Owenavorragh Catchment Assessment 2010-2015 (HA 11)

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

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

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

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1 Introduction

This catchment includes the area drained by the River Owenavorragh and by all streams entering tidal water between Kilmichael Point and Raven Point, Co. Wexford, draining a total area of 395km². The largest urban centre in the catchment is Gorey. The other main urban centre is Courtown. The total population of the catchment is approximately 27,300, with a population density of 68 people per km².

In the northern part of this catchment the Inch River drains the eastern slopes of Croghan Mountain and the undulating landscape between Gorey and Arklow, before flowing into the Irish Sea near Castletown. The Owenavorragh River flows northeast from Oulart, parallel to the coast, being joined by the Ballyedmond, Ballinclare and Ballaghboy rivers from the west. The Banoge River flows south through Gorey, joining the Owenavorragh, which then turns east and flows into the Irish Sea at Courtown. An arterial drainage scheme was completed on the Owenavorragh River by the OPW between 1968 and 1979. Much of the southern part of the catchment south of Kilmuckridge is underlain by an extensive sand and gravel aquifer, and is drained by the Killincooly Beg and Blackwater rivers.

The Owenavorragh catchment comprises three subcatchments (Table 1, Figure 1) with 25 river water bodies, one lake, one transitional and three coastal water bodies, and six groundwater bodies.

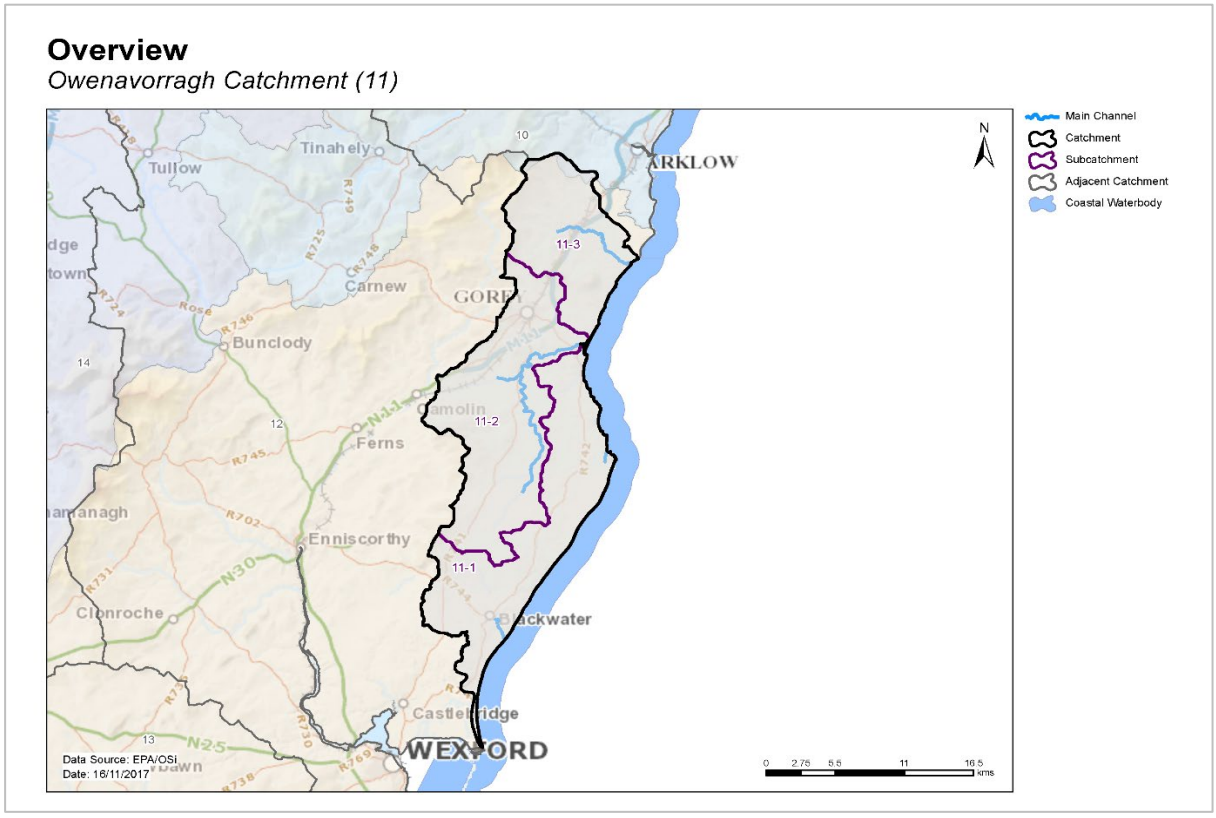


Figure 1. Subcatchments in the Owenavorragh catchment

Table 1. List of subcatchments in the Owenavorragh catchment

Subcatchment ID
11_1
11_2
11_3

2 Water body status and risk of not meeting environmental objectives

2.1 Surface water ecological status

2.1.1 Rivers and lakes

- There was one river water body at Good status and 16 (61%) at less than Good status in 2015 (Table 2, Figure 2). Eight (31%) rivers and one lake water body are unassigned.
- No river water bodies, sites or lakes have a high ecological status objective.
- The numbers of river water bodies at each status class in 2007-09 and 2010-15 is shown in Figure 3. The single lake water body (Kilmacoe) has remained unassigned over the three monitoring cycles.
- Since 2007-09 when WFD monitoring began, four river water bodies have an improved status whereas six have deteriorated (Figure 5).
- The variation in nutrient concentrations and loads in the Owenavorragh main channel is illustrated in Appendix 1.

2.1.2 Transitional and coastal (TraC)

- There are four TraC water bodies in total; one transitional water body (the Owenavorragh Estuary IE_SE_020_0100) which was unassigned in 2015; and three coastal water bodies (Southwestern Irish Sea [HAs 11;12], Southwestern Irish Sea – Brittas Bay and Wexford Harbour) which are at Good, Unassigned and Moderate status, respectively (Figure 2, Table 2).
- These water bodies do not have a high ecological status objective.
- There was no change in the status class for the TraC water bodies in 2007-09 and 2010-15 (Figure 4).
- Note these TraC water bodies are shared with several other catchments (HAs 10,12.13).

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	25	0	1	8	7	1	8	1	6	18
Lake	1	0	0	0	0	0	1	1	0	0
TraCs	4	0	1	1	0	0	2	2	1	1

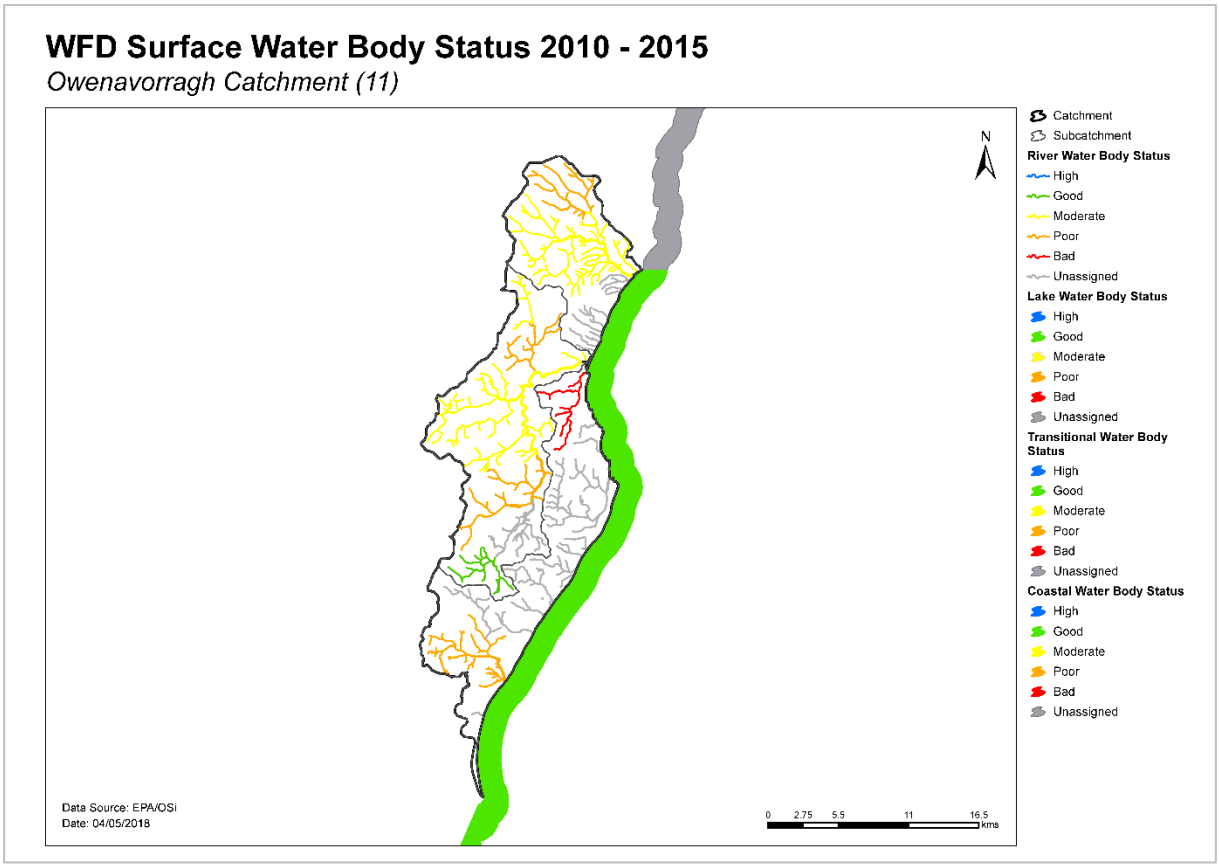


Figure 2. Surface water ecological status

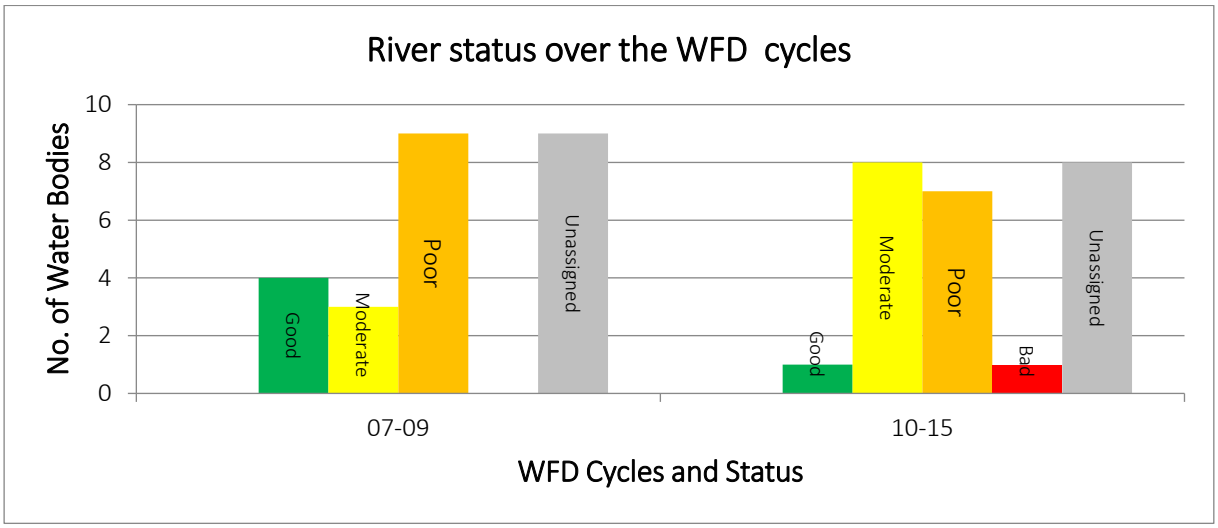


Figure 3. Number of rivers at each status class in 2007-09 and 2010-15

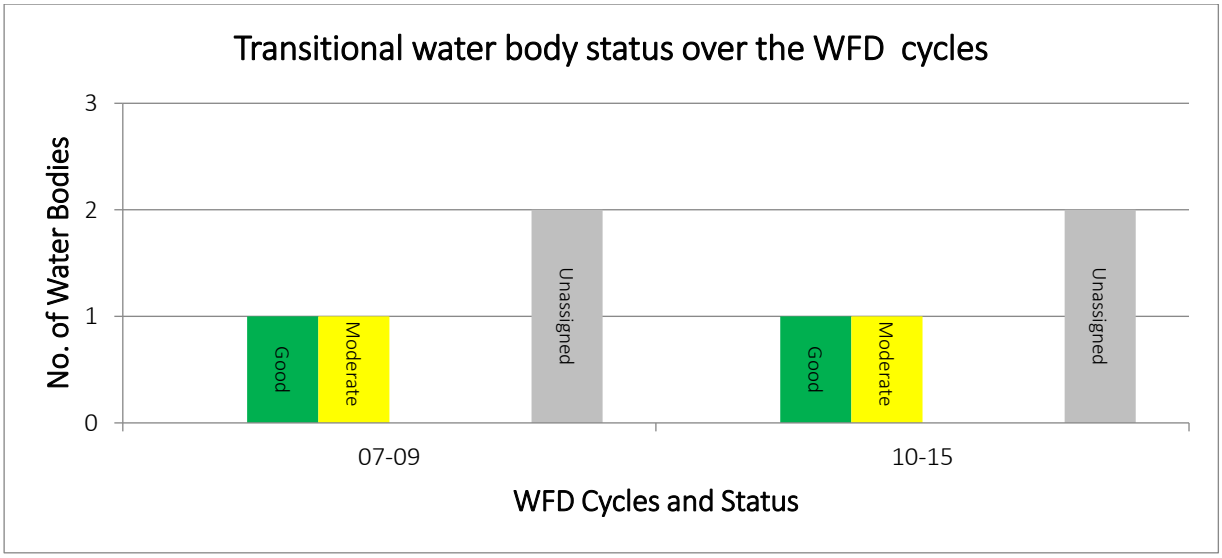


Figure 4. Number of TraC water bodies at each status class in 2007-09 and 2010-15

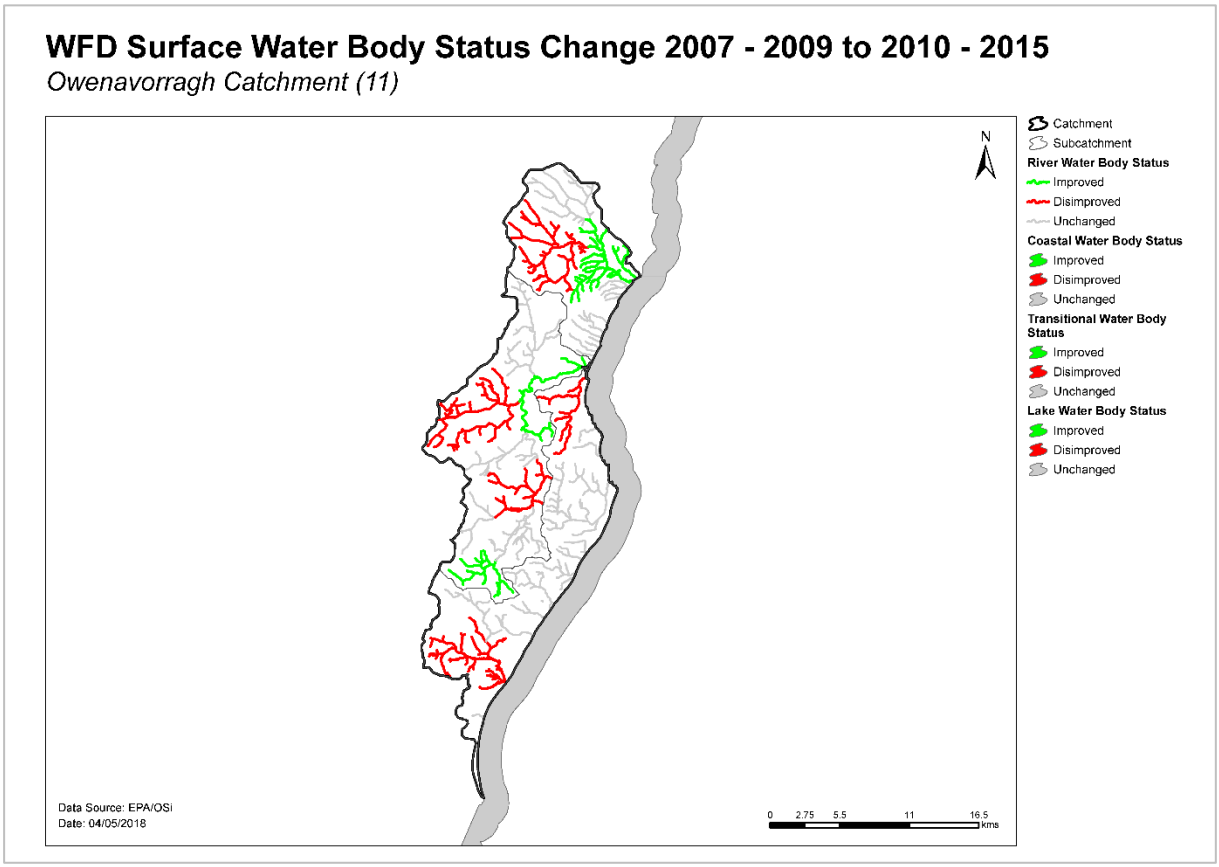


Figure 5. Surface water body status change from 2007-09 to 2010-15

2.2 Groundwater status

- All six groundwater bodies were at Good status in 2015 (Table 3).
- The status of all six groundwater bodies has remained unchanged across the monitoring cycles.

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	6	6	0	2	4	0

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and lakes

- There are two *Not at Risk* surface water bodies (Figure 6, 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 surface water bodies in *Review*. More information is required for all six water bodies.
- Eighteen surface water bodies in the catchment are *At Risk* of not meeting their water quality objectives. Measures will be needed in these water bodies to improve the water quality outcomes. Summary information for the *At Risk* water bodies is given in Appendix 2.

2.3.2 Transitional and coastal (TraC)

- One TraC water body (coastal water body: Southwestern Irish Sea [HAs 11;12]) is *Not at Risk* (Figure 6) and therefore requires no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- One TraC water body (transitional water body Owenavorragh Estuary IE_SE_020_0100) is in *Review*.

2.4 Risk of not meeting groundwater environmental objectives

- Two groundwater bodies are *Not at Risk* (Figure 7, Table 3) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Four groundwater bodies are in *Review*. Cahore Point is hydrologically linked to surface waters that are not meeting water quality objectives where there is potential that groundwater is a significant source of nutrients (Figure 7, Table 4). Gorey, Curracloe Gravels and Oulart Gravels are in *Review* due to elevated nitrate concentrations within the groundwater body grouping (based on a 6-year average).
- There are no *At Risk* groundwater bodies.
- Table 4. Summary of *At Review* surface water bodies where phosphate from groundwater may contribute to an impact.

Groundwater body name	Receiving water body code	Receiving water body name
Cahore Point	IE_SE_11A020200	Aughboy (Wexford)_010
	IE_SE_11B010300	Ballyedmond_010
	IE_SE_11C020150	Cahore Canal_010
	IE_SE_11O010200	Owenavorragh_020
	IE_SE_11O010300	Owenavorragh_030
	IE_SE_11O010400	Owenavorragh_040

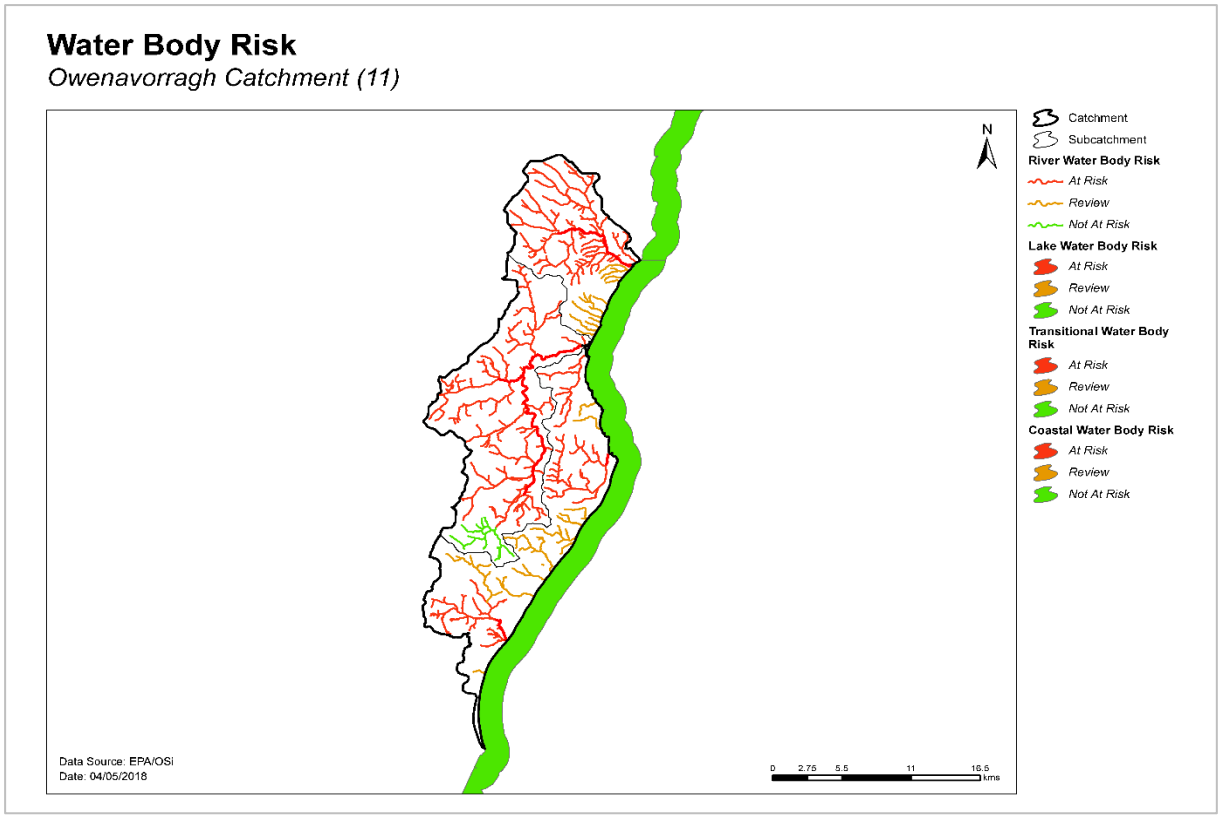


Figure 6. Surface water body risk

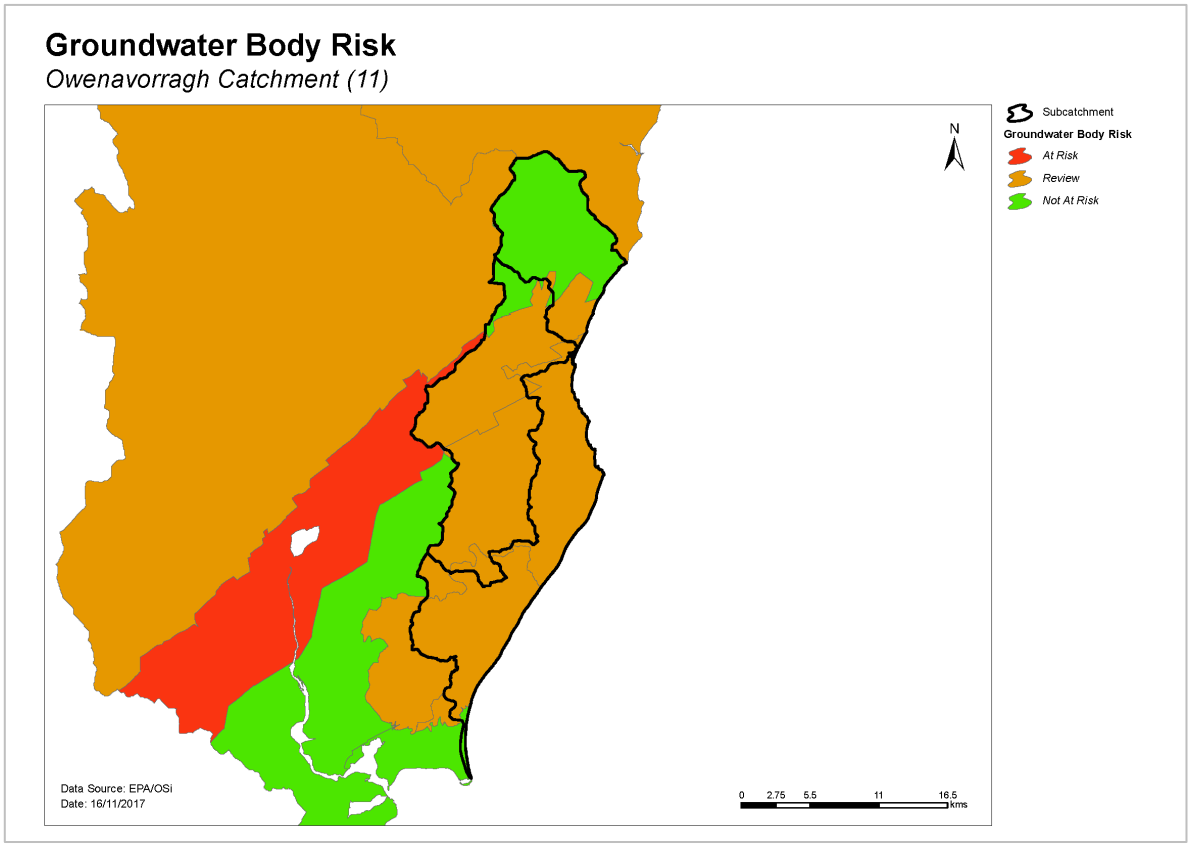


Figure 7. Groundwater body risk

2.5 Protected areas

2.5.1 Drinking water protected areas

- There are 24 abstractions in the Owenavorragh catchment comprising 10 public supply schemes and 2 private schemes (Kilanerin and Knockina).
- All 24 of the abstractions are from four groundwater bodies. The list of the public supplies and the associated water bodies is provided in Appendix 3.
- All drinking water sources were compliant with the standards for nitrate 2015.
- The Sow Regional Supply (abstracted from Cahore Point groundwater) was non-compliant for total pesticides in 2015. All other sources were compliant.

2.5.2 Bathing waters

- There are five designated bathing waters in the catchment (Table 5), all of which are compliant with the environmental objective for bathing waters.

Table 5. Designated bathing waters in the catchment

Bathing water		Water body intersection		Objective met?	
Name	Code	Name	Code	Yes	No
Ballymoney, North Beach	IESEBWC010_0000_0500	Southwestern Irish Sea (HAs 11;12)	IE_SE_010_0000	✓	
Courtown, North Beach	IESEBWC010_0000_0400	Southwestern Irish Sea (HAs 11;12)	IE_SE_010_0000	✓	
Morriscastle	IESEBWC010_0000_0300	Southwestern Irish Sea (HAs 11;12)	IE_SE_010_0000	✓	
Ballinesker	IESEBWC010_0000_0250	Southwestern Irish Sea (HAs 11;12)	IE_SE_010_0000	✓	
Curracloe	IESEBWC010_0000_0200	Southwestern Irish Sea (HAs 11;12)	IE_SE_010_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 four Special Areas of Conservation (SACs) in the catchment (Appendix 4). The one lake water body (Kilmacoe) and the one groundwater body (Castlebridge South) with water dependent qualifying interests within these SACs have met their WFD Protected area objective.
- There are two Special Protected Areas (SPAs) in the catchment:
    - Cahore Marshes SPA (004143)
    - The Raven SPA (004019)

  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 designated heavily modified water bodies (HMWB) in the catchment.
- There are no artificially modified water bodies (AWB) in the catchment.

3 Significant issues in *At Risk* water bodies

- Excess phosphate leading to eutrophication is the dominant pressure in river water bodies. While excess ammonia is also of concern, it is only for a limited number of water bodies.
- Alteration of hydromorphological (or physical) conditions is an issue in one river, Gorteen Upper Stream_010. This includes inputs of excess fine sediment and alteration of the morphology of the river channel, which in turn alter habitat conditions. This can occur as a result of, for example, implementing river and field drainage schemes, discharges from quarries and bank erosion due to animal access.
- There are no *At Risk* TraC 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.
- Figures 8 shows a breakdown of the number of *At Risk* river water bodies in each significant pressure category.

4.1.1 Rivers, lakes, transitional and coastal (TraC)

- Significant pressures have been identified through the initial characterisation process in 19 surface water bodies, 10 of which are subject to multiple pressures. The significant pressures will be refined during the further characterisation process.
- The significant pressure affecting the greatest number of river water bodies is agriculture, followed by domestic waste water, urban waste water, diffuse urban, other (unknown) hydromorphological pressures and industry (unlicensed discharge).
- The only lake, Kilmacoe, is *Not at Risk*. The only TraC water bodies, Owenavorragh Estuary and Southwestern Irish Sea (HAs 11;12), are in *Review* and *Not at Risk,* respectively.

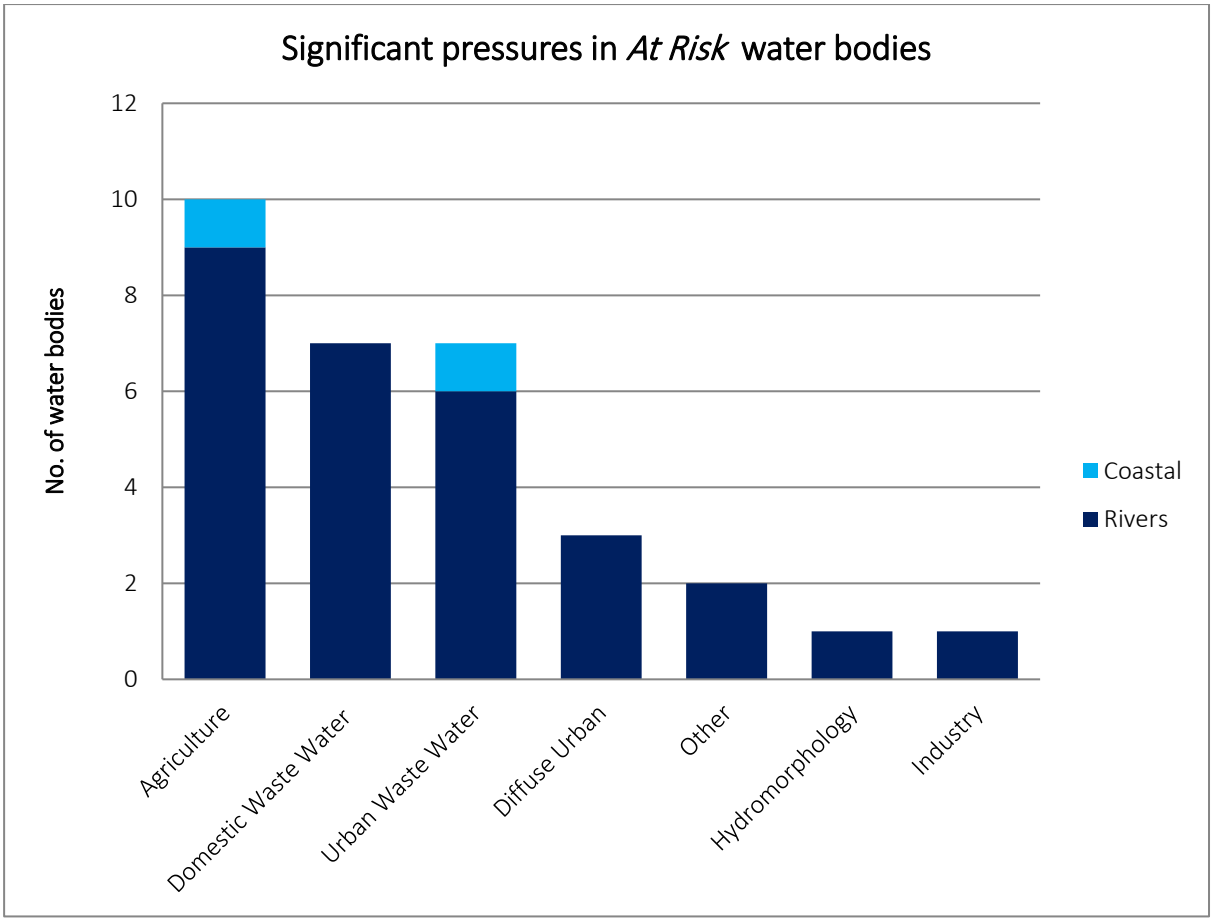


Figure 8. Significant pressures impacting on *At Risk* river water bodies

4.2 Pressure type

4.2.1 Agriculture

- Agriculture is a significant pressure in nine water bodies across all three subcatchments; the water bodies affected by agriculture are shown in Figure 9. The issues related to agriculture 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 5.

4.2.2 Domestic waste water

- Domestic waste water has been identified as a significant pressure in seven water bodies, shown in Figure 10. This is due to inadequate or poorly located domestic waste water treatment systems. The significant issue is excess nutrients entering surface waters. Furthermore, several septic tank systems are mapped on areas of high susceptibility to phosphate transport via near surface pathways.

4.2.3 Urban waste water treatment plants

- Urban Waste Water Treatment Plants (WWTPs) have been highlighted as a significant pressure in seven *At Risk* water bodies; details are given in Table 6 Figure 11. Three *At Risk* water bodies – Owenavorragh_060, Banoge_020 and Banoge_030 – are impacted by the Courtown-Gorey WWTP, which will be upgraded in 2016.

The remaining *At Risk* water bodies are impacted by WWTPs that are currently not scheduled for upgrades, including the Ballycanew WWTP, which also impacts Owenavorragh_060.

Table 6. 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
Blackwater D0143	1,001 to 2,000 p.e.	Blackwater (Wexford)_010	Poor	*NA* [1]
Ballycanew D0402	500 to 1,000 p.e.	Owenavorragh_050	Moderate	*NA* [1]
Ballycanew D0402	500 to 1,000 p.e.	Owenavorragh _060	Moderate	*NA* [1]
Courtown-Gorey D0046	> 10,000 p.e.	Owenavorragh _060	Moderate	2016
Courtown-Gorey D0046	> 10,000 p.e.	Banoge_020	Poor	2016
Courtown-Gorey D0046	> 10,000 p.e.	Banoge_030	Poor	2016
Coolgreany D0174	2,001 to 10,000 p.e.	Clonough_010	Poor	*NA* [1]
Wexford Town D0030	> 10,000 p.e.	Wexford Harbour	Moderate	*NA* [1]

4.2.4 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 – Banoge_010 and Blackwater (Wexford)_010, from Gorey and Blackwater towns respectively, and Aughboy (Wexford)_010 which flows through several unfinished housing estates (Figure 12). Elevated concentrations of phosphates and ammonia are the significant issues.

4.2.5 Other significant pressures

- *Unknown Anthropogenic*
  Two *At Risk* water bodies have unknown anthropogenic pressures – Banoge_010 and Askinch Upper Stream_010 (Figure 13).

4.2.6 Industry

- An unlicensed industry discharge, resulting in nutrient issues, were identified as a significant pressure in Inch (Wexford)_010. (Figure 14), however issues related to this discharge were resolved in 2015, but further monitoring will be required.

4.2.7 Hydromorphology

- Hydromorphological pressures have been identified as a significant pressure in Blackwater (Wexford)_010 within the Cahore (SC11_1) subcatchment (Figure 15). Significant bank erosion has been noted leading to high levels of siltation.

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

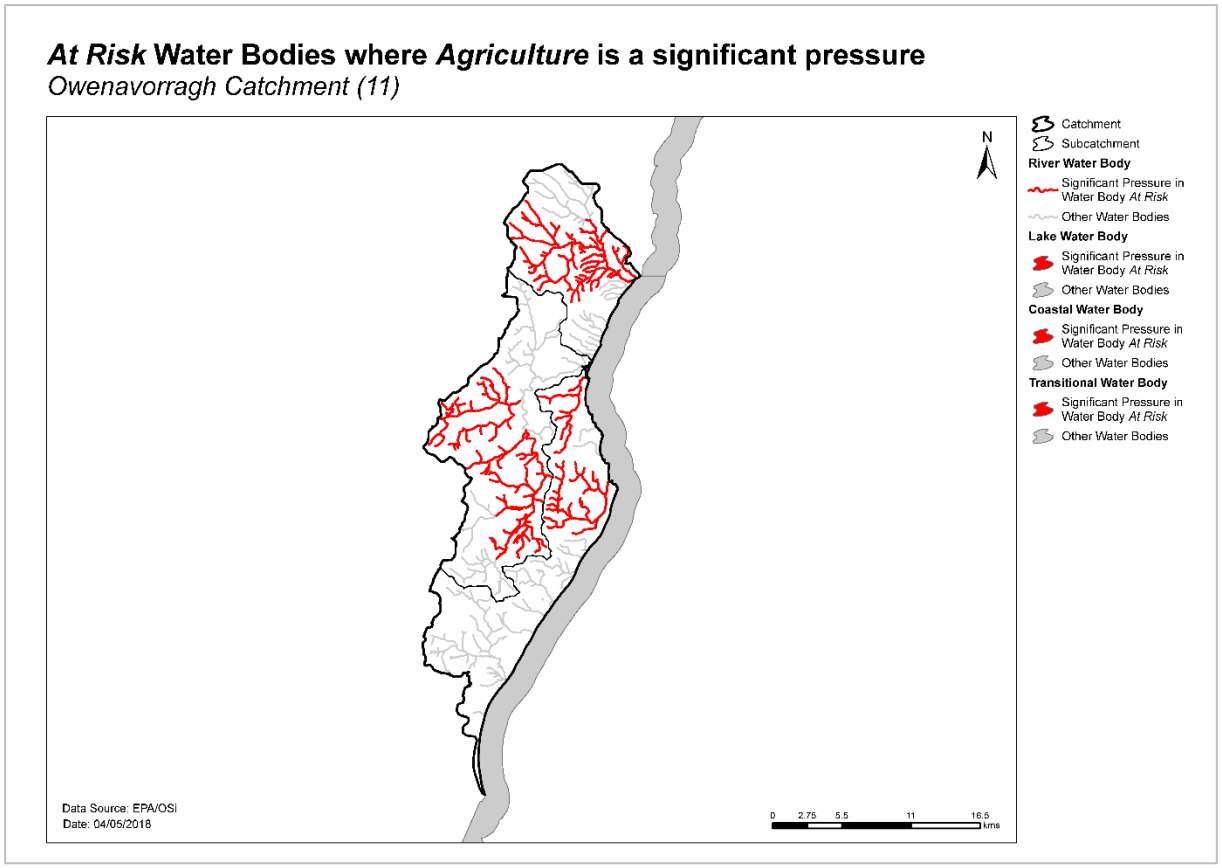


Figure 9. Water bodies that are *At Risk* and are impacted by agricultural activities

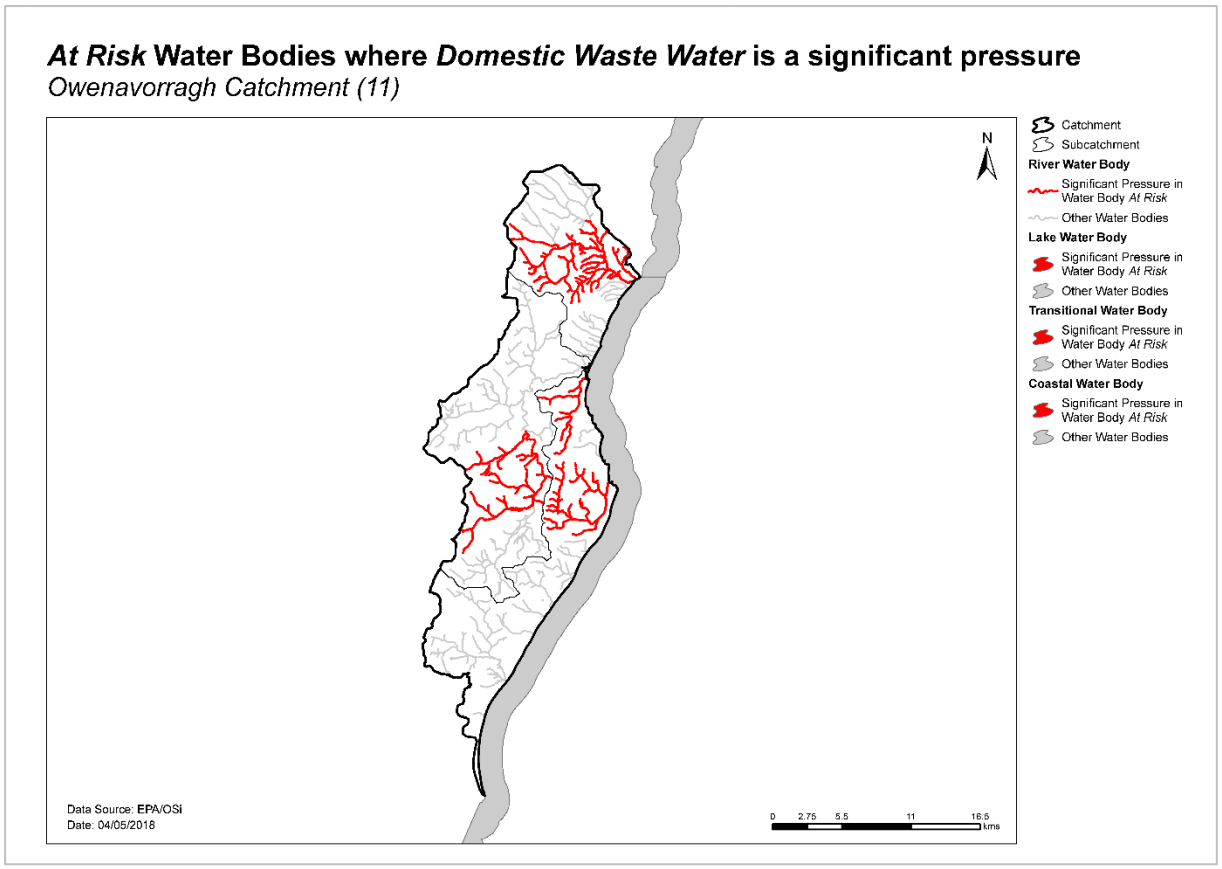


Figure 10. Water bodies that are *At Risk* and are impacted by domestic waste water

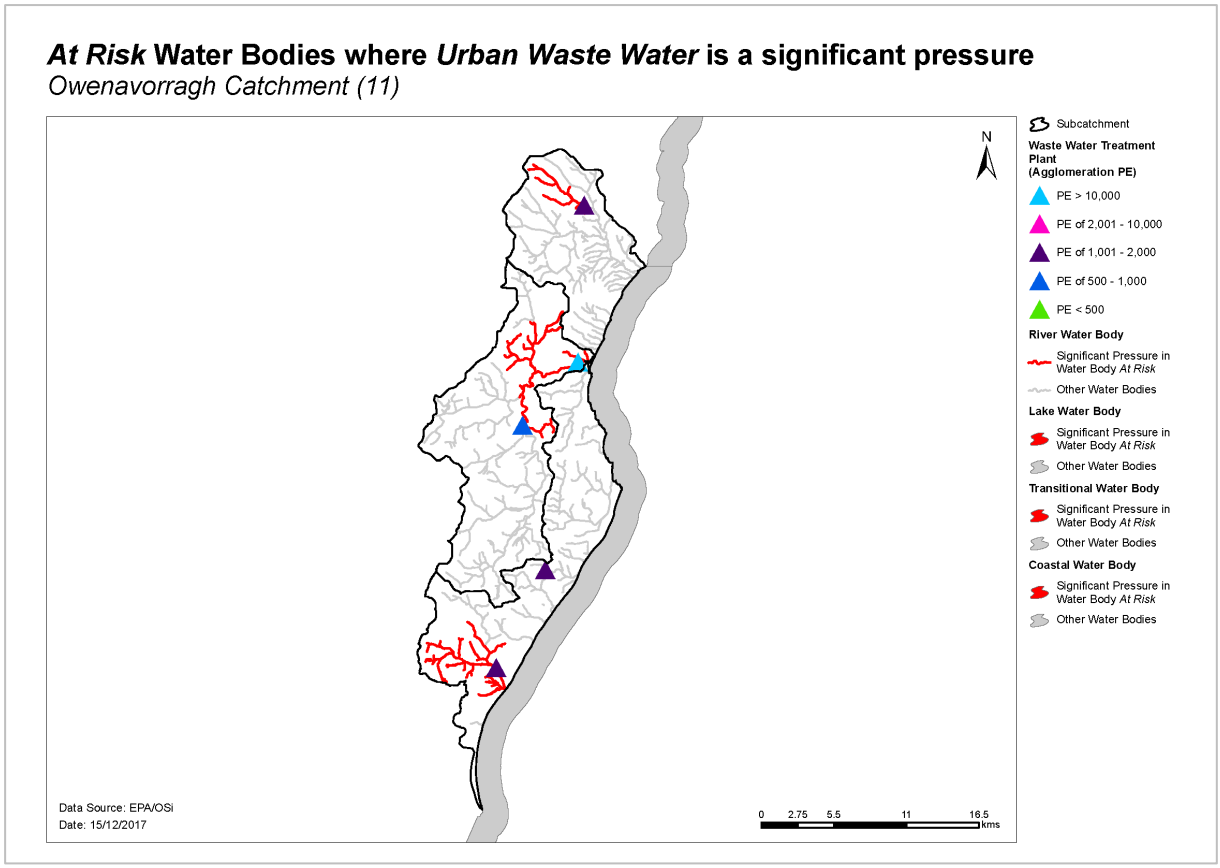


Figure 11. Water bodies that are *At Risk* and are impacted by urban waste water

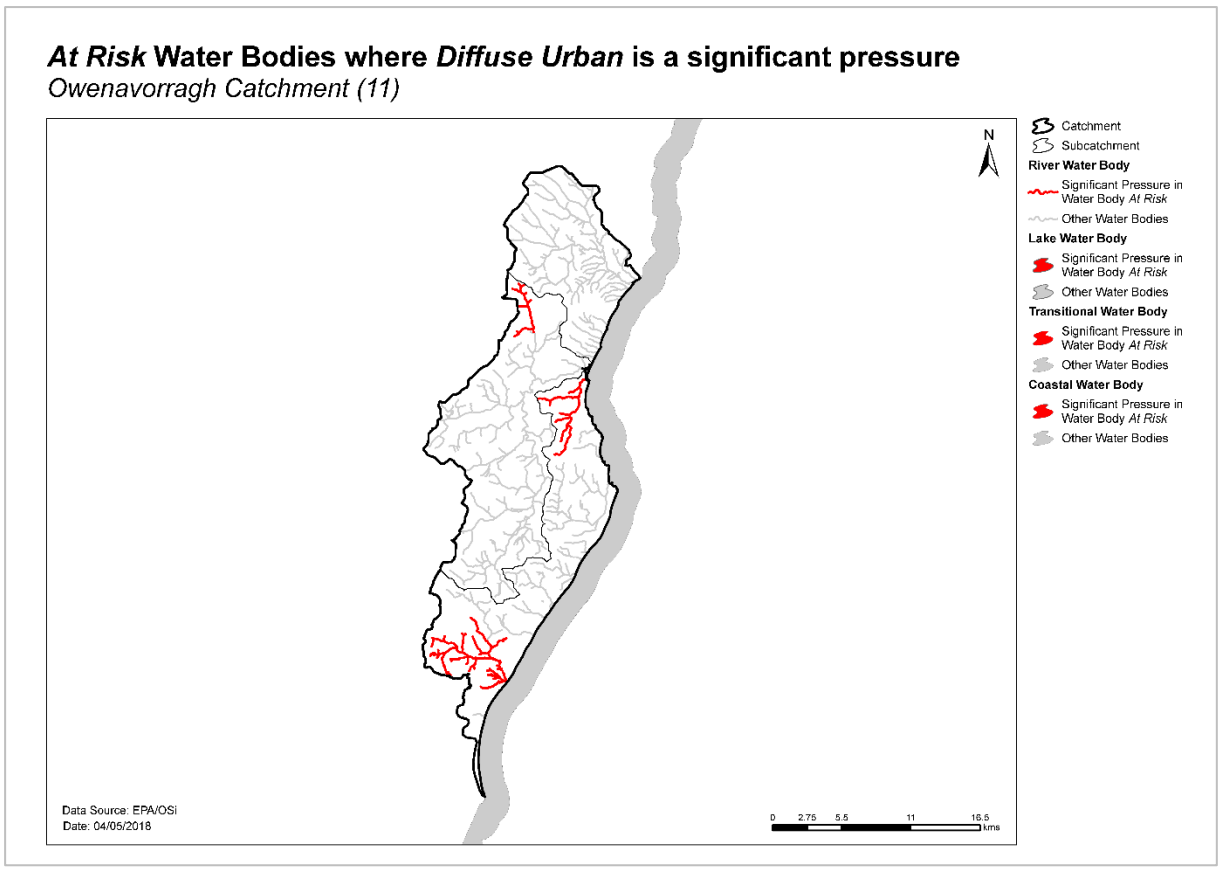


Figure 12. Water bodies that are *At Risk* and are impacted by diffuse urban impacts

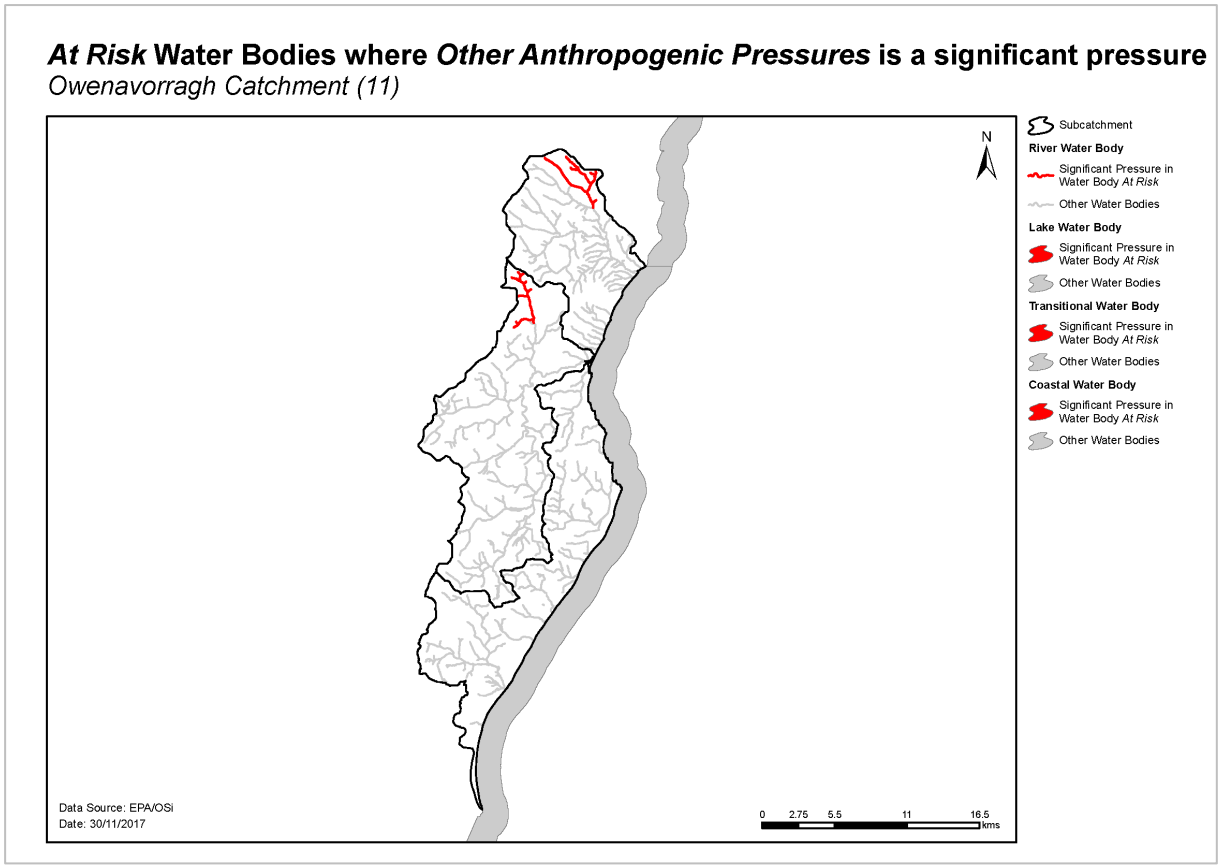


Figure 13. Water bodies that are *At Risk* and are impacted by other anthropogenic pressures

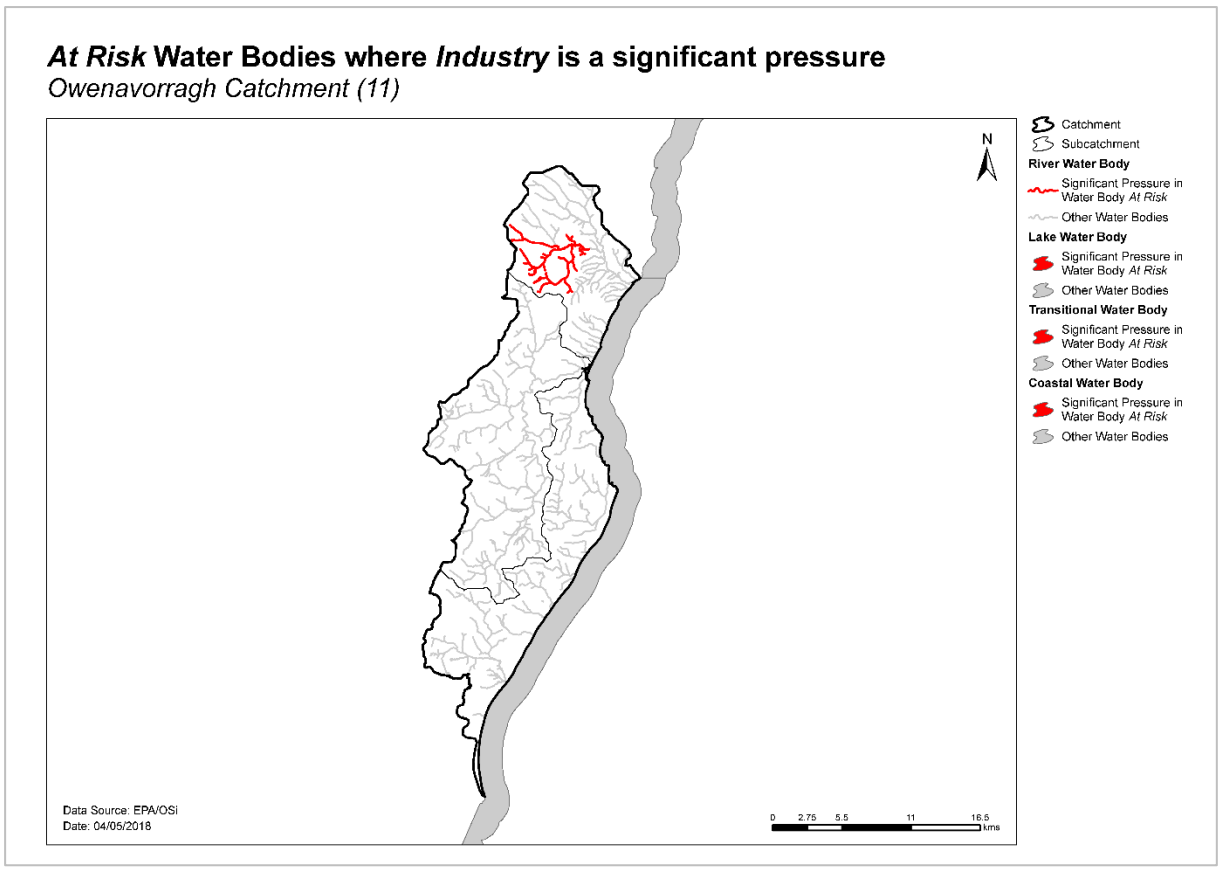


Figure 14. Water bodies that are *At Risk* and are impacted by industry pressures

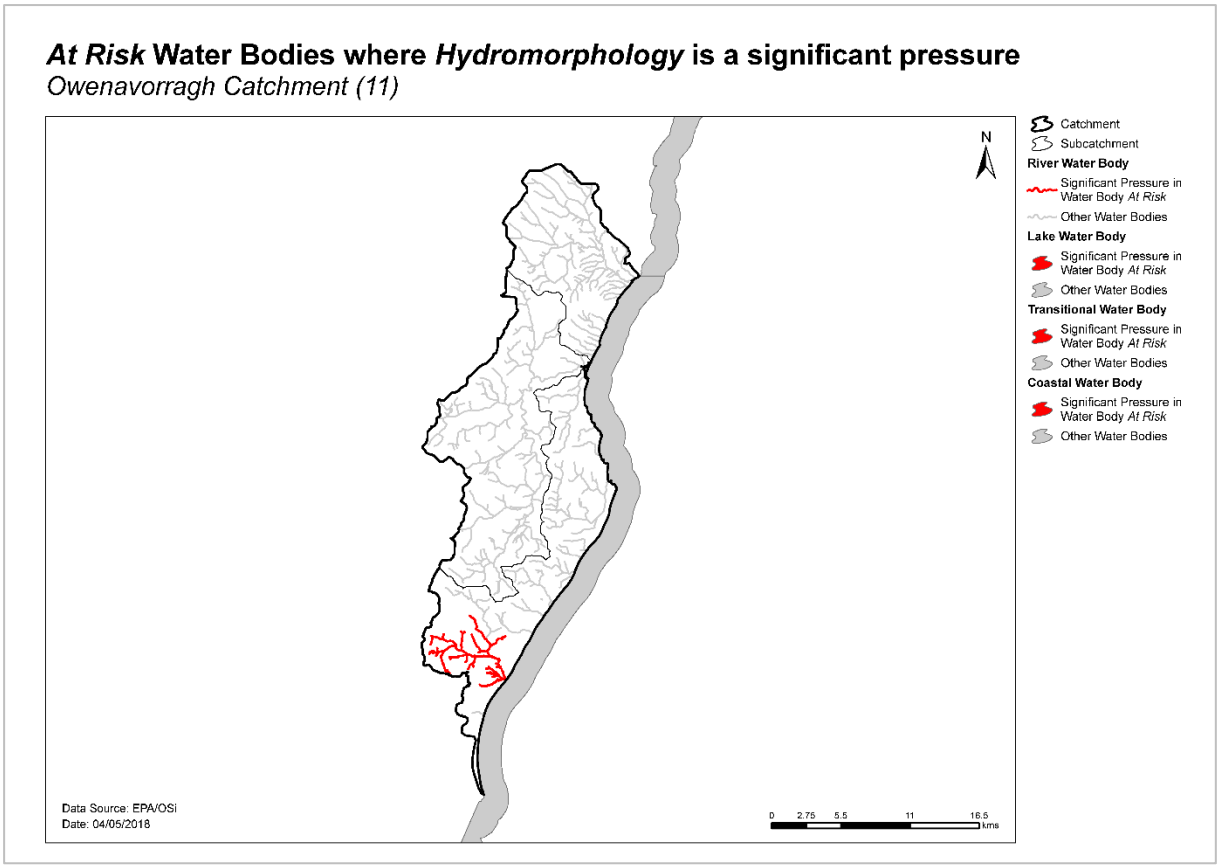


Figure 15. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

5 Load reduction assessment

5.1 River water body load reductions

- The results of the main channel assessment for the Owenavorragh main channel indicate that orthophosphate is the main influencing parameter in rivers (Appendix 1).
- 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 Owenavorragh catchment, the available data indicate that load reduction is required in 11 river water bodies (Table 7).

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

Water Body	P Load Reduction Required
Aughboy (Wexford)_010	V. High
Cahore Canal_010	High
Owenavorragh_060	High
Owenavorragh_050	High
Owenavorragh_040	Med
Inch (Wexford)_020	Low
Brackan_010	Low
Blackwater (Wexford)_010	Low
Owenavorragh_020	Low
Inch (Wexford)_010	Low
Owenavorragh_030	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.

- Load reductions are not currently required for the TraC water bodies in the Owenavorragh catchment as there are none that are *At Risk*.

6 Further characterisation and investigative assessments

- Further characterisation through local catchment assessments is needed in 18 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.
- 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 details on the 10 IA assessment scenarios are given in Appendix 7.

Table 8. Local catchment assessment allocation for *At Risk* and *Review* river and lake water bodies in the catchment

Risk	IA 1	IA 2	IA 3	IA4	IA 5	IA 7	IA 8	IA 9	Total
At Risk	8	0	0	1	2	9	0	0	20
Review	0	0	6	0	0	1	0	0	7
Note water bodies may have multiple categories of Local Catchment Assessments									

7 Catchment summary

- Of the 26 river and lake water bodies (rivers and lakes), 18 are *At Risk* of not meeting their WFD objectives.
- Excess phosphate leading to eutrophication is the dominant issue in river water bodies. While excess ammonia is also of concern, it is only for a limited number of water bodies.
- Hydromorphological (or physical) conditions are an issue in one river (Gorteen Upper Stream_010) due to impacts by excess sediment caused by bank erosion and cattle access. Such impacts have altered the morphology and in turn, altered habitat conditions.
- None of the six groundwater bodies are *At Risk*.
- One coastal water body is *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 two areas for action in the Owenavorragh 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 Owenavorragh catchment are summarised below.

- Two recommended areas for actions (Table 9, Figure 16) were selected.
- These are the Owenavorragh and Blackwater (Wexford).
- These include:
    - 12 river water bodies – 11 *At Risk* and one *Review,* and
    - One *At Risk* coastal water body.
- One groundwater body, that is in *Review* due to groundwater contribution of nutrients to surface water bodies, intersects with one 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 13 *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 17. These include:

- 12 river and lake water bodies – seven *At Risk* and five *Review,* and
- One *Review* transitional water bodies.

Table 9. Recommended Areas for Action in the Owenavorragh catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
OWENAVORRAGH	10	11_2	Wexford	• Longer term challenge. Ten water bodies, four of which are consistently Poor status. • Discharging into bathing water amenity (Courtown). • Teagasc Agriculture Catchments Programme catchment (Bracken_010) • Building on improvements completed in Gorey WWTP. • NHA in Gorey. • Very active community group in Ballycanew. • Two deteriorated water bodies. • Three potential 'quick wins'.
Blackwater (Wexford)	2	11_1	Wexford	• Building on work completed by Wexford County Council. • One deteriorated water body. • Discharging into bathing waters (Ballinesker and Curracloe).

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_SE_G_025	Cahore Point	Review	IE_SE_11B010300	BALLYEDMOND_010	Owenavorragh
			IE_SE_11O010200	OWENAVORRAGH_020	
			IE_SE_11O010300	OWENAVORRAGH_030	
			IE_SE_11O010400	OWENAVORRAGH_040	
			IE_SE_11O010500	OWENAVORRAGH_050	
			IE_SE_11O010700	OWENAVORRAGH_060	

9 Environmental Objectives

9.1 Surface Water

- Assuming resources are available and actions are taken in the recommended areas for action, of the 12 *At Risk* surface water bodies, it is predicted that three (25%) will improve by 2021 and the remaining 9 (75%) will achieve their objective by 2027. For the one *Review* surface water body, 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, see Table 11.

Table 11. 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	11	3	8
Review	1	0	1
TraC			
At Risk	1	0	1
Review	0	0	0
Total	13	3	10

- Four surface water bodies have met their 2015 environmental objective.
- As action is not yet planned to be taken in the remaining seven *At Risk* surface water bodies, a 2027 date is applied to all seven water bodies. For the six *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, see Table 12.

Table 12. 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	7	0	7
Review	5	0	5
TraCs			
At Risk	0	0	0
Review	1	0	1
Total	13	0	13

9.2 Groundwater

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

10 Acknowledgements

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

- Wexford 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.
- Geological Survey Ireland.
- National Federation of Group Water Schemes.
- National Parks and Wildlife Service.
- Waterways Ireland.
- Board Iascaigh Mhara.
- Marine Institute.
- Sea Fisheries Protection Authority.
- National Water Forum.

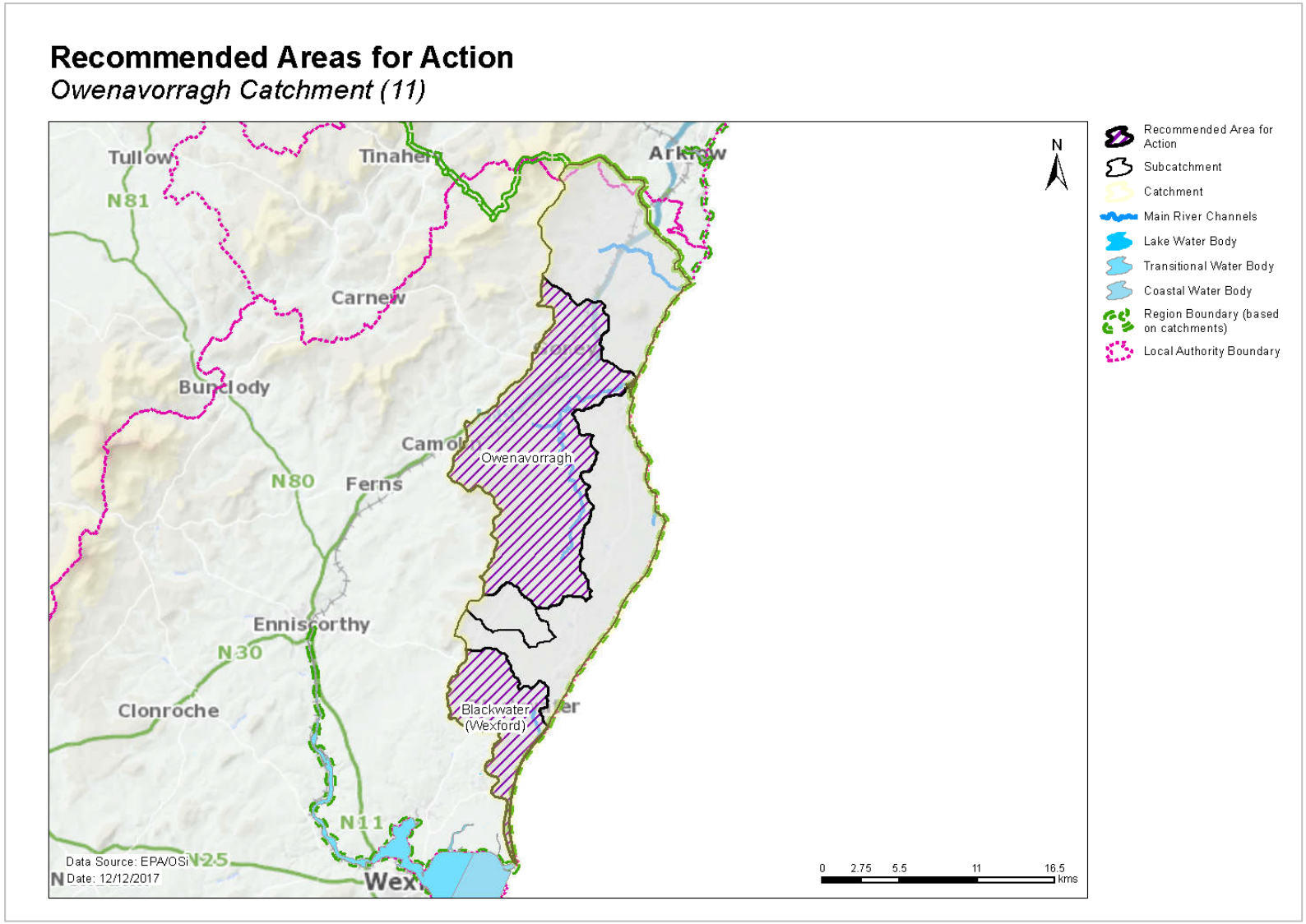


Figure 16. Location of Recommended Areas for Action in the Owenavorragh Catchment

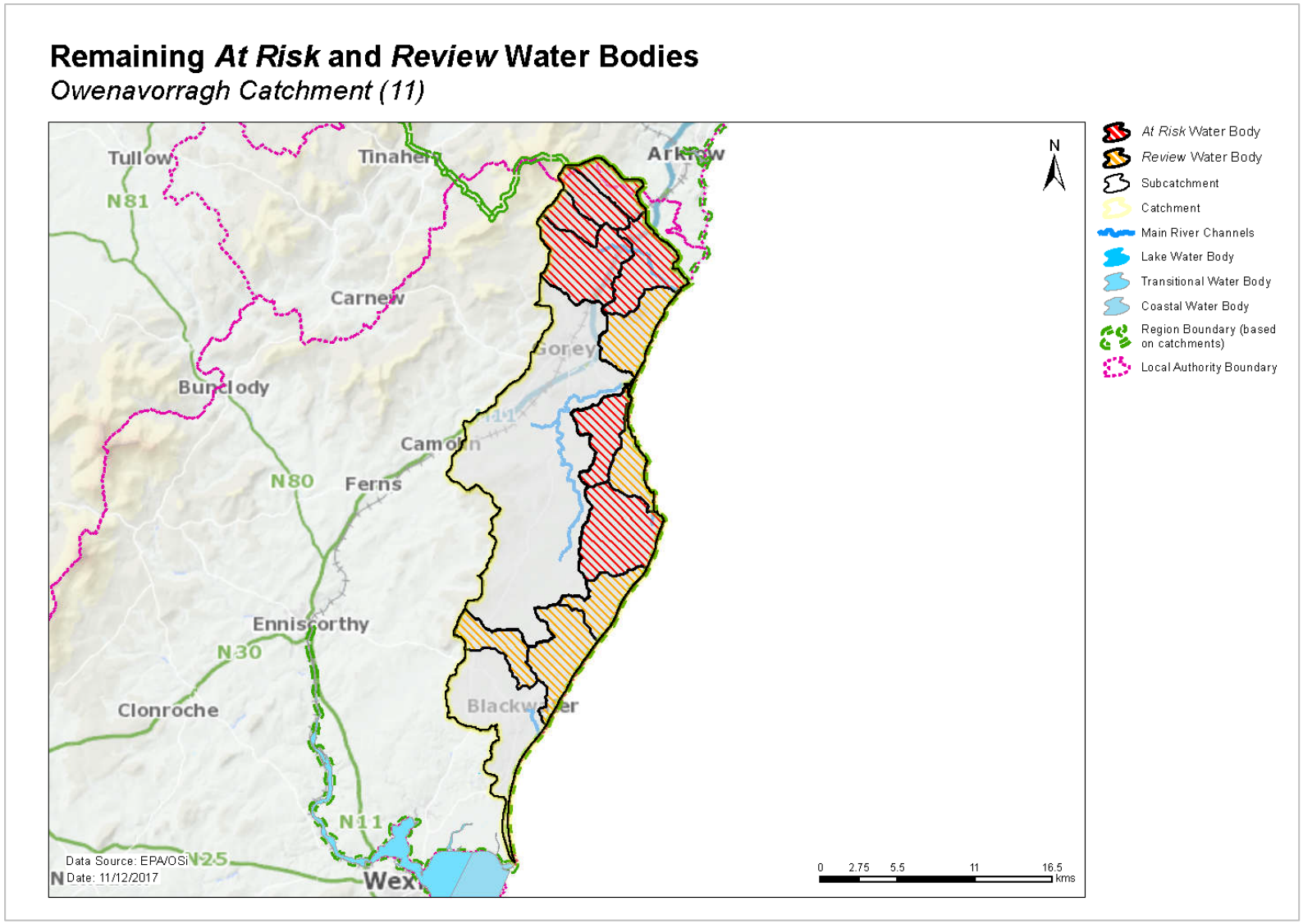
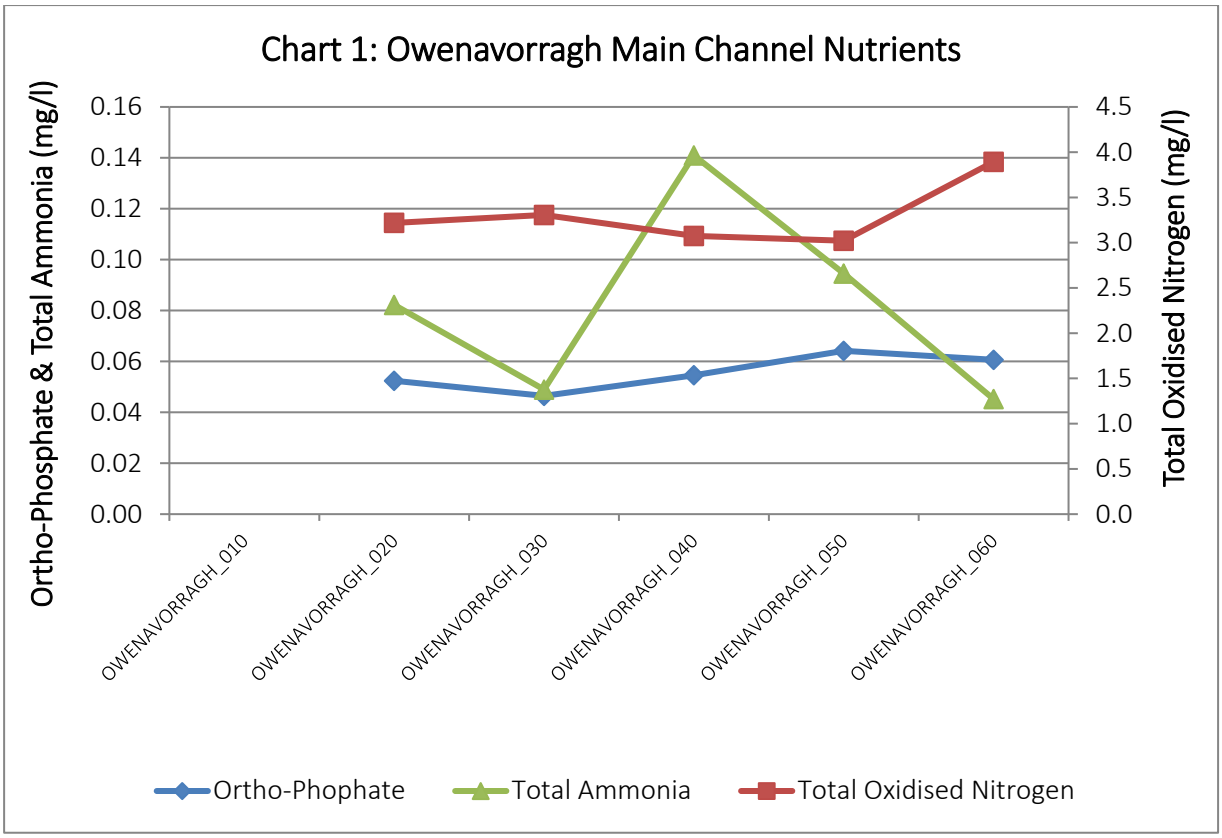


Figure 17. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Owenavorragh Catchment

Appendix 1 Catchment scale nutrient concentrations and in-stream loads

The results of the instream water quality assessment for the Owenavorragh main channel are illustrated in Chart 1. This shows that the 2013-2015 baseline orthophosphate mean concentrations along the main channel are moderately elevated. The EQS (0.035mg/l) for orthophosphate is exceeded from Owenavorragh_020 to Owenavorragh_060 with concentrations ranging from 0.046 to 0.064mg/l.

The ammonia concentrations in the Owenavorragh main channel exceed the EQS for good status (0.065mg/l) at Owenavorragh_020, Owenavorragh_040 and Owenavorragh_050. A significant spike in ammonia concentration is observed at Owenavorragh_040, downstream of which the concentration declines again. The TON drinking water threshold (2.6mg/l) is exceeded from Owenavorragh_020 to Owenavorragh_060 with concentrations ranging from 3.02 to 3.89mg/l.



Appendix 2 Summary information on *At Risk* and *Review* surface water bodies

Sub-catchment 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
11_1	IE_SE_11C020150	Cahore Canal_010	River	At risk	Unassigned	Unassigned	N	Ag,DWW	2027	
11_1	IE_SE_11G020720	Garrymore 11_010	River	Review	Unassigned	Unassigned	N		2027	
11_1	IE_SE_11K070580	Killincooly_Beg_010	River	Review	Unassigned	Unassigned	N		2027	
11_1	IE_SE_11A020200	Aughboy (Wexford)_010	River	At risk	Poor	Bad	N	Ag,DU,DWW	2027	
11_1	IE_SE_11B030300	Blackwater (Wexford)_010	River	At risk	Moderate	Poor	N	DU,Hymo,UWW	2027	Blackwater (Wexford)
11_1	IE_SE_11K190350	Kilmacoe_010	River	Review	Unassigned	Unassigned	N		2027	Blackwater (Wexford)
11_1	IE_SE_11L010400	Litter_More_010	River	Review	Unassigned	Unassigned	N		2027	
11_1	IE_SE_11M100800	Mangan_Lower_010	River	Review	Unassigned	Unassigned	N		2027	
11_1	IE_SE_020_0100	Owenavorragh Estuary	Transitional	Review	Unassigned	Unassigned	N		2027	
11_1	IE_SE_040_0000	Wexford Harbour	Coastal	At risk	Moderate	Moderate	N	Ag,UWW	2027	Wexford Harbour
11_2	IE_SE_11O010200	Owenavorragh_020	River	At risk	Unassigned	Unassigned	N	Ag	2027	Owenavorragh
11_2	IE_SE_11B010300	Ballyedmond_010	River	At risk	Poor	Poor	N	DWW	2021	Owenavorragh
11_2	IE_SE_11B020100	Banoge_010	River	At risk	Unassigned	Moderate	N	DU,Other	2027	Owenavorragh
11_2	IE_SE_11B020200	Banoge_020	River	At risk	Poor	Poor	N	UWW	2021 (measures planned)	Owenavorragh
11_2	IE_SE_11B020300	Banoge_030	River	At risk	Poor	Poor	N	UWW	2021 (measures planned)	Owenavorragh
11_2	IE_SE_11B040200	Brackan_010	River	At risk	Good	Moderate	N	Ag	2027	Owenavorragh
11_2	IE_SE_11O010300	Owenavorragh_030	River	At risk	Good	Poor	N	Ag,DWW	2027	Owenavorragh
11_2	IE_SE_11O010400	Owenavorragh_040	River	At risk	Moderate	Moderate	N	Ag,DWW	2027	Owenavorragh
11_2	IE_SE_11O010500	Owenavorragh_050	River	At risk	Poor	Moderate	N	UWW	2027	Owenavorragh
11_2	IE_SE_11O010700	Owenavorragh_060	River	At risk	Poor	Moderate	N	UWW	2027	Owenavorragh
11_3	IE_SE_11B490430	Ballymoney_Lower_010	River	Review	Unassigned	Unassigned	N		2027	
11_3	IE_SE_11A030035	Askinch Upper Stream_010	River	At risk	Poor	Poor	N	Other	2027	
11_3	IE_SE_11C010100	Clonough_010	River	At risk	Poor	Poor	N	UWW	2027	
11_3	IE_SE_11G010040	Gorteen Upper Stream_010	River	At risk	Good	Moderate	N	Ag	2027	
11_3	IE_SE_11I010130	Inch (Wexford)_010	River	At risk	Good	Moderate	N	Ag,DWW,Ind	2027	
11_3	IE_SE_11I010200	Inch (Wexford)_020	River	At risk	Poor	Moderate	N	Ag,DWW	2027	

Ag: Agriculture

DWW: Domestic Waste Water

For: Forestry

Hymo: Hydromorphology

LSO: Less Stringent Objective

Ind: Industry

M+Q: Mines and Quarries

Peat: Peat Drainage and Extraction

DU: Diffuse Urban

UWW: Urban Waste Water

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

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

Appendix 3 Drinking water supplies in the catchment

Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes /No	Reason why not met
3300PUB1460	Coolgreany	Inch	IE_SE_G_075	Yes	n/a
	Coolgreany				
3300PRI2122	Knockina				
Private GWS	Kilanerin GWS				
3400PUB1042	Thomastown Public Supply				
3300PUB1306	Coolishal Borehole	Gorey	IE_SE_G_071	Yes	n/a
	Banoge Borehole				
	Gorey Regional WSS				
	Gorey Regional WSS				
3300PUB1512	Gorey Regional WSS				
	Gorey Regional WSS				
	Gorey Regional WSS				
	Gorey Regional WSS				
	Gorey Regional WSS				
	Gorey Regional WSS				
	Gorey Regional WSS				
	South Regional				
	South Regional				
3300PUB1010	Knocknasilloge Borehole	Curracloe Gravels	IE_SE_G_162	Yes	n/a
3300PUB1545	Kilmuckridge WS				
3300PUB1641	Sow Regional	Curracloe Gravels	IE_SE_G_162	No	Mecoprop & Dalapon
3300PUB1300	Oulart Borehole	Cahore Point	IE_SE_G_025	Yes	n/a
3300PUB1297	Monamolin Public Supply				
3300PUB1310	Newtown Borehole				

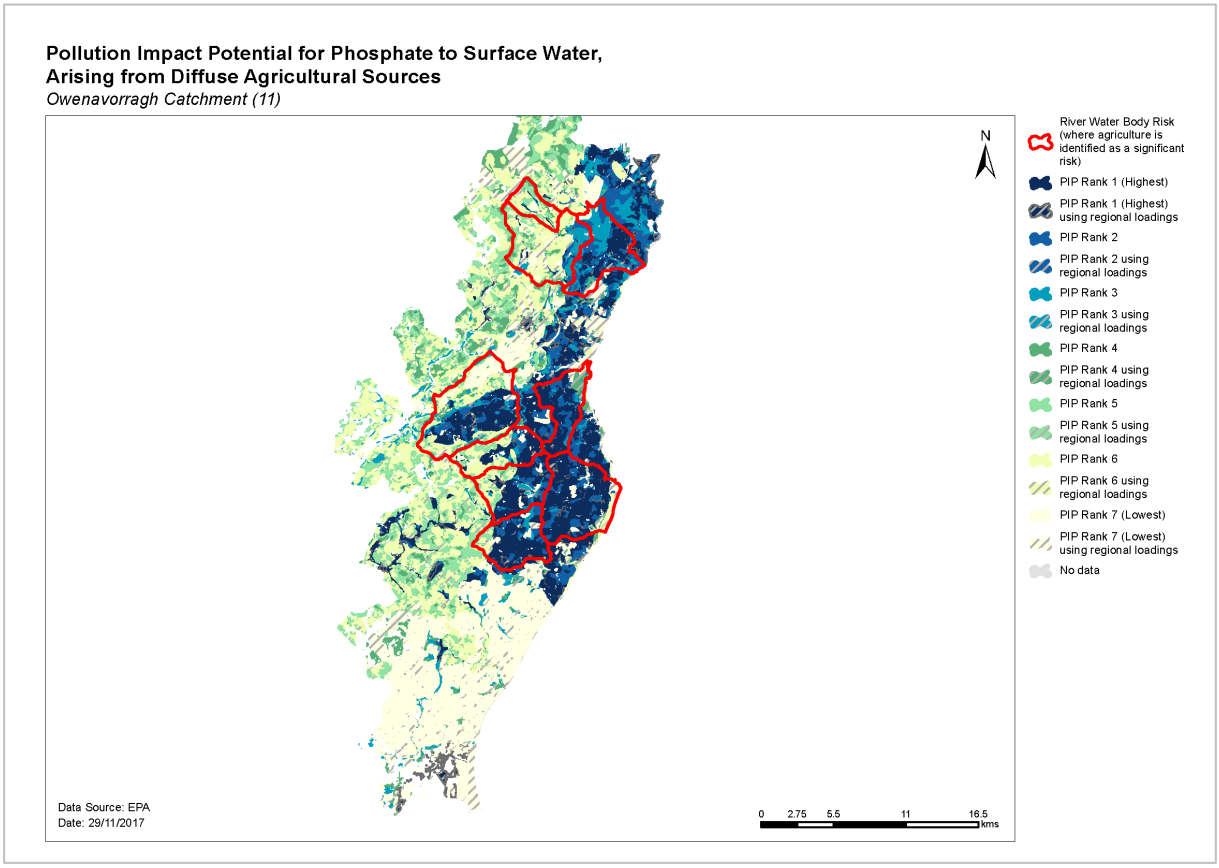
Appendix 4 Prioritisation of water bodies with Natura 2000 site qualifying interests

Note 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?
Cahore Polders And Dunes SAC 000700	none							
Kilmuckridge-Tinnaberna Sandhills SAC 001741	none							
Raven Point Nature Reserve SAC 000710	2190	Good GW level	Groundwater	Castlebridge South	Good (NAR)	No	IE_SE_G_033	Yes
Screen Hills SAC 000708	3110	At least Good	Lake	Kilmacoe	Unassigned (R)	No	IE_SE_11_26	No

Appendix 5 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 6 Local Catchment Assessment Categories

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