Corrib Catchment Assessment 2010-2015 (HA 30)

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 Corrib 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 Corrib and all streams entering tidal water between Renmore Point and Nimmo's Pier, Galway, a total area of 3,112 km². The largest urban centre in the catchment is Galway City. The other main urban centres are Tuam, Ballinrobe, Claremorris and Ballyhaunis. The total population of the catchment is approximately 116,900 with a population density of 38 people per km².

This catchment is characterised by a wide, relatively flat, limestone plain occupying the eastern two-thirds of the catchment which terminates in the large lakes of Corrib and Mask that abut against the granites of west Galway and the metamorphic uplands of southwest Mayo. The entire area of this catchment east of these lakes is karstified limestone with groundwater and surface water highly interconnected in this region.

The upper part of the catchment drains into Lough Mask. The Aille River flows into the northern end of Lough Mask. Lough Carra and its tributaries drain much of the area northeast of Lough Mask and drain into the lough via a surface channel and underground through the limestone aquifer. The Glensaul, Owenbrin, Srahnalong and Finny Rivers, all flow into the western side of Lough Mask.

The Robe River crosses a landscape marked by the presence of numerous turloughs (temporary lakes), swallow holes and springs. It then flows through Ballinrobe and finally discharges into the eastern side of Lough Mask. Lough Mask drains into Lough Corrib via an artificial canal channel that passes through the town of Cong, and naturally via underground caverns in the karstic limestone bedrock aquifer.

The Bealnabrack River flows southeast down Maum Valley and into Lough Corrib and the Oweniff River flows through Oughterard and into the western side of Lough Corrib. The area to the south is drained by the Drimeen River and the remaining area west of Lough Corrib is drained by the Ballycuirke Lough Stream, which flows through Moycullen and into the southwestern side of Lough Corrib. In contrast to the area east of Lough Corrib, there is a dense surface drainage network on the poorly permeable granite and metamorphic rocks that underlie the area.

The area to the east of Lough Corrib is dominated by karstic type drainage and there are numerous springs, swallow holes and turloughs in this area. The Kilmaine River rises near Kilmaine as a karst spring, flowing southwest and into Lough Corrib near Cross. The Black (Shrule) River drains flows through Shrule before entering Lough Corrib near Inchiquin Island. The area around Headford is drained by the Headford Stream, which flows into the southeastern shore of Lough Corrib.

The eastern side of the catchment is drained by the Clare River and its tributaries. The Dalgan River rises near Ballyhaunis flowing south before meeting the Sinking River at Dalgin Bridge. The Sinking River, loses 80-85% of its flow over a 400-m long reach in summer low flow conditions. At the confluence of the 2 rivers, the system become the Clare River. The Clare continues south and is joined by the Nanny River, Grange River and the Abbert River, which drains the southeastern part of the catchment.

The Clare River passes though Claregalway before entering the southern end of Lough Corrib. Three large scale drainage schemes were completed in this catchment by the OPW between 1951 and 1986 consist of the Corrib-Clare scheme (1951 to 1959), the Corrib-Headford scheme (1967 to 1973) and the Corrib Mask scheme (1979 to 1986). Flood relief works were completed at Belclare on the Clare River during 1995 and in the Maam Valley during 2001.

The Corrib River flows out of the southern tip of the Lough, passing through the northern suburbs of Galway City before passing over a large weir near Galway Cathedral, where the river becomes tidal and flowing out to sea at Galway Bay past the Claddagh.

There are two particularly distinguishing and unusual features of the catchment in the karstic limestone east side of Lough Corrib:

- The River Clare is not a natural river; it is an aqueduct linking a series of pre-existing lakes, turloughs and reaches of stream. For instance, prior to arterial drainage in the 19th century, the River Abbert sank underground at Ballyglunin and the River Clare sank underground at Turloughmore.
- A significant proportion of the river flow in the River Clare sinks underground and flows westwards beneath the topographic catchment divide with Lough Corrib, re-emerging as springs, such as Bunatober and Aughcloggeen on the eastern side of Lough Corrib.

The Corrib catchment comprises 19 subcatchments (Table 1, Figure 1) with 97 river water bodies, 31 lakes, one transitional water body, and 21 groundwater bodies. There are no heavily modified or artificial water bodies in the Corrib Catchment.

Table 1. List of subcatchments in the Corrib catchment

Subcatchment ID	Subcatchment Name
30_1	Clare[Galway]_SC_020
30_2	Kilmaine_SC_010
30_3	Aghinish_SC_010
30_4	Clare[Galway]_SC_070
30_5	Clare[Galway]_SC_030
30_6	Robe_SC_020
30_7	Aille[Mayo]_SC_010
30_8	Sinking_SC_010
30_9	Robe_SC_010
30_10	Clare[Galway]_SC_010
30_11	Black[Shrule]_SC_010
30_12	Clare[Galway]_SC_050
30_13	Clare[Galway]_SC_060
30_14	BallycuirkeLoughStream_SC_010
30_15	Joyce's_SC_010
30_16	Glensaul_SC_010
30_17	Cong[Canal]_SC_010
30_18	Corrib_SC_010
30_19	Clare[Galway]_SC_040

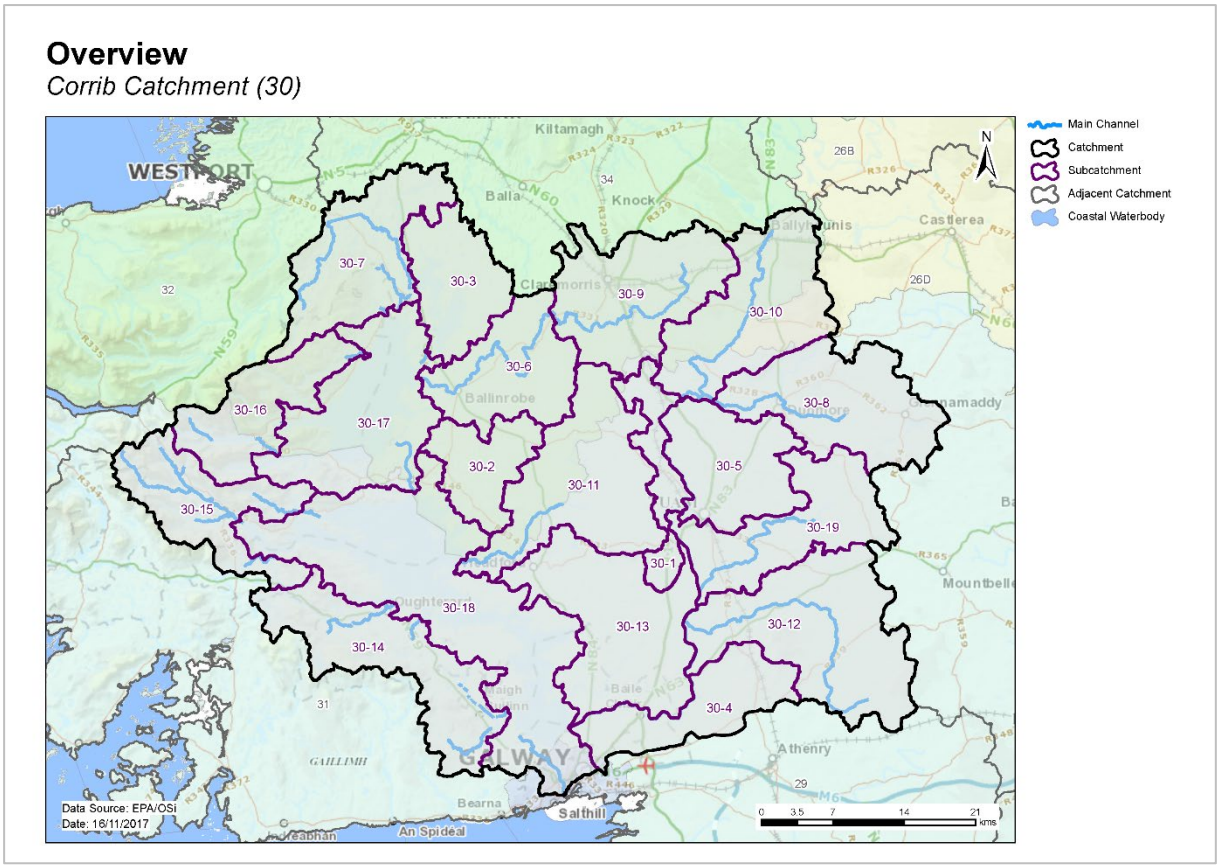


Figure 1. Subcatchments in the Corrib catchment

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 55 (43%) river and lake water bodies at Good or High status, and 35 (26%) at less than Good status in 2015 (Table 2, Figure 2). Thirty-eight (30%) river and lake water bodies are unassigned.
- Seven river water bodies and sites and four lakes have a high ecological status objective. In 2015, three of these water bodies were at High status, and eight were at 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 5 (lakes).
- Since 2007-09 when WFD monitoring began, 15 water bodies have an improved status whereas 21 have deteriorated (Figure 6).
- The variation in nutrient concentrations and loads in the Corrib main channel is illustrated in Appendix 2.

2.1.2 Transitional and coastal (TraC)

- There is one TraC, transitional water body the Corrib Estuary IE_WE_170_0700 and it is at Good status in 2015 (Table 2, Figure 2). This water body does 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. Corrib Estuary is *Not At Risk*.

Table 2. Summary of water body status and risk categories

	Number of water bodies	2010-15						Risk Categories		
		High	Good	Mod	Poor	Bad	Unassigned	*Not at Risk*	*Review*	*At Risk*
Rivers	97	3	44	24	6	1	19	53	8	36
Lakes	31	1	7	3	1	0	19	14	10	7
TraC	1	0	1	0	0	0	0	1	0	0

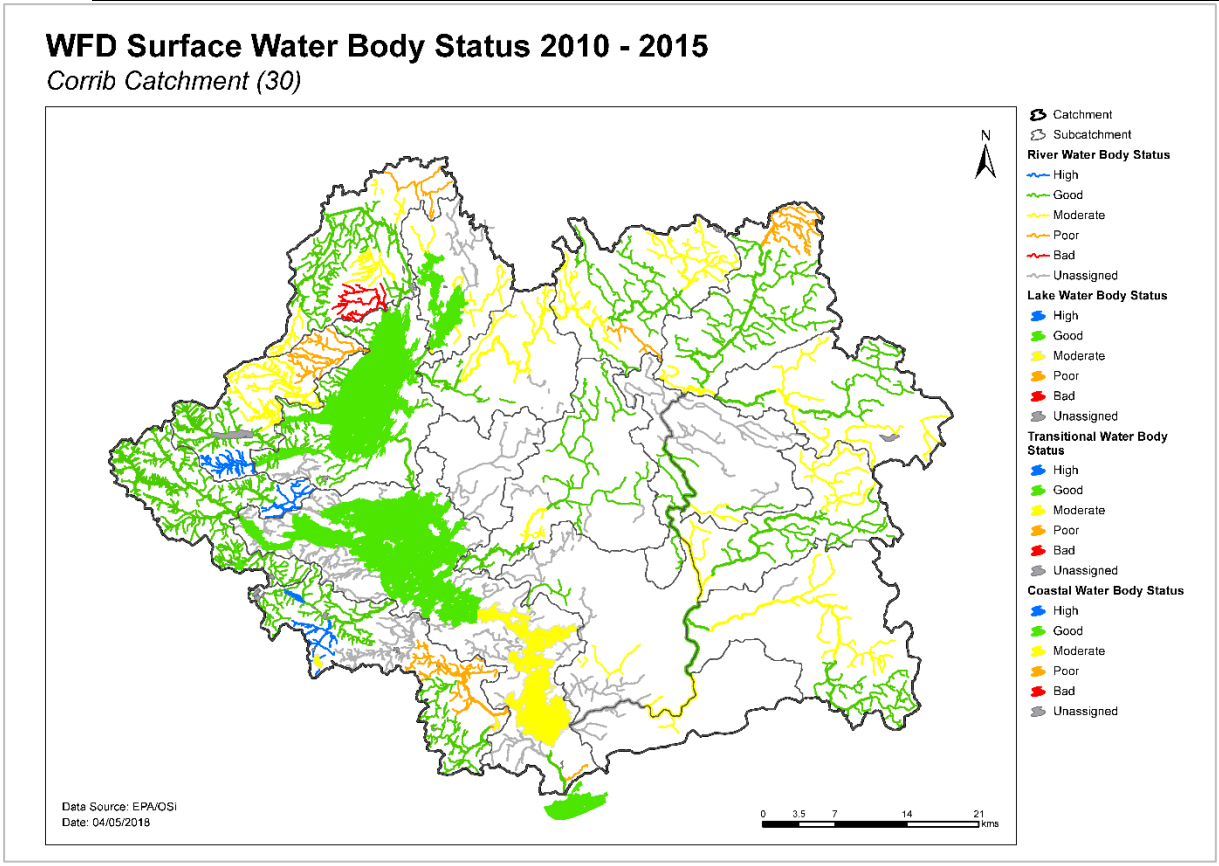


Figure 2. Surface water ecological status

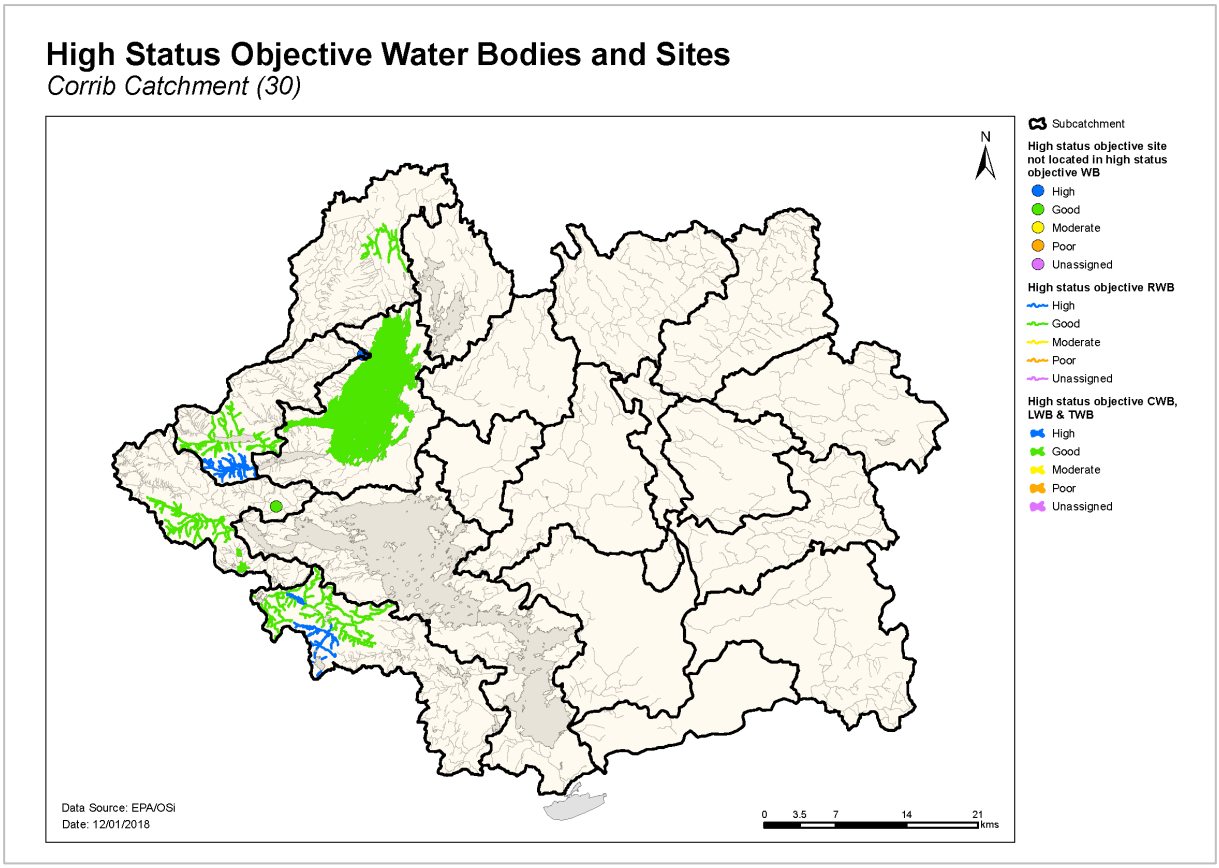


Figure 3. High ecological status objective water bodies and sites

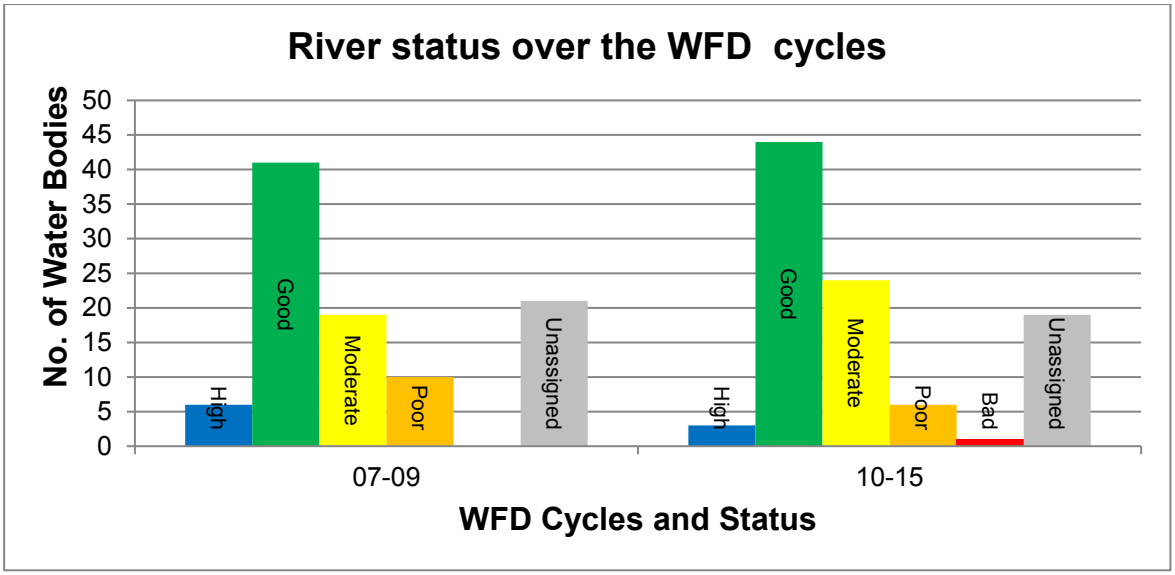


Figure 4. Net change in number of rivers at each status class in 2007-09 and 2010-15

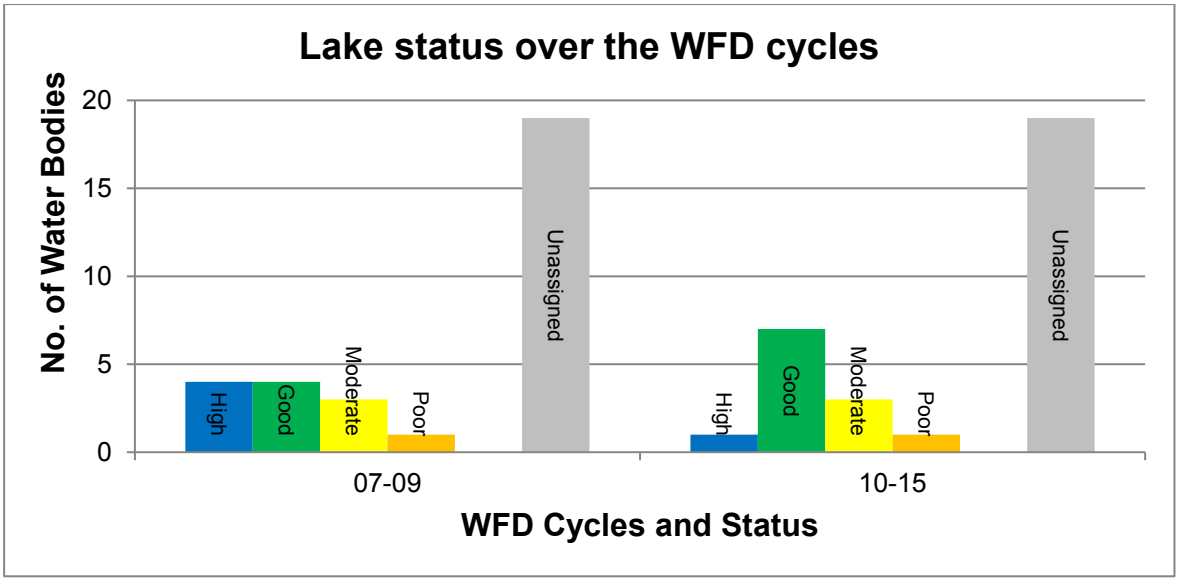


Figure 5. Net change in number of lakes at each status class in 2007-09 and 2010-15

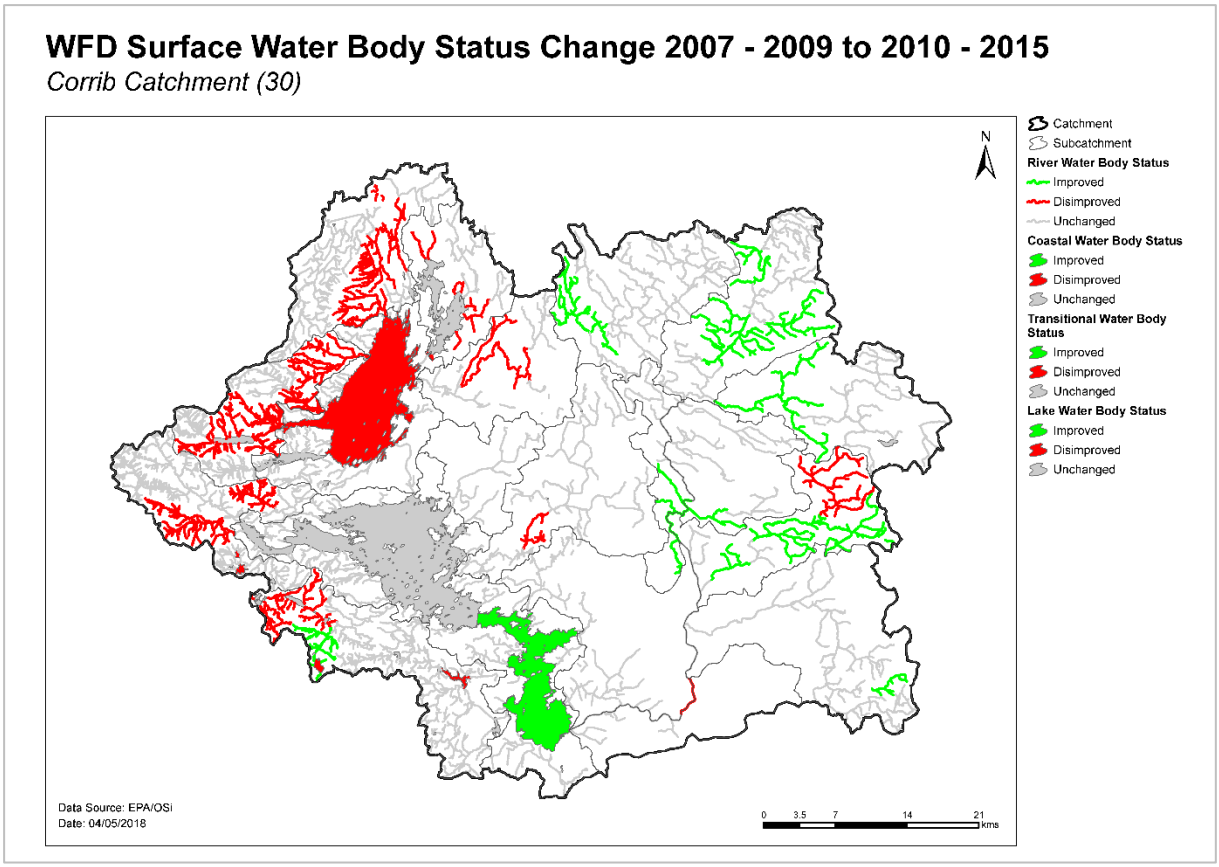


Figure 6. Surface water body status change from 2007-09 to 2010-15

2.2 Groundwater status

- There were 20 groundwater bodies at Good status and one at Poor status in 2015 (Table 3).

- Twenty of the water bodies remained at Good status, and the water body (IE_WE_G_0084) that was classified at Poor status was due to improved information being available and the development of technical assessment approaches, rather than there being deterioration in water quality in this water body between 2007-12 and 2010-15

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	21	20	1	12	6	3

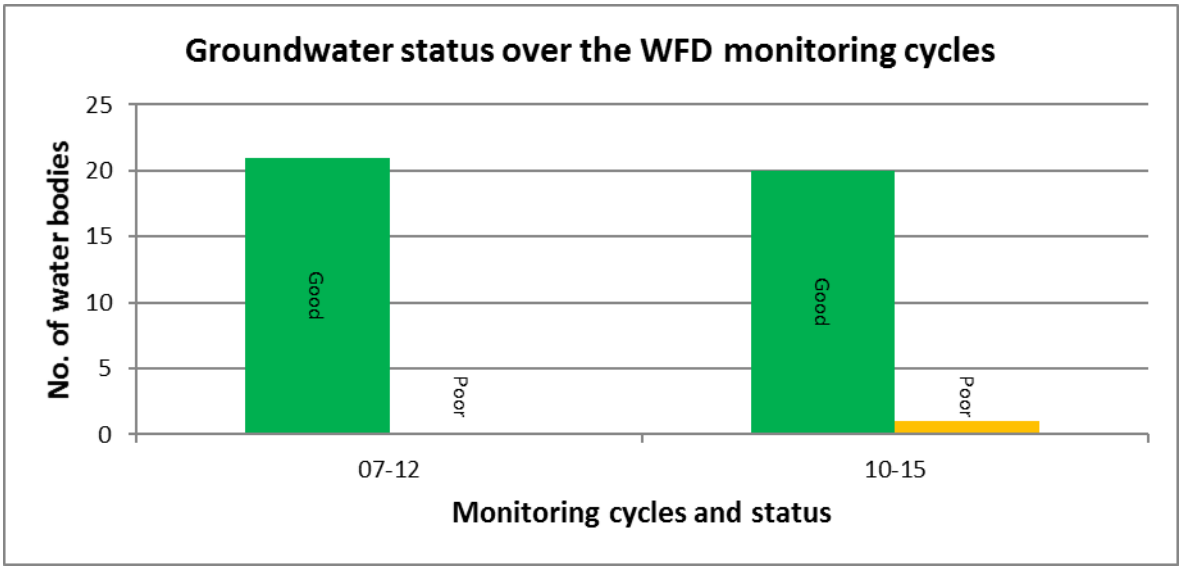


Figure 7. Net change in number of groundwater bodies at each status class in 2007-12 and 2010-15

Groundwater Body Status 2010 - 2015
Corrib Catchment (30)

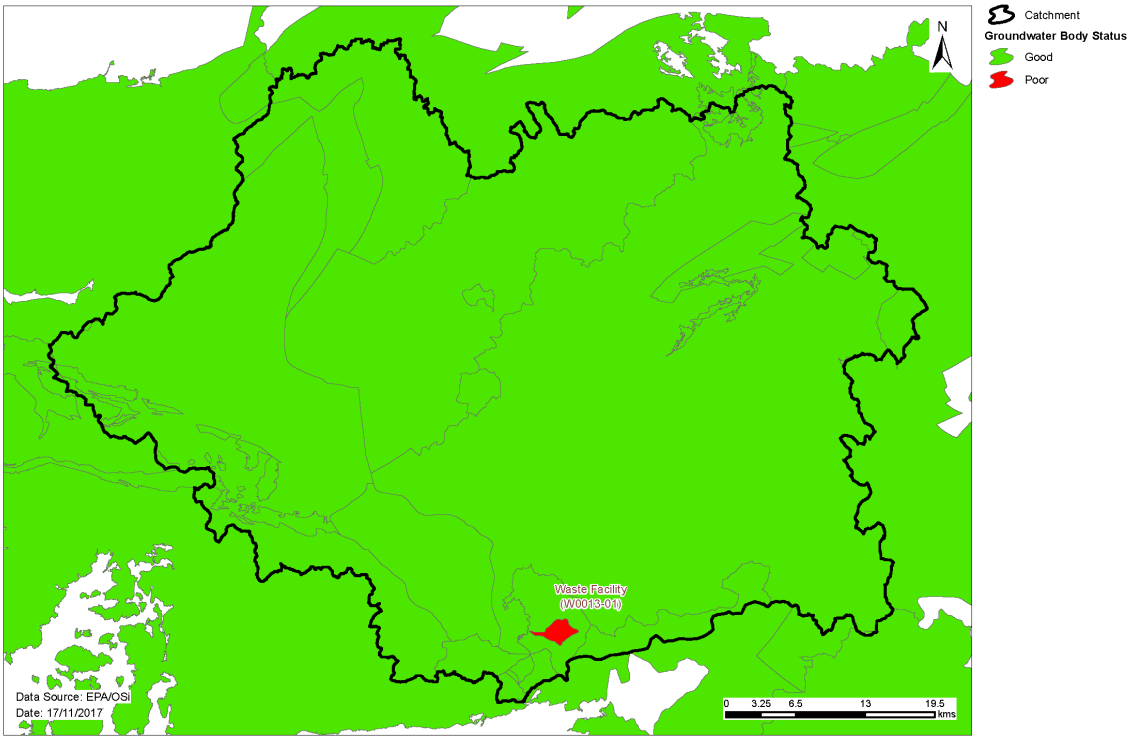


Figure 7a. Groundwater body status

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and lakes

- There are 53 river and 14 lake water bodies that are *Not at Risk* (Figure 8, Table 2) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- There are eight river and ten lake water bodies in *Review*. This includes 11 water bodies where more information is required and seven water bodies where measures have recently been implemented and improvements have not yet been realised.
- Thirty-six river and seven 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)

- There is one TraC water body (Corrib Estuary IE_WE_170_0700) and it is *Not at Risk* (Table 2, Figure 8) and therefore requires no additional assessment or measures to be applied, other than those measures that are already in place.

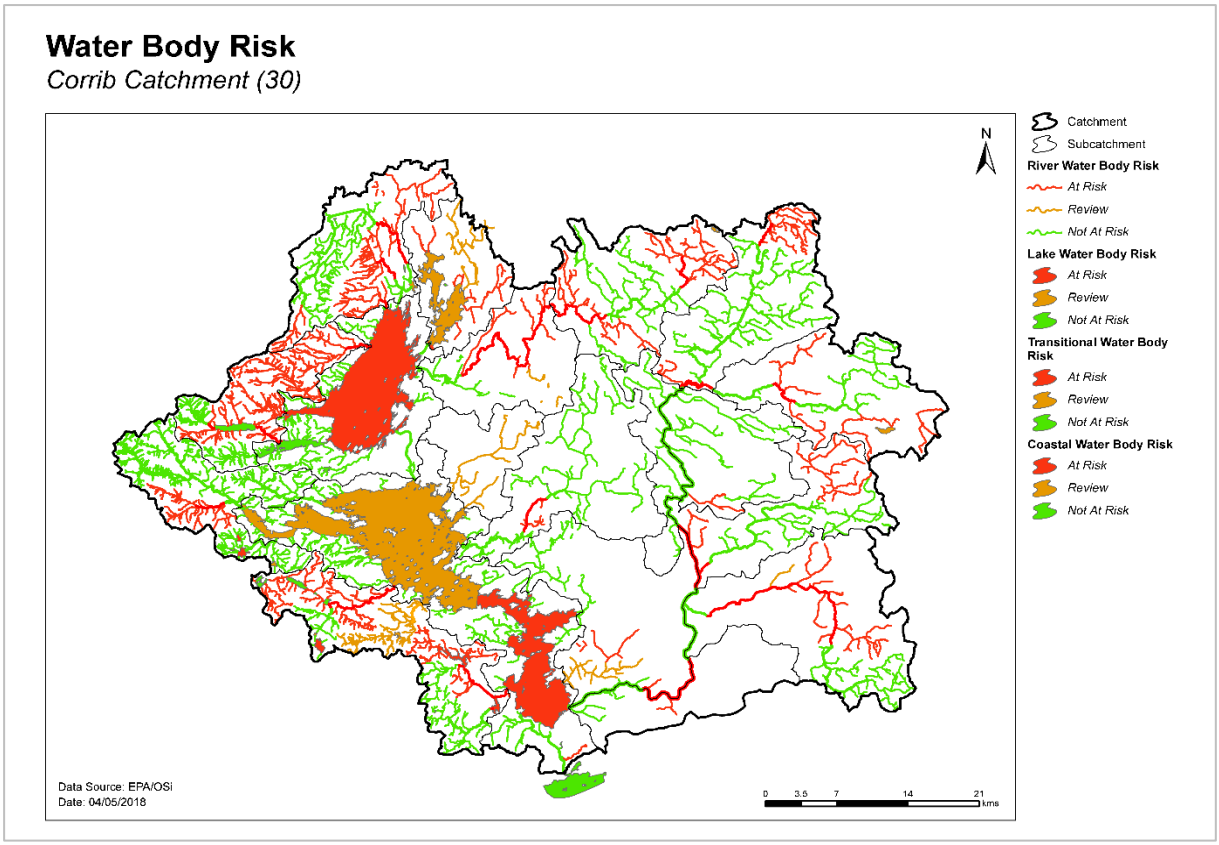


Figure 8. Surface water body risk

2.4 Risk of not meeting groundwater environmental objectives

- Twelve groundwater bodies are *Not at Risk* (Table 3, Figure 9) and require no additional investigative assessment or measures to be applied, other than those measures that are already in place.
- Six groundwater bodies are in *Review.* Suck South, Clarinbridge, Cong-Robe and Ballyhean 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).
- There are three groundwater bodies *At Risk,* Waste Facility (W0013-01) (IE_WE_G_0084), Clarinbridge and Clare-Corrib (Figure 9). Clarinbridge and Clare-Corrib are *At Risk* as 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. (Table 4). Measures will be needed in Waste Facility (W0013-01) to improve water quality outcomes.

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
Clare-Corrib	IE_WE_30A010500	Abbert_040
Clare-Corrib	IE_WE_30B020300	Black (Shrule)_020
Clare-Corrib	IE_WE_30C010100	Clare (Galway)_010
Clare-Corrib	IE_WE_30L070100	Levally stream_010

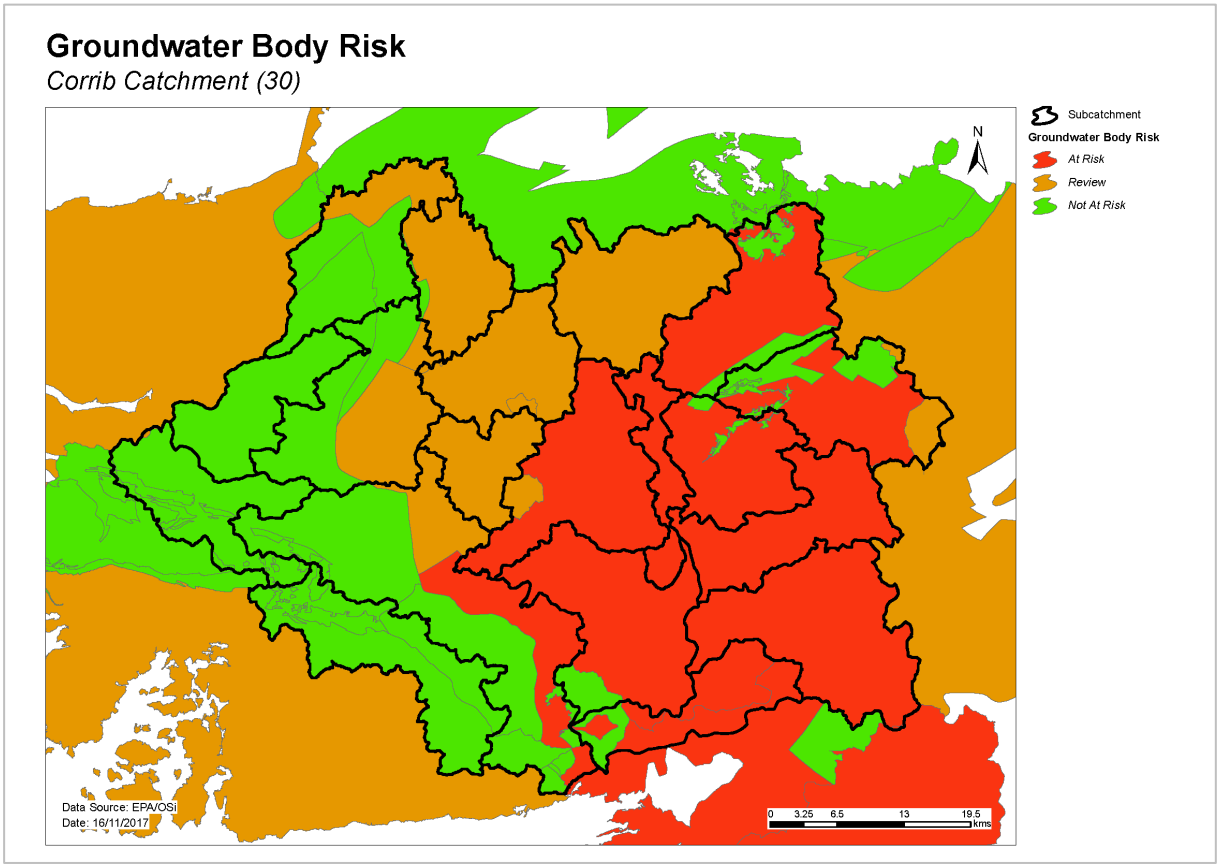


Figure 9. Groundwater body risk

2.5 Protected areas

2.5.1 Drinking water protected areas

- There are 58 abstractions in the Corrib Catchment comprising 35 group water schemes, 11 public supply schemes and 3 other schemes (Kilkeeran, Knockatubber and Kinnuary) (Appendix 4).
- Forty-two of the abstractions are from five groundwater bodies (Clare-Corrib; Dunmore; Cong-Robe; Corrib Gravels; Maam-Clonbur); ten are from four lakes (Corrib Lower; Corrib Upper; Mask; Carra; Buffy), and six are from six river water bodies (Aille (Mayo)_020; Aghinish_010; Black

(Shrule)_010; Corrib_020; Corrib_010; Mocorha_010). The list of the public supplies and the associated water bodies is provided in Appendix 4.

- All drinking water sources were compliant with the standards for nitrate and pesticides in 2015.

2.5.2 Bathing waters

- There are no designated bathing waters in the catchment.

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 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.
- Fourteen water bodies (10 rivers, 4 lakes) have been prioritised for action as the water conservation objectives for their habitats and/or species are not being supported by ecological status (Appendix 5).
- There are three Special Protected Areas (SPAs) in the catchment:
    - Lough Carra SPA
    - Lough Corrib SPA
    - Lough Mask 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 designated heavily modified water bodies (HMWB) in the Corrib catchment.
- There are no artificially modified water bodies (AWB) in the Corrib catchment.

3 Significant issues in *At Risk* water bodies

- Alteration of hydromorphological (or physical) conditions are the dominant issue in rivers and lakes in Corrib Catchment. 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 because of, for example, implementing river and field drainage schemes, forestry activities, animal access, and discharge from quarries.
- Excess phosphate leading to eutrophication is also a concern in several water bodies. While excess ammonia is also of concern, it is only for a limited number of water bodies.
- There are no significant issues for the TraC water body in the Corrib catchment.
- Of the 21 groundwater bodies three are *At Risk*. Ammonia from a waste site and phosphate from two other groundwater bodies have the potential to impact *At Risk* surface water bodies via groundwater.

4 Significant pressures

4.1 Water bodies

- Where water bodies have been classed as *At Risk*, by water quality or survey data, significant pressures have been identified.
- Figure 10 shows a breakdown of the number of *At Risk* water bodies in each significant pressure category.
- The significant pressure affecting the greatest number of water bodies is hydromorphological, followed by agriculture, forestry, other, urban waste water, domestic waste water, peat, diffuse urban, industry and mines and quarries (Figures 10).

4.1.1 Rivers, lakes, transitional and coastal (TraC)

- Significant pressures have been identified through the initial characterisation process in 43 water bodies, 19 of which have multiple pressures. The significant pressures will be refined as further characterisation is carried out.
- There are no significant pressures affecting the Corrib estuary.

4.1.2 Groundwater

- The significant pressure affecting the Waste Facility (W0013-01) (IE_WE_G_0084) groundwater body is a waste disposal facility W0013-01. The key parameter of concern is ammonia. Clarinbridge is impacted by agriculture and septic tanks while Clare-Corrib is impacted by agriculture (Figure 10).

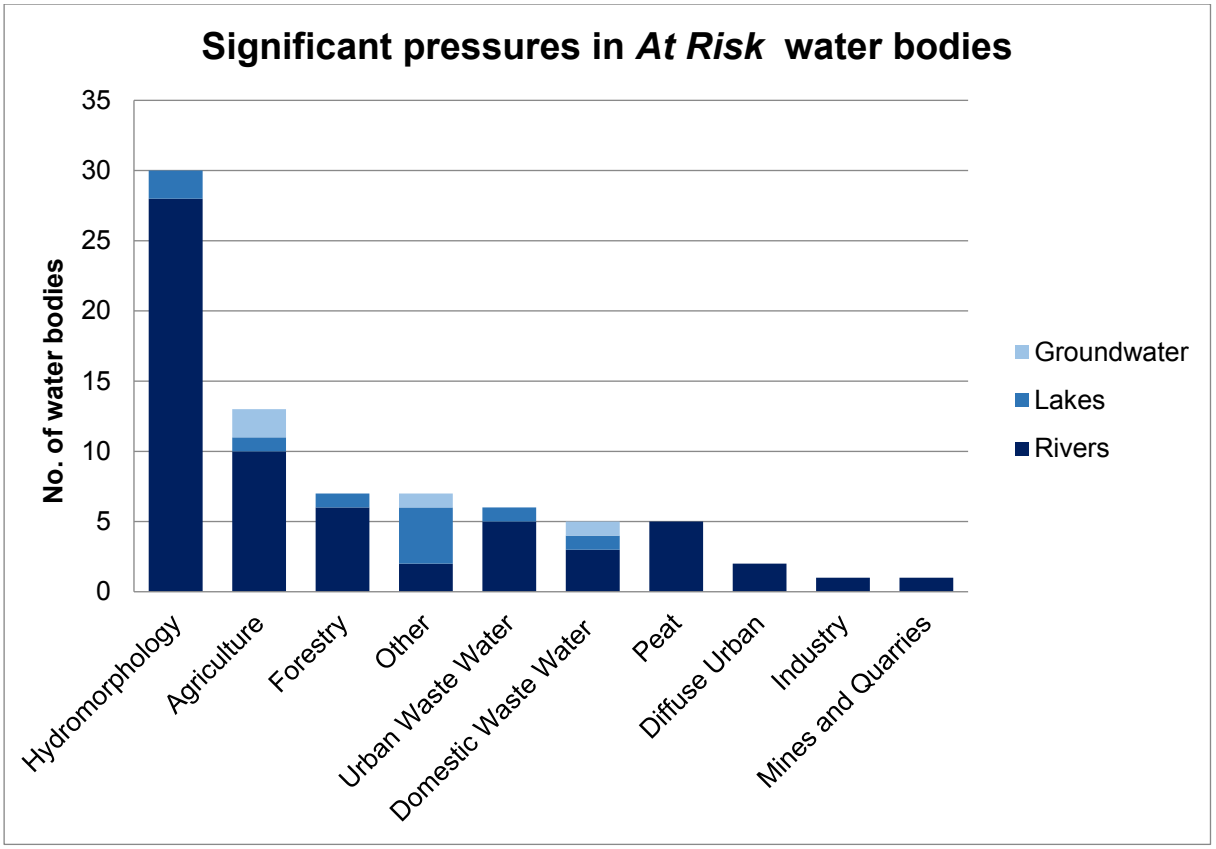


Figure 10. Significant pressures impacting on *At Risk* river water bodies

4.2 Pressure type

4.2.1 Hydromorphology

- Several river water bodies within the catchment are subject to extensive modification due to the presence of drainage schemes. These schemes have led to a significant amount of siltation, especially on the Clare and Sinking subcatchments (Figure 11).
- Water bodies in the Joyce's and Glensaul subcatchments have contributed to the excessive release of sediment, allied to animal access which would appear to be a contributing factor. See Appendix 3 for information on these water bodies (Figure 11).

Table 4a. – Hydromorphological pressures

Pressure	Sub-Catchment	Water body Code
Modification due to Drainage Schemes (Channelisation)	Aghinish_010	Aghinish_010
	Aghinish_010	Cloondaver Stream (N)_010
	Clare (Galway)_070/060	Clare(Galway)_080
	Clare (Galway)_070/060	Clare (Galway)_090
	Clare (Galway)_030	Nanny(Tuam)_030
	Robe_020	Robe_040
	Robe_020	Robe_050
	Aille (Mayo)_010	Claureen_010
	Aille (Mayo)_010	Claureen_020
	Aille (Mayo)_010	Lough Nacorralea Stream) _010
	Sinking_010	Sinking_020
	Robe_010	Ballindine_010
	Robe_010	Robe_010
	Clare(Galway)_010	Clare(Galway)_010
	Black(Shrule)_010	Black(Shrule)_020
	Clare(Galway)_050	Abbert_030
	Clare(Galway)_050	Abbert_040
	Clare(Galway)_060	Clare(Galway)_060
	Clare(Galway)_060	Clare(Galway)_080
	Clare(Galway)_060	Clare(Galway)_090
	Clare(Galway)_060	Cregg_010
	Ballycuirke Lough Stream_010	Ballycuirke_010
	Ballycuirke Lough Stream_010	Owenriff_010
	Ballycuirke Lough Stream_010	Owenriff_020
	Joyces's_010	Loughanillaun Maam Cross
	Joyces's_010	Failmore_010
	Glensaul_010	Finny_010
	Corrib_010	Terryland_010
Land Drainage	Joyce's_010	Maumwee
Bank Erosion (over-grazing)	Joyce's_010	Failmore_010
	Glensaul_010	Owenbrin_010
	Glensaul_010	Owenbrin_020

4.2.2 Agriculture

- Agriculture is a significant pressure in ten river water bodies, one lake and two groundwater bodies (Figure 12). The issues related to farming in this catchment are diffuse phosphorus loss to surface waters due mainly for example, to direct discharges; or runoff from yards, roadways or other compacted surfaces, or runoff from poorly draining soils. Sediment can also be a problem from land drainage works, bank erosion from animal access or stream crossings. The pollution impact potential map showing areas of relative risk for phosphorus loss from agriculture to surface water is given in Appendix 6.

4.2.3 Forestry

- Forestry has been identified as a significant pressure in six river water bodies and one lake water body (Figure 13). The impacts are a combination of forestry taking place on peat soils and extensive felling, which have resulted in heavy siltation and excess nutrients in surface water bodies.

4.2.4 Other significant pressures

- *Invasive Species*
  Four of the lake water bodies (Ballyquirke, Ross GY, Corrib Lower and Mask) have zebra mussels present, which have been identified as a significant pressure (Figure 14).
- *Unknown Anthropogenic*
  Two *At Risk* river water bodies Aille (Mayo)_010 and Gortgarrow Stream_010 have unknown anthropogenic pressures (Figure 15).
- *Waste*
  One *At Risk* Groundwater IE_WE_G_0084 has a Waste Facility (W0013-01), identified as the significant pressure.

4.2.5 Urban waste water treatment plants

- Urban Waste Water Treatment Plants (WWTPs) have been identified as a significant pressure in five *At Risk* water bodies; details are given in Table 5 and Figure 16. Ballyhaunis WWTP, which impacts Dalgan_010, is scheduled to be upgraded in 2024.

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

Facility name	Facility Type	Water Body	2010-15 Ecological Status	Expected Completion Date
Ballyhaunis D0069	2,001 to 10,000 p.e.	Dalgan_010	Poor	2024
Moycullen D0191	2,001 to 10,000 p.e.	Ballyquirke	Moderate	*NA* [1]
Moycullen D0191	2,001 to 10,000 p.e.	Ballycuirke_010	Poor	*NA* [1]
Hollymount A0011	< 500 p.e.	Robe_040	Moderate	*NA* [1]
Ballindine D0355	500 to 1,000 p.e.	Ballindine_010	Poor	*NA* [1]

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

4.2.6 Domestic waste water

- Domestic waste water has been identified as a significant pressure in four water bodies – (Black (Shrule)_020, Abbert_040, Ballycuirke_010 and Mask lake). The issue is excess nutrients entering surface waters. Furthermore, a concentration of domestic waste water treatment plants is located on shallow soils overlying karst meaning a pathway can exist between the groundwater and surface water (Figure 17). There is one groundwater body Clarinbridge that is also impacted by domestic waste water.

4.2.7 Extractive industry

- *Peat*

  Peat drainage and extraction has been identified as a significant pressure in five water bodies – (Clare (Galway)_010, Failmore_010, Lough Nacorralea Stream_010, Sinking_020, and Robe_030). Elevated nutrient concentrations and increased sedimentation are the significant impacts (Figure 19).

- *Quarry*

  A quarry has been identified as a significant pressure in Claureen (Mayo)_010, impacting on habitat morphology (Figure 18).

4.2.8 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 two river water bodies – Dalgan_010 and Terryland_010 (Figure 19). Elevated concentrations of phosphates and ammonia are the significant impacts.

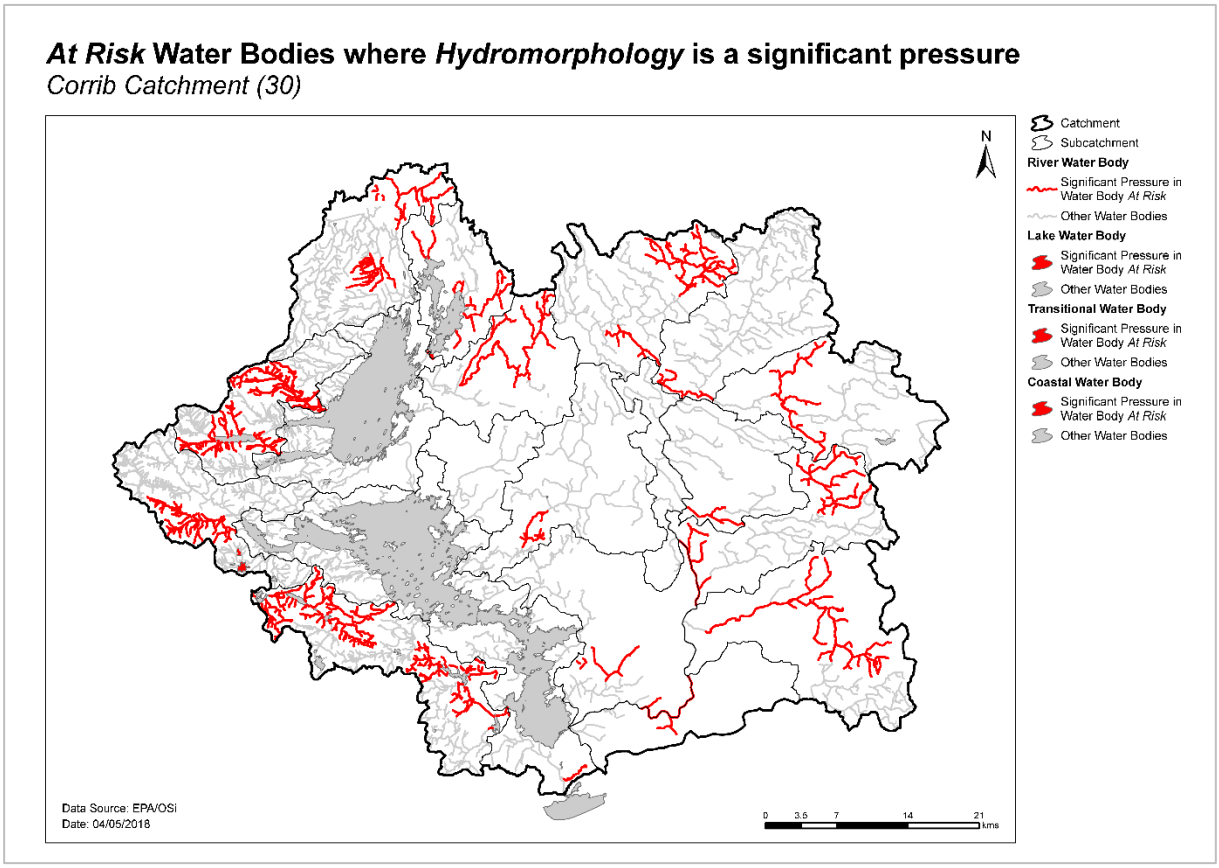


Figure 11. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

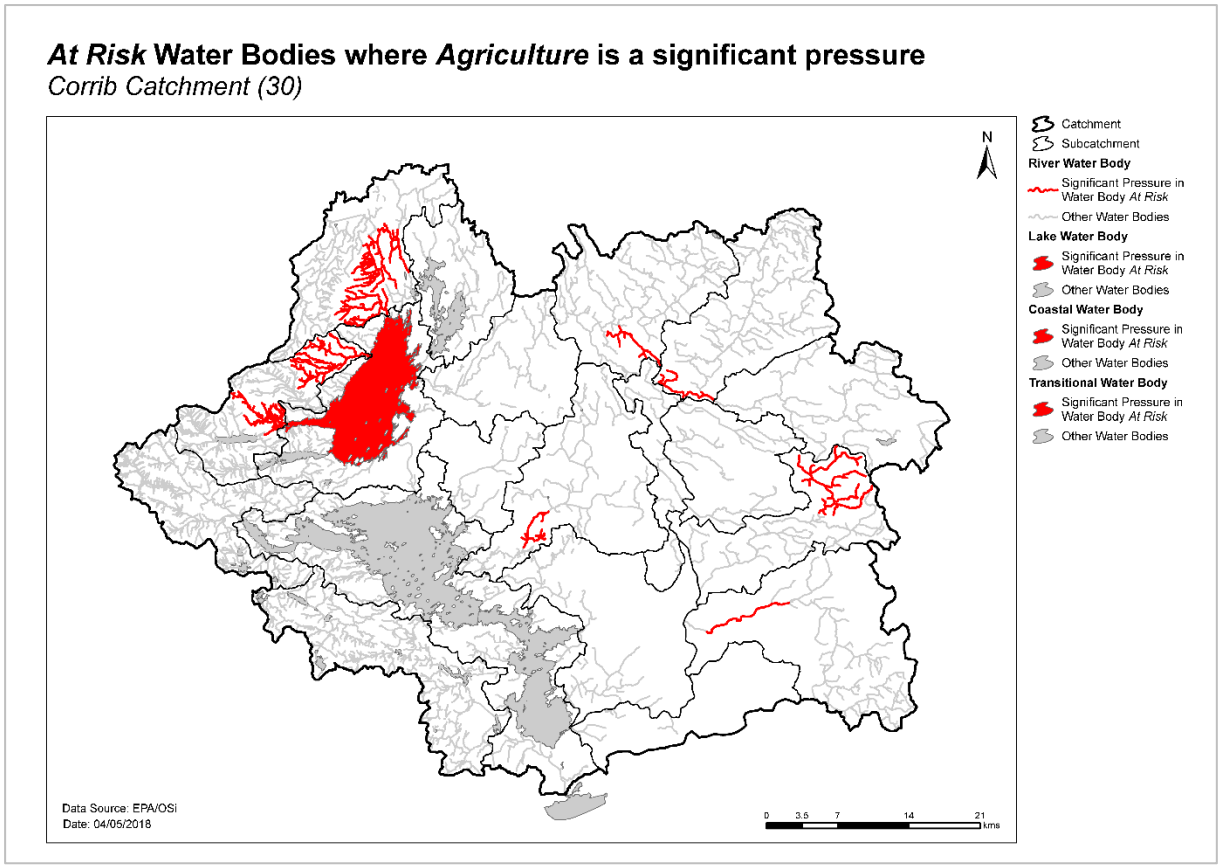


Figure 12. Water bodies that are *At Risk* and are impacted by agricultural activities

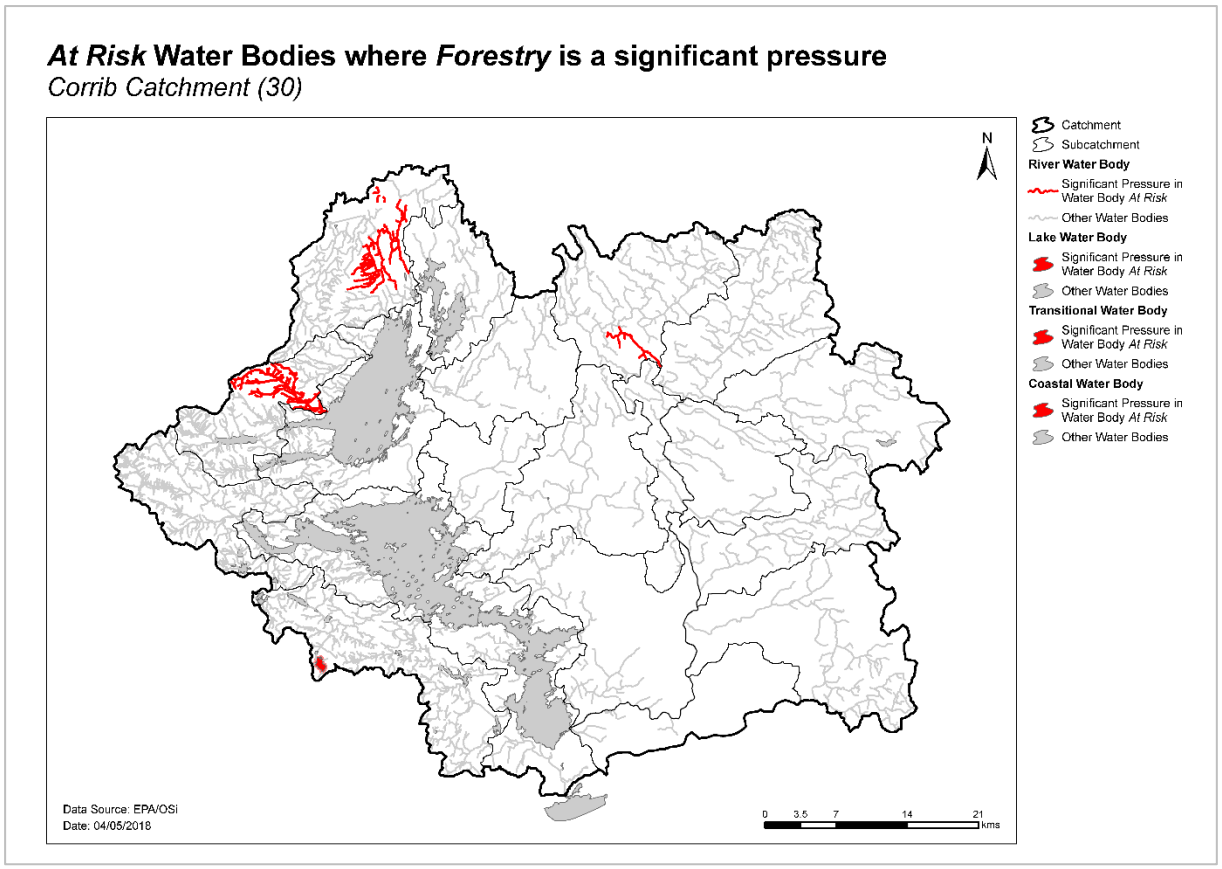


Figure 13. Water bodies that are *At Risk* and are impacted by forestry activities

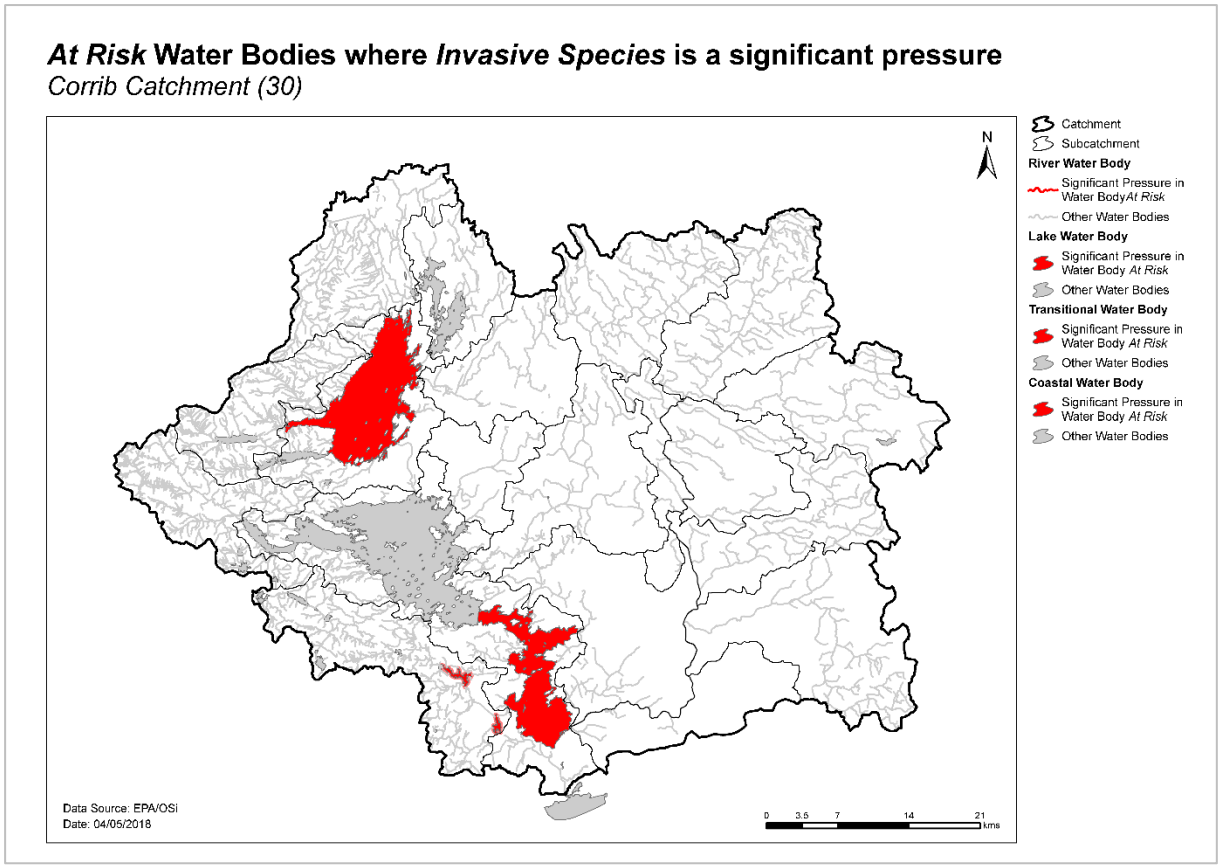


Figure 14. Water bodies that are *At Risk* and are impacted by Invasive Species

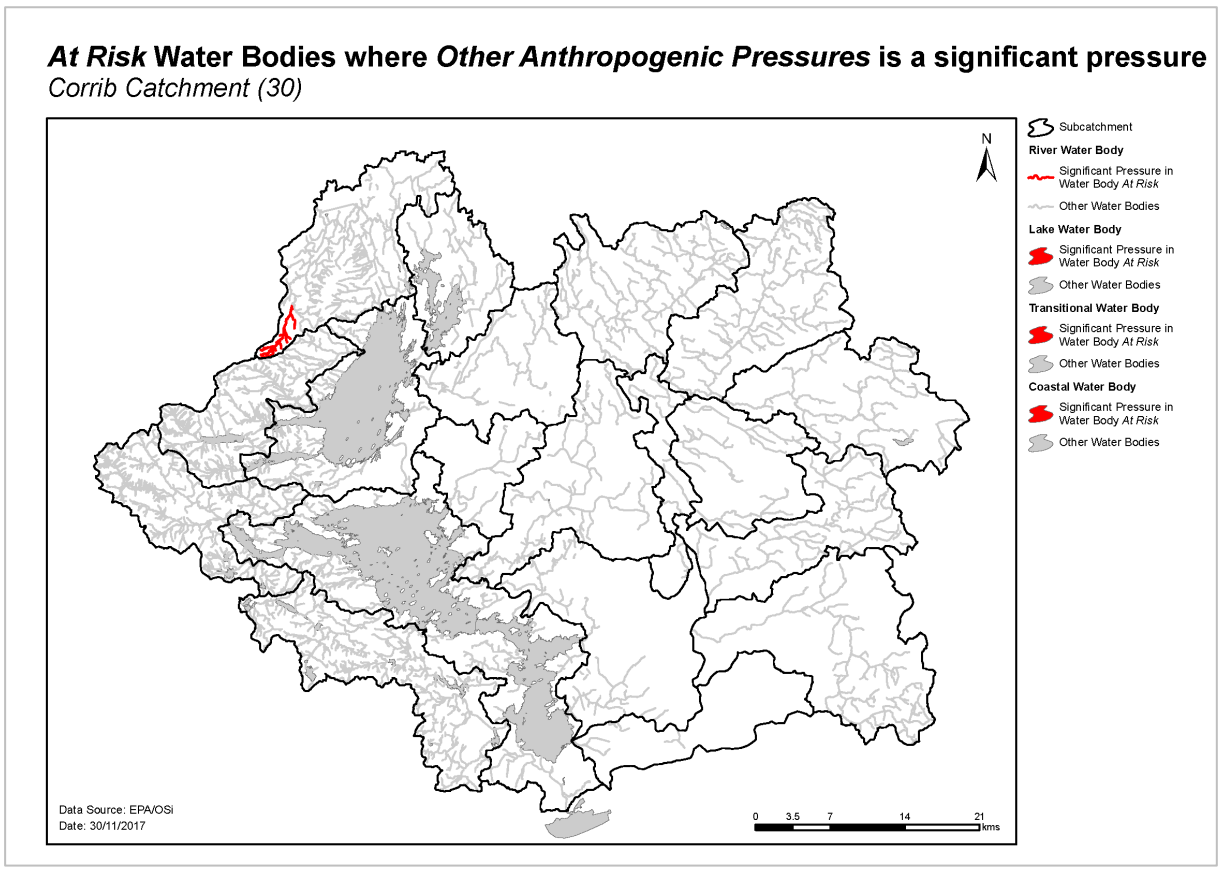


Figure 15. Water bodies that are *At Risk* and are impacted by other anthropogenic pressure

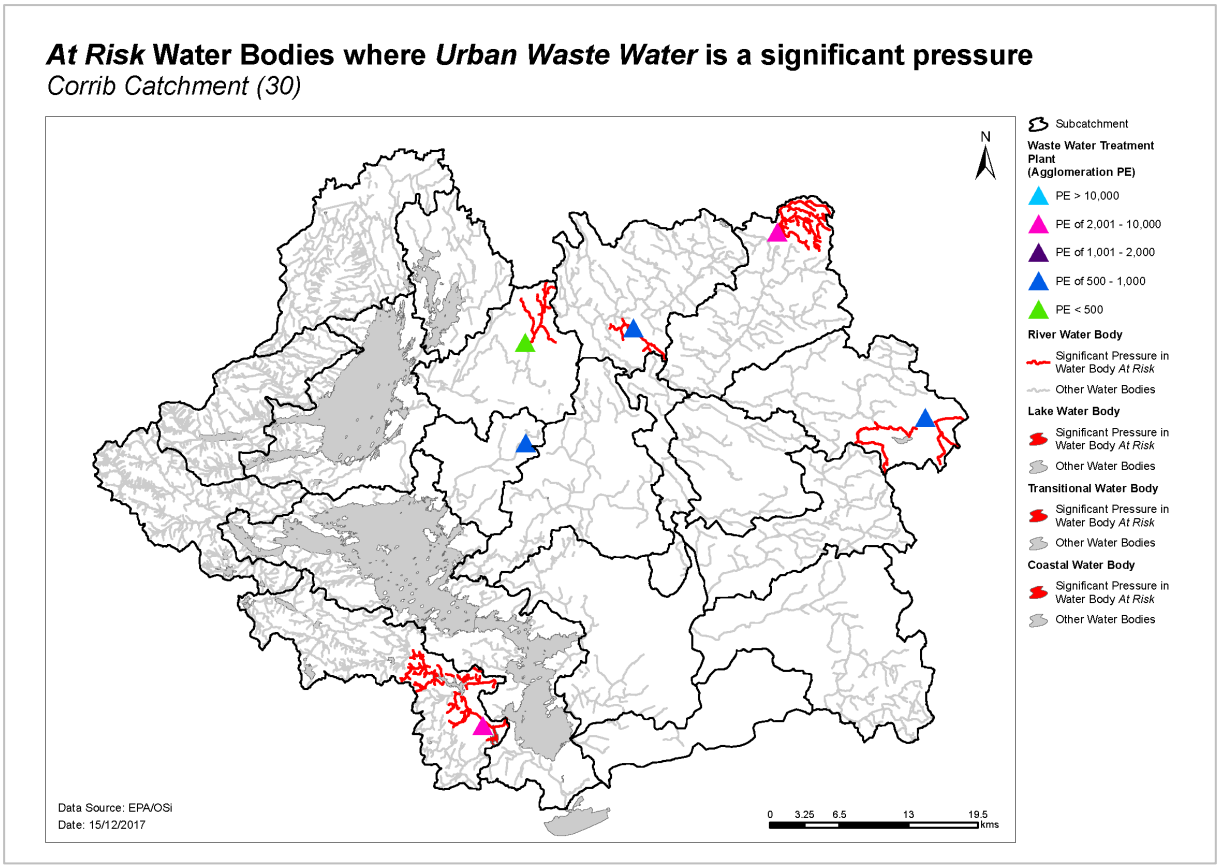


Figure 16. Water bodies that are *At Risk* and are impacted by urban waste water

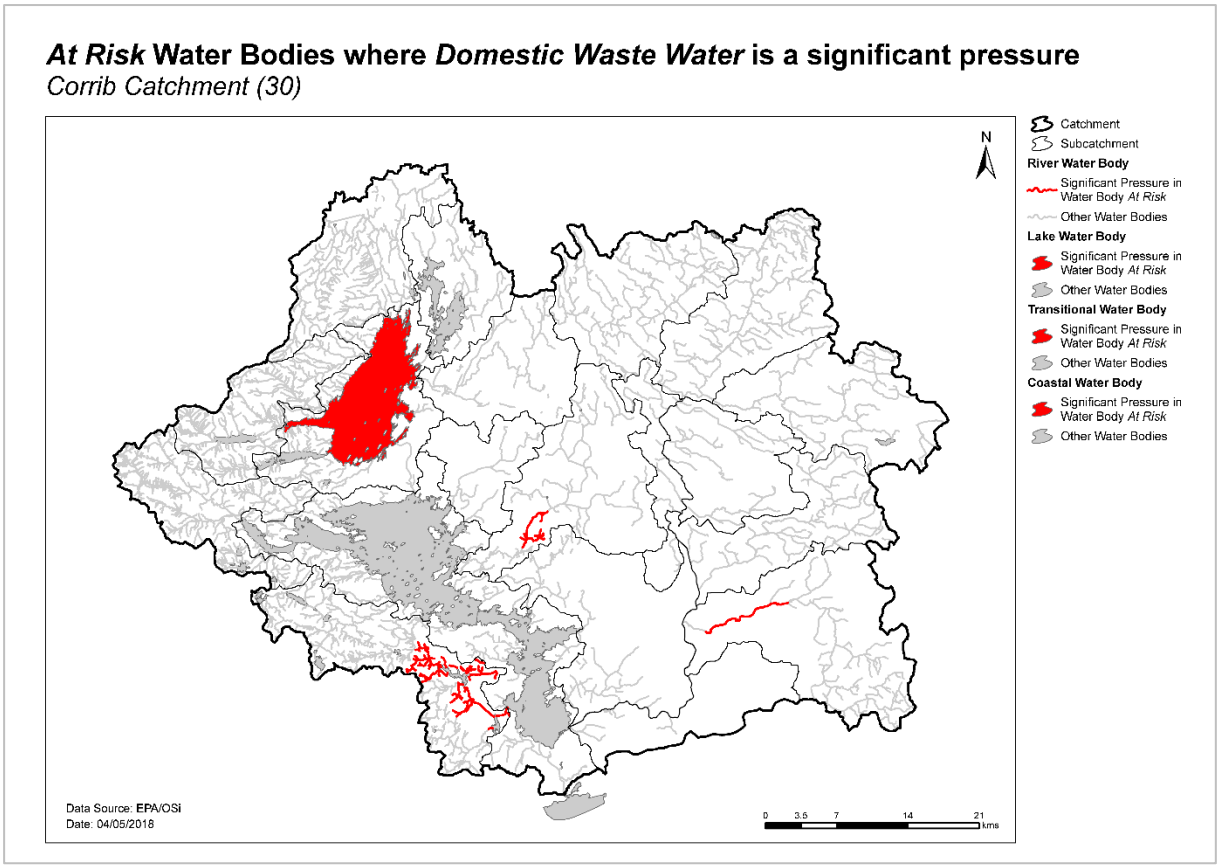


Figure 17. Water bodies that are *At Risk* and are impacted by domestic waste water

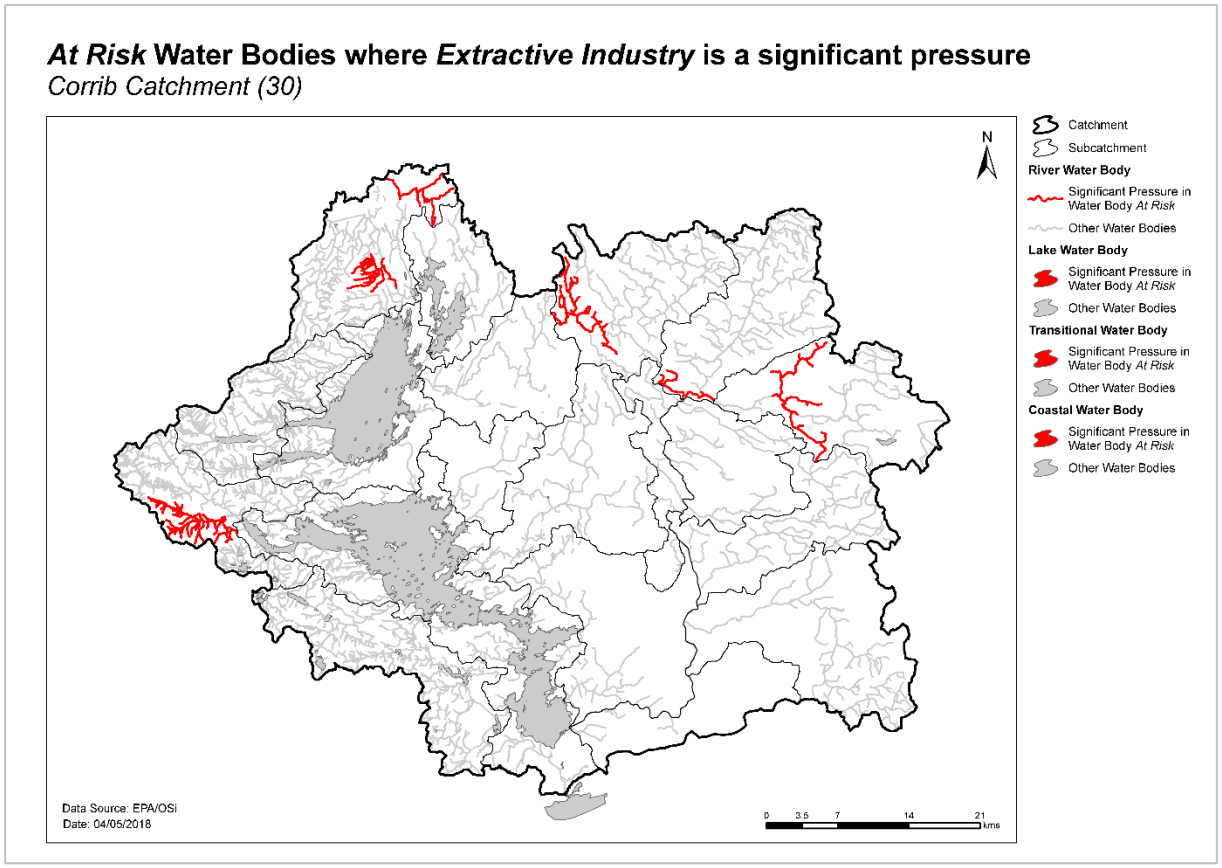


Figure 18. Water bodies that are *At Risk* and are impacted by the Extractive industry

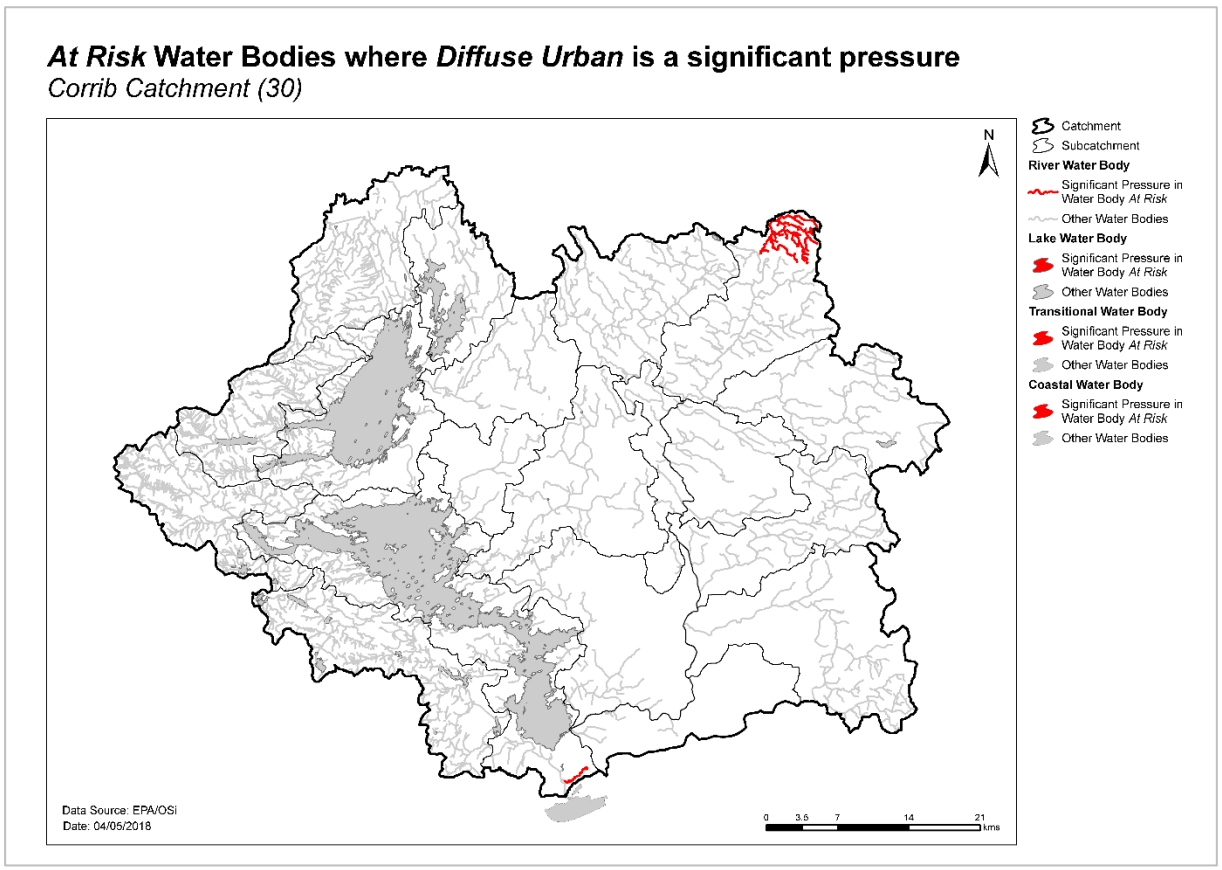


Figure 19. Water bodies that are *At Risk* and are impacted by diffuse urban impacts

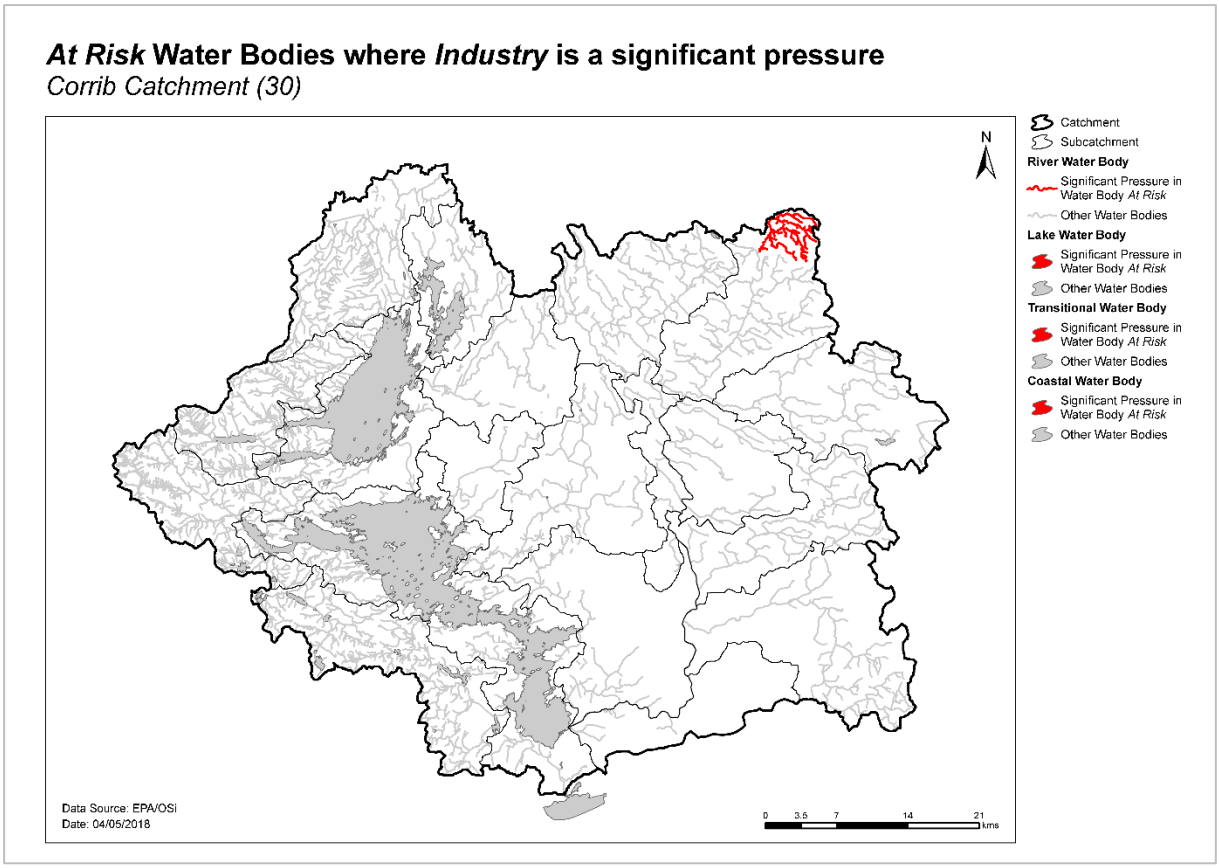


Figure 20. Water bodies that are *At Risk* and are impacted by industry

5 Load reduction assessment

5.1 River water body load reductions

- The results of the main channel assessment for both the Corrib and Clare (Galway) rivers indicate that orthophosphate, ammonia and TON concentrations are consistently low (Appendix 2).
- For water bodies where phosphorus monitoring data are available, the reduction in P load that would be required to bring the mean concentration back to the EQS of 0.035 mg/l as P, can be estimated using a simple method based on the average 2013 to 2015 concentration and the average flow, or the estimated 30th percentile flow (Q30) where flow data are not available. The relative load reductions are ranked on a national scale from Very High (>1 kg/Ha/y), to High (0.5-1 kg/Ha/y), to Medium (0.25-0.5 kg/Ha/y) to Low (<0.25 kg/Ha/y). Note that P load reductions may also be required in other water bodies, but without chemistry monitoring data a quantitative estimate cannot be calculated.
- In the Corrib catchment, water chemistry data are available for 47 of the 98 water bodies monitoring stations. The available data indicate that load reduction is required in one river water body (Table 7).

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

Water body	P Load Reduction Required
Ballindine_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.

- The TraC water body in the Corrib Catchment is not N or P limited.
- As part of the Irelands commitment to the Ospar Convention, nutrient flux or load monitoring has been carried out on the Corrib Estuary since 1990 (Figure 20a and 20b). Further analysis of these nutrient load trends is available at http://dx.doi.org/10.3318/BIOE.2016.23.

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

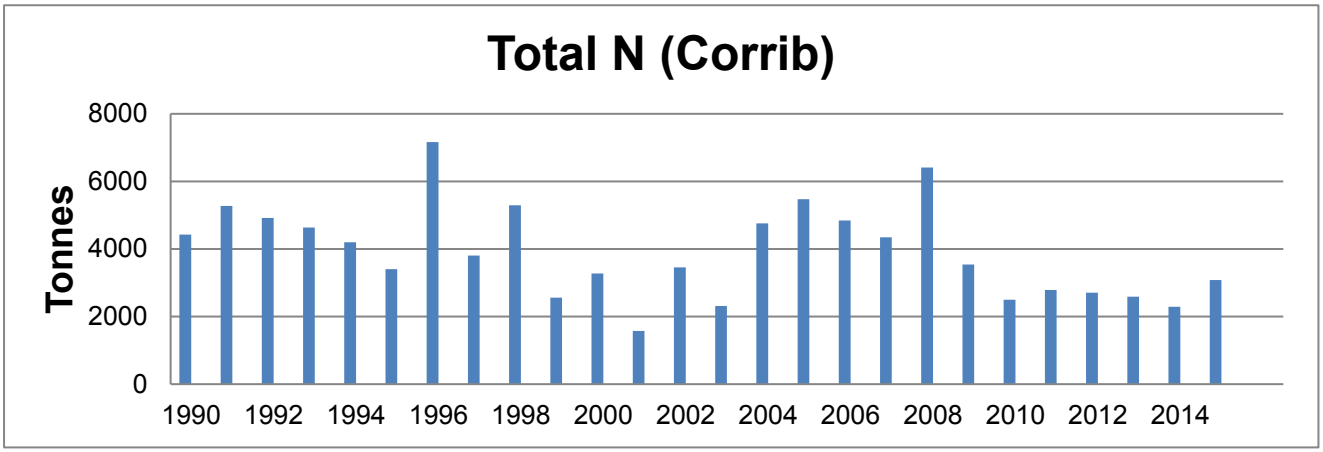
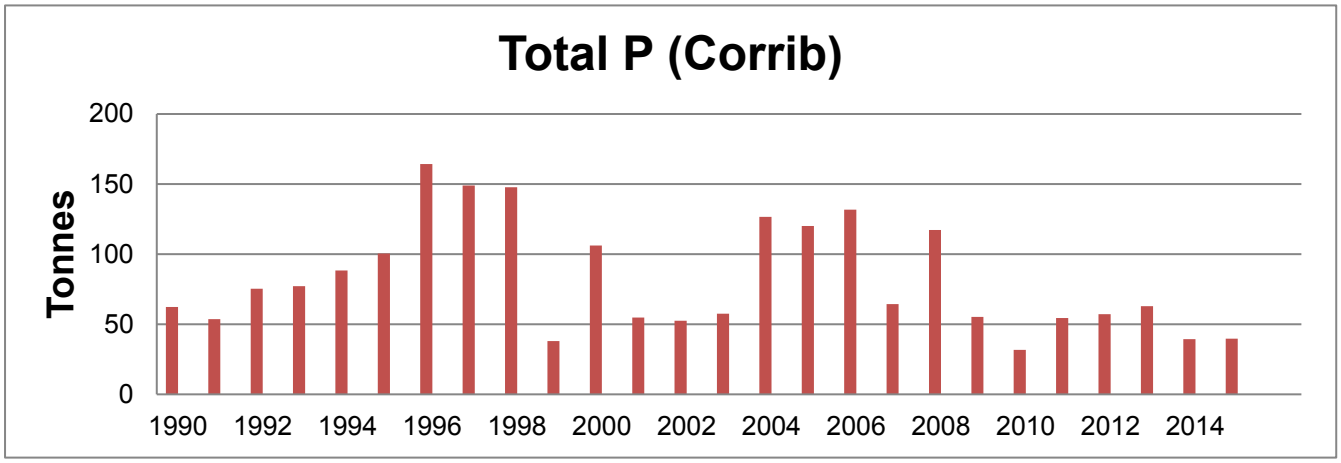


Figure 20b – Total Phosphorus Load (Tonnes/year) 1990-2015



6 Further characterisation and local catchment assessments

- Further characterisation through local catchment assessments is needed in 43 of the *At Risk* water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified (Table 8).
- Further characterisation through Investigative Assessments is needed in 18 of the *Review* water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.
- Brief definitions on the 10 IA assessment scenarios are given in Appendix 7.

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

Risk	IA 1	IA 2	IA 3	IA 4	IA 5	IA 6	IA 7	IA 8	IA 9	IA 10	Total
At Risk	19	1	2	0	4	2	22	9	2	0	61
Review	8	0	9	0	0	0	0	0	2	0	19
Note water bodies may have multiple categories of Local Catchment Assessments											

7 Catchment summary

- Of the 97 river water bodies, 36 are *At Risk* of not meeting their WFD objectives.
- Seven of 31 lake water bodies are *At Risk* of not meeting their WFD objectives.
- Hydromorphological (or physical) conditions (including the input of high levels of fine sediment) and poor habitat quality are major issues for a high proportion of *At Risk* surface water bodies.
- Excess phosphorus leading to eutrophication is also a concern in several water bodies. While excess ammonium is also of concern, it is only for a limited number of water bodies.
- There is one transitional water body, the Corrib estuary, and it is *Not at Risk*.
- There are three groundwater bodies which is *At Risk* - IE_WE_G_0084, Waste Facility (W0013-01) due to ammonia and, Clarinbridge and Clare-Corrib due to phosphate, which have the potential to impact on associated *At Risk* surface water bodies.

8 Areas for Action

The characterisation outcomes described above have highlighted that there is significant work to do in the catchment to protect and restore water quality, and meet the objectives of the WFD. During the development of the draft river basin management plan it became apparent that there would be a need to prioritise areas for collective action so that the best return on investment could be achieved. 190 Areas for action have been selected nationally in a process as described below. There are three areas for action in the Corrib 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 Corrib catchment are summarised below.

- Three recommended areas for actions (Table 9, Figure 21) were selected.
- These are the Owenriff, Failmore and LoughMask/Carra.
- These include 25 *At Risk* and 10 *Review* river and lake water bodies.
- Two groundwater bodies, which are in *Review* due to groundwater contribution of nutrients to surface water bodies, intersect 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 26 *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:

- twenty-six river and lake water bodies – 18 *At Risk* and 8 *Review.*

Table 9. Recommended Areas for Action in the Corrib Catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Owenriff	10	30_14	Galway	• Three *At Risk* water bodies: top 8 Freshwater Pearl Mussel water bodies. • Two *At Risk* High Ecological Status objective water bodies. • One deteriorated water body. • Headwaters flowing into the Corrib.
Failmore	5	30_15	Galway	• Test case for examining deteriorated water bodies in areas of low human activity. • One deteriorated High Ecological Status objective river water body. • Two deteriorated High Ecological Status lake water bodies but low confidence deteriorations. • Headwaters flowing into the Corrib.
Lough Mask and Carra	20	30_16, 30_17, 30_7, 30_3, 30_6	Mayo	• Carra habitat - unique to Europe. Research project to happen on Lough Cara (2019). Tourism area. • Eleven deteriorated water bodies. • Three At Risk High Ecological Status objective water bodies. • Lough Mask is an important drinking water source.

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

Groundwater bodies			Intersecting surface water body		Recommended area for action
Code	Name	Risk	Code	Name	
IE_WE_G_0019	Cong-Robe	Review	IE_WE_30R010400	ROBE_040	Lough Mask and Carra
			IE_WE_30R010600	ROBE_050	
			IE_WE_30R220540	RATHMALIKEEN_010	
			IE_WE_30_665a	Mask	
IE_WE_G_0022	Ballyhean	Review	IE_WE_30A030100	AGHINISH_010	
			IE_WE_30A340980	ANNIES_30_010	
			IE_WE_30C090100	CLOONDAVER STREAM (NORTH)_010	
			IE_WE_30C120400	CLAUREEN (MAYO)_010	
			IE_WE_30C120700	CLAUREEN (MAYO)_020	
			IE_WE_30_347	Carra	
			IE_WE_30_665a	Mask	

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 25 *At Risk* river water bodies, it is predicted that 6 (24%) will improve by 2021 and 18 (76%) will achieve their objective by 2027. For the ten *Review* river water bodies, the absence of information means that there is no scientific basis to quantify an environmental objective date, and therefore a 2027 date is set for these water bodies, see Table 11.

Table 11. Environmental objective dates for water bodies in the Areas for Action

Risk Category	No. of Water Bodies	No. of WBs for 2021 Improvement	No. of WBs for 2027 Status Improvement
At Risk	25	6	19
Review	10	0	10
Not at Risk	0	0	0
Total	35	6	29

- Sixty-eight water bodies have met their 2015 environmental objective.
- As action is not yet planned to be taken in the remaining 18 *At Risk* surface water bodies, a 2027 date is applied to all 18 water bodies.
- For the eight *Review* surface water bodies, the absence of information on these water bodies means that there is no scientific basis to quantify an environmental objective date and therefore a 2027 date is applied, see Table 12.

Table 12. Environmental objectives dates in the *At Risk* and *Review* surface water bodies not included in Areas for Action

Risk Category	No. of Water Bodies	No. of WBs for 2021 Improvement	No. of WBs for 2027 Status Improvement
Rivers			
At Risk	17	0	17
Review	5	0	5
Lakes			
At Risk	1	0	1
Review	3	0	3
Total	26	0	26

9.2 Groundwater

- Twenty of the 21 groundwater bodies are currently Good status and, therefore, have met their environmental objectives.
- The one groundwater body, Waste Facility (W0013-01), in the Corrib catchment that is less than Good status has an environmental objective date of 2027.

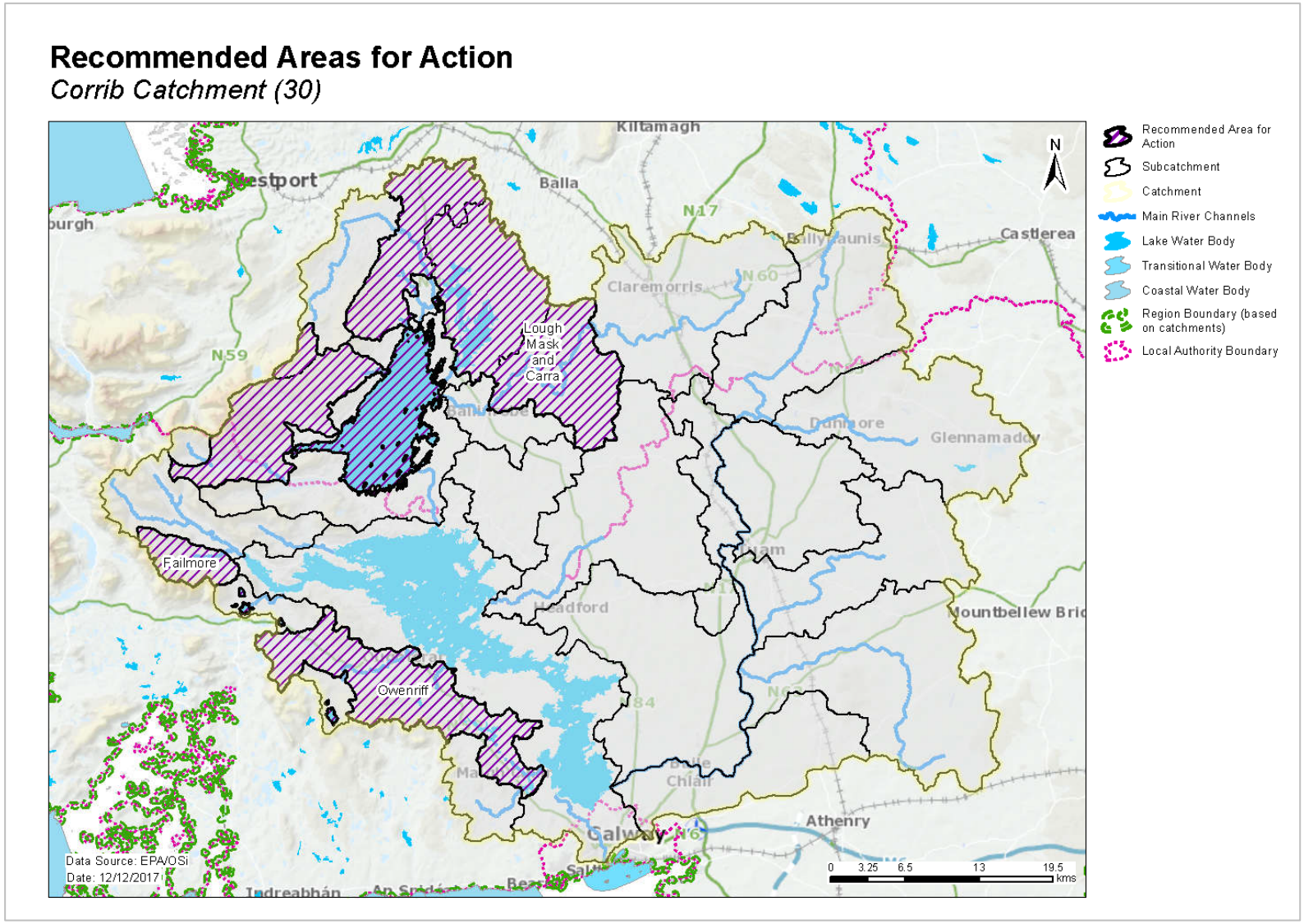


Figure 21. Location of Recommended Areas for Action in the Corrib Catchment

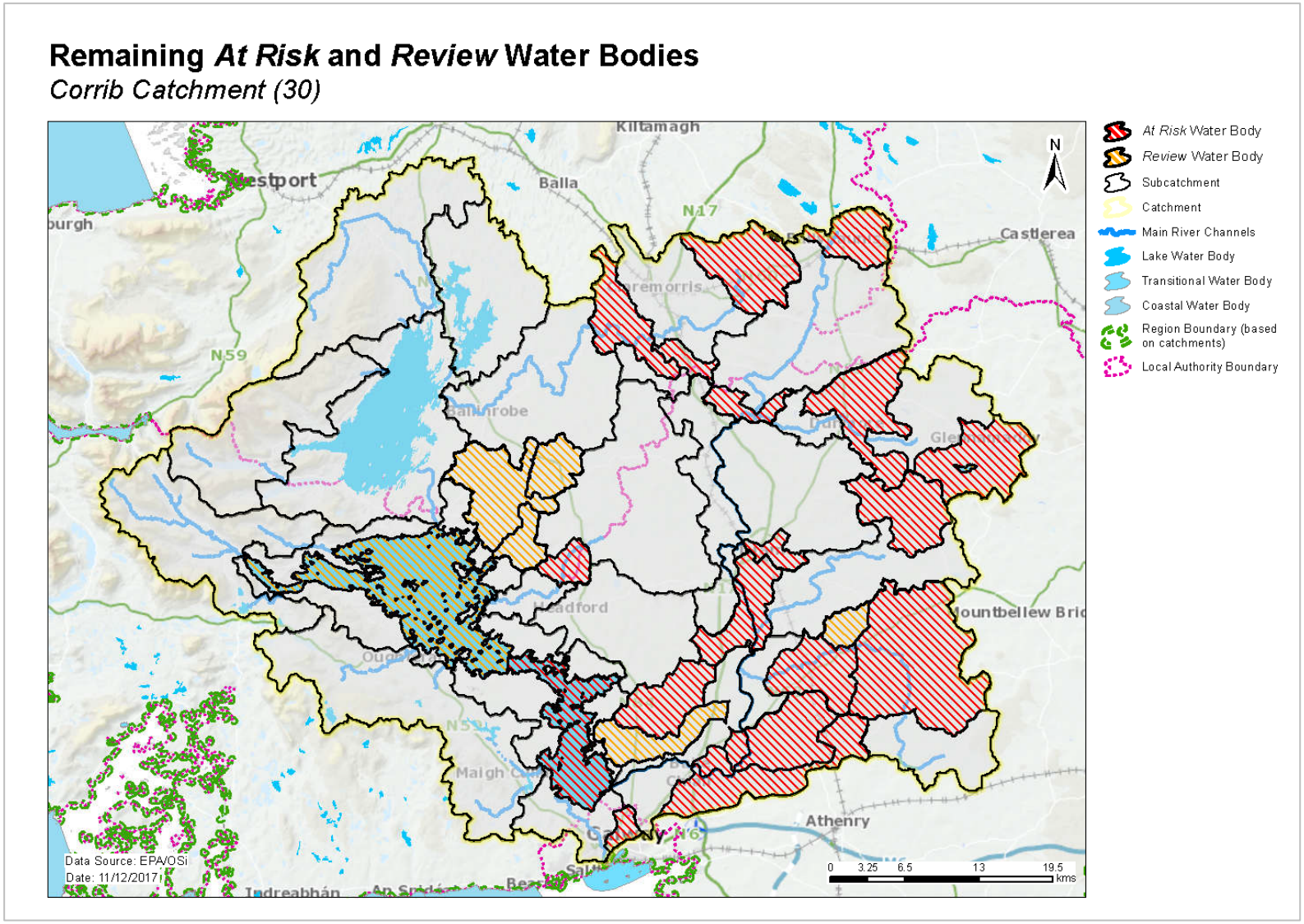


Figure 22. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Corrib Catchment

10 Acknowledgements

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

- Galway County Council
- Mayo County Council.
- Roscommon 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.

Appendix 1 High ecological status objective water bodies

Water body/ Site	Type	Codes	2015 Status
Bofin GY	Lake	IE_WE_30_335	High
GLENGAWBEG_010	River	IE_WE_30G060100	High
OWENRIFF (CORRIB)_010	River	IE_WE_30O020070	Good
OWENRIFF (CORRIB)_020	River	IE_WE_30O020200	Good
Maumwee	Lake	IE_WE_30_343	Good
Loughanillaun Maam Cross	Lake	IE_WE_30_348	Good
FAILMORE_010	River	IE_WE_30F010100	Good
Mask	Lake	IE_WE_30_665a	Good
CAMMANAGH_010	River	IE_WE_30C040100	High
FINNY_010	River	IE_WE_30F030100	Good
AILLE (MAYO)_030	River	IE_WE_30A020250	Good

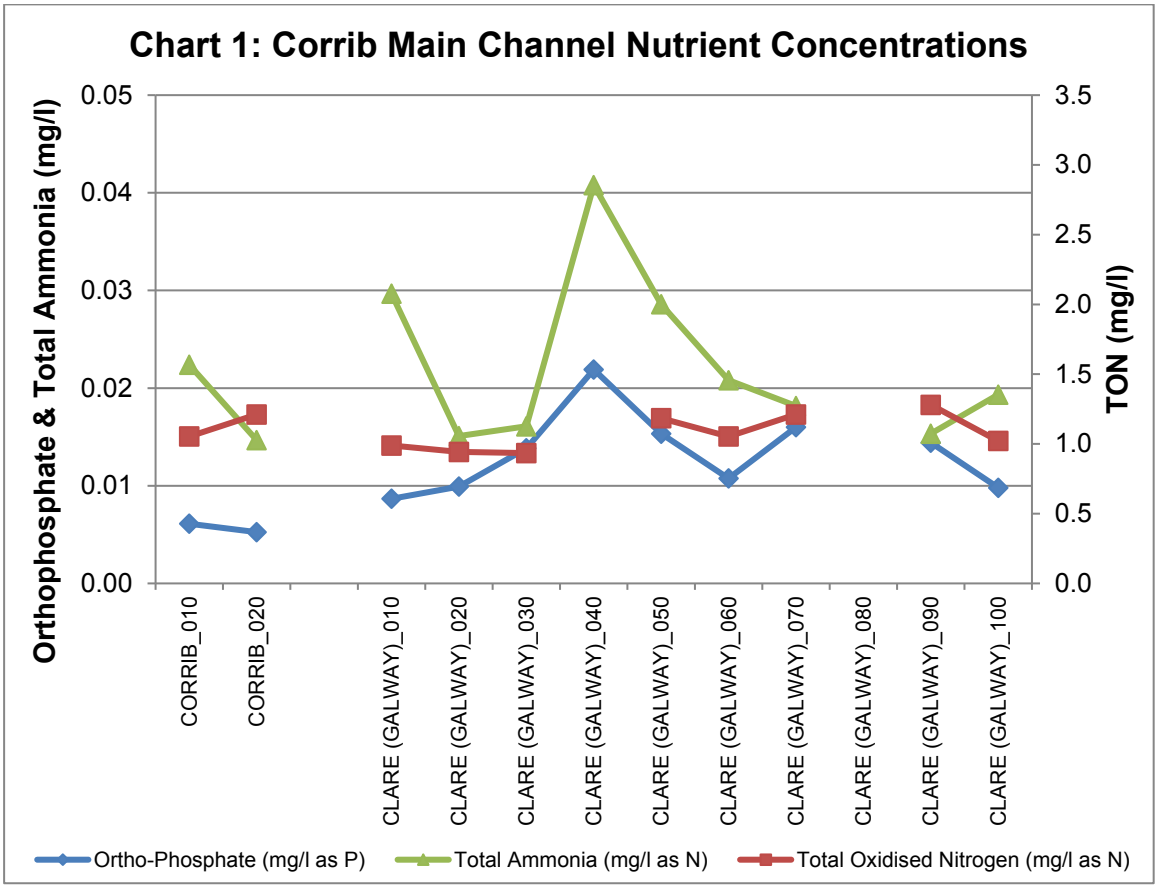
Appendix 2 Catchment scale nutrient concentrations and in-stream loads

The results of the instream water quality assessment for the Corrib catchment main channels are illustrated in Chart 1 and Chart 2.

Average orthophosphate concentrations along the Corrib River are low with values of 0.006 and 0.005mg/l at CORRIB_010 and CORRIB_020. The Environmental Quality Standard (EQS) of 0.035mg/l is not exceeded at either of the main channel monitoring points. Total oxidised nitrogen (TON) concentrations increase from CORRIB_010 to CORRIB_020, but remain below the 2.6mg/l threshold. Ammonia concentrations decrease from 0.022 to 0.014mg/l along the main channel, and remain below the EQS for good status (0.065mg/l).

Average orthophosphate concentrations along the Clare (Galway) river ranged from 0.009 to 0.022mg/l. The EQS is not exceeded at any of the main channel sampling locations. TON concentrations are relatively uniform throughout the river, ranging from 0.93 to 1.28mg/l, and remain below the 2.6mg/l threshold value. Ammonia concentrations are consistently below the EQS, with a peak in concentration (0.041mg/l) at CLARE (GALWAY)_040.

Orthophosphate, TON and ammonia loads in both the Corrib and Clare (Galway) rivers typically mirrored the concentration profiles (Chart 2).



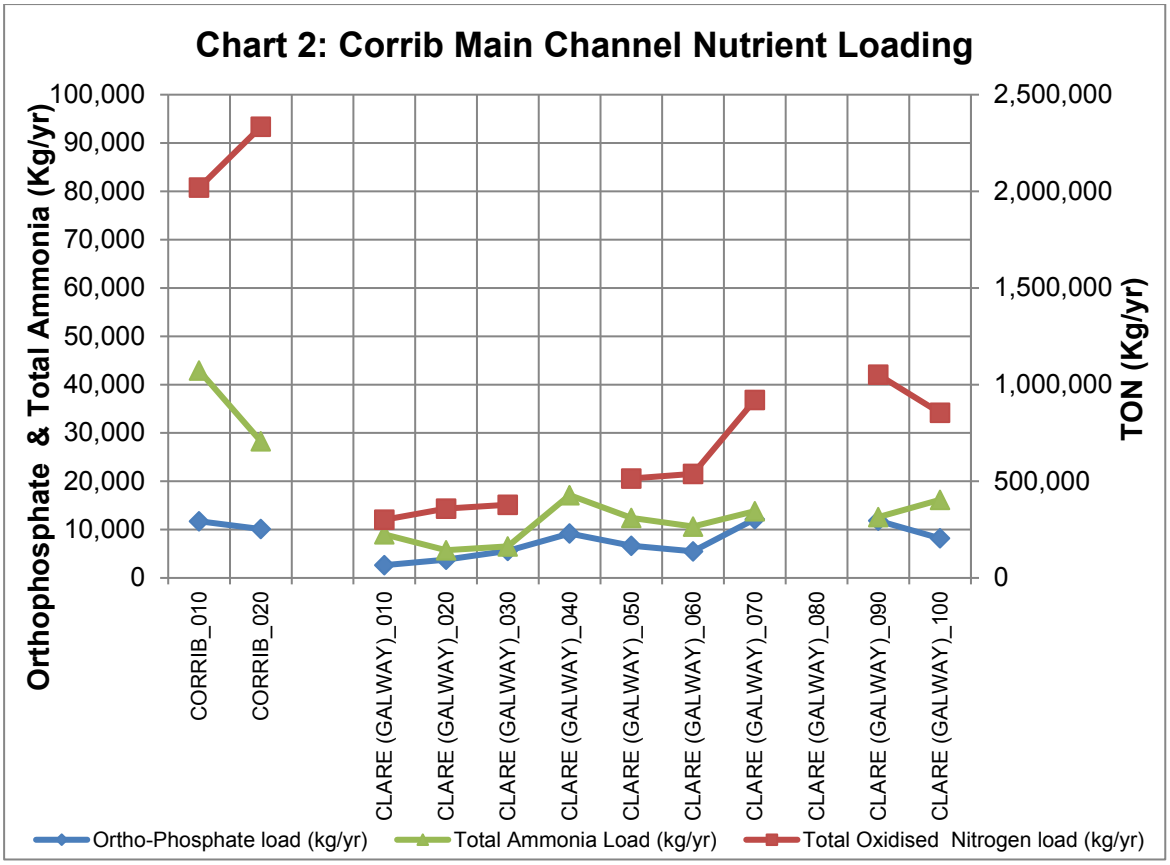


Chart 2: Corrib Main Channel Nutrient Loading
Orthophosphate & Total Ammonia (Kg/yr)
TON (Kg/yr)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
CORRIB_010
CORRIB_020
CLARE (GALWAY)_010
CLARE (GALWAY)_020
CLARE (GALWAY)_030
CLARE (GALWAY)_040
CLARE (GALWAY)_050
CLARE (GALWAY)_060
CLARE (GALWAY)_070
CLARE (GALWAY)_080
CLARE (GALWAY)_090
CLARE (GALWAY)_100
Ortho-Phosphate 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
30_2	IE_WE_30K010220	Kilmaine_010	River	Review	Unassigned	Unassigned	N		2027	
30_2	IE_WE_30K010300	Kilmaine_020	River	Review	Unassigned	Unassigned	N		2027	
30_2	IE_WE_30K220930	Knocknageeha 30_010	River	Review	Unassigned	Unassigned	N		2027	
30_3	IE_WE_30_347	Carra	Lake	Review	Good	Good	N		2027	Lough Mask and Carra
30_3	IE_WE_30A030100	Aghinish_010	River	At Risk	Good	Moderate	N	Hymo	2027	Lough Mask and Carra
30_3	IE_WE_30A340980	Annies_30_010	River	Review	Unassigned	Unassigned	N		2027	Lough Mask and Carra
30_3	IE_WE_30C090100	Cloondaver Stream (North)_010	River	At Risk	Moderate	Moderate	N	Hymo	2027	Lough Mask and Carra
30_5	IE_WE_30N010300	Nanny (Tuam)_030	River	At Risk	Poor	Moderate	N	Hymo	2027	
30_6	IE_WE_30R010400	Robe_040	River	At Risk	Moderate	Moderate	N	Hymo,UWW	2027	Lough Mask and Carra
30_6	IE_WE_30R010600	Robe_050	River	At Risk	Good	Moderate	N	Hymo	2027	Lough Mask and Carra
30_6	IE_WE_30R220540	Rathmalikeen_010	River	Review	Unassigned	Unassigned	N		2027	Lough Mask and Carra
30_7	IE_WE_30_328	Cloon MO	Lake	Review	Unassigned	Unassigned	N		2027	Lough Mask and Carra
30_7	IE_WE_30A020010	Aille (Mayo)_010	River	At Risk	Moderate	Moderate	N	Other	2027	Lough Mask and Carra
30_7	IE_WE_30A020250	Aille (Mayo)_030	River	At Risk	High	Good	Y	Ag,For	2021	Lough Mask and Carra
30_7	IE_WE_30C120400	Claureen (Mayo)_010	River	At Risk	Poor	Poor	N	Hymo,M+Q	2027	Lough Mask and Carra
30_7	IE_WE_30C120700	Claureen (Mayo)_020	River	At Risk	Good	Moderate	N	For,Hymo	2027	Lough Mask and Carra
30_7	IE_WE_30L030400	Lough Nacorralea Stream_010	River	At Risk	Good	Moderate	N	Ag,For,Hymo,Peat	2027	Lough Mask and Carra
30_7	IE_WE_30S020400	Srah Stream_010	River	At Risk	Good	Bad	N	Ag	2027	Lough Mask and Carra
30_8	IE_WE_30_308	Kiltullagh	Lake	Review	Unassigned	Unassigned	N		2027	
30_8	IE_WE_30G050025	Gortgarrow Stream_010	River	At Risk	Moderate	Moderate	N	Other	2027	
30_8	IE_WE_30S010300	Sinking_020	River	At Risk	Poor	Moderate	N	Hymo,Peat	2027	
30_9	IE_WE_30_341	Bekan	Lake	Review	Moderate	Unassigned	N		2027	
30_9	IE_WE_30B030200	Ballindine_010	River	At Risk	Poor	Poor	N	Ag,For,Hymo,UWW	2027	
30_9	IE_WE_30R010030	Robe_010	River	At Risk	Moderate	Moderate	N	Hymo	2027	
30_9	IE_WE_30R010310	Robe_030	River	At Risk	Poor	Moderate	N	Peat	2027	
30_10	IE_WE_30C010100	Clare (Galway)_010	River	At Risk	Moderate	Moderate	N	Ag,Hymo,Peat	2027	
30_10	IE_WE_30D010200	Dalgan_010	River	At Risk	Poor	Poor	N	DU,Ind,UWW	2027	
30_11	IE_WE_30B020300	Black (Shrule)_020	River	At Risk	Good	Moderate	N	Ag,DWW,Hymo	2027	
30_12	IE_WE_30A010300	Abbert_030	River	At Risk	Moderate	Moderate	N	Hymo	2027	
30_12	IE_WE_30A010500	Abbert_040	River	At Risk	Moderate	Moderate	N	Ag,DWW,Hymo	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
30_12	IE_WE_30F170810	Feagh_East_010	River	Review	Unassigned	Unassigned	N		2027	
30_13	IE_WE_30C010800	Clare (Galway)_060	River	At Risk	Moderate	Moderate	N	Hymo	2027	
30_13	IE_WE_30C011100	Clare (Galway)_080	River	At Risk	Good	Moderate	N	Hymo	2027	
30_13	IE_WE_30C011200	Clare (Galway)_090	River	At Risk	Unassigned	Moderate	N	Hymo	2027	
30_13	IE_WE_30C030150	Cregg_010	River	At Risk	Moderate	Moderate	N	Hymo	2027	
30_13	IE_WE_30C030200	Cregg_020	River	Review	Unassigned	Unassigned	N		2027	
30_14	IE_WE_30_315	Buffy	Lake	Review	Unassigned	Unassigned	N		2027	Owenriff
30_14	IE_WE_30_325	Acogga	Lake	Review	Unassigned	Unassigned	N		2027	Owenriff
30_14	IE_WE_30_336	Parkyflaherty	Lake	Review	Unassigned	Unassigned	N		2027	Owenriff
30_14	IE_WE_30_340	Ballyquirke	Lake	At Risk	Moderate	Moderate	N	Other,UWW	2027	Owenriff
30_14	IE_WE_30_344	Lettercraffroe	Lake	At Risk	Good	Moderate	N	For	2021	Owenriff
30_14	IE_WE_30_345	Ross GY	Lake	At Risk	Moderate	Poor	N	Other	2027	Owenriff
30_14	IE_WE_30B140100	Ballycuirke_010	River	At Risk	Poor	Poor	N	DWW,Hymo,UWW	2027	Owenriff
30_14	IE_WE_30D030600	Drimneen_010	River	Review	Good	Unassigned	N		2027	Owenriff
30_14	IE_WE_30O020070	Owenriff (Corrib)_010	River	At Risk	High	Good	Y	Hymo	2027	Owenriff
30_14	IE_WE_30O020200	Owenriff (Corrib)_020	River	At Risk	Good	Good	Y	Hymo	2027	Owenriff
30_15	IE_WE_30_313	Loughaunieran Maam Cross	Lake	Review	Unassigned	Unassigned	N		2027	Failmore
30_15	IE_WE_30_326	Shannagrena	Lake	Review	Unassigned	Unassigned	N		2027	Failmore
30_15	IE_WE_30_343	Maumwee	Lake	At Risk	High	Good	Y	Hymo	2021	Failmore
30_15	IE_WE_30_348	Loughanillaun Maam Cross	Lake	At Risk	High	Good	Y	Hymo	2027	Failmore
30_15	IE_WE_30F010100	Failmore_010	River	At Risk	High	Good	Y	Hymo,Peat	2027	Failmore
30_16	IE_WE_30_665a	Mask	Lake	At Risk	High	Good	Y	Ag,DWW,Other	2027	Lough Mask and Carra
30_16	IE_WE_30F030100	Finny_010	River	At Risk	High	Good	Y	Hymo	2021	Lough Mask and Carra
30_16	IE_WE_30G010250	Glensaul_010	River	At Risk	Good	Poor	N	Ag	2021	Lough Mask and Carra
30_16	IE_WE_30O010050	Owenbrin_010	River	At Risk	Moderate	Moderate	N	For,Hymo	2027	Lough Mask and Carra
30_16	IE_WE_30O010200	Owenbrin_020	River	At Risk	Good	Moderate	N	For,Hymo	2027	Lough Mask and Carra
30_16	IE_WE_30S030100	Srahnalong_010	River	At Risk	Good	Moderate	N	Ag	2021	Lough Mask and Carra

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
30_18	IE_WE_30_666a	Corrib Lower	Lake	At Risk	Poor	Moderate	N	Other	2027	
30_18	IE_WE_30_666b	Corrib Upper	Lake	Review	Good	Good	N		2027	
30_18	IE_WE_30T010500	Terryland_010	River	At Risk	Poor	Poor	N	DU,Hymo	2027	
30_19	IE_WE_30L070100	Levally Stream_010	River	At Risk	Good	Moderate	N	Ag,Hymo	2027	

Ag: Agriculture

DWW: Domestic Waste Water

For: Forestry

Hymo: Hydromorphology

Ind: Industry

M+Q: Mines and Quarries

Peat: Peat Drainage and Extraction

DU: Diffuse Urban

UWW: Urban Waste Water

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

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

Appendix 4 Drinking water supplies in the catchment

Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes /No	Reason why not met
1200PRI0145	Balroebuckbeg	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0147	Barnaderg Gortbeg GWS Well	Clare-Corrib	IE_WE_G_0020	Yes	N/A
	Barnaderg Gortbeg GWS Spring	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0445	Corohan	Dunmore	IE_WE_G_0005	Yes	N/A
1200PRI0445	Rusheens	Clare-Corrib	IE_WE_G_0020	Yes	N/A
2200PRI2088	Milford GWS	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0104	Anbally and District	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0151	Belclare	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0152	Belmont (Kilconly)	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0159	Boyounagh/Ballyedmond Spring	Clare-Corrib	IE_WE_G_0020	Yes	N/A
	Boyounagh/Ballyedmond Borehole no 1	Dunmore	IE_WE_G_0005	Yes	N/A
	Boyounagh/Ballyedmond Borehole no 2 (Back up)	Dunmore	IE_WE_G_0005	Yes	N/A
	Boyounagh/Ballyedmond Borehole no 3	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0161	Brierfield No 1, Ballinasloe	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0175	Cahereenlea,Athenry	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0286	Clough/Cummer	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0318	Feigh East and West	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0323	Gallagh/Brownsgrove	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0337	Gurteen/Cloonmore	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0385	Kiltevna and Toberowen schemes	Dunmore	IE_WE_G_0005	Yes	N/A
1200PRI0415	Lisananey/Liskeavy	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0444	Milltown Community Group Scheme	Clare-Corrib	IE_WE_G_0020	Yes	N/A
2200PRI2011	Barnacarroll GWS	Cong-Robe	IE_WE_G_0019	Yes	N/A
2200PRI2037	Cregduff Group Water Scheme	Cong-Robe	IE_WE_G_0019	Yes	N/A
2200PRI2060	Gurteen GWS	Corrib Gravels	IE_WE_G_0063	Yes	N/A
2200PRI2064	Irishtown GWS No. 1	Clare-Corrib	IE_WE_G_0020	Yes	N/A
	Irishtown GWS No. 2	Clare-Corrib	IE_WE_G_0020	Yes	N/A
	Irishtown GWS Kilvine Well	Clare-Corrib	IE_WE_G_0020	Yes	N/A
2200PRI2065	Johnstown GWS	Clare-Corrib	IE_WE_G_0020	Yes	N/A
2200PRI2136	Loughanemon	Cong-Robe	IE_WE_G_0019	Yes	N/A
2200PRI2153	Shraheen/Aughgower	Maam-Clonbur	IE_WE_G_0006	Yes	N/A
1200PRI0179	Cahermorris (Glenrevagh), Corandulla	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PRI0216	Claren/Knocklehard	Corrib Upper	IE_WE_30_666b	Yes	N/A
2200PRI2056	Glencorrib GWS	Corrib Upper	IE_WE_30_666b	Yes	N/A

Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes /No	Reason why not met
2200PRI2083	Lough Mask Creevagh GWS	Lough Mask	IE_WE_30_665a	Yes	N/A
2200PRI2147	Funchona/Cross	Corrib Upper	IE_WE_30_666b	Yes	N/A
2200PRI2668	Lough Carra GWS	Lough Carra	IE_WE_30_347	Yes	N/A
1200PRI0178	Kilcoona Caherlistrane	Lough Corrib	IE_WE_30_666a	Yes	N/A
2200PRI2004	Ayle GWS	Lough Aille/ Aille (Mayo)_020	IE_WE_30A020100	Yes	N/A
2200PRI2100	Robeen GWS	Aghinish_010	IE_WE_30A030100	Yes	N/A
2200PRI2138	Pulbawn/Killenrevagh	Black (Shrule)_010	IE_WE_30B020200	Yes	N/A
1200PUB1018	Dunmore Glenamaddy	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PUB1021	Glenamaddy	Clare-Corrib	IE_WE_G_0020	Yes	N/A
1200PUB1038	Mid Galway Spring	Clare-Corrib	IE_WE_G_0020	Yes	N/A
	Mid Galway Spring	Clare-Corrib	IE_WE_G_0020	Yes	N/A
	Mid Galway Borehole	Clare-Corrib	IE_WE_G_0020	Yes	N/A
2200PUB1016	Kilmaine WSS Tubber Padraig	Cong-Robe	IE_WE_G_0019	Yes	N/A
	Kilmaine WSS Fountain Hill	Cong-Robe	IE_WE_G_0019	Yes	N/A
1200PUB1047	Tuam	Corrib Lower	IE_WE_30_666a	Yes	N/A
1200PUB1013	Clonbur	Corrib Upper	IE_WE_30_666b	Yes	N/A
1200PUB1041	Oughterard	Lough Buffy	IE_WE_30_315	Yes	N/A
2200PUB1019	Lough Mask RWSS	Lough Mask	IE_WE_30_665a	Yes	N/A
1100PUB1001	Terryland WTP	Corrib_020	IE_WE_30C020600	Yes	N/A
2200PUB1012	Cong WSS	Corrib_010	IE_WE_30C020300	Yes	N/A
2200PUB1023	Shrule WSS	Mocorha_010	IE_WE_30M330920	Yes	N/A
2200PRI2148	Kilkeeran	Cong-Robe	IE_WE_G_0019[2]	Yes	N/A
2200PRI2149	Knockatubber	Cong-Robe	IE_WE_G_0019*	Yes	N/A
2200PRI2158	Kinnuary	Maam-Clonbur	IE_WE_G_0006	Yes	N/A

[2] These final 3 listed do not have any description of scheme type in spreadsheet*

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

Note that additional water dependent species have been added that are not qualifying interests within the SACs (i.e. White-clawed Crayfish (Austropotamobius pallipes; 1192) and Arctic char (Salvelinus alpinus) have been added to Lough Carra/Mask Complex SAC).

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Ardkill Turlough SAC 000461	3180	Good GW level/quality	Groundwater	Cong-Robe GWB	Good (R)	No	IE_WE_G_0019	No
Ballymaglancy Cave, Cong SAC 000474	none							
Carrowkeel Turlough SAC 000475	3180	Good GW level/quality	Groundwater	Cong-Robe GWB	Good (R)	No	IE_WE_G_0019	No
Cloughmoyne SAC 000479	none							
Clyard Kettle-Holes SAC 000480	3180	Good GW level/quality	Groundwater	Cong-Robe GWB	Good (R)	No	IE_WE_G_0019	No
Connemara Bog Complex SAC 002034	3130	At least Good	Lake	Bofin GY	High (NAR-HES obj)	No	IE_WE_30_335	Yes
	Potential 3110/Potential 3130	At least Good	Lake	Adrehid	Unassigned (NAR)	No	IE_WE_30_ 215	Yes
			Lake	Agraffard	Unassigned (NAR)	No	IE_WE_30_334	Yes
	Potential 3110	At least Good	Lake	Acogga	Unassigned (R)	Yes	IE_WE_30_325	Yes
			Lake	Lettercraffroe	Moderate (AT RISK)	Yes	IE_WE_30_344	Yes
	1029 (8 priority catchments)	High	River	Owenriff (Corrib)_010	Good (AT RISK-HES obj)	Yes	IE_WE_30O020070	Yes
			River	Glengawbeg_010	High (NAR-HES obj)	No	IE_WE_30G060100	Yes
	7230	Good GW level	Groundwater	Maam-Clonbur GWB	Good (NAR)	No	IE_WE_G_0006	Yes
			Groundwater	Oughterard Marbles GWB	Good (NAR)	No	IE_WE_G_0009	No
Gortnandarragh Limestone Pavement SAC 001271	none							
Greaghans Turlough SAC 000503	3180	Good GW level/quality	Groundwater	Cong-Robe GWB	Good (R)	No	IE_WE_G_0019	No
Kildun Souterrain SAC 002320	none							

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Kilglassan/Caheravoostia Turlough Complex SAC 000504	3180	Good GW level/quality	Groundwater	Cong-Robe GWB	Good (R)	No	IE_WE_G_0019	No
Levally Lough SAC 000295	3180	Good GW level/quality	Groundwater	Clare-Corrib GWB	Good (R)	No	IE_WE_G_0020	No
Lisnageeragh Bog and Ballinastack Turlough SAC 000296	3180	Good GW level/quality	Groundwater	Suck South GWB	Good (R)	No	IE_WE_G_225	Yes
Lough Carra/Mask Complex SAC 001774	3110	At least Good	Lake	Mask	Good (AT RISK-HES obj)	No	IE_WE_30_665a	No
			Lake	Upper Mask	Good (NAR)	No	IE_WE_30_665b	No
	3130	At least Good	Lake	Mask	Good (AT RISK-HES obj)	No	IE_WE_30_665a	No
			Lake	Upper Mask	Good (NAR)	No	IE_WE_30_665b	No
	3140	At least Good	Lake	Carra	Good (R)	No	IE_WE_30_347	No
	7230	Good GW level	Groundwater	Ballyhean GWB	Good (R)	No	IE_WE_G_0022	No
			Groundwater	Cong-Robe GWB	Good (R)	No	IE_WE_G_0019	No
	Arctic char	Good	Lake	Mask	Good (AT RISK-HES obj)	No	IE_WE_30_665a	No
			Lake	Upper Mask	Good (NAR)	No	IE_WE_30_665b	No
	1092 (not listed)	Moderate	Lake	Carra	Good (R)	No	IE_WE_30_347	No
Lough Corrib SAC 000297	3110	At least Good	Lake	Corrib Upper	Good (R)	No	IE_WE_30_666b	No
	3130	At least Good	Lake	Corrib Upper	Good (R)	No	IE_WE_30_666b	No
	3140	At least Good	Lake	Corrib Lower	Moderate (AT RISK)	Yes	IE_WE_30_666a	No
	7220	Good GW level	Groundwater	Lough Corrib Fens 3 & 4 (SAC000297)	Good (NAR)	No	IE_WE_G_0106	No
			Groundwater	Lough Corrib Fen 2 (SAC000297)	Good (NAR)	No	IE_WE_G_0109	No
			Groundwater	Clare-Corrib GWB	Good (AT RISK)	No	IE_WE_G_0020	No
			Groundwater	Waste facility (W0013-01)	Poor (AT RISK)	No	IE_WE_G_0084	No
			Groundwater	Ross Lake GWB	Good (NAR)	No	IE_WE_G_0010	No
			Groundwater	Maam-Clonbur GWB	Good (NAR)	No	IE_WE_G_0006	No
			Groundwater	Oughterard Marbles GWB	Good (NAR)	No	IE_WE_G_0009	No
			Groundwater	Cong-Robe GWB	Good (R)	No	IE_WE_G_0019	No
	7230	Good GW level	Groundwater	Lough Corrib Fens 3 & 4 (SAC000297)	Good (NAR)	No	IE_WE_G_0106	No
			Groundwater	Lough Corrib Fen 2 (SAC000297)	Good (NAR)	No	IE_WE_G_0109	No

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Lough Corrib SAC 000297	7230	Good GW level	Groundwater	Clare-Corrib GWB	Good (AT RISK)	No	IE_WE_G_0020	No
			Groundwater	Waste facility (W0013-01)	Poor (AT RISK)	No	IE_WE_G_0084	No
			Groundwater	Ross Lake GWB	Good (NAR)	No	IE_WE_G_0010	No
			Groundwater	Maam-Clonbur GWB	Good (NAR)	No	IE_WE_G_0006	No
			Groundwater	Oughterard Marbles GWB	Good (NAR)	No	IE_WE_G_0009	No
			Groundwater	Cong-Robe GWB	Good (R)	No	IE_WE_G_0019	No
	1029 (8 priority catchments)	High	River	Owenriff (Corrib)_020	Good (AT RISK-HES obj)	Yes	IE_WE_30O020200	Yes
	1092	At least Moderate	Lake	Corrib Upper	Good (R)	No	IE_WE_30_666b	No
			Lake	Corrib Lower	Moderate (AT RISK)	No	IE_WE_30_666a	No
			River	Corrib_010	Unassigned (NAR)	No	IE_WE_30C020300	No
			River	Cregg_020	Unassigned (R)	No	IE_WE_30C030200	No
			River	Clare (Galway)_100	Unassigned (NAR)	No	IE_WE_30C011300	No
			River	Clare (Galway)_090	Moderate (AT RISK)	No	IE_WE_30C011200	No
			River	Clare (Galway)_080	Moderate (AT RISK)	No	IE_WE_30C011100	No
			River	Clare (Galway)_070	Good (NAR)	No	IE_WE_30C011000	No
			River	Clare (Galway)_060	Moderate (AT RISK)	No	IE_WE_30C010800	No
			River	Clare (Galway)_050	Good (NAR)	No	IE_WE_30C010700	No
			River	Clare (Galway)_040	Good (NAR)	No	IE_WE_30C010670	No
			River	Clare (Galway)_030	Good (NAR)	No	IE_WE_30C010500	No
			River	Clare (Galway)_020	Unassigned (NAR)	No	IE_WE_30C010300	No
			River	Clare (Galway)_010	Moderate (AT RISK)	No	IE_WE_30C010100	No
			River	Cnocnagur_30_010	Unassigned (NAR)	No	IE_WE_30C070900	No
			River	Cloonfad_010	Unassigned (NAR)	No	IE_WE_30C110300	No
			River	Dalgan_030	Good (NAR)	No	IE_WE_30D010400	No
			River	Dalgan_040	Good (NAR)	No	IE_WE_30D010500	No
			River	Dalgan_050	Good (NAR)	No	IE_WE_30D010600	No
			River	Sinking_010	Good (NAR)	No	IE_WE_30S010100	No
			River	Sinking_020	Moderate (AT RISK)	No	IE_WE_30S010300	No
			River	Sinking_030	Good (NAR)	No	IE_WE_30S010400	No
			River	Yellow (Sinking)_010	Good (NAR)	No	IE_WE_30Y010055	No
			River	Gortgarrow Stream_010	Moderate (AT RISK)	No	IE_WE_30G050025	No

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Lough Corrib SAC 000297	1092	At least Moderate	River	Levally Stream_010	Moderate (AT RISK)	No	IE_WE_30L070100	No
			River	Grange (Galway)_010	Good (NAR)	No	IE_WE_30G020200	No
			River	Grange (Galway)_020	Good (NAR)	No	IE_WE_30G020400	No
			River	Grange (Galway)_030	Good (NAR)	No	IE_WE_30G020500	No
			River	Grange (Galway)_040	Good (NAR)	No	IE_WE_30G020700	No
			River	Abbert_020	Good (NAR)	No	IE_WE_30A010100	No
			River	Abbert_030	Moderate (AT RISK)	No	IE_WE_30A010300	No
			River	Abbert_040	Moderate (AT RISK)	No	IE_WE_30A010500	No
	1106	Good	Lake	Corrib Upper	Good (R)	No	IE_WE_30_666b	No
			Lake	Corrib Lower	Moderate (AT RISK)	Yes	IE_WE_30_666a	No
			River	Clare (Galway)_100	Unassigned (NAR)	No	IE_WE_30C011300	No
			River	Clare (Galway)_090	Moderate (AT RISK)	Yes	IE_WE_30C011200	No
			River	Clare (Galway)_080	Moderate (AT RISK)	Yes	IE_WE_30C011100	No
			River	Clare (Galway)_070	Good (NAR)	No	IE_WE_30C011000	No
			River	Clare (Galway)_060	Moderate (AT RISK)	Yes	IE_WE_30C010800	No
			River	Clare (Galway)_050	Good (NAR)	No	IE_WE_30C010700	No
			River	Clare (Galway)_040	Good (NAR)	No	IE_WE_30C010670	No
			River	Clare (Galway)_030	Good (NAR)	No	IE_WE_30C010500	No
			River	Clare (Galway)_020	Unassigned (NAR)	No	IE_WE_30C010300	No
			River	Clare (Galway)_010	Moderate (AT RISK)	Yes	IE_WE_30C010100	No
			River	Grange (Galway)_010	Good (NAR)	No	IE_WE_30G020200	No
			River	Grange (Galway)_020	Good (NAR)	No	IE_WE_30G020400	No
			River	Grange (Galway)_030	Good (NAR)	No	IE_WE_30G020500	No
			River	Grange (Galway)_040	Good (NAR)	No	IE_WE_30G020700	No
			River	Abbert_020	Good (NAR)	No	IE_WE_30A010100	No
			River	Abbert_030	Moderate (AT RISK)	Yes	IE_WE_30A010300	No
			River	Abbert_040	Moderate (AT RISK)	Yes	IE_WE_30A010500	No
			River	Sinking_010	Good (NAR)	No	IE_WE_30S010100	No
			River	Sinking_020	Moderate (AT RISK)	Yes	IE_WE_30S010300	No
			River	Sinking_030	Good (NAR)	No	IE_WE_30S010400	No
			River	Dalgan_030	Good (NAR)	No	IE_WE_30D010400	No
			River	Dalgan_040	Good (NAR)	No	IE_WE_30D010500	No
			River	Dalgan_050	Good (NAR)	No	IE_WE_30D010600	No

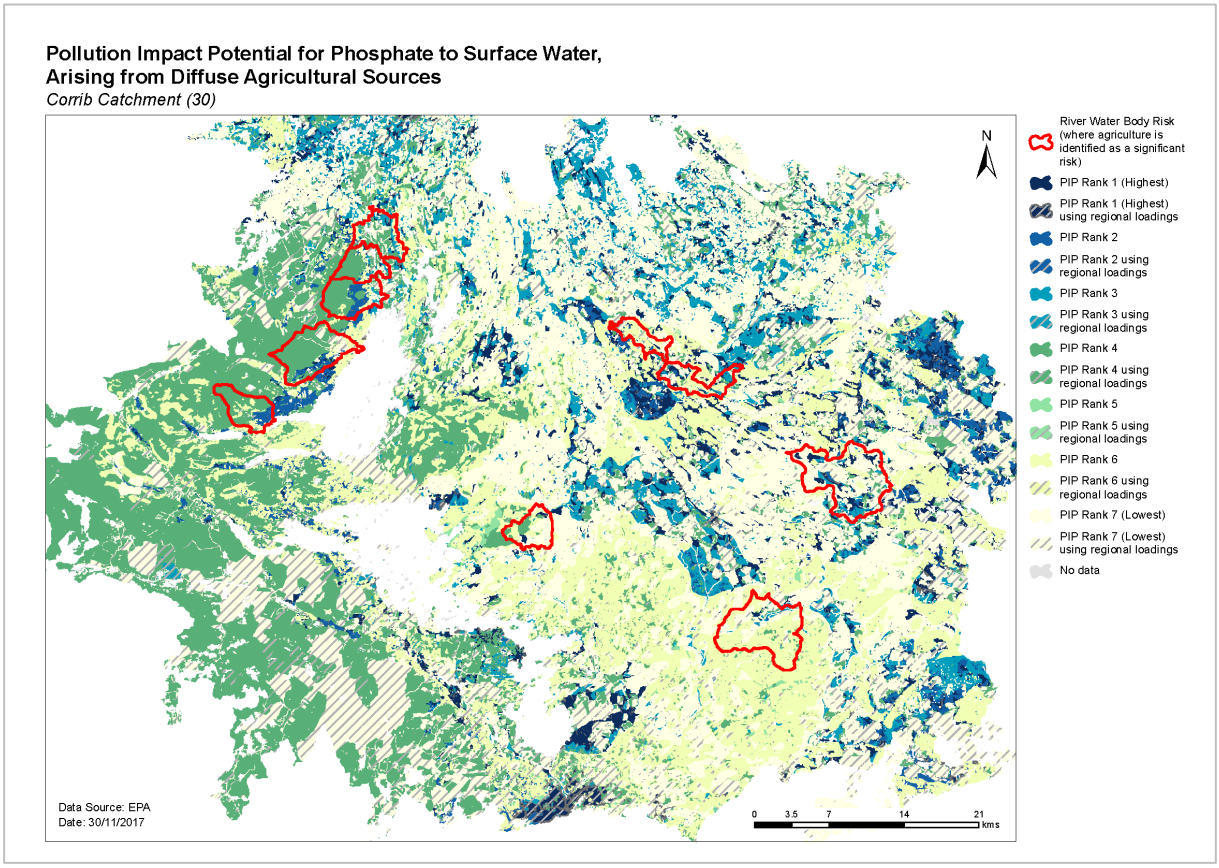
SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Lough Corrib SAC 000297	1106	Good	River	Black (Shrule)_020	Moderate (AT RISK)	Yes	IE_WE_30B020300	No
			River	Black (Shrule)_030	Good (NAR)	No	IE_WE_30B020600	No
			River	Owenriff (Corrib)_010	Good (AT RISK-HES obj)	No	IE_WE_30O020070	No
			River	Owenriff (Corrib)_020	Good (AT RISK-HES obj)	No	IE_WE_30O020200	No
			River	Drimneen_010	Unassigned (R)	No	IE_WE_30D030600	No
			River	Corrib_010	Unassigned (NAR)	No	IE_WE_30C020300	No
			River	Dooghta_010	Good (NAR)	No	IE_WE_30D020100	No
			River	Dooghta_020	High (NAR)	No	IE_WE_30D0201200	No
			River	Failmore_010	Good (AT RISK-HES obj)	No	IE_WE_30F010100	No
			River	Bealanabrack_010	Good (NAR)	No	IE_WE_30B010050	No
			River	Bealanabrack_020	Good (NAR)	No	IE_WE_30B010200	No
			River	Cong Canal_010	Good (NAR)	No	IE_WE_30C060300	No
	1833	At least Good	Lake	Corrib Upper	Good (R)	No	IE_WE_30_666b	No
Lough Lurgeen Bog/Glenamaddy Turlough SAC 000301	3180	Good GW level/quality	Groundwater	GWDTE-Glenamaddy Turlough (SAC000301)	Good (R)	No	IE_WE_G_0094	No
Maumturk Mountains SAC 002008	3110	At least Good	Lake	Maumwee	Good (AT RISK-HES obj)	No	IE_WE_30_343	No
			Lake	Loughanillaun Maam Cross	Good (AT RISK-HES obj)	No	IE_WE_30_348	No
			Lake	Shannagrena	Unassigned (R)	No	IE_WE_30_326	No
	1106	Good	River	Bealnabrack_010	Good (NAR)	No	IE_WE_30B010050	No
			River	Bealnabrack_020	Good (NAR)	No	IE_WE_30B010200	No
Mocorha Lough SAC 001536	none							
Monivea Bog SAC 002352	none							
Moore Hall (Lough Carra) SAC 000527	none							
Mweelrea/Sheeffry/Erriff Complex SAC 001932	none							
Ross Lake and Woods SAC 001312	3140	At least Good	Lake	Ross GY	Poor (AT RISK)	Yes	IE_WE_30_345	No
Shrule Turlough SAC 000525	3180	Good GW level/quality	Groundwater	GWDTE-Shrule Turlough (SAC000525)	Good (R)	No	IE_WE_G_0102	No
Skealoghan Turlough SAC 000541	3180	Good GW level/quality	Groundwater	GWDTE-Skealoughan Turlough (SAC000541)	Good (R)	No	IE_WE_G_0103	No

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Towerhill House SAC 002179	none							
Williamstown Turloughs SAC 002296	3180	Good GW level/quality	Groundwater	Clare-Corrib GWB	Good (AT RISK)	No	IE_WE_G_0020	No

Natura Codes of Qualifying interests with water conservation objectives			
3110	Oligotrophic waters containing very few minerals of sandy plains	1106	Salmon (Salmo salar)
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea	1029, 1990	Freshwater pearl mussel (Margaritifer margaratifera)
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp	1092	White-clawed Crayfish
3150	Natural eutrophic lakes with Magnopotamin or Hydrocharition type vegetation	21A0	Machairs (in Ireland)
3160	Natural dystrophic lakes and ponds.	2190	Humid dune slacks
3180	Turloughs	7220	Petrifying springs with tufa deposits
1833	Slender Naiad (Najas flexilis)	7230	Alkaline fens
1150	Coastal Lagoons	Arctic char	Arctic Char has no Natura Code

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