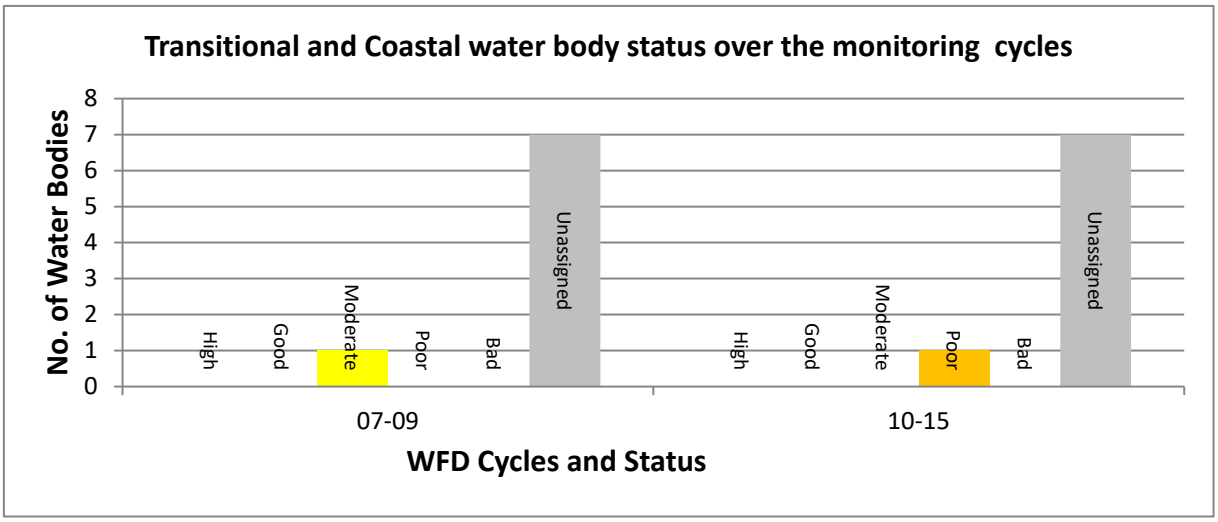


Figure 6. Number of TraCs at each status class in 2007-09 and 2010-15

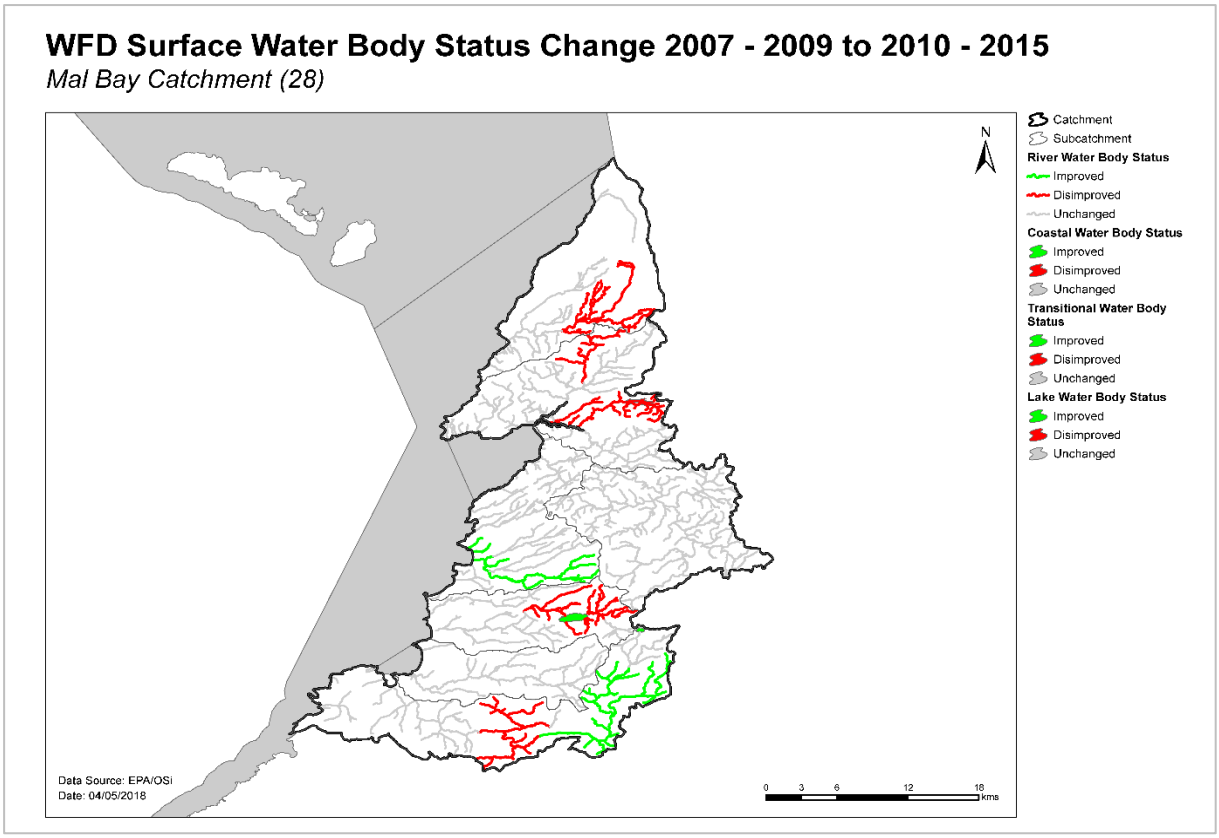


Figure 7. Surface water body status change from 2007-09 to 2010-15

2.2 Groundwater status

- There were four (100%) groundwater bodies at Good status and none at Poor status for 2010-15 (Table 3).
- There has been no change in status for any groundwater body between 2007-12 and 2010-15.

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	4	4	0	1	3	0

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and lakes

- There are 20 river water bodies and two lake water bodies *Not at Risk* (Figure 8, Table 2) and these require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- There are six river water bodies in *Review*. This includes five river water bodies where more information is required and one water body where measures have recently been implemented and improvements have not yet been realised.
- Eleven river water bodies 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)

- Four of the coastal water bodies are *Not at Risk* (Doonbeg Bay, Liscannor Bay, Shannon Plume (HAs 27;28) and Aran Islands, Galway Bay, Connemara (HAs 29;31)) (Figure 9) and therefore require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Four of the transitional water bodies are in *Review* (Doonbeg Estuary, Inagh Estuary, Aille (Clare) Estuary and Lough Donnell) all of which require further information.
- There are no *At Risk* TraC water bodies.

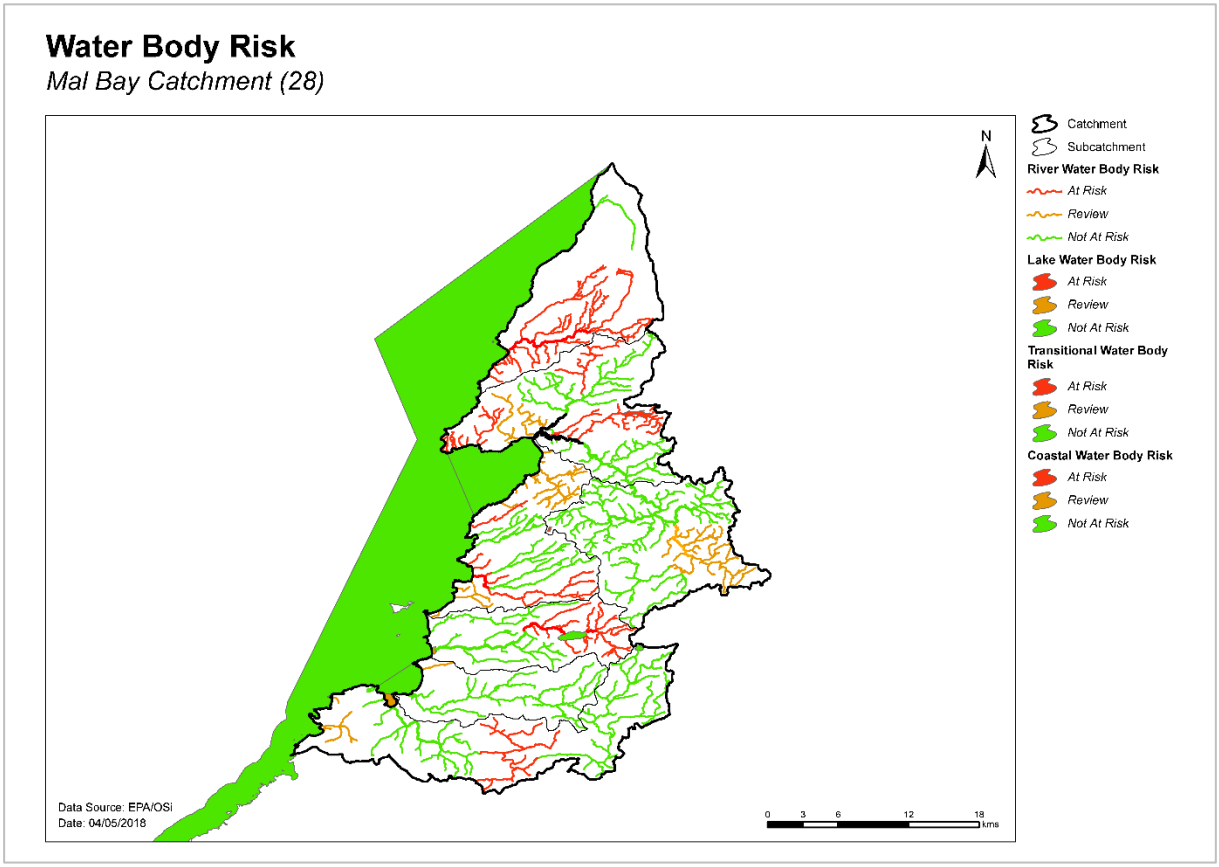


Figure 8. Surface water body risk

2.4 Risk of not meeting groundwater environmental objectives

- One groundwater body is *Not at Risk* (Figure 9) – Waste water Discharge Facility (A0079-01)) – and requires no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Three groundwater bodies are in *Review* (Burren, Milltown Malbay and Slieve Elva) due to groundwater contribution of phosphate to associated surface water bodies.
- There are no *At Risk* groundwater bodies.

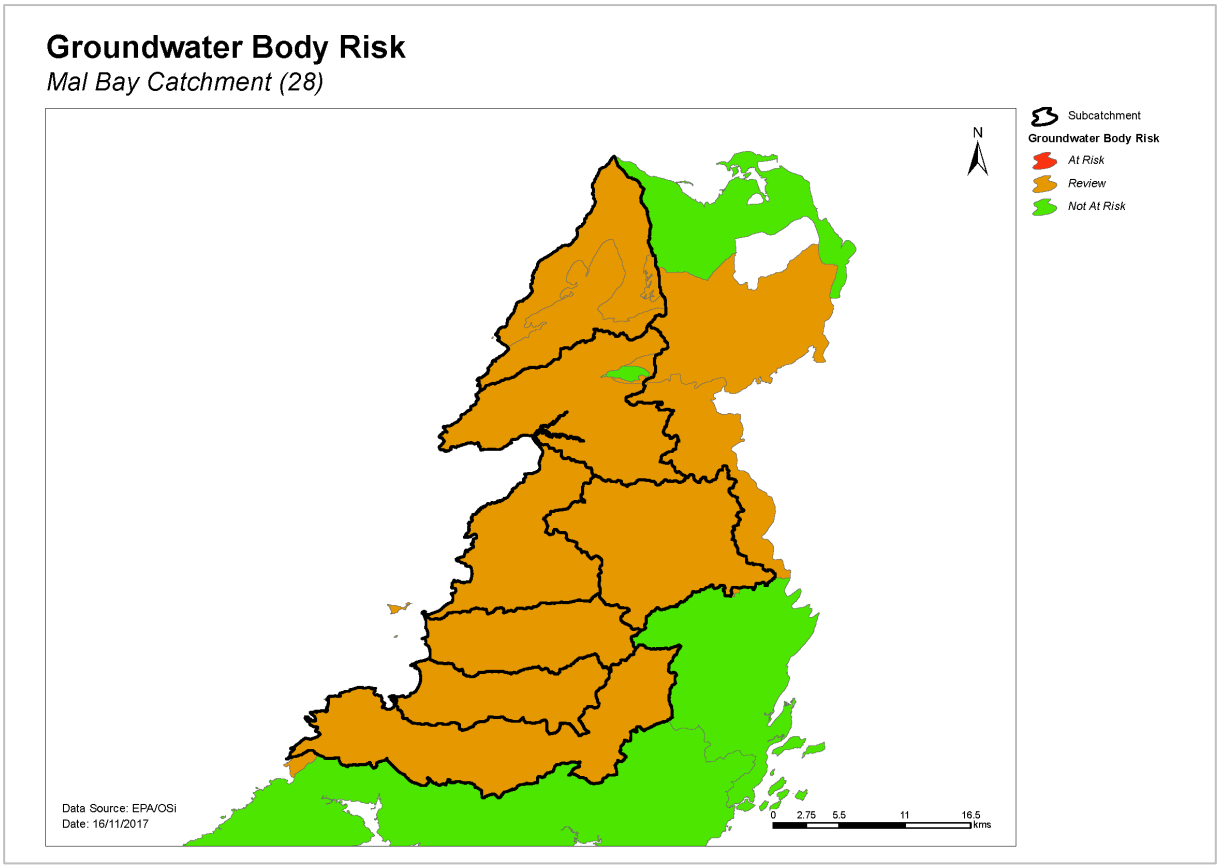


Figure 9. Groundwater body risk

2.5 Protected areas

2.5.1 Drinking water protected areas

- There are eight abstractions in the Mal Bay Catchment comprising three private group water schemes (Liscasey, Fanore and Kilmaley/Inagh), one public water supply scheme (Milltown Malbay) and two regional water schemes (Ennistymon and West Clare) (Appendix 4).
- One of the abstractions is from a groundwater body (Milltown Malbay GWB); one is from a river water body (Caher (Clare)_010); four abstractions are from three lakes (Naminna, Lickeen and Doo CE); the remaining two abstractions are from small lakes along rivers (Lough Acrow on Doonbeg_010 and Lough Keagh on Inagh (Ennistymon)_040). The list of the public supplies and the associated water bodies is provided in Appendix 4.
- All drinking water sources were compliant with the standards for nitrate in 2015.
- In 2015, both Ennistymon RWS (0300PUB1004) and West Clare RWS (New WTP) (0300PUB1066) were non-compliant with the standards for pesticides. Ennistymon RWS was non-compliant due to MCPA in both 2014 and 2015, whilst West Clare RWS was non-compliant for both MCPA and 2,4-D in 2015.

2.5.2 Bathing waters

- There are five designated bathing waters in the catchment all of which meet the water quality objectives (Table 4).

Table 4. Designated bathing waters in the catchment

Bathing water		Water body intersection		Objective met?	
Name	Code	Name	Code	Yes	No
White Strand, Doonbeg	IESHBWC080_0000_0100	Doonbeg Bay	IE_SH_080_0000	✓	
Spanish Point	IESHBWC070_0000_0300	Shannon Plume (HAs 27;28)	IE_SH_070_0000	✓	
White Strand, Miltown Malbay	IESHBWC070_0000_0200	Shannon Plume (HAs 27;28)	IE_SH_070_0000	✓	
Lahinch	IESHBWC100_0000_0100		IE_SH_100_1000	✓	
Fanore	IESHBWC070_0000_0100	Shannon Plume (HAs 27;28)	IE_SH_070_0000	✓	

2.5.3 Shellfish areas

- There are no designated shellfish areas in the catchment.

2.5.4 Nutrient sensitive areas

- There are no nutrient sensitive areas in the catchment.

2.5.5 Natura 2000 sites

- There are seven 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 transitional water boy (Lough Donnell) has been prioritised for action as the water conservation objectives for its habitat and/or species is not being supported by ecological status (Appendix 5).
- There are two Special Protected Areas (SPAs) in the catchment:
    - Cliffs of Moher SPA
    - Mid-Clare Coast 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 is one designated heavily modified water body (HMWB) in the catchment – Doo (CE) Lough due to drinking water supply. It was classified as having Good Ecological Potential in 2013-15.
- There are no artificially modified water bodies (AWB) in the catchment.

3 Significant issues in *At Risk* water bodies

- Excess nutrients (notably phosphate) leading to eutrophication is the dominant issue in rivers and lakes in the Mal Bay catchment.
- Alteration of hydromorphological (or physical) conditions is one of the significant issues in rivers in the Mal Bay Catchment. This includes inputs of excess fine sediment and alteration of the morphology of river channels, which in turn alter habitat conditions. This can occur because of, for example, implementing river and field drainage schemes, forestry activities, animal access, and impoundments or in river barriers.
- There are no significant issues for the TraC water bodies or groundwater bodies in the catchment.

4 Significant pressures

4.1 Water bodies

- Where water bodies have been classed as *At Risk*, by water quality or survey data, significant pressures have been identified.
- Figure 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 (TraCs)

- Significant pressures have been identified through the initial characterisation process in the catchment areas of 13 water bodies, six of which have multiple pressures. These significant pressures will be refined as further characterisation is carried out.
- The significant pressure affecting the greatest number of water bodies is forestry, followed by agriculture, domestic waste water (three river water bodies), hydromorphological pressures (one river water body), urban waste water (one river water body) and industry (one river water body) (Figure 10).
- There are no *At Risk* TraC water bodies therefore no significant pressures.

4.1.2 Groundwater

- There are no *At Risk* groundwater bodies, therefore no significant pressures.

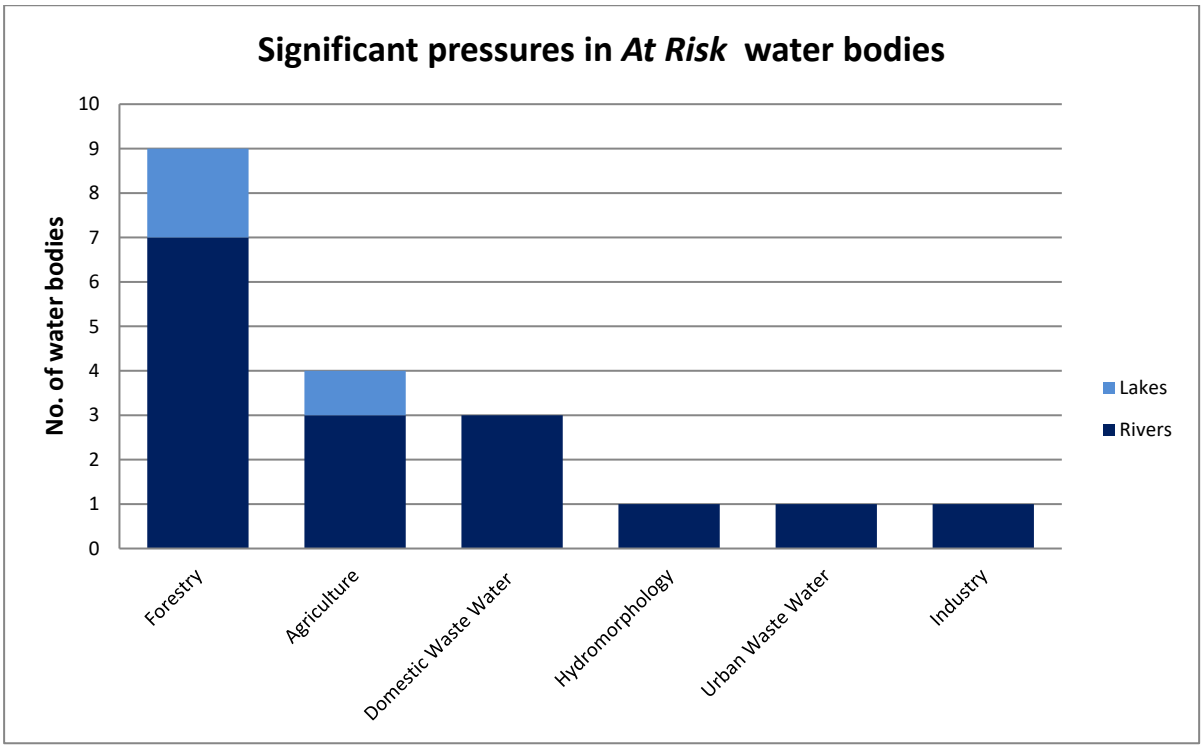


Figure 10. Significant pressures impacting on *At Risk* water bodies

4.2 Pressure type

4.2.1 Forestry

- Forestry has been identified as a potentially significant pressure in seven river water bodies and two lakes (Keagh and Lickeen) (Figure 11). The types of problems encountered include for example: losses of sediment and/or nutrients during afforestation, tree felling and abstraction; losses of

sediment from access roads and during road construction; losses of nutrients during aerial fertilisation and impacts from public access. Agriculture

- Agriculture is a significant pressure in the catchment areas of three river water bodies – Aille (Clare)_020, Freagh_010 and Beaghy_010. It is also a significant pressure in the catchment area of Lickeen lake. The water bodies affected by farming are shown in Figure 12.

- The issues related to farming in this catchment are diffuse phosphorus loss to surface waters from, for example, direct discharges; or runoff from yards, roadways or other compacted surfaces, or runoff from poorly draining soils. Sediment can also be a problem from land drainage works, bank erosion from animal access or stream crossings. The pollution impact potential map showing areas of relative risk for phosphorus loss from agriculture to surface water is given in Appendix 6.

4.2.2 Domestic waste water

- Domestic waste water has been identified as a significant pressure in three river water bodies – Freagh_010, Annagh (Clare)_010 and Cooleen_010 (Figure 13). This is due to a concentration of septic tanks in close proximity to the water bodies, which are on poorly draining soils. The significant issues are inflow of excess nutrients entering surface waters.

4.2.3 Urban waste water treatment plants

- Urban Waste Water Treatment Plants (WWTPs) have been identified as a significant pressure in one *At Risk* water body, Kilmihil Stream_010; details are given in Table 5 Figure 14. The WWTP that impacts Kilmihil Stream_010, Kilmihil WWTP, is scheduled to be upgraded by 2021.

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

Facility name	Facility Type	Water Body	2010-15 Ecological Status	Expected Completion Date
Kilmihil A0091	< 500 p.e.	Kilmihil Stream_010	Poor	2021

4.2.4 Hydromorphology

- A barrier located at the outlet of a lake has impacted the hydrological conditions of the downstream river water body (Ballymacravan_010) within the Inagh [Ennistymon] (SC28_6) subcatchment (Figure 15).

4.2.5 Industry

- Industry has been identified as a significant pressure in Aille (Clare)_020 (Figure 16). Discharges from several Section 4 licences have been identified as a source of elevated nutrients in this water body.

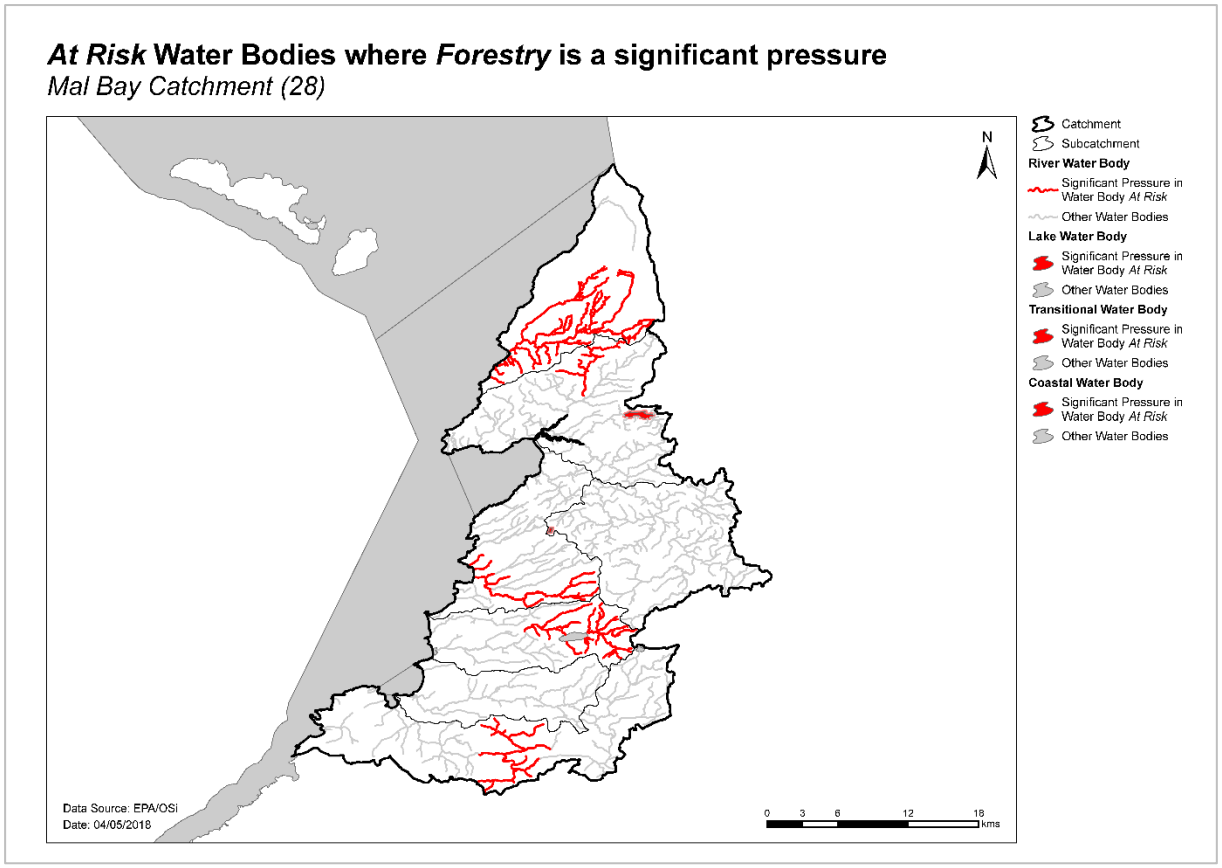


Figure 11. Water bodies that are *At Risk* and are impacted by forestry activities

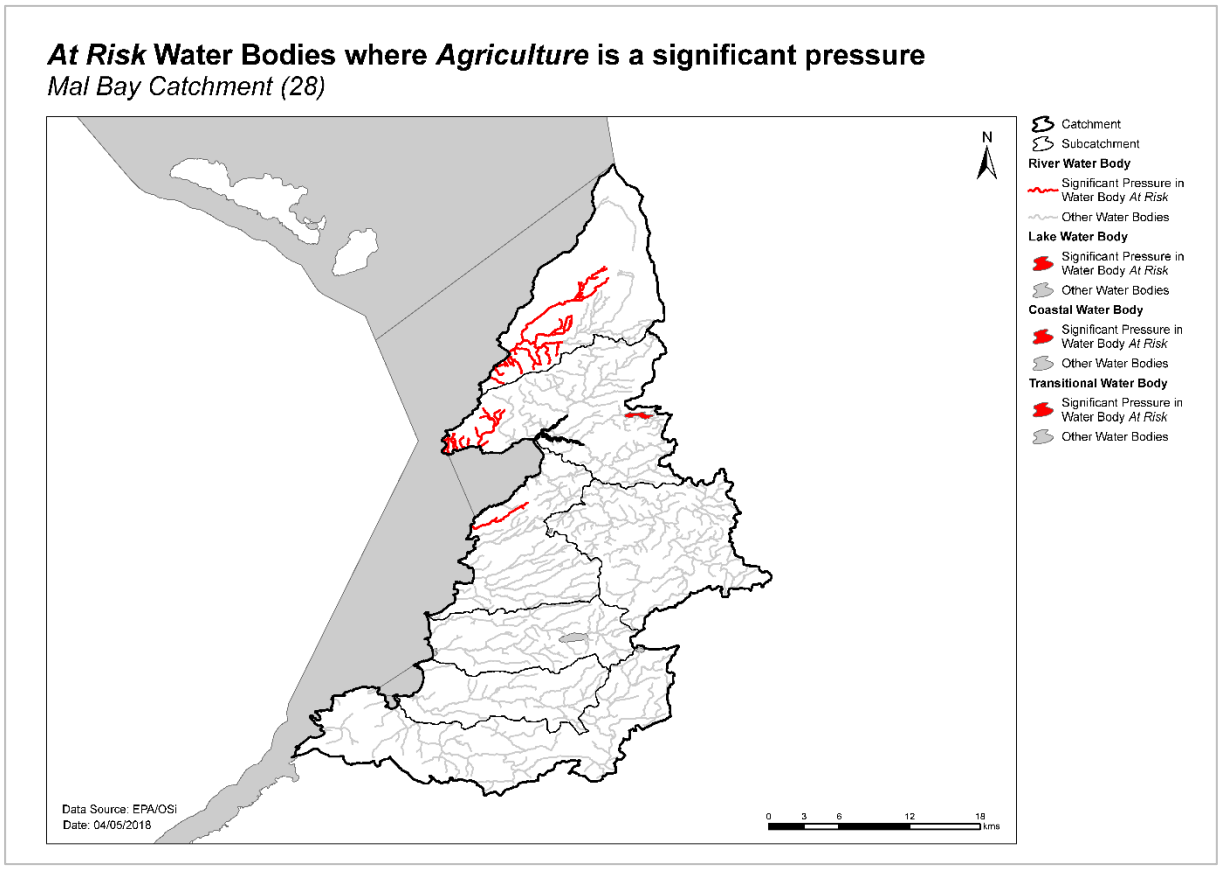


Figure 12. Water bodies that are *At Risk* and are impacted by agricultural activities

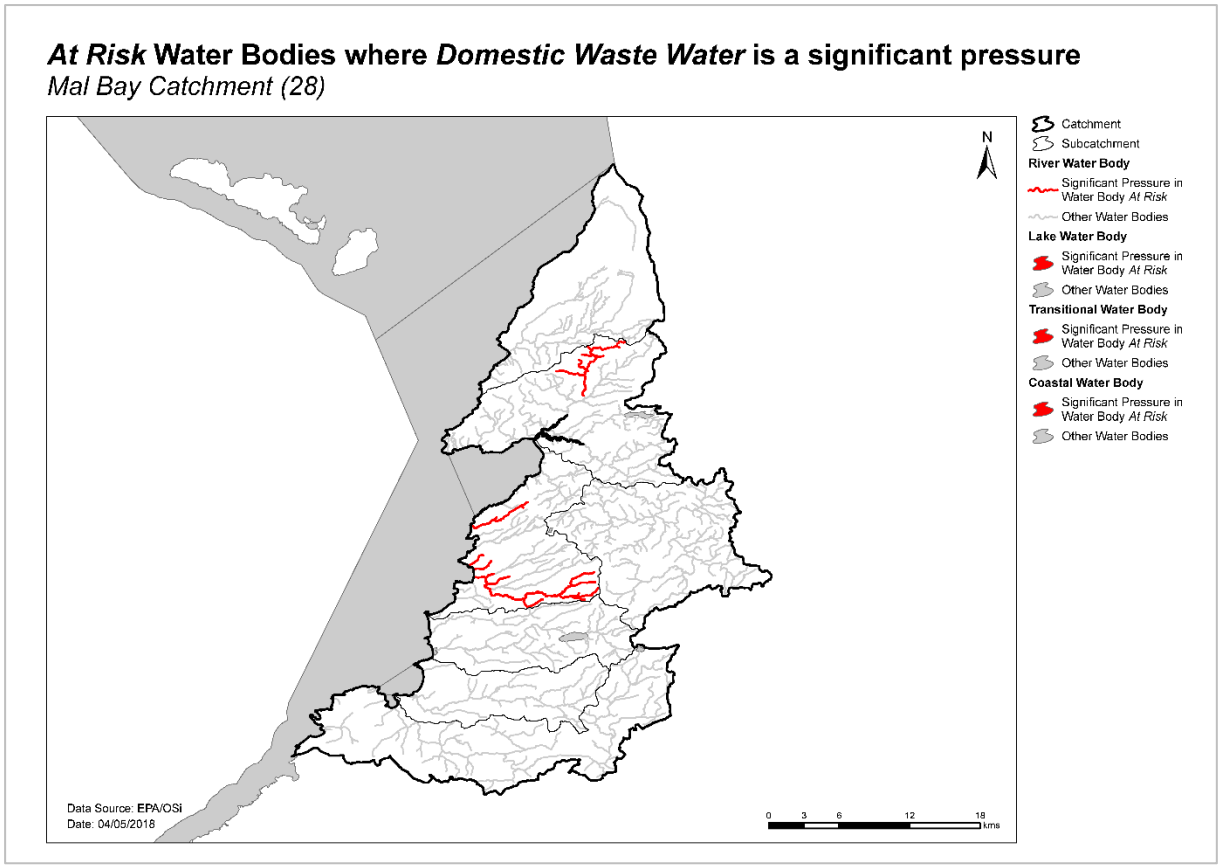


Figure 13. Water bodies that are *At Risk* and are impacted by domestic waste water

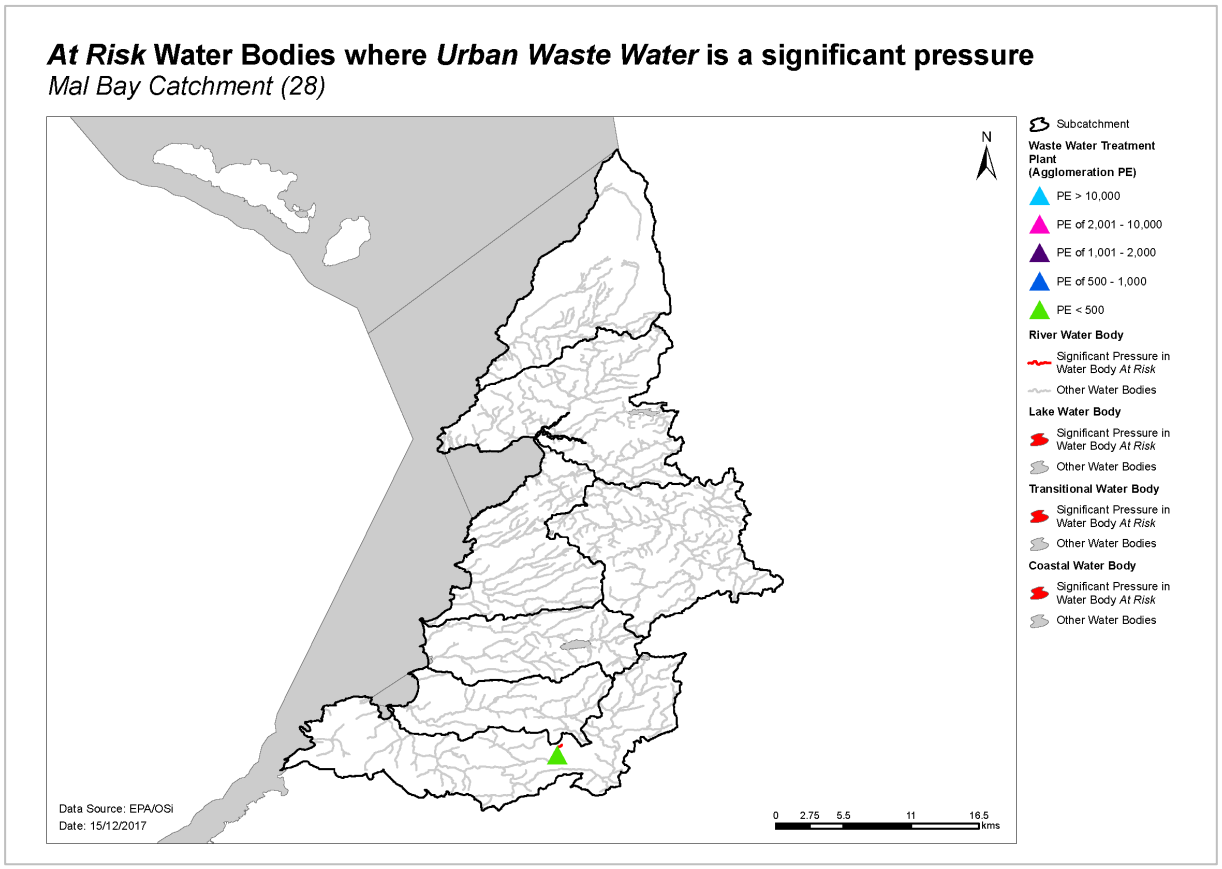


Figure 14. Water bodies that are *At Risk* and are impacted by urban waste water

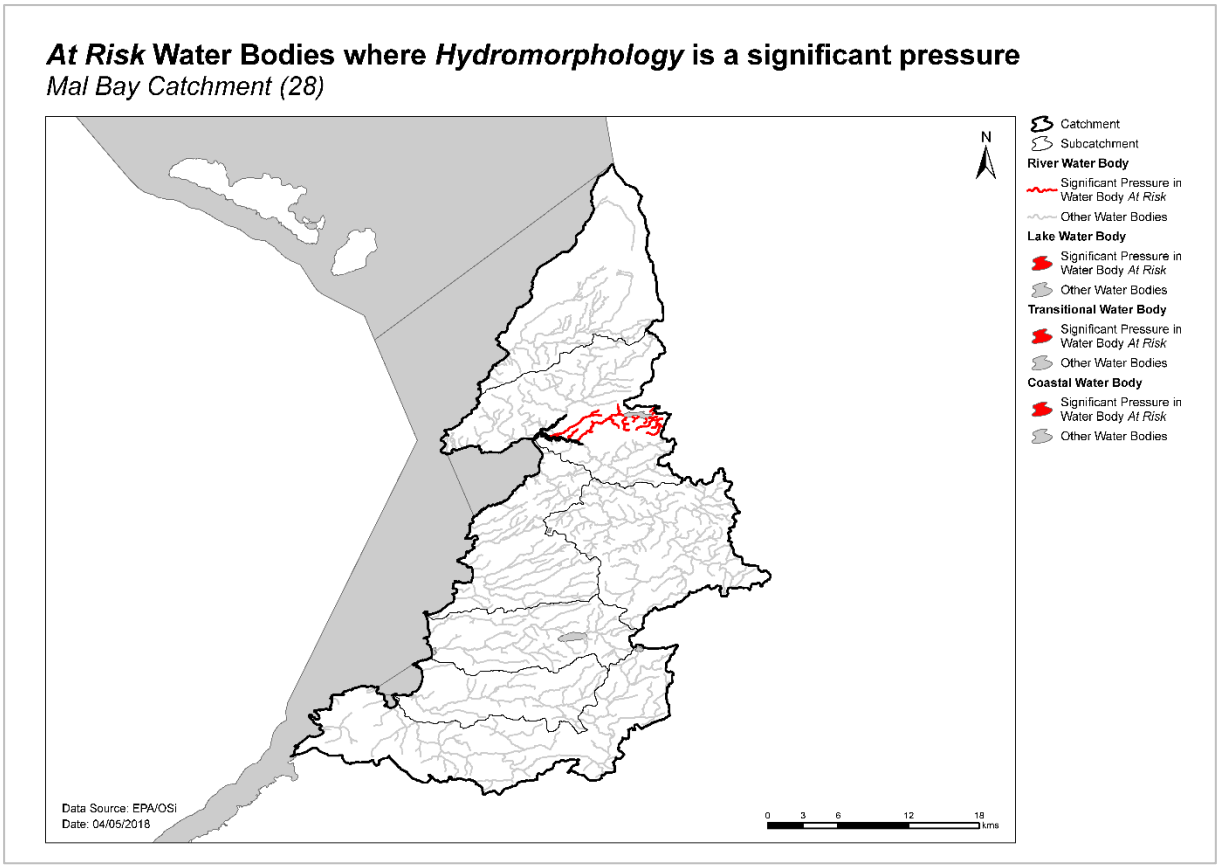


Figure 15. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

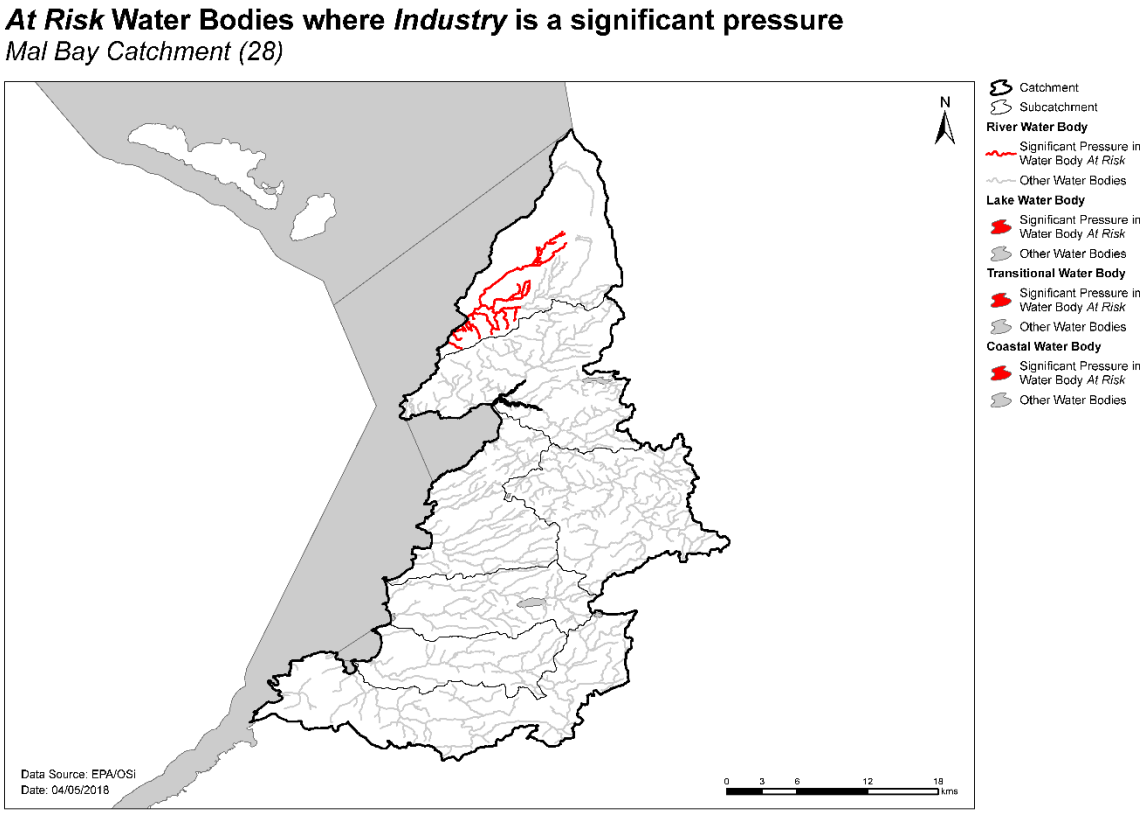


Figure 16. Water bodies that are *At Risk* and are impacted by industrial pressures

5 Load reduction assessment

5.1 River water body load reductions

- The results of the main channel assessment for the Inagh (Ennistymon), Doonbeg and Creegh rivers indicate that orthophosphate, ammonia and TON concentrations are consistently low (Appendix 2).
- 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 Mal Bay catchment, the available water chemistry data indicate that load reduction is required in one river water body (Table 7). Only three of the five main channel water bodies have associated chemistry data.

Table 7. Relative load reductions required in monitored water bodies that are *At Risk.*

Water body	P Load Reduction Required
Kilmihil Stream_010	V. High

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.

6 Further characterisation and investigative assessments

- Further characterisation through local catchment assessments is needed in 13 of the *At Risk* water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.
- Further characterisation through local catchment assessments is needed in six of the *Review* water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.

- Brief definitions on the 10 IA assessment scenarios are given in Appendix 7.

Table 8. Investigative Assessment Allocation for *At Risk* and *Review* River and Lake Water Bodies in the Catchment

Risk	IA 1	IA 2	IA 3	IA4	IA 5	IA6	IA 7	IA 8	IA 9	Total
At Risk	8	0	1	0	2	0	5	0	2	**18**
Review	1	0	6	0	0	0	0	0	0	**7**
Note water bodies may have multiple categories of Local Catchment Assessments										

7 Catchment summary

- Of the 37 river water bodies, 11 are *At Risk* of not meeting their WFD objectives.
- Two of the four lake water bodies are *At Risk* of not meeting their WFD objectives.
- There are no TraC water bodies *At Risk* in the catchment.
- Excess nutrients (notably phosphate) leading to eutrophication is a major issue for several surface water bodies.
- Hydromorphological (or physical) conditions (including the input of excessive fine sediment and physical barriers) and poor habitat quality are also of concern in a limited number of river and lake water bodies.
- None of the groundwater bodies in the catchment are *At Risk*.

8 Areas for Action

The characterisation outcomes described above have highlighted that there is significant work to do in the catchment to protect and restore water quality, and meet the objectives of the WFD. During the development of the draft river basin management plan it became apparent that there would be a need to prioritise areas for collective action so that the best return on investment could be achieved. 190 Areas for action have been selected nationally in a process as described below. There are 4 areas for action in the Mal 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. Since this selection, the Local Authorities Water and Communities Office (LAWCO) have undertaken public engagement and feedback sessions in each local authority.

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, or when feedback from the public engagement process is assessed, areas for action may 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 Mal Bay catchment are summarised below.

- Four recommended areas for actions (Table 9, Figure 17) were selected.
- These are the Doonbeg system, Lickeen system, Doo Lough and Annageeragh, and Aille.
- These include 7 *At Risk* river and one *At Risk* lake water body.
- Three groundwater bodies, that are in *Review* due to groundwater contribution of nutrients to surface water bodies, intersect with four 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 15 *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:

- 11 river and lake water bodies – five *At Risk* and six *Review,* and
- Four *Review* transitional and coastal water bodies.

Table 9. Recommended Areas for Action in the Mal Bay catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Doonbeg System	2	28_3	Clare	• Manageable area. • Important for salmon and sea trout. • Active community group in Doonbeg. • One deteriorated water body.
Lickeen System	2	28_6	Clare	• Bad status lake • Lickeen lake is an important trout fishery and former char lake. • Active community group. • Manageable area - small number of land owners. • Two deteriorated water bodies. • One water body (Lickeen lake) is failing to meet its protected area objectives for drinking water.
Doo Lough and Annageeragh	3	28_7	Clare	• Potential pilot project to examine impact from forestry. • Freshwater Pearl Mussels were recently found here. • Important salmon and sea trout fishery. • Headwaters to Doo Lough. • One deteriorated water body. • One water body (Doo Lough) is failing to meet its protected area objective for MCPA.
Aille (Clare)	2	28_2	Clare	• Opportunity to work with Integrated catchment management project (Grainne - Uisce Aille) • Community interest due to the amenity value of the river. • Unique habitat for fish surviving in the karst conduits. • Important for tourism. • Historic heritage value. • Headwaters of the river Aille. • One deteriorated water body.

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_SH_G_047	Burren	Review	IE_SH_28A010300	AILLE (CLARE)_010	Aille (Clare)
IE_SH_G_212	Slieve Elva	Review	IE_SH_28A010300	AILLE (CLARE)_010	
			IE_SH_28A010400	AILLE (CLARE)_020	
IE_SH_G_167	Milltown Malbay	Review	IE_SH_28A010300	AILLE (CLARE)_010	
			IE_SH_28A010400	AILLE (CLARE)_020	
			IE_SH_28A020010	ANNAGEERAGH_010	Doo Lough and Annageeragh Project
			IE_SH_28A020100	ANNAGEERAGH_020	
			IE_SH_28_82	Doo CE	
			IE_SH_28B020400	BALLYMACRAVAN_010	Lickeen System
			IE_SH_28_85	Lickeen	
			IE_SH_28D020650	DOONBEG_030	Doonbeg System
			IE_SH_28K020200	KILMIHIL STREAM_010	

9 Environmental Objectives

9.1 Surface Water

- Assuming resources are available and actions are taken in the recommended areas for action, of the eight *At Risk* river and lake water bodies, it is predicted that all eight will achieve their objective by 2027, see Table 10. One of the *Not at Risk* lake water bodies that is in a recommended area for action met its 2015 environmental objective for ecological status but failed to meet its protected area objectives for drinking water.

Table 10. Environmental objective dates for water bodies in the Recommended 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	7	0	7
Review	0	0	0
Lakes			
At Risk	1	0	1
Review	0	0	0
Total	8	0	8

- Twenty-six surface water bodies have met their 2015 environmental objective. Two of the 26 surface water bodies met their 2015 environmental objectives for ecological status but failed to meet their protected area objectives.

- As action is not yet planned to be taken in the remaining five *At Risk* surface water bodies, a 2027 date is applied to a five water bodies. For the 10 *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 set for these water bodies, see Table 11.

Table 11. Environmental objectives dates in the *At Risk* and *Review* surface water bodies not included in Recommended 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	6	0	6
Lakes			
At Risk	1	0	1
Review	0	0	0
TraC			
At Risk	0	0	0
Review	4	0	4
Total	15	0	15

9.2 Groundwater

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

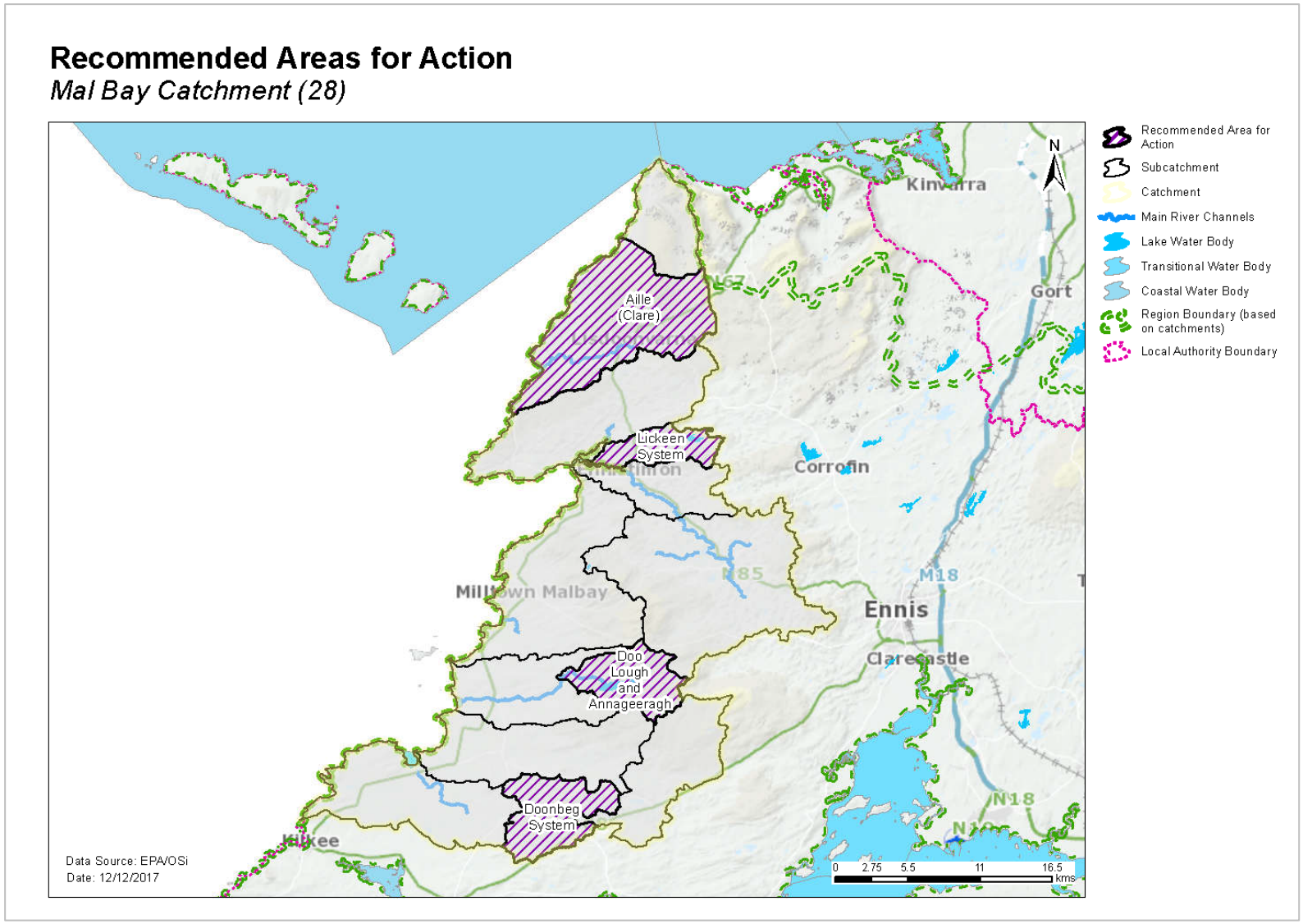


Figure 17. Location of Recommended Areas for Action in the Mal Bay Catchment

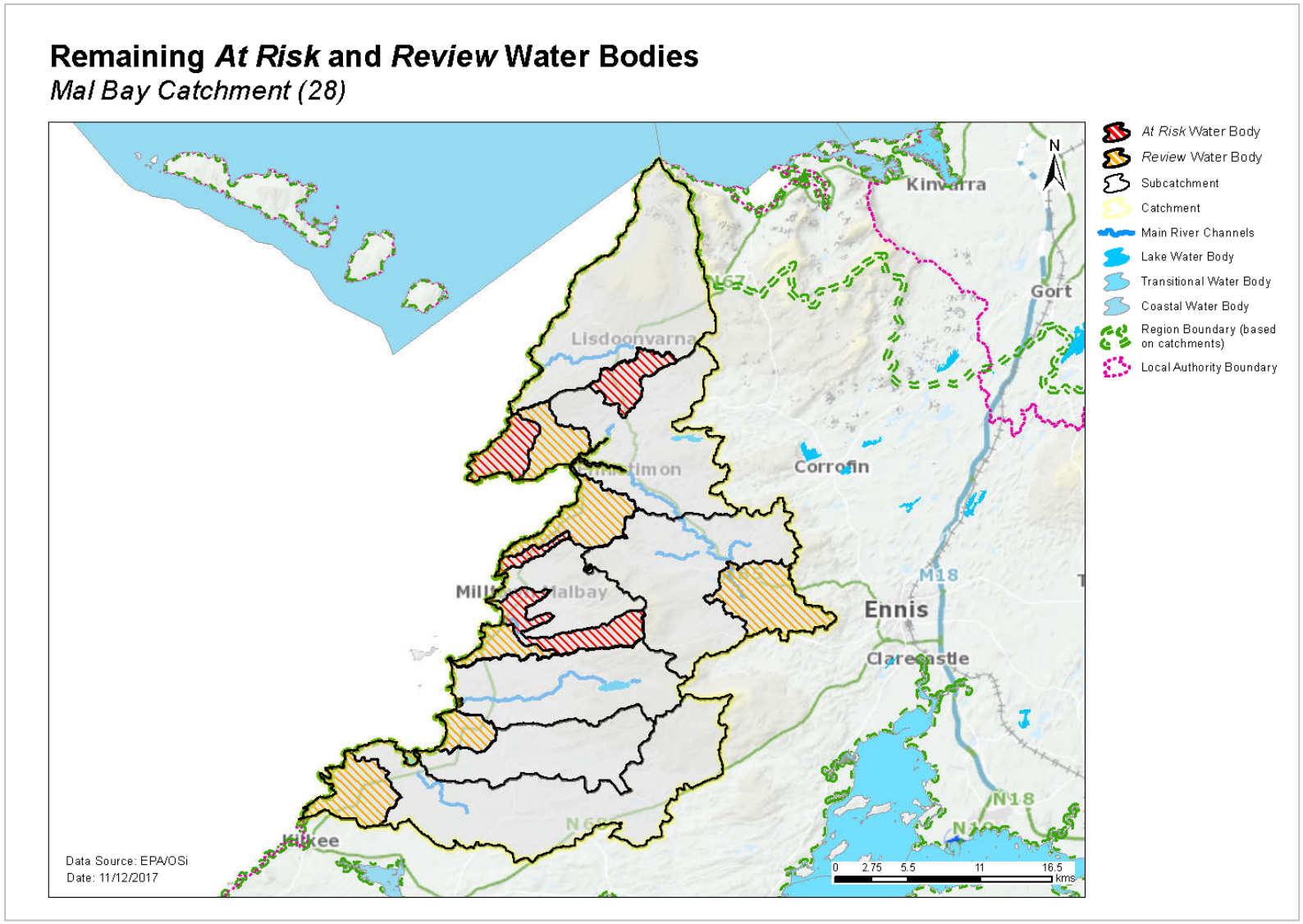


Figure 18. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in Mal Bay Catchment

10 Acknowledgements

This Mal Bay Catchment Assessment (Version 2) has been produced by the Catchment Science & Management Unit, EPA, with the assistance of the following:

- Clare County Council.
- Inland Fisheries Ireland.
- Local Authorities Waters & Communities Office.
- Irish Water.
- RPS Group.
- Ecological Monitoring & Assessment Unit, EPA.
- Hydrometric & Groundwater Section, EPA.
- Informatics Section, EPA.
- Laboratories, EPA.
- Office of Environmental Enforcement, EPA.
- Department of Housing, Planning and Local Government.
- DAFM Agriculture.
- DAFM Forest Service.
- Coillte.
- Teagasc.
- National Federation of Group Water Schemes.
- National Parks and Wildlife Service.
- Waterways Ireland.
- Board Iascaigh Mhara.
- Marine Institute.
- Sea Fisheries Protection Authority.
- Electricity Supply Board.

Appendix 1 High ecological status objective water bodies and sites

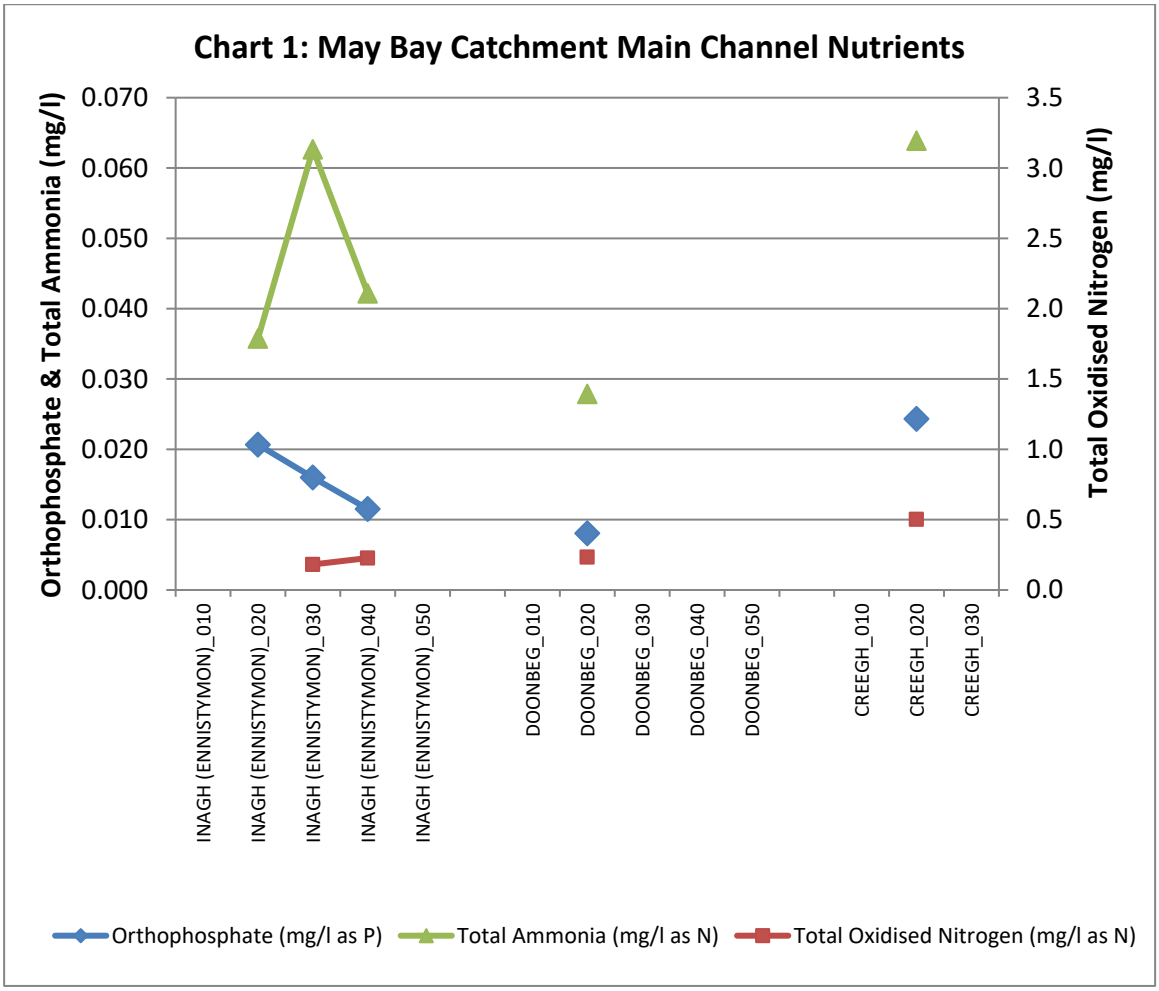
Water body/ Site	Type	Codes	2015 Status
Aughaglanna_010	River	IE_SH_28A060700	High

Appendix 2 Catchment scale nutrient concentrations and in-stream loads

The results of the instream water quality assessment for the Mal Bay catchment main channels 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. Orthophosphate concentrations in the Inagh (Ennistymon) decrease from 0.021 to 0.012mg/l downstream and remain well below the EQS for good status (0.035mg/l). Note: only three of the five main channel water bodies have associated chemistry data. Along the Doonbeg and Creegh rivers, data is available for DOONBEG_020 and CREEGH_020, both of which are below the EQS for orthophosphate.

Total oxidised nitrogen (TON) concentrations along the Inagh (Ennistymon), Doonbeg and Creegh rivers are uniformly low, consistently below the 2.6mg/l drinking water threshold value.

The EQS for ammonia (0.065mg/l) is not exceeded at any of the monitoring points along the Inagh (Ennistymon), Doonbeg or Creegh rivers where water chemistry data is available. Peaks in concentration of 0.63 and 0.64mg/l occurred at INAGH (ENNISTYMON)_030 and CREEGH_020.



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
28_1	IE_SH_28_64	Keagh	Lake	At Risk	Moderate	Moderate	N	For	2027	
28_1	IE_SH_28I010206	Inagh (Ennistymon)_020	River	Review	Good	Good	N		2027	
28_2	IE_SH_28A010300	Aille (Clare)_010	River	At Risk	Moderate	Poor	N	For	2027	Aille (Clare)
28_2	IE_SH_28A010400	Aille (Clare)_020	River	At Risk	Moderate	Moderate	N	Ag,For,Ind	2027	Aille (Clare)
28_2	IE_SH_110_0100	Aille Clare Estuary	Transitional	Review	Unassigned	Unassigned	N		2027	
28_3	IE_SH_28B420460	Ballard 28_010	River	Review	Unassigned	Unassigned	N		2027	
28_3	IE_SH_28D020650	Doonbeg_030	River	At Risk	Moderate	Poor	N	For	2027	Doonbeg System
28_3	IE_SH_28K020200	Kilmihil Stream_010	River	At Risk	Poor	Poor	N	UWW	2027	Doonbeg System
28_3	IE_SH_080_0100	Doonbeg Estuary	Transitional	Review	Unassigned	Unassigned	N		2027	
28_4	IE_SH_28C800530	Carrowmore_North_010	River	Review	Unassigned	Unassigned	N		2027	
28_5	IE_SH_28A030900	Annagh (Clare)_010	River	At Risk	Poor	Moderate	N	DWW,For	2027	
28_5	IE_SH_28C670910	Clooneyogan_North_010	River	Review	Unassigned	Unassigned	N		2027	
28_5	IE_SH_28F010300	Freagh_010	River	At Risk	Unassigned	Poor	N	Ag,DWW	2027	
28_5	IE_SH_28T110930	Tromra_East_010	River	Review	Unassigned	Unassigned	N		2027	
28_5	IE_SH_100_0100	Inagh Estuary	Transitional	Review	Unassigned	Unassigned	N		2027	
28_6	IE_SH_28_85	Lickeen	Lake	At Risk	Poor	Bad	N	Ag,For	2027	Lickeen System
28_6	IE_SH_28B020400	Ballymacravan_010	River	At Risk	Good	Poor	N	Hymo	2027	Lickeen System
28_6	IE_SH_28B320970	Ballyea 28_010	River	Review	Unassigned	Unassigned	N		2027	
28_6	IE_SH_28B400850	Beaghy 28_010	River	At Risk	Unassigned	Unassigned	N	Ag	2027	
28_6	IE_SH_28C050500	Cooleen_010	River	At Risk	Good	Moderate	N	DWW,For	2027	
28_7	IE_SH_28_82	Doo CE	Lake	Not At Risk	Moderate	Good	N			Doo Lough and Annageeragh

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
28_7	IE_SH_28A020010	Annageeragh_010	River	At Risk	Moderate	Moderate	N	For	2027	Doo Lough and Annageeragh
28_7	IE_SH_28A020100	Annageeragh_020	River	At Risk	Good	Poor	N	For	2027	Doo Lough and Annageeragh
28_7	IE_SH_090_0100	Lough Donnell	Transitional	Review	Moderate	Poor	N		2027	

Ag: Agriculture

DWW: Domestic Waste Water

For: Forestry

Hymo: Hydromorphology

Ind: Industry

M+Q: Mines and Quarries

Peat: Peat Drainage and Extraction

DU: Diffuse Urban

UWW: Urban Waste Water

Note: Significant Pressures for Review water bodies have not been included as they will need to be confirmed as part of an Investigative Assessment.

Protected Area: If a water body is one or more of the following: Drinking Water Protected Area; Bathing Water; Shellfish Area; Nutrient Sensitive Area or; a Natura 2000 site with a water dependent qualifying interest with a water quality and/or quantity conservation objective, then it has been highlighted as a protected area in this table.

Appendix 4 Drinking water supplies in the catchment

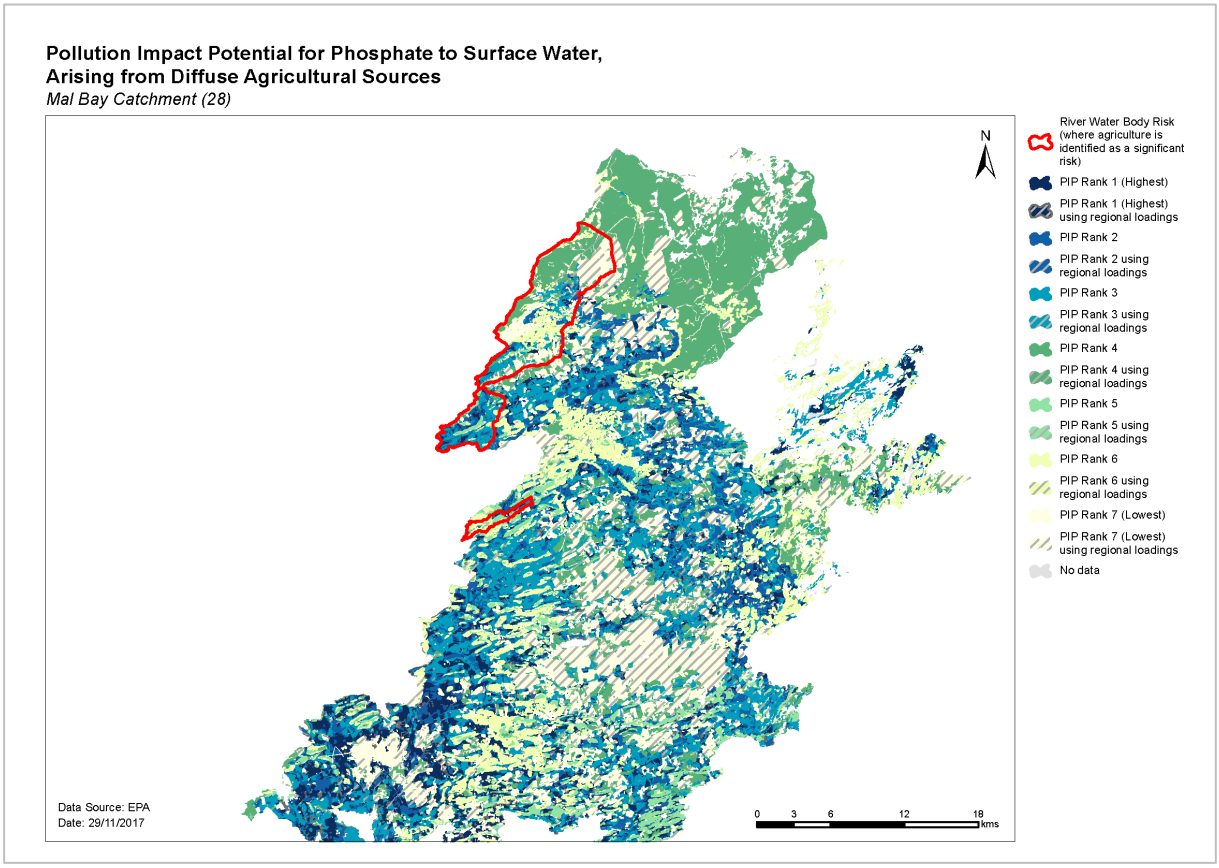
Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes /No	Reason why not met
0300PRI2004_1	Liscasey	Milltown Malbay GWB	IE_SH_G_167	Yes	N/A
0300PRI2004_2	Liscasey	Lough Acrow on Doonbeg_010	IE_SH_28D020100	Yes	N/A
0300PRI2008_1	Fanore	Caher (Clare)_010	IE_SH_28C010100	Yes	N/A
0300PRI2010_1	Kilmaley/Inagh	Naminna LWB	IE_SH_28_87	Yes	N/A
0300PUB1004_1	Ennistymon RWS	Lickeen LWB	IE_SH_28_85	**No**	**2014/2015** MCPA
0300PUB1005_1	Milltown Malbay PWS	Lough Keagh LWB on Inagh (Ennistymon)_040	IE_SH_28_64 IE_SH_28I010300	Yes	N/A
0300PUB1022_1	W.Clare RWS (Old WTP)	Doo CE LWB	IE_SH_28_82	Yes	N/A
0300PUB1066_1	W.Clare RWS (New WTP)	Doo CE LWB	IE_SH_28_82	**No**	**2015** MCPA & 2,4-D

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?
Ballyteige (Clare) SAC 000994	none							
Black Head-Poulsallagh Complex SAC 000020	7220	Good GW level	Groundwater	Slieve Elva GWB	Good (R)	No	IE_SH_G_212	Yes
Carrowmore Dunes SAC 002250	none							
Carrowmore Point To Spanish Point And Islands SAC 001021	1150	Good	Transitional	Lough Donnell	Poor (AT RISK)	Yes	IE_SH_090_0100	Yes
	7220	Good GW level	Groundwater	Milltown Malbay	Good (R)	No	IE_SH_G_167	Yes
Inagh River Estuary SAC 000036	none							
Kilkee Reefs SAC 002264	none							
Tullaher Lough And Bog SAC 002343	none							

Appendix 6 Pollution Impact Potential (PIP) Map for Phosphorus

For areas where agriculture is deemed as the significant pressure, areas of high risk to surface water can be targeted. The map below shows relative risk of loss of phosphorus to surface water. The risk of phosphorus losses is strongly correlated on whether the land is poorly draining or free draining and the loadings applied i.e. significant loadings applied on poorly draining areas result in a high potential risk to surface water. However, this figure does not imply that actual losses from these areas are occurring but is a useful tool for informing where resources should be focused (i.e. by allowing high risk areas to be identified and prioritised for further investigation). PIP maps are available online at a scale of 1:20,000 and can be accessed by public bodies via the EDEN process.



Appendix 7 Local Catchment Assessment Categories

Category	Assessment & Measures Evaluation Details
IA1	Further information provision (e.g. from IFI, LAs, EPA)
IA2	Point source desk-based assessment
IA3	Assessment of unassigned status water bodies, requiring field visit(s)
IA4	Regulated point sources, requiring field visit/s
IA5	Stream (catchment) walk to evaluate multiple sources in a defined (1 km) river stretch (used as the basis for estimating resource requirements)
IA6	Stream (catchment) walk in urban areas
IA7	Stream (catchment) walk along >1 km river stretches
IA8	Stream (catchment) walk along high ecological status (HES) objective rivers
IA9	Lakes assessment, requiring field visits
IA10	Groundwater assessments, requiring field visits