Galway Bay South East Catchment Assessment 2010-2015 (HA 29)

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 Galway Bay South 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

This catchment includes the area drained by all streams entering tidal water in Galway Bay between Black Head and Renmore Point, draining a total area of 1,270 km². The largest urban centre in the catchment is the eastern part of Galway City. The other main urban centres are Athenry, Loughrea, Gort, and Oranmore. The total population of the catchment is approximately 74,400, with a population density of 59 people per km².

This catchment is predominantly underlain by karstified limestone, including the northern part of the Burren in County Clare, and the groundwater and surface water systems in the area are closely interlinked. Only the south-eastern part of the catchment, which is underlain by red sandstones, is unkarstified.

There is essentially no natural connected surface drainage network in this catchment west of a line running from Athenry to Craughwell to Gort. Surface drainage is entirely absent in the north Clare part of the catchment. In this area, virtually all rainfall enters the limestone bedrock aquifer and makes its way underground via several groundwater flow routes towards the coast at Ballyvaughan or Kinvara.

East of Gort and south of Loughrea, the Kilchreest, Boleyneendorrish and Owendalulleegh Rivers flow west – southwest off the sandstone Slieve Aughty Mountains before crossing onto the limestones near Gort. The streams follow a pattern of sinking underground and then re-emerging before eventually sinking underground in the Coole-Caherglassaun area and then flowing underground in caverns, resurfacing via springs both on the shoreline and in Galway Bay in the Kinvara area.

The Clarinbridge River rises to the northeast of Athenry and flows southwest through Athenry and onward across a karstic limestone plain and through Clarinbridge where it reaches Dunbulcaun Bay.

The Kilcolgan River flows out of Lough Rea and through Loughrea Town before making its way towards Craughwell, where it is joined by the Radford River. The Kilcolgan River then continues west entering Dunbulcaun Bay near the village of Kilcolgan.

The Galway Bay South East catchment comprises nine subcatchments (Table 1, Figure 1) with 33 river water bodies, six lakes, 20 transitional and nine coastal water bodies, and 17 groundwater bodies. There are no heavily modified or artificial water bodies in the catchment.

Table 1. List of subcatchments in the Galway Bay South East catchment

Subcatchment ID	Subcatchment Name
29_1	Boleyneendorrish_SC_010
29_2	Kilcogan_SC_020
29_3	GLENINAGH_SOUTH_SC_010
29_4	Clarinbridge_SC_010
29_5	Raford_SC_010
29_6	CARROWMONEASH[Oranmore]_SC_010
29_7	Cannahowna_SC_010
29_8	Kilchreest_SC_010
29_9	Kilcogan_SC_010

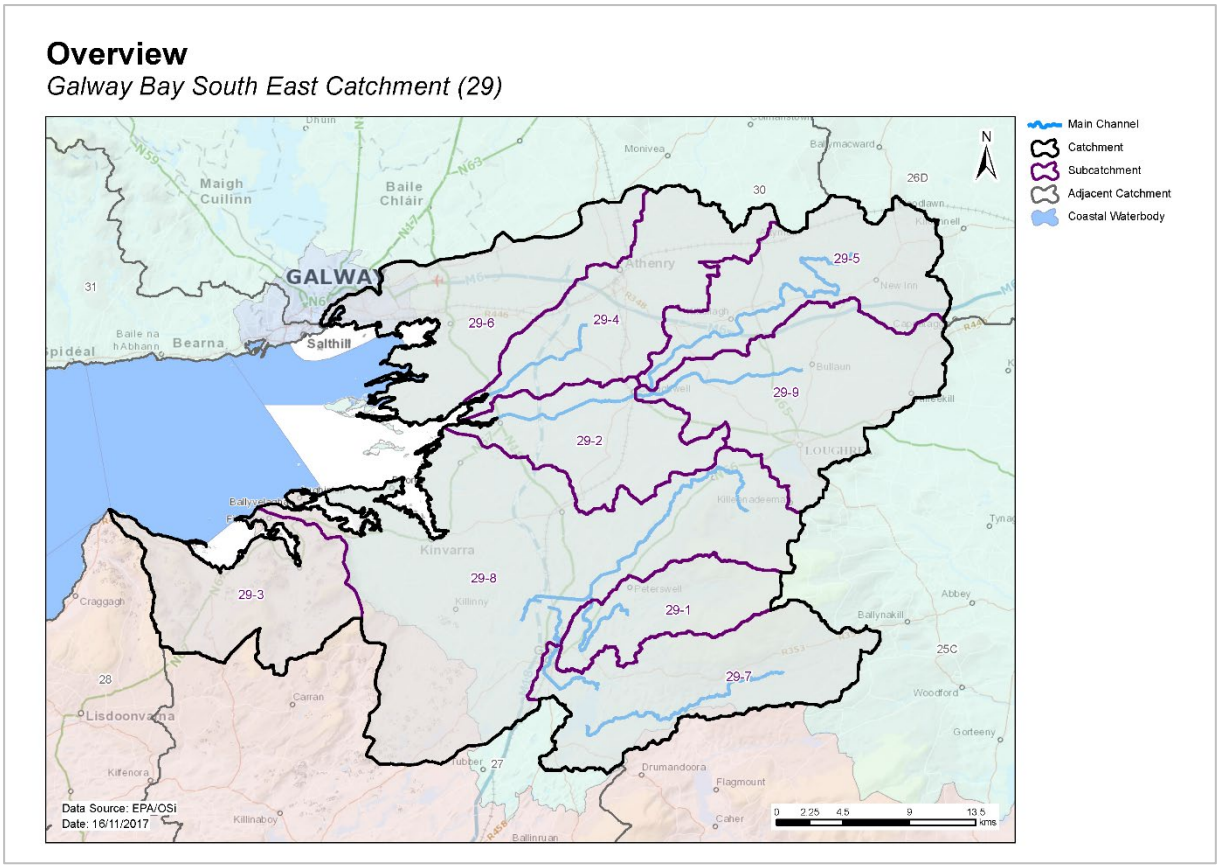


Figure 1. Subcatchments in the Galway Bay South East catchment

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 10 (26%) river and lake water bodies at Good or High status, and 19 (48%) at less than Good status in 2015 (Table 2 and Figure 2). Ten (26%) river and lakes water bodies are unassigned.
- Six river water bodies and sites and one lake have a high ecological status objective. In 2015, five of these water bodies were at High status, one was at Good, and one was at less than Good (Figure 3, Appendix 1).
- The number of water bodies at each status class in 2007-09 and 2010-15 are shown in Figure 4 (rivers) and Figure 5 (Lakes).
- Two surface water bodies have improved, 11 have deteriorated since 2007-09 WFD monitoring (Figure 7).
- The variation in nutrient concentrations and loads in the Kilcolgan main channel is illustrated in Appendix 2.

2.1.2 Transitional and coastal (TraC)

- Of the 29 TraC water bodies, three were at Good or High status (Corrib Estuary, Inner Galway Bay North and Outer Galway Bay), two were at Moderate status (Murree Lough and Kinvarra Bay), one was at Poor status (Rincarna Pools North), one was at Bad status (Bridge Lough, Knockakilleen) in 2015 (Table 2). Twenty-Two TraC water bodies are unassigned.
- One of the TraC water bodies (Outer Galway Bay) has a high ecological status objective, which was at High status in 2015 (Figure 3).
- The number of TraC water bodies at each status class in 2007-09 and 2010-15 are shown in Figure 6.
- Note that two coastal water bodies Shannon Plume (HAs 27;28) and Aran Islands, Galway Bay, Connemara (HAs 29;31) 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	33	5	4	12	5	0	7	9	5	19
Lakes	6	0	1	2	0	0	3	3	0	3
TraC	29	1	2	2	1	1	22	9	16	4

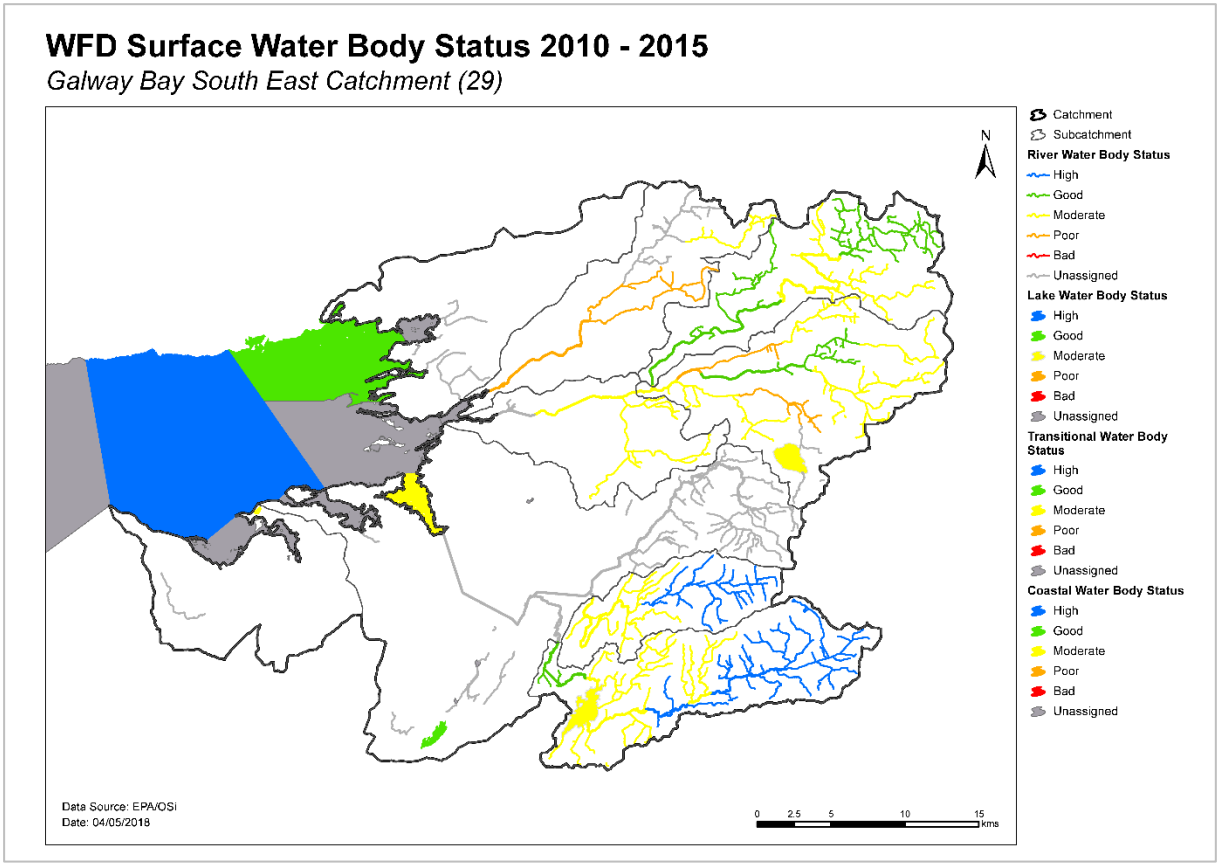


Figure 2. Surface water ecological status

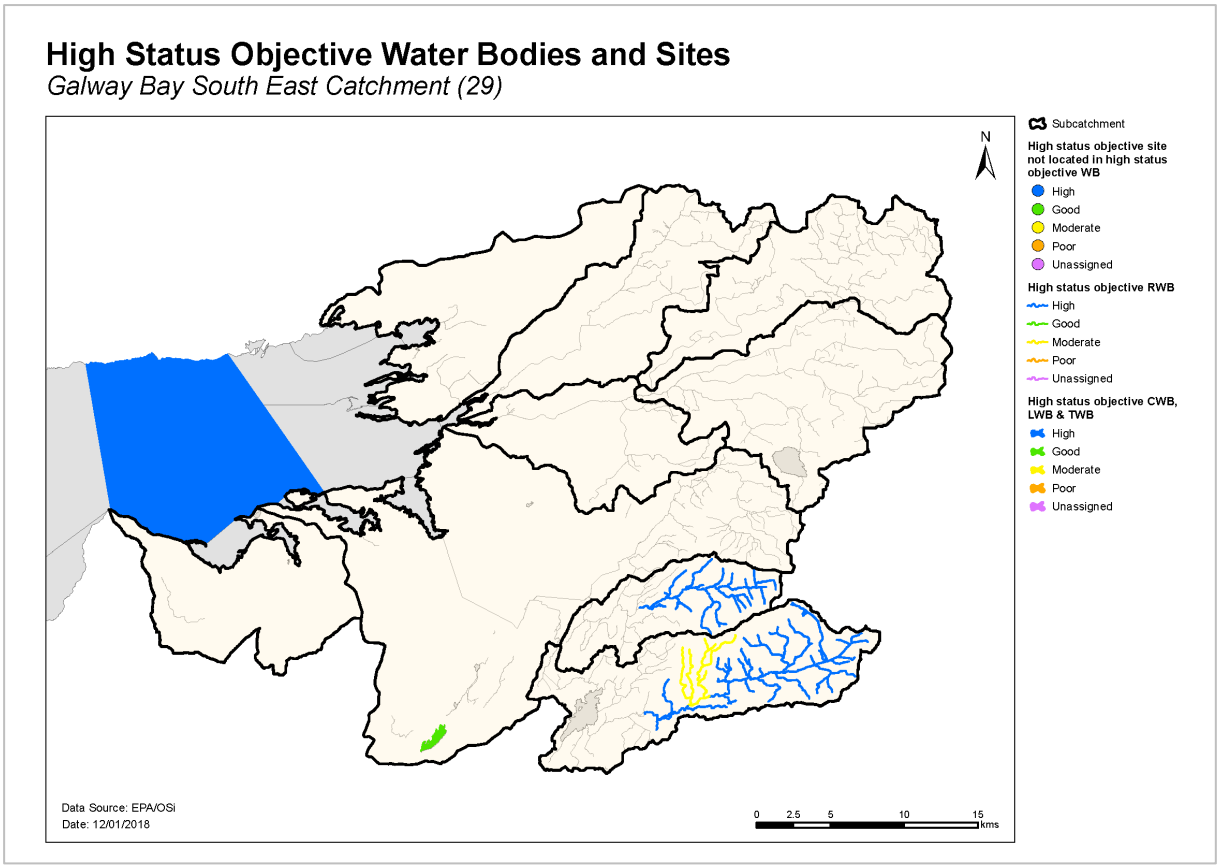


Figure 3. High ecological status objective water bodies and sites

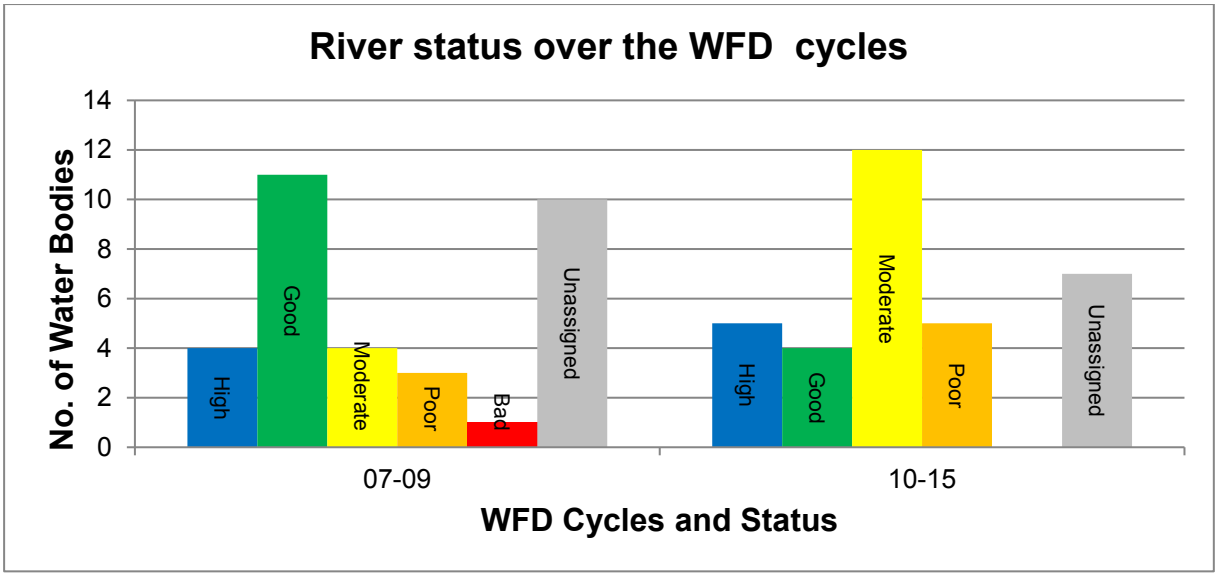


Figure 4. Number of rivers at each status class in 2007-09 and 2010-15

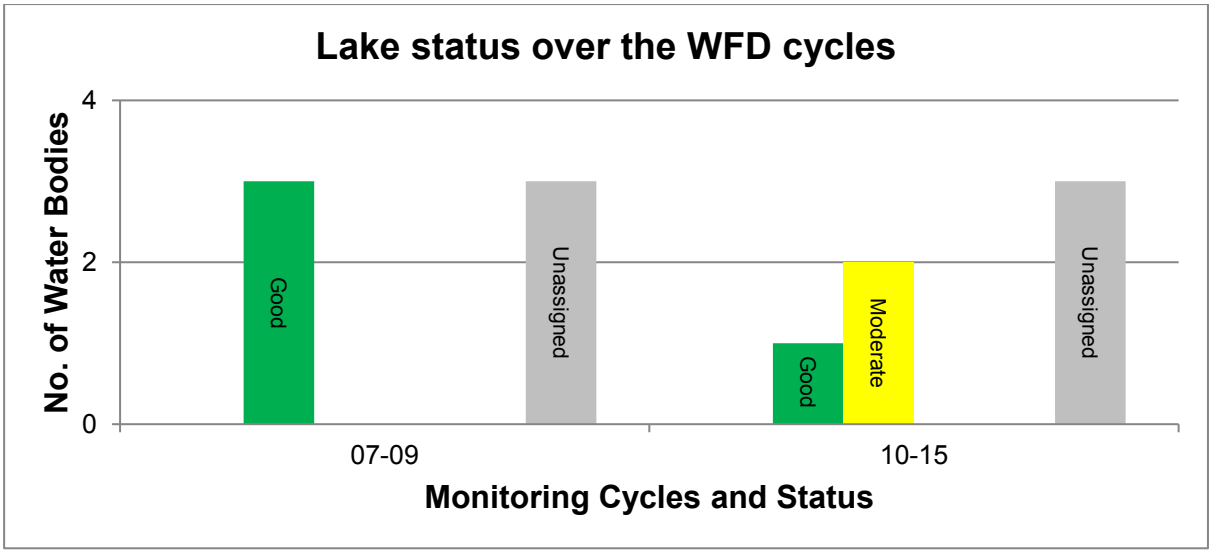


Figure 5. Number of lakes at each status class in 2007-09 and 2010-15

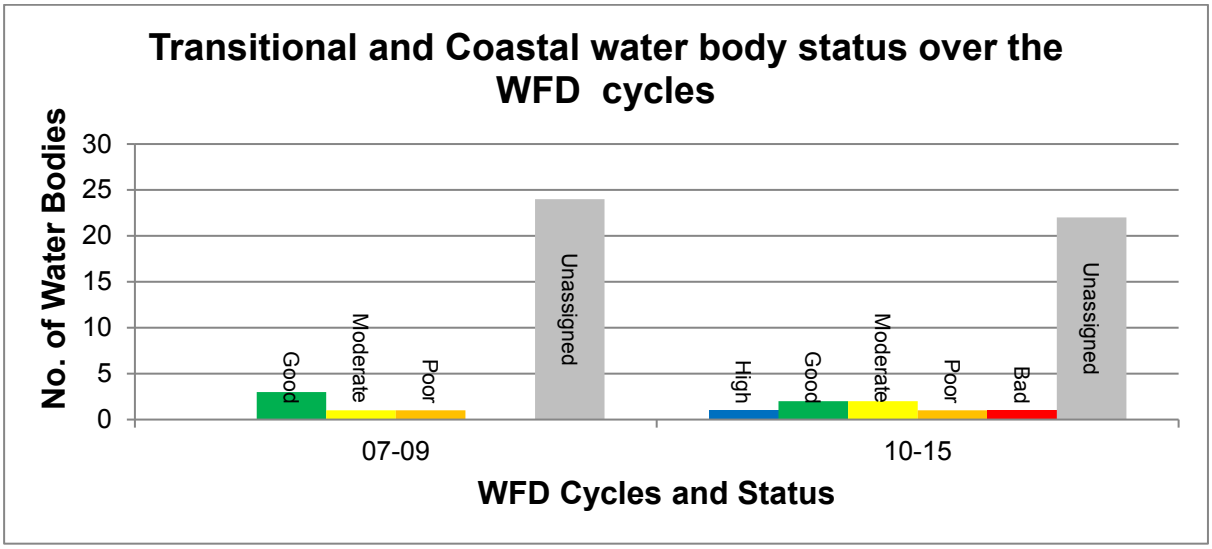


Figure 6. Number of transitional and coastal water bodies at each status class in 2007-09[1] and 2010-15.

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

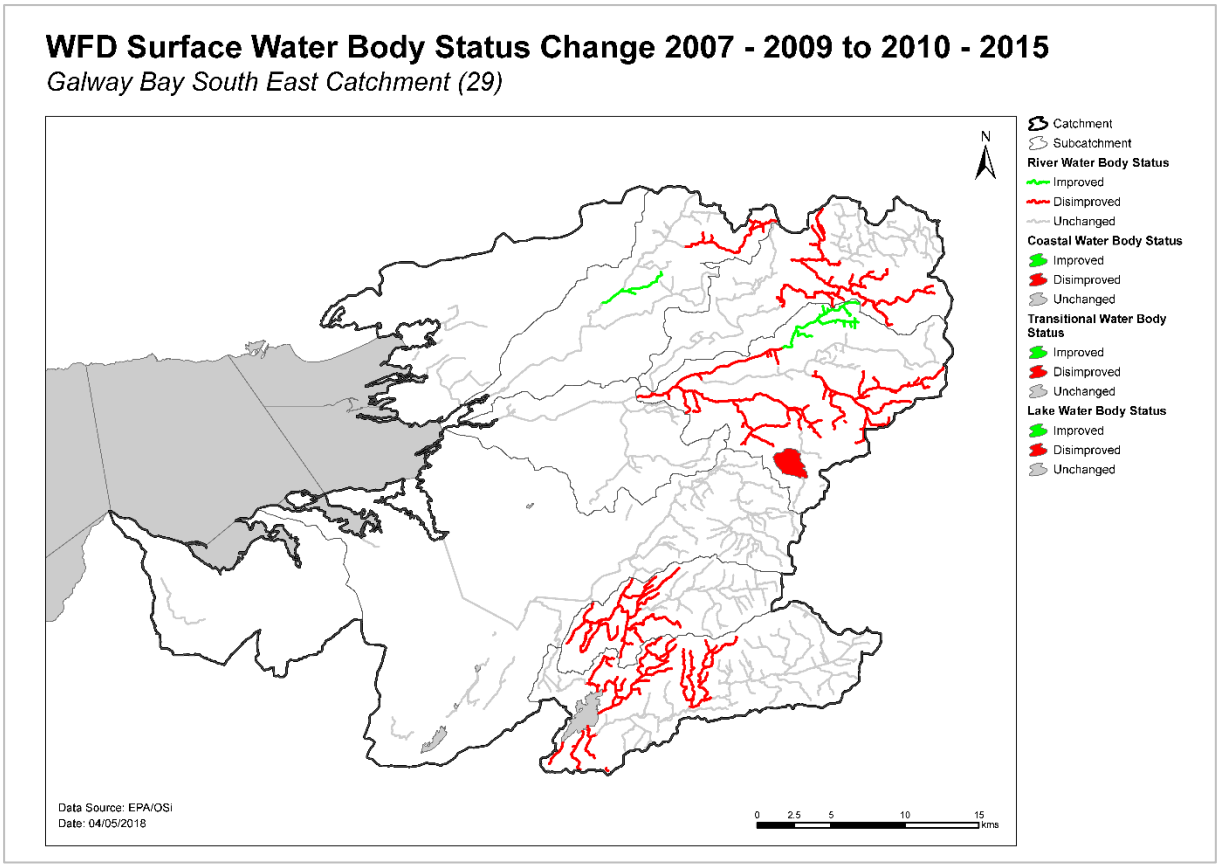


Figure 7. Surface water body status change from 2007-09 to 2010-15

2.2 Groundwater status

- There were 14 groundwater bodies at Good status and three at Poor status in 2015 (Table 3, Figure 8).

Table 3. Summary of groundwater body status and risk categories

	Number of water bodies	2010-15		Risk Categories		
		Good	Poor	*Not at Risk*	*Review*	*At Risk*
Groundwater	17	14	3	4	8	5

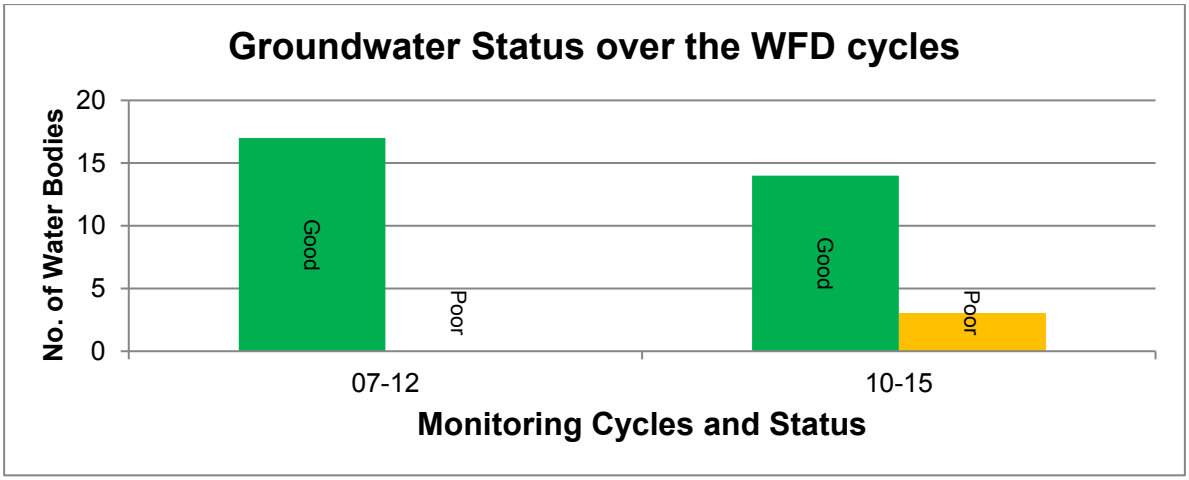


Figure 8. Net change in number of groundwater bodies at each status class in 2007-12 and 2010-15

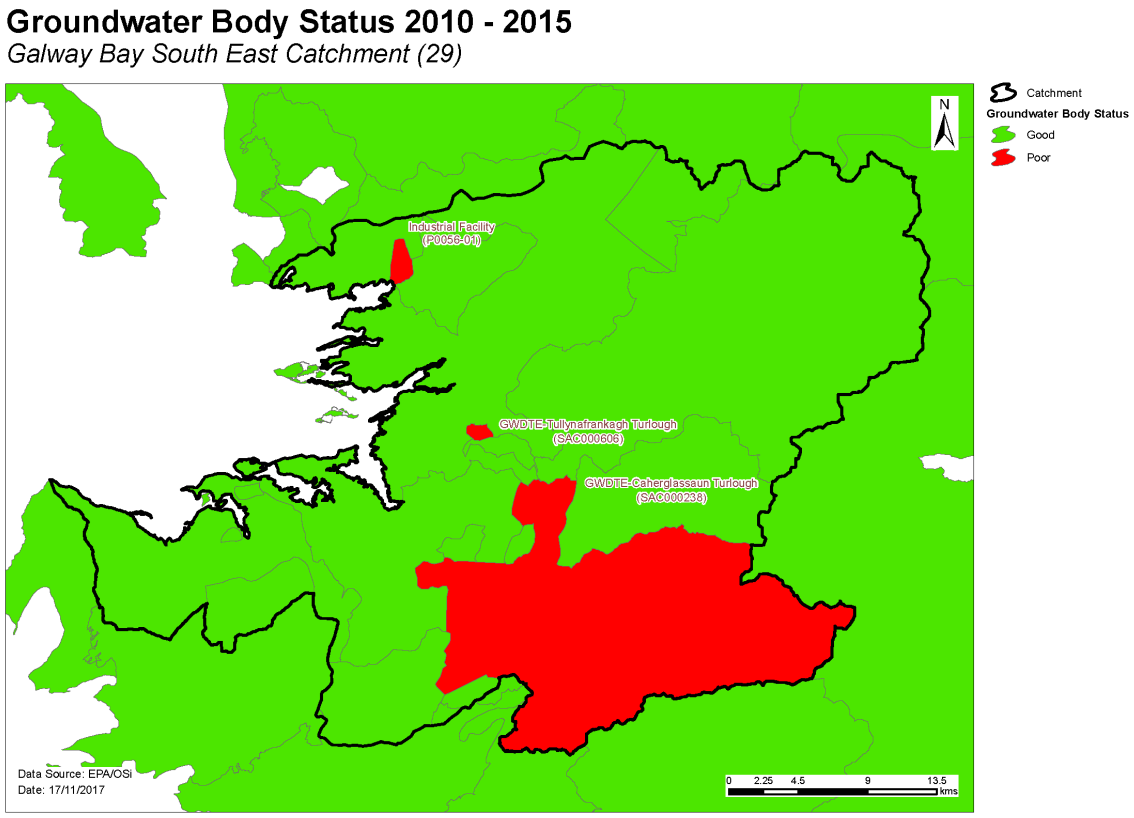


Figure 8a) – Groundwater body status

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and lakes

- There are nine river and three lake water bodies *Not at Risk* (Figure 9, Table 2) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Five river water bodies are in *Review*. This includes three river water bodies where more information is required and two river water bodies where measures have recently been implemented and improvements have not yet been realised.

- Nineteen river and three 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)

- Nine TraC water 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.
- Sixteen TraC water bodies are in *Review* where more information is required.
- Four TraC 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.

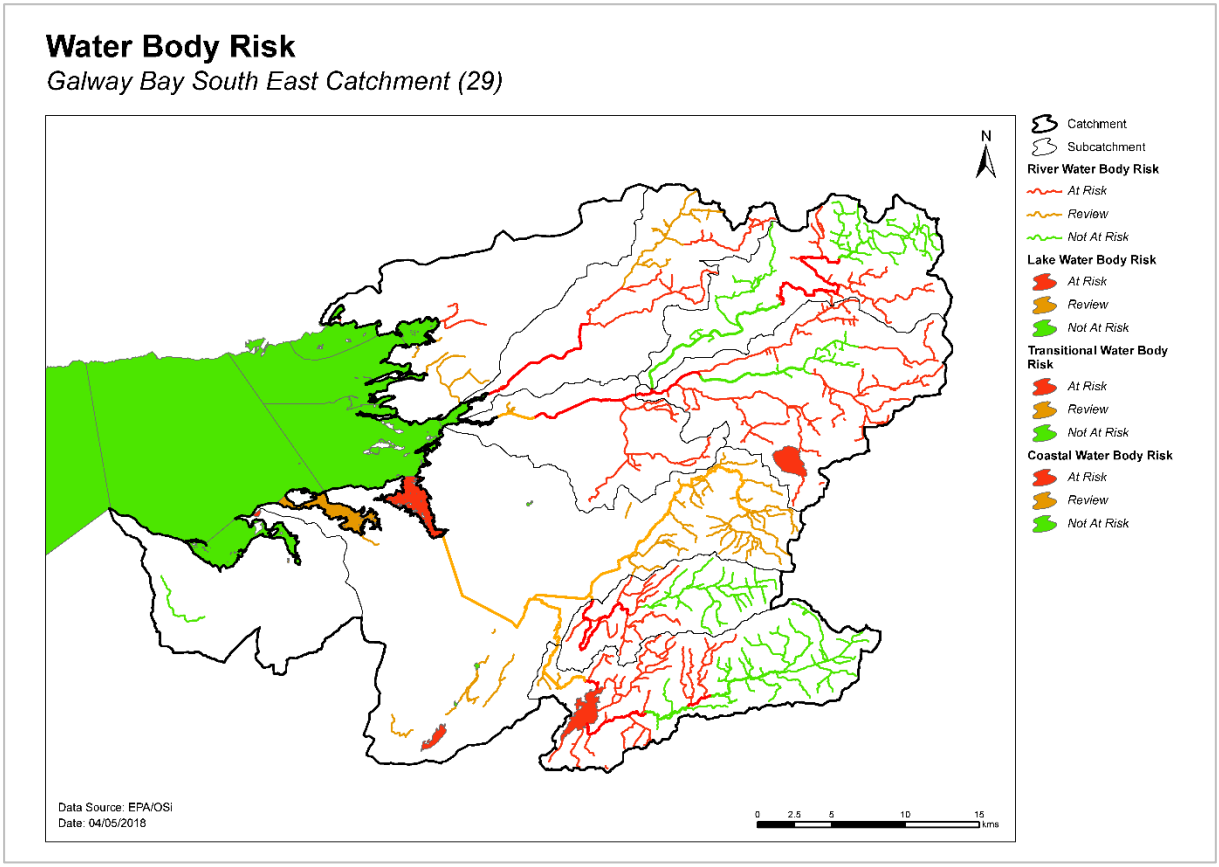


Figure 9. Surface water body risk

2.4 Risk of not meeting groundwater environmental objectives

- Four groundwater bodies are *Not at Risk* (Figure 10, Table 3) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Eight groundwater bodies are in *Review.* Two are in *Review* (Kinvara-Gort, Clarinbridge and GWDTE-Galway Bay Complex Fens (SAC000268) 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 (Figure 9). Five groundwater bodies (GWDTE-Ballyvelaghan Turlough (SAC000268), GWDTE-Cahermore Turlough (SAC002294), GWDTE-Coy Turlough (SAC002117), GWDTE-Kiltiernan Turlough (SAC001285) and GWDTE-Lough Mannagh Turlough (SAC001926) have priority issues of agriculture/ septic tanks, while GWDTE-Gortboyheen Turlough (SAC000054) requires further investigation.
- There are five groundwater bodies which are *At Risk* (GWDTE-Caherglassaun Turlough (SAC000238), GWDTE-Tullynafrankagh Turlough (SAC000606), GWDTE-Rahasane Turlough (SAC000322), IE_WE_G_0117 and Clarinbridge in the catchment. This is due to impacts on two groundwater dependent ecosystems (GWDTEs), deterioration in groundwater quality in one groundwater body caused by an industrial site while two are *At Risk* due to groundwater contribution of phosphate to associated surface water bodies. (Table 4).

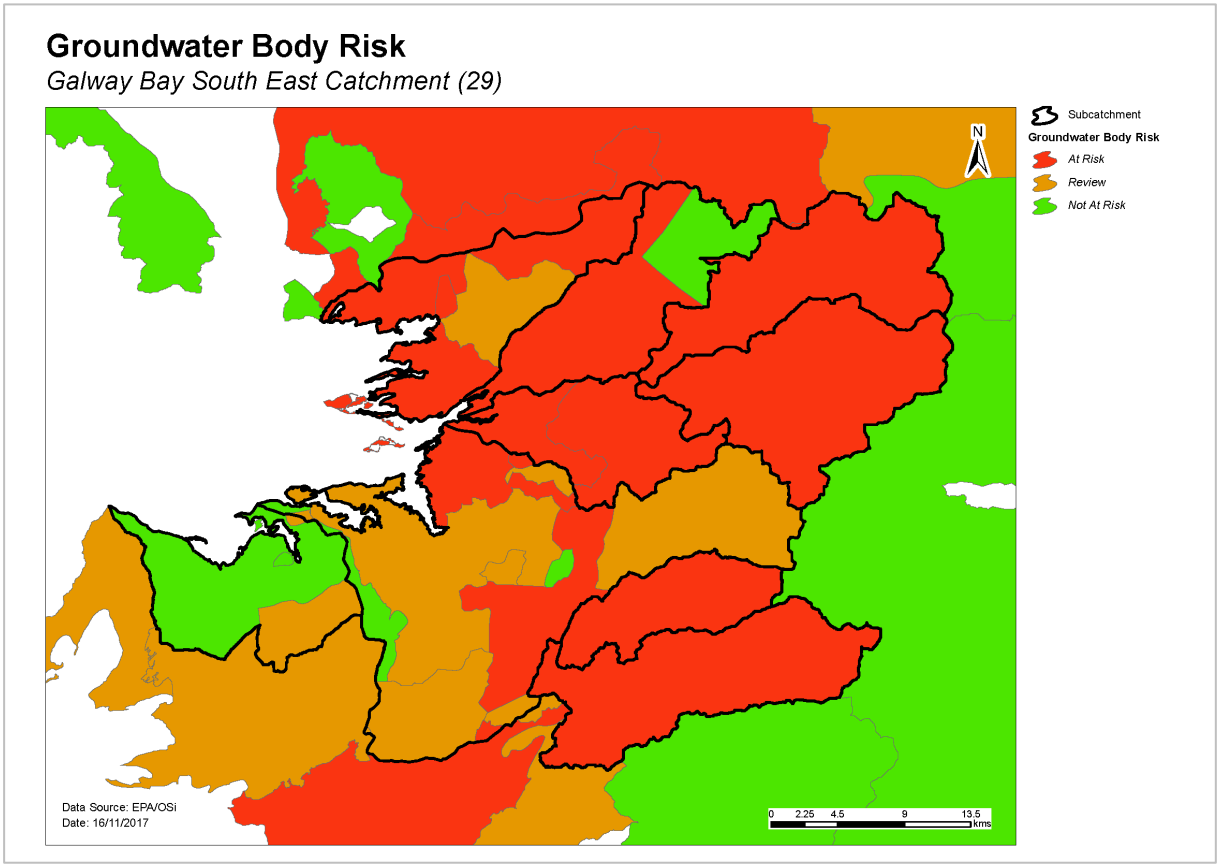


Figure 10. Groundwater body risk

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

Groundwater body name	Receiving water body code	Receiving water body name
Clarinbridge	IE_WE_29C020500	Clarinbridge_050
Clarinbridge	IE_WE_29C050400	Carrowmoneash (Oranmore) _010
Clarinbridge	IE_WE_29K010600	Kilcolgan_040
GWDTE-Rahasane Turlough (SAC000322)	IE_WE_30A010500	BALLYMABILLA_010
GWDTE-Rahasane Turlough (SAC000322)	IE_WE_30B020300	Kilcolgan_010
GWDTE-Rahasane Turlough (SAC000322)	IE_WE_29K010600	Kilcolgan_040
GWDTE-Rahasane Turlough (SAC000322)	IE_WE_29L010600	Lecarrow stream_010
GWDTE-Rahasane Turlough (SAC000322)	IE_WE_29R010200	Raford_020
GWDTE-Rahasane Turlough (SAC000322)	IE_WE_29T010300	Toberdoney 29_010
GWDTE-Rahasane Turlough (SAC000322)	IE_WE_29T010700	Toberdoney 29_020

2.5 Protected areas

2.5.1 Drinking water protected areas

- There are 44 abstractions in the Galway Bay South East Catchment comprising 15 group water schemes, seven public supplies, and three other schemes.
- Forty of the abstractions are from eight groundwater bodies, one is from a lake (Lough Rea), and one is from a river water body (Cannahowna_010). The list of the public supplies and the associated water bodies is provided in Appendix 4.
- All sources were compliant with the standards for nitrate in 2015.
- All sources were compliant with the standards for pesticides in 2015.

2.5.2 Bathing waters

- There is one designated freshwater bathing water and three marine bathing waters in the Galway Bay South East catchment.
- The freshwater bathing water and two of the three marine bathing waters were in satisfactory condition.
- Ballyloughane beach failed to meet its environmental objective due to poor water quality results during 2011-2014 and 2012-2015. The bathing water profile indicates that the significant pressure is urban sewer outfalls from east Galway city. A management plan has been prepared by Galway City Council and includes a CCTV assessment of connections in the Merlin Park area of Galway city prior to assessment of remedial works.
- The list of the bathing waters and the associated water bodies is provided in Table 5.

Table 5. Bathing waters in the catchment

Bathing Water		Water Body Intersection		Objective met?		Comment
Name	Code	Name	Code	Yes	No	
Loughrea Lake	IEWEBWL29_194_0100	Rea	IE_WE_29_194	✓		
Ballyloughane Beach	IEWEBWT170_0700_0200	Corrib Estuary	IE_WE_170_0700		✓	Poor water quality during 2011-2014 and 2012-2015. The significant pressure is urban sewer outfalls from west Galway city.
Traught, Kinvara	IEWEBWC160_0000_0100	Inner Galway Bay South	IE_WE_160_0000	✓		
Bishopsquarter	IEWEBWC110_0000_0100	Ballyvaghan Bay	IE_WE_110_0000	✓		

2.5.3 Shellfish areas

- There are three designated Shellfish Areas in the catchment. Two of the three shellfish areas are compliant with the relevant standards and there are no water quality issues of concern. Clarinbridge/Kinvarra Bay failed to meet its environmental objective in 2015; the percentage compliance with E. coli 230 MPN $100g^{-1}$ was less than 75%. The list of shellfish areas and the associated water bodies is provided in Table 6.

Table 6. Shellfish areas in the catchment

Shellfish Area		Water Body Intersection		Objective met?		Comment
Name	Code	Name	Code	Yes	No	
Clarinbridge/ Kinvara Bay	IEPA2_0005	Bridge Lough, Knockakilleen	IE_WE_160_0200		✓	The significant pressures are a combination of waste water treatment plants (Loughrea, Athenry and Kinvarra) and septic tank systems.
		Kinvarra Bay	IE_WE_160_0100			
		Dunbulcaun Bay	IE_WE_160_0800			
		Lough Sallagh (Doorus Loughs)	IE_WE_160_0600			
		Inner Galway Bay South	IE_WE_160_0000			
The Bay at Aughinish	IEPA2_0001	Aughinish Bay	IE_WE_130_0000	✓		
Ballyvaughan/Poulnaclough Bay	IEPA2_0024	Ballyvaghan Bay	IE_WE_110_0000	✓		

2.5.4 Nutrient sensitive areas

- There are no designated nutrient sensitive areas in the Galway Bay South East catchment.

2.5.5 Natura 2000 sites

- There are 25 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.
- Sixteen rivers water bodies (2 lakes, 12 TraCs and 2 groundwater bodies) have been prioritised for action as the water conservation objectives as their habitats and/or species are not being supported by ecological status (Appendix 5).

- There are seven Special Protected Areas (SPAs) in the catchment:
    - Coole-Garryland SPA
    - Cregganna Marsh SPA
    - Inner Galway Bay SPA
    - Lough Cutra SPA
    - Lough Rea SPA
    - Rahasane Turlough SPA
    - Slieve Aughty Mountains 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 (HMWB) in the Galway Bay South East catchment.
- There are no designated artificial water bodies (AWB) in the catchment.

3 Significant issues in *At Risk* water bodies

- Excess phosphates leading to eutrophication is the dominant issue in the rivers and lakes. Excess ammonia and excess fine sediment, resulting in poor habitat quality, are also a concern, however these are affecting a limited number of water bodies.
- Kinvarra Bay IE_WE_160_0100 has issues with elevated Dissolved Oxygen and Biological Oxygen Demand. In Murree Lough and Bridge Lough, there are issues with dissolved oxygen and macrophytes. In Rincarna Pools North, there are issues with macrophytes, dissolved oxygen and nutrients.
- The issues affecting groundwater bodies include excess phosphorus concentrations that are being delivered to surface water bodies that are At Risk, via groundwater. Five of the 17 groundwater bodies are *At Risk.* For GWDTE-Tullynafrankagh Turlough (SAC000606) (IE_WE_G_0105) and GWDTE-Caherglassaun Turlough (SAC000238) (IE_WE_G_0091), elevated Total Phosphorus, Chlorophyll and aquatic ecology damage are the priority issues. For IE_WE_G_0117, the IPC industrial facility (P0056-01), chemical and nutrients are an issue. For Clarinbridge (IE_WE_G_0008) and GWDTE-Rahasane Turlough (SAC000322) (IE_WE_G_0100), elevated phosphate concentrations are an issue.

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 11 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 domestic waste water followed by agriculture, urban waste water, hydromorphological pressures, forestry, diffuse urban, and industry (Figure 11).

4.1.1 Rivers, lakes, transitional and coastal (TraC)

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

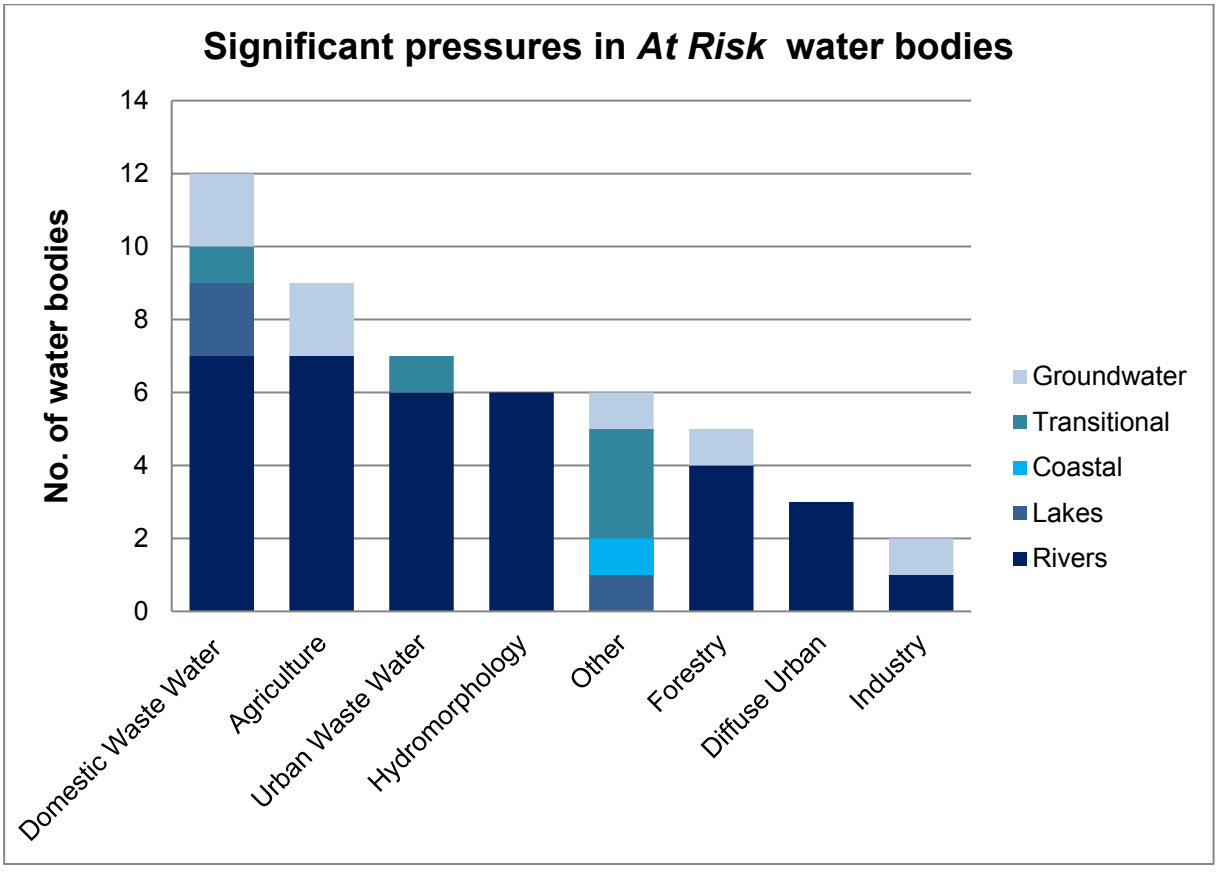


Figure 11. Significant pressures impacting on *At Risk* water bodies

4.1.2 Groundwater

- Groundwater bodies GWDTE-Rahasane Turlough (SAC000322) and Clarinbridge are impacted by agriculture and domestic waste water. GWDTE-Caherglassaun Turlough (SAC000238) is impacted by forestry. For GWDTE-Tullynafrankagh Turlough (SAC000606), the significant pressure has not been determined. For IE_WE_G_0117, the significant pressure is an industrial facility.

4.2 Pressure type

4.2.1 Domestic waste water

- Domestic waste water has been identified as a significant pressure in seven river, two lake (Cutra and Rea) water bodies and one transitional water body Kinvarra Bay. This is due to high concentration of domestic waste water systems in areas of extreme vulnerability where karstified limestone outcrops are exposed. The Local Authority reported that several septic tank systems failed inspections due to unsuitable soil percolation conditions. Water bodies that are *At Risk* from domestic waste water are shown in Figure 12.

- Two groundwater bodies GWDTE-Rahasane Turlough (SAC000322) and Clarinbridge are also impacted by domestic waste water pressures.

4.2.2 Agriculture

- Agriculture is a significant pressure in seven river water bodies Figure 13. Two groundwater bodies GWDTE-Rahasane Turlough (SAC000322) and Clarinbridge are also impacted by domestic waste water pressures. The issues related to farming in this catchment are diffuse phosphorus loss to surface waters due to poorly draining soils and extreme vulnerability in karstic areas; resulting in excess nutrients causing signs of enrichment. 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) and agglomeration networks have been highlighted as significant pressures in seven *At Risk* water bodies; details are given in Table 7 and Figure 14. These *At Risk* water bodies, with the exception of Kilcolgan_020 and _030, are impacted by WWTPs or agglomeration networks that have capital works scheduled or completed.

Table 7. Waste Water Treatment Plants and agglomerations identified as Significant Pressures in *At Risk* water bodies and expected completion dates for associated upgrade works, where applicable.

Facility name	Facility Type	Water Body	2010-15 Ecological Status	Expected Completion Date
Athenry D0193	2,001 to 10,000 p.e.	Clarinbridge_030	Poor	2020
Athenry D0193	2,001 to 10,000 p.e.	Clarinbridge_040	Poor	2020
Galway D0050	> 10,000 p.e.	Carrowmoneash (Oranmore)_010	*Unassigned* [3]	*2028* [2]
Loughrea D0194	2,001 to 10,000 p.e.	Kilcolgan_010	*Unassigned* [3]	*2018* [4]
Loughrea D0194	2,001 to 10,000 p.e.	Kilcolgan_020	Poor	*NA* [4]
Loughrea D0194	2,001 to 10,000 p.e.	Kilcolgan_030	Moderate	*NA* [4]
Kinvara D0276	1,000 to 2,000 p.e.	Kinvarra Bay	Moderate	Complete

[2] *Galway WWTP upgrade is complete, however, the agglomeration network, which has been determined to be a significant pressure impacting Carrowmoneash (Oranmore)_010, is due to be upgraded by 2028.*

[3] *Ecological Status is not available for Carrowmoneash (Oranmore)_010 and Kilcolgan_010, however, following discussions with Galway County Council/Galway City Council, both water bodies were deemed to be At Risk of not meeting their environmental objectives.*

[4] *Loughrea WWTP is not scheduled to be upgraded, however, works on the agglomeration network are due to be completed in 2018. The agglomeration network has been determined to be a significant pressure impacting Kilcolgan_010 while the WWTP has been determined to be impacting Kilcolgan_020 and 030.*

4.2.4 Hydromorphology

- River water bodies (six) within the Boleyneendorrish (SC29_1), Cannahowna (SC29_7) and Kilcogan (SC29_9) subcatchments are subject to extensive modification due to the presence of drainage schemes (Figure 15). See Appendix 3 for information on these water bodies.

4.2.5 Other significant pressure

Anthropogenic Pressures

- There are three transitional, one coastal Rincarna Pools North, one groundwater body GWDTE-Tullynafrankagh Turlough (SAC000606) and one lake water body Bunny lake impacted by unknown Anthropogenic Pressures and requires further investigation. Figure 16.

Aquaculture

- The transitional water body Kinvarra Bay is impacted by aquaculture. Figure 17.

4.2.6 Forestry

- Forestry has been identified as a significant pressure in four river water bodies – (Boleyneendorrish_030, Ballymabilla_010, Owendalulleegh_030, and Owendalulleegh_050). The water bodies affected by forestry are shown in Figure 18. Forestry activities has also been identified as a significant pressure on groundwater body GWDTE-Caherglassaun Turlough (SAC000238).

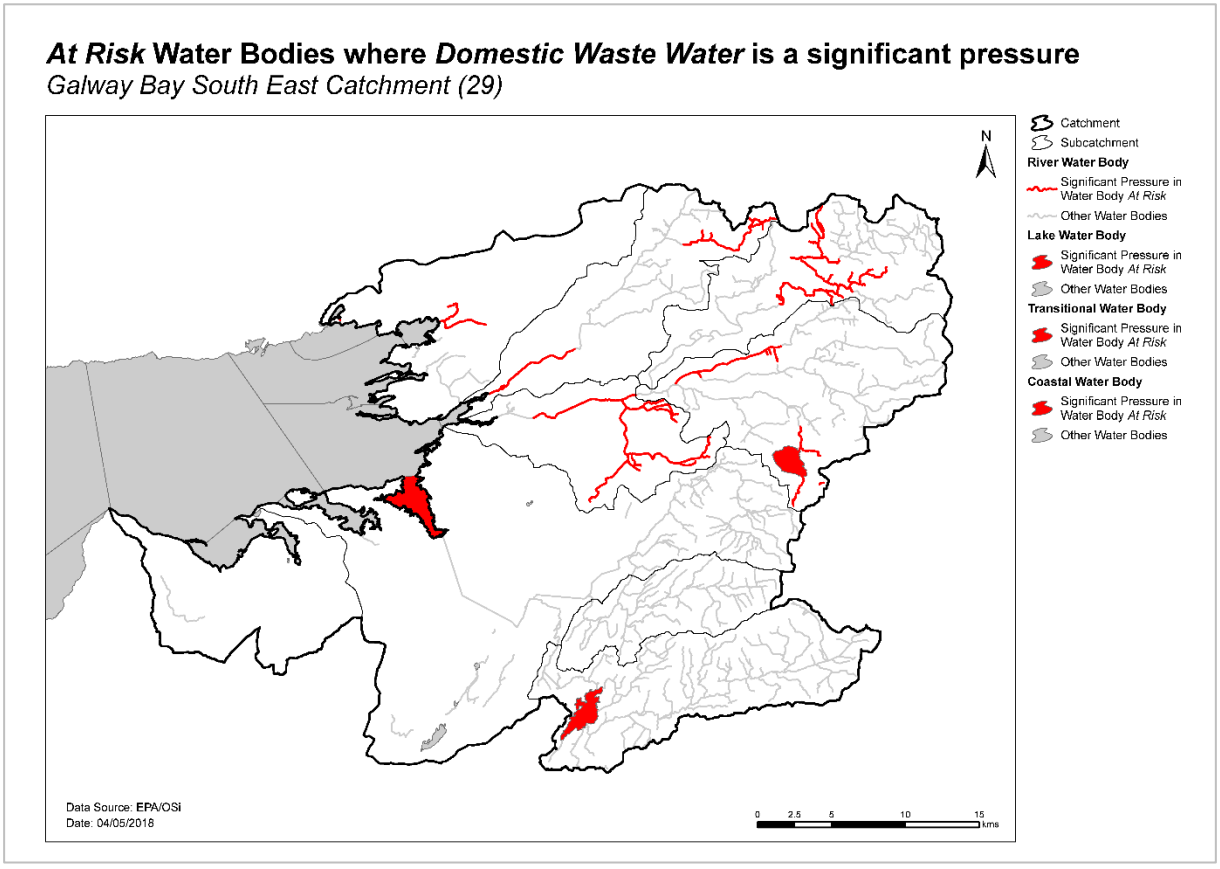


Figure 12. Water bodies that are *At Risk* and are impacted by domestic waste water

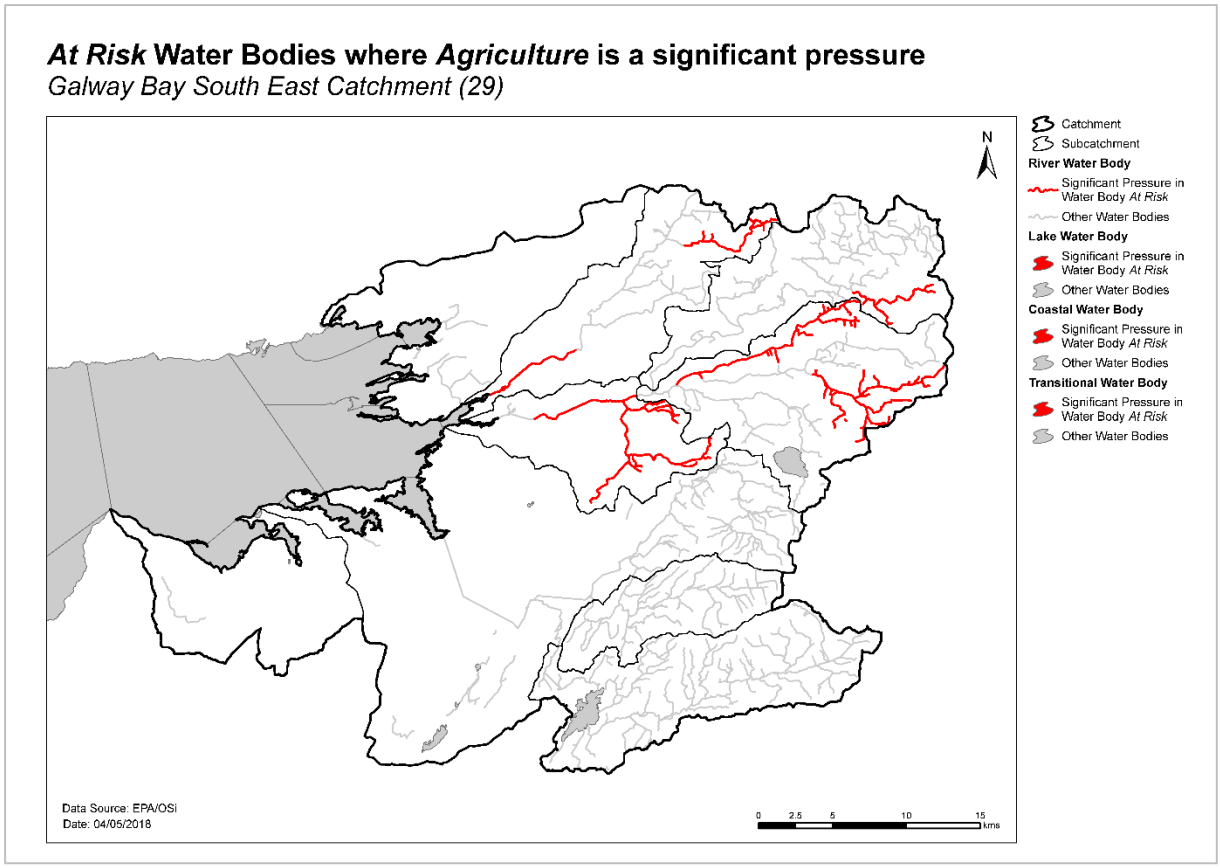


Figure 13. Water bodies that are *At Risk* and are impacted by agricultural activities

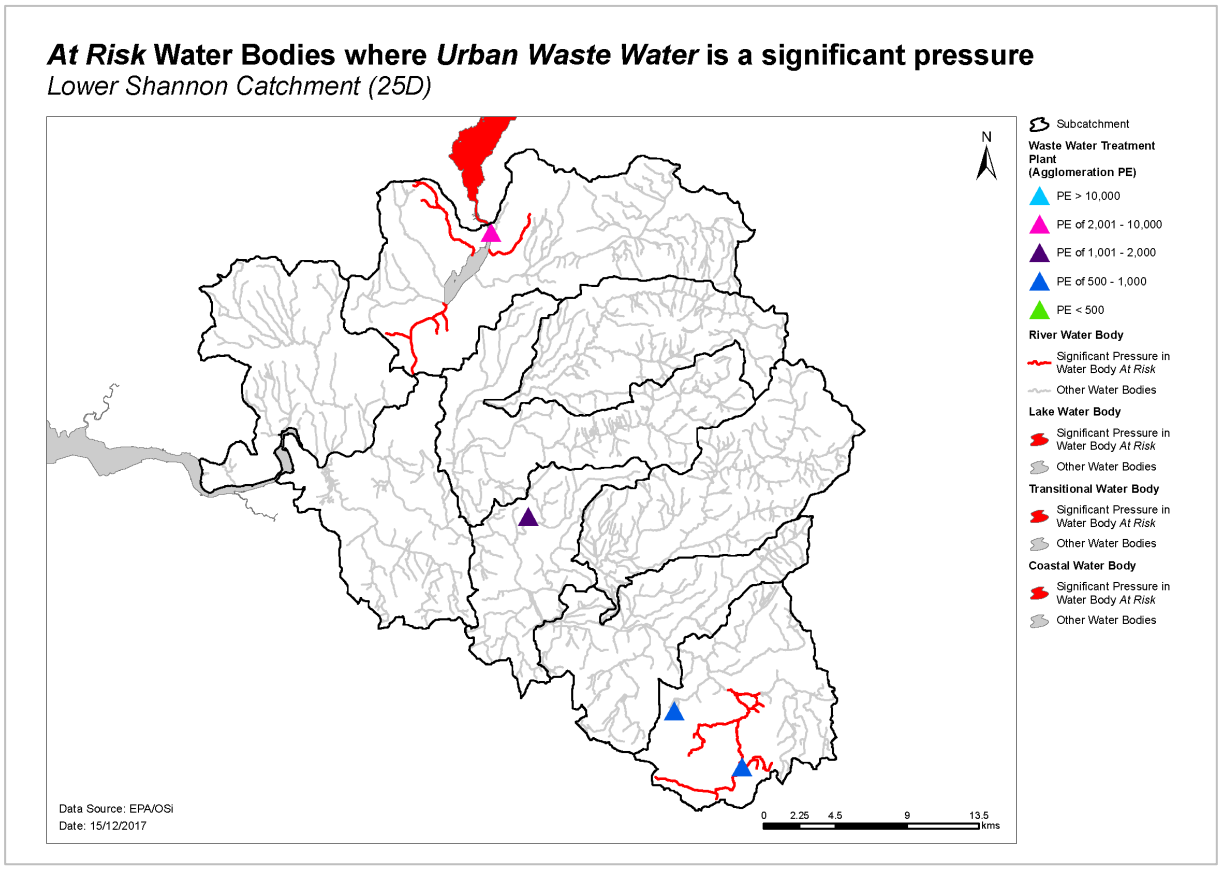


Figure 14. Water bodies that are *At Risk* and are impacted by urban waste water

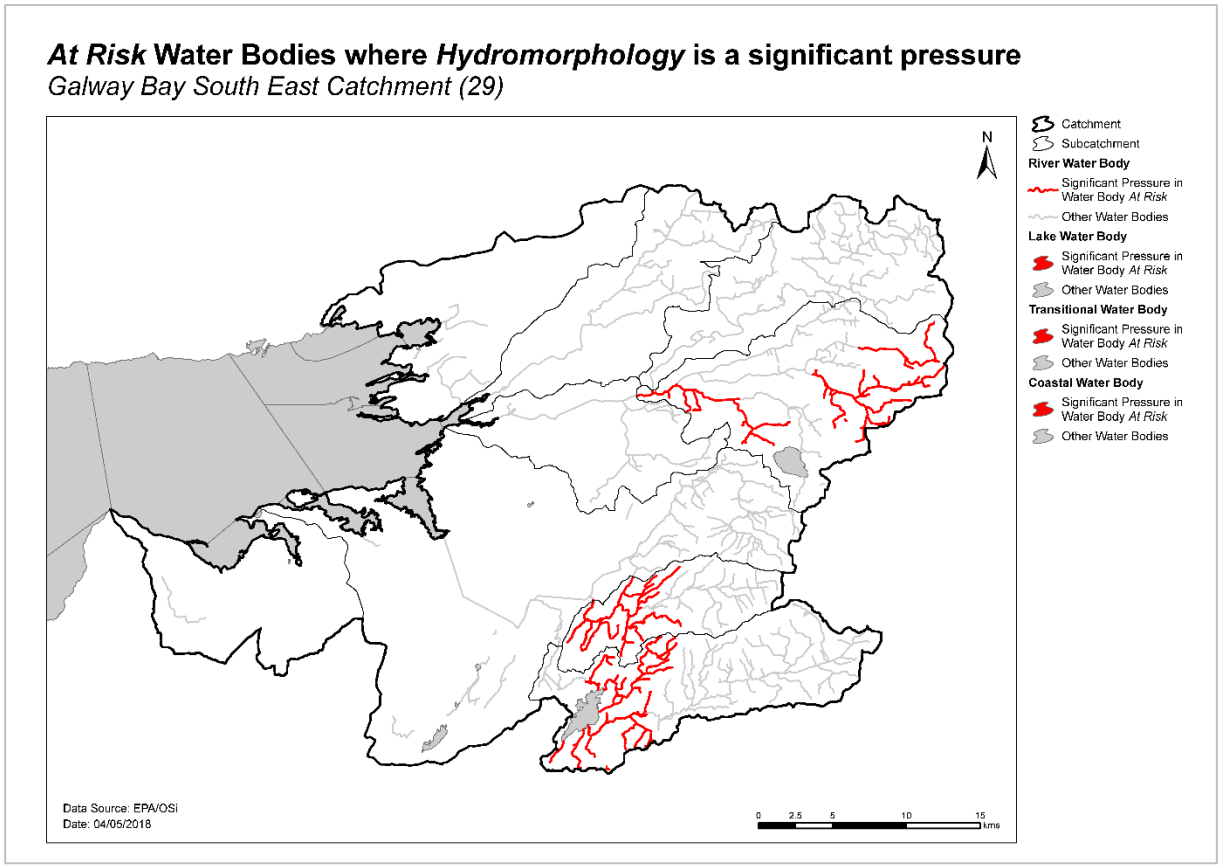


Figure 15. Water bodies that are At *Risk* and are impacted by hydromorphological pressures

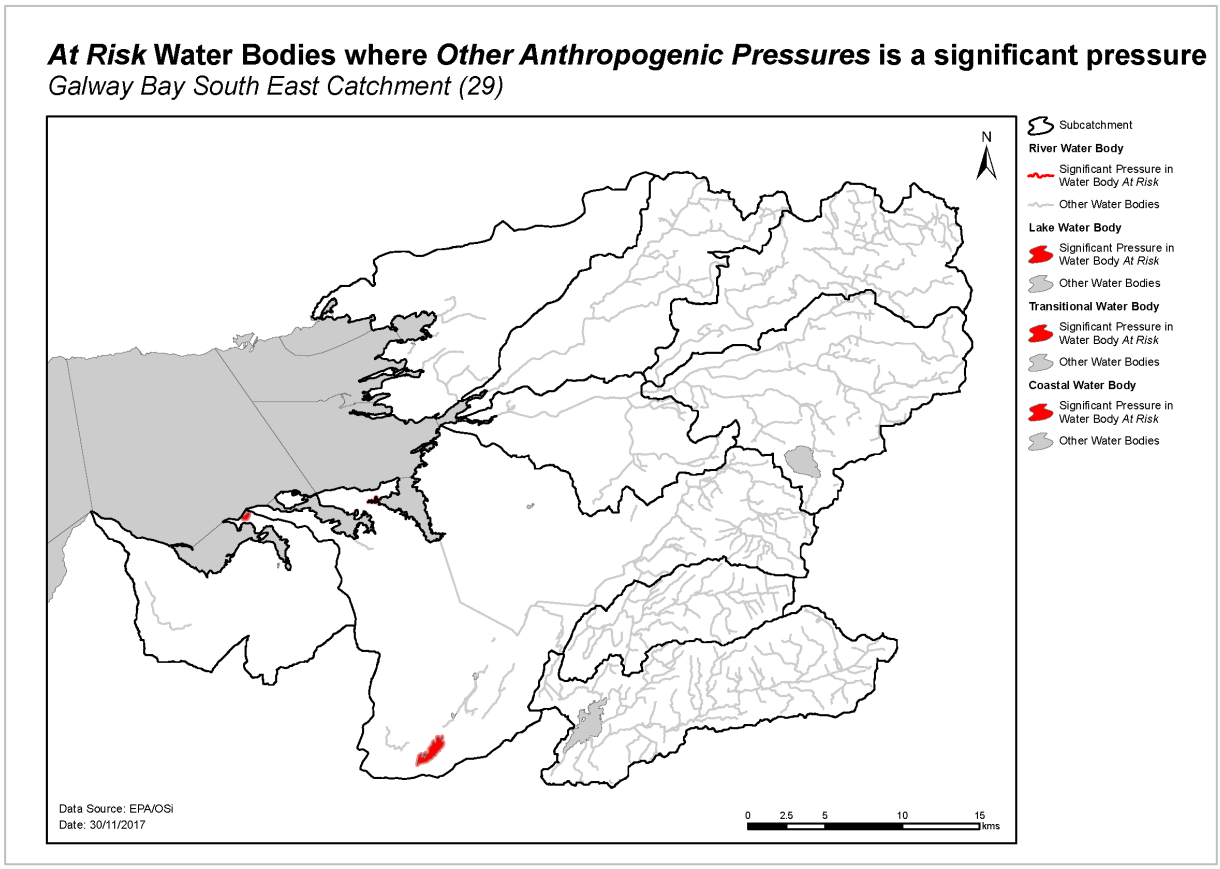


Figure 16. Water bodies that are *At Risk* and are impacted by other Anthropogenic pressures

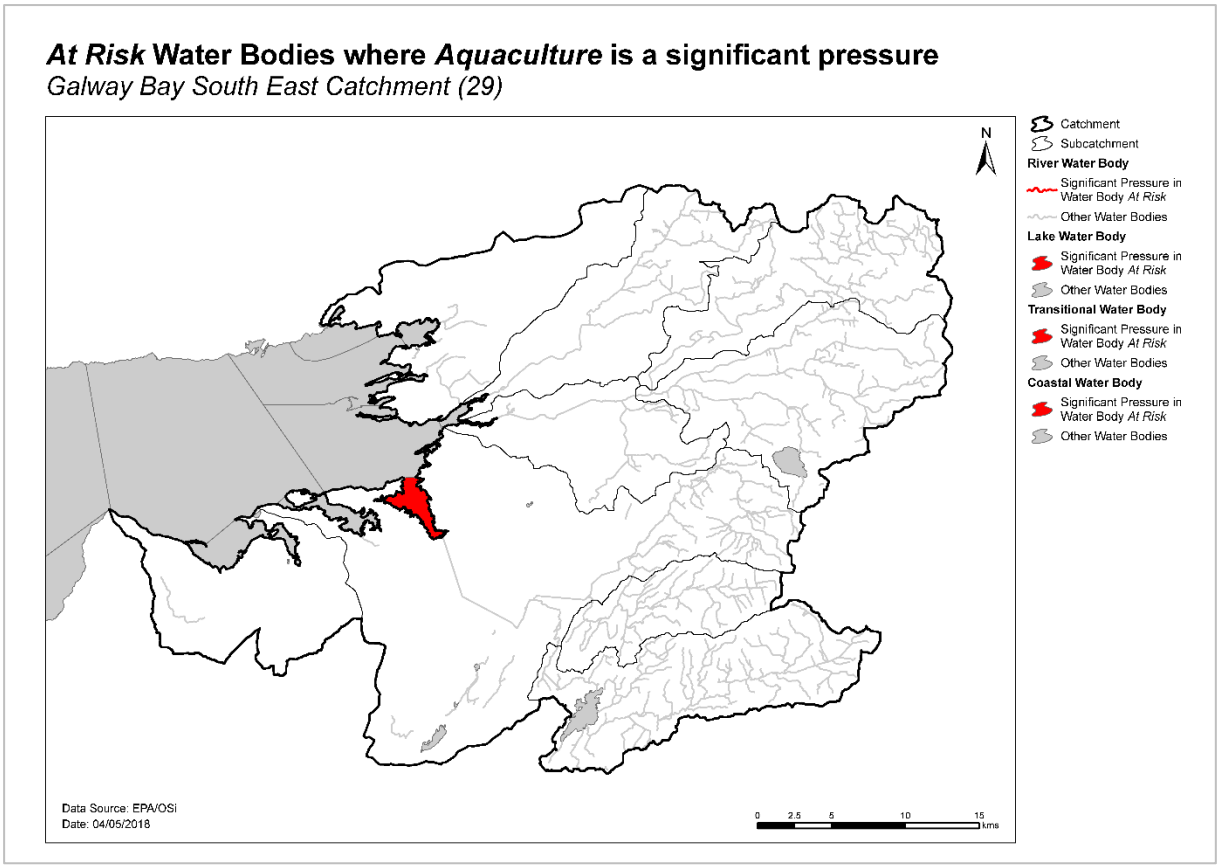


Figure 17. Water bodies that are *At Risk* and are impacted by Aquaculture

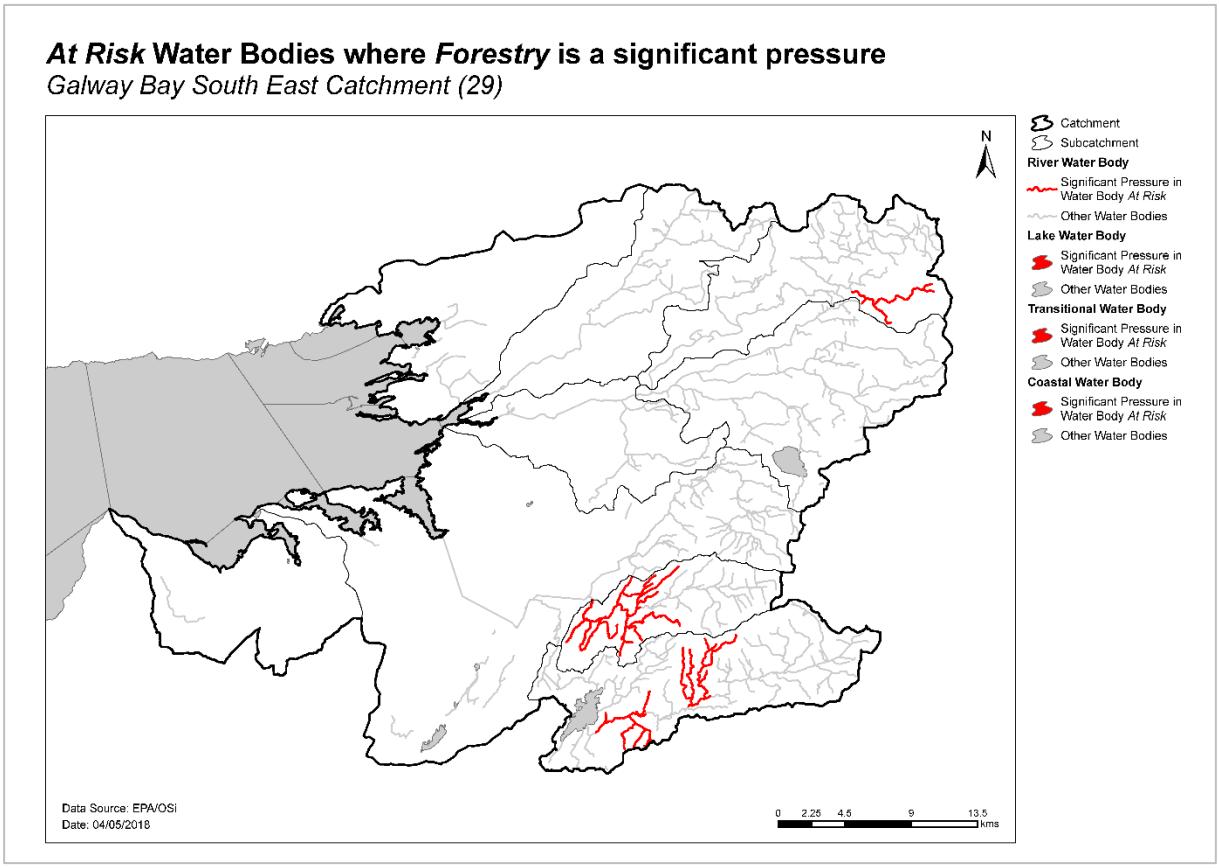


Figure 18. Water bodies that are *At Risk* and are impacted by forestry activities

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 river water bodies in the Galway Bay South East catchment (Clarinbridge_050, Carrowmoneash (Oranmore)_010, and Kilcolgan_010. Elevated concentrations of phosphates and ammonia are the significant issues. The map showing water bodies which are *At Risk* where diffuse urban is a significant pressure is given in Figure 19.

4.2.8 Industry

- Elevated nutrients from an industrial site has been identified as a significant pressure impacting Kilcolgan_040 (Figure 20).

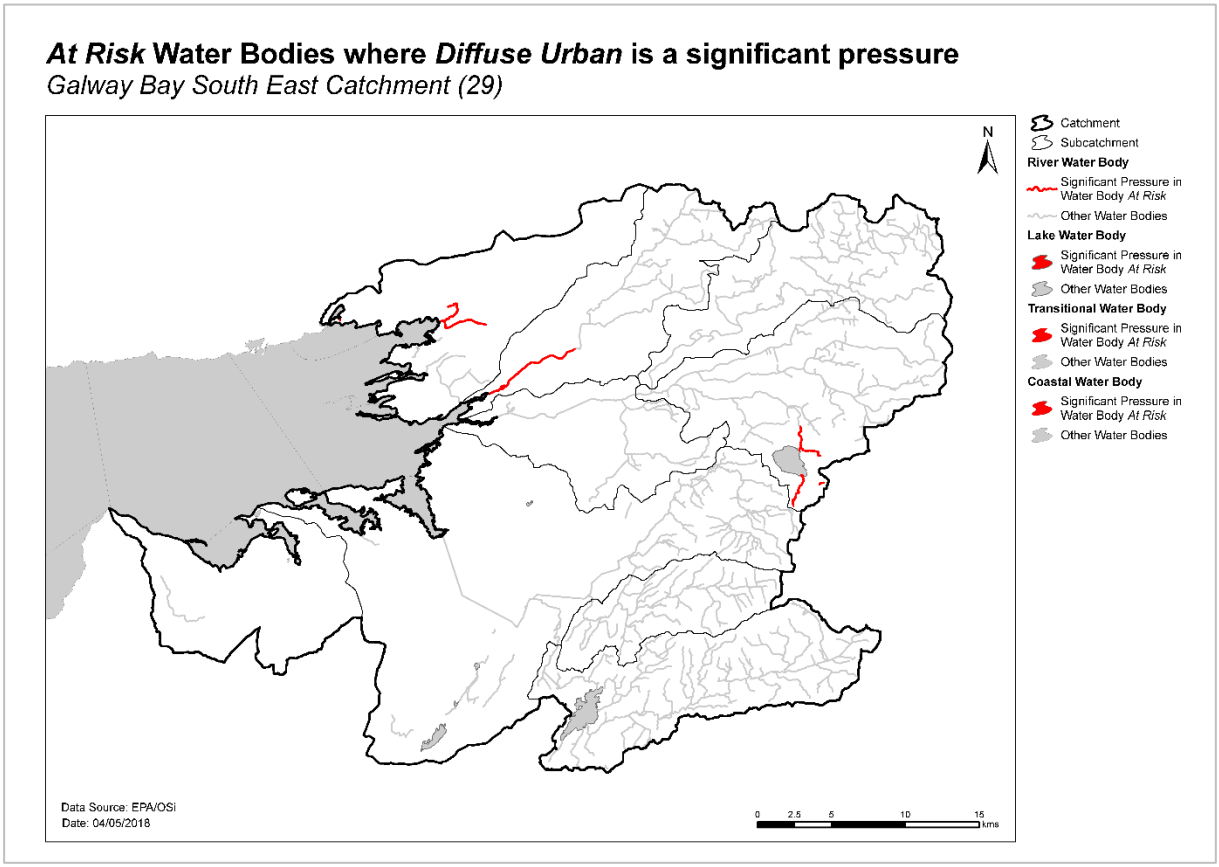


Figure 19. Water bodies that are *At Risk* and are impacted by diffuse urban pressures

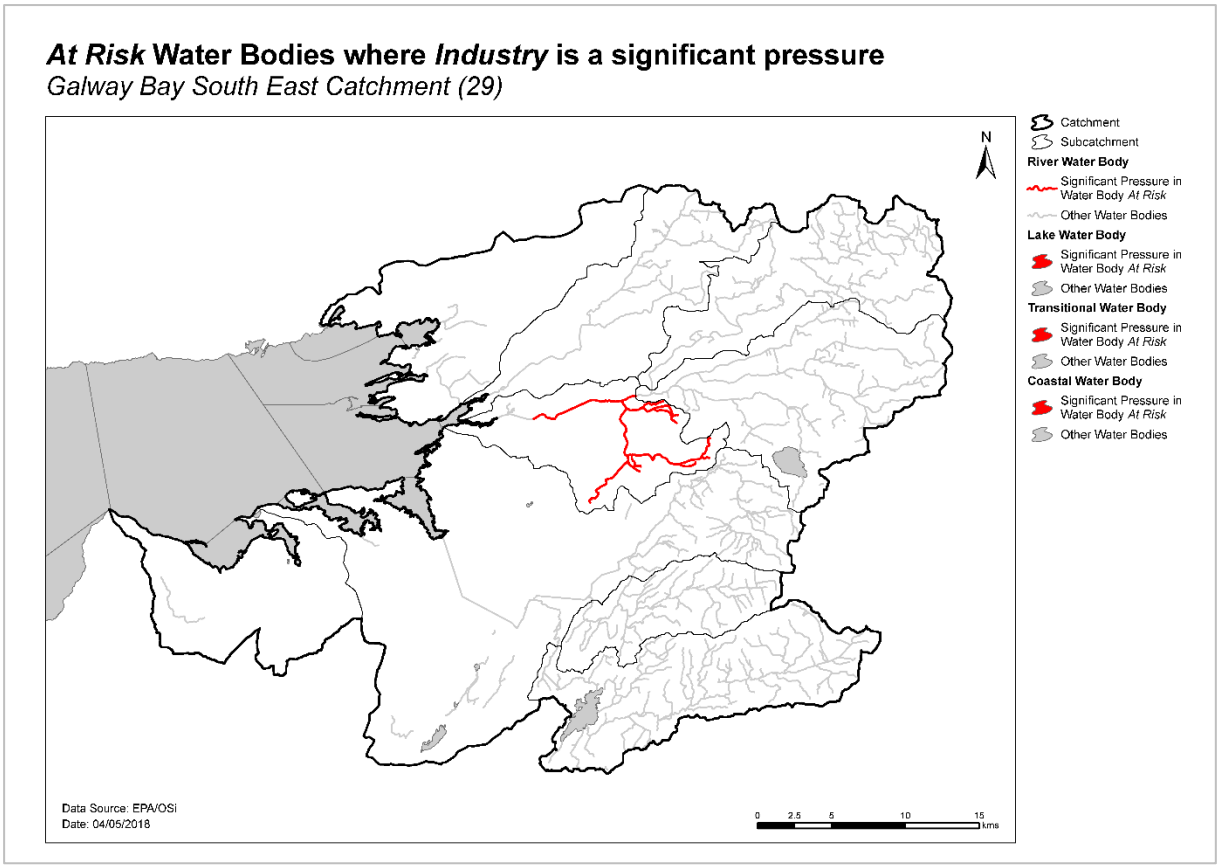


Figure 20. Water bodies that are *At Risk* and are impacted by Industry

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 Galway Bay South, East catchment, water chemistry data are available for 16 of the 32 water body monitoring points. The available data indicate that load reductions are required in five river water bodies (Table 8).

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

Water Body	P Load Reduction Required
KILCOLGAN_020	V. High
CLARINBRIDGE_030	V. High
KILCOLGAN_030	High
KILCOLGAN_010	Low
CARROWMONEASH (ORANMORE)_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.

- Many the transitional and coastal water bodies in the Galway Bay South East catchment remain Unassigned. With the exception of Kinvara Bay, which is expected to meet its objective due to the WWTP upgrade works in progress, further work is required to consider whether, and how, much nutrient load reductions are required.

6 Further characterisation and local catchment assessments

- Further characterisation through local catchment assessments is needed in 19 of the *At Risk* river 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 10).
- Further characterisation through local catchment assessment is needed in five of the *Review* river 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 transitional water bodies (Four *At Risk* and 16 *Review*).
- 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 in the Catchment

Risk	IA 1	IA2	IA 3	1A4	IA 5	IA6	IA 7	IA 8	IA 9	1A10	Total
At Risk	9	0	0	0	2	3	12	1	1	0	28
Review	2	0	3	0	0	0	0	0	0	0	5
Note water bodies may have multiple categories of Local Catchment Assessments											

7 Catchment summary

- Of the 39 river and lake water bodies, 22 are *At Risk* of not meeting their WFD objectives.
- Excess nutrient loss, mainly phosphorus, leading to eutrophication is the dominant issue in the rivers and lakes in the catchment. The significant pressures relating to excess nutrients are primarily domestic waste water, but also agriculture (diffuse and point) and urban waste water.
- Hydromorphological (or physical) conditions (including the input of excessive fine sediment) and poor habitat quality are major issues for several surface water bodies
- Four of the 29 TraC water bodies in the catchment are *At Risk* of not meeting their water quality objectives. Dissolved oxygen, macrophytes and elevated nutrient concentrations are the significant issues. Significant pressures relating to these issues are septic tanks, urban waste water treatment, aquaculture and other anthropogenic pressures.
- There are five groundwater bodies which are *At Risk* in the catchment due to aquatic ecological damage and elevated chemical and nutrient concentrations. These issues are due to impacts by agriculture, forestry, septic tanks and a licensed facility.

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 2 areas for action in the Galway Bay South East 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 Galway Bay South East catchment are summarised below.

- Two recommended areas for actions (Table 11, Figure 21) were selected.
- These are the St Clerans Stream and Radford.
- These include 10 *At Risk* surface water bodies.
- One groundwater body, which is *At Risk* due to groundwater contribution of nutrients to surface water bodies, intersects with two of the recommended areas for action, see Table 12. Actions taken to improve surface water will need to take account of the groundwater contribution to surface water.

A remaining 37 *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:

- seventeen river and lake water bodies – 12 *At Risk* and five *Review*, and
- twenty transitional and coastal water bodies – four *At Risk* and 16 *Review.*

Table 11. Recommended Areas for Action in the Galway Bay South East Catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
St Clerans Stream	9	29_9	Galway	• Kilcolgan river ultimately enters Clarinbridge/Kinvarra shellfish area which failed to meet its protected area objectives. • Active community groups • Four deteriorated water bodies in the headwaters to the shellfish area. Linked with 29_5.
Radford	2	29_5	Galway	• Kilcolgan river ultimately flows into the Clarinbridge/Kinvarra shellfish area which failed to meet its protected area objectives. • Active community groups • Two deteriorated water bodies in the headwaters to the shellfish area. • Linked with 29_9.

Table 12. 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_0100	GWDTE-Rahasane Turlough (SAC000322)	At risk	IE_WE_29B030300	BALLYMABILLA_010	Radford
			IE_WE_29R010200	RAFORD_020	
			IE_WE_29C031000	CARRA STREAM_010	St Clerans stream
			IE_WE_29K010100	KILCOLGAN_010	
			IE_WE_29K010200	KILCOLGAN_020	
			IE_WE_29K010400	KILCOLGAN_030	
			IE_WE_29L010600	LECARROW STREAM_010	
			IE_WE_29T010300	TOBERDONEY 29_010	
			IE_WE_29T010700	TOBERDONEY 29_020	
			IE_WE_29_194	Rea	

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 ten *At Risk* river water bodies, it is predicted that five (50%) will improve by 2021 and five (50%) will achieve their objective by 2027. The *Not at Risk* water body met its environmental objective for ecological status but failed to meet the protected area objective for shellfish areas, see Table 13.

Table 13. Environmental objective dates for river water bodies in the Areas for Action

Risk Category	No. of Water Bodies	No. of WBs for 2021 Improvement	No. of WBs for 2027 Status Improvement
At Risk	10	5	5
Review	0	0	0
Not at Risk	1	0	0
Total	11	5	5

- Twenty-one water bodies have met their 2015 environmental objective but five have failed to meet the protected area objective for bathing waters (3) and shellfish areas (2).
- As action is not yet planned to be taken in the remaining 16 *At Risk* surface water bodies, a 2027 date is applied to all 16 water bodies.
- For the 21 *Review* surface water bodies, measures are planned for one water body and therefore, a 2021 date is applied to achieve its environmental objective. For the remaining 20 *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 14.

Table 14. 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	10	0	10
Review	5	1	4
Lakes			
At Risk	2	0	2
Review	0	0	0
TraC			
At Risk	4	0	4
Review	16	0	16
Total	37	1	36

9.2 Groundwater

- Fourteen of the seventeen groundwater bodies are currently Good status and, therefore, have met their environmental objectives.
  Of the three groundwater bodies that are Poor status, all have a 2027 environmental objective.

Table 15 Environmental Objective dates of Poor status groundwater bodies in the Galway Bay South east catchment

Water body code	Water body name	Environmental Objective
IE_WE_G_0091	GWDTE-Caherglassaun Turlough (SAC000238)	2027
IE_WE_G_0105	GWDTE-Tullynafrankagh Turlough (SAC000606)	2027
IE_WE_G_0117	Industrial Facility (P0056-01)	2027

10 Acknowledgements

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

- Galway County Council
- Galway City Council.
- 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.
- DAFM Agriculture.
- DAFM Forest Service.
- Coillte.
- Teagasc.
- Geological Survey Ireland.
- National Parks and Wildlife Service.
- Marine Institute.

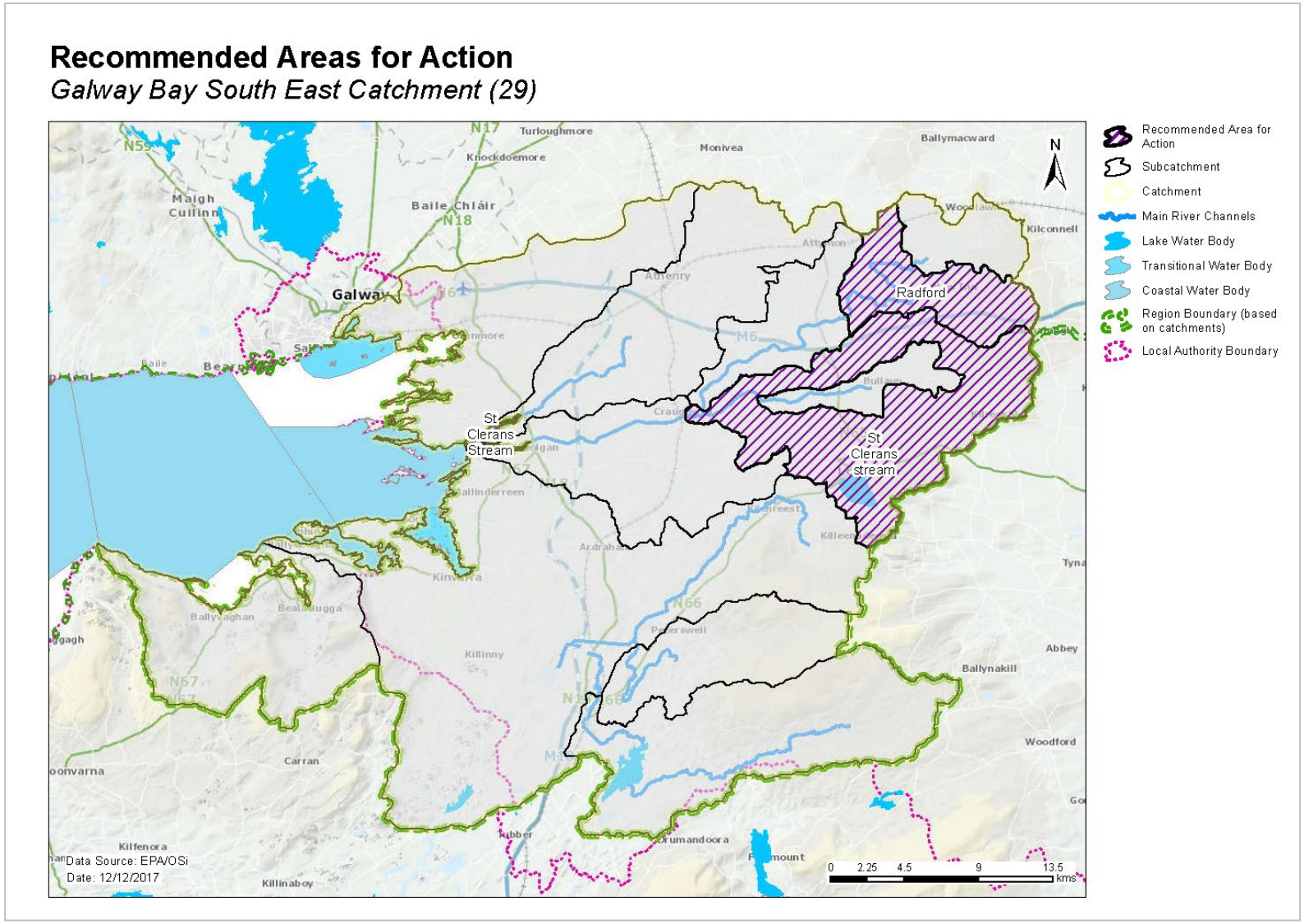


Figure 21. Location of Recommended Areas for Action in the Galway Bay South East Catchment

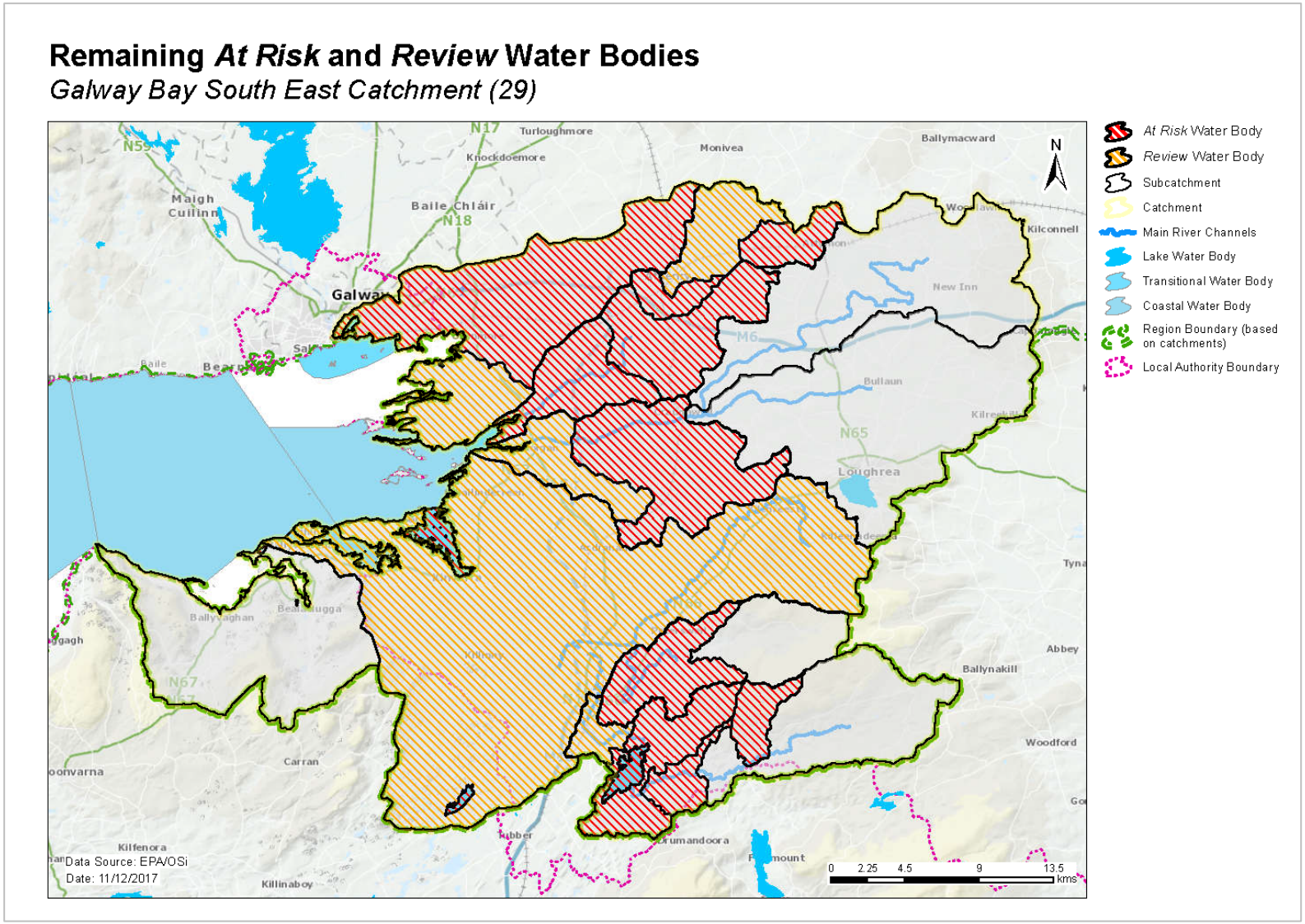


Figure 22. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Galway Bay South East Catchment

Appendix 1 High ecological status objective water bodies

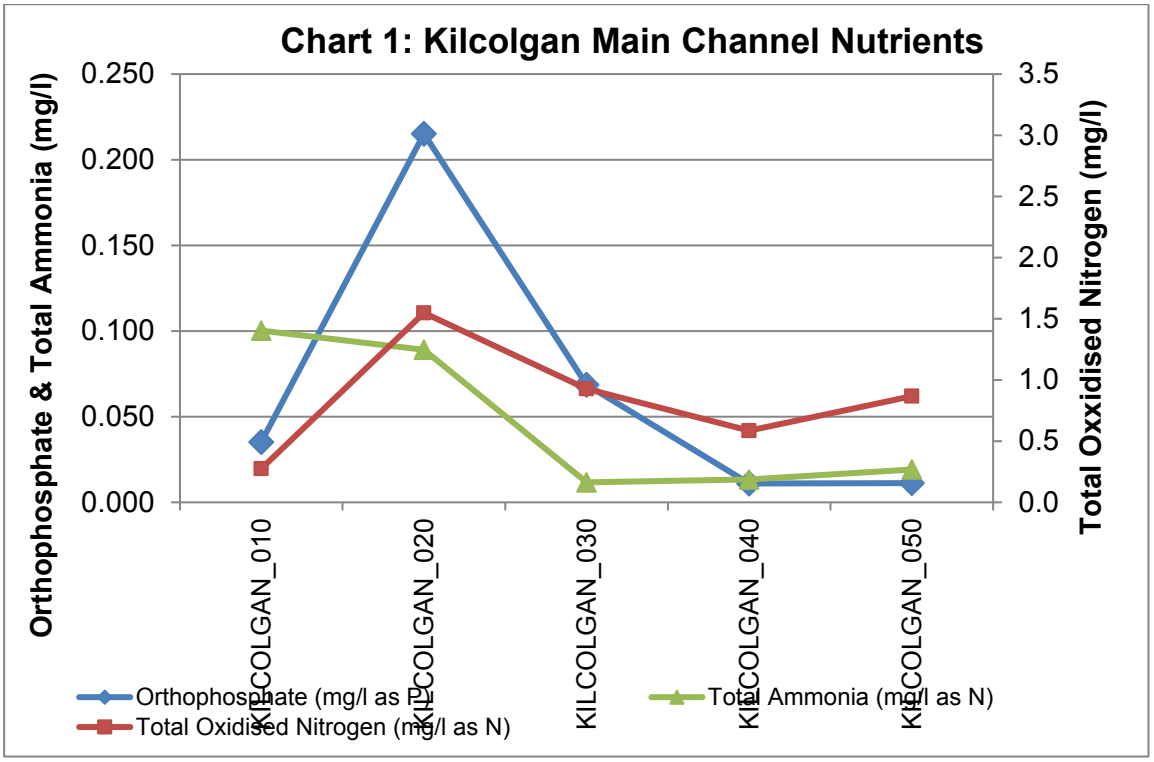
Water body/ Site	Type	Codes	2015 Status
Boleyneendorrish_010	River	IE_WE_29B040100	High
Boleyneendorrish_020	River	IE_WE_29B040300	High
Owendalulleegh_010	River	IE_WE_29O010500	High
Owendalulleegh_020	River	IE_WE_29O010700	High
Owendalulleegh_030	River	IE_WE_29O010800	Moderate
Owendalulleegh_040	River	IE_WE_29O010900	High
Bunny	Lake	IE_WE_27_114	Good
Outer Galway Bay	Coastal	IE_WE_100_0000	High

Appendix 2 Catchment Scale Nutrient concentrations and in-stream loads

The results of the instream water quality assessment for the Kilcolgan River are illustrated in Chart 1 and Chart 2. The assessment is based on the mean concentrations between 2013 and 2015 at each site from the headwaters down to the estuary. The EQS for orthophosphate (0.035mg/) is exceeded at three of the main channel monitoring points: KILCOLGAN_010, KILCOLGAN_020 and KILCOLGAN_030. A significant concentration spike (0.215mg/l) is evident at KILCOLGAN_020. There have been consistently large orthophosphate concentrations at this monitoring point throughout the sampling period (2013-15).

The Total Oxidised Nitrogen (TON) profile appears to mirror the distribution of orthophosphate. TON concentrations are relatively low, ranging from 0.3 to 1.6mg/l, without exceeding the drinking water threshold for TON (2.6mg/l) at any of the main channel monitoring points.

Total ammonia concentrations decrease from the headwaters downstream exceeding the EQS (0.065mg/l) at KILCOLGAN_010 and KILCOLGAN_020.



In the Kilcolgan channel, stream discharge increases significantly between KILCOLGAN_020 (0.95m3/s) and KILCOLGAN_030 (6.9m3/s). Measured orthophosphate loads at KILCOLGAN_030 are substantially greater than KILCOLGAN_020, despite lower concentrations. Downstream of KILCOLGAN_030, orthophosphate loads drop substantially, reflecting lower concentrations. TON and ammonia loads typically increase downstream. Like orthophosphate, the TON load at KILCOLGAN_030 exceeded KILCOLGAN_020 despite lower concentrations.

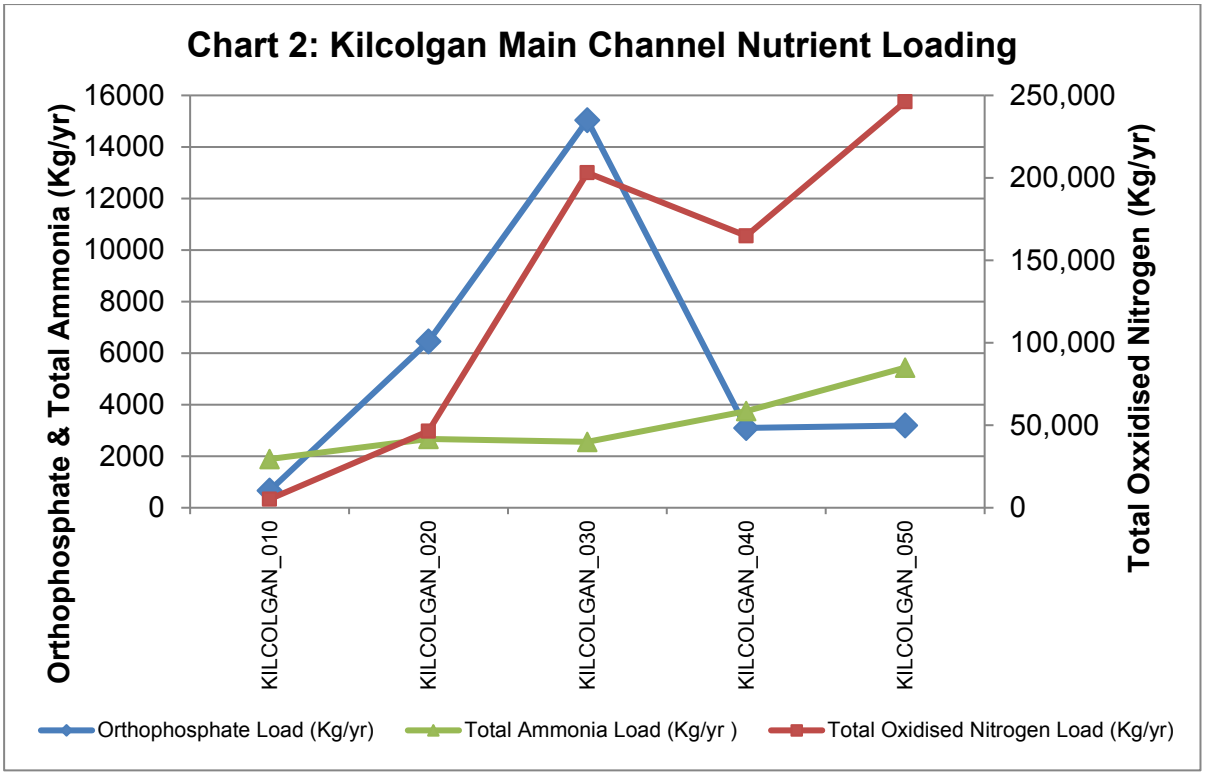


Chart 2: Kilcolgan Main Channel Nutrient Loading
Orthophosphate & Total Ammonia (Kg/yr)
16000
14000
12000
10000
8000
6000
4000
2000
0
250,000
200,000
150,000
100,000
50,000
0
Total Oxxidised Nitrogen (Kg/yr)
KILCOLGAN_010
KILCOLGAN_020
KILCOLGAN_030
KILCOLGAN_040
KILCOLGAN_050
Orthophosphate Load (Kg/yr)
Total Ammonia Load (Kg/yr)
Total Oxidised Nitrogen Load (Kg/yr)

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
29_1	IE_WE_29B040800	Boleyneendorrish_030	River	At Risk	Good	Moderate	N	For,Hymo	2027	
29_2	IE_WE_29K010600	Kilcolgan_040	River	At Risk	Moderate	Moderate	N	Ag,DWW,Ind	2027	
29_2	IE_WE_29K010700	Kilcolgan_050	River	Review	Unassigned	Unassigned	N		2027	
29_2	IE_WE_160_0800	Dunbulcaun Bay	Transitional	Not At Risk	Unassigned	Unassigned	N			St Clerans stream
29_3	IE_WE_110_0100	Muckinish Lough	Transitional	Review	Unassigned	Unassigned	N		2027	
29_3	IE_WE_120_0100	Murree Lough	Transitional	At Risk	Moderate	Moderate	N	Other	2027	
29_4	IE_WE_29C020040	Clarinbridge_010	River	At Risk	Good	Moderate	N	Ag,DWW	2027	
29_4	IE_WE_29C020200	Clarinbridge_020	River	Review	Unassigned	Unassigned	N		2027	
29_4	IE_WE_29C020300	Clarinbridge_030	River	At Risk	Bad	Poor	N	UWW	2027	
29_4	IE_WE_29C020400	Clarinbridge_040	River	At Risk	Poor	Poor	N	UWW	2027	
29_4	IE_WE_29C020500	Clarinbridge_050	River	At Risk	Poor	Poor	N	Ag,DU,DWW	2027	
29_5	IE_WE_29B030300	Ballymabilla_010	River	At Risk	Good	Moderate	N	Ag,For	2021	Radford
29_5	IE_WE_29R010200	Raford_020	River	At Risk	Good	Moderate	N	DWW	2021	Radford
29_6	IE_WE_29C050400	Carrowmoneash (Oranmore)_010	River	At Risk	Unassigned	Unassigned	N	DU,DWW,UWW	2027	
29_6	IE_WE_29R090950	Rockhill 29_010	River	Review	Unassigned	Unassigned	N		2027	
29_6	IE_WE_170_0100	Mweeloon Pool South	Transitional	Review	Unassigned	Unassigned	N		2027	
29_6	IE_WE_170_0150	Mweeloon Pool North	Transitional	Review	Unassigned	Unassigned	N		2027	
29_6	IE_WE_170_0200	Loughaunascalia, Ardfry Point	Transitional	Review	Unassigned	Unassigned	N		2027	
29_6	IE_WE_170_0300	Ardfry Oyster Pool	Transitional	Review	Unassigned	Unassigned	N		2027	
29_6	IE_WE_170_0400	Turreen Lough (Rinville West)	Transitional	Review	Unassigned	Unassigned	N		2027	
29_6	IE_WE_170_0600	Renmore Lough, Galway City	Transitional	Review	Unassigned	Unassigned	N		2027	
29_7	IE_WE_29_37	Cutra	Lake	At Risk	Unassigned	Moderate	N	DWW	2027	
29_7	IE_WE_29B020100	Beagh_010	River	At Risk	High	Moderate	N	Hymo	2027	
29_7	IE_WE_29C010200	Cannahowna_010	River	Review	Good	Good	N		2021	
29_7	IE_WE_29O010800	Owendalulleegh_030	River	At Risk	High	Moderate	Y	For	2027	
29_7	IE_WE_29O011000	Owendalulleegh_050	River	At Risk	Moderate	Moderate	N	For,Hymo	2027	
29_8	IE_WE_27_114	Bunny	Lake	At Risk	Good	Good	Y	Other	2027	
29_8	IE_WE_29K022100	Kilchreest_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
29_8	IE_WE_130_0000	Aughinish Bay	Coastal	Review	Unassigned	Unassigned	N		2027	
29_8	IE_WE_140_0100	Aughinish Lagoon	Transitional	Review	Unassigned	Unassigned	N		2027	
29_8	IE_WE_140_0200	Carrownahallia Lagoon, Aughinish	Transitional	Review	Unassigned	Unassigned	N		2027	
29_8	IE_WE_150_0100	Rossalia Lagoon	Transitional	Review	Unassigned	Unassigned	N		2027	
29_8	IE_WE_160_0100	Kinvarra Bay	Transitional	At Risk	Good	Moderate	N	DWW,Other,UWW	2027	
29_8	IE_WE_160_0200	Bridge Lough, Knockakilleen	Transitional	At Risk	Poor	Bad	N	Other	2027	
29_8	IE_WE_160_0300	Loughaungreena (Doorus Loughs)	Transitional	Review	Unassigned	Unassigned	N		2027	
29_8	IE_WE_160_0400	Lough Fadda (Doorus Loughs)	Transitional	Review	Unassigned	Unassigned	N		2027	
29_8	IE_WE_160_0500	Lough Namona (Doorus Loughs)	Transitional	Review	Unassigned	Unassigned	N		2027	
29_8	IE_WE_160_0600	Lough Sallagh (Doorus Loughs)	Transitional	Review	Unassigned	Unassigned	N		2027	
29_8	IE_WE_160_0700	Rincarna Pools South	Coastal	Review	Unassigned	Unassigned	N		2027	
29_8	IE_WE_160_0710	Rincarna Pools North	Coastal	At Risk	Unassigned	Poor	N	Other	2027	
29_9	IE_WE_29_194	Rea	Lake	At Risk	Good	Moderate	N	DWW	2021	St Clerans stream
29_9	IE_WE_29C031000	Carra Stream_010	River	At Risk	Moderate	Moderate	N	Hymo	2027	St Clerans stream
29_9	IE_WE_29K010100	Kilcolgan_010	River	At Risk	Unassigned	Unassigned	N	DU,DWW,UWW	2027	St Clerans stream
29_9	IE_WE_29K010200	Kilcolgan_020	River	At Risk	Moderate	Poor	N	UWW	2027	St Clerans stream
29_9	IE_WE_29K010400	Kilcolgan_030	River	At Risk	Good	Moderate	N	Hymo,UWW	2027	St Clerans stream
29_9	IE_WE_29L010600	Lecarrow Stream_010	River	At Risk	Good	Moderate	N	Ag,Hymo	2021	St Clerans stream
29_9	IE_WE_29T010300	Toberdoney 29_010	River	At Risk	Poor	Moderate	N	Ag	2027	St Clerans stream
29_9	IE_WE_29T010700	Toberdoney 29_020	River	At Risk	Good	Poor	N	Ag,DWW	2021	St Clerans stream

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
1200PRI0465	New Inn GWS Borehole	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
	New Inn Borehole 2	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
	New Inn Borehole 3	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
	New Inn Borehole 4	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
	New Inn Borehole 5	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
	New Inn Borehole 6	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
	New Inn Borehole 7	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
1200PRI0164	Brockagh/Lisduff, Craughwell GWS	Clarinbridge	IE_WE_G_0008	Yes	N/A
1200PRI0359	Kilchreest GWS	GWDTE-Coy Turlough (SAC002117)	IE_WE_G_0093	Yes	N/A
1200PRI0492	Rinn/Killeeneen GWS	Clarinbridge	IE_WE_G_0008	Yes	N/A
1200PRI0496	Roo GWS	Kinvara-Gort	IE_WE_G_0002	Yes	N/A
1200PRI0507	Seehan,Gort GWS	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A
1200PRI0526	Tierneevin GWS	GWDTE-Lough Mannagh Turlough (SAC001926)	IE_WE_G_0098	Yes	N/A
1200PRI0756	Ballymanagh GWS	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
1200PRI1028	Lydacan GWS	Kinvara-Gort	IE_WE_G_0002	Yes	N/A
1200PRI1029	Kilconierin GWS	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
1200PRI1056	Kiltiernan GWS Co-op Borehole	GWDTE-Kiltiernan Turlough (SAC001285)	IE_WE_G_0096	Yes	N/A
1200PRI1057	Kiltiernan GWS Co-	GWDTE-Kiltiernan	IE_WE_G_0096	Yes	N/A

Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes/ No	Reason why not met
	op Borehole	Turlough (SAC001285)			
1200PRI1061	Ballyaneen Rakerin Co- op	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A
1200PRI1066	Peterswell Castledaly GWS Co-op	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A
1200PRI1067	Peterswell Castledaly GWS Co-op	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A[5]
1200PRI1068	Peterswell Castledaly GWS Co-op	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A
1200PRI1069	Peterswell Castledaly GWS Co-op	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A
1200PRI0575	Bullan Loughrea 2 bore holes	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
	Bullan Loughrea 2 bore holes	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
1200PRI0198	Carrigan, Craughwell	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
1200PRI0261	Coole, Gort	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A
0300PUB1039	Kilkeedy PWS	GWDTE-Lough Mannagh Turlough (SAC001926)	IE_WE_G_0098	Yes	N/A
0300PUB1069	Turlough Borehole	Ballyvaughan Uplands	IE_WE_G_0001	Yes	N/A
1200PUB1052	Ardrahan - Caislean Raithlin Estate	Clarinbridge	IE_WE_G_0008	Yes	N/A
0300PUB1013	Newtown Borehole	Ballyvaughan Uplands	IE_WE_G_0001	Yes	N/A
1200PUB1022	Gort Borehole	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A

[5] For these final abstraction schemes, no description given

Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes/ No	Reason why not met
	Gort Borehole	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A
	Gort	Cannahowna_010	IE_WE_29C010200	Yes	N/A
	Gort	Cannahowna_010	IE_WE_29C010200	Yes	N/A
1200PUB1034	Kinvara Borehole	Kinvara-Gort	IE_WE_G_0002	Yes	N/A
	Kinvara Borehole	Kinvara-Gort	IE_WE_G_0002	Yes	N/A
	Kinvara Borehole	Kinvara-Gort	IE_WE_G_0002	Yes	N/A
1200PUB1037	Loughrea	Lough rea lake	IE_WE_29_194	Yes	N/A
	Loughrea	Lough rea lake	IE_WE_29_194	Yes	N/A
1200PRI0111	Ardrahan Bored well	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A
	Ardrahan Bored well	GWDTE-Caherglassaun Turlough (SAC000238)	IE_WE_G_0091	Yes	N/A
1200PRI0138	Ballyglass/Fiddane	GWDTE-Rahasane Turlough (SAC000322)	IE_WE_G_0100	Yes	N/A
0300PRI2068	Bell Harbour Turlough Borehole	Ballyvaughan Uplands	IE_WE_G_0001	Yes	N/A

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?
Ardrahan Grassland SAC 002244	none							
Ballinduff Turlough SAC 002295	3180	Good GW level/quality	Groundwater	GWDTE-Ballinaduff Turlough (SAC002295)	Good (NAR)	No	IE_WE_G_0088	No
Ballyvaughan Turlough SAC 000996	3180	Good GW level/quality	Groundwater	Ballyvaughan Uplands GWB	Good (NAR)	No	IE_WE_G_0001	No
Black Head-Poulsallagh Complex SAC 000020	7220	Good GW level	Groundwater	Ballyvaughan Uplands GWB	Good (NAR)	No	IE_WE_G_0001	Yes
Caherglassaun Turlough SAC 000238	3180	Good GW level/quality	Groundwater	GWDTE-Caherglassaun Turlough (SAC000238)	Poor (AT RISK)	Yes	IE_WE_G_0091	No
Cahermore Turlough SAC 002294	3180	Good GW level/quality	Groundwater	GWDTE-Cahermore Turlough (SAC002294)	Good (R)	No	IE_WE_G_0092	No
Carrowbaun, Newhall And Ballylee Turloughs SAC 002293	3180	Good GW level/quality	Groundwater	GWDTE-Caherglassaun Turlough (SAC000238)	Poor (AT RISK)	Yes	IE_WE_G_0091	No
Castletaylor Complex SAC 000242	3180	Good GW level/quality	Groundwater	Clarinbridge	Good (AT RISK)	No	IE_WE_G_0008	No
			Groundwater	GWDTE-Kiltiernan Turlough (SAC001285)	Good (R)	No	IE_WE_G_0096	No
Coole-Garryland Complex SAC 000252	3180	Good GW level/quality	Groundwater	Kinvara Gort GWB	Good (R)	No	IE_WE_G_0002	No
			Groundwater	GWDTE-Caherglassaun Turlough (SAC000238)	Poor (AT RISK)	Yes	IE_WE_G_0091	No
			Groundwater	GWDTE-Lough Mannagh Turlough (SAC001926)	Good (R)	No	IE_WE_G_0098	No
			Groundwater	GWDTE-Ballinaduff Turlough (SAC002295)	Good (NAR)	No	IE_WE_G_0088	No
Drummin Wood SAC 002181	none							
East Burren Complex SAC 001926	3140	At least Good	Lake	Bunny	Good (AT RISK-HES obj)	Yes	IE_WE_27_114	No
	3180	Good GW level/quality	Groundwater	Kinvara Gort GWB	Good (R)	No	IE_WE_G_0002	No

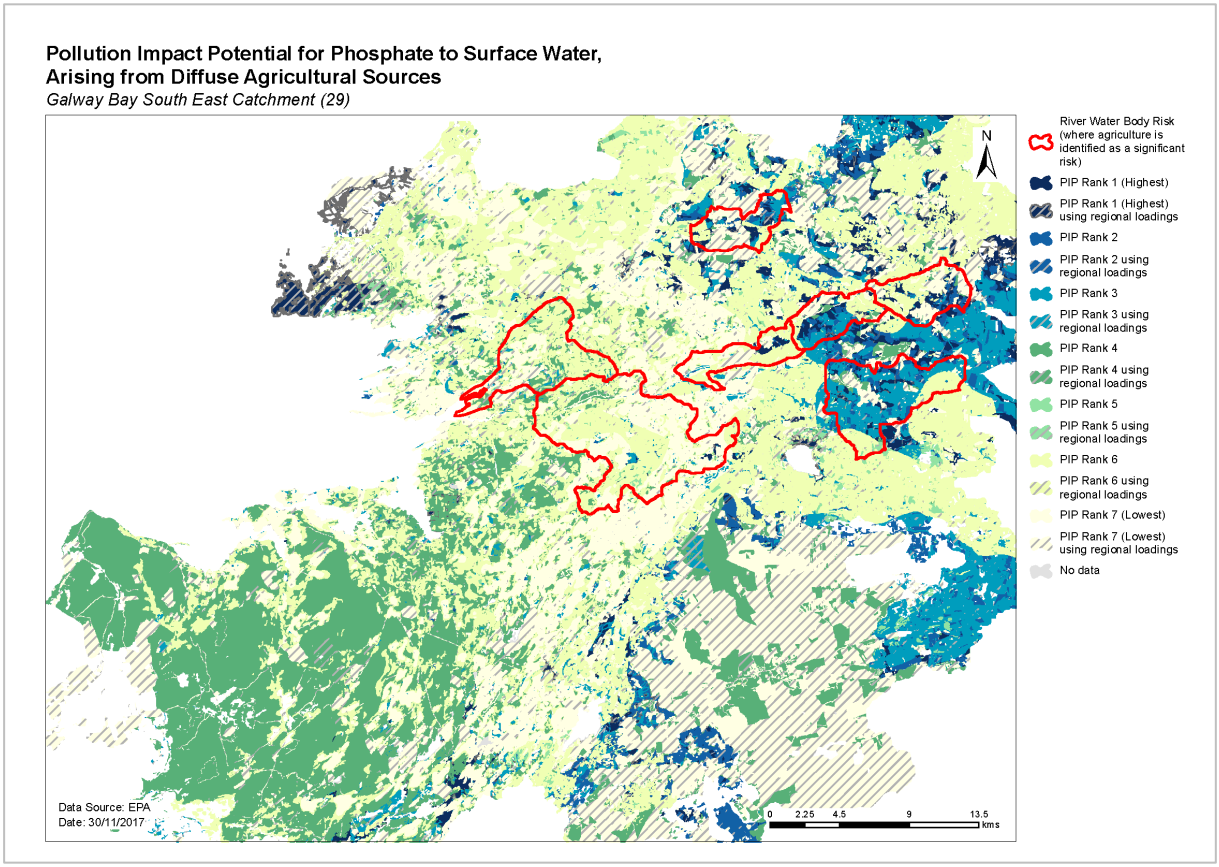
SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
East Burren Complex SAC 001926			Groundwater	Ballyvaughan Uplands GWB	Good (NAR)	No	IE_WE_G_0001	No
			Groundwater	GWDTE-Gortboyheen Turlough (SAC000054)	Good (R)	No	IE_WE_G_0095	No
			Groundwater	Burren GWB	Good (R)	No	IE_SH_G_047	No
			Groundwater	GWDTE-Lough Mannagh Turlough (SAC001926)	Good (R)	No	IE_WE_G_0098	No
			Groundwater	GWDTE-Caherglassaun Turlough (SAC000238)	Poor (AT RISK)	Yes	IE_WE_G_0091	No
	7220	Good GW level	Groundwater	Ballyvaughan Uplands GWB	Good (NAR)	No	IE_WE_G_0001	No
	7230	Good GW level	Groundwater	Kinvara Gort GWB	Good (R)	No	IE_WE_G_0002	No
			Groundwater	Ballyvaughan Uplands GWB	Good (NAR)	No	IE_WE_G_0001	No
			Groundwater	GWDTE-Gortboyheen Turlough (SAC000054)	Good (R)	No	IE_WE_G_0095	No
			Groundwater	Burren GWB	Good (R)	No	IE_SH_G_047	No
			Groundwater	GWDTE-Lough Mannagh Turlough (SAC001926)	Good (R)	No	IE_WE_G_0098	No
			Groundwater	GWDTE-Caherglassaun Turlough (SAC000238)	Poor (AT RISK)	No	IE_WE_G_0091	No
Galway Bay Complex SAC 000268	1150		Transitional	Corrib Estuary	Good (NAR)	No	IE_WE_170_0700	Yes
			Transitional	Turreen Lough (Rinville West)	Unassigned (R)	Yes	IE_WE_170_0400	Yes
			Transitional	Ardfry Oyster Pool	Unassigned (R)	Yes	IE_WE_170_0300	Yes
			Transitional	Mweeloon North	Unassigned (R)	Yes	IE_WE_170_0150	Yes
			Transitional	Mweeloon South	Unassigned (R)	Yes	IE_WE_170_0100	Yes
			Transitional	Loughaungreena (Doorus Loughs)	Unassigned (R)	Yes	IE_WE_160_0300	Yes
			Transitional	Lough Fadda (Doorus Loughs)	Unassigned (R)	Yes	IE_WE_160_0400	Yes
			Transitional	Lough Namona (Doorus Loughs)	Unassigned (R)	Yes	IE_WE_160_0500	Yes
			Transitional	Lough Sallagh (Doorus Loughs)	Unassigned (R)	Yes	IE_WE_160_0600	Yes
			Transitional	Bridge Lough, Knockakilleen	Bad (AT RISK)	Yes	IE_WE_160_0200	Yes
			Transitional	Rossalia Lagoon	Unassigned (R)	Yes	IE_WE_150_0100	Yes

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Galway Bay Complex SAC 000268			Transitional	Aughinish Lagoon	Unassigned (R)	Yes	IE_WE_140_0200	Yes
			Transitional	Murree	Moderate (AT RISK)	Yes	IE_WE_120_0100	Yes
	3180	Good GW level/quality	Groundwater	Clarinbridge GWB	Good (AT RISK)	No	IE_WE_G_0008	Yes
			Groundwater	GWDTE-Ballyvelaghan Turlough (SAC000268)	Good (R)	No	IE_WE_G_0090	Yes
			Groundwater	Ballyvaughan Uplands GWB	Good (NAR)	No	IE_WE_G_0001	Yes
	7230	Good GW level	Groundwater	GWDTE-Galway Bay Complex Fens (SAC000268)	Good (R)	No	IE_WE_G_0087	No
Gortacarnaun Wood SAC 002180	none							
Kiltartan Cave (Coole) SAC 000286	none							
Kiltiernan Turlough SAC 001285	3180	Good GW level/quality	Groundwater	GWDTE-Kiltiernan Turlough (SAC001285)	Good (R)	No	IE_WE_G_0096	No
Lough Coy SAC 002117	3180	Good GW level/quality	Groundwater	GWDTE-Coy Turlough (SAC002117)	Good (R)	No	IE_WE_G_0093	No
Lough Cutra SAC 000299	none							
Lough Fingall Complex SAC 000606	3180	Good GW level/quality	Groundwater	Clarinbridge GWB	Good (AT RISK)	No	IE_WE_G_0008	No
			Groundwater	GWDTE-Tullynafrankagh Turlough (SAC000606)	Poor (AT RISK)	Yes	IE_WE_G_0105	No
			Groundwater	GWDTE-Kiltiernan Turlough (SAC001285)	Good (R)	No	IE_WE_G_0096	No
Lough Rea SAC 000304	3140	At least Good	Lake	Rea	Moderate (AT RISK)	Yes	IE_WE_29_194	No
Moneen Mountain SAC 000054	3180	Good GW level/quality	Groundwater	GWDTE-Muckinish Turlough (SAC000054)	Good (NAR)	No	IE_WE_G_0099	No
	7220	Good GW level	Groundwater	Ballyvaughan Uplands GWB	Good (NAR)	No	IE_WE_G_0001	No
			Groundwater	GWDTE-Muckinish Turlough (SAC000054)	Good (NAR)	No	IE_WE_G_0099	No
			Groundwater	GWDTE-Gortboyheen Turlough (SAC000054)	Good (R)	No	IE_WE_G_0095	No

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Monivea Bog SAC 002352	none							
Peterswell Turlough SAC 000318	3180	Good GW level/quality	Groundwater	GWDTE-Coy Turlough (SAC002117)	Good (R)	No	IE_WE_G_0093	No
Rahasane Turlough SAC 000322	3180	Good GW level/quality	Groundwater	GWDTE-Rahasane Turlough (SAC000322)	Good (AT RISK)	No	IE_WE_G_0100	No
Sonnagh Bog SAC 001913	none							
Termon Lough SAC 001321	3180	Good GW level/quality	Groundwater	GWDTE-Caherglassaun Turlough (SAC000238)	Poor (AT RISK)	Yes	IE_WE_G_0091	No
			Groundwater	Kinvara Gort GWB	Good (R)	No	IE_WE_G_0002	No
			Groundwater	Ennis GWB	Good (AT RISK)	No	IE_SH_G_080	No

Appendix 6 Pollution Impact Potential (PIP) Map for Phosphorus

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



Appendix 7 Local Catchment Assessment Categories

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