Liffey Catchment Assessment 2010-2015 (HA 09)

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

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

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

Table of contents

1 Introduction

This catchment includes the area drained by the River Liffey and by all streams entering tidal water between Sea Mount and Sorrento Point, Co. Dublin, draining a total area of 1,616km². The largest urban centre in the catchment is Dublin City. The other main urban centres are Dun Laoghaire, Lucan, Clonee, Dunboyne, Leixlip, Maynooth, Kilcock, Celbridge, Newcastle, Rathcoole, Clane, Kill, Sallins, Johnstown, Naas, Newbridge, Athgarvan, Kilcullen and Blessington. The total population of the catchment is approximately 1,255,000.

The Liffey catchment contains the largest population of any catchment in Ireland and is characterised by a sparsely populated, upland south eastern area and a densely populated, flat, low lying area over the remainder of the catchment basin.

The River Liffey rises on the western slopes of Tonduff in the Wicklow Mountains, from where it flows west, before being joined by the Brittas River from the north and then flowing into the northern end of Pollaphuca Reservoir, which was created by the ESB in the 1930s. The Kings River, which flows into the southern end of the reservoir, together with the Liffey, drains much of the north-western side of the Dublin and Wicklow Mountain area. The Liffey flows out of the reservoir through the Pollaphuca generating station and into the lower reservoir and generating station at Golden Falls, upstream of Ballymore Eustace. The Liffey then flows west though Kilcullen before flowing through Newbridge, then past Sallins and Clane, after which it is joined by the Morell from the south. Flood relief works were completed on the Shinkeen Stream and Morrell River during 2001 and 2003.

The Liffey continues through Celbridge to Leixlip, before which it flows into Leixlip reservoir and generating station and is then joined by the Ryewater. Flood relief works were completed in Leixlip during 2009. The Liffey then enters a steep-sided valley, through which it flows past Islandbridge, where the river becomes tidal, and through the centre of Dublin City where it is now considerably constrained by quay walls. The Liffey is then joined by the outflow from the Royal and Grand Canals, the River Dodder from the south and the River Tolka to the north. The Liffey flows past Dublin Port and through the north and south Bull Walls flowing out to sea in Dublin Bay.

The River Dodder rises on the northern flanks of the Dublin Mountains, flowing north through the Upper and Lower Glenasmole reservoirs and onward through south Dublin, becoming tidal near Lansdowne Road before entering the Liffey at Ringsend.

The source of the River Tolka is located southwest of Dunshaughlin from where it flows through Dunboyne and Blanchardstown before entering the northwest of Dublin City, becoming tidal downstream of Drumcondra and flowing into Dublin Bay along the northern edge of Dublin Port.

The eastern part of the catchment is drained by several small coastal streams including the Sluice, Mayne and Santry Rivers on the northside of Dublin and the Elm Park, Priory and Monkstown Streams on the southside.

The Liffey catchment comprises 17 subcatchments with 77 river water bodies, six lakes, six transitional and five coastal water bodies, and 16 groundwater bodies (Table 1, Figure1).

Table 1. List of subcatchments in the Liffey catchment

Subcatchment ID	Subcatchment Name
09_1	Liffey_SC_100
09_2	Liffey_SC_030
09_3	RyeWater_SC_010
09_4	Tolka_SC_020
09_5	Liffey_SC_080
09_6	Liffey_SC_060
09_7	Liffey_SC_050
09_8	King's[Liffey]_SC_010
09_9	Lyreen_SC_010
09_10	Tolka_SC_010
09_11	Liffey_SC_040
09_12	Liffey_SC_020
09_13	Liffey_SC_010
09_14	Liffey_SC_070
09_15	Liffey_SC_090
09_16	Dodder_SC_010
09_17	Mayne_SC_010

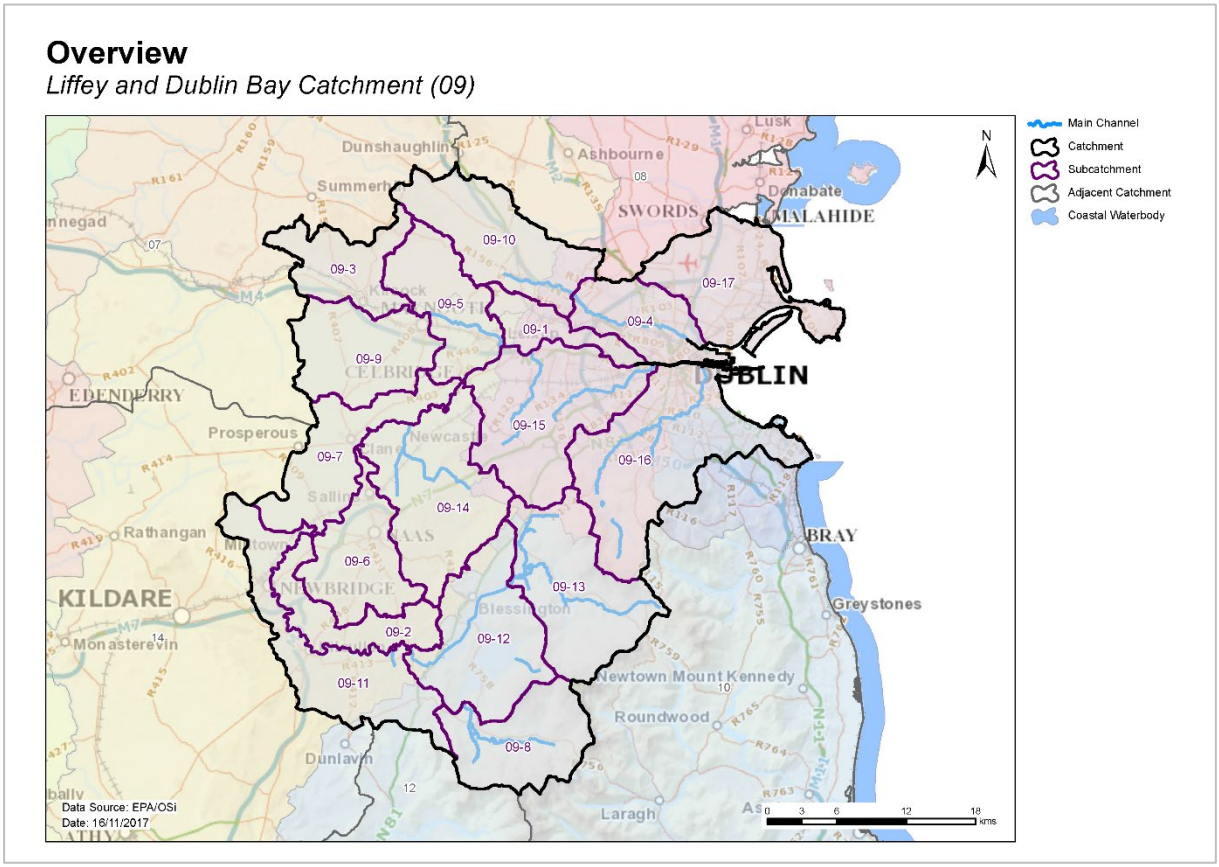


Figure 1. Subcatchments in the Liffey catchment

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 21 (25%) river and lake water bodies at Good status, and 42 (51%) at less than Good status in 2015 (Table 2, Figure 2). Twenty (24%) river and lakes water bodies are unassigned.
- Two river water bodies have a high ecological status objective (Lemonstown Stream_010 and Cock Brook_010). In 2015, neither of these water bodies were at High status, both were at Good (Figure 3, Appendix 1).
- The numbers of water bodies at each status class in 2007-09 and 2010-15 are shown in Figures 4 (rivers) and 5 (lakes).
- Twelve river water bodies have improved and 19 have deteriorated (including one lake water body - Pollaphuca) since 2007-09 (Figure 6).
- The variation in nutrient concentrations and loads in the Liffey main channel is illustrated in Appendix 2.

2.1.2 Transitional and Coastal (TraC)

- Of the 11 TraC water bodies, one was at High status (Southwestern Irish Sea – Killiney Bay HA10), two were at Good status (Dublin Bay and North-western Irish Sea HA08) and five were at Moderate status (Liffey Estuary Lower & Upper, Broadmeadow Water, the Tolka Estuary and one coastal Malahide Bay) in 2015 (Table 2, Figure 2). Two transitional water bodies (Mayne Estuary and North Bull Island) and one coastal water body Irish Sea Dublin (HA 09) are unassigned.
- Two TraC water bodies, both coastal have a high ecological status objective, Southwestern Irish Sea – Killiney Bay HA10 and North-western Irish Sea HA08. The former was at High status and the latter at Good status in 2015.
- The numbers of TraC water bodies in each status class in 2007-09 and 2010-15 is shown in Figure 7.
- Note Killiney Bay HA10 and North-western Irish Sea HA08 are shared with other catchments.

Table 2. Summary of surface water body status and risk categories

	Number of water bodies	2010-15 Status						Risk Categories		
		High	Good	Mod	Poor	Bad	Unassigned	*Not at Risk*	*Review*	*At Risk*
Rivers	77	0	19	21	19	1	17	14	15	48
Lakes	6	0	2	1	0	0	3	2	3	1
TraC	11	1	2	5	0	0	3	3	3	5

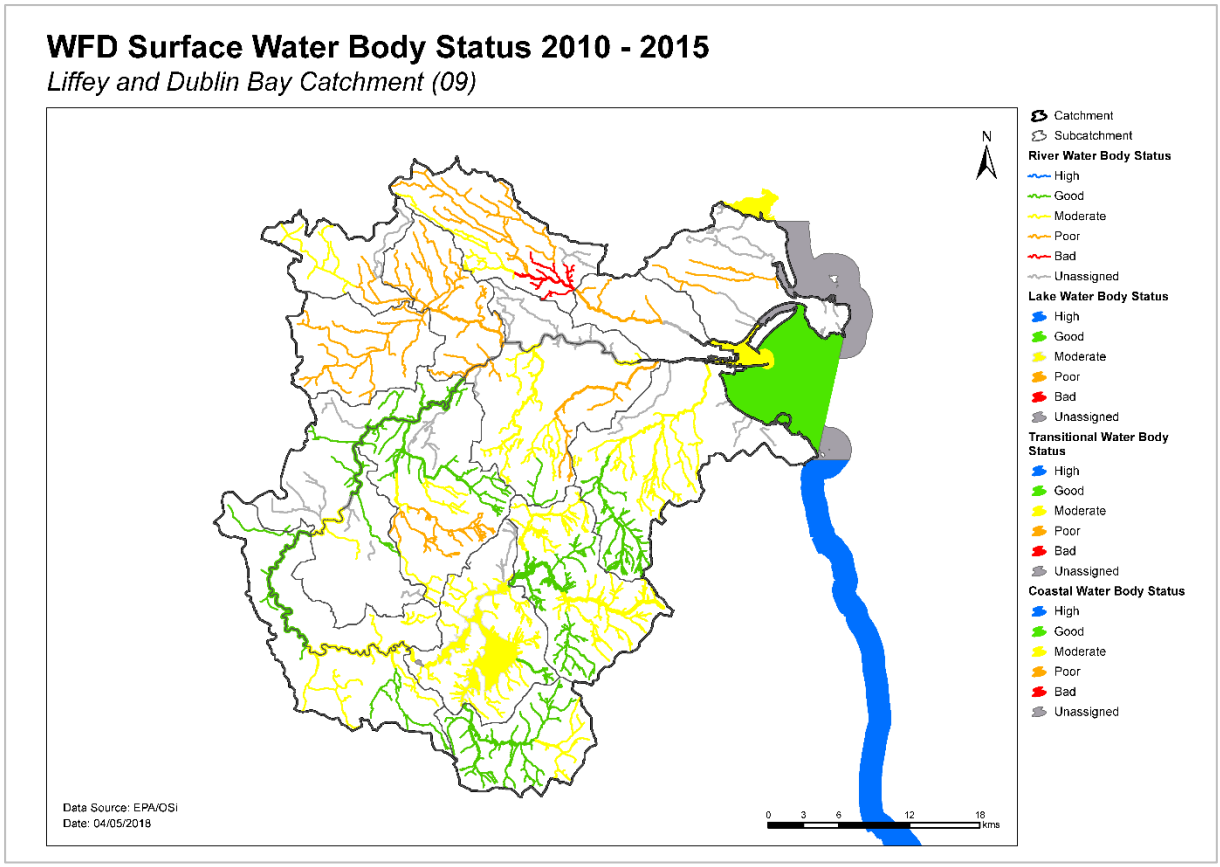


Figure 2. Surface water ecological status

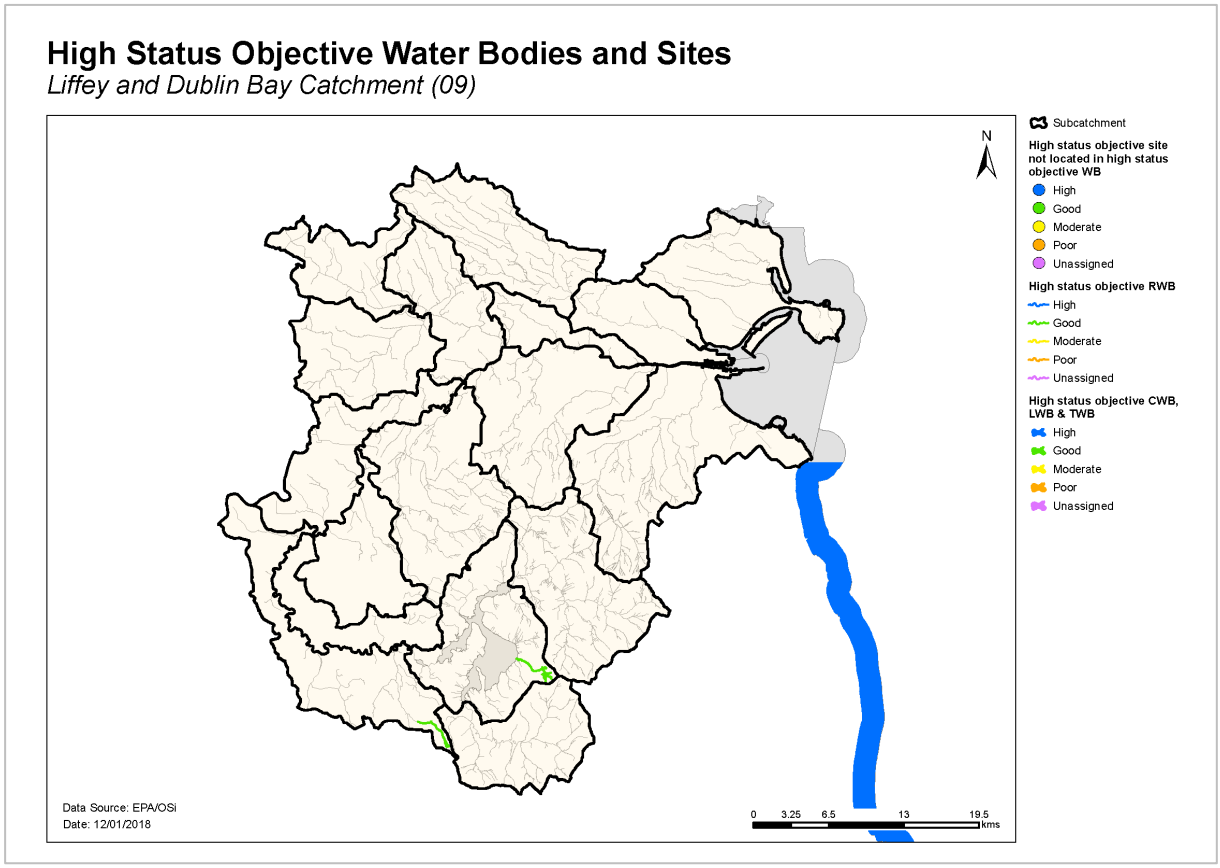


Figure 3. High ecological status objective water bodies and sites.

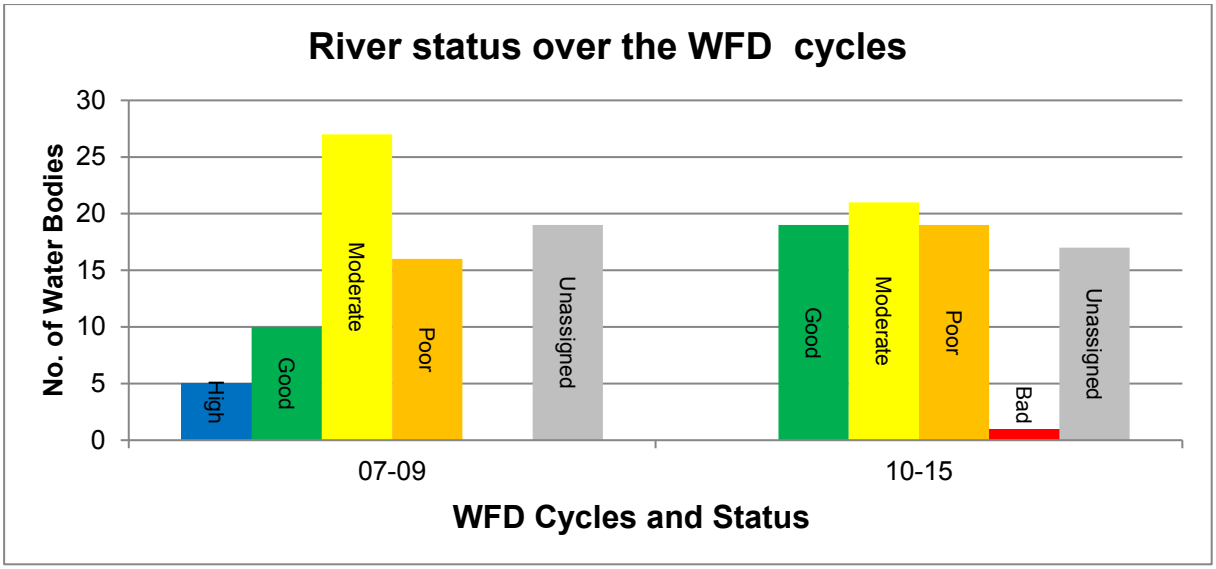


Figure 4. Number of rivers at each status class in 2007-09 and 2010-15

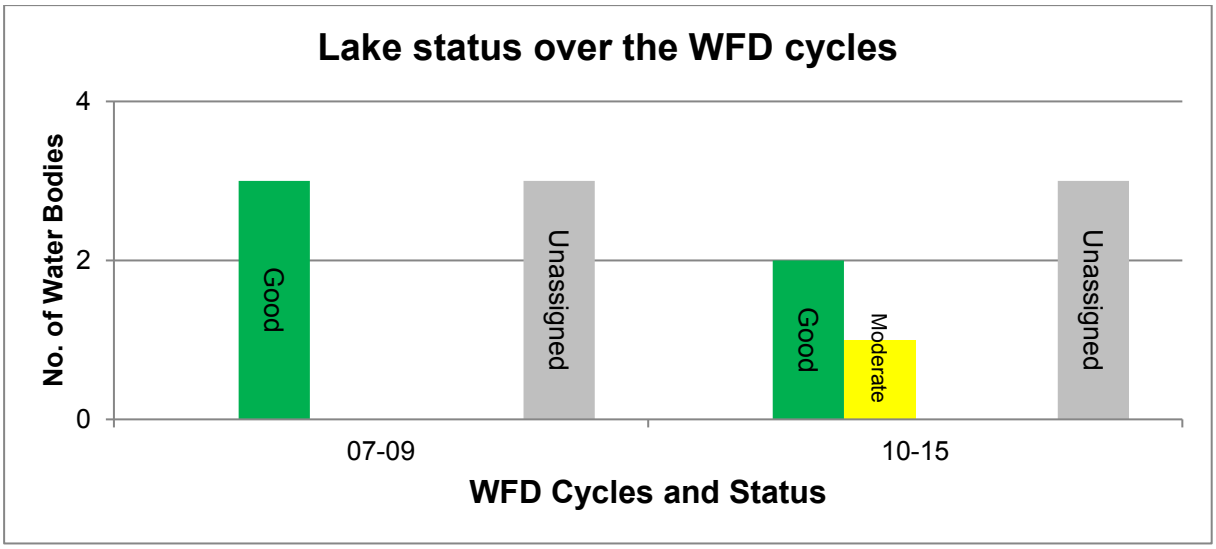


Figure 5. Number of lakes at each status class in 2007-09 and 2010-15

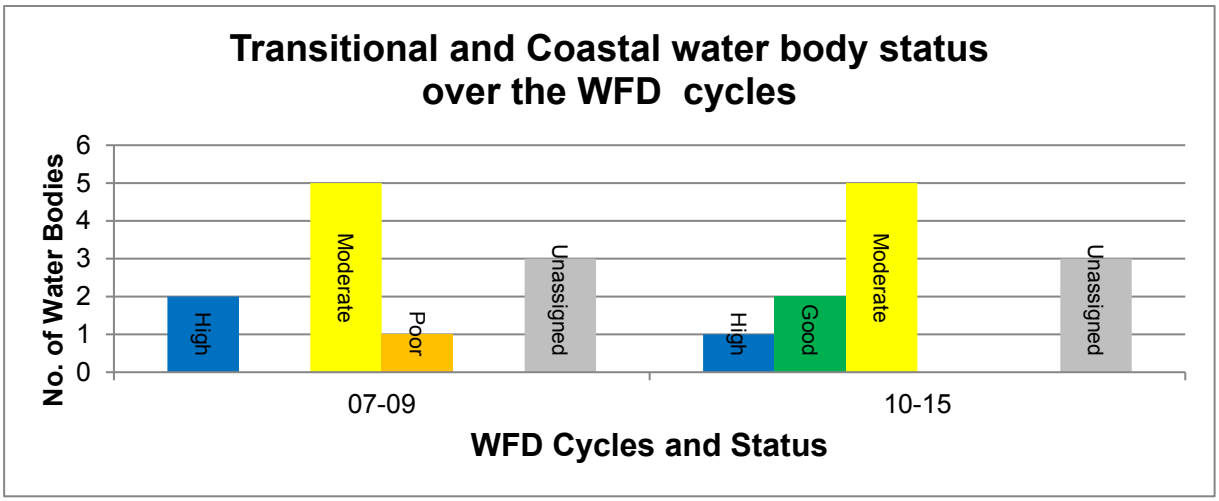


Figure 6. Number of transitional and coastal water bodies at each status class in 2007-09 and 2010-15

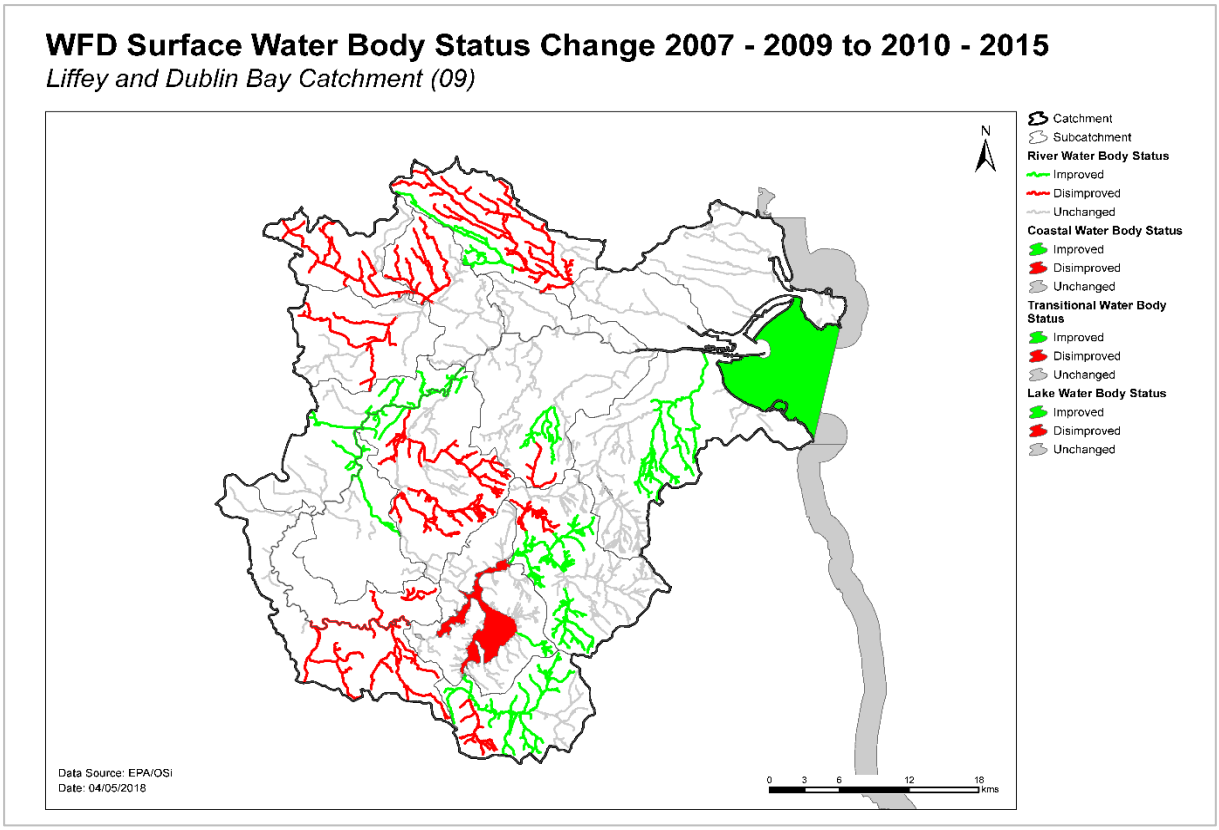


Figure 7. Surface water body status changes from 2007-09 to 2010-15

2.2 Groundwater status

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

Table 3. Summary of groundwater body status and risk categories

	Number of water bodies	2010-15 Status		Risk Categories		
		Good	Poor	*Not at Risk*	*Review*	*At Risk*
Groundwater	16	13	3	5	8	3

2.3 Risk of not meeting surface water environmental objectives

2.3.1 Rivers and lakes

- There are 14 *Not at Risk* river water bodies and two lake water bodies (Figure 9, Table 2) which require no additional assessment or measures to be applied, other than those measures that are already in place.
- There are 15 river water bodies and three lake water bodies in *Review*. This includes 12 water bodies where more information is required and six water bodies where measures have recently been implemented and improvements have not yet been realised.
- Forty-eight river water bodies and one lake water body, Golden Falls 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.

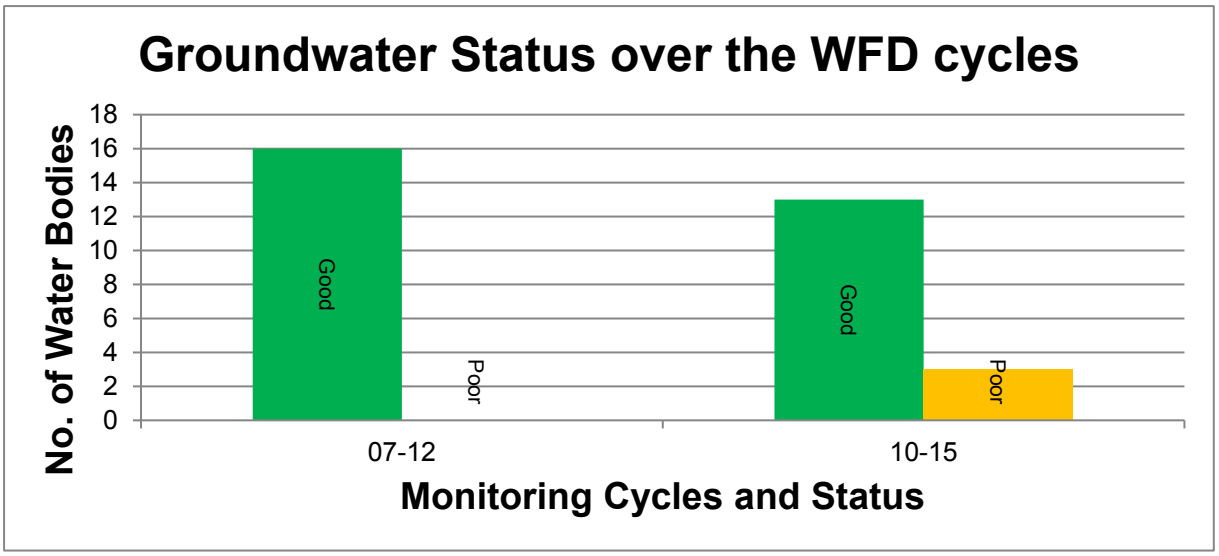


Figure 7a – Number of groundwater bodies at each status class in 2007-09 and 2010-15

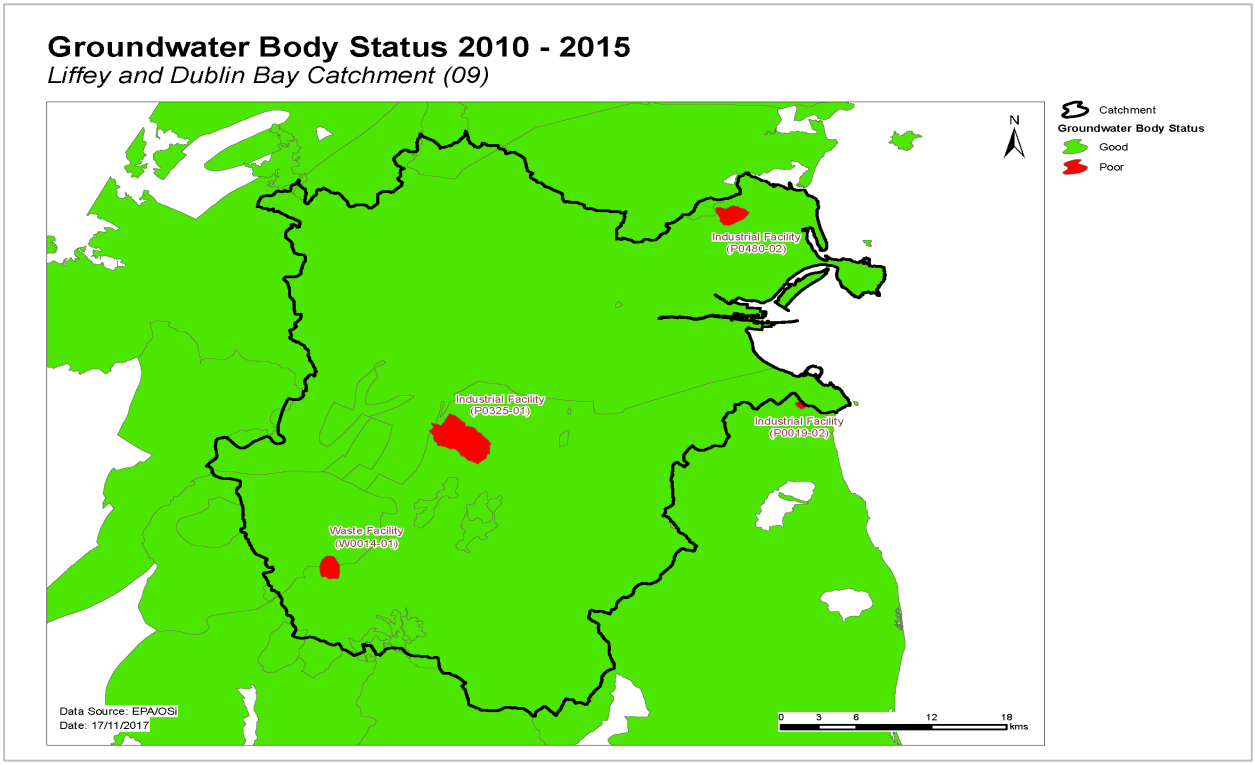


Figure 8. Groundwater body status 2010-15

2.4 Risk of not meeting groundwater environmental objectives

- Five groundwater bodies are *Not at Risk* (Figure 10, Table 3) and require no additional assessment or measures to be applied, other than those measures that are already in place.
- Eight groundwater bodies are in *Review* (Figure 10). Three are in *Review* due to historic landfill sites (Historic Waste Facility (S22-02779), Historic Waste Facility (S22-02168) and Historic Waste Facility (S22-02748)). The GWDTE-Red Bog of Kildare (SAC000397) is in *Review* due to quarry dewatering and the remaining four are in *Review* due to elevated nitrate concentrations (Nass, Gormanstown Gravels, Blessington Gravels and West Blessington Gravels).

- Three groundwater bodies are *At Risk,* Industrial Facility (P0325-01), Industrial Facility (P0480-02) and Waste Facility (W0014-01) (Figure 10). Measures will be needed in these water bodies to improve the water quality outcomes. This is related to TPH & PAH (industrial site), TCE (industrial site) and ammonia (waste site) respectively.

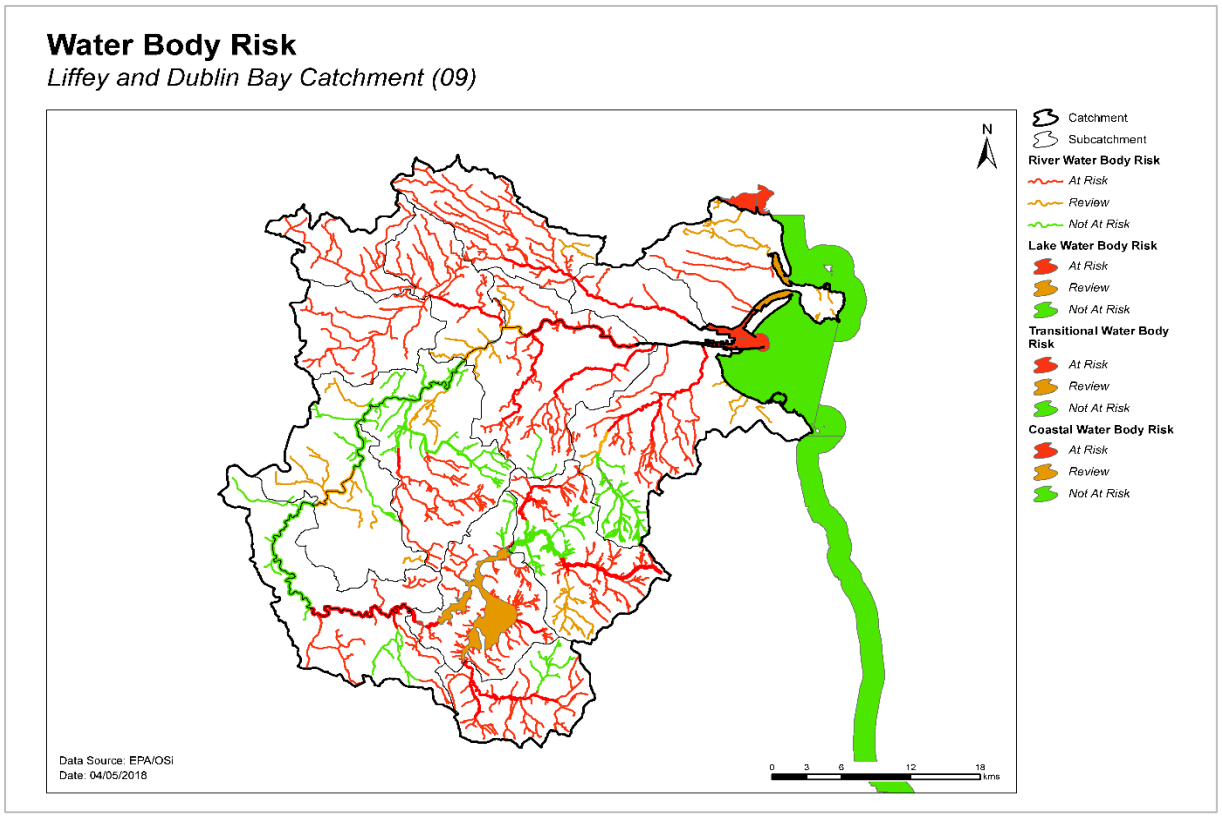


Figure 9. Surface water body risk

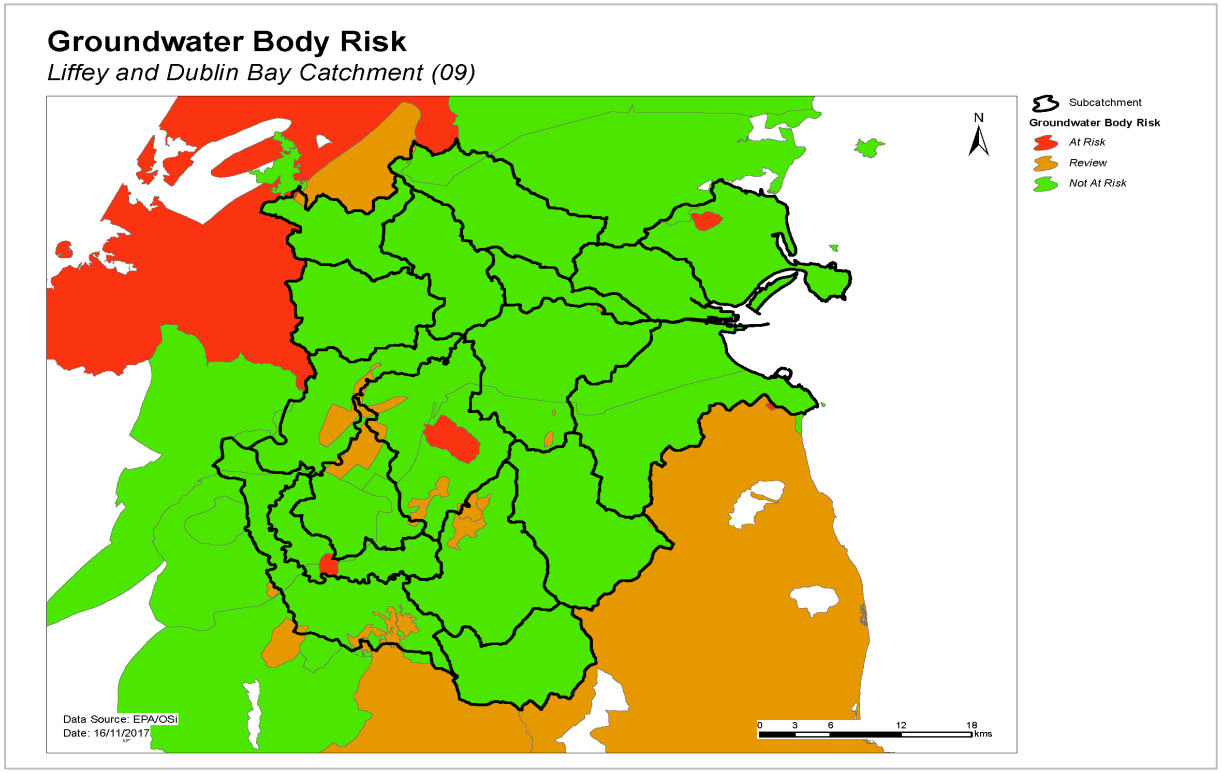


Figure 10. Groundwater body risk

2.5 Protected areas

2.5.1 Drinking water abstractions

- There are 26 abstractions in the Liffey Catchment comprising 17 public supplies and six private supplies (Appendix 4).
- Twenty of the abstractions are from six groundwater bodies and six are three river water bodies (Liffey_040, Dodder_020 and Liffey_150). The list of the public supplies and the associated water bodies is provided in Appendix 4.
- All sources were compliant with the standard for nitrate and pesticides in 2015.

2.5.2 Bathing waters

- There are seven designated marine bathing waters in the catchment, four of which are in satisfactory condition (Table 5). Three did not meet the specified water quality objectives.
- The list of the bathing waters and the associated water bodies is provided in Table 4.

2.5.3 Shellfish areas

- There is one designated shellfish area in the catchment. This is compliant with the relevant standards and there no water quality issues of concern.
- Details on the shellfish area and its associated water body is summarised in Table 5.

Table 4. Designated bathing waters in the catchment

Bathing water		Water body intersection		Objective met?	
Name	Code	Name	Code	Yes	No
Merrion Strand	IEEABWC090_0000_0200	Dublin Bay	IE_EA_090_0000		✓
Sandymount Strand	IEEABWC090_0000_0300	Dublin Bay	IE_EA_090_0000		✓
Dollymount Strand	IEEABWC090_0000_0400	Dublin Bay	IE_EA_090_0000		✓
Portmarnock, Velvet Strand Beach	IEEABWC070_0000_0200	Irish Sea Dublin (HA09)	IE_EA_070_0000	✓	
Seapoint	IEEABWC090_0000_0100	Dublin Bay	IE_EA_090_0000	✓	
Sutton, Burrow Beach	IEEABWC070_0000_0100	Irish Sea Dublin (HA09)	IE_EA_070_0000	✓	
Claremont Beach	IEEABWC070_0000_0500	Irish Sea Dublin (HA09)	IE_EA_070_0000	✓	

Table 5. Designated shellfish areas in the catchment

Shellfish area		Water body intersection		Objective met?	
Name	Code	Name	Code	Yes	No
Malahide	IEPA2_0057	Irish Sea Dublin (HA 09)	IE_EA_070_0000	✓	
		North-western Irish Sea (HA08)	IE_EA_020_0000	✓	

2.5.4 Nutrient Sensitive Areas

- There are five designated Nutrient Sensitive Areas (NSAs) (Broadmeadow Estuary (Inner), Liffey (River), Liffey, Liffey Estuary and Tolka Estuary) associated with three urban waste water treatment plants (Swords, Upper Liffey Valley Sewerage Scheme, and Ringsend (Liffey and Tolka Estuaries)).
- Two of the three urban waste water treatment plants (Swords and Upper Liffey Valley Sewerage Scheme) have tertiary treatment and, therefore, were compliant with the environmental objectives for NSAs.

- Ringsend urban waste water treatment was not compliant with the environmental objective for NSAs but is due to be upgraded to tertiary treatment in 2021.
- The list of NSAs, associated agglomerations and intersecting water bodies are provided in Table 6.

Table 6. Nutrient sensitive areas in the catchment

Nutrient Sensitive Area		Agglomeration		Intersecting water bodies		Objective met?		Comment
Name	Code	Name	Code	Name	Code	Yes	No	
Broadmeadow Estuary (Inner)	IETW_EA_2001_0026	Swords	D0024	Broadmeadow Water	IE_EA_060_0100	✓		Tertiary treatment is in place.
Liffey (River)	IERI_EA_1994_0004	Upper Liffey Valley Sewerage Scheme	D0002	Liffey_100	IE_EA_09L011200	✓		Tertiary treatment is in place.
				Liffey_110	IE_EA_09L011300			
				Liffey_120	IE_EA_09L011500			
				Liffey_130	IE_EA_09L011600			
				Liffey_140	IE_EA_09L011700			
				Liffey_150	IE_EA_09L011900			
Liffey	IERI_EA_2010_0007			Liffey_150	IE_EA_09L011900			
				Liffey_160	IE_EA_09L012040			
				Liffey_170	IE_EA_09L012100			
				Liffey_180	IE_EA_09L012350			
				Liffey_190	IE_EA_09L012360			
Liffey Estuary	IETW_EA_2001_0027a	Ringsend	D0034	Liffey Estuary Lower	IE_EA_090_0300		✓	Upgrade to include tertiary treatment is due in 2021.
Tolka Estuary	IETW_EA_2001_0027b			Tolka Estuary	IE_EA_090_0200			

2.5.5 Natura 2000 Sites

- There are 11 Special Areas of Conservation (SACs) in the catchment not all of which have water quality and/or quantity conservation objectives for their qualifying interests.
- The two groundwater bodies (Kilcullen GWB and Dublin GWB) with water dependent qualifying interests within these SACs have met their WFD Protected area objectives.
- There are seven Special Protected Areas (SPAs) in the catchment:
    - Baldoyle Bay SPA
    - Broadmeadow/Swords Estuary SPA
    - Howth Head Coast SPA
    - North Bull Island SPA
    - Pollaphuca Reservoir SPA
    - South Dublin Bay and River Tolka Estuary SPA
    - Wicklow Mountains SPA

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

2.6 Heavily modified water bodies

- There are eight designated heavily modified water bodies (HMWB) in the catchment: Santry_020 due to flood protection; Glenasmole Lower and Glenasmole Upper due to drinking water supply; Golden Falls due to power generation; Leixlip Reservoir and Pollaphuca due to both power generation and drinking water supply; Broadmeadow Water due to public transport infrastructure; and Liffey Estuary Lower due to port facilities. Glenasmole Reservoir Lower and Upper were classified as having Good Ecological Potential in 2013-15, while Pollaphuca, Liffey

Estuary Lower and Broadmeadow Water were classified as having Moderate Ecological Potential. Ecological Potential of Santry_020, Golden Falls and Leixlip Reservoir were unassigned.

- There are three designated artificial water bodies (AWB) in the catchment – Royal Canal Main Line, Grand Canal Main Line East of Lowtown and Grand Canal Corbally Branch.

3 Significant issues in *At Risk* water bodies

- Excess phosphorus leading to eutrophication is the dominant issue in the rivers and lakes. Elevated ammonia concentrations are also a concern in a small number of water bodies.
- Alteration of hydromorphological (or physical) conditions is one of the most significant issues in rivers in the Liffey 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 as a result of, for example, implementing river and field drainage schemes, forestry activities, animal access, and discharge from quarries.
- The five TraCs water bodies (Liffey Estuaries Upper and Lower, Broadmeadow Water, Tolka Estuary and Malahide Bay) that are *At Risk* are impacted by urban waste water, with the Broadmeadow Water also impacted by domestic waste water.
- Three groundwater bodies are *At Risk,* Industrial Facility (P0325-01), Industrial Facility (P0480-02) and Waste Facility (W0014-01). This is related to TPH & PAH, TCE and ammonia respectively.

4 Significant pressures

4.1 Water bodies

- Where water bodies have been classed as *At Risk*, by water quality or survey data, significant pressures have been identified.
- Figure 11 shows a breakdown of the number of *At Risk* water bodies in each significant pressure category.

4.1.1 Rivers, lakes, Transitional and Coastal (TraC)

- Significant pressures have been identified by initial characterisation in 54 surface water bodies, 31 of which have multiple pressures. The significant pressures will be refined as further characterisation is carried out.
- The significant pressure affecting the greatest number of water bodies is agriculture, followed by urban waste water, diffuse urban diffuse, domestic waste water, hydromorphological pressures, forestry, industry, mines and quarries and other (golf courses, contaminated land, atmospheric).
- There is only one lake that is *At Risk* – Golden Falls – with urban waste water and hydromorphological significant pressures.
- The significant pressure affecting the Liffey Estuaries Upper and Lower and the Tolka Estuary is urban waste water from Ringsend. The Broadmeadow Water is impacted by urban waste water from Swords WWTP and also from domestic waste water discharges. The significant pressure on Malahide Bay is urban waste water from Malahide WWTP.

4.1.2 Groundwater

- Three groundwater bodies are *At Risk,* Industrial Facility (P0325-01), Industrial Facility (P0480-02) and Waste Facility (W0014-01). The significant pressures here specifically relate to the industrial or waste facility for which the water body is designated and named. These relate to TPH & PAH (industrial site), TCE (industrial site) and ammonia (waste site), respectively.

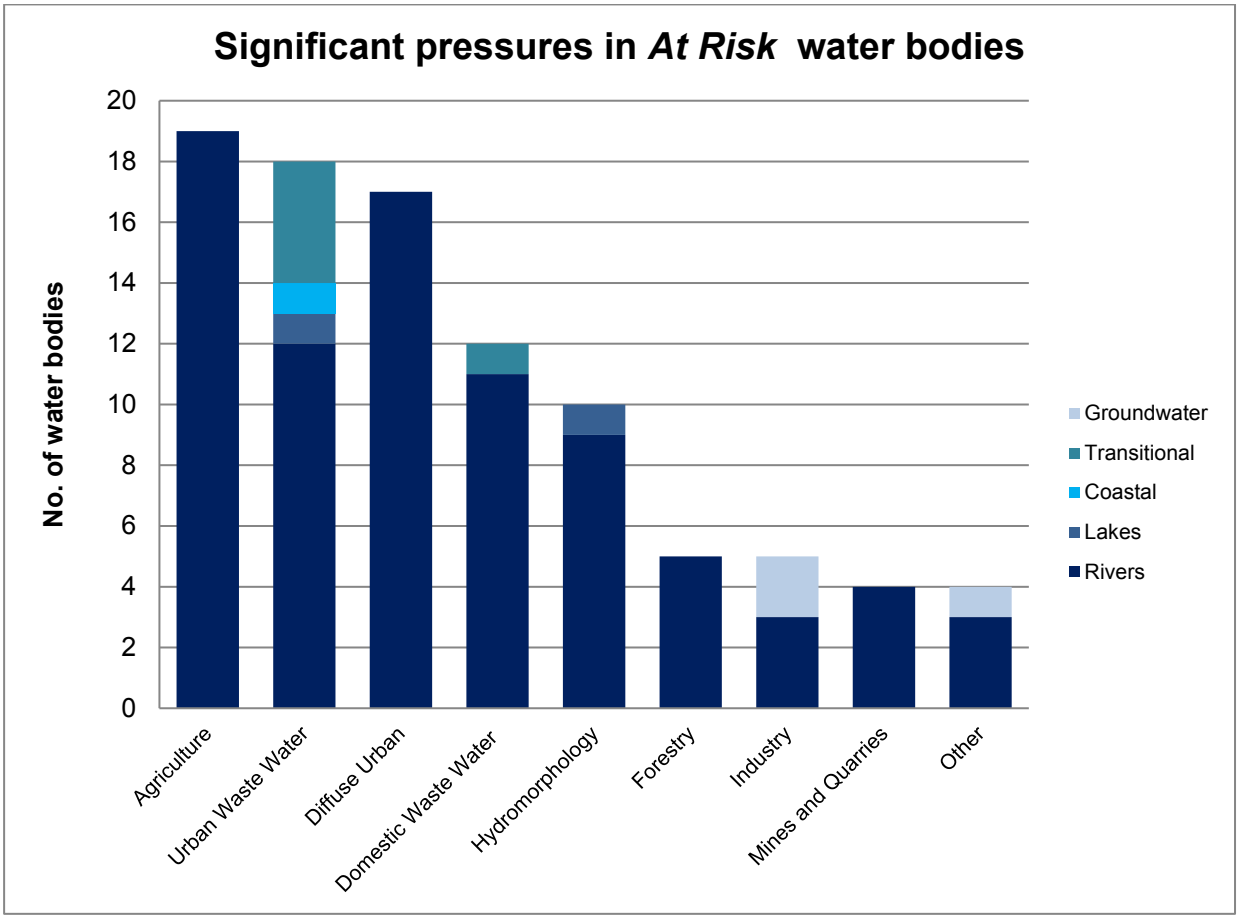


Figure 11. Significant pressures impacting on *At Risk* water bodies

4.2 Pressure type

4.2.1 Agriculture

- Agriculture is a significant pressure in 19 river water bodies (Figure 12, Appendix 3). The issues related to farming in this catchment are predominantly due to enrichment from diffuse phosphorus loss to surface waters from, for example, direct discharges; or runoff from yards, roadways or other compacted surfaces, or runoff from poorly draining soils. Sediment can also be a problem from land drainage works, bank erosion from animal access or stream crossings. The pollution impact potential map showing areas of relative risk for phosphorus loss from agriculture to surface water is given in Appendix 6.

4.2.2 Urban waste water treatment plants

- Urban Waste Water Treatment Plants (WWTPs) and agglomeration networks have been highlighted as a significant pressure in 18 *At Risk* water bodies; details are given in Table 8 and Figure 13.

- 12 water bodies are impacted by the Ringsend WWTP and/or the agglomeration network. The WWTP is scheduled to be upgraded by 2021 and the agglomeration network is scheduled to be upgraded post 2027.

- Liffey_040, Liffey_050 and Golden Falls are impacted by Blessington WWTP, which is scheduled to be upgraded by 2021.
- Swords WWTP, which impacts Broadmeadow Water, is to be upgraded in 2017.

4.2.3 Diffuse urban

- Diffuse urban pressures, caused by misconnections, leaking sewers, and run-off from paved and unpaved areas, such industrial estates, major road networks, and car parks for example, have been identified as a significant pressure in 17 river water bodies from Dublin City and major towns. The significant impacts are a combination of enrichment due to upward trends in orthophosphate and spikes in ammonia concentrations (Figure 14, Appendix 3).

4.2.4 Domestic waste water

- Domestic waste water has been identified as a significant pressure in 11 river water bodies. The issues arise from unsuitable domestic waste water systems, especially when they are sited on areas of high pollution impact potential/poorly draining soils, resulting in enrichment and potential for pollution (Figure 15, Appendix 3). It has also been identified as one of the significant pressures on the transitional water body Broadmeadow Water (TraCs).

4.2.5 Hydromorphology

- Hydromorphological pressures are significant in nine water bodies. Four river water bodies within the Liffey subcatchments are subject to extensive modification due to the presence of flood alleviation works, while one river water body is mostly culverted. Two river water bodies of the Liffey are regulated by a dam which in turn has impacted hydrological conditions. One river water body within the Liffey (09_14) subcatchment has experienced excessive levels of erosion driven siltation due to lateral movement of the river channel. This issue will need to be reviewed.
- Golden Falls lake water body is also impacted by hydromorphology due to an impoundment for power generation with a poor flow regime. Water bodies that are *At Risk* and impacted by hydromorphological pressures are shown in Figure 16 and listed in Table 6a and Appendix 3.

Table 6a – Hydromorphological Pressures in the Liffey Catchment

Pressure	Sub-Catchment	Water body Code
Modification due to Drainage Schemes (Channelisation)	Liffey_040	Lemonstown Stream_010
	Liffey_020	Cock Brook_010
Bank Modification (Embankments)	Liffey_070	Morell_020
	Liffey_070	Morell_030
In River Structures	Liffey_030/Liffey_040	Liffey_050
	Liffey_020	Golden Falls
	Liffey_020	Liffey_040
	Liffey_090	Camac_040
Bank Erosion	Liffey_070	Rathmore Stream_010

4.2.6 Forestry

- Forestry has been identified as a significant pressure in five river water bodies (Figure 17, Appendix 3). The types of problems encountered include for example: losses of sediment and/or nutrients during afforestation, tree felling and abstraction; losses of sediment from access roads and during road construction; losses of nutrients during aerial fertilisation and impacts from public access.

Table 8. Waste Water Treatment Plants and agglomerations identified as Significant Pressures in *At Risk* water bodies and expected completion dates for associated upgrade works, where applicable.

Facility name	Facility Type	Water Body	2010-15 Ecological Status	Expected Completion Date
Ringsend D0034	> 10,000 p.e.	*Liffey_180* [2]	*Unassigned* [1]	Post 2027
Ringsend D0034	> 10,000 p.e.	*Liffey_190* [2]	Moderate	Post 2027
Ringsend D0034	> 10,000 p.e.	*Liffey_170* [2]	Moderate	Post 2027
Ringsend D0034	> 10,000 p.e.	*Camac_040* [2]	Poor	Post 2027
Ringsend D0034	> 10,000 p.e.	*Dodder_050* [2]	Moderate	Post 2027
Ringsend D0034	> 10,000 p.e.	*Santry_020* [2]	*Unassigned* [1]	Post 2027
Ringsend D0034	> 10,000 p.e.	*Santry_010* [2]	Poor	Post 2027
Ringsend D0034	> 10,000 p.e.	*Tolka_060* [2]	*Unassigned* [1]	Post 2027
Ringsend D0034	> 10,000 p.e.	*Tolka_050* [2]	Poor	Post 2027
Blessington D0063	2,001 to 10,000 p.e.	Liffey_040	Moderate	2021
Blessington D0063	2,001 to 10,000 p.e.	Golden Falls	*Unassigned* [1]	2021
Blessington D0063	2,001 to 10,000 p.e.	Liffey_050	Moderate	2021
Lower Liffey Regional Scheme (Leixlip) D0004	> 10,000 p.e.	*Rye Water_020*[3]	Poor	*NA* [3]
Ringsend D0034	> 10,000 p.e.	*Liffey Estuary Lower* [4]	Moderate	*2021* [4]
Ringsend D0034	> 10,000 p.e.	*Liffey Estuary Upper* [2]	Moderate	Post 2027
Ringsend D0034	> 10,000 p.e.	*Tolka Estuary* [4]	Moderate	*2021* [4]
Malahide D0021	> 10,000 p.e.	Malahide Bay	Moderate	*NA* [5]
Swords D0024	> 10,000 p.e.	Broadmeadow Water	Moderate	2017

[1] *Ecological Status is not available for Liffey_180, Tolka_060*, Santry_020 and *Golden Falls, however, following discussions at the local authority workshops, all three water bodies were deemed to be At Risk of not meeting their environmental objectives.*

[2] *The agglomeration network, rather than the WWTP, has been identified as a significant pressure impacting these water bodies.*

[3] *Leixlip WWTP was upgraded in 2016, however, the agglomeration network, which is currently not scheduled to be upgraded, has been identified as a significant pressure impacting Rye Water_020.*

[4] *The Liffey Estuary Lower and the Tolka Estuary are impacted by both the Ringsend WWTP and the agglomeration network. The WWTP is scheduled to be upgraded by 2021 and the agglomeration network is scheduled to be upgraded post 2027.*

[5] *The Malahide agglomeration network is scheduled to be upgraded by 2022, however, the WWTP, which is currently not scheduled to be upgraded, has been identified as a significant pressure impacting Malahide Bay.*

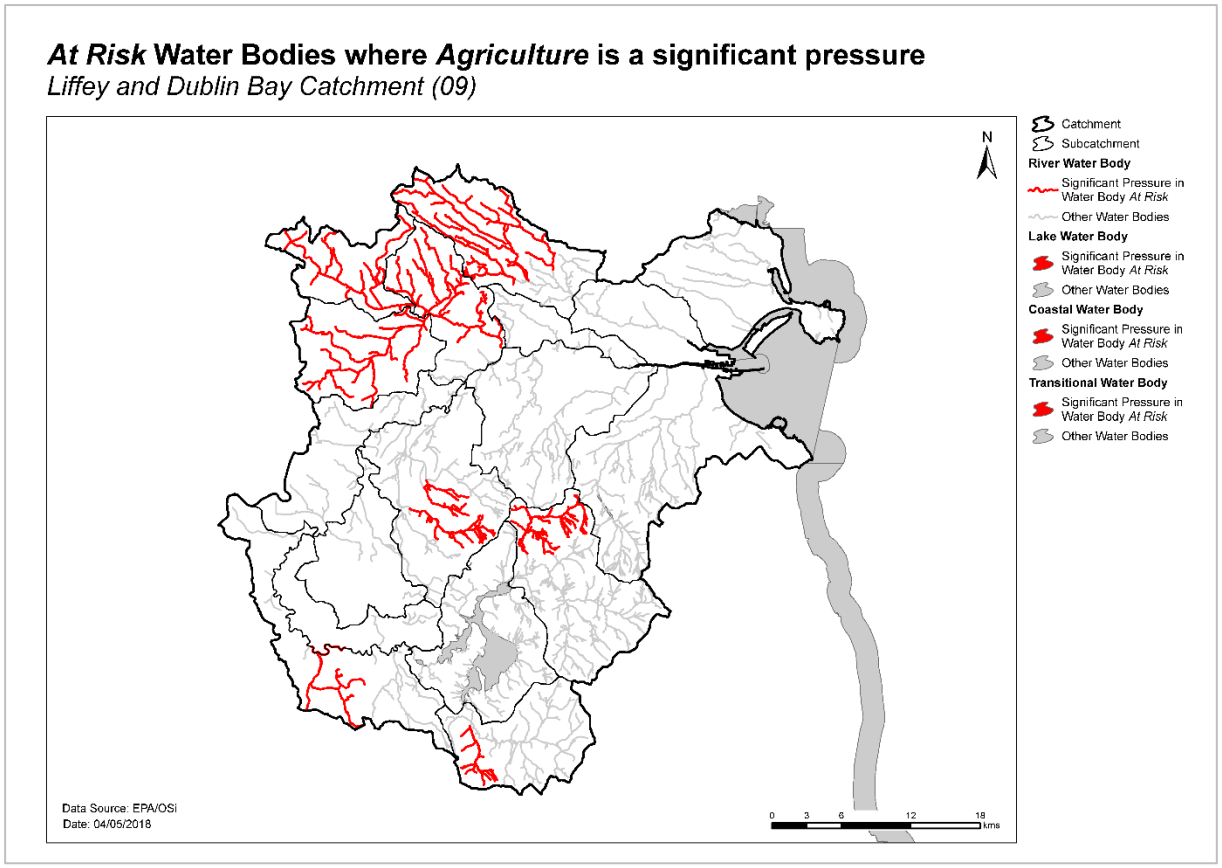


Figure 12. Water bodies that are *At Risk* and are impacted by agricultural activities

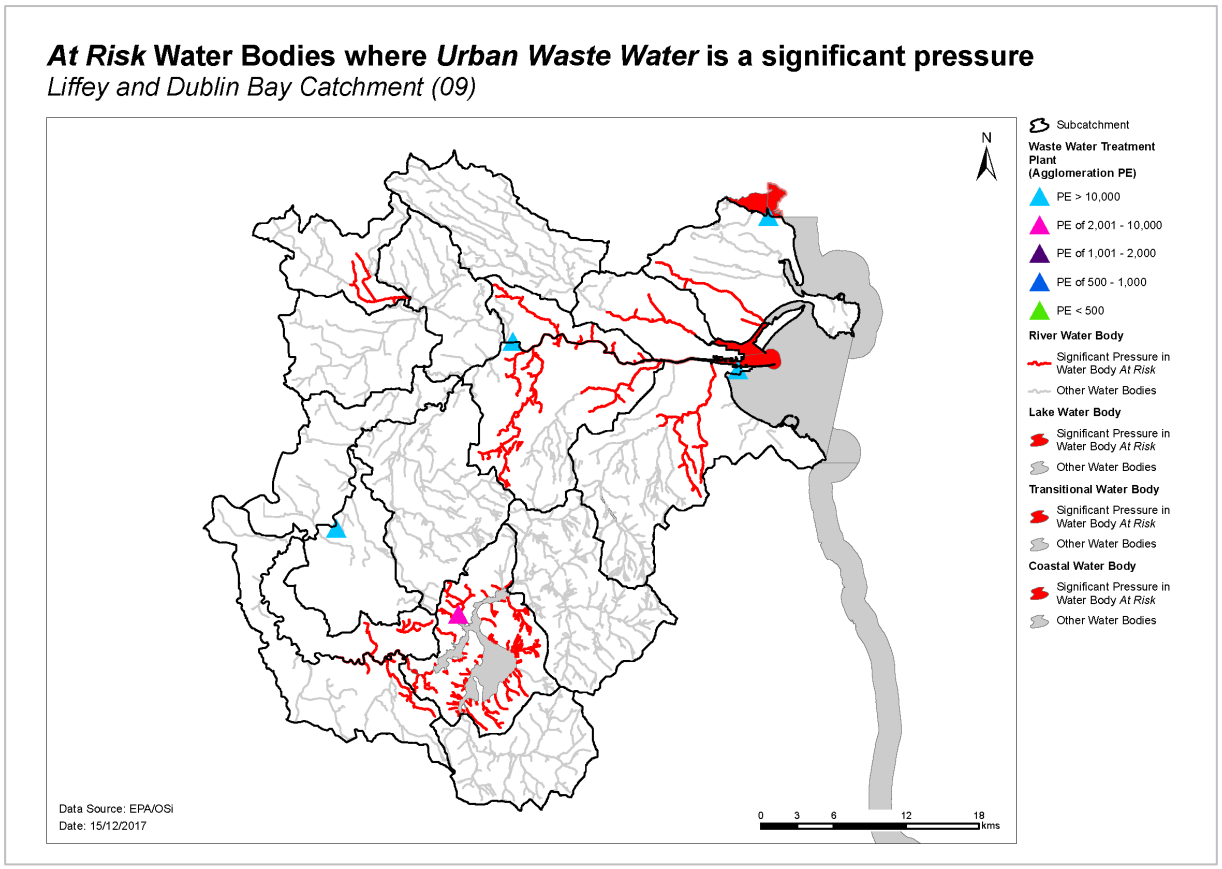


Figure 13. Water bodies that are *At Risk* and are impacted by urban waste water

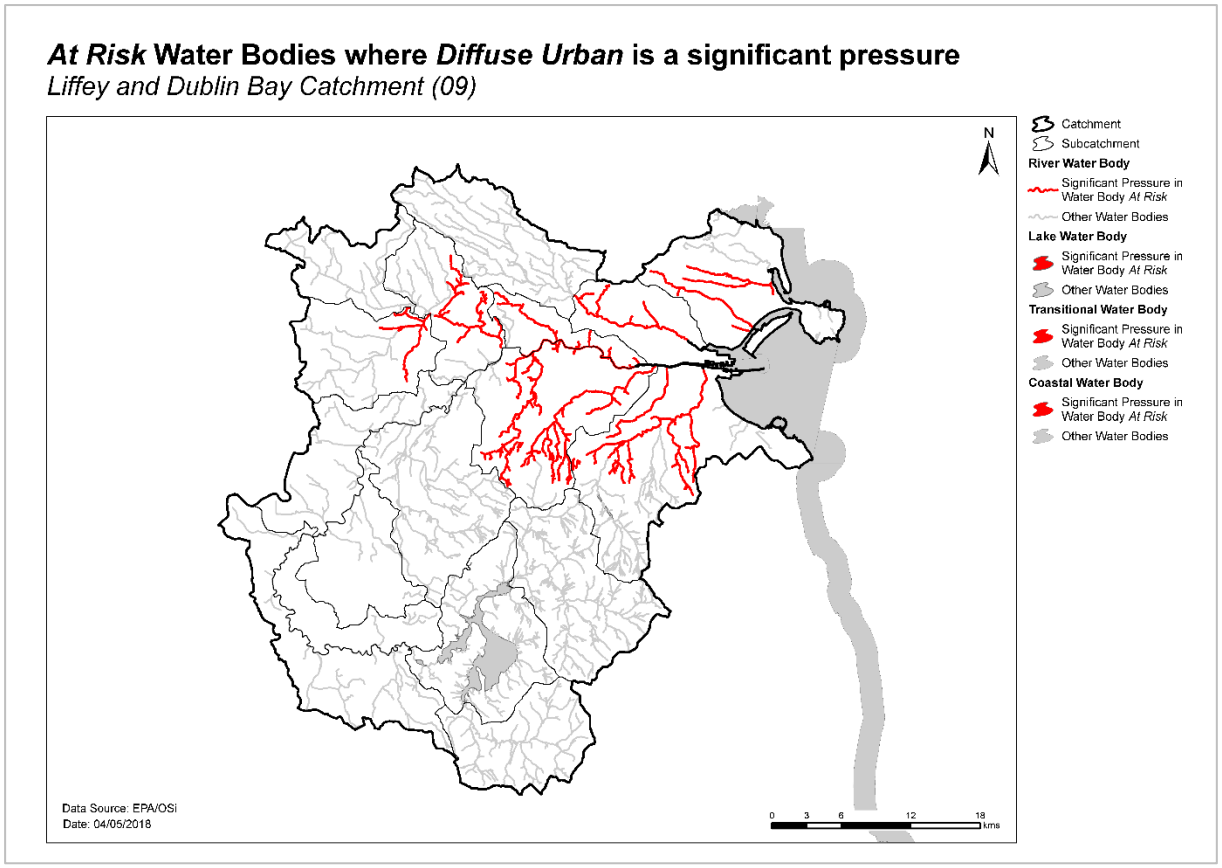


Figure 14. Water bodies that are *At Risk* and are impacted by diffuse urban pressures

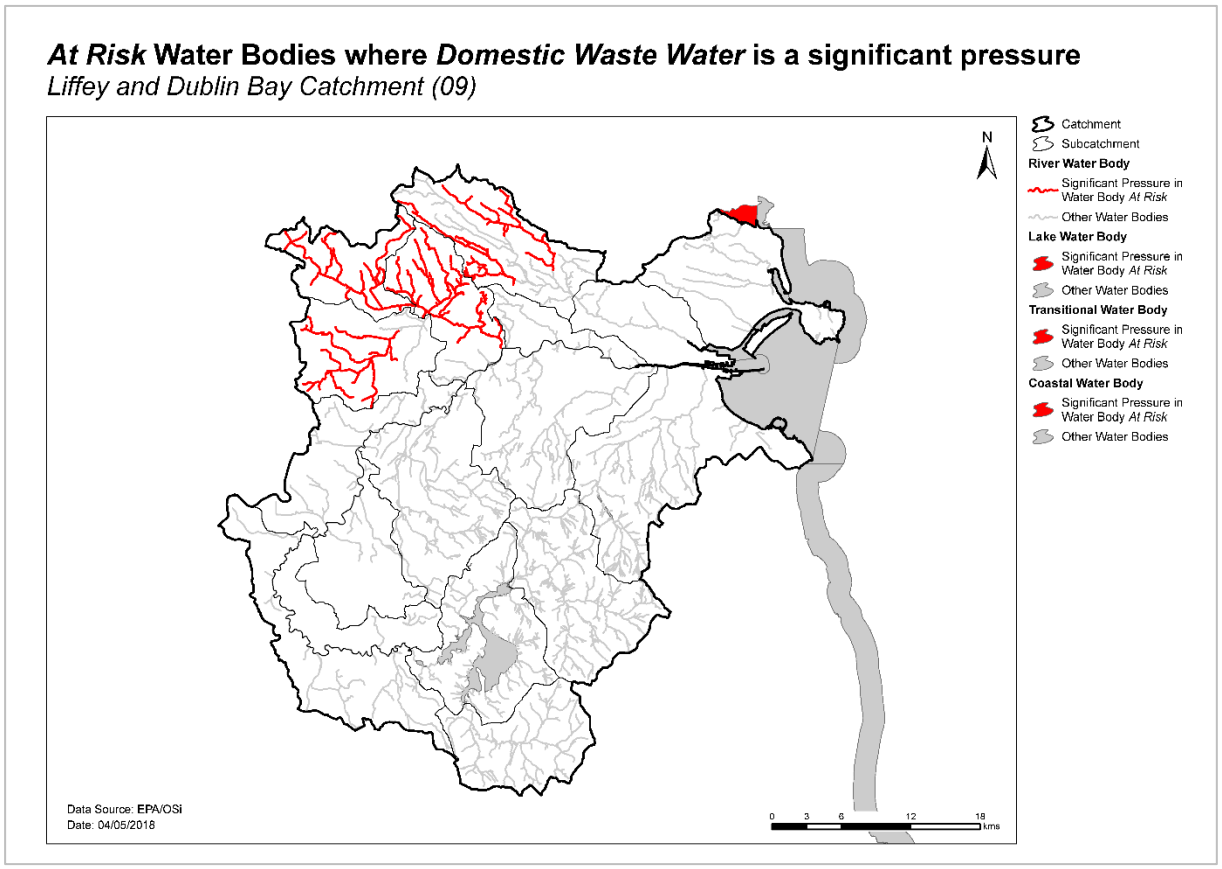


Figure 15. Water bodies that are *At Risk* and are impacted by domestic waste water

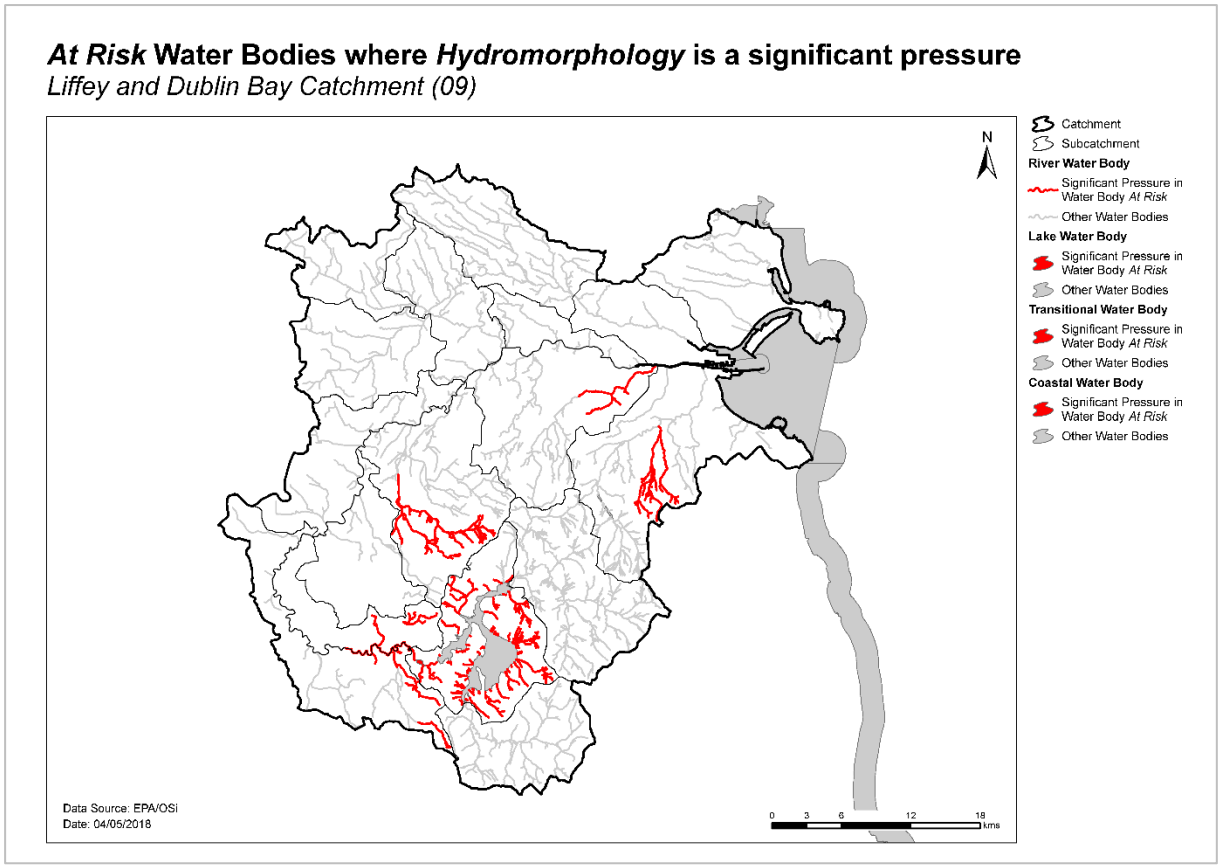


Figure 16. Water bodies that are *At Risk* and are impacted by hydromorphological pressures

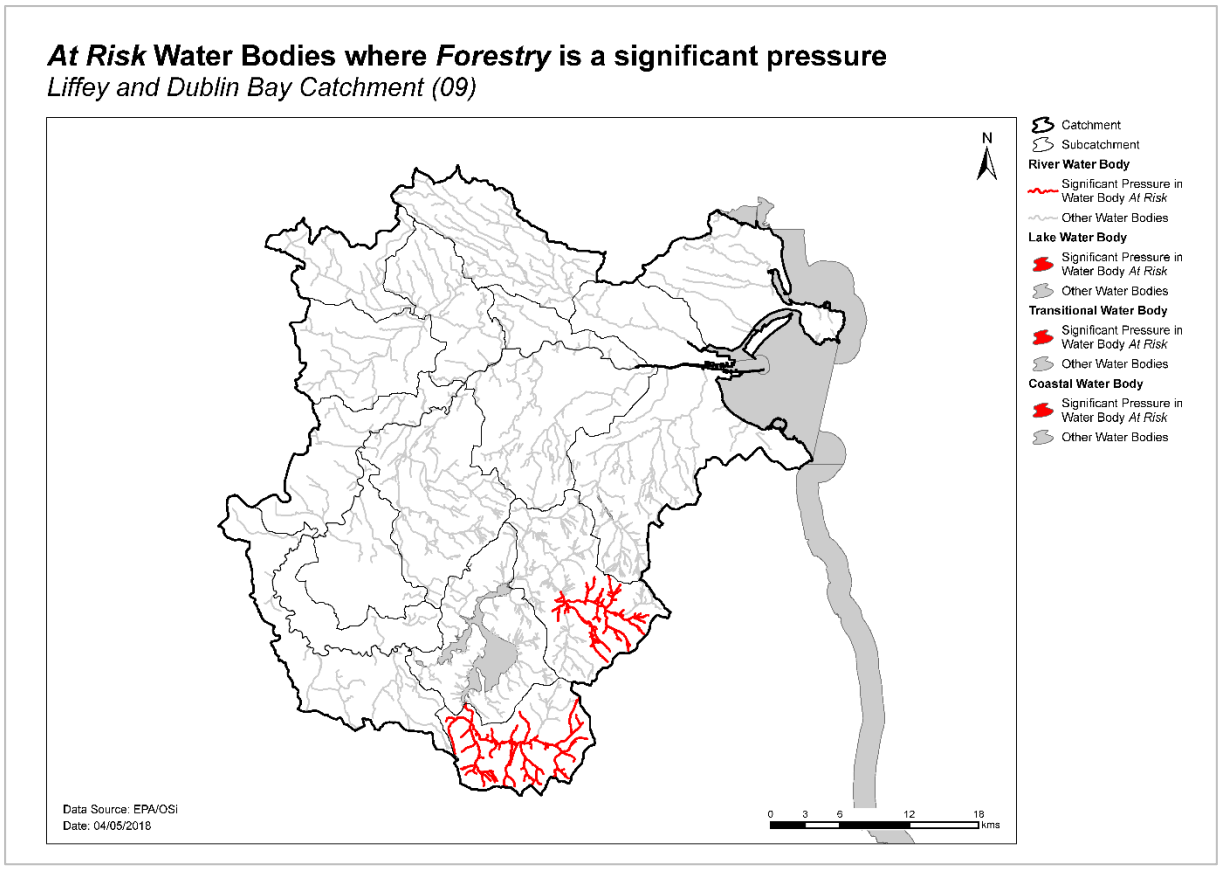


Figure 17. Water bodies that are *At Risk* and are impacted by forestry

4.2.7 Industry

- Industrial discharges have been identified as significant pressures in three water bodies – Tolka_030, Camac_030 and Lyreen_010 (Figure 18). Elevated organic and nutrient concentrations are the significant issues related to these point source discharges. Two groundwater bodies have Industrial Facility (P0325-01) and Industrial Facility (P0480-02) identified as the significant pressure.

4.2.8 Extractive industry

- Quarries have been identified as a significant pressure in four river water bodies – Morell_010, Morell_020, Morell_030 and Brittas_010. For Morell_010, _020 and _030, a quarry located in Morell_010 is the significant pressure causing increased siltation which is having knock-on impacts on the two downstream water bodies (Figure 19).

4.2.9 Other Significant Pressures

- *Other Anthropogenic*

  Golf courses have been identified as a significant pressure in two water bodies – Dodder_050 and Santry_020 (Figure 20). There was a fish kill in 2014 on the Dodder and the suspected cause was the release of pesticides from a local golf course. For Santry_020, Dublin City Council staff are currently monitoring to ensure no deterioration whilst awaiting upstream measures in relation to nutrient pressure. Dublin City Council already has a measure in place, with the golf club developing constructed wetlands.

- *Unknown Anthropogenic*
  The significant pressure in the headwaters of the Liffey (Liffey_010) is unknown resulting in low pH.

- *Waste*
  The licenced waste facility W0014-01, Silliot Hill Landfill is the significant pressure on the groundwater IE_EA_G_087, with ammonia being the main impact.

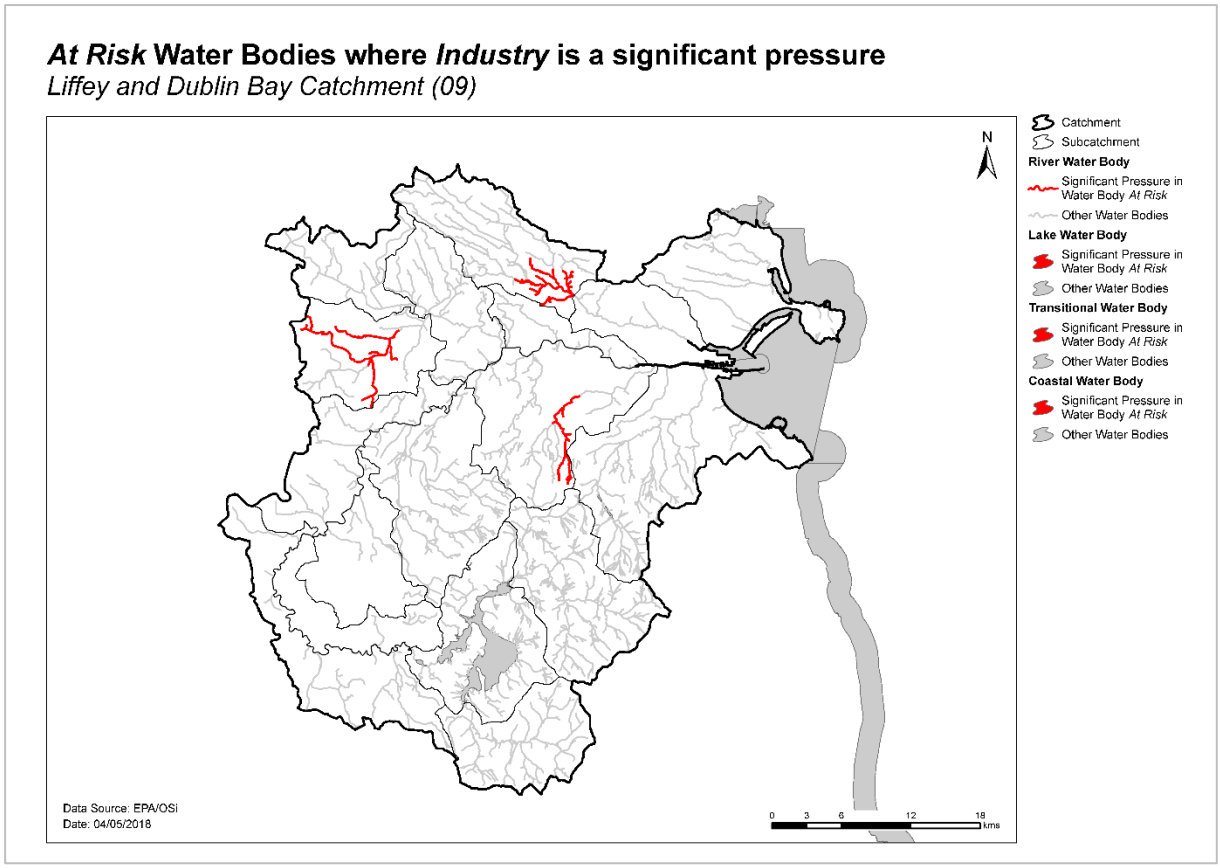


Figure 18. Water bodies that are *At Risk* and are impacted by industry

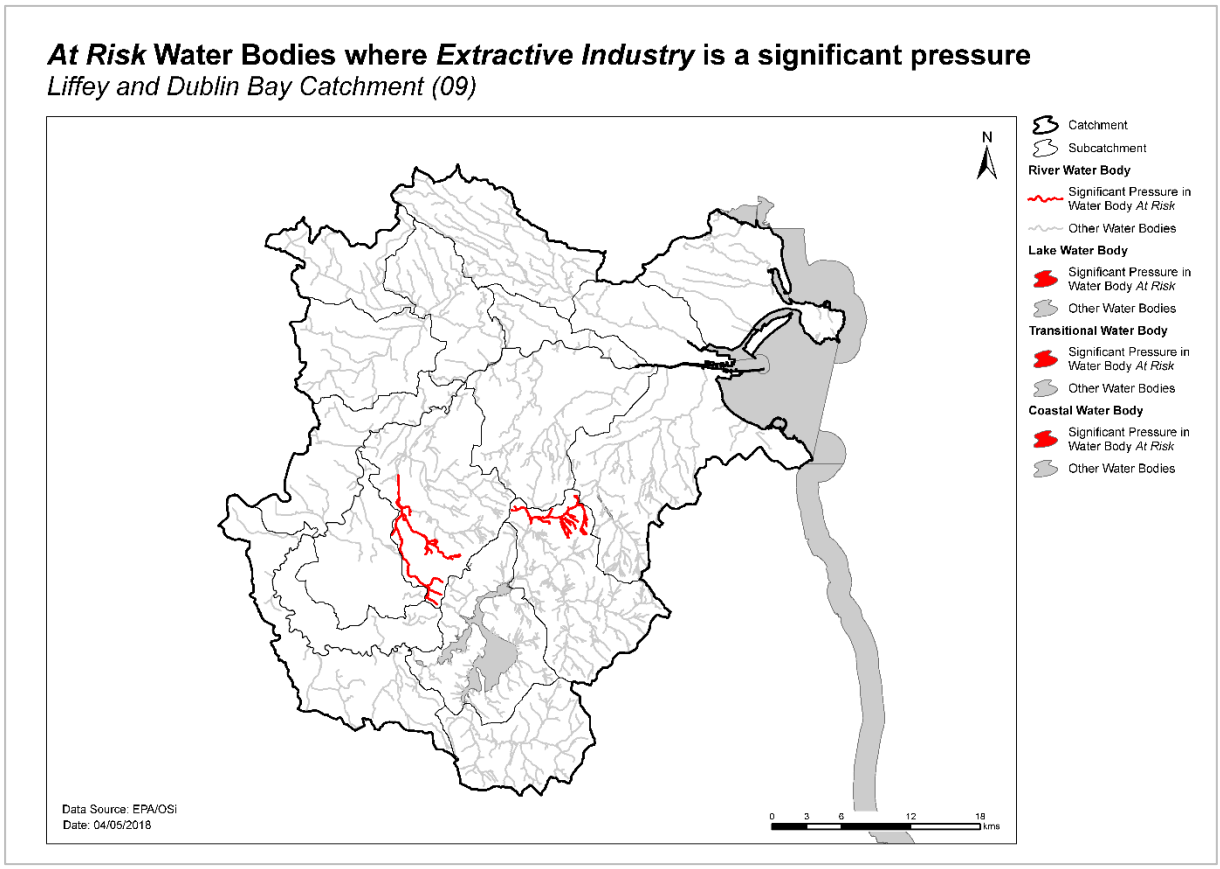


Figure 19. Water bodies that are *At Risk* and are impacted by extractive industries

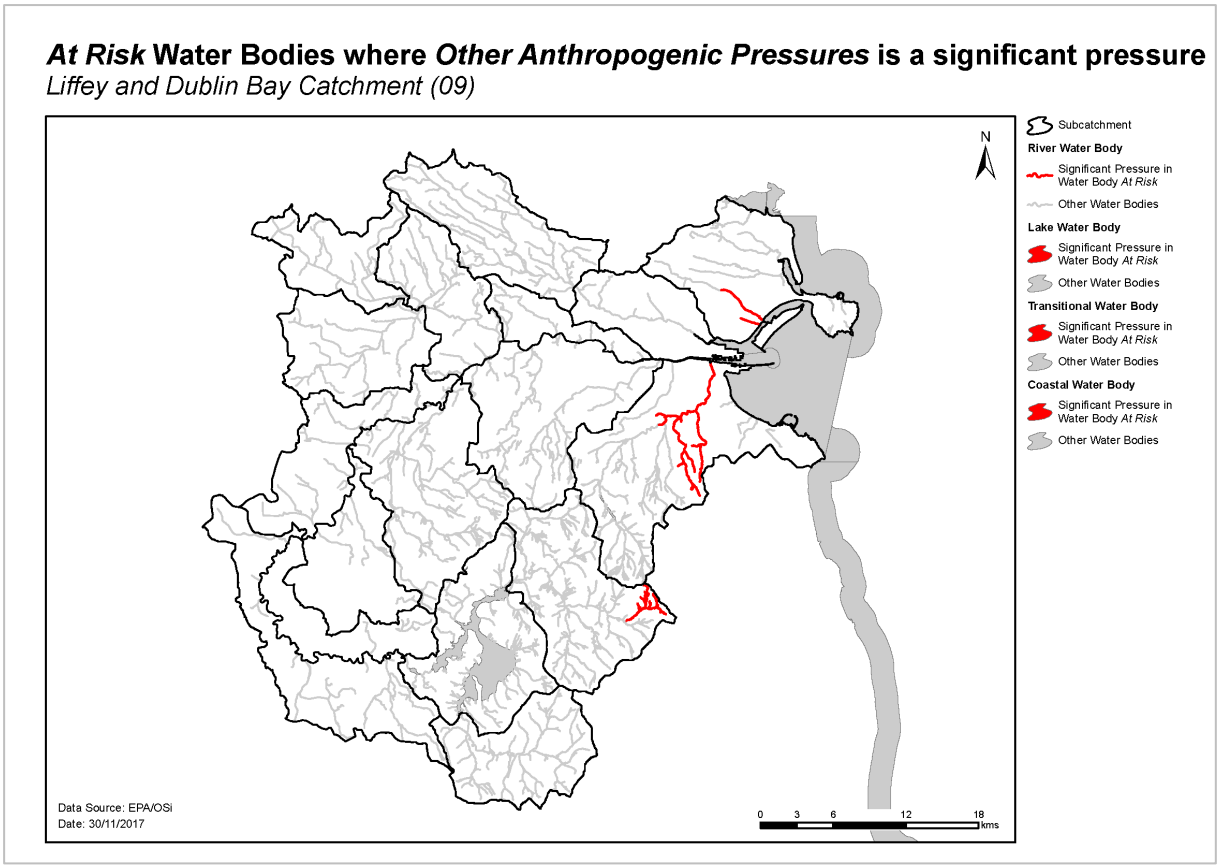


Figure 20. Water bodies that are *At Risk* and are impacted by other Anthropogenic pressures

5 Load reduction assessment

5.1 River water body load reductions

- Phosphate is the main parameter influencing water quality in rivers in the catchment.
- For water bodies where phosphorus monitoring data are available, the reduction in P load that would be required to bring the mean concentration back to the EQS of 0.035 mg/l as P, can be estimated using a simple method based on the average 2013 to 2015 concentration and the average flow, or the estimated 30th percentile flow (Q30) where flow data are not available. The relative load reductions are ranked on a national scale from Very High (>1 kg/Ha/y), to High (0.5-1 kg/Ha/y), to Medium (0.25-0.5 kg/Ha/y) to Low (<0.25 kg/Ha/y). Note that P load reductions may also be required in other water bodies, but without chemistry monitoring data a quantitative estimate cannot be calculated.
- Based on the available data, it is known that load reductions are required in at least 16 of the 77 river water bodies. The most significant reductions are required in the Liffey_180 and Tolka_030, followed by Lyreen_010 and Pinkeen_010, while the remaining water bodies require a relatively low load reduction (Table 10).

Table 10. Relative phosphate load reductions required in monitored water bodies that are *At Risk.*

Water Body	P Load Reduction Required
Liffey_180	V. High
Tolka_030	V. High
Lyreen_010	Med
Rye Water_030	Low
Pinkeen_010	Med
Dunboyne Stream_010	Low
Mayne_010	Low
Tolka_010	Low
Clonshanbo_010	Low
Rye Water_010	Low
Tolka_020	Low
Lyreen_020	Low
Santry_010	Low
Camac_040	Low
Santry_020	Low
Painestown_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.

- Estuarine water quality modelling has been carried out by the EPA for the Liffey and Tolka estuaries.

- The Liffey Estuary is limited by residence time or light in various parts (O'Boyle 2015) and so the phytoplankton production is not as responsive to nutrient conditions as other systems. Nevertheless, the model indicates that P reductions are needed in the Upper Liffey Estuary, while N reductions in the summer months are required in the Lower Liffey Estuary. It has been estimated that a 15% reduction in nitrogen loads are required to achieve Good status in the estuary.

- The Ringsend WWTP is a significant source of nutrients to the Liffey Estuary and is due to be upgraded by 2021. The planned upgrade should be adequate to achieve the required reduction in nutrient loads.

- Further reductions in nitrogen will also be achieved with other planned WWTP upgrades throughout the Liffey catchment, e.g. Blessington and Leixlip (Lower Liffey Regional Scheme) [6].

- The modelling of the Tolka estuary indicates that nitrogen is the most limiting nutrient, with light and space limiting at certain times of the year. The estuarine and coastal dynamics of the system are such that Liffey Estuary and Dublin Bay are significant sources of nutrients to the Tolka. Water quality improvements in the Lower Tolka will therefore also be achieved with the upgrade at Ringsend. Other than Ringsend, the most significant source of nutrients from the Tolka catchment to the Tolka estuary is diffuse urban which will be considered as part of Irish Water's drainage network planning.

As part of the Irelands commitment to the Ospar Convention, nutrient flux or load monitoring has been carried out on the Dodder, Liffey and Tolka Estuaries since 1990 (Figure 20a to 20f). 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

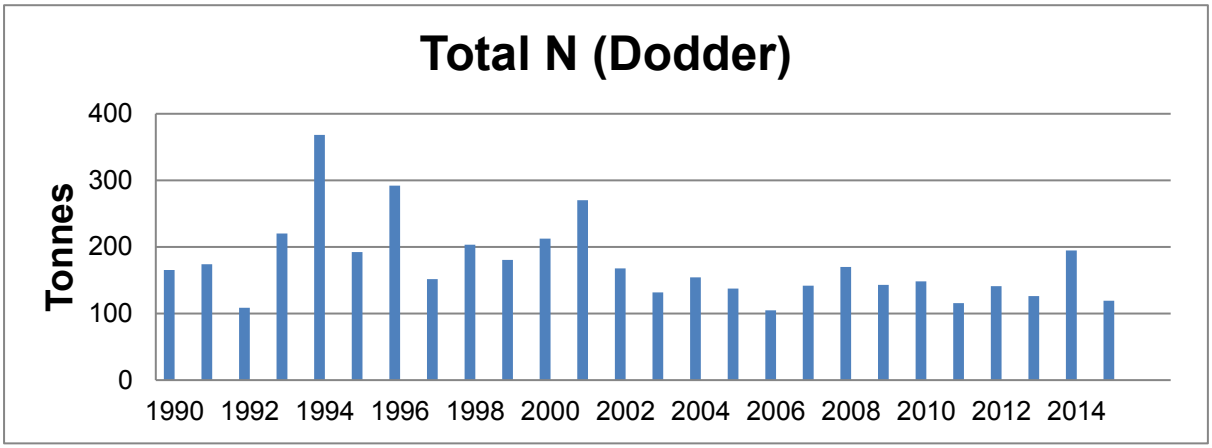
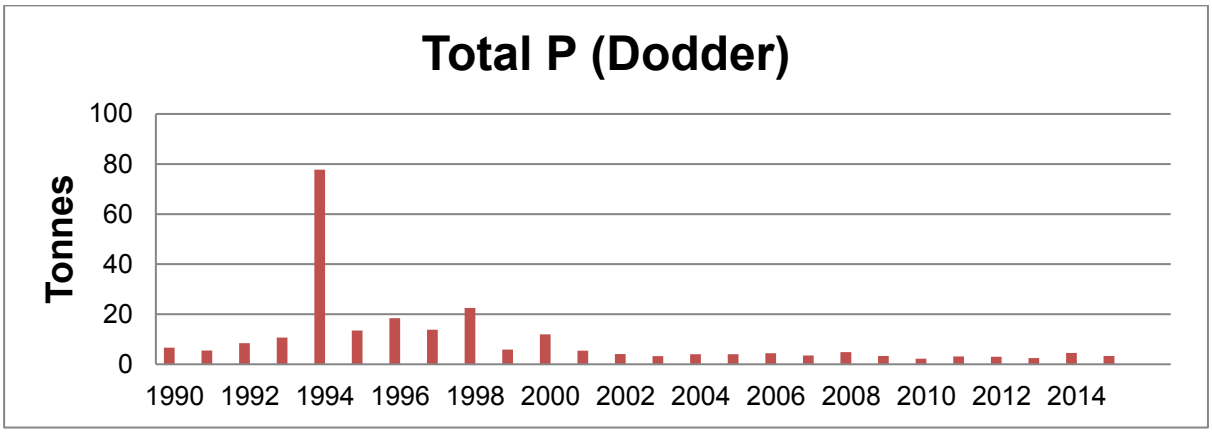


Figure 20b - Total Phosphorus Load (Tonnes/year) 1990-2015



[6] Leixlip WWTP (Lower Liffey Regional Scheme) upgrade is complete, however, agglomeration works are ongoing and due to be completed in 2027. There is no upgrade planned for Blessington WWTP but a 13% N reduction for the period 2014 to 2015 was noted in the AER, so an improvement at the WWTP is likely to have taken place during this period.

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

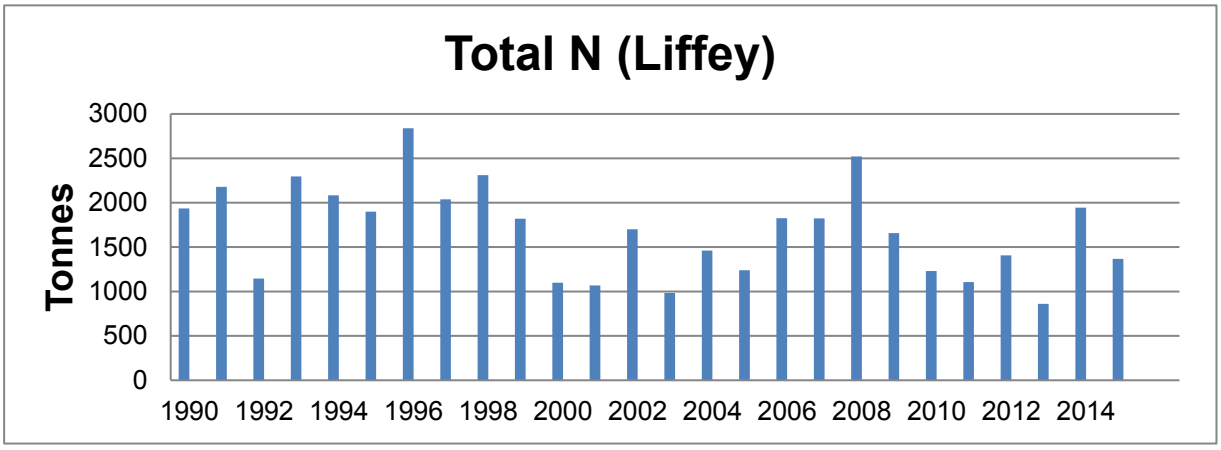


Figure 20d - Total Phosphorus Load (Tonnes/year) 1990-2015

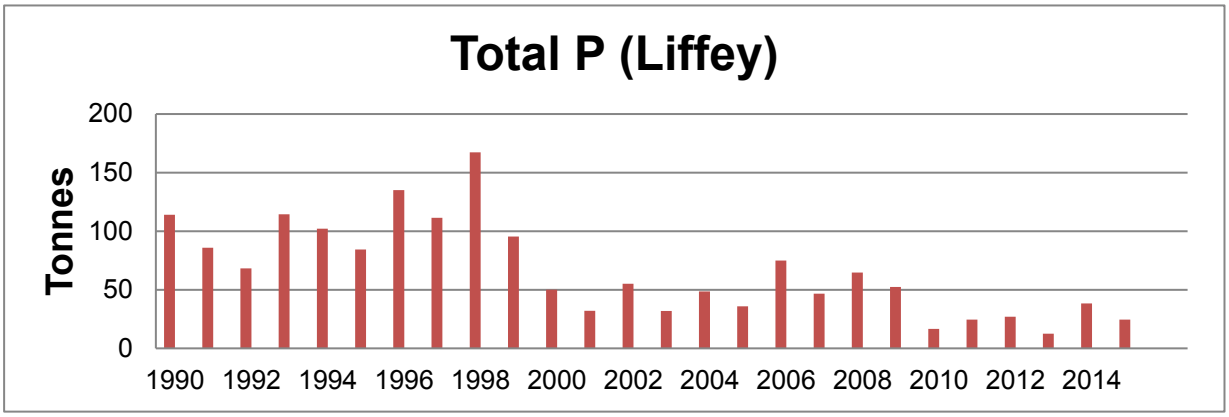


Figure 20e - Total Nitrogen Load (Tonnes/year) 1990-2015

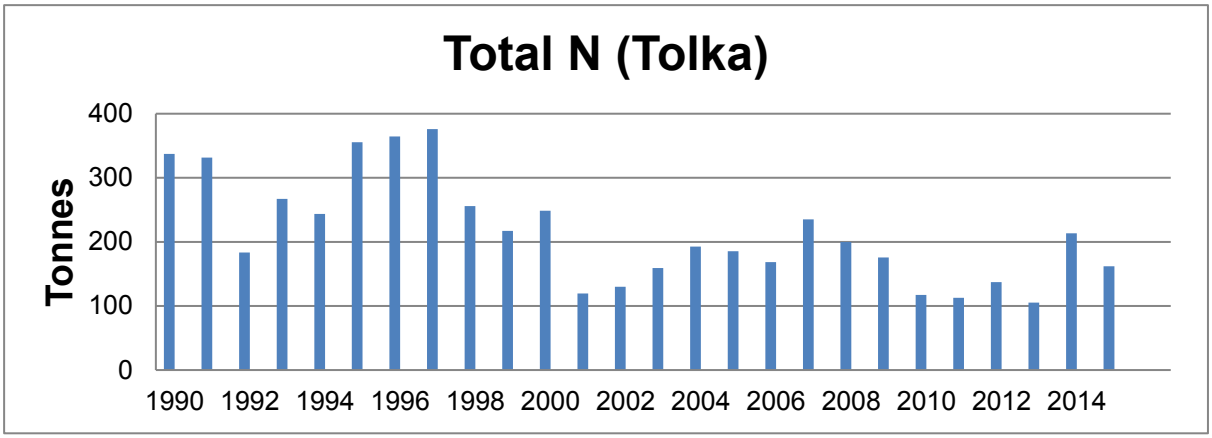
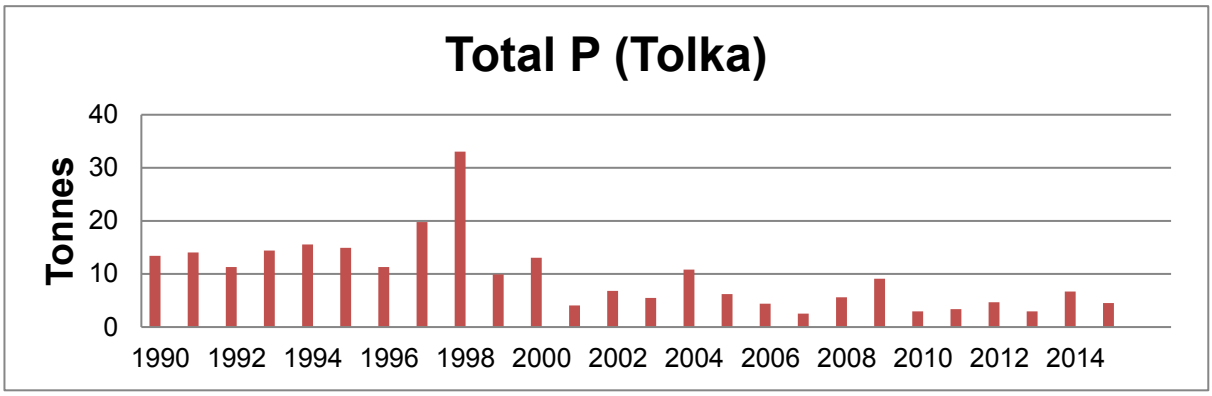


Figure 20f - Total Phosphorus Load (Tonnes/year) 1990-2015



6 Further Characterisation and Local Catchment Assessments

- Further characterisation through local catchment assessments is needed in 49 of the *At Risk* river and lake water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.
- Further characterisation through local catchment assessments is needed in 18 *Review* river and lake water bodies to refine the understanding of the significant pressures at the site/field scale so that specific and targeted measures can be identified.
- A specialist assessment will be required to determine the extent of the reduction in nitrogen that will be required to improve ecological status in the estuaries.
- Brief details on the 10 IA scenarios are given in Appendix 7 and the number of IAs required for each scenario are given in Table 11.

Table 11. Local catchment assessment allocation for *At Risk* and *Review* river and lake water bodies

Risk	IA 1	IA 2	IA 3	IA 4	IA 5	IA 6	IA 7	IA 8	IA 9	IA 10	Total
At Risk	29	22	0	0	7	17	10	2	0	0	87
Review	13	5	8	0	0	3	0	0	0	0	29
Note water bodies may have multiple categories of Local Catchment Assessments											

7 Catchment summary

- Of the 77 river water bodies, 48 are *At Risk* of not meeting their WFD objectives.
- Only one of the lake water bodies out of six Golden Falls is *At Risk* of not meeting their WFD objectives.
- Excess nutrient loss, mainly phosphate, leading to eutrophication is also a major issue for rivers and lakes in the catchment. The significant pressures relating to excess nutrients are primarily agricultural (diffuse and point), but also waste water (urban and domestic).
- Hydromorphological (or physical) conditions (including the input of excessive fine sediment) and poor habitat quality are significant issues for several water bodies.
- Five out of the 11 TraC water bodies are *At Risk* – the Liffey Estuaries Upper and Lower, Tolka Estuary, Broadmeadow Water and Malahide Bay are *At Risk* and urban waste water is the significant pressure.

- There are three *At Risk* groundwater bodies (Industrial Facility (P0325-01), Industrial Facility (P0480-02) and Waste Facility (W0014-01)) in the catchment.

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 6 areas for action in the Liffey 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 Liffey catchment are summarised below.

- Six recommended areas for actions (Table 12, Figure 21) were selected.
- These are the Dodder, pH (Wicklow) 1, Morell, Clonshanbo/Lyreen, Santry River, and Upper Tolka.
- These include 23 river water bodies – 22 *At Risk* and one *Review.*
- There are no *At Risk* or *Review* water bodies where risk is driven by groundwater contribution of nutrients to surface water.

A remaining 52 *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 23. These include:

- 44 river and lake water bodies – 27 *At Risk* and 17 *Review,* and
- eight transitional and coastal water bodies – five *At Risk* and three *Review.*

Table 12. Recommended Areas for Action in the Liffey catchment

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Dodder	3	9_16	Dublin City Dun Laoghaire Rathdown South Dublin	• Will support improvement in the estuary. • Building on knowledge gained from a study on the Merrion Strand where a management plan is currently in progress between DCC and EPA. • Diffuse urban pilot that could be compared to results of Santry project. • Possibility to study historic landfill in the upper reaches and apply knowledge elsewhere. • Invasive species survey has been carried out which should be investigated further and include mitigation. • • Active community group (Dodder Action Group). • Flows into SAC and Dublin Bay Biosphere. • Important trout fishery, recruitment. Salmon in lower and ongoing work for removal of weirs to allow salmon to pass. • Important for recreation. Greenway proposed which would increase tourism. • Ringsend agglomeration is on the Irish Water investment programme.
pH (Wicklow) 1	4	9_8 9_13	Wicklow	• An acid water project in the east. • Build on work completed by Wicklow County Council. • Headwaters to reservoir. • Important for recreation - active angling club in the area.
Morell	4	9_14	Kildare	• Pilot project to address issues and measures associated with quarries. • Important for salmonid recruitment on the Liffey. • Three potential quick wins. • Source of the Grand Canal. • Potential case study for considering the role of planning. • Rathmore stream_010 is a headwater stream to the river Morell and runoff in this area is resulting in bank erosion and siltation downstream. • Two deteriorated water bodies.
Clonshanbo/ Lyreen	4	9_9	Kildare	• Building on existing work, including stream works, completed by Kildare County Council and IFI. • Building on existing measures that have been put in place – fencing to prevent cattle access issues. There is a procedure in place to monitor the effectiveness of the fencing. • Three potential 'quick wins'. • One deteriorated water body. • A headwaters area.

Recommended area for action	Number of water bodies	SCs	Local authority	Reason for Selection
Santry River	2	9_17	Dublin City	• Multi-disciplinary, cross-agency project. • DCC are looking to develop projects here for green infrastructure so would build on that existing investment. • Building on Irish Water work - a drainage area study was recently completed for the catchment. • Building on on-going work by Fingal County Council. • Urban project - measures could be implemented elsewhere. • Potential to work with fisheries for guidance on river restoration. • Includes a headwaters area. • Santry is currently negatively impacting on North Bull Island (SPA, SAC, pNHA, RAMSAR site, nutrient sensitive waters, UNESCO. Biosphere). Improving status in the river will eliminate the impact of the river on North Bull Island. • Proposed Natural Heritage Area (Santry Demesne). • Contained within Dublin Bay Biosphere. • Active community groups in area.
Upper Tolka	6	9_10	Meath	• One Bad status water body where the pressure is known. • Headwaters of the river Tolka. • Potential to apply the results of the Santry Project here. • Building on decline in phosphate concentrations. • Important fishery, huge amenity for youth engagement with the Tolka anglers. • Four deteriorated water bodies.

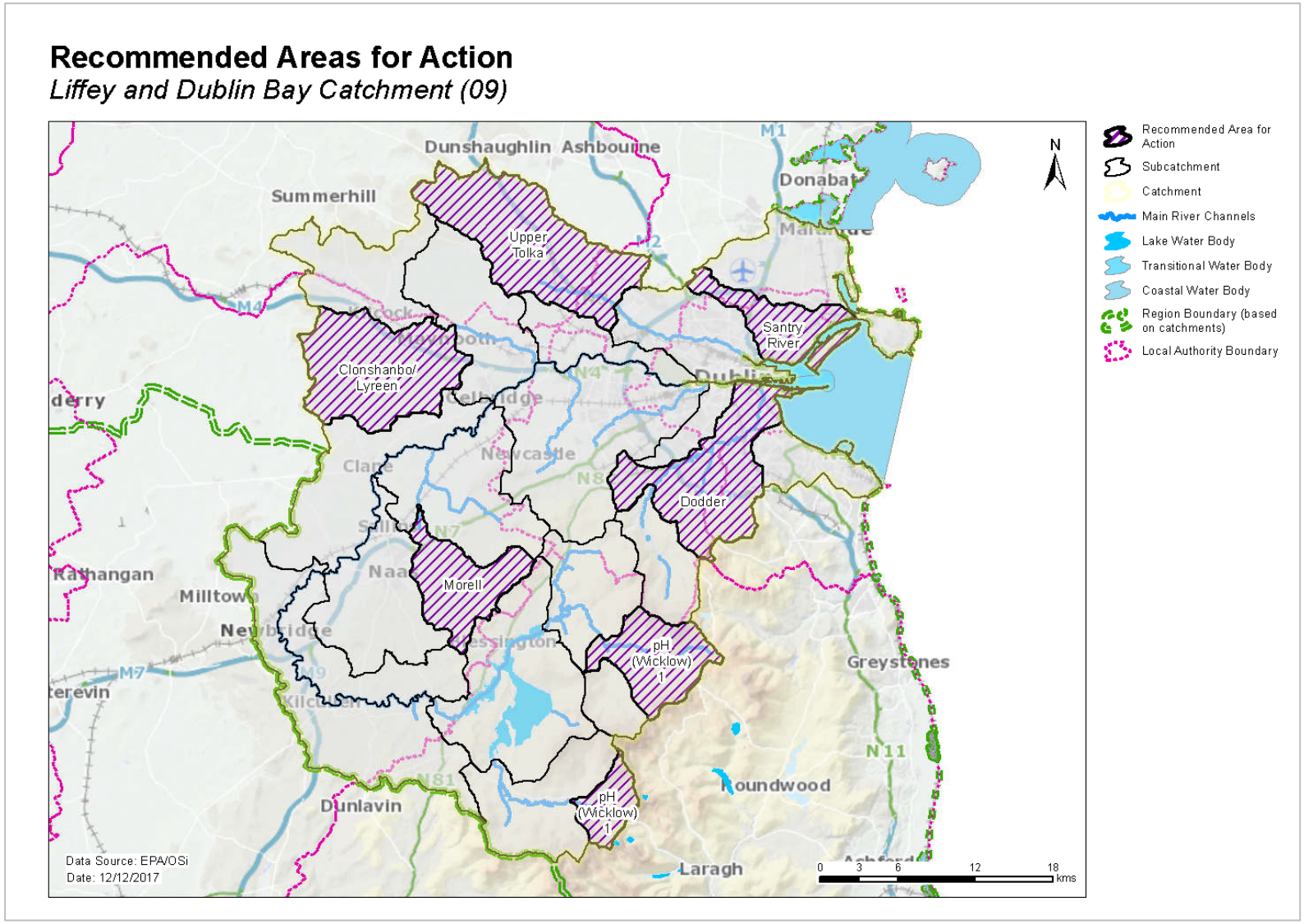


Figure 21. Location of Recommended Areas for Action in the Liffey Catchment

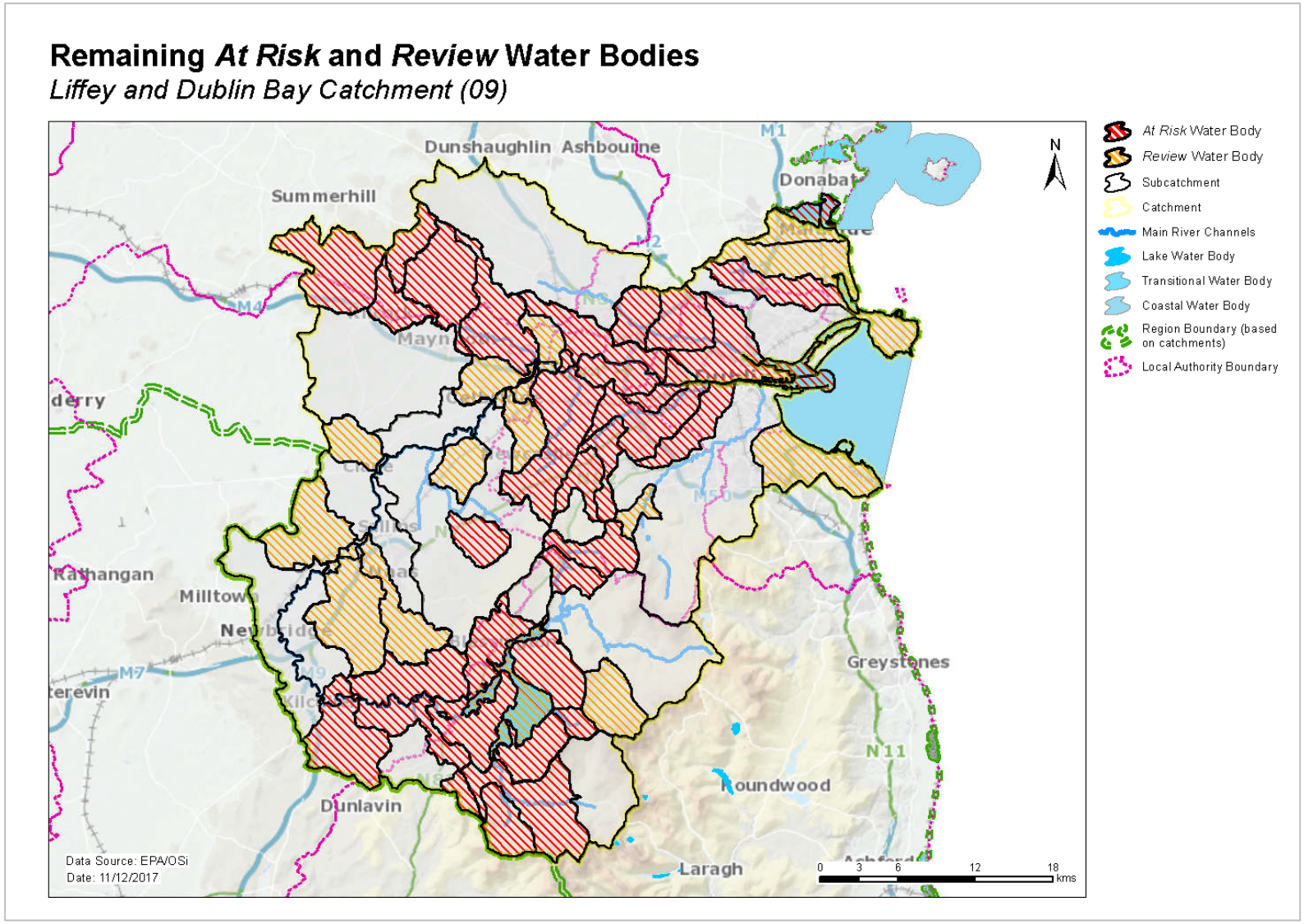


Figure 22. Location of *At Risk* and *Review* water bodies located outside Recommended Areas for Action in the Liffey Catchment

9 Environmental Objectives

9.1 Surface Water

- Assuming resources are available and actions are taken in the recommended areas for action, of the 23 *At Risk* surface water bodies, it is predicted that eight (36%) will improve by 2021 and the remaining 14 (63%) will achieve their objective by 2027. For the one *Review* surface water body, the absence of information on this water body means that there is no scientific basis to quantify an environmental objective date and therefore a 2027 date is set, see Table 14.

Table 14. 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	22	8	14
Review	1	0	1
Total	23	8	15

- Twenty-one river and lake water bodies have met their 2015 environmental objective. One of the 21 water bodies met its environmental objective for ecological status but failed to meet its protected area objective.
- As action is not yet planned to be taken in the remaining 32 *At Risk* surface water bodies, a 2027 date is applied to all32 of the water bodies.
- For the 20 *Review* surface water bodies, the absence of information on these water bodies means that there is no scientific basis to quantify an environmental objective date and therefore a 2027 date is applied, see Table 15.

Table 15. 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	26	0	26
Review	14	0	14
Lakes			
At Risk	1	0	1
Review	3	0	3
TraCs			
At Risk	5	0	5
Review	3	0	3
Total	52	0	52

9.2 Groundwater

- Thirteen of the 16 groundwater bodies are currently Good status and, therefore, have met their environmental objectives.
- Of the three groundwater bodies that are Poor status, has all have a 2027 environmental objective, see Table 16.

Table 16 Environmental Objective dates of Poor status groundwater bodies in the Liffey catchment

Water body code	Water body name	Environmental Objective
IE_EA_G_078	Industrial Facility (P0325-01)	2027
IE_EA_G_086	Industrial Facility (P0480-02)	2027
IE_EA_G_087	Waste Facility (W0014-01)	2027

10 Acknowledgements

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

- Dublin City Council.
- South Dublin County Council.
- Dun Laoghaire Rathdown County Council.
- Fingal County Council.
- Kildare County Council.
- Meath County Council.
- Wicklow 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 Forest Service.
- DAFM Agriculture.
- Bord Na Mona.
- Coillte.
- Teagasc.
- Geological Survey Ireland.
- National Federation of Group Water Schemes.
- National Parks and Wildlife Service.
- National Water Forum.

Appendix 1 High ecological status objective water bodies and sites

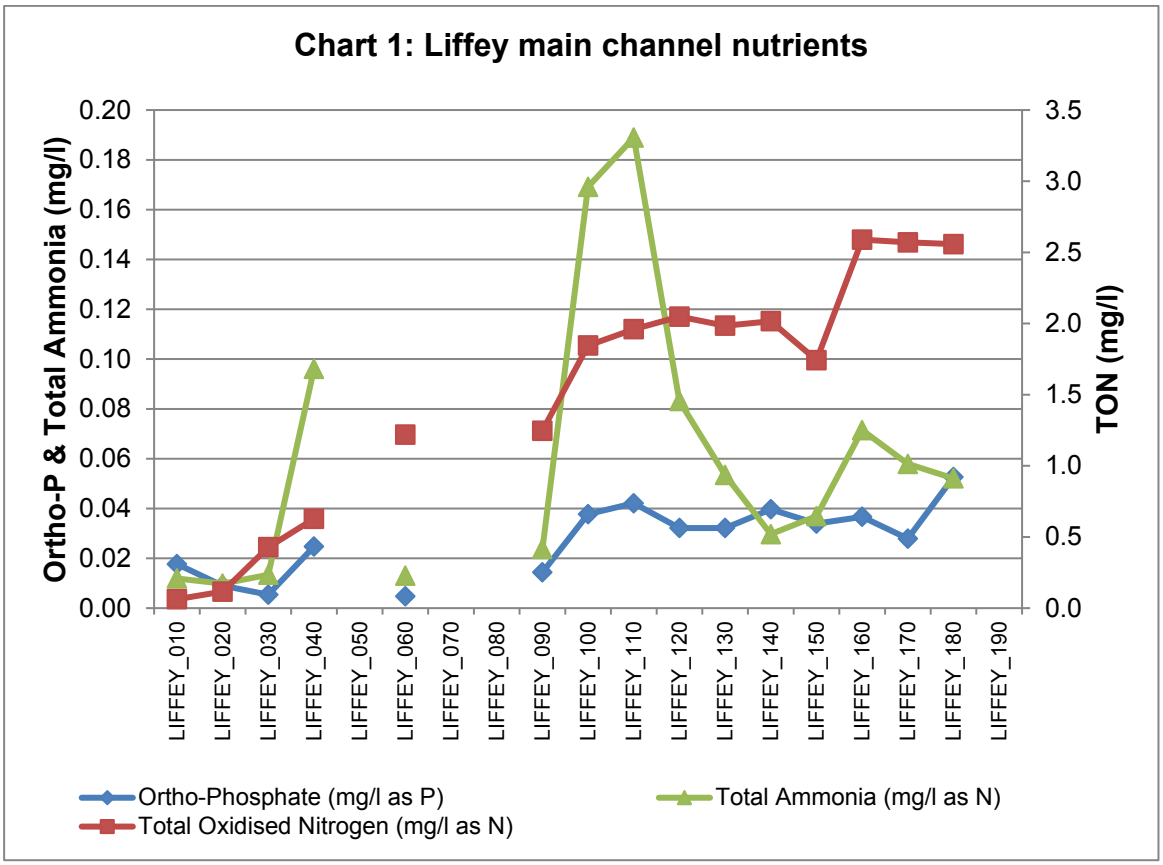
Water body/Site	Type	Codes	2015 Status
Lemonstown Stream_010	River	IE_EA_09L030100	Good
Cock Brook_010	River	IE_EA_09C040100	Good
Southwestern Irish Sea – Killiney Bay HA10	TraC	IE_EA_100_0000	High
North-western Irish Sea (HA 08)	TraC	IE_EA_020_0000	Good

Appendix 2 Catchment scale nutrient concentrations and in-stream loads

The results of the instream water quality assessment for the Liffey catchment are illustrated in Chart 1. This shows the 2013-2015 baseline orthophosphate concentrations along the main channel show a gradual upward spatial trend ranging from 0.005mg/l up to 0.053mg/l.

The ammonia concentrations also increase towards the catchment outlet but show significant spikes in concentrations above the Environmental Quality Standard (EQS) for good status (0.065mg/l) at Liffey_040, Liffey_100 & Liffey_110 and Liffey_160. The elevated concentrations are related directly to waste water discharges from the Blessington Waste water Treatment Plant (WWTP) (PE> 2,001 to 10,000) for the Liffey_040, the Upper Liffey Valley Sewerage Scheme (PE> 10,000) for the Liffey_100 and Lower Liffey Valley Regional Sewerage Scheme (PE> 10,000) for the Liffey_160. The ammonia concentrations reduce significantly downstream of these points.

The TON concentrations in the river headwaters (Liffey_010) are relatively low (0.065mg/l) but increase steadily as the contribution of agricultural and diffuse urban runoff increases downstream along the river. There is a marked increase at Liffey_160 up to 2.59mg/l, possibly related to the waste water discharge from the Lower Liffey Valley Regional Sewerage.



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
09_1	IE_EA_09L012040	Liffey_160	River	Review	Unassigned	Unassigned	N		2027	
09_1	IE_EA_09L012350	Liffey_180	River	At risk	Unassigned	Unassigned	N	DU,UWW	2027	
09_1	IE_EA_09L012100	Liffey_170	River	At risk	Moderate	Moderate	N	DU,UWW	2027	
09_1	IE_EA_09L012360	Liffey_190	River	At risk	Moderate	Moderate	N	DU,UWW	2027	
09_1	IE_EA_090_0400	Liffey Estuary Upper	Transitional	At risk	Poor	Moderate	N	UWW	2027	
09_3	IE_EA_09J010950	Jenkinstown Stream_010	River	At risk	Unassigned	Unassigned	N	Ag,DWW	2027	
09_3	IE_EA_09R010100	Rye Water_010	River	At risk	Good	Moderate	N	Ag,DWW	2027	
09_3	IE_EA_09R010300	Rye Water_020	River	At risk	Moderate	Poor	N	Ag,DWW,UWW	2027	
09_4	IE_EA_09T011150	Tolka_060	River	At risk	Unassigned	Unassigned	N	DU,UWW	2027	
09_4	IE_EA_09T011000	Tolka_040	River	At risk	Poor	Poor	N	DU	2027	
09_4	IE_EA_09T011100	Tolka_050	River	At risk	Poor	Poor	N	DU,UWW	2027	
09_5	IE_EA_09R010400	Rye Water_030	River	At risk	Moderate	Poor	N	Ag,DWW	2027	
09_5	IE_EA_09R010600	Rye Water_040	River	At risk	Poor	Poor	N	Ag,DU,DWW	2027	
09_6	IE_EA_09L011300	Liffey_110	River	Review	Unassigned	Unassigned	N		2027	
09_6	IE_EA_09L011200	Liffey_100	River	Review	Moderate	Moderate	N		2027	
09_7	IE_EA_09A020300	Awillyinish Stream_010	River	Review	Unassigned	Unassigned	N		2027	
09_7	IE_EA_09K260890	Kilmurry 09_010	River	Review	Unassigned	Unassigned	N		2027	
09_8	IE_EA_09D020200	Douglas (Liffey)_010	River	At risk	High	Good	N	Ag,For	2027	
09_8	IE_EA_09K010060	King's (Liffey)_010	River	At risk	Moderate	Moderate	N	For	2027	pH (Wicklow) 1
09_8	IE_EA_09K010100	King's (Liffey)_020	River	At risk	Moderate	Good	N	For	2027	
09_9	IE_EA_09C030300	Clonshanbo_010	River	At risk	Poor	Poor	N	Ag,DWW	2021	Clonshanbo/ Lyreen
09_9	IE_EA_09C030600	Clonshanbo_020	River	At risk	Unassigned	Poor	N	Ag,DWW	2021	Clonshanbo/ Lyreen
09_9	IE_EA_09L020035	Lyreen_010	River	At risk	Moderate	Poor	N	Ag,DWW,Ind	2021	Clonshanbo/ Lyreen
09_9	IE_EA_09L020100	Lyreen_020	River	At risk	Poor	Poor	N	Ag,DU	2027	Clonshanbo/ Lyreen
09_10	IE_EA_09P210700	Powerstown 09_010	River	Review	Unassigned	Unassigned	N		2027	Upper Tolka
09_10	IE_EA_09D040500	Dunboyne Stream_010	River	At risk	Poor	Moderate	N	Ag,DWW	2027	Upper Tolka
09_10	IE_EA_09P020500	Pinkeen_010	River	At risk	Moderate	Poor	N	Ag,DWW	2027	Upper Tolka

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
09_10	IE_EA_09T010300	Tolka_010	River	At risk	Moderate	Poor	N	Ag,DWW	2027	Upper Tolka
09_10	IE_EA_09T010600	Tolka_020	River	At risk	Moderate	Poor	N	Ag	2027	Upper Tolka
09_10	IE_EA_09T010800	Tolka_030	River	At risk	Poor	Bad	N	Ind	2021	Upper Tolka
09_11	IE_EA_09L010600	Liffey_050	River	At risk	Good	Moderate	N	Hymo,UWW	2027	
09_11	IE_EA_09L010700	Liffey_060	River	At risk	Good	Moderate	N	Ag	2027	
09_11	IE_EA_09L030100	Lemonstown Stream_010	River	At risk	High	Good	Y	Hymo	2027	
09_12	IE_EA_09_130	Redbog	Lake	Review	Unassigned	Unassigned	N		2027	
09_12	IE_EA_09_53	Golden Falls	Lake	At risk	Unassigned	Unassigned	N	Hymo,UWW	2027	
09_12	IE_EA_09_71	Pollaphuca	Lake	Review	Good	Moderate	N		2027	
09_12	IE_EA_09C040100	Cock Brook_010	River	At risk	Moderate	Good	Y	Hymo	2027	
09_12	IE_EA_09L010400	Liffey_040	River	At risk	Moderate	Moderate	N	Hymo,UWW	2027	
09_13	IE_EA_09B020300	Brittas_010	River	At risk	Moderate	Moderate	N	Ag,M+Q	2027	
09_13	IE_EA_09B020500	Brittas_020	River	At risk	Good	Moderate	N	Ag	2027	
09_13	IE_EA_09B030100	Ballydonnell Brook_010	River	Review	Moderate	Good	N		2027	
09_13	IE_EA_09B040100	Ballylow Brook_010	River	At risk	Moderate	Moderate	N	For	2027	pH (Wicklow) 1
09_13	IE_EA_09L010100	Liffey_010	River	At risk	Moderate	Moderate	N	Other	2027	pH (Wicklow) 1
09_13	IE_EA_09L010200	Liffey_020	River	At risk	Moderate	Moderate	N	For	2027	pH (Wicklow) 1
09_14	IE_EA_09R140550	Reeves_010	River	Review	Unassigned	Unassigned	N		2027	
09_14	IE_EA_09M010060	Morell_010	River	At risk	Unassigned	Moderate	N	M+Q	2021	Morell
09_14	IE_EA_09M010100	Morell_020	River	At risk	Moderate	Poor	N	Hymo,M+Q	2021	Morell
09_14	IE_EA_09M010150	Morell_030	River	At risk	Moderate	Moderate	N	Hymo,M+Q	2021	Morell
09_14	IE_EA_09P010400	Painestown_010	River	At risk	Moderate	Moderate	N	Ag	2027	
09_14	IE_EA_09R020300	Rathmore Stream_010	River	At risk	Good	Poor	N	Ag,Hymo	2027	Morell
09_15	IE_EA_09_69	Leixlip Reservoir	Lake	Review	Unassigned	Unassigned	N		2027	
09_15	IE_EA_09C500830	Castletown 09_010	River	Review	Unassigned	Unassigned	N		2027	
09_15	IE_EA_09C020250	Camac_020	River	At risk	Poor	Moderate	N	DU	2027	
09_15	IE_EA_09C020310	Camac_030	River	At risk	Poor	Poor	N	DU,Ind	2027	
09_15	IE_EA_09C020500	Camac_040	River	At risk	Poor	Poor	N	DU,Hymo,UWW	2027	
09_15	IE_EA_09L011900	Liffey_150	River	Review	Poor	Poor	N		2027	
09_16	IE_EA_09B130400	Brewery Stream_010	River	Review	Unassigned	Unassigned	N		2027	
09_16	IE_EA_09P030800	Poddle_010	River	At risk	Poor	Unassigned	N	DU	2027	
09_16	IE_EA_09D010300	Dodder_030	River	Review	Good	Good	N		2027	

Subcatchment code	Water body code	Water body name	Water body type	Risk	Ecological Status 07-09	Ecological Status 10-15	High Ecological Status Objective Water Body Y/N	Significant Pressures	Date to Meet Environmental Objective	Recommended Area for Action Name
09_16	IE_EA_09D010620	Dodder_040	River	At risk	Moderate	Moderate	N	DU	2027	Dodder
09_16	IE_EA_09D010900	Dodder_050	River	At risk	Poor	Moderate	N	DU,Other,UWW	2027	Dodder
09_16	IE_EA_09O011700	Owenadoher_010	River	At risk	Poor	Moderate	N	Hymo	2021	Dodder
09_16	IE_EA_090_0300	Liffey Estuary Lower	Transitional	At risk	Moderate	Moderate	N	UWW	2027	
09_17	IE_EA_08G080700	Gaybrook_010	River	Review	Unassigned	Unassigned	N		2027	
09_17	IE_EA_09H230880	Howth_09_010	River	Review	Unassigned	Unassigned	N		2027	
09_17	IE_EA_09S011100	Santry_020	River	At risk	Unassigned	Unassigned	N	DU,Other,UWW	2027	Santry River
09_17	IE_EA_09S071100	Sluice_010	River	Review	Unassigned	Unassigned	N		2027	
09_17	IE_EA_09M030500	Mayne_010	River	At risk	Poor	Poor	N	DU	2027	
09_17	IE_EA_09S010300	Santry_010	River	At risk	Poor	Poor	N	DU,UWW	2027	Santry River
09_17	IE_EA_020_0000	North-western Irish Sea (Ha 08)	Coastal	Review	High	Good	Y		2027	
09_17	IE_EA_060_0000	Malahide Bay	Coastal	At risk	Moderate	Moderate	N	UWW	2027	
09_17	IE_EA_060_0100	Broadmeadow Water	Transitional	At risk	Moderate	Moderate	N	DWW,UWW	2027	
09_17	IE_EA_080_0100	Mayne Estuary	Transitional	Review	Unassigned	Unassigned	N		2027	
09_17	IE_EA_090_0100	North Bull Island	Transitional	Review	Unassigned	Unassigned	N		2027	
09_17	IE_EA_090_0200	Tolka Estuary	Transitional	At risk	Moderate	Moderate	N	UWW	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

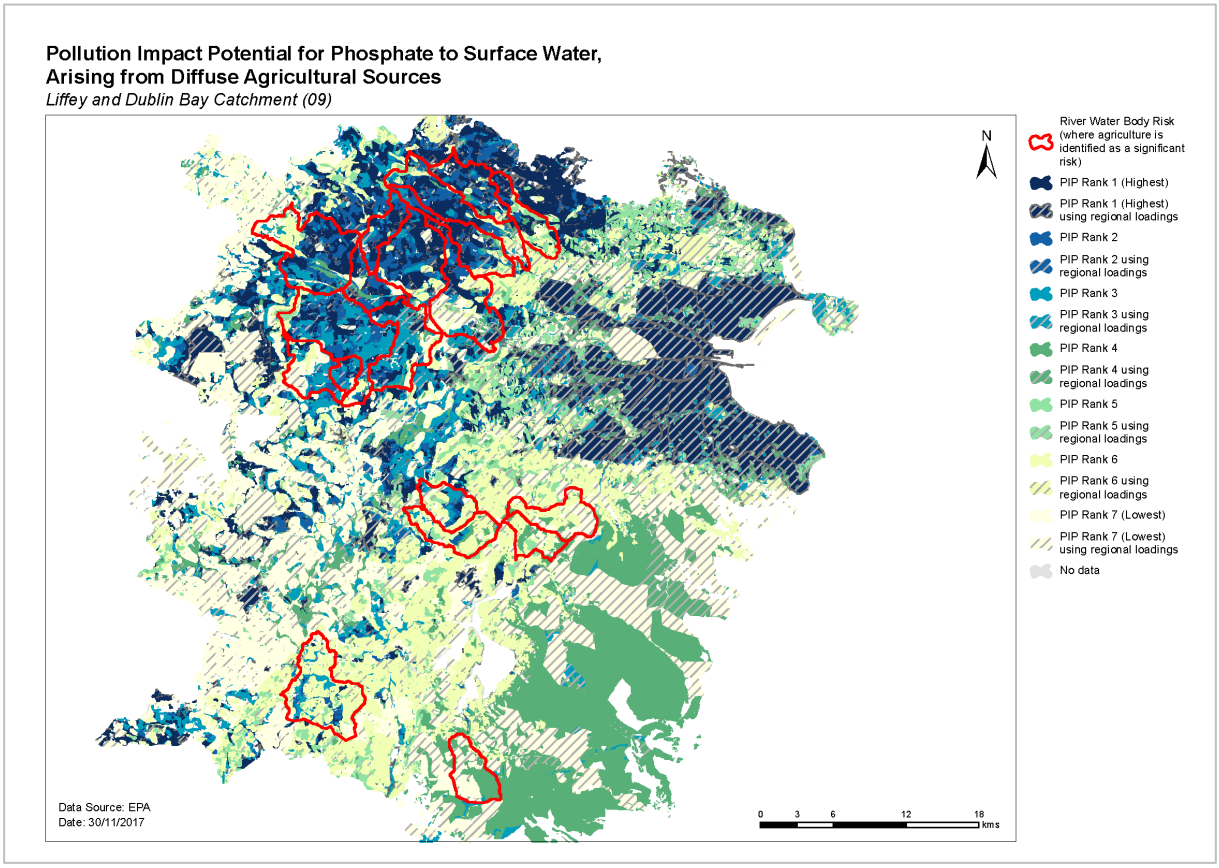
Scheme Code	Scheme Name	Water Body	Water Body Code	Objective met? Yes /No	Reason why not
2300PUB1066	Churchview	Dublin	IE_EA_G_008	Yes	N/A
2300PUB1067	Batterstown				
2300PUB1080	Balfeisfon				
1400PUB1026	Newtown Grove	West Blessington Gravels	IE_EA_G_082	Yes	N/A
1400PUB1024	Redbog	GWDTE-Red Bog of Kildare (SAC000397)	IE_EA_G_085	Yes	N/A
1400PRI3033	Gormanstown/Usk GWS	Gormanstown Gravels	IE_EA_G_046	Yes	N/A
3400PUB1018	Blessington Public Supply	Blessington Gravels	IE_EA_G_047	Yes	N/A
3400PRI1105	Hempstown				
	Hempstown	Kilcullen	IE_EA_G_003	Yes	N/A
	Hempstown				
3400PRI1111	Blakestown				
3400PUB1022	Hollywood Donard Public Supply				
	Hollywood Donard Public Supply				
3400PUB1026	Ballyknockan Public Supply				
3400PUB1038	Valleymount Spring				
3400PRI1103	Tinode				
3400PRI1104	Balytboys				
1400PRI3055	Kilteel				
1400PUB1006	Bullock Park				
0800PUB1003	SD_ZONE3				
0700PUB1001	DCC_ZONE1	Liffey_040	IE_EA_09L010400	Yes	N/A
1400PUB1023	Poulaphouca Regional				
3400PUB1018	Blessington Public Supply				
3400PUB1037	Lacken Public Supply				
0700PUB1002	DCC_ZONE2	Dodder_020	IE_EA_09D010100	Yes	N/A
0900PUB1001	F_ZONE1	Liffey_150	IE_EA_09L011900	No	2,4-D

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

SAC Name	Relevant Qualifying interests	Target status	Water body type	Water bodies	Status (risk)	Prioritise?	Code	Survey data?
Baldoyle Bay SAC 000199	none							
Glenasmole Valley SAC 001209	7220	Good GW level	Ground water	Kilcullen GWB	Good (NAR)	No	IE_EA_G_003	No
Howth Head SAC 000202	none							
Malahide Estuary SAC 000205	none							
Mouds Bog SAC 002331	none							
North Dublin Bay SAC 000206	2190	Good GW level	Ground water	Dublin GWB	Good (NAR)	No	IE_EA_G_008	Yes
Red Bog, Kildare SAC 000397	none							
Rockabill to Dalkey Island SAC 003000	none							
Rye Water Valley/Carton SAC 001398	7220	Good GW level	Ground water	Dublin GWB	Good (NAR)	No	IE_EA_G_008	No
South Dublin Bay SAC 000210	none							
Wicklow Mountains SAC 002122	none							

Appendix 6 Pollution Impact Potential (PIP) Map for Phosphate

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



Appendix 7 Local catchment assessment categories

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