



Lough Melvin and Drowes

Priority Area for Action

AFA0121 Desk Study Report

LAWPRO (Border Region)

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1. Background

The Lough Melvin and Drowes Priority Area for Action (PAA) is a cross-border sub-catchment, with part of the eastern side of the sub-catchment being shared with Northern Ireland. Within the sub-catchment there are a total of nine river water bodies (Sragarve_010, Kinlough_010, Ballagh_010, Glenaniff_010, Drowes_010, County River (Carran West), County River (Lattone), Rosfriar_010 and Lattone_010) and two lake water bodies (Lough Melvin and Lattone Lake) (Figure 1). Lough Melvin is the main lake waterbody in the sub-catchment with all river waterbodies to the east and south discharging into it. The Drowes_010 is the largest river waterbody in the sub-catchment and flows into Lough Melvin from both the north and south; it is also the connection between the Lough Melvin outfall and the coast/sub-catchment outlet located to the north-west near Tullaghan Town.

Lattone Lake is located within the County River (Lattone) sub-basin in the east of the sub-catchment; the County River (Lattone) and the County River (Carran West) water bodies rise in, and are located mostly within, Northern Ireland, as are the tributaries of the Drowes_010 to the north of Lough Melvin (Figure 2). The County River (Lattone) and Rosfriar_010 flows in a westerly direction to the County River (Carran West) which also has Lattone_010 flowing into it from the south (Figure 2). The County River (Carran West) flows north/north-westerly and discharges into Lough Melvin (Figure 2). The Sragarve_010 and Ballagh_010 flow first easterly before heading northerly into Lough Melvin (Figure 2). Kinlough_010 and the Glenaniff_010 waterbodies flow briefly into the Drowes_010 sub-basin for a short distance prior to discharging into Lough Melvin (Figure 2).

Topography within the Lough Melvin and Drowes sub-catchment is elevated in the east and south-east of the sub-catchment, dominated by the Arroo and Dough/Thur Mountains, with the remainder of the sub-catchment being low-lying and relatively flat with a gentle undulating landscape. The drainage density is high around these mountainous areas and at the elevated Aghavoghil Bog area between Arroo and Lough Melvin.

The main towns in the sub-catchment are Kinlough and Tullaghan with part of the environs of Bundoran extending into the sub-catchment in the north-west. Rossinver and Kiltyclogher are located to the east of the sub-catchment. Lough Melvin is a dominant feature within the sub-catchment with land cover comprising a mixture of agricultural land with significant areas of peat and forestry situated to the south and south-east of the Lough Melvin.

Reason why the area for action was chosen:

- One deteriorated waterbody, Drowes_010, with a protected areas objective that is not being met. This waterbody recently dropped in status to Moderate in the 2013 – 2015 monitoring cycle.
- Lough Melvin is also not meeting its protected area objective.
- Previous catchment management plan in this area which can be built on and may inform and focus investigation.
- Six unassigned river water bodies that flow into Lough Melvin are included to determine the respective water quality which maybe impacting on the lake.
- Community engagement possibilities in the area.
- Long term challenge requiring cross agency approach.
- Cross border partnership required.

Protected Areas: There are 3 spring water abstractions the sub-catchment to the south of Rossinver and Kiltyclogher. Lough Melvin is also a drinking water abstraction point. The Donegal Bay wetlands and water birds Special Protection Area (SPA) is located to the west of the sub-catchment. The Sligo/Leitrim Uplands SPA is located south of Lough Melvin. The Aghavoghil Bog Natural Heritage Area (NHA) is in the middle of the sub-catchment while the Dough/Thur Mountains NHA are in the south-

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east. The Lough Melvin and the Arroo Mountain Special Area of Conservation (SAC) are in the sub-catchment both of which are also proposed NHAs.

Within the current WFD cycle there are nine waterbodies within the Lough Melvin and Drowes sub-catchment which are in the PAA, these include the: Sragarve_010, Kinlough_010, Ballagh_010, Drowes_010, County River (Carran West), Rosfriar_010, Lattone_010, Lough Melvin and Lattone Lake (Table 1, Figure 1). There are two further waterbodies within the Lough Melvin and Drowes sub-catchment which have not been identified as PAA's these include Glenaniff_010 and County River Lattone (Table 1).

The initial characterisation sub-catchment assessment recommended that the following actions be undertaken:

Sragarve_010:

- *“Investigative assessment needed, to include water sampling and walkover”.*

Kinlough_010:

- *“Investigative assessment needed, to include water sampling and walkover”.*

Ballagh_010:

- *“Investigative assessment needed, to include water sample and walkover. If there is an issue, further investigative assessment will need to focus on areas of agriculture”.*

Drowes_010:

- *“Investigative assessment is needed to determine what is driving water body status and should be incorporated into the Lough Melvin investigative assessment.”*
- *“Review the data since improvements were carried out to farming impacts which entered the Drowes.”*
- *“EPA to liaise with/obtain monitoring data from NIEA.”*
- *“Further discussion with NIEA regarding significant pressures is required and updates to status since 2014; it is noted that the cross-border combined status for 2014 was Good but is currently Moderate.”*

Lough Melvin:

- *“Large water body with a number of potential significant pressures - investigative assessment needed to narrow these down. Also consider any potential impacts from UWW at Garrison in Fermanagh. Review information in the Lough Melvin Catchment Management Plan 2008”.*

County River (Carran West):

- *“Investigative assessment needed, to include water sampling and walkover. This should be carried out before the investigative assessment of Lough Melvin, to help identify areas that issues are more likely to be in Lough Melvin.”*
- *“EPA to liaise with/obtain monitoring data from NIEA.”*
- *“Liaise with NIEA to determine significant pressures.”*
- *“Internal data gathering regarding the Kilcoo C1 drainage scheme running along the border with Northern Ireland (Fermanagh). Requires further investigation to determine whether this is having any negative impact on the river and/or Lough Melvin.”*

Rosfriar_010:

- *“Investigative assessment needed, to include water sampling and walkover.”*

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Lattone_010:

- *“Forestry activities identified as significant pressure. Undertake IA5, with a focus on forestry pressures and the areas of clear-felling in particular. A river walk also required to evaluate multiple sources concentrating on forestry in a defined (1 km) river stretch.”*

Lattone Lake:

- *“A review of fish classification in relation to water body statuses is currently being carried out. The outcome of this review should be applied to the water body. Fish is currently at Bad status for 2010-2015”.*
- *“Internal liaison regarding updates from lake water quality sampling, and the deterioration in chlorophyll and total phosphorus.”*

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Table 1 Summary of waterbodies within the Lough Melvin and Drowes PAA.

WB Code	WB Name	WFD Risk	Status Objectives	WFD Status				Bio 18	Pressure Category	Pressure Subcat.	Impact	Sig. Pressure	AA
				07-09	10-12	10-15	13-18						
IE_NW_35S070870	Sragarve_010	Review	Good (2027)	Unassigned	Unassigned	Unassigned			Forestry	Forestry		No	Y
									Agriculture	Pasture			
									Anthropogenic pressures	Unknown			
IE_NW_35K380940	Kinlough_010	Review	Good (2027)	Unassigned	Unassigned	Unassigned			Forestry	Forestry		No	Y
									Agriculture	Pasture			
									Anthropogenic pressures	Unknown			
IE_NW_35B010400	Ballagh_010	Review	Good (2027)	Unassigned	Unassigned	Unassigned			Forestry	Forestry		No	Y
									Agriculture	Pasture			
									Anthropogenic pressures	Unknown			
UKGBNI1NW353504082	Glenaniff_010	Not At Risk	High (2021)	High	High	High	Good						N
UKGBNI1NW353504082	Drowes_010	At Risk	Good (2027)	Good	Good	Moderate	Good	4	Agriculture	Pasture	Nutrient Pollution	Yes	Y
IE_NW_35_160	Lough Melvin	At Risk	Good (2027)	Moderate	Moderate	Moderate	Moderate		Invasive Species	Invasive Species		No	Y
									Urban Waste Water	Agglomeration PE of 1,001 to 2,000			
									Anthropogenic Pressures	Unknown			
UKGBNI1NW353504065	Roogagh River					NIEA (GOOD)	NIEA (MOD)						
UKGBNI1NW353504075	County River (Carran West)	Review	Good (2027)	Unassigned	Unassigned	Unassigned			Agriculture	Pasture		No	Y
									Extractive Industry	Peat			
									Forestry	Forestry			
									Anthropogenic Pressures	Unknown			
IE_NW_35R320460	Rosfriar_010	Review	Good (2027)	Unassigned	Unassigned	Unassigned			Forestry	Forestry		No	Y
									Agriculture	Pasture			
									Anthropogenic pressures	Unknown			
IE_NW_35L660960	Lattone_010	Review	Good (2027)	Unassigned	Unassigned	Unassigned			Forestry	Forestry		No	Y

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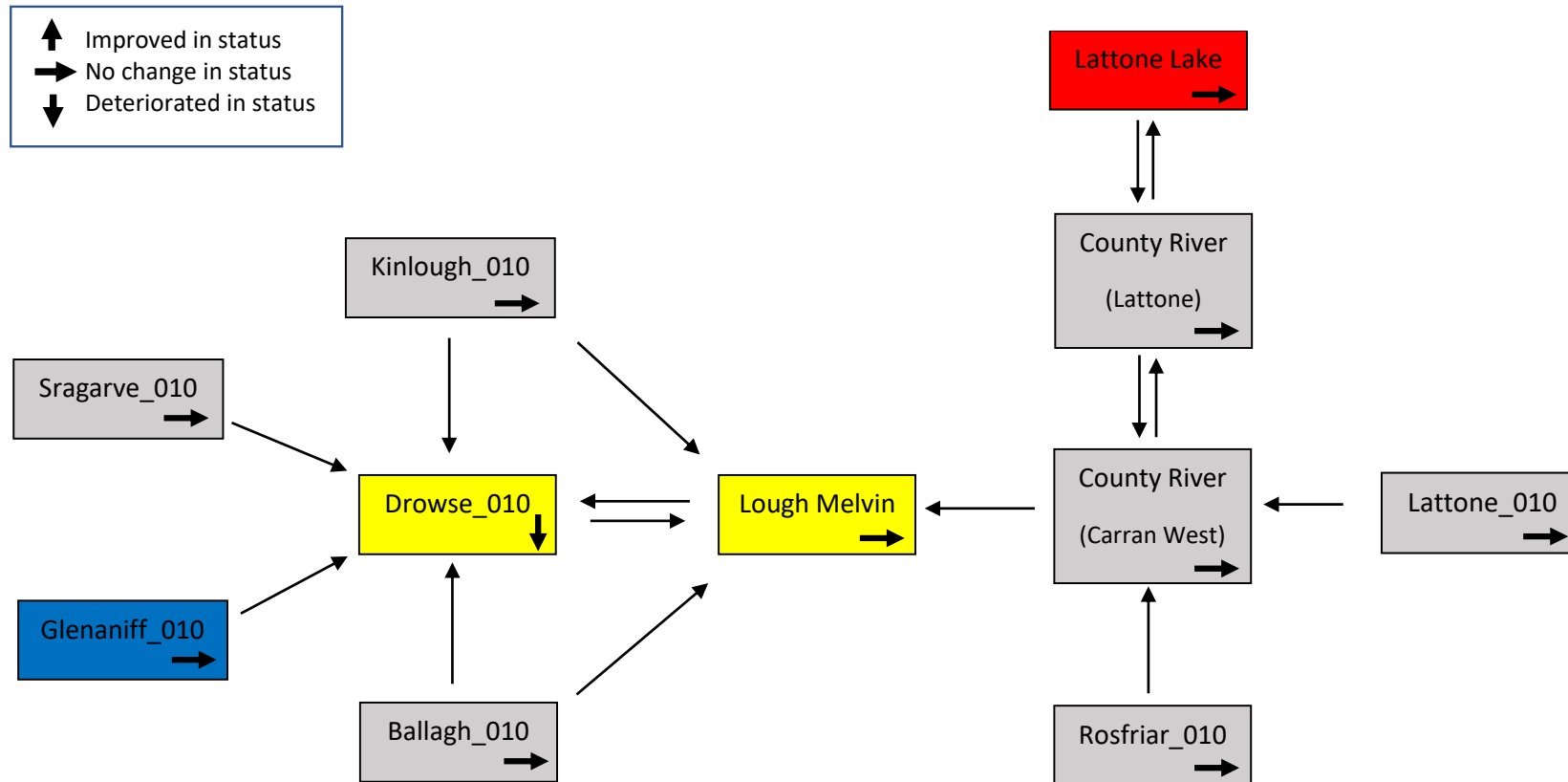


Figure 1 Flow direction of the waterbodies within the Lough Melvin and Drowes PAA.

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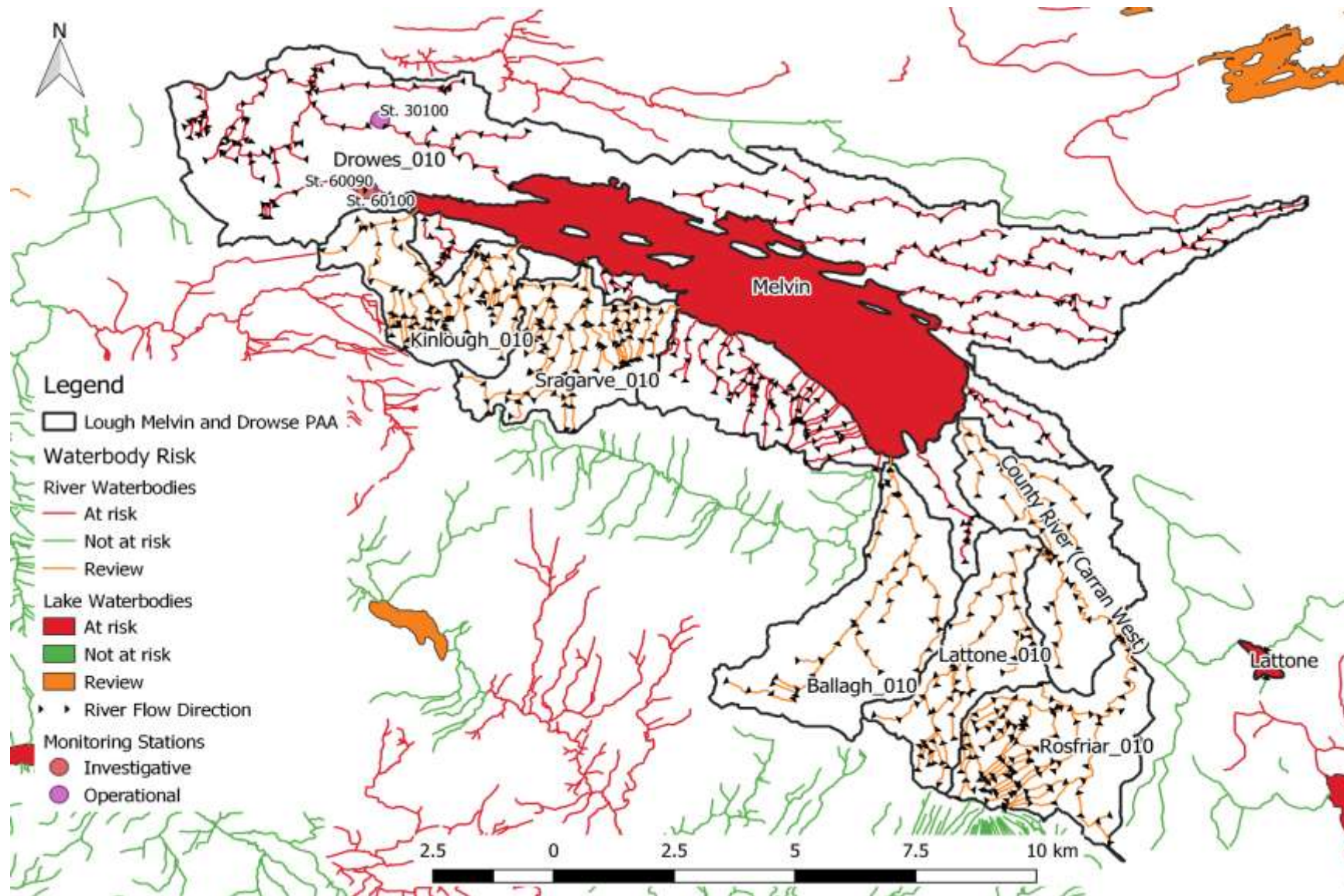


Figure 2 Monitoring stations located within the Lough Melvin and Drowes PAA.

2. Receptor Information and Assessment

There are nine waterbodies in the Lough Melvin and Drowes sub-catchment which are PAA's and have been identified either as *At Risk* or *Review* based on the reporting period 2010-2015. The biological status for the Lough Melvin and Drowes sub-catchment is only available for the Drowes_010 waterbody. The latest Q-Value assessment (2017), categorises the Drowes_010 waterbody as Moderate Ecological Status (Q3-4) (Table 3).

The monitoring stations within the Lough Melvin and Drowes sub-catchment, labelled in Table 3 will be identified as follows:

- St. 30100 Lennox's Bridge
- St. 60090 u/s ambient
- St. 60100 Kilough Stream u/s WWTP

Water quality results for the chemical and biological status are presented for an Operational (St. 30100), an Investigative (St. 60090) and a PreWFD (St. 60100) monitoring station located near the outflow of the Lough Melvin and Drowes waterbodies (Table 3).

Table 2 Receptor information for the Sragrave_010, Kinlough_010 and Ballagh_010 waterbodies.

Factor	Figures Tables	IE_NW_35S070870 Sragrave_010	IE_NW_35K380940 Kinlough_010	IE_NW_35B010400 Ballagh_010
Risk Category	N	<i>Review</i>	<i>Review</i>	<i>Review</i>
Biological Status				
Monitoring Station(s) with Q values	N	None	None	None
2009-2015 Status	N/A			
Trends in Q value since 2009	N/A			
2016-2018 Q value data	N/A			
Hydrochemistry Data				
Monitoring Station(s) with data	N	None	None	None
Existing	N/A			
New	N/A			
Summary & Trends in PO₄, NH₃ and NO₃				
In App	N	None	None	None
All Available data	N	None	None	None
Other water quality data	N	None	None	None
Baseline				
Concentration (mg/l)	N/A	N/A	N/A	N/A
Other relevant values	N	None	None	None
Distance to threshold	N/A	N/A	N/A	N/A
Indicative Quality	N	N/A	N/A	N/A
Supporting Conditions				
Chemical conditions?	N	None	None	None
Oxygenation conditions	N	None	None	None
Acidification conditions	N	None	None	None
Hydromorphology				
RHAT score	N	N/A	N/A	N/A

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Evidence of arterial drainage	Y	There is a high drainage density in this waterbody.	There is a high drainage density in this waterbody.	The drainage density in this waterbody is moderate.
Ecological Status (2010 – 2015) Trends 2010 - 2015	Y	Unassigned	Unassigned	Unassigned
Protected Areas	Fig. 3 Fig. 4 Fig. 5	<ul style="list-style-type: none"> SAC in the south-west of the waterbody NHA in the south-east of the waterbody 	<ul style="list-style-type: none"> SAC in the south of the waterbody SPA in the south of the waterbody 	<ul style="list-style-type: none"> Small SAC area in the south-west of the waterbody
WFD Objectives	Y	Good ecological status by 2027	Good ecological status by 2027	Good ecological status by 2027
EPA biologists notes (if any)	N	N/A	N/A	N/A
Significant issue		Not determined, no data available	Not determined, no data available	Not determined, no data available

*Available in WFD app.

Table 3 Receptor information continued for the Drowes_010, Lough Melvin and County River (Carran West).

Factor	Figures Tables	UKGBNI1NW353504082 Drowes_010	IE_NW_35_160 Lough Melvin	UKGBNI1NW353504075 County River (Carran West)
Risk Category	N	<i>At Risk</i>	<i>At Risk</i>	<i>Review</i>
Biological Status Monitoring Station(s) with Q values 2009-2015 Status Trends in Q value since 2009 2016-2018 Q value data	Y Y Y Y	St. 30100 (Lennox Bridge) Outflow from Lough Melvin 3-4 Downward 4	None	None
Hydrochemistry Data Monitoring Station(s) with data Existing New	Y Y Y	St. 30100 (Lennox Bridge) St. 60090 (u/s ambient) St. 60100 (Kilough Stream u/s) St. 30100: PO ₄ , TN, NH ₃ St. 60090: PO ₄ , NH ₃ St. 60100: PO ₄ , NH ₃	6 sampling sites within the lake TP, NH ₃ , Chl- <i>a</i>	None
Summary & Trends in PO₄, NH₃ and NO₃ In App All Available data	Y N	St. 30100: PO ₄ : down TN: up NH ₃ : down St. 60090: PO ₄ : down NH ₃ : down St. 60100: PO ₄ : down NH ₃ : down Yes	Site 2: TP up Chl- <i>a</i> up Yes	N/A N/A

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Other water quality data	N	St. 30100: BOD St. 60090: BOD, SS St. 60100: BOD, SS	None	N/A
Baseline Concentration (mg/l)	Y	St. 30100: PO ₄ : 0.005 mg/l TN: 0.532 mg/l NH ₃ : 0.025 mg/l St. 60090: PO ₄ : 0.021 mg/l NH ₃ : 0.084 mg/l St. 60100: PO ₄ : 0.036 mg/l NH ₃ : 1.002 mg/l	Site 1 TP: 0.020 mg/l Chl- <i>a</i> : 4.2 mg/l NH ₃ : 0.013 mg/l Site 2 TP: 0.016 mg/l Chl- <i>a</i> : 3.9 mg/l NH ₃ : 0.011 mg/l Site 3 TP: 0.016 mg/l Chl- <i>a</i> : 3.1 mg/l NH ₃ : 0.012 mg/l Site 4 TP: 0.016 mg/l Chl- <i>a</i> : 2.7 mg/l NH ₃ : 0.011 mg/l Site 5 TP: 0.016 mg/l Chl- <i>a</i> : 3.1 mg/l NH ₃ : 0.012 mg/l Site 6 TP: 0.016 mg/l Chl- <i>a</i> : 2.6 mg/l NH ₃ : 0.011 mg/l	N/A
Other relevant values	N	N/A	None	None
Distance to threshold	N	Far	Far	N/A
Indicative Quality	N	PO ₄ : 0.035 mg/l TN: 3.5 mg/l NH ₃ : 0.065 mg/l	NH ₃ 0.040 mg/l TP 0.025 mg/l Chl- <i>a</i> 5.8 µg/l	N/A
Supporting Conditions				
Chemical conditions?	N	None	None	None
Oxygenation conditions	Y	St. 30100: BOD (<1.5 mg/l) St. 60090: BOD (< 1.5 mg/l) St. 60100: BOD (< 1.5 mg/l, spiked to 3.1 mg/l in 6 th April 2017).	None	None
Acidification conditions	N	None	None	None
Hydromorphology				
RHAT score	N	N/A	N/A	N/A
Evidence of arterial drainage	Y	There is a high drainage density in this waterbody.	There is a high drainage density into the lake.	The drainage density in this waterbody is moderate. The OPW has carried out channel drainage along the length of

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				the river in this waterbody in 2015-2016.
Ecological Status (2010 – 2015) Trends 2010 - 2015	Y	Decline from good to moderate	Remained at moderate	unassigned
Protected Areas	Fig 3	<ul style="list-style-type: none"> SAC around the lake shore 	<ul style="list-style-type: none"> The lake is a SAC with the exception of the north-east section 	
WFD Objectives	Y	Good ecological status by 2027	Good ecological status by 2027	Good ecological status by 2027
EPA biologists notes (if any)	Y	Although condition in the Drowse at Lennox's Bridge (St. 30100) had improved to satisfactory in 2018, the improved quality is borderline, as enrichment was apparent with increased biomass of opportunistic algae and invertebrate grazers.	N/A	N/A
Significant issue		At the outflow of the catchment (St. 30100) not determined, However, both PO₄ and NH₃ appear to be an issue from the WWTP	Not determined all below their respective EQS for lakes	Not determined, no data available

*Available in WFD app.

Table 4 Receptor information for the Rosfriar_010, Lattone_010 and Lattone Lake waterbodies.

Factor	Figures Tables	IE_NW_35R320460 Rosfriar_010	IE_NW_35L660960 Lattone_010	IE_NW_35_143 Lattone Lake
Risk Category	N	Review	Review	At Risk
Biological Status Monitoring Station(s) with Q values 2009-2015 Status Trends in Q value since 2009 2016-2018 Q value data	N N/A N/A N/A	None	None	2013-2015 Macrophytes <i>Good</i> Fish <i>Bad</i> Chlorophyll <i>Moderate</i>
Hydrochemistry Data Monitoring Station(s) with data Existing New	N N/A N/A	None	None	2013-2015 Total P <i>Moderate</i> Value ug/l:0.040, 0.036, 0.042 Ammonia <i>High</i>
Summary & Trends in PO₄, NH₃ and NO₃ In App All Available data Other water quality data Baseline Concentration (mg/l) Other relevant values	N N N N/A N	None None None N/A None	None None None N/A None	0.25 class deterioration for Macrophytes 2007--2013 0.25 class improvement for chlorophyll 2007 -2013

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Distance to threshold Indicative Quality	N/A N	N/A N/A	N/A N/A	
Supporting Conditions				
Chemical conditions?	N	None	None	Chemical Surface water status <i>good</i>
Oxygenation conditions	N	None	None	Oxygenation Conditions <i>High</i>
Acidification conditions	N	None	None	Acidification Conditions: <i>High</i>
Hydromorphology				
RHAT score	N	N/A	N/A	N/A
Evidence of arterial drainage	Y	There is a high drainage density in this waterbody.	The drainage density in this waterbody is moderate.	Low drainage density into this lake
Ecological Status (2010 – 2015)				
Trends 2010 - 2015	Y	Unassigned	Unassigned	Remained at bad status
Protected Areas	Fig. 5	NHA in the south-west of the waterbody	NHA in the south-east of the waterbody	
WFD Objectives	Y	Good ecological status by 2027	Good ecological status by 2027	Good ecological status by 2027
EPA biologists notes (if any)	N	N/A	N/A	N/A
Significant issue		Not determined, no data available	Not Determined	Fish , Nutrients (TP)

*Available in WFD app.

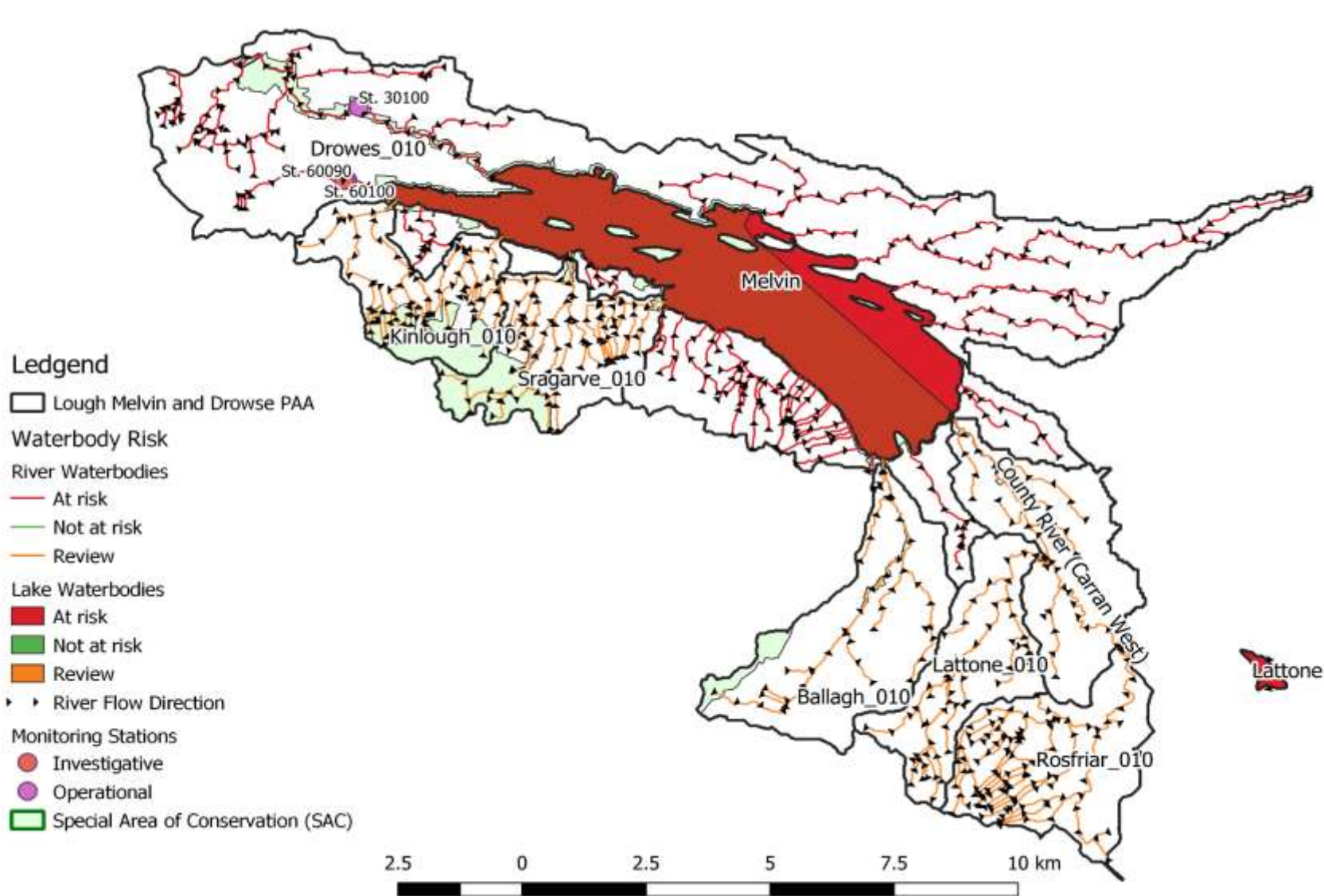


Figure 3 Special Area of Conservation within the Lough Melvin and Drowes PAA.

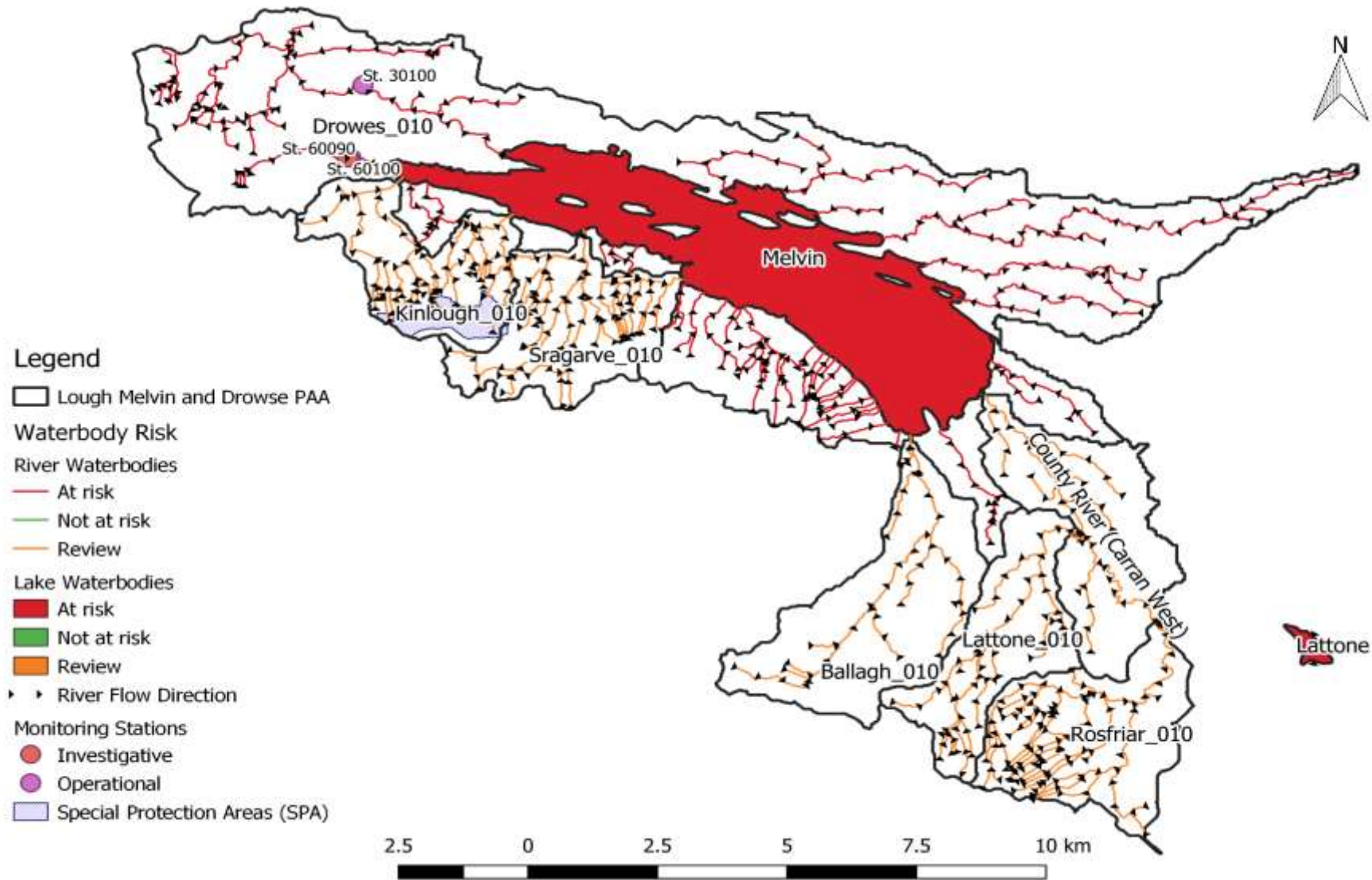


Figure 4 Special Protection Area within the Lough Melvin and Drowes PAA.

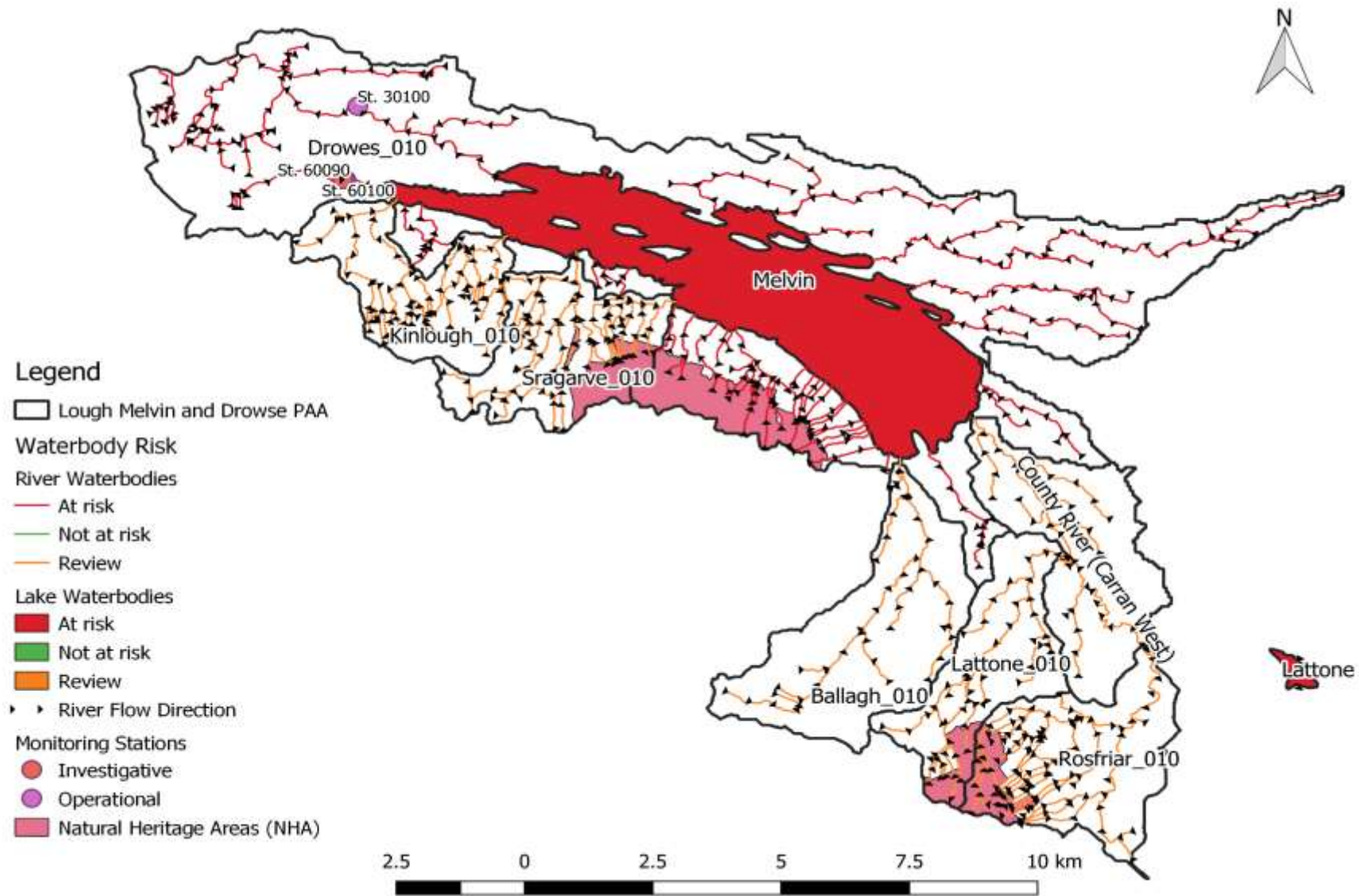


Figure 5 Natural Heritage Areas within the Lough Melvin and Drowes PAA.

2.1. Drowes_010

2.1.1. Monitoring Station – Lennox Bridge (St. 30100)

The monitoring St 30100 is an Operational monitoring station located on the main river channel at the end of the Lough Melvin and Drowes sub-catchment before the river drains into the Atlantic Ocean. This is the only monitoring station within the sub-catchment which has biological and chemical data (Figure 6, Table 5, Figure 7).

Data summary:

- The 2018 biological data characterises the river in the Drowes_010 as coming back up to Good Ecological Status (Q4) (Figure 6).
- The ecological status in the Drowes has fluctuated between High Ecological Status in 2000 to Moderate Ecological Status in 2015 (Figure 6).
- Total Oxidised Nitrogen concentrations are generally below the EQS, apart from a spike which occurred on the 9th of Aug 2016. Even though TON is trending upwards the general concentrations and baseline concentrations are well below the EQS of 1.8 mg/l for TON (Table 5, Figure 7).

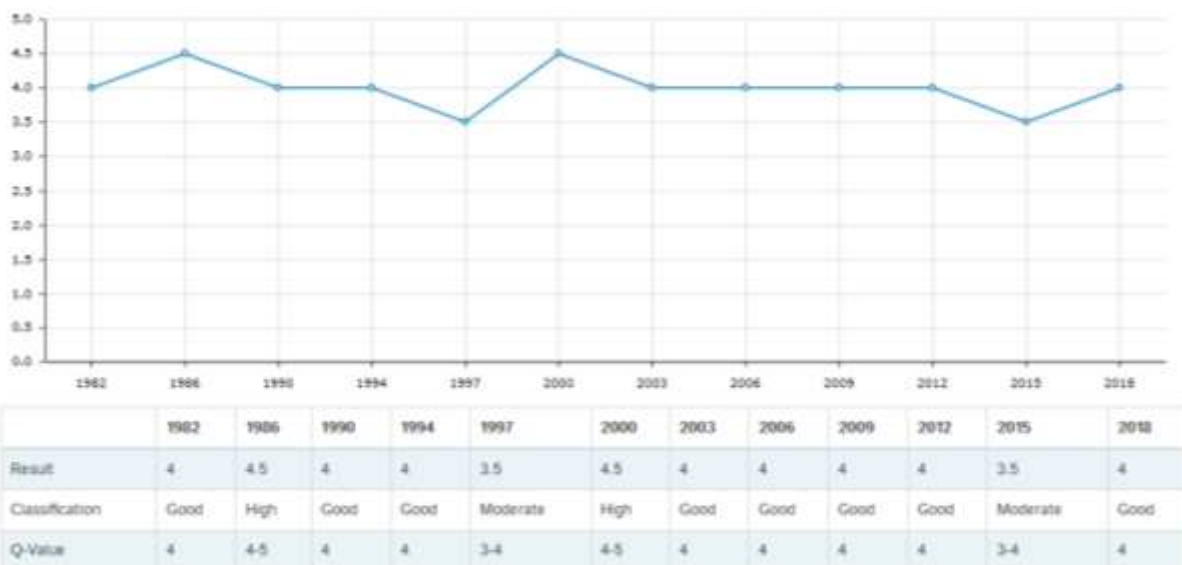


Figure 6 The biological trend and data for monitoring St. 30100 (1982 – 2018).

Table 5 The associated aggregation table for the Total Oxidised Nitrogen (as N mg/l) trend for monitoring St. 30100 (2011 – 2015).

		2011	2012	2013	2014	2015	2016	2017	2018	2019
TON	n	5	4	0	0	0	5	5	5	5
	mg/l	0.192	0.209				2.080	<0.2	<0.2	<0.2

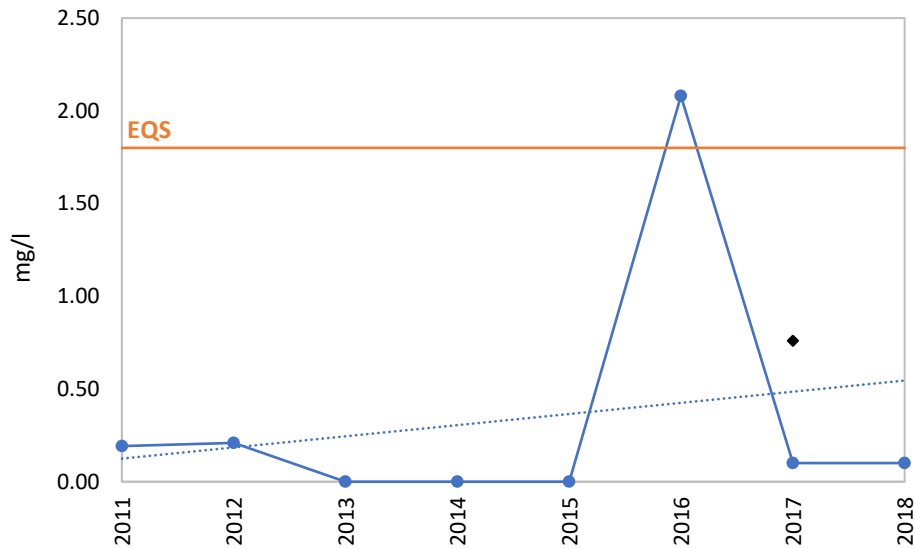


Figure 7 Total Oxidised Nitrogen (as N mg/l) trend chart for monitoring St. 30100 (2011 – 2015).

2.2. Roogagh River

The data presented in Table 6 outlines the status for the Roogagh River and was obtained from the NIEA river monitoring programme for 2018. The Roogagh River is solely located in Northern Ireland and flows into Lough Melvin.

Table 6 The NIEA 2018 Roogagh River Status.

RWBID450	GBNI1NW353504065
River waterbody name	Roogagh River
WFD2018 Invert River Waterbody Class	HIGH
Macrophyte River Waterbody Class WFD2018	HIGH
Fish River Waterbody Class WFD2018	MODERATE
Diatoms River Waterbody Class WFD2018	GOOD
Final Biology River Waterbody Class WFD2018	MODERATE
DO% Sat River Waterbody Class WFD2018	HIGH
SRP River Waterbody Class WFD2018	HIGH
pH WFD2018 river waterbody class	HIGH
Physico-chem River Waterbody Class WFD2018	HIGH
Total Ammonia River Waterbody Class WFD2018	HIGH
Other Specific Pollutants River Waterbody class WFD2018	HIGH
Final Specific Pollutant River Waterbody Class WFD2018	HIGH
Breaching SP substance(s) by river waterbody	
Morphology Class WFD2018	GOOD
Hydrology class WFD2018	HIGH
Hydromorphology Class WFD2018	GOOD
Ecological Status WFD2018	MODERATE
Priority Substances (Chemical status) River waterbody Class WFD2018	HIGH
Breaching PS Substance(s) by river waterbody	

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Proxy rwb (3 not monitored rwbs classified using a proxy rwb)	
Continuity	
IE Status WFD2018	
Surface Water Status WFD2018	MODERATE
Surface Water Status + HWMB Ecological Potential WFD2018	MODERATE
Notes	
HMWB ECOL POT (H,G,M)	
Specified Use	
Overall Status (2018)	MODERATE

2.3. County River (Carran West)

The data presented in Table 7 outlines the status for the County River (Carran West) and was obtained from the NIEA river monitoring programme for 2018. The County River (Carran West) is a cross border river which enters the Lough Melvin from Northern Ireland.

Table 7 The NIEA 2018 County River (Carran West) Status.

RWBID450	GBNI1NW353504075
River waterbody name	County River (Carran West)
WFD2018 Invert River Waterbody Class	HIGH
Macrophyte River Waterbody Class WFD2018	HIGH
Fish River Waterbody Class WFD2018	GOOD
Diatoms River Waterbody Class WFD2018	HIGH
Final Biology River Waterbody Class WFD2018	GOOD
DO% Sat River Waterbody Class WFD2018	HIGH
SRP River Waterbody Class WFD2018	HIGH
pH WFD2018 river waterbody class	HIGH
Physico-chem River Waterbody Class WFD2018	HIGH
Total Ammonia River Waterbody Class WFD2018	HIGH
Other Specific Pollutants River Waterbody class WFD2018	HIGH
Final Specific Pollutant River Waterbody Class WFD2018	HIGH
Breaching SP substance(s) by river waterbody	
Morphology Class WFD2018	GOOD
Hydrology class WFD2018	HIGH
Hydromorphology Class WFD2018	GOOD
Ecological Status WFD2018	GOOD
Priority Substances (Chemical status) River waterbody Class WFD2018	HIGH
Breaching PS Substance(s) by river waterbody	
Proxy rwb (3 not monitored rwbs classified using a proxy rwb)	
Continuity	
IE Status WFD2018	NO DATA
Surface Water Status WFD2018	GOOD
Surface Water Status + HWMB Ecological Potential WFD2018	GOOD

Notes	NI data classifies
HMWB ECOL POT (H,G,M)	
Specified Use	
Overall Status (2018)	GOOD

2.4. Lough Melvin

Sampling sites for Lough Melvin are illustrated in Figure 10.

Data summary:

- The TP baseline concentration at all sites were below the EQS of 0.025 mg/l for TP.
- Since 2012 Lough Melvin hasn't been above the EQS of 0.025 mg/l for TP.
- The overall current trend for TP is going downwards except for Site 3 (Mid Lake) of Lough Melvin which is trending upwards (Table 8, Figure 8).
- The Chl a baseline concentration for all six sampling sites are below the EQS of 10 $\mu\text{g/l}$ for Chl- a .
- Lough Melvin has not exceeded the Chl- a EQS since 2007.
- Overall, the current trend for Chl- a in Lough Melvin is trending downwards except for Site 2 (Table 9, Figure 9).

Table 8 The associated aggregation table for Total Phosphorus (mg/l) trend Site 3 in Lough Melvin.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Site 3	n	5	7	8	12	8	8	8	7	7	11	4	4
	mg/l	0.016	0.016	0.011	0.015	0.015	0.023	0.018	0.012	0.016	0.021	0.016	0.012

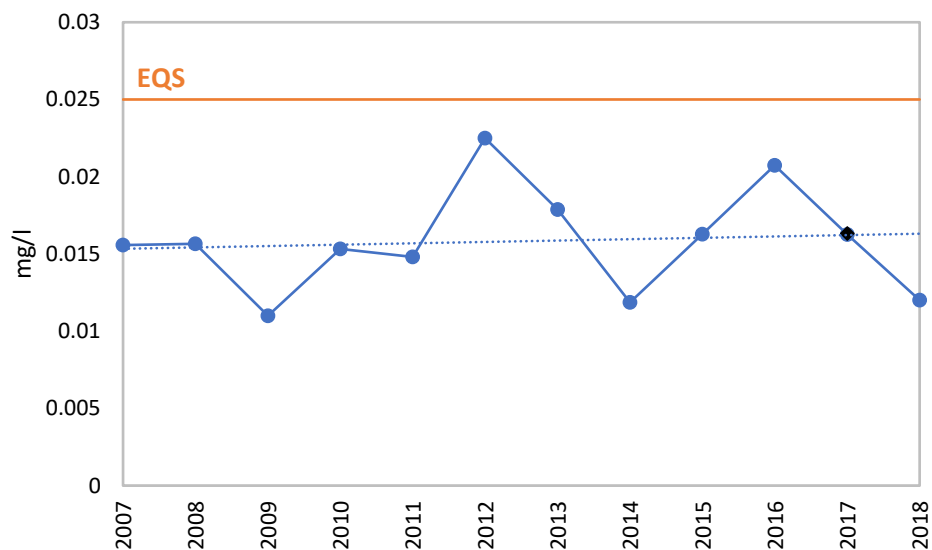


Figure 8 Total phosphorus (mg/l) trend for Site 3 in Lough Melvin (2007 – 2018).

Table 9 The associated aggregation table for Chlorophyll a ($\mu\text{g/l}$) trend Site 2 in Lough Melvin.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Site 2	n	6	6	8	12	5	8	9	7	7	10	4	4
	$\mu\text{g/l}$	3.0	4.0	3.9	4.1	4.0	4.3	3.5	5.0	4.9	3.3	3.6	4.8

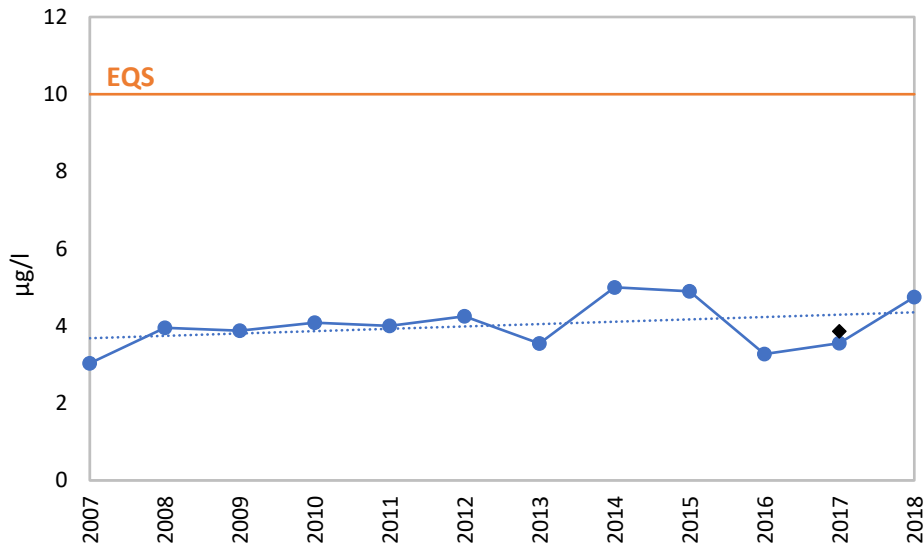


Figure 9 Chlorophyll a (µg/l) trend for Site 2 in Lough Melvin (2007 – 2018).

2.5. Lattone Lake

Lattone Lake is on the EPA 2018- 2019 surveillance monitoring programme. The following information was sourced from the EPA. Raw data currently not available for download from WFD App.

Monitored: 2013-2015

Lake type: Natural lake

Status determinants: Fish and Nutrients (TP).

General Physio chemistry: Moderate Status.

Macrophytes: Good however 0.25 class deterioration between 2007 and 2013.

Chlorophyll: Moderate 0.25 class improvement between 2007 and 2013.

Total P: Moderate. Values: 0.040 ug/l, 0.036 ug/l, 0.042 ug/l.

Information received from the NIEA indicated that natural barriers are potentially an issue for this lake

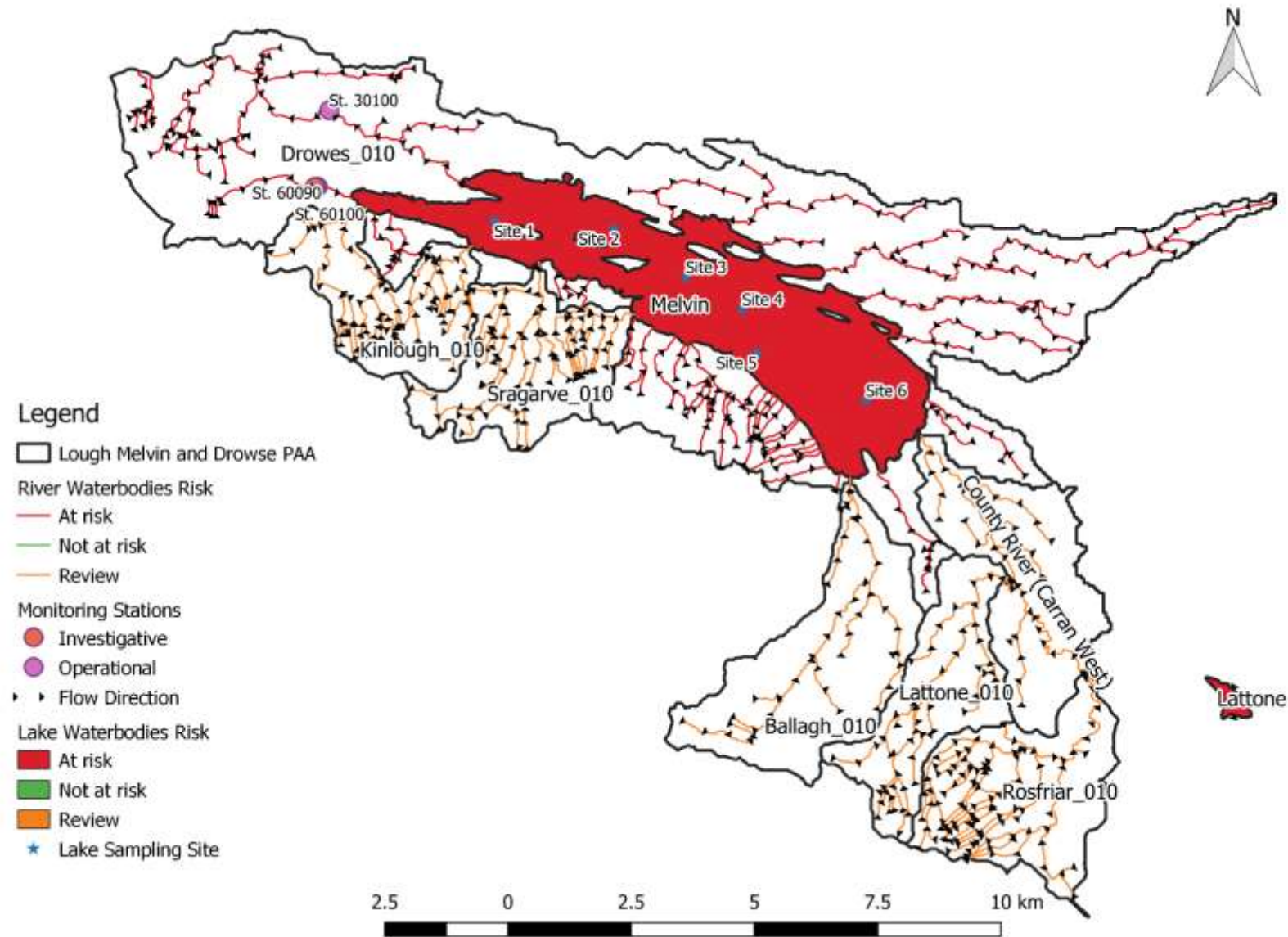


Figure 10 Sampling site locations in Lough Melvin.

3. Pressures

Any further additional information identified on the significant pressures outlined in Table 1 is outlined below.

Table 10 Summary of waterbodies and pressure information on each waterbody within the Lough Melvin and Drowes PAA.

WB Name	Pressure Category	Pressure Subcat.	Impact	Sig. Pressure	AA	IA
Sragarve_010	Forestry	Forestry		No	Y	IA3: "Investigative assessment needed, to include water sampling and walkover".
	Agriculture	Pasture				
	Anthropogenic pressures	Unknown				
Kinlough_010	Forestry	Forestry		No	Y	IA3: "Investigative assessment needed, to include water sampling and walkover".
	Agriculture	Pasture				
	Anthropogenic pressures	Unknown				
Ballagh_010	Forestry	Forestry		No	Y	IA3: "Investigative assessment needed, to include water sample and walkover. If there is an issue, further investigative assessment will need to focus on areas of agriculture".
	Agriculture	Pasture				
	Anthropogenic pressures	Unknown				
Glenaniff_010					N	
Drowes_010	Agriculture	Pasture	Nutrient Pollution	Yes	Y	IA7: "Investigative assessment is needed to determine what is driving water body status and should be incorporated into the Lough Melvin investigative assessment." IA1: "Review the data since improvements were carried out to farming impacts which entered the Drowes." IA1: "EPA to liaise with/obtain monitoring data from NIEA." IA1: "Further discussion with NIEA regarding significant pressures is required and updates to status since 2014; it is noted that the cross-border combined status for 2014 was Good but is currently Moderate."
Lough Melvin	Invasive Species	Invasive Species		No	Y	IA9: "Large water body with a number of potential significant pressures - investigative assessment needed to narrow these down. Consider also any potential impacts from UWW at Garrison in Fermanagh. Review information in the Lough Melvin Catchment Management Plan 2008".
	Urban Waste Water	Agglomeration PE of 1,001 to 2,000				
	Anthropogenic Pressures	Unknown				
Roogagh River						
County River (Carran West)	Agriculture	Pasture		No	Y	IA3: "Investigative assessment needed, to include water sampling and walkover. This should be carried out before the investigative assessment of Lough Melvin, to help identify areas that issues are more likely to be in Lough Melvin." IA1: "EPA to liaise with/obtain monitoring data from NIEA." IA1: "Liaise with NIEA to determine significant pressures." IA1: "Internal data gathering regarding the Kilcoo C1 drainage scheme running along the border with Northern Ireland (Fermanagh). Requires further investigation to determine whether this is having any negative impact on the river and/or Lough Melvin."
	Extractive Industry	Peat				
	Forestry	Forestry				
	Anthropogenic Pressures	Unknown				
Rosfriar_010	Forestry	Forestry		No	Y	IA3: "Investigative assessment needed, to include water sampling and walkover."
	Agriculture	Pasture				
	Anthropogenic pressures	Unknown				

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Lattone_010	Forestry	Forestry		No	Y	IA5: "Forestry activities identified as significant pressure. Undertake IA5, with a focus on forestry pressures and the areas of clear-felling in particular. A river walk also required to evaluate multiple sources concentrating on forestry in a defined (1 km) river stretch."
	Agriculture	Pasture				
	Anthropogenic pressures	Unknown				
Lattone Lake	Forestry	Forestry		Yes	Y	IA1: "A review of fish classification in relation to water body statuses is currently being carried out. The outcome of this review should be applied to the water body. Fish is currently at Bad status for 2010-2015". IA1: "Internal liaison regarding updates from lake water quality sampling, and the deterioration in chlorophyll and total phosphorus."
	Agriculture	Pasture		No		
	Invasive species	Invasive species		No		
County River (Lattone)					N	

3.1. Kinlough WWTP

The agglomeration is served by a wastewater treatment plant with a plant capacity PE 2600. The treatment process includes the following:

- Preliminary Treatment (Grit Removal, 6mm screen)
- Secondary Treatment (Conventional Aeration)
- Nutrient Removal (Nutrient Removal)

Summary for the 2017 AER for the Kinlough WWTP:

- 24,660kgs total weight liquid sludge was removed from the WWTP in 2017, which was transferred to, Co. Meath. (Kinlough sludge included in Carrick on Shannon total).
- No improvements were carried out in 2017.
- In 2017 there were fourteen samples found to be non-compliant with the Emission Limit Values (ELV) for both NH₃ and PO₄.
- All sample collected for NH₃ both upstream (St. 60090) and downstream (St. 60100) of the WWTP were above the EQS of 0.065 mg/l. However, samples collected for NH₃ at the downstream site (St. 60100) was approximately 5 times higher in concentration compared to the samples collected upstream (St. 60090) (Table 11, Figure 11).
- Samples collected downstream (St. 60100) of the WWTP for PO₄ were above the EQS of 0.035 mg/l on two of the sampling occasions.
- Ortho-Phosphorus samples downstream (St. 60100) were 2 times higher is concentration compared to the samples collected upstream (St. 60090) (Table 11, Figure 12).
- The 2018 Waste Water Discharge Licence Audit Report and the 2019 Site Visit Report carried out by the EPA have noted some issues with both NH₃ and PO₄ in the discharge from the plant.

Table 11 Annual Environmental Report 2017 for the upstream (St. 60090) and downstream (St. 60100) monitoring point at the Kinlough WWTP (Licence No. D0280-01).



Appendix 7.2 Ambient Monitoring

Upstream

Date	Ammonia (mg/l)	Ortho P (mg/l)	BOD (mg/l)	Total N (mg/l)	D.O. (% Sat)	D.O. (mg/l)	pH (mg/l)
1-Feb-2017	0.07	0.01	1.00	0.90	94.00	11.46	7.43
6-Apr-2017	0.11	0.02	3.10	1.50	86.40	9.94	6.90
4-July-2017	0.16	0.03	4.10	2.20	85.00	8.71	6.62
3-Oct-2017	0.23	0.03	1.70	2.20	70.10	7.75	7.39
Mean	0.14	0.02	2.48	1.70	83.88	9.47	7.09
95%ile	0.22	0.03	3.95	2.20	92.86	11.23	7.42

Downstream

Date	Ammonia (mg/l)	Ortho P (mg/l)	BOD (mg/l)	Total N (mg/l)	D.O. (% Sat)	D.O. (mg/l)	pH (mg/l)
1-Feb-2017	0.12	0.05	1.00	3.30	92.00	11.10	7.49
6-Apr-2017	0.22	0.03	1.40	3.00	90.20	10.45	6.99
4-July-2017	0.39	0.04	4.80	2.40	86.90	8.90	6.74
3-Oct-2017	2.42	0.03	2.50	3.30	73.70	8.04	7.49
Mean	0.79	0.04	2.43	3.00	85.70	9.62	7.18
95%ile	2.12	0.05	4.46	3.30	91.73	11.00	7.49

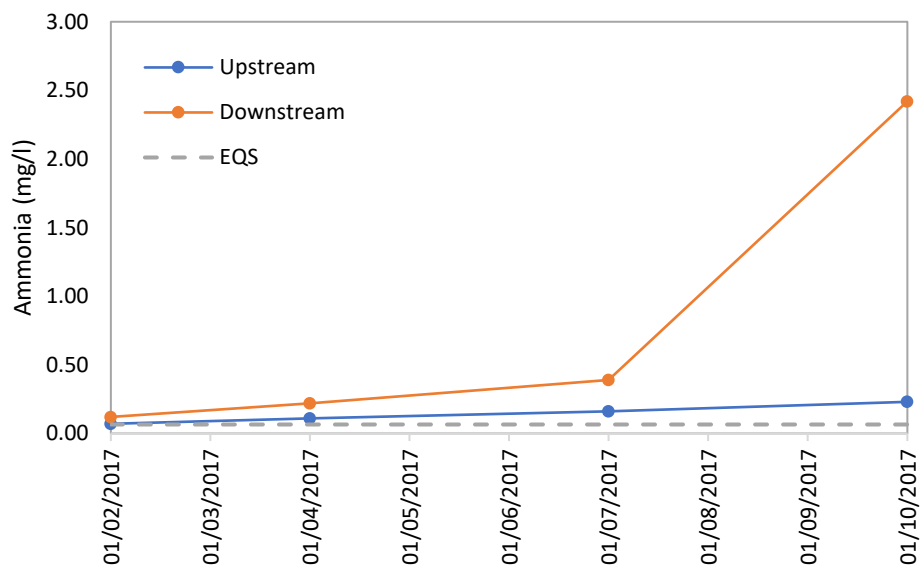


Figure 11 Ammonia concentrations at the monitoring stations upstream (St. 60090) and downstream (St. 60100) of Kinlough WWTP.

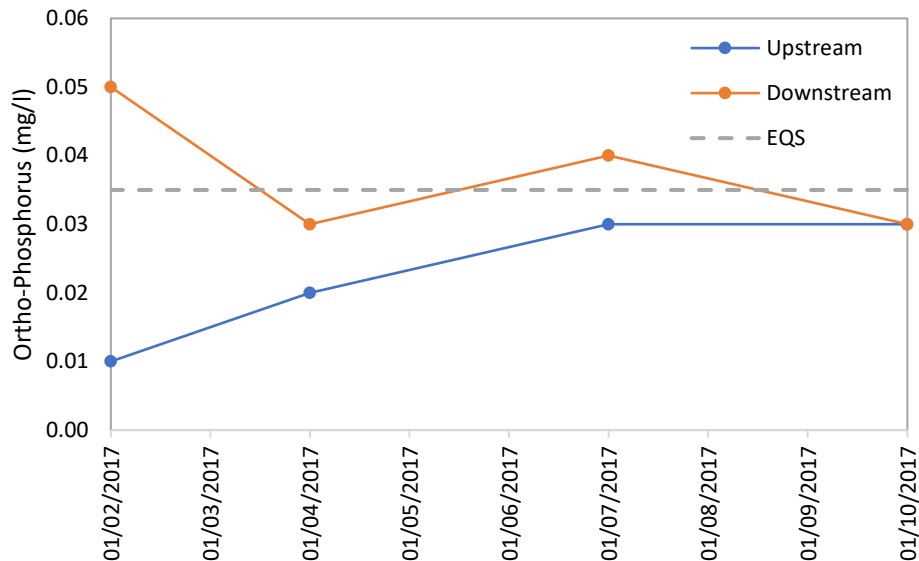


Figure 12 Ortho-Phosphorus concentrations at the monitoring stations upstream (St. 60090) and downstream (St. 60100) of Kinlough WWTP.

3.2. Pollution Impact Potential Maps

Agriculture has been identified as a pressure for all the waterbodies in the Melvin and Drowes PAA apart from Lough Melvin itself. It has been identified as a significant pressure for the Drowes_010.

- The PO₄ surface water receptor PIP maps indicate that the Drowes_10 is moderately impacted (ranking around 3) by P with several small areas mainly located along river channels being highly impacted (ranking 2 or higher). Similar can be seen for the Kinlough_010, Ballagh_010, Lattone_010 and the County River (Carran West) (Figure 13, Figure 14).
- The NO₃ surface water receptor PIP maps are showing that the Melvin and Drowes PAA is not being impacted by surface NO₃ runoff, except for several small areas ranking 5 or above in the Ballagh_010 (Figure 15, Figure 16).
- The NO₃ groundwater receptor PIP maps are showing that the Melvin and Drowes PAA is not being impacted by groundwater NO₃ (Figure 17).

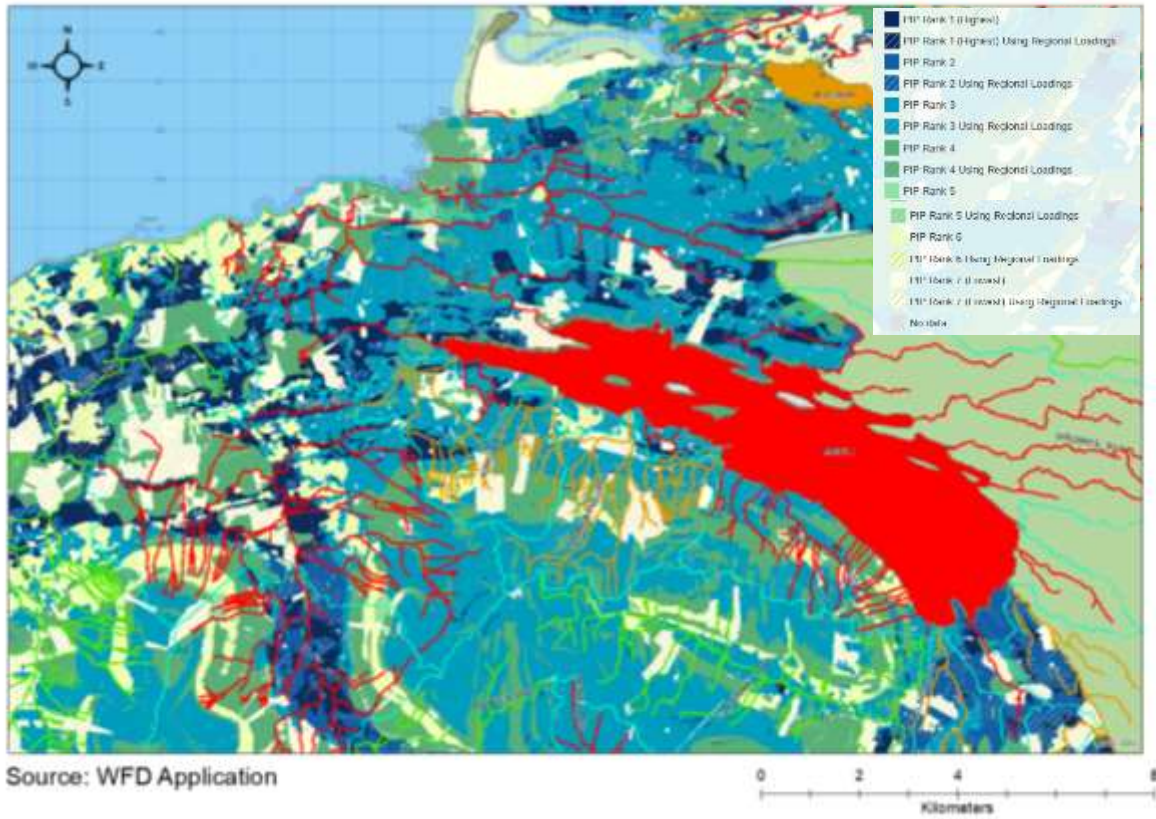


Figure 13 Surface water receptor PO₄ PIP maps for the north-west section of the Lough Melvin and Drowes PAA.

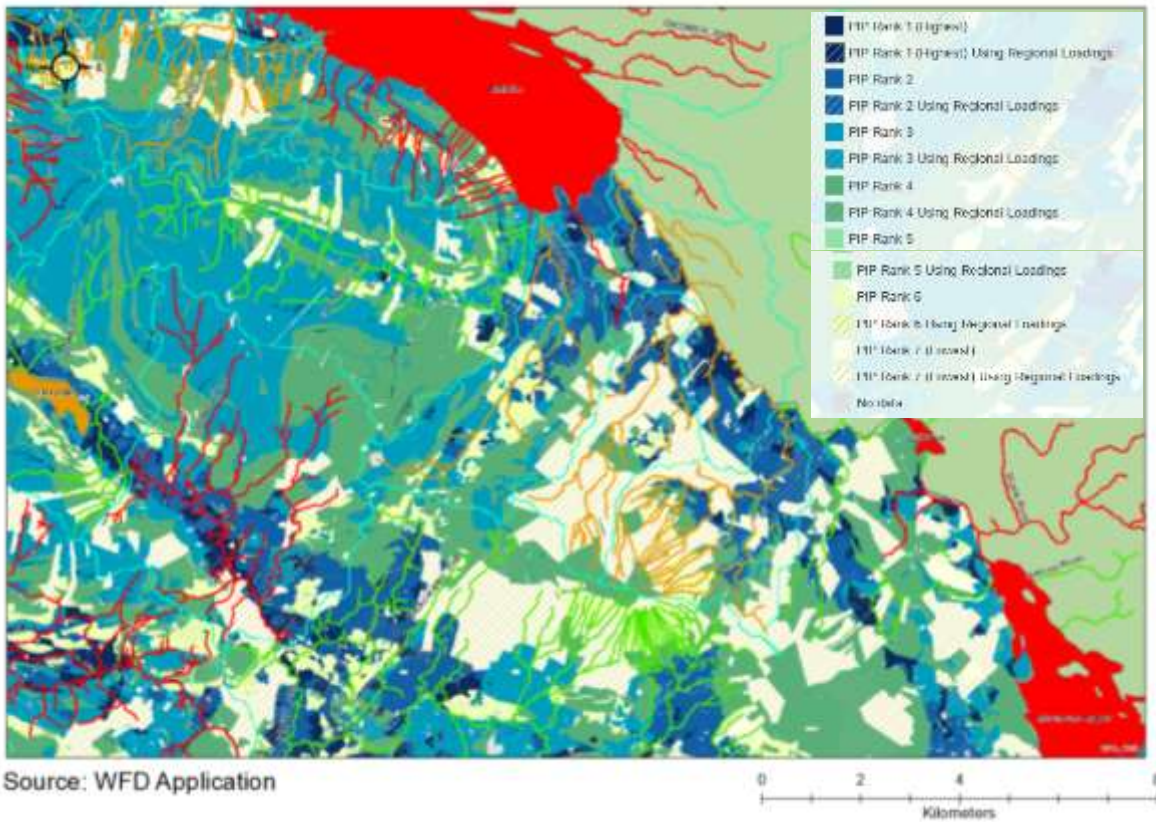


Figure 14 Surface water receptor PO₄ PIP maps for the south-east section of the Lough Melvin and Drowes PAA.

AFA0121_Lough Melvin and Drowes PAA

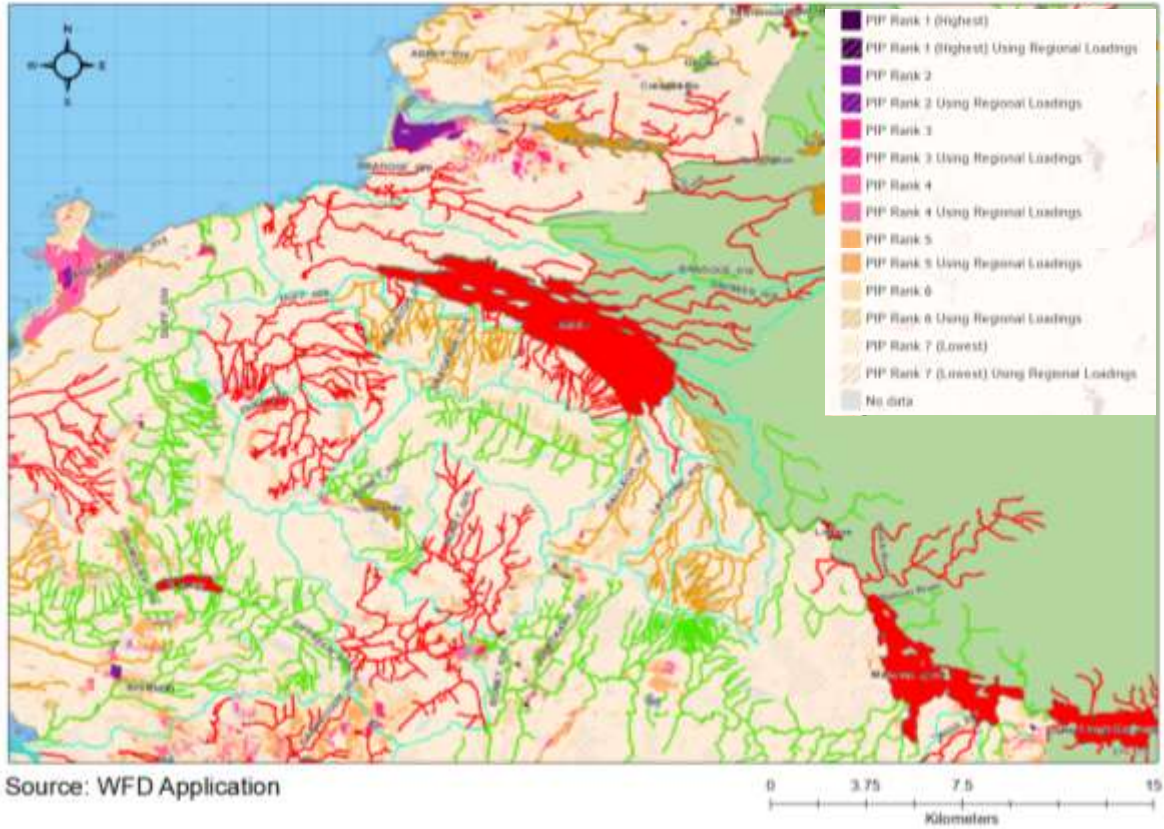


Figure 15 Surface water receptor NO₃ PIP maps for the Lough Melvin and Drowes PAA.

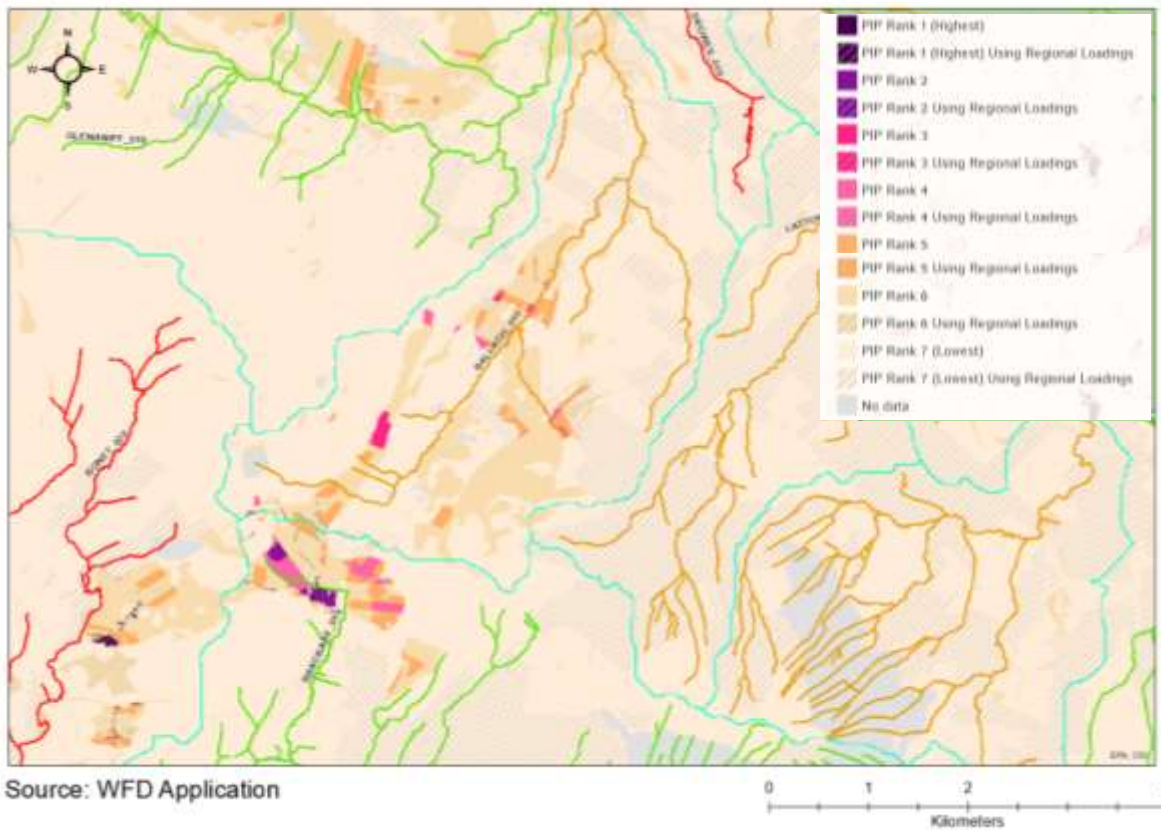


Figure 16 Surface water receptor NO₃ PIP maps for the Ballagh_010 waterbody in the Lough Melvin and Drowes PAA.

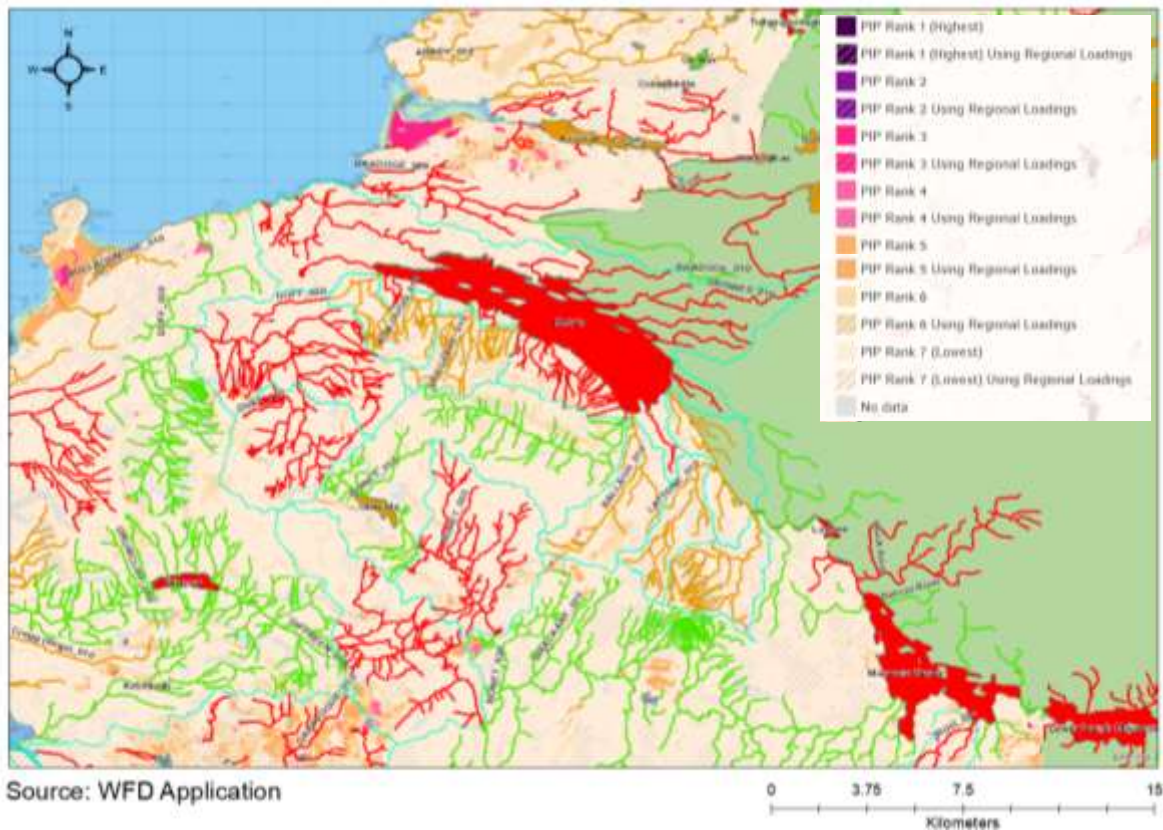


Figure 17 The groundwater receptor NO₃ PIP map for the Lough Melvin and Drowes PAA.

3.3 Other Pressures – OPW Channel Maintenance

The Lough Melvin and Drowes PAA is part of the OPW channel maintenance programme, the areas of which are outlined in Figure 18. Planned channel maintenance within the County Water (Carran West) waterbody was put on programme for 2019 (Figure 19).

AFA0121_Lough Melvin and Drowes PAA

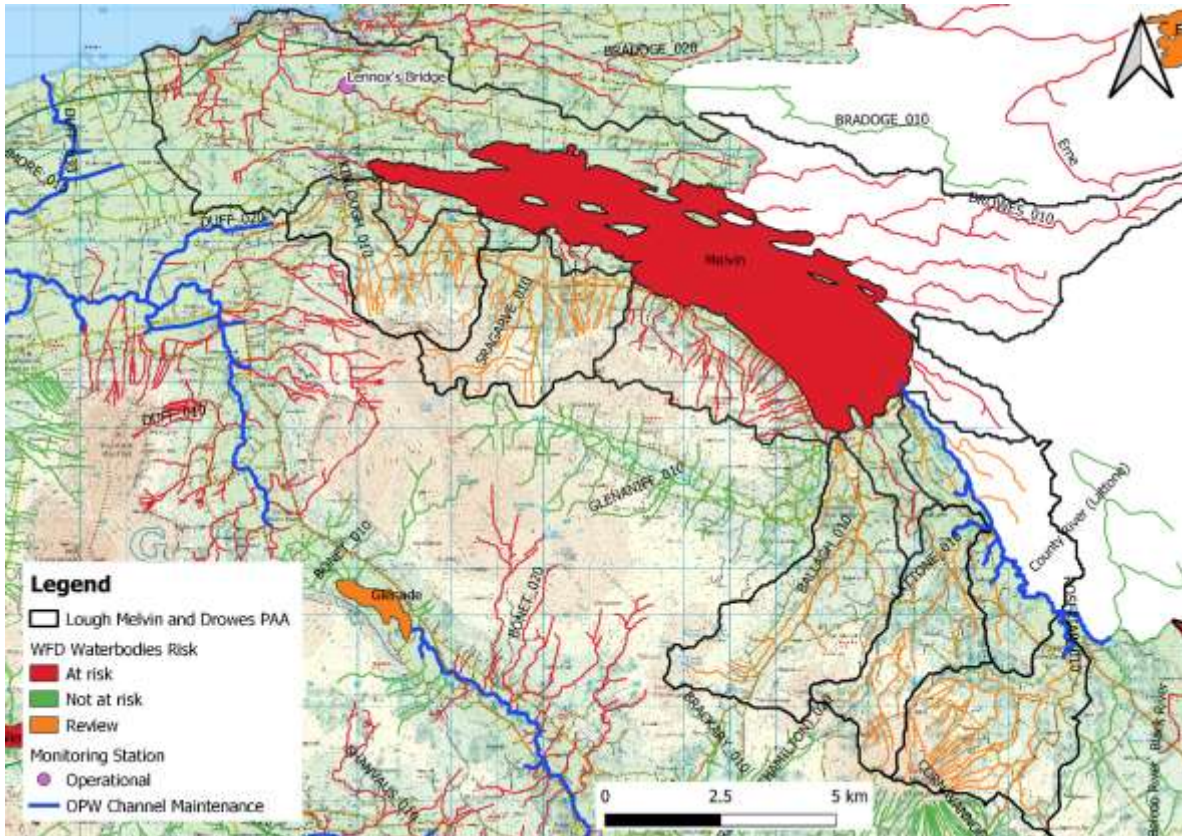


Figure 18 Location of the OPW channel maintenance areas within the Lough Melvin and Drowes PAA.

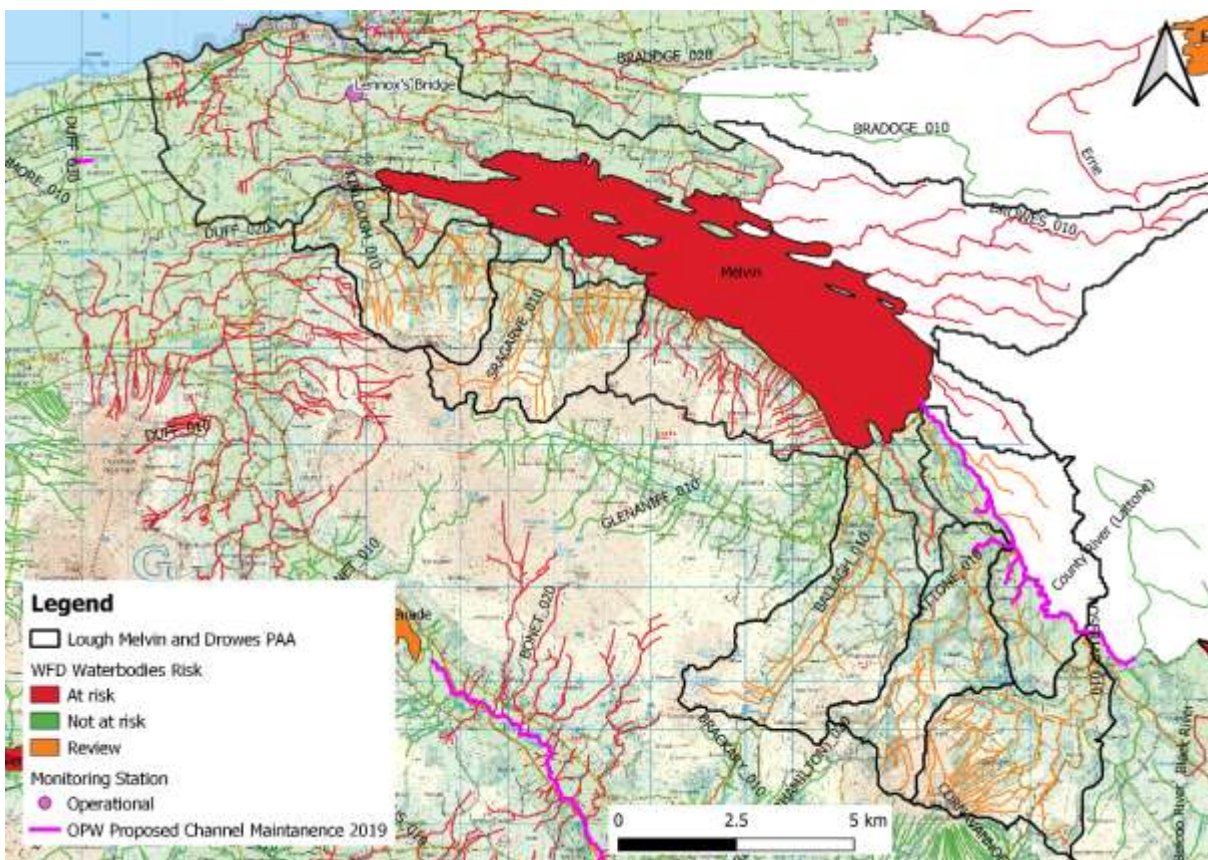


Figure 19 Location of the OPW channel maintenance areas proposed for 2019 within the Lough Melvin and Drowes PAA.

4. Pathway Information and Analysis

4.1. Overview of Pathways in the PAA

The drivers for this section are the significant issues(s), as these dictate the pathways that are relevant. The regional pathway framework is provided by the aquifers in the PAA (Figure 20). Three compartments are identified:

1. Low transmissivity: Locally Important Bedrock Aquifer, Generally Moderately Productive (Lm).
2. Low transmissivity: Locally Important Bedrock Aquifer, Moderately Productive only in Local Zones (LI) and Bedrock which is Generally Unproductive (Pu).
3. High transmissivity: Regionally Important Karstified Bedrock Aquifer (Rkc).

Using the well/poorly drained soils map the three compartments were sub-divided into 9 sub-compartments (Figure 21, Table 12).

4.1.1 Karst Features in the PAA

Karst features have been identified mainly in the Glenaniff_010, not included in the Lough Melvin and Drowes PAA due to it being a high status waterbody. However, within the Ballagh_010 waterbody, which is in the PAA, one enclosed depression, two caves and two springs have been identified and may be an additional pathway particularly for groundwater flow within the Lough Melvin and Drowes PAA (Figure 29).

AFA0121_Lough Melvin and Drowes PAA

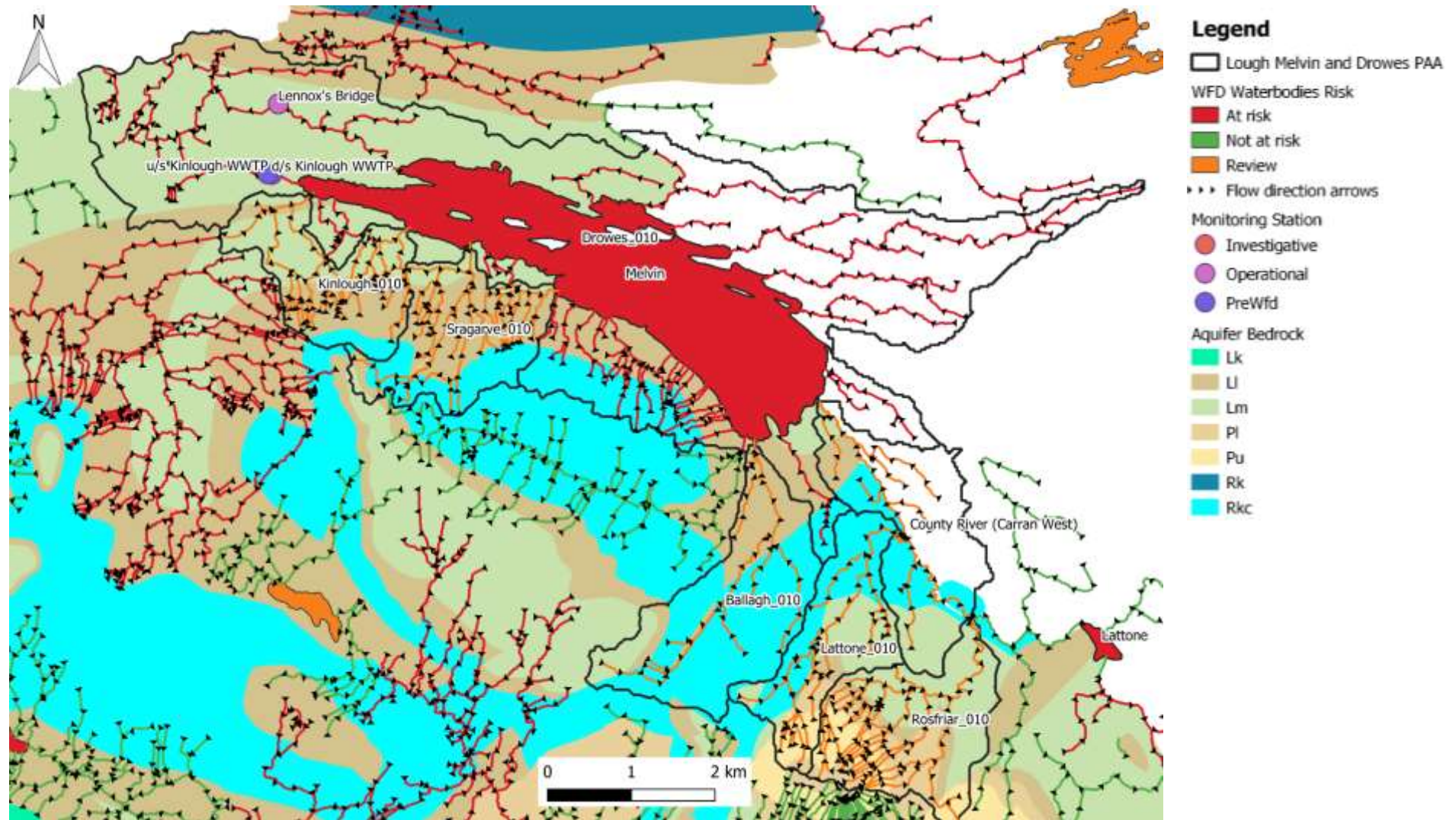


Figure 20 The aquifer bedrock for the Lough Melvin and Drowes PAA.

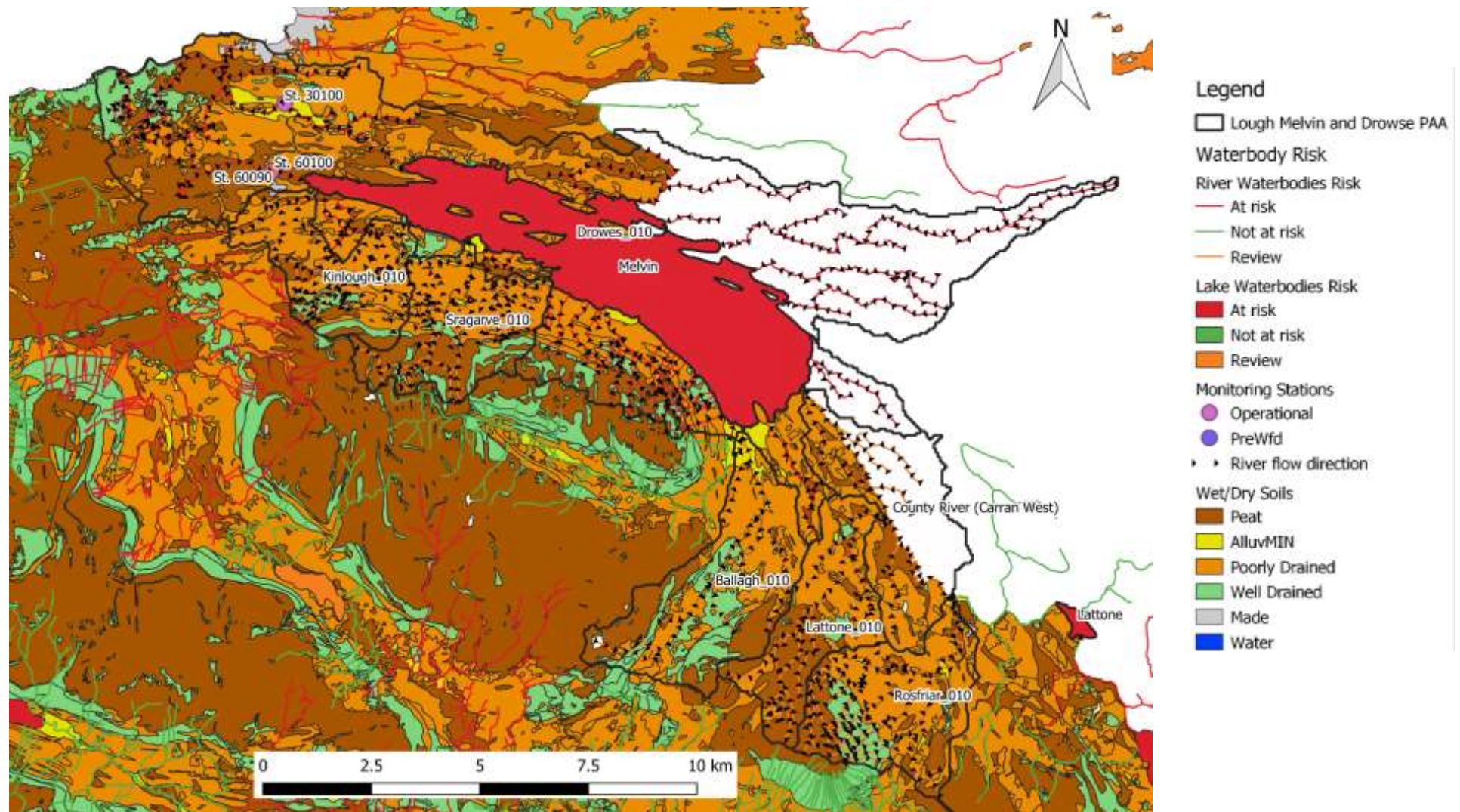


Figure 21 The well/poorly drained soils for the Lough Melvin and Drowes PAA

AFA0121_Lough Melvin and Drowes PAA

Table 12 Conceptual model information for the pathways

Compartment 1			Compartment 2				Compartment 3		
Direct ¹	Kinlough WWTP and drains			Drains			Drains		
Aquifer (Fig. 20)	Lm			Ll, Pu			Rkc		
Rock Units	Dinantian Sandstones,			Dinantian Shales and Limestones, Dinantian Upper Impure Limestones, Dinantian Pure Unbedded Limestone and Namurian Sandstone			Dinantian Pure Bedded Limestones with small areas of Granites and other igneous Intrusive Rocks and Dinantian Mixed Sandstones, Shales and Limestone		
	Sub-Compartment. 1A	Sub-Compartment. 1B	Sub-Compartment. 1C	Sub-Compartment. 2A	Sub-Compartment. 2B	Sub-Compartment. 2C	Sub-Compartment. 3A	Sub-Compartment. 3B	Sub-Compartment. 3C
Soil type (Fig. 21)	Poorly drained	Well drained	Peat	Poorly drained	Well drained	Peat	Poorly drained	Well drained	Peat
Subsoil	Till derived from Namurian Sand	Till derived from Namurian Sand	Cut over Peat	Till derived from Namurian Sand, Bedrock at surface, Cut over Peat	Till derived from Namurian Sand, Bedrock at surface, Scree	Cut over Peat	Till derived from Namurian Sand	Karstified Limestone Bedrock at surface	Cut over Peat
Subsoil K	Low	Low	Low	Low	Low	Low	Low	Low	Low
Groundwater Vulnerability (Fig. 22)	Mainly M, with a small area of H, E, X	Mainly M, with a small area of H	M	H, E, X	M, H, E, X	L, M, H	E, X, L	X	E, X
PO ₄ Susceptibility (Fig. 23 & Fig. 24)	High	Moderate	High	Low to High	Low to moderate	High	Moderate	Low	Moderate
NO ₃ Susceptibility (Fig. 25 & Fig. 26)	Low	Low	Low	Low	Low	Low	Low	Very Low	Low
PO ₄ PIP (Fig. 13, Fig. 14)	Moderate to High	Low	Moderate to High	Low to Moderate	Low	Low to Moderate	Low to Moderate	Low to Moderate	Low to Moderate
NO ₃ PIP (Fig. 15 - Fig 17)	Low	Low	Low	Low	Low	Low	Low	Low	Low
Main Flow Paths	Mainly overland flow, with areas of near surface flow. Land drains	Near surface, overland flow and land drains	Overland flow and land drains	Overland flow with areas of near surface flow and land drains	Near surface, overland flow and land drains	Overland flow and land drains	Overland flow, with areas of near surface flow and land drains. Groundwater flow in areas of exposed bedrock	Overland flow, with areas of near surface flow and land drains. Groundwater flow in areas of exposed bedrock	Overland flow and land drains. Groundwater flow in areas of exposed bedrock

¹ Point discharges to the water body

AFA0121_Lough Melvin and Drowes PAA

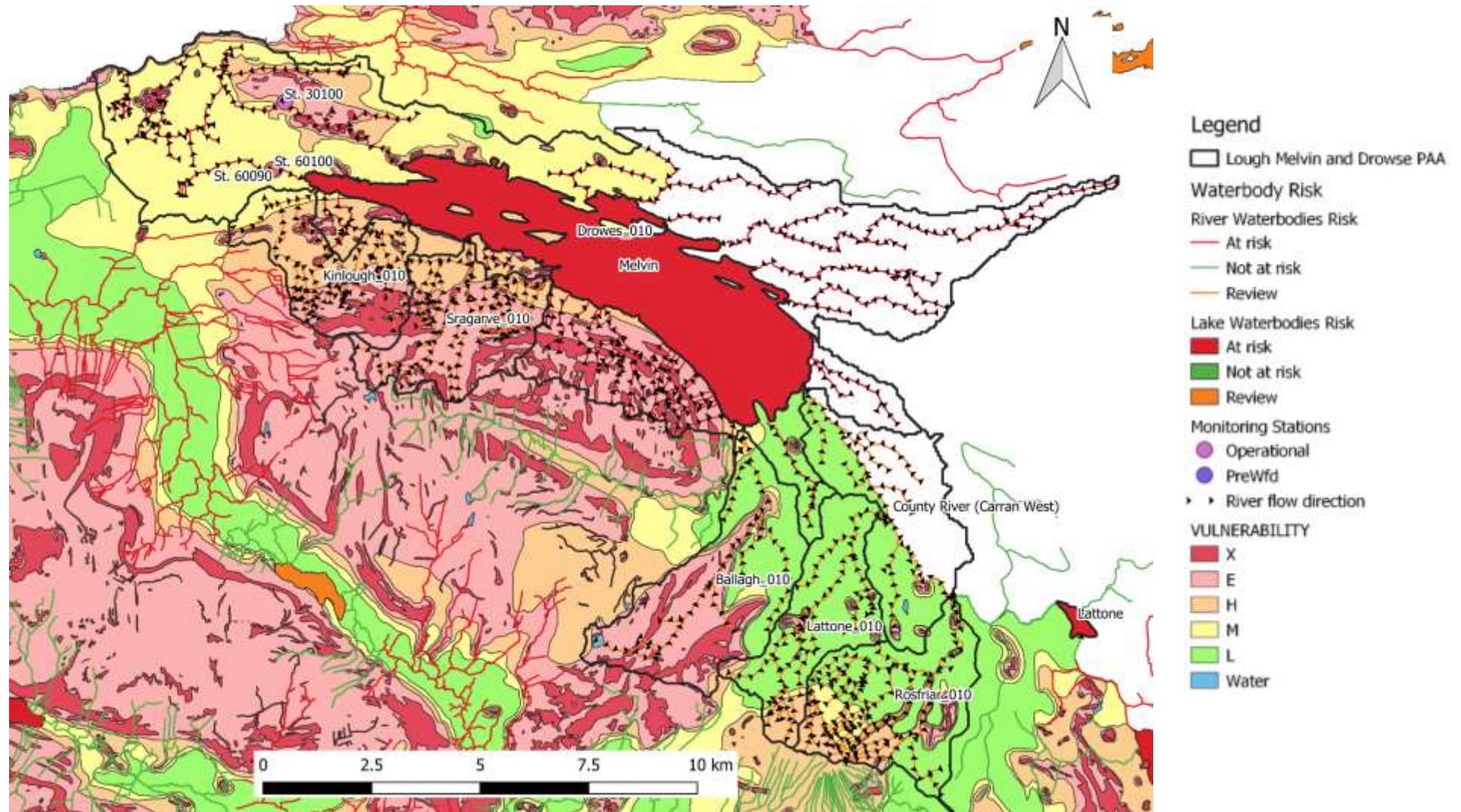


Figure 22 The groundwater vulnerability for the Lough Melvin and Drowes PAA.

AFA0121_Lough Melvin and Drowes PAA



Figure 23 The near surface PO₄ susceptibility map for the Lough Melvin and Drowes PAA.



Figure 24 The near surface PO₄ susceptibility map for the Lough Melvin and Drowes PAA.

AFA0121_Lough Melvin and Drowes PAA



Figure 25 The sub-surface NO₃ susceptibility map for the Lough Melvin and Drowes PAA.



Figure 26 The sub-surface NO₃ susceptibility map for the Lough Melvin and Drowes PAA.

5. Interim 'Story' of the Priority Area for Action

The desktop study for Lough Melvin and Drowes PAA has identified several pressures (Anthropogenic Pressures, UWW, Extractive Industry and Invasive Species), however, Agriculture and Forestry are the only pressures identified as being significant. The current ecological status in Glenaniff_010 is High, this drops down to Moderate in the Lough Melvin and Drowes_010 waterbodies and Lattone Lake is currently at bad status. The remaining six sub-catchments in the Lough Melvin and Drowes PAA are Unassigned. The conceptual model has identified overland and near surface flow as the main pathways within the Lough Melvin and Drowes PAA. As the majority of waterbodies are Unassigned the significant pressure was only identifiable for the Drowes_010 and Lough Melvin waterbodies. The significant issue based on the PIP and susceptibility maps have identified PO₄ to be a potential significant for the Drowes_010. Meanwhile the desk study did not identify a significant issue for the Lough Melvin.

5.1. Sragarve_010

Risk category: Review

Status: Unassigned

Hydrochemistry summary: None

Baseline Concentration: None

Significant issue: Not determined, no data available

Significant pressure: No Significant pressure identified

Other pressures: Forestry, Agriculture, Anthropogenic pressures

Relevant pathways: Overland flow, with areas of near surface flow

5.2. Kinlough_010

Risk category: Review

Status: Unassigned

Hydrochemistry summary: None

Baseline Concentration: None

Significant issue: Not determined, no data available

Significant pressure: No Significant pressure identified

Other pressures: Forestry, Agriculture, Anthropogenic Pressures

Relevant Pathways: Overland flow, with areas of near surface flow

5.3. Ballagh_010

Risk category: Review

Status: Unassigned

Hydrochemistry summary: None

Baseline Concentration: None

Significant issue: Not determined, no data available

Significant pressure: No Significant pressure identified

Other pressures: Forestry, Agriculture, Anthropogenic Pressures

Relevant Pathways: Overland flow, with areas of near surface flow and land drains. Groundwater flow in areas of exposed bedrock

5.4. Drowes_010

Risk category: At Risk

Status: Moderate. The Drowes_010 has declined in status from good to moderate in the latest cycle (2010 – 2015).

Hydrochemistry summary: St. 30100 (2018): PO₄ 0.006 mg/l, NH₃ 0.010 mg/l, TON 0.100 mg/l

St. 30100: BOD (<1.5 mg/l, in 2017-2018)

St. 60090: BOD (<1.5 mg/l, in 2017-2018, except for a spike of 3.1 mg/l on the 6th April 2017), TN (1.8 mg/l 2017-2018), SS (<4 mg/l 2017-2018)

St. 60100: BOD (<1.5 mg/l in 2017-2018), TN (1.8 mg/l 2017-2018), SS (<4 mg/l 2017-2018)

Phosphorus is currently trending downwards thus suggesting that P is not an issue for the Drowes_010. However, the pollution impact potential and susceptibility maps would indicate that PO₄ is an issue. Furthermore, TON at St. 30100 is currently trending upwards, however, this appears to be due to a spike in concentration seen in 2016. The last two consecutive years (2017, 2018) concentrations at this monitoring station have remained the same (0.100 mg/l), suggesting that TON may not be an issue for this waterbody.

Baseline Concentration: St. 30100 (2018): PO₄ 0.005 mg/l, NH₃ 0.010 mg/l, TON 0.760 mg/l
 St. 30100: BOD (0.5 mg/l, in 2016-2018)

Significant issue: PO₄

Significant Pressure: Agriculture (Pasture).

Relevant Pathways: Overland flow, with areas of near surface flow and land drains. Groundwater flow in areas of exposed bedrock

5.5. Lough Melvin

Risk category: *At Risk*

Status: Moderate. Lough Melvin has remained at moderate status for the last three cycles.

Hydrochemistry summary: 2018

	TP (mg/l)	Chl- <i>a</i> (µg/l)	NH ₃ (mg/l)
Site 1	0.023	4.3	0.016
Site 2	0.011	4.8	0.010
Site 3	0.012	4.5	0.010
Site 4	0.011	4.1	0.010
Site 5	0.011	4.8	0.014
Site 6	0.011	3.6	0.010

Baseline Concentration:

	TP (mg/l)	Chl- <i>a</i> (µg/l)	NH ₃ (mg/l)
Site 1	0.020	4.2	0.013
Site 2	0.016	3.9	0.011
Site 3	0.016	3.1	0.012
Site 4	0.016	2.7	0.011
Site 5	0.016	3.1	0.012
Site 6	0.016	2.6	0.011

Significant issue: No significant issues have been identified for the lake. However, as the lake is surrounded by waterbodies which are in the PAA it would suggest that any work carried out in these would have a positive effect of Lough Melvin itself.

Significant Pressure: None identified

Other pressures: Invasive Species, Urban Waste Water, Anthropogenic Pressures

Relevant Pathways: Overland Flow, point sources (land drains) from agriculture, near surface and groundwater flow

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5.6. County River (Carran West)

Risk category: *Review*

Status: Unassigned

NIEA (2018) data: **Good Status**

Hydrochemistry summary: None

Baseline Concentration: None

Significant issue: None determined, no data available

Significant pressure: No Significant pressure identified

Other pressures: Forestry, Extractive Industry, Agriculture, Anthropogenic Pressures

Relevant Pathways: Overland flow, with areas of near surface flow and land drains. Groundwater flow in areas of exposed bedrock.

5.7. Rosfriar_010

Risk category: *Review*

Status: Unassigned

Hydrochemistry summary: None

Baseline Concentration: None

Significant issue: None determined, no data available

Significant pressure: No Significant pressure identified

Other pressures: Forestry, Agriculture, Anthropogenic Pressures

Relevant Pathways: Overland flow, with areas of near surface flow

5.8. Lattone_010

Risk category: *Review*

Status: Unassigned

Hydrochemistry summary: None

Baseline Concentration: None

Significant issue: None determined, no data available

Significant pressure: No Significant pressure identified

Other pressures: Forestry, Agriculture, Anthropogenic Pressures

Relevant Pathways: Overland flow, with areas of near surface flow and land drains. Groundwater flow in areas of exposed bedrock.

5.9. Lattone Lake

Risk category: *At Risk*

Status: Bad (Fish, Bad) (Nutrients, TP Moderate)

Hydrochemistry summary: Total P 2013 -2015 Moderate ; Value ug/l:0.040, 0.036, 0.042

Baseline Concentration: None

Significant issue: Fish, Nutrients TP

Significant Pressure: Forestry

Relevant Pathways: Overland flow, with areas of near surface flow

5.10. Roogagh River

Risk category:

NIEA (2018) Status: Moderate

Hydrochemistry summary:

Baseline Concentration:

Significant issue:

Significant Pressure:

Relevant Pathways:

The environmental objective date for all the waterbodies in the Lough Melvin and Drowes sub-catchment is good status by 2027.

6. Communications Plan

A community information meeting will be held in Rossinver Community Centre, Rossinver, Co Leitrim on Thursday the 21st of February 2019 from 7:30–8:30 pm.

Review the finding of the desktop with Leitrim County Council and any other interested organisations for their input and knowledge of the sub-catchment. Discuss with Leitrim County Council on whether they have any additional information the Lough Melvin and Drowes PAA particularly in relation to the unassigned waterbodies.

Review the finding of the desktop with NIEA for their input particularly in relation to the Northern Ireland section of the PAA. Find out how the NIEA determine status for rivers in the Northern Ireland to see how it can be compared with the Southern Ireland. Review our planned workplan with the NIEA and see if there is the potential for collaboration.

Agriculture has been identified as a significant pressure in the Drowes waterbody, therefore, the findings of the desk study need to be reviewed with ASSAP.

7. Work Plan

7.1. Further Characterisation Actions Assigned:

Sragarve_010:

- **IA3:** *“Investigative assessment needed, to include water sampling and walkover”.*

Kinlough_010:

- **IA3:** *“Investigative assessment needed, to include water sampling and walkover”.*

Ballagh_010:

- **IA3:** *“Investigative assessment needed, to include water sample and walkover. If there is an issue, further investigative assessment will need to focus on areas of agriculture”.*

Drowes_010:

- **IA7:** *“Investigative assessment is needed to determine what is driving water body status and should be incorporated into the Lough Melvin investigative assessment.”*
- **IA1:** *“Review the data since improvements were carried out to farming impacts which entered the Drowes.”*
- **IA1:** *“EPA to liaise with/obtain monitoring data from NIEA.”*
- **IA1:** *“Further discussion with NIEA regarding significant pressures is required and updates to status since 2014; it is noted that the cross-border combined status for 2014 was Good but is currently Moderate.”*

Lough Melvin:

- **IA9:** *“Large water body with a number of potential significant pressures - investigative assessment needed to narrow these down. Consider also any potential impacts from UWW at Garrison in Fermanagh. Review information in the Lough Melvin Catchment Management Plan 2008”.*

County River (Carran West):

- **IA3:** “Investigative assessment needed, to include water sampling and walkover. This should be carried out before the investigative assessment of Lough Melvin, to help identify areas that issues are more likely to be in Lough Melvin.”
- **IA1:** “EPA to liaise with/obtain monitoring data from NIEA.”
- **IA1:** “Liaise with NIEA to determine significant pressures.”
- **IA1:** “Internal data gathering regarding the Kilcoo C1 drainage scheme running along the border with Northern Ireland (Fermanagh). Requires further investigation to determine whether this is having any negative impact on the river and/or Lough Melvin.”

Rosfriar_010:

- **IA3:** “Investigative assessment needed, to include water sampling and walkover.”

Lattone_010:

- **IA5:** “Forestry activities identified as significant pressure. Undertake IA5, with a focus on forestry pressures and the areas of clear-felling in particular. A river walk also required to evaluate multiple sources concentrating on forestry in a defined (1 km) river stretch.”

Lattone Lake:

- **IA1:** “A review of fish classification in relation to water body statuses is currently being carried out. The outcome of this review should be applied to the water body. Fish is currently at Bad status for 2010-2015”.
- **IA1:** “Internal liaison regarding updates from lake water quality sampling, and the deterioration in chlorophyll and total phosphorus.”

7.2 Further Information Required

- The 2018 Annual Environmental Reports for Kinlough WWTP have been requested from the EPA.
- Contact forestry services regarding any forestry activities which are being planned in the sub-catchment.

7.3 Local Catchment Assessment

7.3.1 Unassigned waterbodies

Regarding the unassigned waterbodies (Sragrave_010, Kinlough_010, Ballagh_010, County River (Carran West), Lattone_010 and Rossfriar_010), no planned EPA monitoring has been outlined on the EDEN App. All the unassigned waterbodies are currently in *Review* and would require SSIS/RA assessment to be carried out at their outflow to determine the potential impacts within these waterbodies. In addition, samples for PO₄, NH₃ and TON need to be collected and measurements for pH, DO, temperature and conductivity.

7.3.2 Drowes_010

The Drowes_010 has dropped from Good to Moderate Ecological Status in the last cycle (2010–2015). The desk study has highlighted both PO₄ and NH₃ to be an issue mainly attributed to the Kinlough WWTP. Although Kinlough WWTP has not been identified as a significant pressure for the Drowes_010, further investigation of the discharge and its impacts need to be looked at. The following initial LCA plan has been proposed for the Drowes_010.

- Carry out a SSIS/RA assessment at Lennox Bridge which is the EPA monitoring station on the outflow of the Drowes_010 waterbody, to determine whether there has been deterioration

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at this point or whether there is no change since the EPA carried out their last round of Q assessment.

- Carry out SSIS/RA u/s and d/s of the Kinlough WWTP. Also carry out a stream walk along this stretch of river to determine where the stormwater overflow and discharge pipes are located in relation to the WWTP itself.
- A stream walk in conjunction with SSIS/RA analysis may be required to be carried out on the tributary which flows through the village of Kinlough, to ascertain if urban pressures are having an impact.
- Carry out SSIS/RA analysis on a number of the larger inflowing streams to Lough Melvin to determine if any impacts to the lake are associated with these tributaries. If tributaries are deemed to have an impact on the lake, carry out stream walks to see if point or diffuse sources are identified as causing an impact. Note as agriculture is a significant issue for the Drowes_010 it may be of interest to carry out stream walk on impacted streams with the ASSAP advisor assigned to the area.

The EPA have outlined their planned monitoring for the Drowes_010 for the next three years on the EDEN App which is summarised in Table 13.

Table 13 Planned EPA monitoring for the Drowes_010 (2019 – 2021).

	Lennox’s Bridge (St. 30100)		
	2019	2020	2021
Chemical Surface Water Status	0	0	0
Fish Status or Potential	0	0	0
General Conditions	5	5	5
Hydromorphological Conditions	0	0	0
Invertebrate Status or Potential (AWIC)	0	0	0
Invertebrate Status or Potential (Q-Value)	0	0	1
Macrophyte Status or Potential	0	0	0
Phytobenthos Status or Potential	0	0	0
Specific Pollutant Conditions	0	0	0

7.3.3 Kinlough_010

As Kinlough is an unassigned waterbody, the local catchment assessment (LCA) proposed is outlined in Section 8.3.1. However, as the village of Kinlough is located within this catchment further attention regarding urban pressures need to be included when carrying out LCA work.

7.3.4 Lough Melvin

Lough Melvin has remained at Moderate Status for the last three status cycles. This desk study has highlighted that nutrient are not an issue as they are all below their retrospective EQS. However, it is important to note that the potential of Zebra Mussel sightings within the lake have been noted and need to be confirmed, which may be contributing to the low nutrient concentrations within the lake. An extensive in-lake general conditions monitoring programme has been outlined on the EDEN App for 2019, which is to be phased down to a quarterly basis for the subsequent 2 years (2020, 2021). Based on the results for the 2019 monitoring programme, a clearer insight for Lough Melvin maybe obtained. In the meantime, concentrating on the inflowing streams will be priority for LCA work in 2019.

The EPA have outlined their planned monitoring for Lough Melvin for the next three years on the EDEN App which is summarised in Table 14.

Table 14 Planned EPA monitoring within Lough Melvin (2019 – 2021).

	Site 1			Site 2			Site 3			Site 4			Site 6		
	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021
Chemical Surface Water Status	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fish Status or Potential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
General Conditions	12	4	4	12	4	4	12	4	4	12	4	4	12	4	4
Hydromorphological Conditions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Invertebrate Status or Potential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrophyte Status or Potential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phytobenthos Status or Potential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plankton Status and Potential	0	0	0	0	0	0	2	2	2	0	0	0	0	0	0
Specific Pollutant Conditions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7.3.5 Lattone Lake

No monitoring data has been published for Lattone Lake on the EDEN App. Info sourced for this desk study was from the EPA. As both the inflowing and outflowing streams are located in Northern Ireland, initial LCA work will focus on the southern lake shore to identify potential impacts. Collaboration with the NIEA for Lattone Lake will be necessary. In addition, as the lake is failing for fish further consultation with the IFI will be required.

8 Review of Mitigation Options

- Overland mitigation options need to be considered when looking at pathway interception options for this PAA.
- In areas where Karst have been identified in the Ballagh_010, Lattone_010, County Water (Carran West) and Drowes_010 waterbodies any pollution pathways identified will need to regard sub-surface and groundwater flow mitigation measures.

Date of Completion of Desk Study: 06/12/2019

Work Plan Summary:

1. Review updated chemistry data for Lough Melvin and the Drowes waterbodies to see for improvements and non-deterioration.
2. Carry out SSIS/RA assessment on the outflow of the unassigned waterbodies to determine potential impacts.
3. Chemistry samples (PO_4 , NH_3 and TON) and portable measurements (pH, DO, temperature and conductivity) need to be collected on a quarterly basis at the outflow of the unassigned waterbodies.
4. Carry out SSIS/RA u/s and d/s of the Kinlough WWTP.
5. Carry out stream walk to identify where Kilough WWTP's, storm water overflow and discharge pipes are located.
6. Carry out SSIS/RA and stream walks along the streams which flow through the village of Kinlough to determine any potential urban issues.
7. Carry out SSIS/RA analysis on a number of the larger inflowing streams to Lough Melvin, if deemed impacted, carry out stream walks.

Appendix A

The data presented in Table 15 was obtained from the NIEA in relation to the 2018 data for the Garrisons Sewage Works (S03115). Note that there was an exceedance in suspended solids on the 14th of Feb 2018, but this was allowed under the 95thile standard.

Total Phosphorous (mg/l) is calculated on an annual mean basis. When there is a result that is less than the limit of detection this is treated for the purposes of calculating the mean as “0”. This approach is used by all the UK regulators. The annual mean limit for TP is 2 mg/l for the Garrisons Sewage Works. In 2018 the annual mean limit for TP was 0.8 mg/l meaning that the treatment plant at Garrisons was in compliance with its licence.

Table 15 Performance of the Garrison Sewage Works

Name	Date	Time	BOD	40	SS	60	PTOT	2
GARRISON (S03115)	24-Jan-18	1100	1.7	<	2.8		0.53	0.53
GARRISON (S03115)	14-Feb-18	0800	12		99.5	*A	2.6	2.6
GARRISON (S03115)	22-Mar-18	0840	2		16.5		0.51	0.51
GARRISON (S03115)	20-Apr-18	0820	1.7		12.5		0.23	0.23
GARRISON (S03115)	01-May-18	0835	6.6		31.5		0.79	0.79
GARRISON (S03115)	05-Jun-18	0930	2.9		8		0.5	0.5
GARRISON (S03115)	06-Aug-18	1030	0.93		12		0.61	0.61
GARRISON (S03115)	07-Sep-18	1027	0.96		9.5		0.71	0.71
GARRISON (S03115)	04-Oct-18	1041	1.2		9.5		0.8	0.8
GARRISON (S03115)	31-Oct-18	1222	2.2		9		0.99	0.99
GARRISON (S03115)	05-Dec-18	1225	1.6		6	<	0.07	0
GARRISON (S03115)	13-Dec-18	1021	1.6		16.5			
							Mean Total P	0.8
PASS								

Appendix B

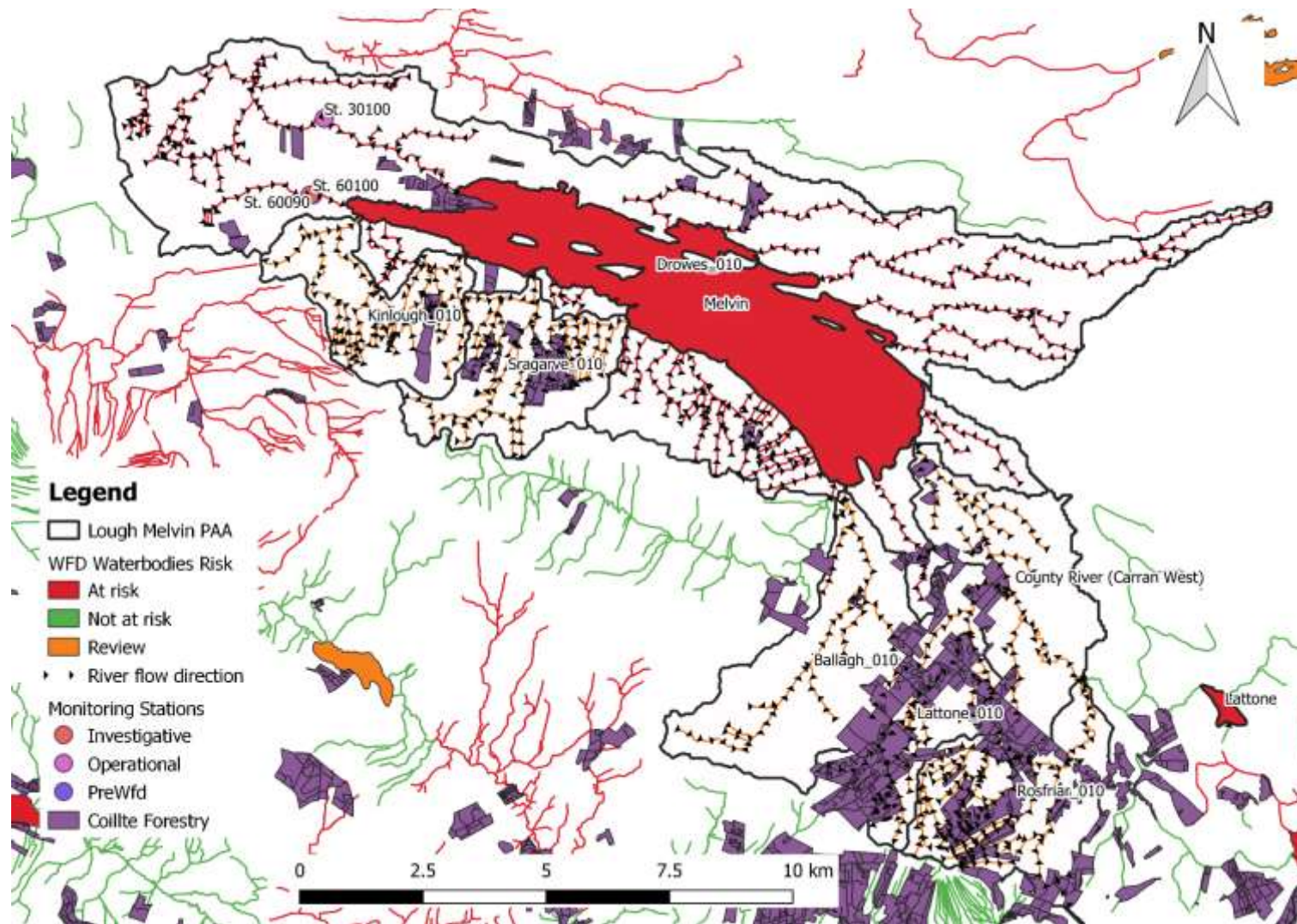


Figure 27 Coillte Forestry register 2018 for the Lough Melvin and Drowes PAA.

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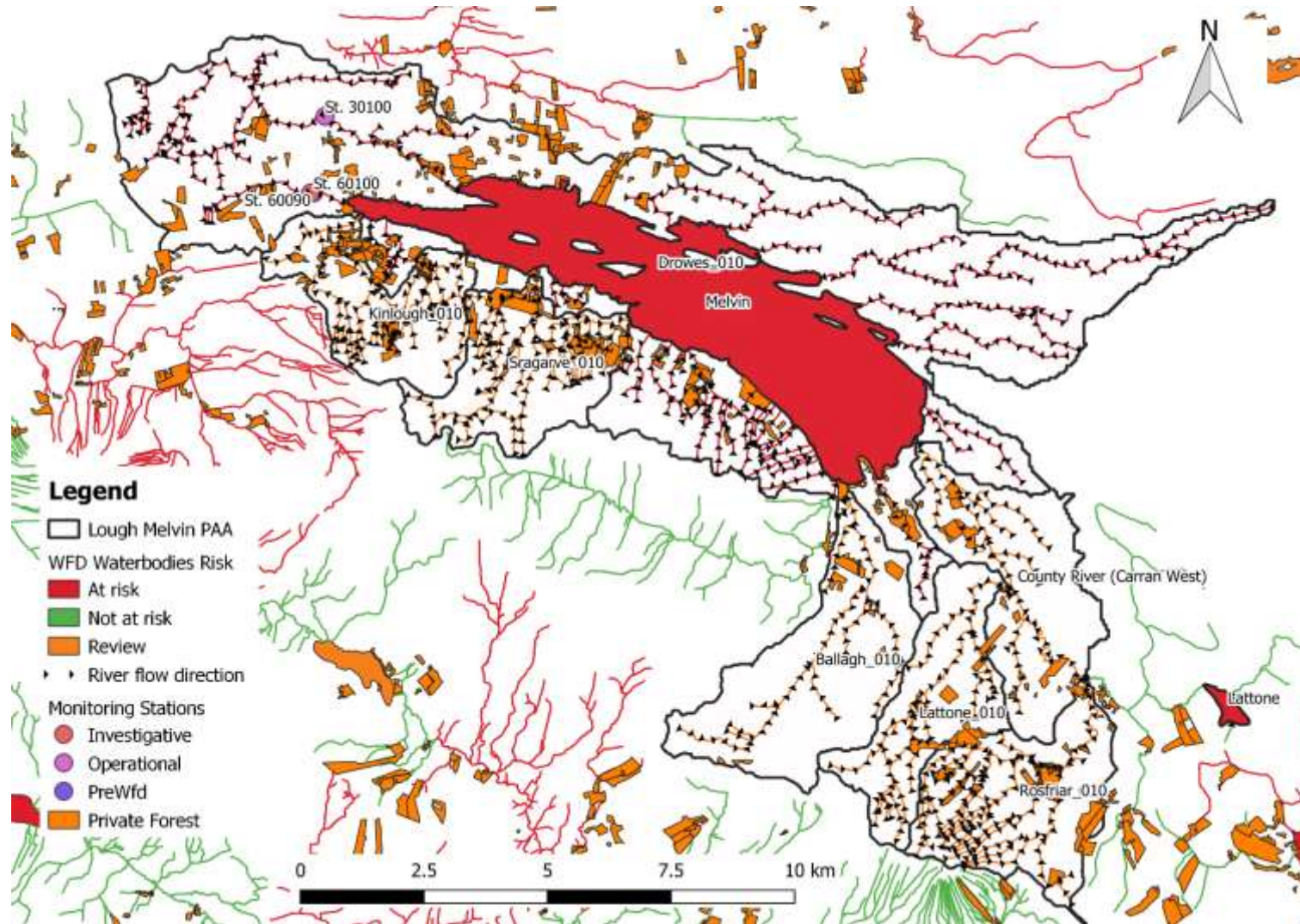


Figure 28 Private Forestry register 2017 for the Lough Melvin and Drowes PAA.

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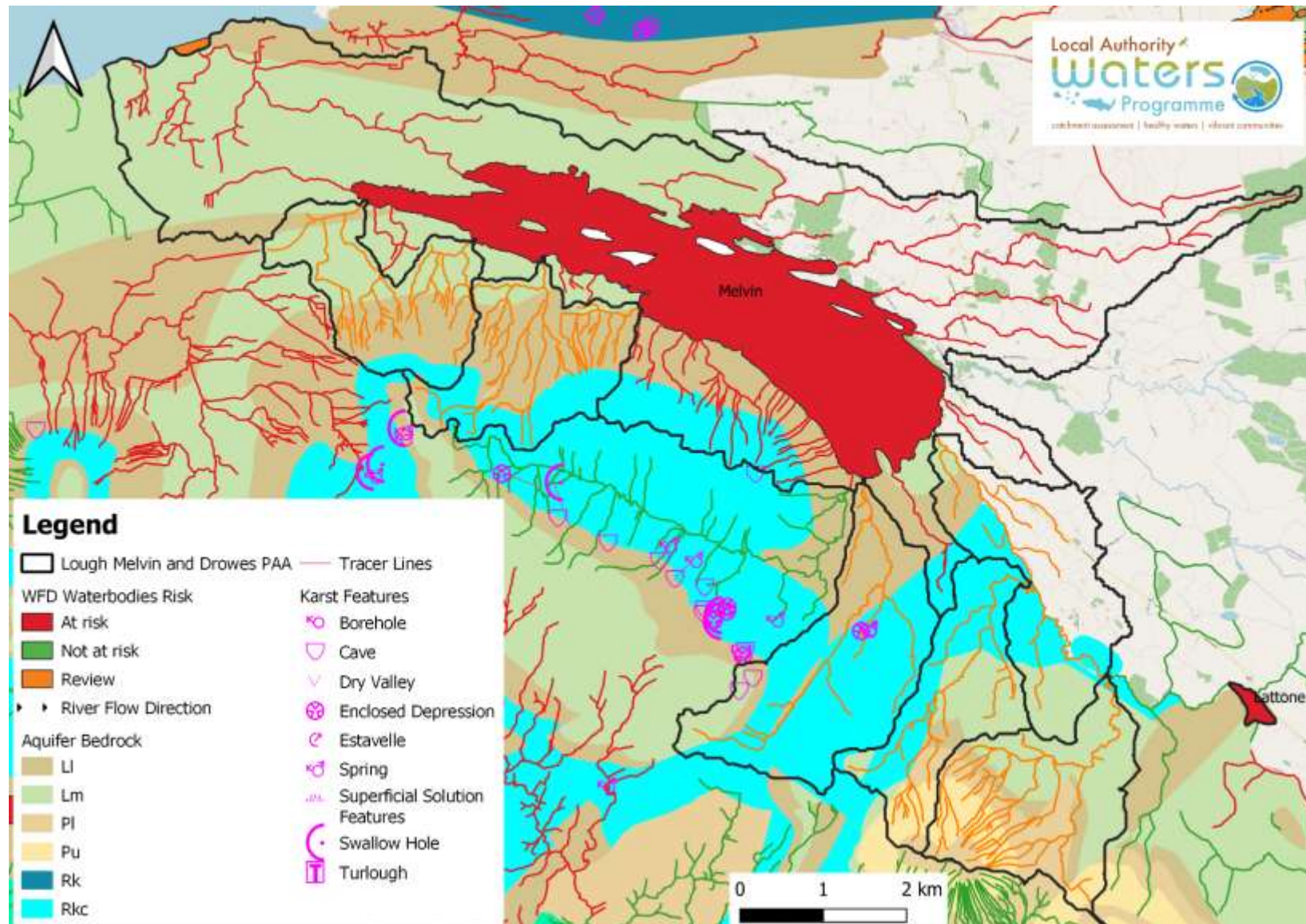


Figure 29 Karst Features within the Lough Melvin and Drowes PAA.

Appendix C

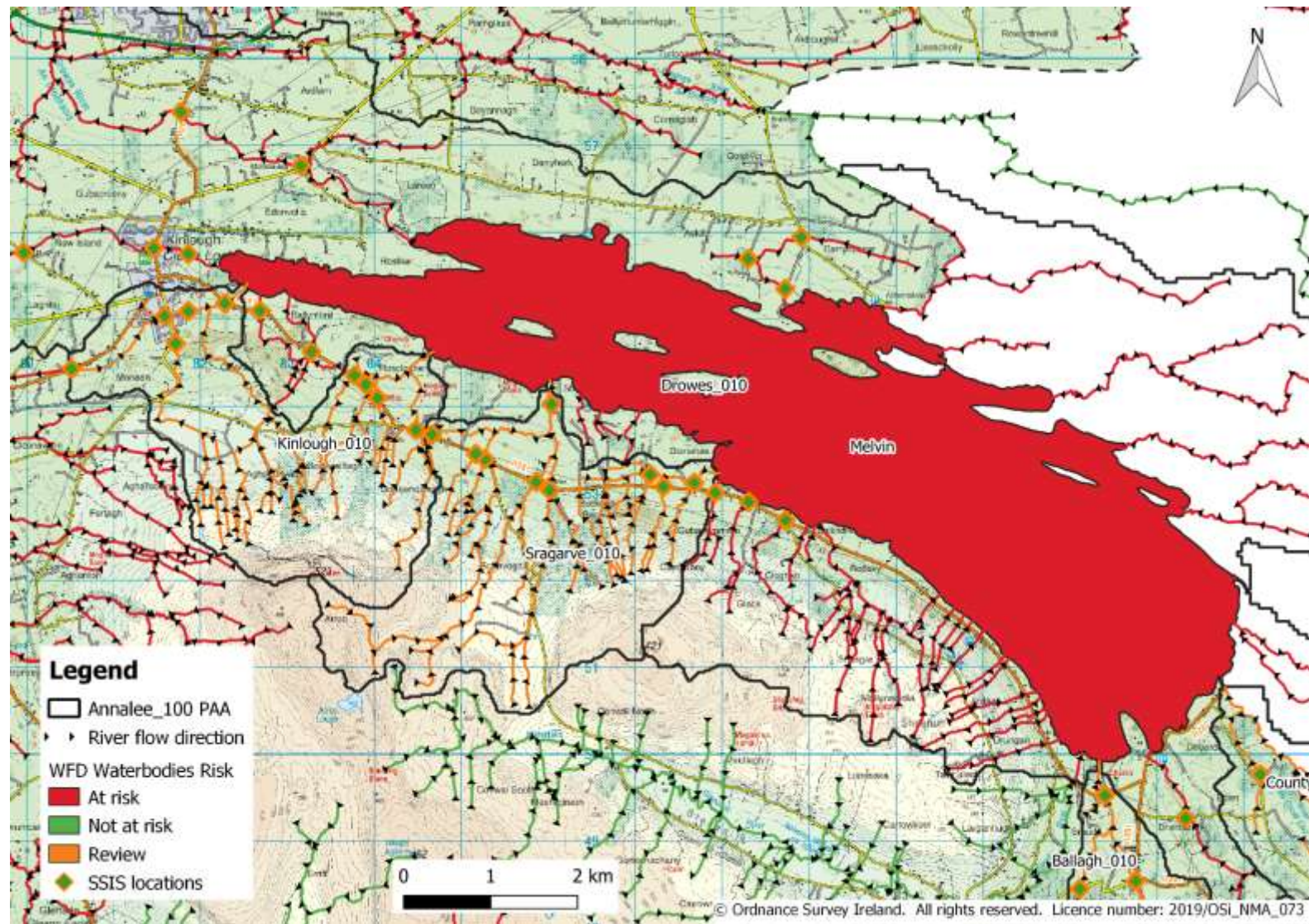


Figure 30 Initial sampling locations for SSIS/RA analysis.

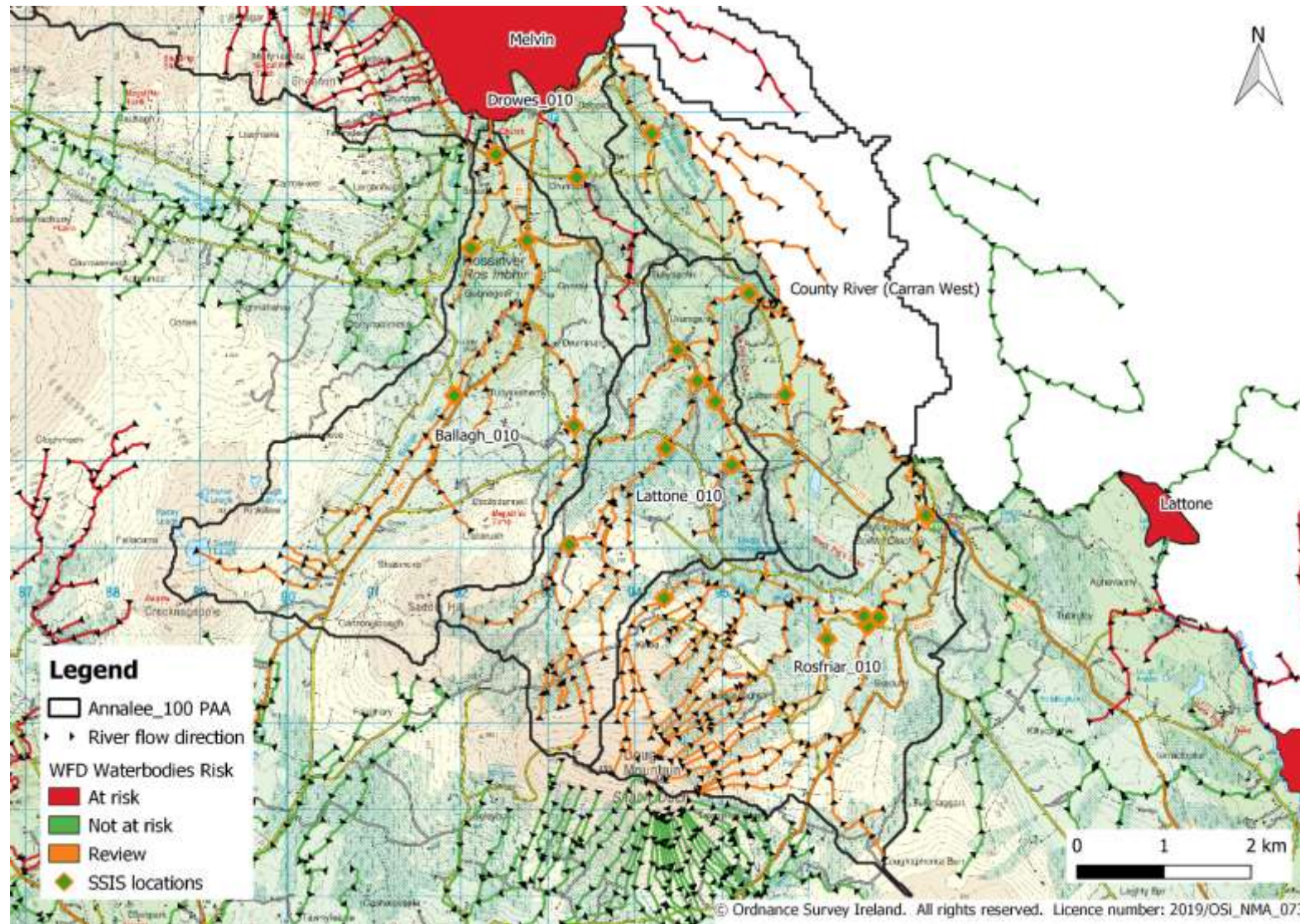


Figure 31 Initial sampling locations for SSIS/RA analysis.