

Mountain Water and Emy Lough Priority Area for Action AFA0134 Desk Study Report

LAWPRO (Border Region)

Version F01



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1 Background

The Mountain Water River rises in the Slieve Beagh Mountains Co. Monaghan and flows eastward. The river passes through agricultural land and among small drumlins meeting several small tributaries before reaching the town of Emyvale. Just above Emyvale, there is a weir and a millrace which diverts some of the flow from the Mountain Water River to Emy Lough which is used as a drinking water source for Glaslough/Tyholland group water scheme (GWS). Back on the main Mountain Water River channel below Emyvale is the towns wastewater treatment plant (WWTP). The river from here continues to flow on through agricultural land, before passing north of the village of Glaslough and the nearby estate of Castle Leslie. Within this area there is another WWTP serving the village of Glaslough. The river continues north-east of the village to meet the River Blackwater which is about 8.5 km from Emyvale. The Blackwater River eventually enters Lough Neagh.

Reason why the area for action was chosen:

- Build on improvements in the two waterbodies.
- River Trust in operation.
- Group Water Scheme present.
- Communities project in the Mountain Water_040 which is looking at the hydromorphology issue.

Within the Mountain Water and Emy Lough Catchment there are three lakes (Emy Lough, Glaslough and Grove Lake). Both Emy Lough and Glaslough are protected drinking water sources. The Mountain Water River is currently not a designated salmonid river, nor is it designates as a Special Protection Area (SPA), Special Area of Conservation (SAC) or a Natural Heritage Area (NHA). Inland Fisheries Ireland has noted that the river holds good stocks of Brown Trout and has a natural spawning and nursery habitat throughout. The river also contains some stocks of crayfish.

Within the current WFD cycle there are seven waterbodies within the Mountain Water and Emy Lough sub-catchment which are in the PAA, these include the Mountain Water_030, Mountain Water_040, Mountain Water_050, Mountain Water_060, Grove Lake, Emy Lough and Glaslough (Table 1, Figure 1, Figure 2). There are two further waterbodies within the Mountain Water sub-catchment which have not been identified as PAA's due to their high status and therefore, *Not At Risk*, this is the Mountain Water_010 and Mountain Water_020 (Table 1).

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

Mountain Water_030:

- *"This waterbody has returned to Good Status in 2013-2015 but the Ortho-phosphate concentrations, while currently supporting Good Status, would appear to be increasing. Review the ongoing chemistry samples as they are recorded and take further investigative action as necessary."*
- *"Internal liaison with the Office of Environmental Enforcement on the significance of the industrial discharge on this water body and downstream on the Mountain Water_040."*

Grove Lake:

- *"Agriculture in the area. No water quality data available. Need to undertake small stream risk scores of the feeder stream entering the lake and water quality samples to be taken, as well as water quality samples from the lake. Lake appears turbid from aerial photography. Consideration also of the impacts of the abstraction regime"*.

Mountain Water_040:

- *“Urban wastewater discharges, suspected misconnections in the Emyvale Town/ Village, as ammonia is elevating somewhere around the town. Investigative assessment to focus around the Emyvale Town/ Village where stream passes through.”*
- *“Internal liaison on biological conditions in order to look at site condition (weir present, arterial drainage and flow diversion to Emy Lough) and to assess how much these factors are impacting the water body.”*
- *“Key sources of diffuse urban pressure to be investigated.”*

Mountain Water_050:

- *“Measure - Compliance Checks: carry out follow up farm visits and problem areas identified previously from surveys.”*

Glaslough:

- *“Noted to be eutrophic. No water quality data available therefore, small stream risk scores of the stream feeding the lake and take water quality samples need to be taken. If water quality issues are identified investigate diffuse urban runoff from Glaslough”.*
- *“Diffuse Urban pressure to be investigated”.*

Mountain Water_060:

- *“Assess the water quality at the downstream end of this water body initially using chemistry and small stream risk scores. Areas of high pollution impact potential from phosphate and the upstream stream water quality suggests problems are likely. Take additional investigative action as necessary if water quality results indicate issues.”*

Emy Lough:

- *“Assess the water quality at the downstream end of this water body initially using chemistry and small stream risk scores. Areas of high pollution impact potential from phosphate and the upstream stream water quality suggests problems are likely. Take additional investigative action as necessary if water quality results indicate issues.”*
- *“Internal liaison to check biological information on the impact of abstraction on the lake.”*
- *“Diffuse Urban pressure to be investigated and identify the main sources.”*

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Table 1 Summary of waterbodies within the Mountain Water and Emy Lough PAA.

WB Code	WB Name	WFD Risk	Status Objective	WFD Status			Bio 17	Pressure Category	Pressure Subcat.	Impact	Sig. Pressure	AA
				07-09	10-12	10-15						
UKGBNI1NB030308254	MOUNTAIN WATER_010	Not At Risk	High (2021)	G	G	H	4-5					N
IE_NB_03M010200	MOUNTAIN WATER_020	Not At Risk	Good (2021)	G	G	H	4					N
IE_NB_03M010400	MOUNTAIN WATER_030	Review	Good (2027)	M	M	G	4-5	Not Assigned	Not Assigned			Y
IE_NB_03_3	GROVE	Review	Good (2027)	Unassigned	Unassigned	Unassigned		Agriculture Anthropogenic Pressures	Pasture Unknown		No	Y
IE_NB_03M010500	MOUNTAIN WATER_040	At Risk	Good (2027)	P	P	P	3	Hydromorphology	Channelisation Dams, Barriers, Locks, Weirs,	Altered habitat due to Hydrological and Morphological changes	Yes	Y
								Agriculture	Pasture, Agriculture,	Nutrient Pollution		
								DWW	Waste Water discharge,	Nutrient and Organic Pollution		
								UWW	Agglomeration PE of 1001 to 2000,	Nutrient and Organic Pollution		
IE_NB_03_102	EMY LOUGH	At Risk	Good (2027)	P	B	M		Urban Run-off	Diffuse Source Run-off	Nutrient and Organic Pollution	Yes	Y
IE_NB_03M010650	MOUNTAIN WATER_050	At Risk	Good (2027)	Unassigned	M	P	3-4	Agriculture	Agriculture,	Nutrient Pollution	Yes	Y
							Hydromorphology	Channelisation	Altered habitat due to Hydrological			

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									and Morphological changes		
IE_NB_03_79	GLASLOUGH	<i>Review</i>	Good (2027)	Unassigned	Unassigned	Unassigned	Urban Run-off Anthropogenic Pressures	Diffuse Source Run-off Unknown		No	Y
IE_NB_03M010700	MOUNTAIN WATER_060	<i>Review</i>	Good (2027)	Unassigned	Unassigned	Unassigned	Agriculture UWW Hydromorphology Anthropogenic pressures	Pasture, Agglomeration PE of 1001 to 2000, Channelisation, Unknown		No	Y

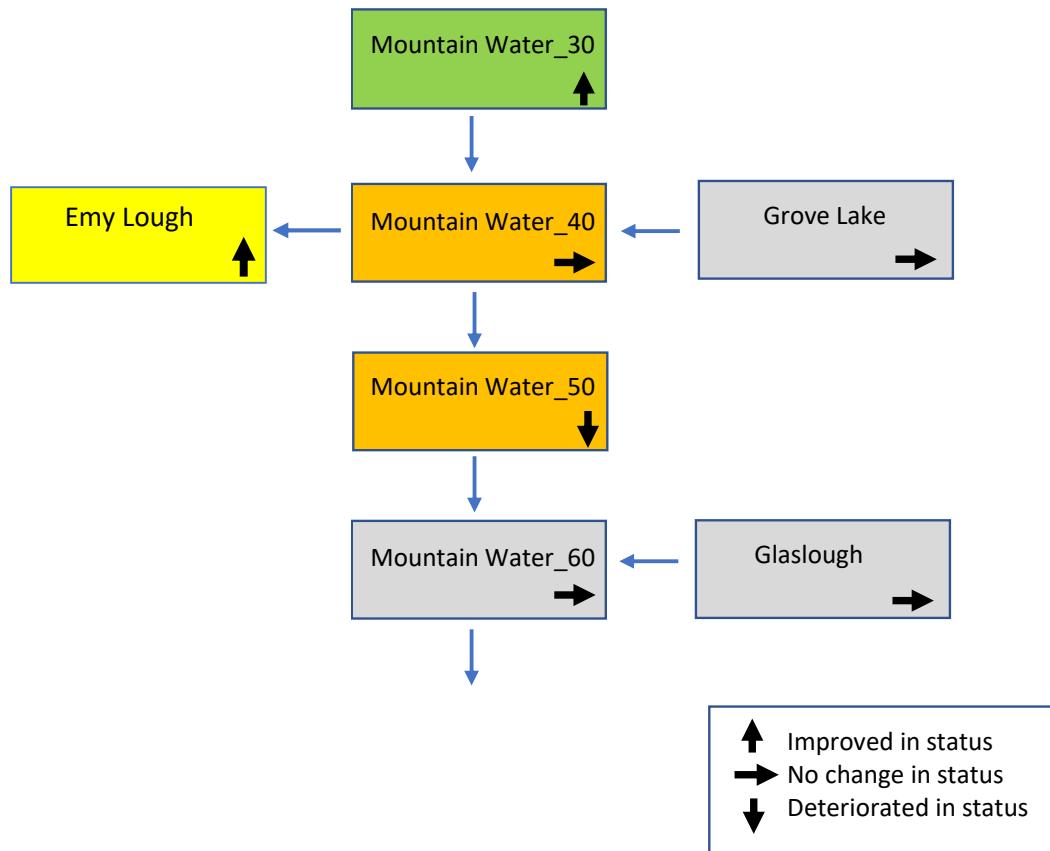


Figure 1 Flow direction of the waterbodies within the Mountain Water and Emy Lough PAA.

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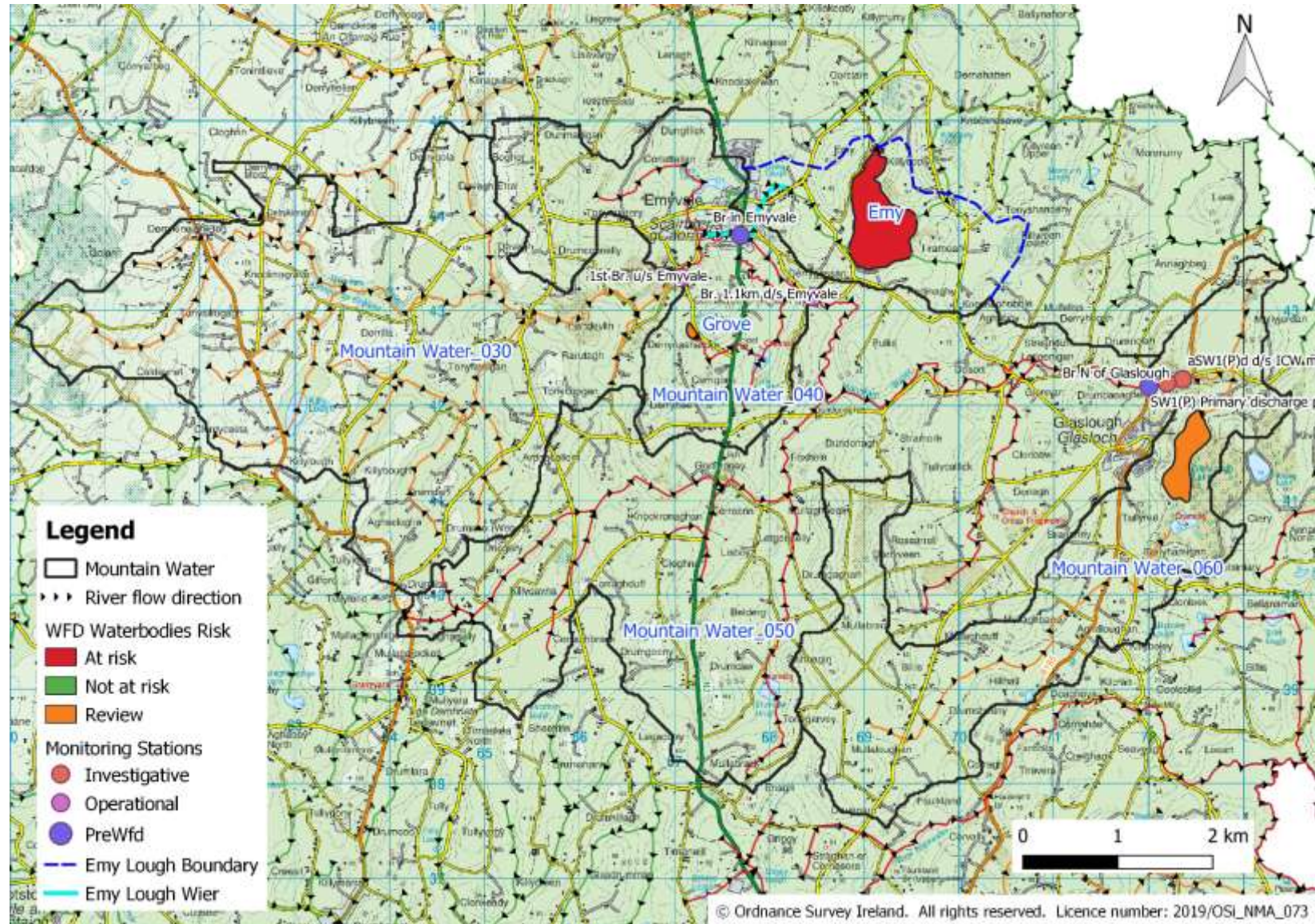


Figure 2 Monitoring stations located within the Mountain Water and Emy Lough PAA.

2 Receptor Information and Assessment

There are seven waterbodies in the Mountain Water and Emy Lough 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 is based on the latest Q-value assessment (2017), which categorises the Mountain Water and Emy Lough sub-catchment from High Ecological Status upstream to Poor Ecological Status downstream based on the data period 2007 – 2017 (Table 2, Table 3).

The monitoring stations within the Mountain Water and Emy Lough sub-catchment, labelled in Table 2 and Table 3 will be identified as follows:

- 1st Bridge u/s Emyvale: St. 400
- Br in Emyvale: St. 450
- Br 1.1km d/s Emyvale: St. 500
- Br N of Glaslough: St. 650
- SW1(P) Primary discharge point: St. 670
- aSW1(P)d d/s ICW: St. 680

Water quality results for the chemical and biological status are presented for two Operational (St 400, St 500), two PreWfd (St 450, St 650) and two Investigative (St 670, St 680) monitoring stations located throughout the Mountain Water sub-catchment as well as the Midlake monitoring point for Emy Lough, for the monitoring periods up to and including 2015 (Table 2 and 3).

Table 2 Receptor information for the Mountain Water_030, Grove Lake, Mountain Water_040 and Emy Lough waterbodies

Factor	Figures Tables	IE_NB_03M010400 Mountain Water_030	IE_NB_03_3 Grove Lake	IE_NB_03M010500 Mountain Water_040	IE_NB_03_102 Emy Lough
Risk Category	N	<i>Review</i>	<i>Review</i>	<i>At Risk</i>	<i>At Risk</i>
Biological Status					
Monitoring Station(s) with Q values	Y	St 400 Q4 (2013)	N/A	St 500 Q3 (2013)	N/A
Trends in Q value since 2009	Y	increased for 2017		the same for 2017	
2016-2018 Q value data	Y	Q4-5		Q3	
Hydrochemistry Data					
Monitoring Station(s) with data	Y	St 400: NH ₃ , PO ₄ , TON	N/A	St 450: NH ₃ , PO ₄ St 500: NH ₃ , PO ₄ , TON	Midlake: NH ₃ , TP, Chl- <i>a</i>
Existing					
New	Y				
Summary & Trends in PO₄, NH₃ and NO₃					
In App	Y	St 400: PO ₄ up NH ₃ down TON down	N/A	St 450: PO ₄ up NH ₃ down St 500: PO ₄ down NH ₃ down TON down	Mid Lake: NH ₃ down TP up Chl- <i>a</i> down
All Available data	y				
Other water quality data	y	BOD		BOD	None
Baseline Concentration (mg/l)	Y	St 400: PO ₄ 0.034 NH ₃ 0.021 TON 0.573		St 450: PO ₄ 0.022 NH ₃ 0.038 St 500: PO ₄ 0.038 NH ₃ 0.072 TON 0.817	Mid Lake: NH ₃ 0.037 TP 0.015 Chl- <i>a</i> 5.8 µg/l
Other relevant values		None		None	None
Distance to threshold		Far		Far	Far

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Indicative Quality (mg/l)		PO ₄ 0.035 NH ₃ 0.040 TON 1.8	NH ₃ 0.040 TP 0.025 Chl- <i>a</i> 10.00	PO ₄ 0.035 NH ₃ 0.065 TON 1.8	NH ₃ 0.040 TP 0.025 Chl- <i>a</i> 10 µg/l
Supporting Conditions Chemical conditions? Oxygenation conditions Acidification conditions		None BOD > 1.5 mg/l None	None None None	None BOD St. 450 > 1.5 mg/l None	None None None
Hydromorphology RHAT score Evidence of arterial drainage	N Y	N/A OPW have no recent drainage works, lot of tributaries to the main river channel and aerial mapping indicates a lot of drains in the area.	N/A	N/A OPW have no recent drainage works, lot of tributaries to the main river channel and aerial mapping indicates a lot of drains in the area.	N/A
Ecological Status (2010 – 2015) Trends 2010 - 2015	Y	Good Up from moderate status (2010 – 2015)	Not Assigned	Poor No change in status (2010 – 2015)	Moderate Up from bad status (2010 – 2015)
Protected Areas	N	Small SPA area to the west of the waterbody	N/A	N/A	Drinking Water Source (Glaslough Tyholland GWS, Emyvale / Glaslough PWS)
WFD Objectives	Y	Good ecological status by 2027	Good ecological status by 2027	Good ecological status by 2027	Good ecological status by 2027
EPA biologists notes (if any)	Y	St 400, just upstream of Emyvale, continued to improve to a highly satisfactory position (Q4-5) not seen here since 1998.	N/A	Downstream of Emyvale conditions deteriorate again	N/A
Significant issue	Y	Based on 2018 data: St 400 indicating an upward trend in PO₄ , however, the trend is still below the EQS (0.035 mg/l)	Not determined, no data available **MCPA have been reported as an issue in Emy Lough which may be coming from the surrounding landscape in Mountain Water_040	Based on 2018 data: St 450 indicating an upward trend in PO₄ St 500 indicating a downward trend in all parameters, however, PO₄ and NH₃ baseline concentrations are above their respective EQS Sediment may also be an issue **MCPA have been reported as an issue in Emy Lough	Based on 2018 data: The mid lake monitoring point is indicating an upward trend in TP , however, this is still below the IQS of 0.025 mg/l. **MCPA is an issue for the lake

*Available in WFD app.

** EPA Update on Exceedances & Enforcement to the NPDWAG 11th of September 2019.

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Table 3 Receptor information continued for the Mountain Water_050, Mountain Water_060 and Glaslough waterbodies.

Factor	Figures Tables	IE_NB_03M010650 Mountain Water_050	IE_NB_03M010700 Mountain Water_060	IE_NB_03_79 Glaslough
Risk Category	N	<i>At Risk</i>	<i>Review</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	St 650 Q3 (2013) increased for 2017 Q3-4	N/A	N/A
Hydrochemistry Data Monitoring Station(s) with data Existing New	Y Y	St 650: NH ₃ , PO ₄ , TON	St 670: NH ₃ , PO ₄ , TON St 680: NH ₃ , PO ₄ , TON	N/A
Summary & Trends in PO₄, NH₃ and NO₃ In App	Y	St 650: PO ₄ up NH ₃ up TON up	St 670: PO ₄ up NH ₃ up TON down	St 680: PO ₄ up NH ₃ up TON up
All Available data	Y			
Other water quality data	Y	BOD	BOD	
Baseline Concentration (mg/l)	Y	St 650: PO ₄ 0.050 NH ₃ 0.040 TON 0.798	St 670: PO ₄ 0.053 NH ₃ 0.065 TON 1.272	St 680: PO ₄ 0.072 NH ₃ 0.109 TON 1.270
Other relevant values		None	None	
Distance to threshold		Far	Far	
Indicative Quality (mg/l)		PO ₄ 0.035 NH ₃ 0.040 TON 1.8	PO ₄ 0.035 NH ₃ 0.065 TON 1.8	NH ₃ 0.040 TP 0.025 Chl- <i>a</i> 10 µg/l
Supporting Conditions Chemical conditions? Oxygenation conditions		None BOD < 4 mg/l	None BOD St 670 > 1.5 mg/l (spiked to 8.2 mg/l in Nov 2017). St 680 > 1.5 mg/l (spiked to 8.8 mg/l in Nov 2017).	None None
Acidification conditions		None	None	None
Hydromorphology RHAT score Evidence of arterial drainage	N Y	N/A OPW have no recent drainage works, lot of tributaries to the main river channel and aerial mapping indicates a lot of drains in the area.	N/A OPW have no recent drainage works, lot of tributaries to the main river channel and aerial mapping indicates a lot of drains in the area.	N/A
Ecological Status (2010 – 2015) Trends 2010 - 2015	Y	Poor Down from moderate status (2010 – 2015)	Not Assigned	Not Assigned

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Protected Areas	N	N/A	N/A	Drinking Water Source
WFD Objectives	Y	Good ecological status by 2027	Good ecological status by 2027	Good ecological status by 2027
EPA biologists notes (if any)	Y	St 650 upstream of Glaslough had improved compared with the 2013 survey results	N/A	N/A
Significant issue	Y	Based on 2018 data: St 650 is indicating an upward trend in NH₃ , TON and PO₄ , with PO₄ being the only parameter which is exceeding its EQS Sediment may also be an issue	Based on 2018 data: St 670 indicating an upward trend in NH₃ and PO₄ , both of which are above their respective EQS limits St 680 indicating an upward trend in PO₄ , TON and NH₃ , with both PO₄ and NH₃ exceeding their EQS limits	Not determined, no data available Characterisation report notes the lake to be eutrophic.

*Available in WFD app.

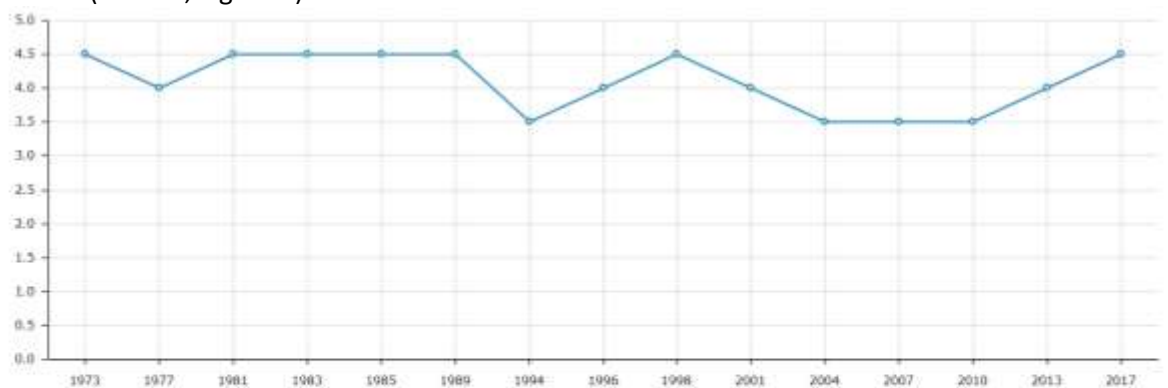
2.1 Mountain Water_030

2.1.1 Monitoring Station - 1st Bridge u/s Emyvale (St. 400)

The monitoring St 400 is an Operational Monitoring station located on the main river channel at the first bridge upstream from Emyvale Town, before the Mountain Water_030 flows into the Mountain Water_040 waterbody (Figure 2).

Data summary:

- The 2017 biological data characterises the river in the Mountain Water_030 as High Ecological Status (Q4-5) (Figure 3).
- This ecological status has continually improved from Moderate Status in 2004 back to High Status in 2017 (Figure 3).
- The PO₄ baseline concentration (0.034 mg/l) and the average 2018 PO₄ concentration (0.033 mg/l, n = 5) is below the EQS of 0.035 mg/l for PO₄, however, the current trend for PO₄ is going upwards (Table 4, Figure 4).



	1973	1977	1981	1983	1985	1989	1994	1996	1998	2001	2004	2007	2010	2013	2017
Result	4.5	4	4.5	4.5	4.5	4.5	3.5	4	4.5	4	3.5	3.5	3.5	4	4.5
Classification	High	Good	High	High	High	High	Moderate	Good	High	Good	Moderate	Moderate	Moderate	Good	High
Q-Value	4.5	4	4.5	4.5	4.5	4.5	3.4	4	4.5	4	3.4	3.4	3.4	4	4.5

Figure 3 The biological trend and data for monitoring St. 400 (1973 – 2017).

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Table 4 The associated aggregation table for the Ortho-Phosphate (as P mg/l) trend for monitoring St. 400 (2007 – 2018).

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PO₄	n	10	6	6	6	6	6	6	6	5	5	5
	mg P L⁻¹	0.023	0.027	0.035	0.025	0.034	0.019	0.025	0.03	0.036	0.040	0.030

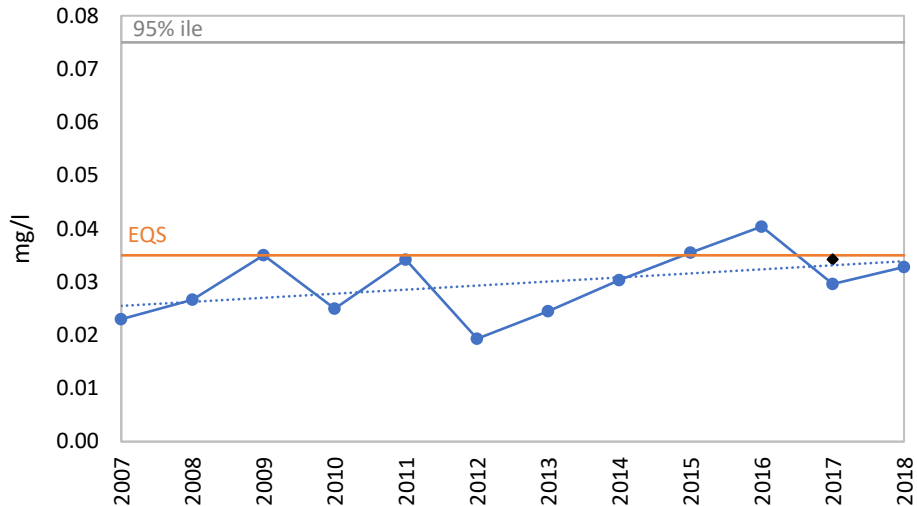


Figure 4 Ortho-Phosphate (as P mg/l) trend chart for monitoring St. 400 (2007 – 2018).

2.2 Mountain Water_040

2.2.1 Monitoring Station - Br in Emyvale (St. 450)

The monitoring St 450 is a PreWfd monitoring station located on the main river channel at the bridge upstream from Emyvale Town WWTP, in the Mountain Water_040 waterbody (Figure 2).

Data summary:

- There is no biological data available for the monitoring station.
- BOD concentration in 2017 and 2018 consistently fluctuated above the EQS of 1.5mg/l, ranging between 2.8 mg/l on the 19th of April 2017 and 1.2 mg/l on the 20th of June 2018.
- The PO₄ baseline concentration (0.027 mg/l) and the average 2018 PO₄ concentration (0.022 mg/l) is below the EQS of 0.035 mg/l for PO₄, however, the current trend for PO₄ is going upwards (Table 5, Figure 5).

Table 5 The associated aggregation table for the Ortho-Phosphate (as P mg/l) trend for monitoring St. 450 (2013 – 2018).

	2013	2014	2015	2016	2017	2018
PO₄	n	4	4	3	6	6
	mg P L⁻¹	0.02	0.021	0.042	0.026	0.035

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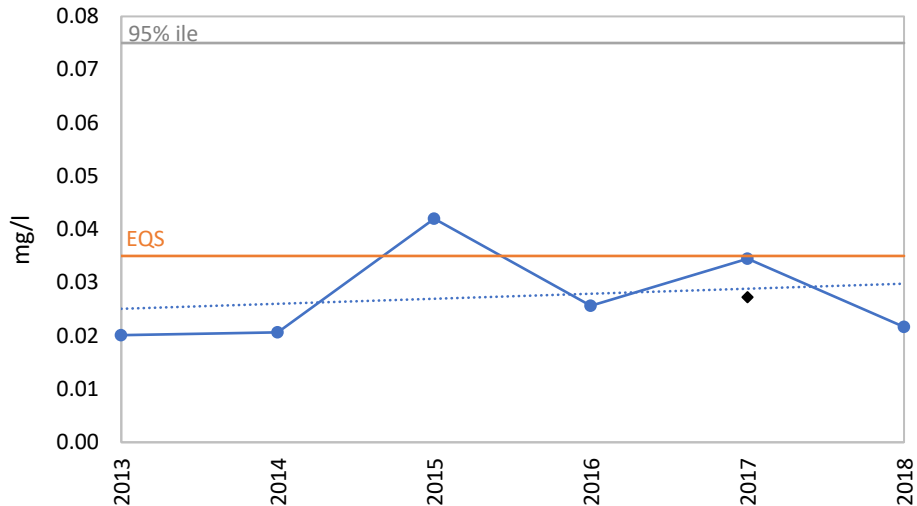


Figure 5 Ortho-Phosphate (as P mg/l) trend chart for monitoring St. 450 (2013 – 2018).

2.2.2 Monitoring Station – Br 1.1km d/s Emyvale (St.500)

The monitoring St 500 is a PreWfd monitoring station located on the main river channel at the bridge 1.1 km downstream from Emyvale Town and the Emyvale WWTP, before the Mountain Water_040 flows into the Mountain Water_050 waterbody (Figure 2).

Data summary:

- The 2017 biological data characterises the river in the Mountain Water_040 as Poor Ecological Status (Q3) (Figure 6).
- Ecological status at this site has not changed since 1998 (Figure 6).
- BOD concentration in 2017 and 2018 consistently fluctuated above the EQS of 1.5mg/l, ranging between 3.1 mg/l on the 19th of April 2017 and 0.5 mg/l on the 19th of April 2018.
- The NH₃ (0.072 mg/l) and PO₄ (0.038 mg/l) baseline concentrations are above the EQS of 0.065 mg/l for NH₃ and 0.035 mg/l for PO₄, however, the trends are currently going downwards (Table 6, Figure 7, Figure 8).
- The average NH₃ concentration for 2017 was 0.100 mg/l which was above the EQS, however, the average concentration decreased below the EQS in 2018 (0.055 mg/l) (Table 6, Figure 7).
- The average PO₄ concentration for both 2017 and 2018 were above the EQS (Table 6, Figure 8).

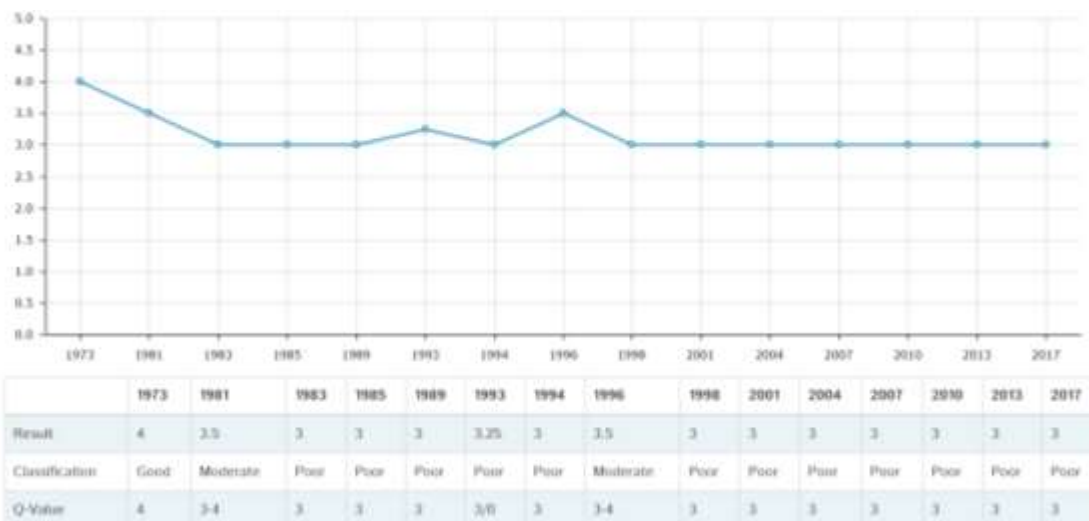


Figure 6 The biological trend and data for monitoring St. 500 (1973 – 2017).

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Table 6 The associated aggregation table for the ammonia (as N mg/l) and Ortho-Phosphate (as P mg/l) trend for monitoring St. 500 (2007 – 2018).

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
NH ₃	n	10	6	6	6	6	6	13	10	10	11	11	9
	mg P L ⁻¹	0.168	0.195	0.143	0.083	0.011	0.047	0.043	0.055	0.051	0.059	0.100	0.055
PO ₄	n	10	6	6	6	6	6	13	10	10	11	11	9
	mg P L ⁻¹	0.052	0.050	0.077	0.045	0.034	0.021	0.021	0.026	0.037	0.034	0.037	0.041

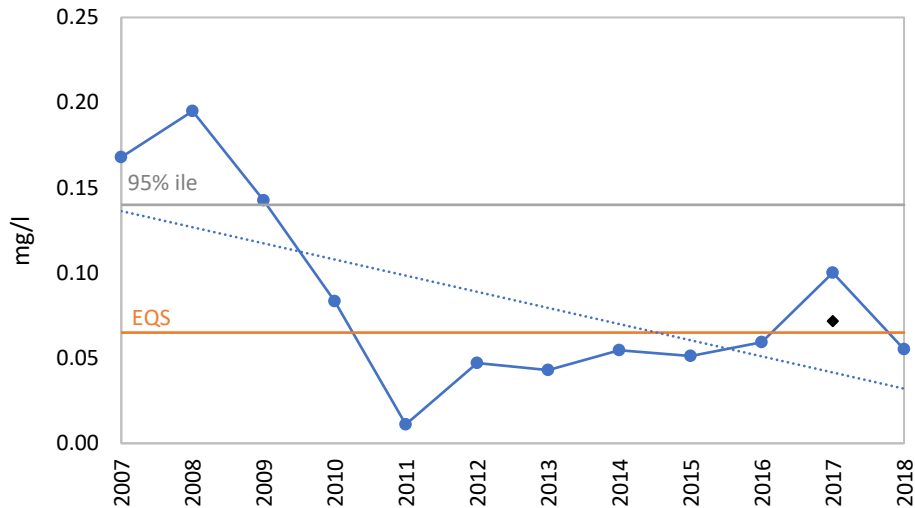


Figure 7 Ammonia (as N mg/l) trend chart for monitoring St. 500 (2007 – 2018).

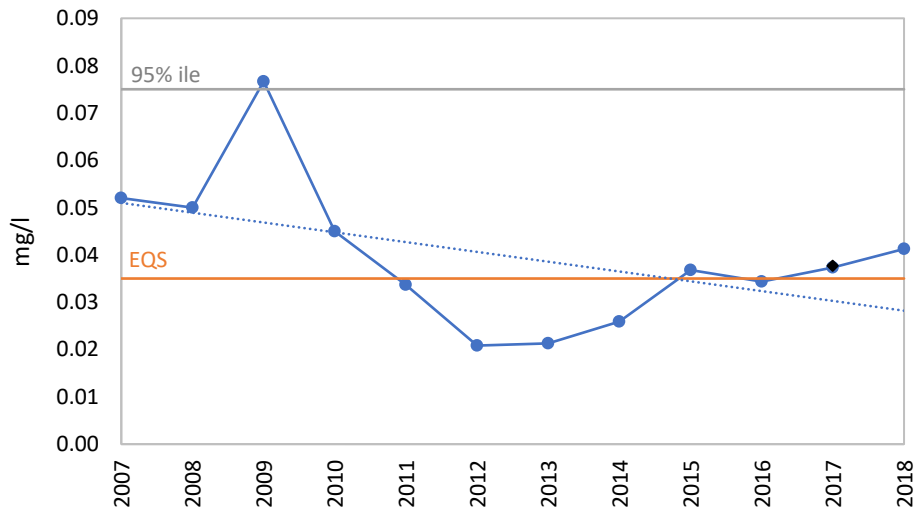


Figure 8 Ortho-Phosphate (as P mg/l) trend chart for monitoring St. 500 (2007 – 2018).

2.3 Mountain Water_050

2.3.1 Monitoring Station - Br N of Glaslough (St. 650)

The monitoring St. 650 is a PreWfd monitoring station located on the main river channel at the bridge north of Glaslough Village, before the Mountain Water_050 flows into the Mountain Water_060 waterbody (Figure 2).

Data summary:

- The 2017 biological data characterises the river in the Mountain Water_050 as Moderate Ecological Status (Q3-4) (Figure 9).
- Ecological status at this site has increased from Poor Status in 2013 (Figure 9).

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- The Ammonia (0.040 mg/l) and TON baseline concentration (0.798 mg/l) and 2017 average concentration (0.048 mg/l NH₃ and 0.742 mg/l TON, n = 6) are below the EQS of 0.065 mg/l for NH₃ and 1.8 mg/l for TON, however, the trends are currently going upwards (Table 7, Figure 10, Figure 12).
- The PO₄ baseline concentration (0.050 mg/l) and the average 2017 PO₄ concentration (0.051 mg/l, n = 6) are above the PO₄ EQS of 0.035 mg/l, with the trend currently going upwards (Table 7, Figure 11).

2.1.2

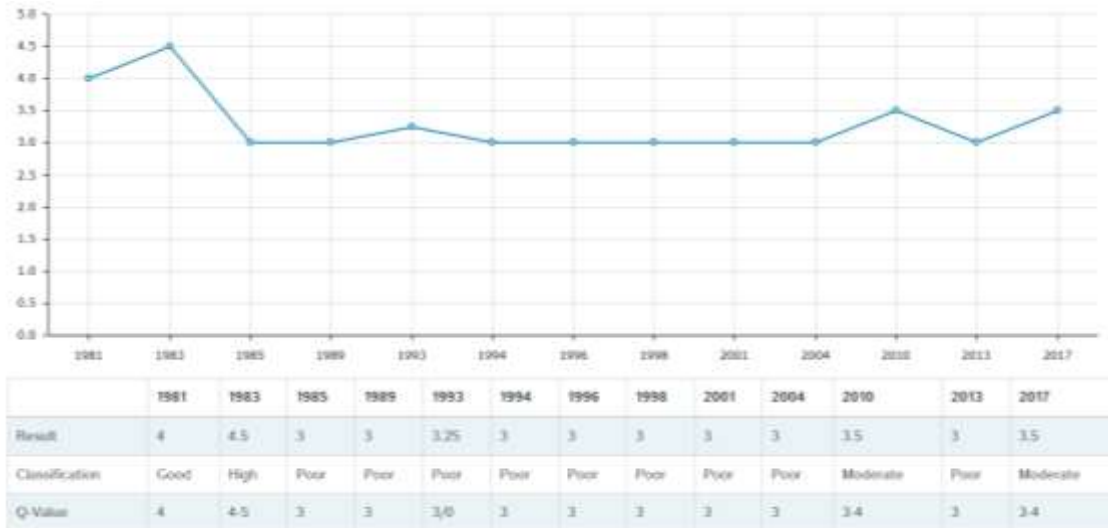


Figure 9 The biological trend and data for monitoring St. 650 (1981 – 2017).

Table 7 The associated aggregation table for Ammonia (as N mg/l), Total Oxidised Nitrogen (as N mg/l) and Ortho-Phosphate (as P mg/l) trend for monitoring St. 650 (2012 – 2017).

		2012	2013	2014	2015	2016	2017	2018
NH ₃	n	4			6	6	6	
	mg N L ⁻¹	0.039			0.031	0.042	0.048	
TON	n	4			6	6	6	
	mg N L ⁻¹	0.803			0.973	0.680	0.742	
PO ₄	n	4			6	6	6	
	mg P L ⁻¹	0.031			0.042	0.057	0.051	

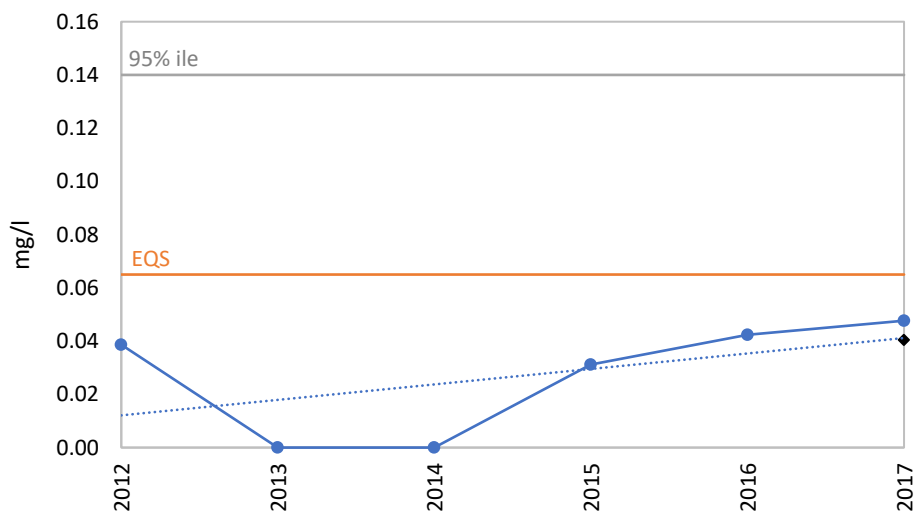


Figure 10 Ammonia (as N mg/l) trend chart for monitoring St. 650 (2012 – 2017).

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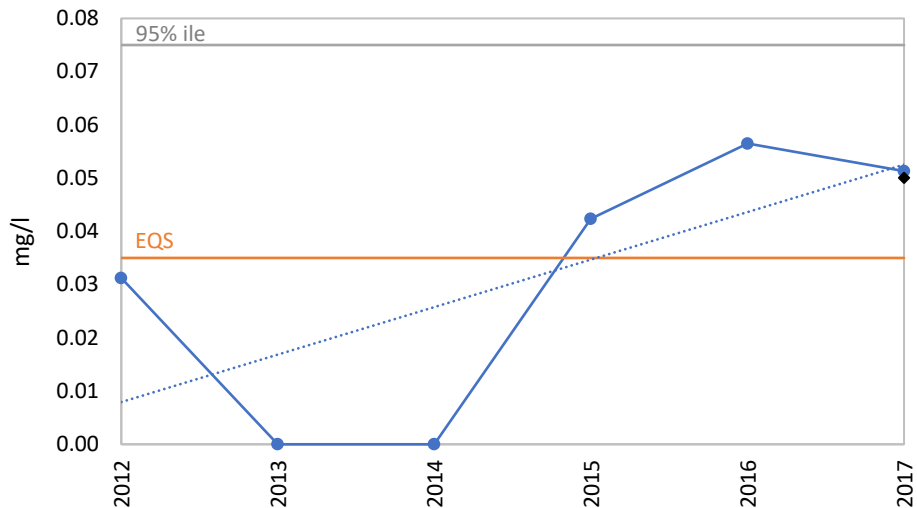


Figure 11 Ortho-Phosphate (as P mg/l) trend chart for monitoring St. 650 (2012 – 2017).

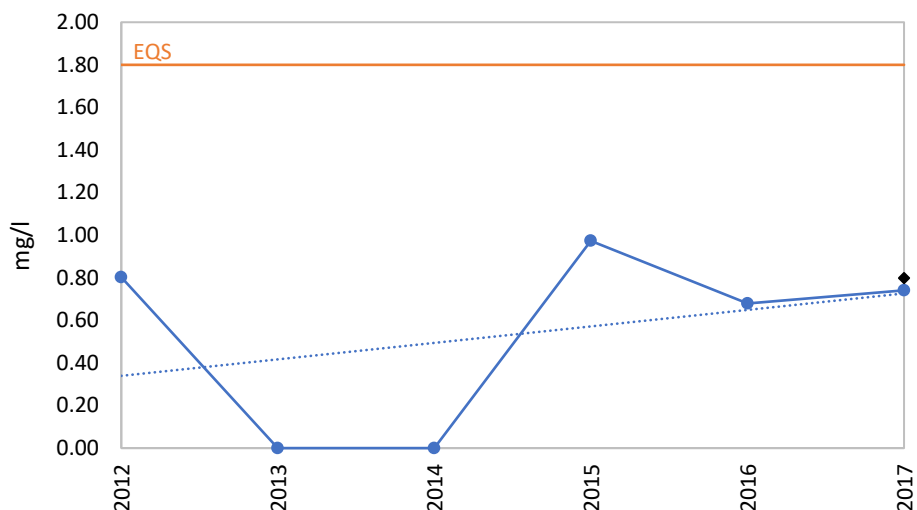


Figure 12 Total Oxidised Nitrogen (as N mg/l) trend chart for monitoring St. 650 (2012 – 2017).

2.4 Mountain Water_060

2.4.1 Monitoring Station - SW1(P) Primary discharge point (St. 670)

The monitoring St. 670 is a primary discharge point upstream of the Integrated Constructed Wetland (ICW) located on the main river channel at Glaslough Village, within the Mountain Water_060 waterbody (Figure 2).

Data summary:

- There is no biological data available for the monitoring station.
- BOD concentration in 2017 and 2018 consistently fluctuated above the EQS of 1.5mg/l, ranging between 8.2 mg/l on the 22nd of November 2017 and 1.0 mg/l on the 10th of October 2017.
- The NH₃ baseline concentration 0.065 mg/l is just on the EQS for NH₃ this is due to the mean NH₃ concentration of 0.086 mg/l obtained in 2017. The current trend is downwards but this parameter still might be causing an issue (Table 8, Figure 13).
- The PO₄ baseline concentration (0.053 mg/l) is above the EQS of 0.035 mg/l this appears to be due to the PO₄ concentrations obtained during 2017. The average 2018 PO₄ concentration (0.029 mg/l, n = 5) is below the EQS, however, the current trend for PO₄ is going upwards (Table 8, Figure 14).

Table 8 The associated aggregation table for ammonia (as N mg/l) and Ortho-Phosphate (as P mg/l) trend for monitoring St. 670 (2013 – 2018).

		2013	2014	2015	2016	2017	2018
NH₃	n	8	9	7	6	6	5
	mg P L⁻¹	0.061	0.062	0.059	0.051	0.086	0.056
PO₄	n	8	9	7	6	6	5
	mg P L⁻¹	0.020	0.052	0.030	0.049	0.082	0.029

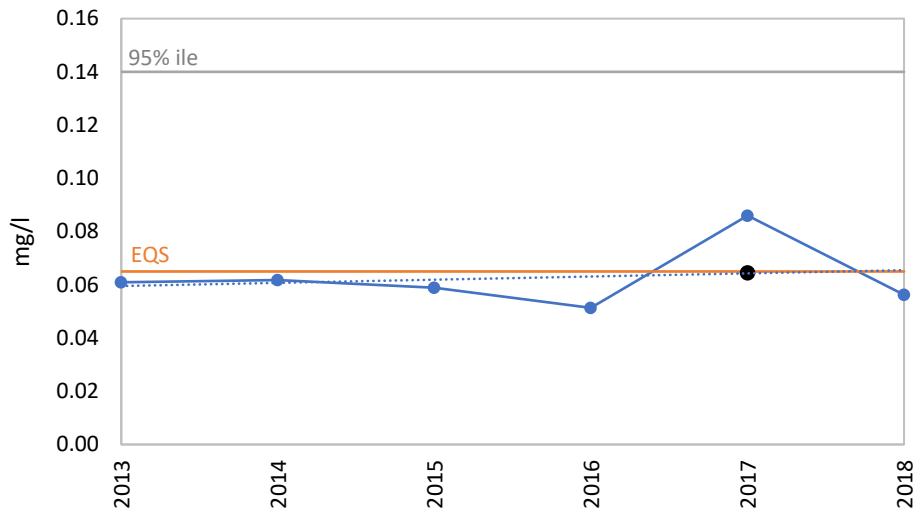


Figure 13 Ammonia (as N mg/l) trend chart for monitoring St. 670 (2013 – 2018).

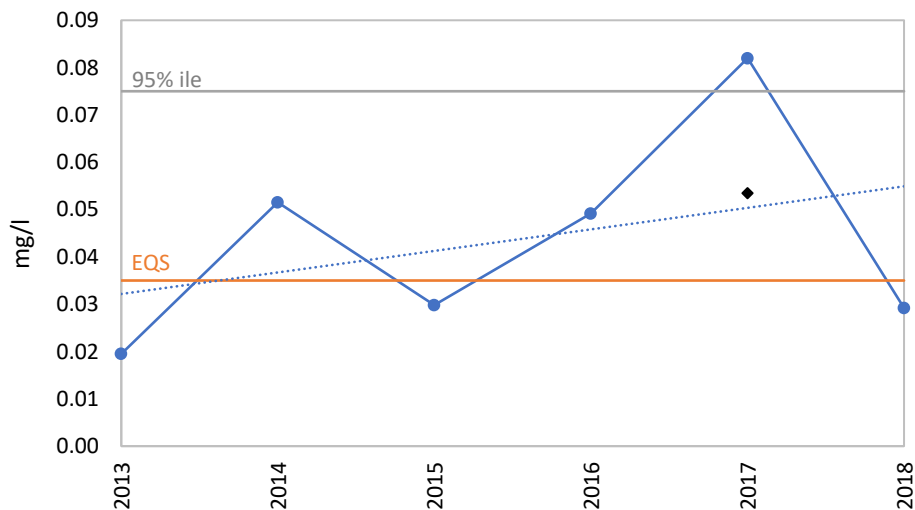


Figure 14 Ortho-Phosphate (as P mg/l) trend chart for monitoring St. 670 (2013 – 2018).

2.4.2 Monitoring Station - aSW1(P)d d/s ICW (St. 680)

The monitoring St. 680 is a surface water monitoring point downstream from the ICW located on the main river channel near Glaslough Village, within the Mountain Water_060 waterbody (Figure 2).

Data summary:

- There is no biological data available for the monitoring station.
- BOD concentration in 2017 and 2018 consistently fluctuated above the EQS of 1.5mg/l, ranging between 8.8 mg/l on the 22nd of November 2017 and 1.2 mg/l on the 10th of October 2017.

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- Ammonia and PO₄ are currently trending upwards with both the baseline concentration for NH₃ (0.109 mg/l) and PO₄ (0.072 mg/l) above their EQS.
- The 2018 average concentration for NH₃ (0.074 mg/l, n = 6) and PO₄ (0.039 mg/l, n = 6) are also above the EQS limit (Table 9, Figure 15 and Figure 16).
- The current trend for TON is trending upwards, however, the baseline concentration (1.27 mg/l) is below the EQS of 1.8 mg/l (Figure 17).

Table 9 The associated aggregation table for the Ammonia-Total (as N mg/l) and Ortho-Phosphate (as P mg/l) trend for monitoring St. 680 (2013 – 2018).

		2013	2014	2015	2016	2017	2018
NH ₃	n	9	9	6	6	6	5
	mg N L ⁻¹	0.061	0.055	0.062	0.059	0.194	0.074
PO ₄	n	9	9	6	6	6	5
	mg N L ⁻¹	0.036	0.051	0.033	0.057	0.119	0.039
TN	n	9	9	6	6	6	5
	mg N L ⁻¹	1.283	1.500	0.700	1.150	1.000	1.660

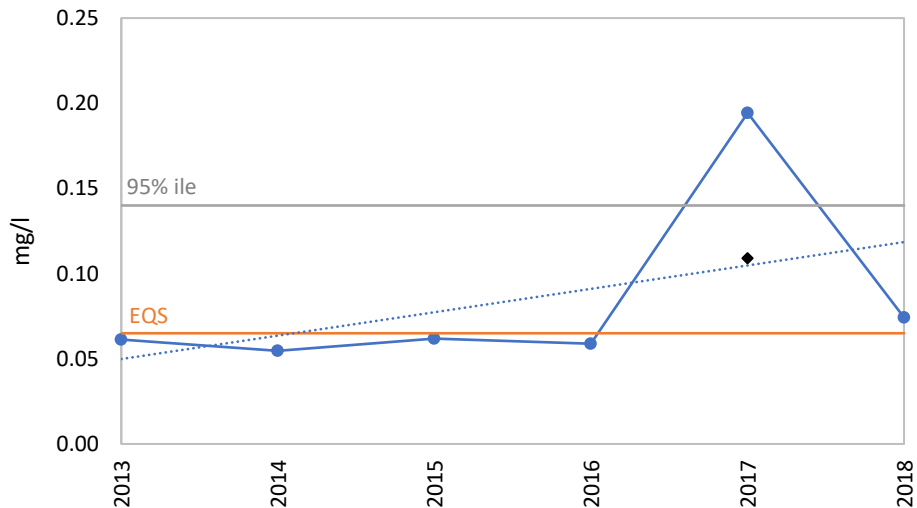


Figure 15 Ammonia-Total (as N mg/l) trend chart for the monitoring St. 680 (2013 – 2018).

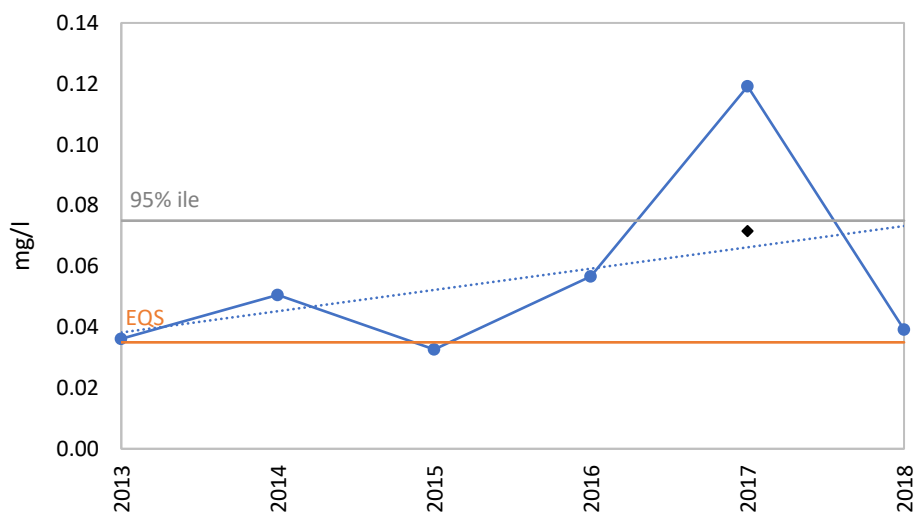


Figure 16 Ortho-Phosphate (as P mg/l) trend chart for the monitoring St. 680 (2013 – 2018).

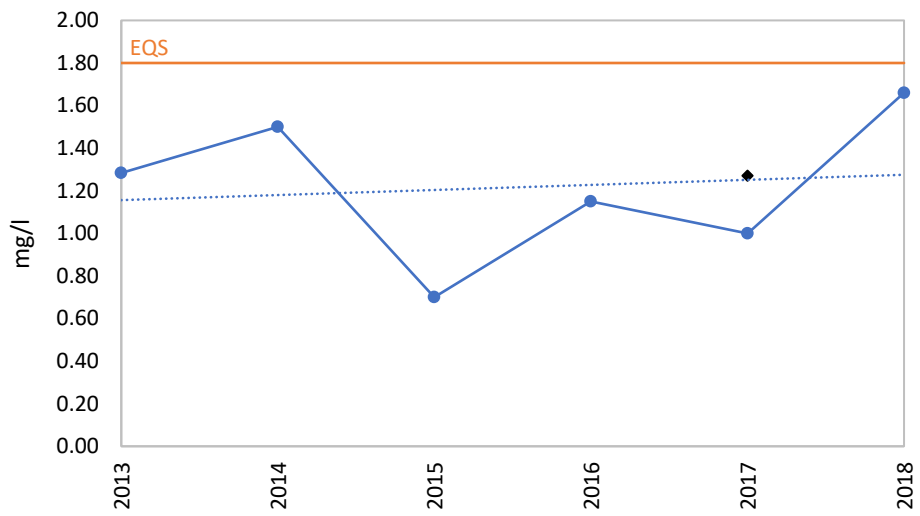


Figure 17 Total Nitrogen (as N mg/l) trend chart for the monitoring St. 680 (2013 – 2018).

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Table 10 Summary of chemistry data at each river monitoring station within the Mountain Water waterbodies.

NH₃

Monitoring Station		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
St 400	1st Br. u/s Emyvale	0.034	0.033	0.048	0.054	0.013	0.017	0.022	0.014	0.023	0.016	0.019	0.029
St 450	Br. in Emyvale							0.051	0.03	0.046	0.030	0.055	0.038
St 500	Br. 1.1km d/s Emyvale	0.168	0.195	0.143	0.083	0.011	0.047	0.042	0.055	0.051	0.059	0.100	0.055
St 650	Br. N of Glaslough							0.065	0.039	0.031	0.042	0.048	
St 670	SW1(P) Primary discharge point ICW							0.061	0.062	0.059	0.051	0.086	0.056
St 680	aSW1(P)d d/s ICW monitor							0.061	0.055	0.062	0.059	0.194	0.074

PO₄

Monitoring Station		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
St 400	1st Br. u/s Emyvale	0.023	0.027	0.035	0.025	0.034	0.019	0.025	0.03	0.036	0.040	0.030	0.033
St 450	Br. in Emyvale							0.02	0.021	0.042	0.026	0.035	0.022
St 500	Br. 1.1km d/s Emyvale	0.052	0.05	0.077	0.045	0.034	0.021	0.021	0.026	0.037	0.034	0.037	0.041
St 650	Br. N of Glaslough							0.038	0.031	0.042	0.057	0.051	
St 670	SW1(P) Primary discharge point ICW							0.02	0.052	0.03	0.049	0.082	0.029
St 680	aSW1(P)d d/s ICW monitor							0.036	0.051	0.033	0.057	0.119	0.039

TON

Monitoring Station		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
St 400	1st Br. u/s Emyvale	0.687	0.623	0.623	0.693	0.358	0.505	0.393	0.575	0.43	0.564	0.490	0.664
St 450	Br. in Emyvale												
St 500	Br. 1.1km d/s Emyvale	0.839	0.825	1	0.767	0.317	0.665	0.543	0.835	0.578	0.712	0.936	0.802
St 650	Br. N of Glaslough							1.24	0.803	0.973	0.680	0.742	
St 670	SW1(P) Primary discharge point ICW							5.125	1.644	0.843	0.833	1.283	1.700
St 680	aSW1(P)d d/s ICW monitor							1.283	1.500	0.700	1.150	1.000	1.660

2.5 Emy Lough

2.5.1 Mid-lake monitoring point (St. 010)

The monitoring St. 010 is a mid-lake monitoring point within Emy Lough.

Data summary:

- The TP baseline concentration (0.015 mg/l) is below the IQS of 0.025 mg/l for TP.
- The 2018 average TP concentration (0.011 mg/l, n = 4) is also below the EQS.
- The current TP trend is going upwards (Table 11, Figure 18).

Table 11 The associated aggregation table for Total Phosphorus (mg/l) trend for the Midlake monitoring St. 010 (2007 – 2018).

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TP												
n	1	3	4	4	0	0	4	4	4	3	4	4
mg P L⁻¹	0.010	0.017	0.010	0.013			0.007	0.005	0.005	0.018	0.017	0.011

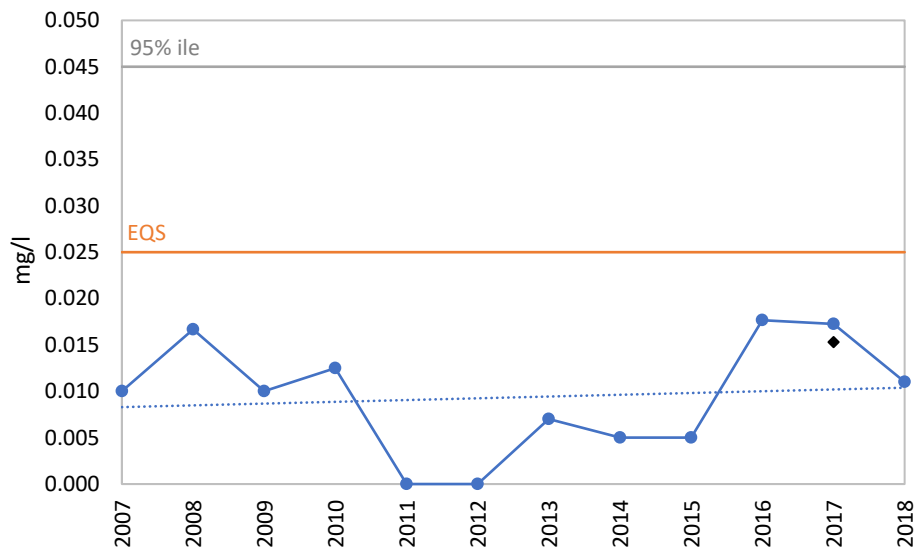


Figure 18 Total Phosphorus (mg/l) trend chart for the Midlake monitoring station St 010 (2007 – 2018).

3 Significant Pressures

Any further additional information identified on the significant pressures outlined in Table 1 is detailed in Table 12.

Table 12 Summary of waterbodies and pressure information on each waterbody within the Mountain Water and Emy Lough PAA.

WB Name	Pressure Category	Pressure Subcat.	Impact	Sig. Pressure	Within AA	IA
Mountain Water_030	Not Assigned	Not Assigned			Y	<p>IA1 RWB Pressure: This waterbody has returned to Good status in 2013-15 but the orthophosphate concentrations, while currently supporting Good status, would appear to be increasing. Review the ongoing chemistry samples as they are recorded and take further investigative action as necessary.</p> <p>IA1 RWB Pressure: Internal liaison with the Office of Environmental Enforcement on the significance of the industrial discharge on this water body and downstream on the Mountain Water_040.</p>
Grove	Agriculture	Pasture		No	Y	<p>IA3 LWB Pressure: Agriculture in the area. No water quality data available. Need to undertake small stream risk scores of the feeder stream entering the lake and water quality samples to be taken, as well as water quality samples from the lake. Lake appears turbid from aerial photography. Consideration also of the impacts of the abstraction regime.</p>
	Anthropogenic Pressures	Unknown				
Mountain Water_040	Hydromorphology	Channelisation, Dams, Barriers, Locks and Weirs	Altered habitat due to Hydrological and Morphological changes	Yes	Y	<p>IA5 RWB Pressure: Urban wastewater discharges, suspected misconnections in the Emyvale town/village, as ammonia is elevating somewhere around the town. Investigative assessment to focus around the Emyvale town/village where stream passes through.</p> <p>IA5 RWB Pressure: Internal liaison on biological conditions in order to look at site condition (weir present, arterial drainage and flow diversion to Emy Lough) and to assess how much these factors are impacting the water body.</p> <p>IA6 RWB Pressure: Key sources of diffuse urban pressure to be investigated.</p>
	Agriculture	Pasture, Agriculture	Nutrient Pollution			
	DWW	Waste Water Discharge	Nutrient and Organic Pollution			
	UWW	Agglomeration PE of 1001 to 2000	Nutrient and Organic Pollution			
Emy Lough	Urban Run-off	Diffuse Source Run-off	Nutrient and Organic Pollution	Yes	Y	<p>IA5 LWB Pressure: Emyvale village discharge at bridge was noted to be contaminated, with septic tank issues in an unsewered area near the village. Investigative assessment to focus on Emyvale village and septic tank areas. Maintain a watching brief on pesticides.</p> <p>IA1 LWB Pressure: Internal liaison to check biological information on the impact of abstraction on the lake.</p>
	DWW	Waste Water Discharge	Nutrient Pollution			

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						IA6 LWB Pressure: Diffuse Urban pressure to be investigated and identify the main sources.
Mountain Water_050	Agriculture	Agriculture	Nutrient Pollution	Yes	Y	IA1 RWB Pressure: Measure - Compliance Checks: carry out follow up farm visits and problem areas identified previously from surveys.
	Hydromorphology	Channelisation	Altered habitat due to Hydrological and Morphological changes			
Glaslough	Urban Run-off	Diffuse Source Run-off		Yes	Y	IA3 LWB Pressure: Noted to be eutrophic. No water quality data available therefore small stream risk scores of the stream feeding the lake and take water quality samples need to be taken. If water quality issues are identified investigate diffuse urban runoff from Glaslough. IA6 LWB Pressure: Diffuse Urban pressure to be investigated.
	Anthropogenic Pressures	Unknown				
Mountain Water_060	Agriculture	Pasture		No	Y	IA3 RWB Pressure: Assess the water quality at the downstream end of this water body initially using chemistry and small stream risk scores. Areas of high pollution impact potential from phosphate and the upstream stream water quality suggests problems are likely. Take additional investigative action as necessary if water quality results indicate issues.
	UWW	Agglomeration PE of 1001 to 2000				
	Hydromorphology	Channelisation				
	Anthropogenic Pressures	Unknown				

3.1 WWTP within the Mountain Water and Emy Lough PAA

Two urban WWTP facilities have been identified within the PAA. Emyvale WWTP has been identified as a significant pressure in the Mountain Water_040 and Glaslough ICW has been identified as a pressure for the Mountain Water_060. The location of the treatment facilities is outlined in Figure 19. Further information regarding the individual facilities are outlined in Section 3.1.1 and 3.1.2.

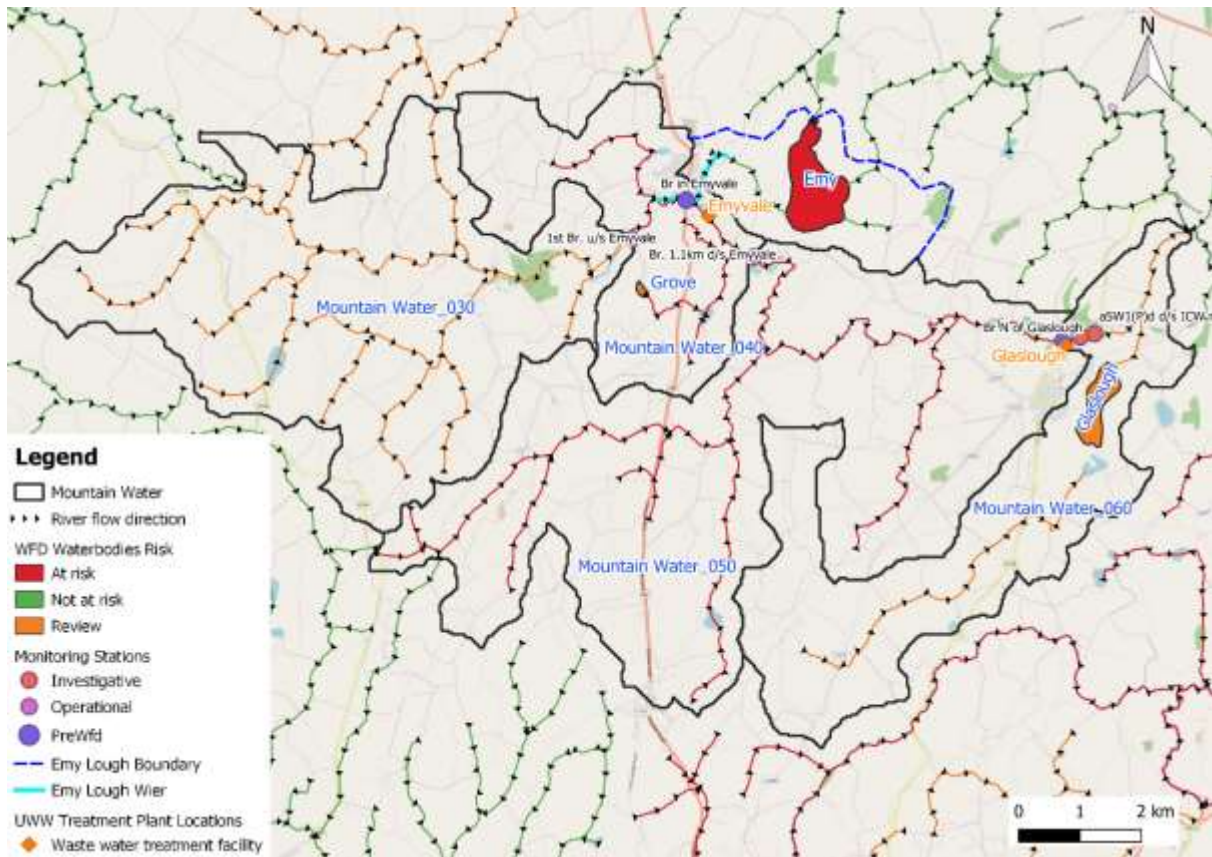


Figure 19 WWT Facility Locations in the Mountain Water and Emy Lough PAA.

3.1.1 Emyvale WWTP

The agglomeration is served by a wastewater treatment plant with a plant capacity PE 2150. The treatment process includes the following:

- Preliminary Treatment (Screening).
- Primary Treatment (Primary settlement tank).
- Secondary Treatment (RBC and Percolating Filters).
- Nutrient Removal (Ferric Dosing).

Summary for the 2017 AER for the Emyvale WWTP:

- 644,000kgs total weight liquid sludge was removed from the WWTP in 2017, which was transferred to Monaghan WWTP.
- The following improvements were undertaken and completed in 2017:
 - Replacement of fridge and temperature sensor on both the influent and effluent composite samplers.
 - Relocate ferric dosing point to after the RBC.
- In 2017 there were seven samples found to be non-compliant with the Emission Limit Values (ELV) for both NH₃ and pH.
- On two occasions samples collected upstream from the WWTP in Emyvale were above the EQS of 0.060 mg/l NH₃ (Table 13).
- Samples for NH₃ downstream (St. 500) from the WWTP are generally higher in concentration compared to the upstream (St. 450) samples collected on the same day.
- Three of the downstream samples for NH₃ were recorded above the EQS in 2017 (Table 13, Figure 20).

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- While pH was found to be non-compliant with the ELV, this was not reflected at the downstream sampling point from the WWTP.

Table 13 Annual Environmental Report 2017 for the upstream (St. 450) and downstream (St. 500) monitoring point at the Emyvale WWTP (Licence No. D0346-01).



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)	Temp °C
14/02/2017	0.02	0.02	2.40			12.30	8.10	6.00
19/04/2017	0.01	0.01	2.80			10.76	8.10	11.70
13/06/2017	0.09	0.04	1.70			8.90	8.00	16.50
09/08/2017	0.00	0.04	1.20			11.51	8.10	18.00
10/10/2017	0.20	0.09	0.50			9.67	7.90	12.60
21/11/2017	0.01	0.02	1.80			8.82	7.80	6.92
Mean	0.06	0.03	1.73			10.33	8.00	11.95
95%ile	0.17	0.08	2.70			12.10	8.10	17.63

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)	Temp °C
14/02/2017	0.05	0.02	2.30			12.10	8.00	6.20
19/04/2017	0.03	0.01	3.10			10.54	8.00	11.70
13/06/2017	0.10	0.05	2.30			9.55	8.00	15.40
09/08/2017	0.24	0.08	1.70			11.13	8.00	18.50
10/10/2017	0.12	0.06	1.00			9.48	7.80	12.00
21/11/2017	0.02	0.02	2.00			8.90	7.70	7.10
Mean	0.09	0.04	2.07			10.28	7.92	11.82
95%ile	0.21	0.08	2.90			11.86	8.00	17.73

3.1.2 Glaslough ICW

The agglomeration is served by a wastewater treatment plant with a plant capacity PE 1850. The treatment process includes the following:

- Preliminary Treatment (Sludge Settlement Pond).
- Secondary Treatment (Wetland Treatment System).
- Nutrient Removal (Wetland Treatment System).

Summary for the 2017 AER for the Glaslough ICW:

- Okgs total weight liquid sludge was removed from the WWTP in 2017, sludge was transferred to Sludge settlement ponds onsite.
- The following improvements were undertaken and completed in 2017:
 - Replacement of fridge and temperature sensor on both the influent and effluent composite samplers.
 - Interpond sample programme (to include provision of composite samplers and flow measurements between ponds). Results of this sample program will be used to determine further actions required.
- In 2017 there were nine samples found to be non-compliant with the Emission Limit Values (ELV) for both NH₃ (3 samples above max ELV) and PO₄ (6 samples above max ELV).
- The three NH₃ non-compliance was put down to vegetation decay and die back in the wetland system.

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- On three occasions NH₃ samples collected upstream (St. 670) from the ICW in Glaslough were above the EQS of 0.060 mg/l NH₃, while PO₄ samples collected upstream were above the EQS of 0.035 mg/l on four of the sampling dates (Table 14).
- Samples for both NH₃ and PO₄ collected downstream (St. 680) from the ICW are higher in concentration compared to the upstream samples collected on the same day.
- All samples collected downstream are generally higher than the EQS for both NH₃ and PO₄, except for NH₃ on two sampling dates (19/04/17 and 22/08/17) (Table 14, Figure 20, Figure 21).
- On the 10/10/17 there was a very high concentration for both NH₃ and PO₄ recorded at the monitoring site downstream from the ICW (Table 14, Figure 20, Figure 21).

Table 14 Annual Environmental Report 2017 for the upstream (St. 670) and downstream (St. 680) monitoring point at the Glaslough ICW (Licence No. D0347-01).



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)	Temp °C
14/02/2017	0.03	0.03	2.00	0.50		12.30	8.30	7.30
19/04/2017	0.02	0.02	2.40	3.20		11.06	8.20	9.90
20/06/2017	0.08	0.06	1.80	1.70		9.56	8.40	13.90
22/08/2017	0.03	0.07	1.50	0.50		9.61	8.20	15.20
10/10/2017	0.18	0.10	1.00	1.30		9.04	8.10	12.10
22/11/2017	0.17	0.21	8.20	0.50		10.45	7.60	8.00
Mean	0.09	0.08	2.82	1.28		10.34	8.13	11.07
95%ile	0.18	0.18	6.75	2.83		11.99	8.38	14.88

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)	Temp °C
14/02/2017	0.07	0.04	2.80	0.50		12.01	8.20	7.30
19/04/2017	0.02	0.04	2.50	1.20		11.14	8.20	10.01
20/06/2017	0.09	0.11	1.80	1.70		9.29	8.20	15.00
22/08/2017	0.03	0.08	2.10	0.50		9.84	8.20	15.40
10/10/2017	0.78	0.24	1.20	1.60		9.74	8.10	11.80
22/11/2017	0.18	0.21	8.80	0.50		10.51	7.60	8.70
Mean	0.19	0.12	3.20	1.00		10.42	8.08	11.37
95%ile	0.63	0.23	7.30	1.68		11.79	8.20	15.30

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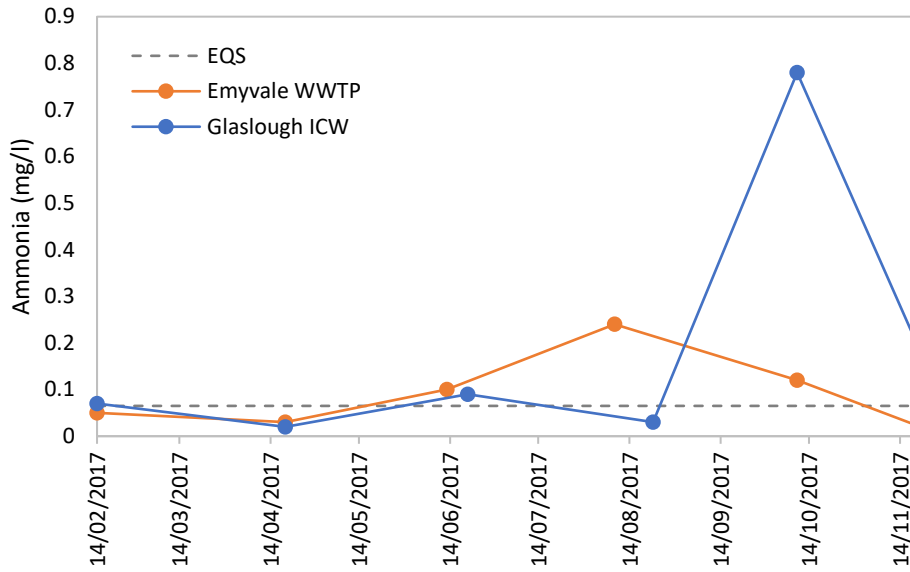


Figure 20 Ammonia concentrations at the downstream monitoring points for Emyvale WWTP (St. 500) and Glaslough ICW (St. 680).

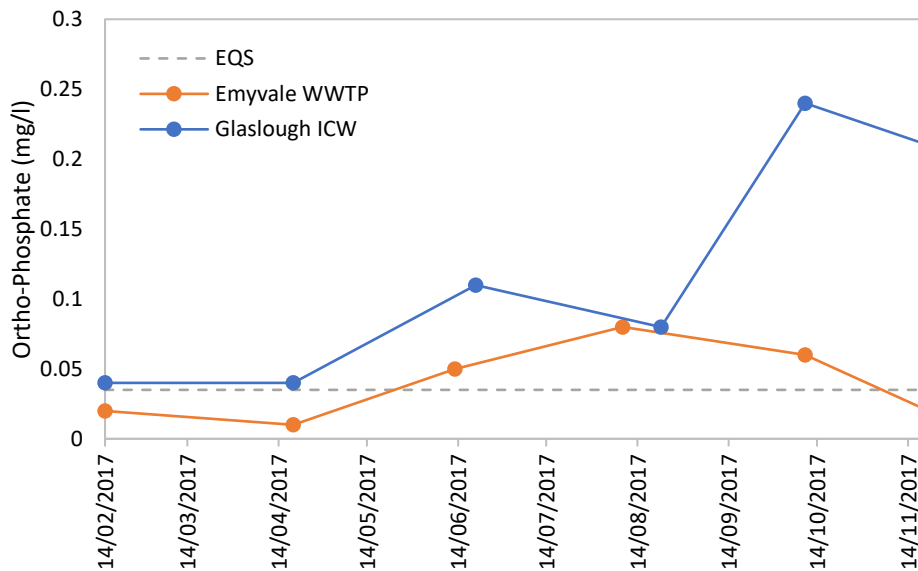


Figure 21 Ortho-Phosphate concentrations at the downstream monitoring points for Emyvale WWTP (St. 500) and Glaslough ICW (St. 680).

3.2 IPC licenced Facilities

- There are thirteen IPC licenced facilities in the Mountain Water and Emy Lough PAA.
- Of the thirteen IPC licenced facilities, six IPC licenced facilities located on the Mountain Water_030, Mountain Water_040 and Emy Lough may be potential pressures due to their proximity to the watercourse.

3.3 Pollution Impact Potential Maps

Agriculture has been identified as a significant pressure for Grove Lake, Mountain Water_040, Mountain Water_050 and the Mountain Water_060.

- The PO₄ surface water receptor PIP maps indicate that the Mountain Water_040, the majority of the Mountain Water_050 and the area surrounding Emy Lough have high surface PO₄ impact potential, with a PIP ranking generally 3 or above (Figure 22).
- The NO₃ surface water receptor PIP maps are showing that the Mountain Water_060, a small south easterly section of the Mountain Water_050 and a small area south west of Emy Lough have high surface NO₃ impact potential, with a PIP ranking above 3 (Figure 23).
- The NO₃ groundwater receptor PIP maps are showing similar trend as seen with the surface water receptor NO₃ PIP maps, with a number of small areas ranking above 3 (Figure 24).

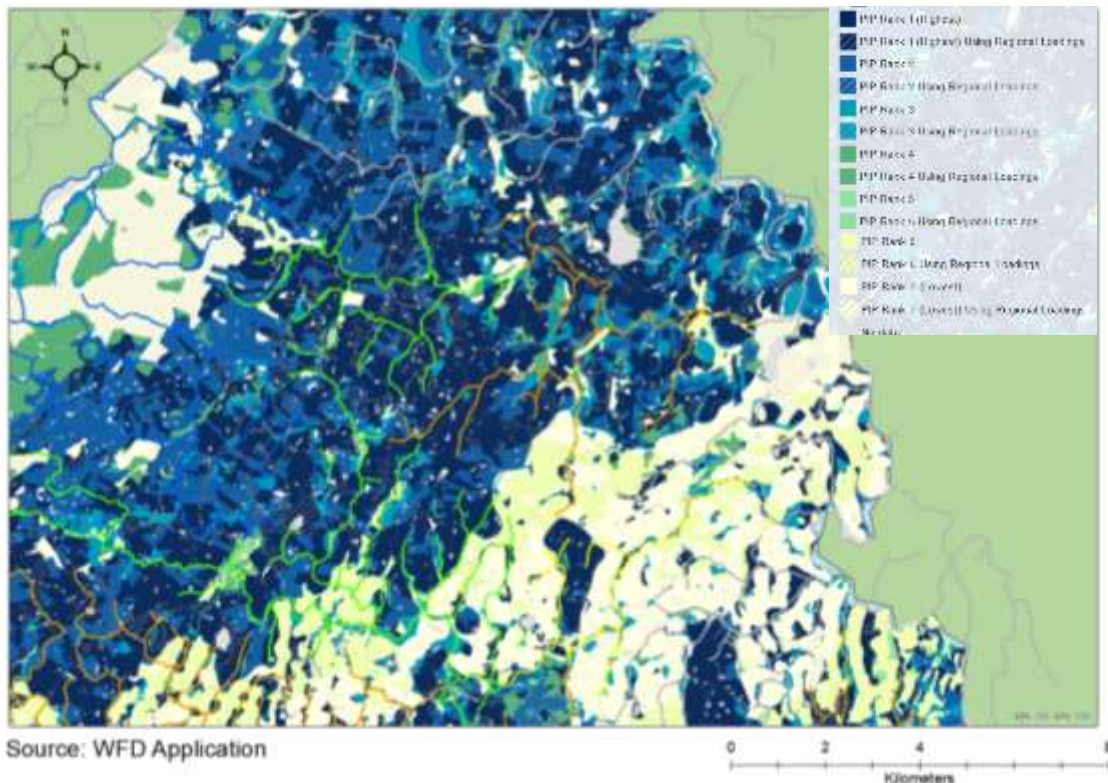


Figure 22 Surface water receptor PO₄ PIP maps for the Mountain Water and Emy Lough waterbodies.

AFA0134_Mountain Water and Emy Lough PAA

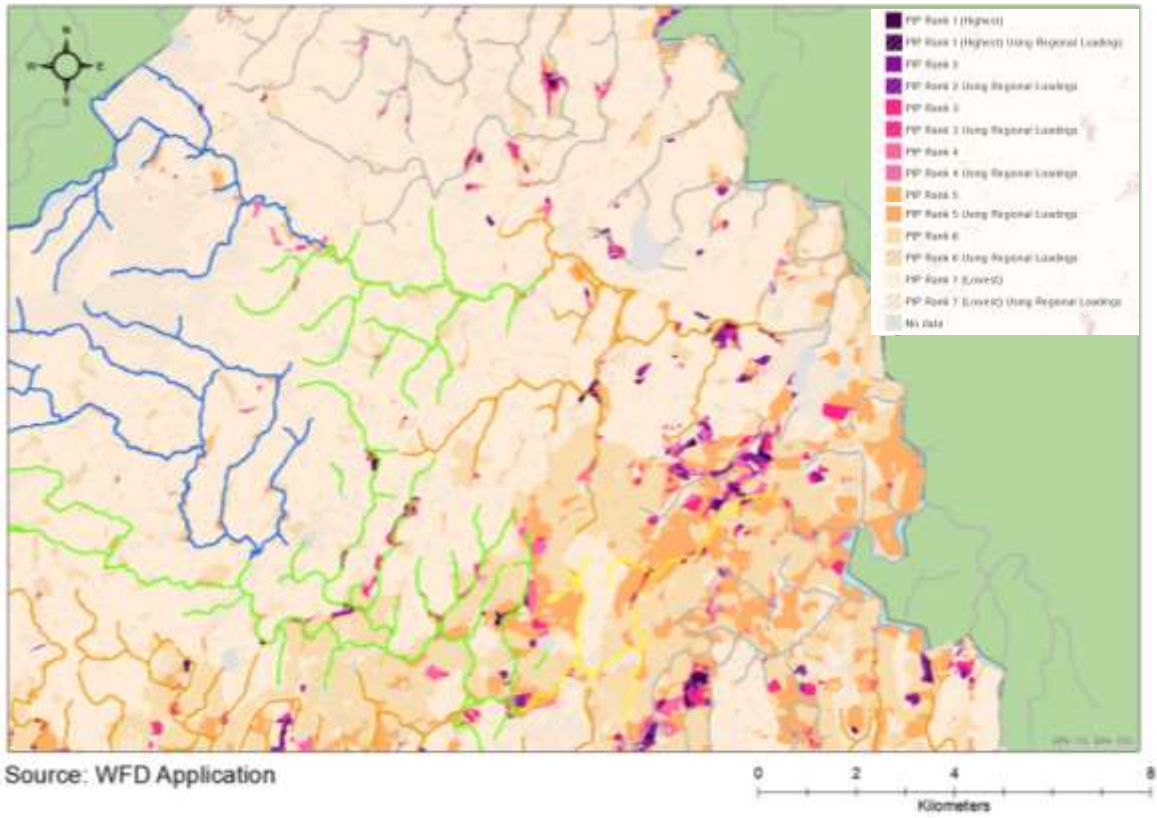


Figure 23 Surface water receptor NO₃ PIP for the Mountain Water and Emy Lough waterbodies.

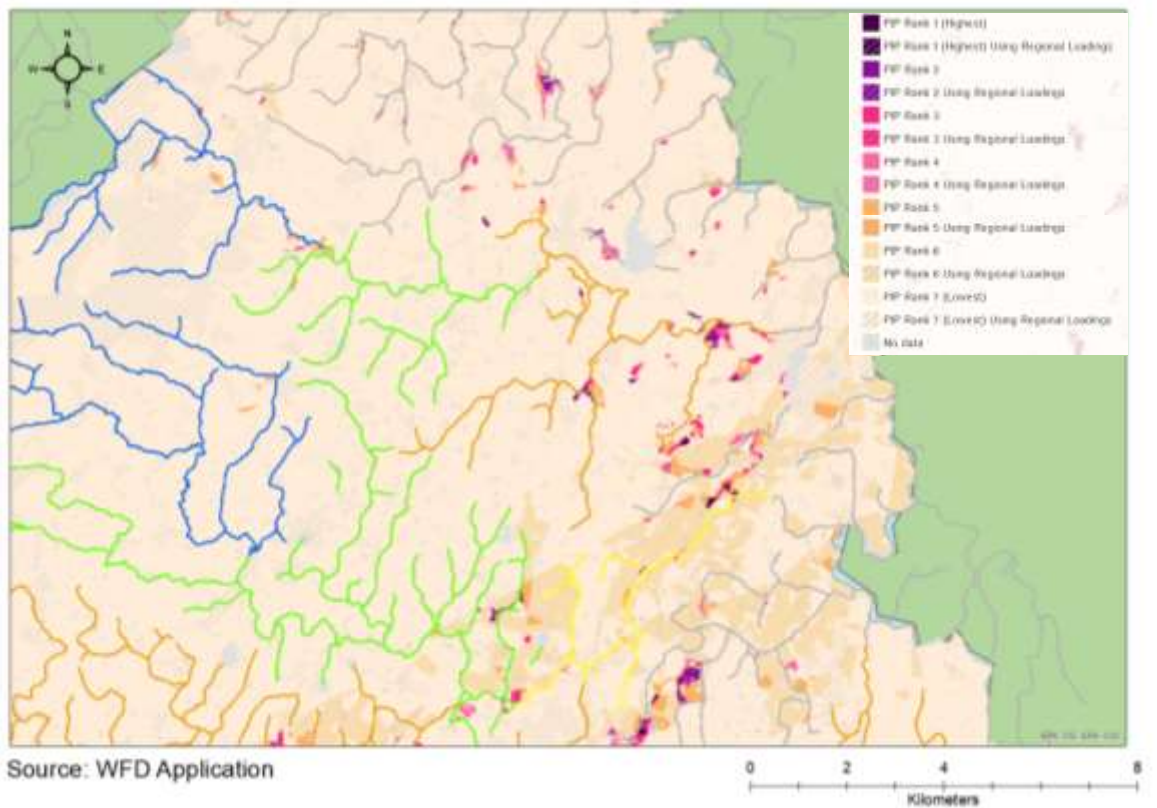


Figure 24 The groundwater receptor NO₃ PIP for the Mountain Water and Emy Lough waterbodies.

3.4 Hydromorphology – Weir in Emyvale Village

A weir located in Emyvale Village has been identified as a significant pressure. The weir is located in the Mountain Water_040, with a purpose of diverting water from the main Mountain Water channel to supply Emy Lough, which is used as a potable water supply for the Glaslough/Tyholland GWS. The weir is believed to divert a high proportion (aprox. 80%) of the average flow of the main Mountain Water channel into the lade which feeds Emy Lough. The outflow of Emy Lough discharges through a separate channel, to enter the Blackwater River at Friganny.

The rate of abstraction and subsequent low flow conditions in the Mountain Water channel amplify the impact of this barrier. The weir has been identified as a formidable structure, which impedes the upstream migration of fish and the downstream movement of juvenile fish within the Mountain Water. In addition, it is believed that the weir could have additional impacts on the movement of juvenile and adult fish to and from Emy Lough.

The location and flow direction of the weir has not been clearly outlined. Aerial imagery has provided the potential direction and pathway of the weir which is outlined in Figure 25. This will need further confirmation once the local catchment assessments commence within the Mountain Water and Emy Lough PAA.

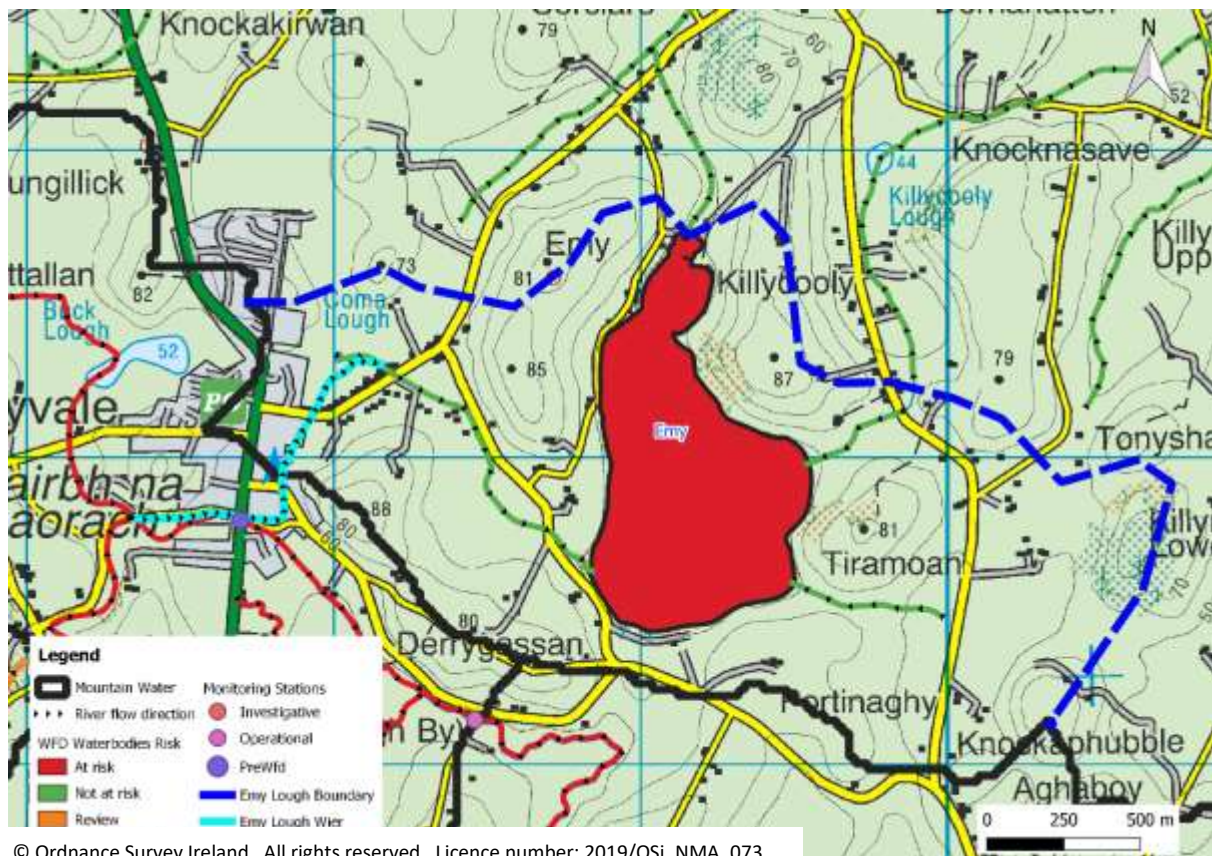


Figure 25 Location and flow direction of the Weir in Emyvale Village, including Emy Loughs watershed additional boundary line.

3.5 Hydromorphology – OPW Channel Maintenance

The Mountain Water PAA is part of the OPW channel maintenance programme, the areas of which are outlined in Figure 26. Channel maintenance carried out by the OPW within the Mountain Water PAA has been scheduled for the Mountain Water_040, Mountain Water_050 and Mountain Water_060 for 2019 (Figure 27).

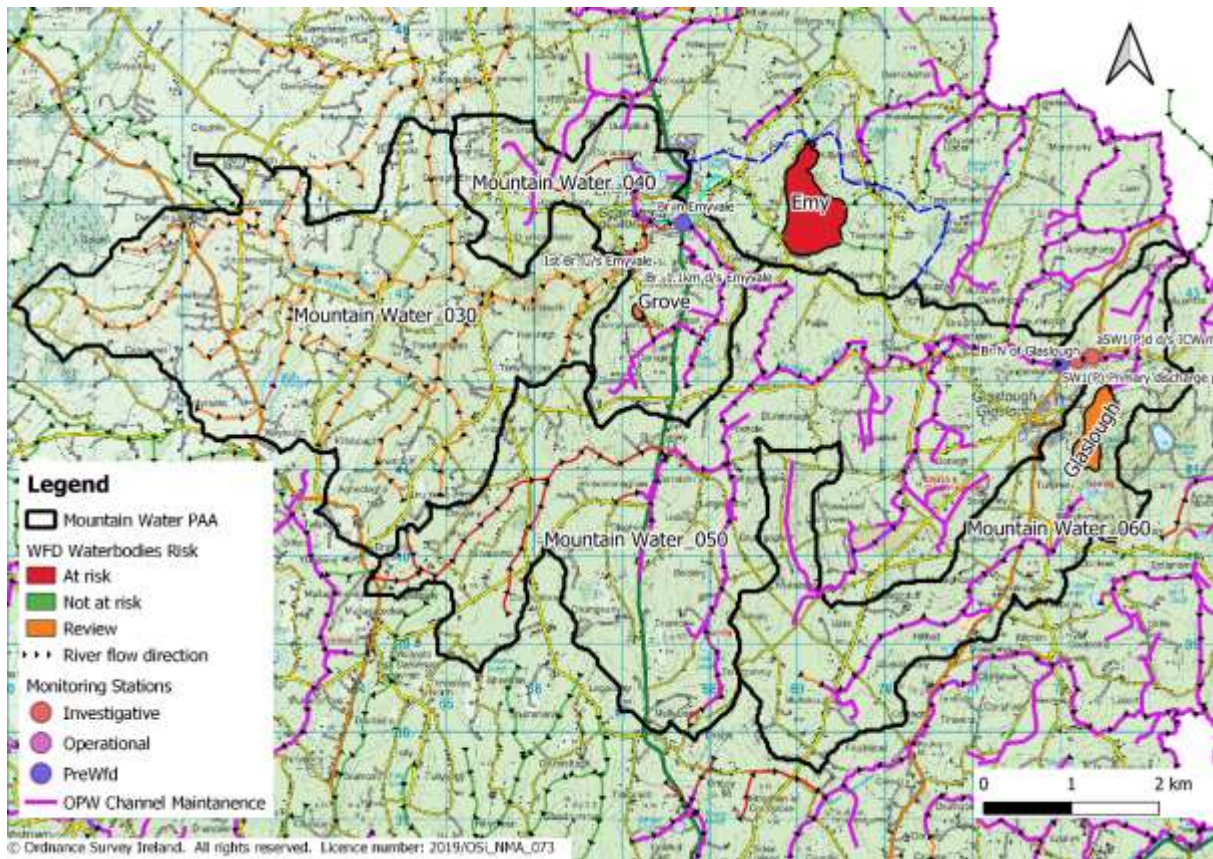


Figure 26 OPW channel maintenance locations within the Mountain Water and Emy Lough sub-catchment.

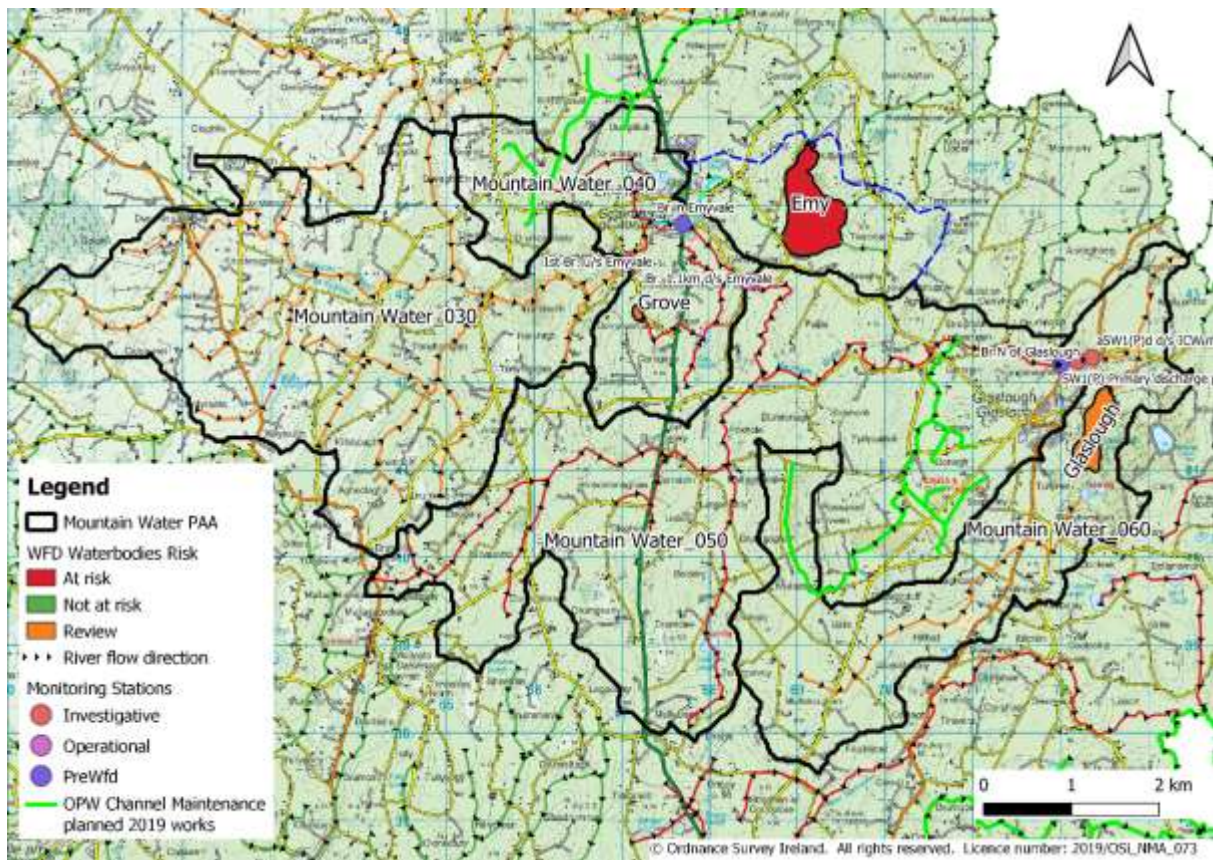


Figure 27 OPW channel maintenance programme planned for 2019 within the Mountain Water and Emy Lough sub-catchment.

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 28). 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).
3. High transmissivity: Regionally Important Karstified Bedrock Aquifer (Rk) and Locally Important Karstified Bedrock Aquifer (Lk).

Using the well/poorly drained soils map the three compartments were sub-divided into 7 sub-compartments (Figure 29, Table 15).

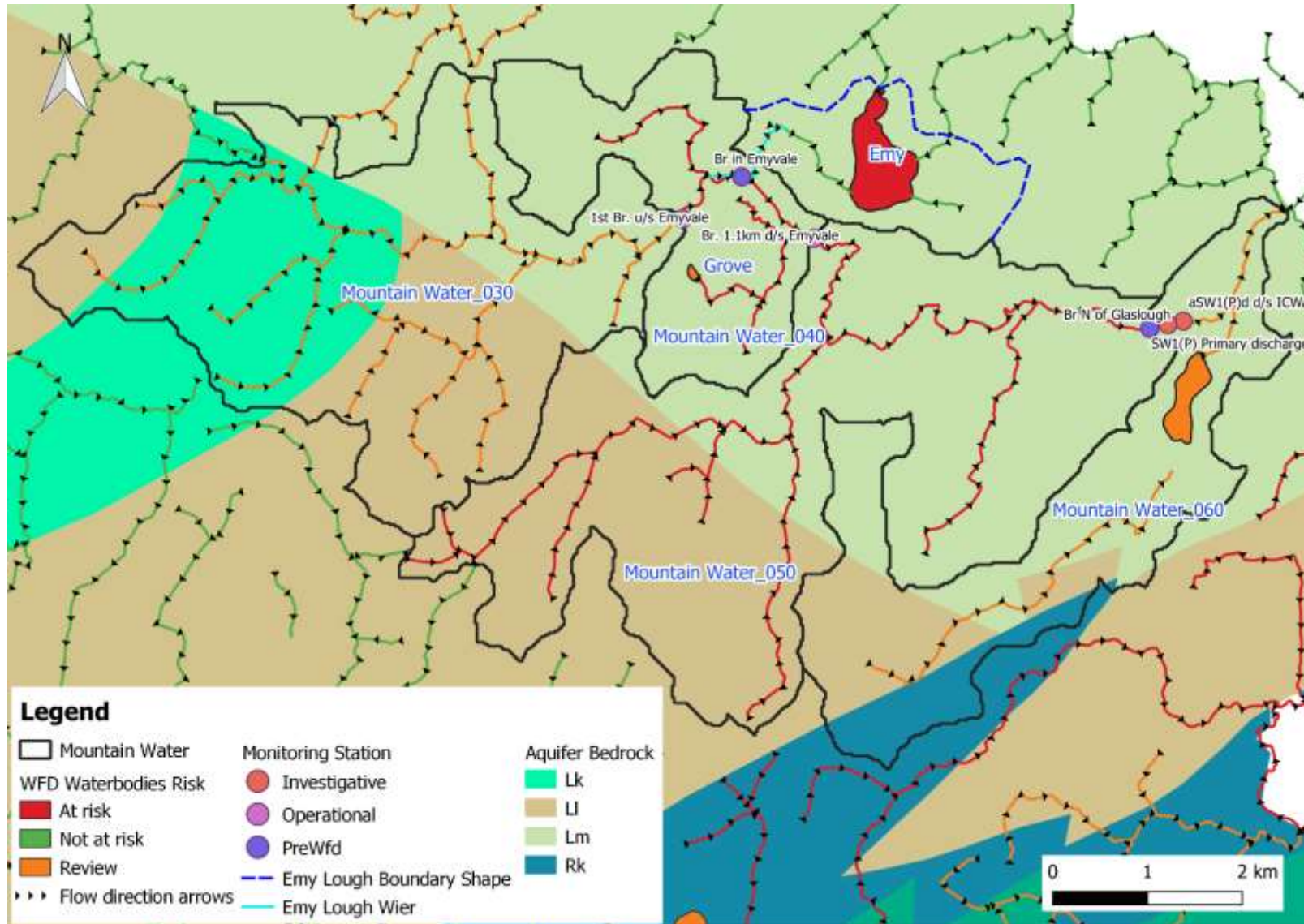


Figure 28 The aquifer bedrock for the Mountain Water and Emy Lough sub-catchment.

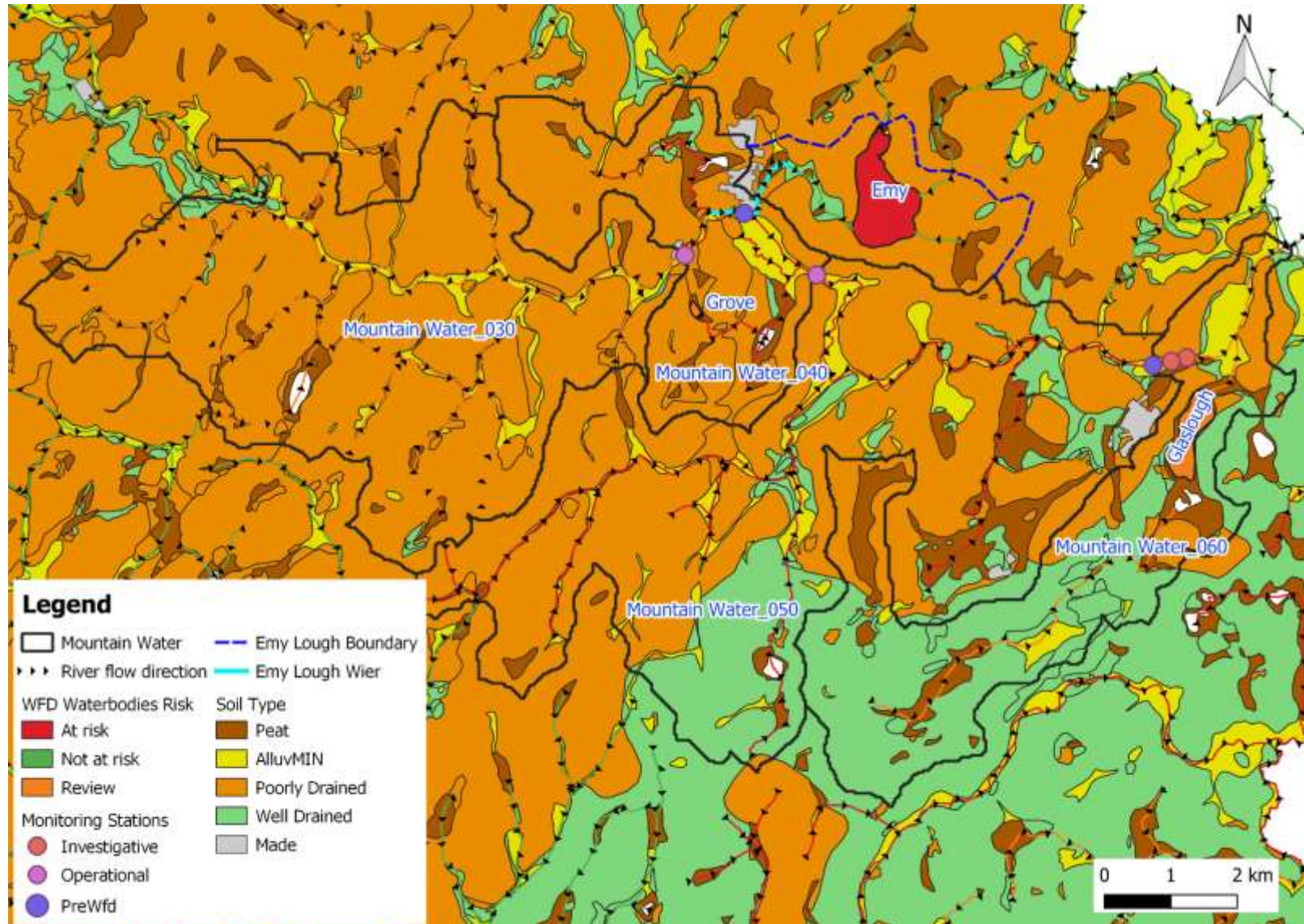


Figure 29 The well/poorly drained soils for the Mountain Water and Emy Lough sub-catchment.

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Table 15 Conceptual model information for the pathways

	Compartment 1			Compartment 2		Compartment 3	
Direct ¹	Emyvale WWTP			Glaslough ICW			
Aquifer (Fig. 28)	Lm			LI		Rk, Lk	
Rock Units	Mainly Dinantian Mixed Sandstones, Shales and Limestones, with a small area of Dinantian Sandstones			Dinantian Shales and Limestones		Dinantian Pure Bedded Limestones	
	Sub-Compartment. 1A	Sub-Compartment. 1B	Sub-Compartment. 1C	Sub-Compartment. 2A	Sub-Compartment. 2B	Sub-Compartment. 3A	Sub-Compartment. 3B
Soil type (Fig. 29)	Poorly drained	Well drained	Peat	Poorly drained	Well drained	Poorly drained	Well drained
Subsoil	Sandstone sands and gravels	Sandstone sands and gravels	Sandstone sands and gravels	Sandstone and shale till and Sandstone sands and gravels	Sandstone sands and gravels	Sandstone and shale till	Sandstone sands and gravels
Subsoil K	Low, with small areas of High	Moderate	Low, Moderate	Low, with small areas of High	Moderate	Low, with small areas of High	Moderate
Groundwater Vulnerability (Fig. 30)	L, M, H	M	M, H	L, M, H, E	M, H, E	L	M, H, E, X
PO ₄ Susceptibility (Fig. 31)	Moderate, Low	Low, Very Low	Moderate, Low	Moderate, Low	Low	Moderate	Low
NO ₃ Susceptibility (Fig. 32)	Predom. Low	Predom. Low with areas of High	Low, Moderate	Low	Moderate	Very Low	High
PO ₄ PIP (Fig. 22)	High, Very High	High, Very High	High, Very High	High, Very High	Low	High, Very High	Low
NO ₃ PIP (Fig 23 & 24)					Surface water: Moderate, High		Surface Water: Areas of High to Very High in the lower Mountain Water_060 Groundwater: Mainly Low Small area of Moderate in Lower Mountain Water_060
Main Flow Paths	Overland	Near surface, Groundwater	Overland	Overland	Near surface, Groundwater	Overland	Near surface, Groundwater

¹ Point discharges to the water body

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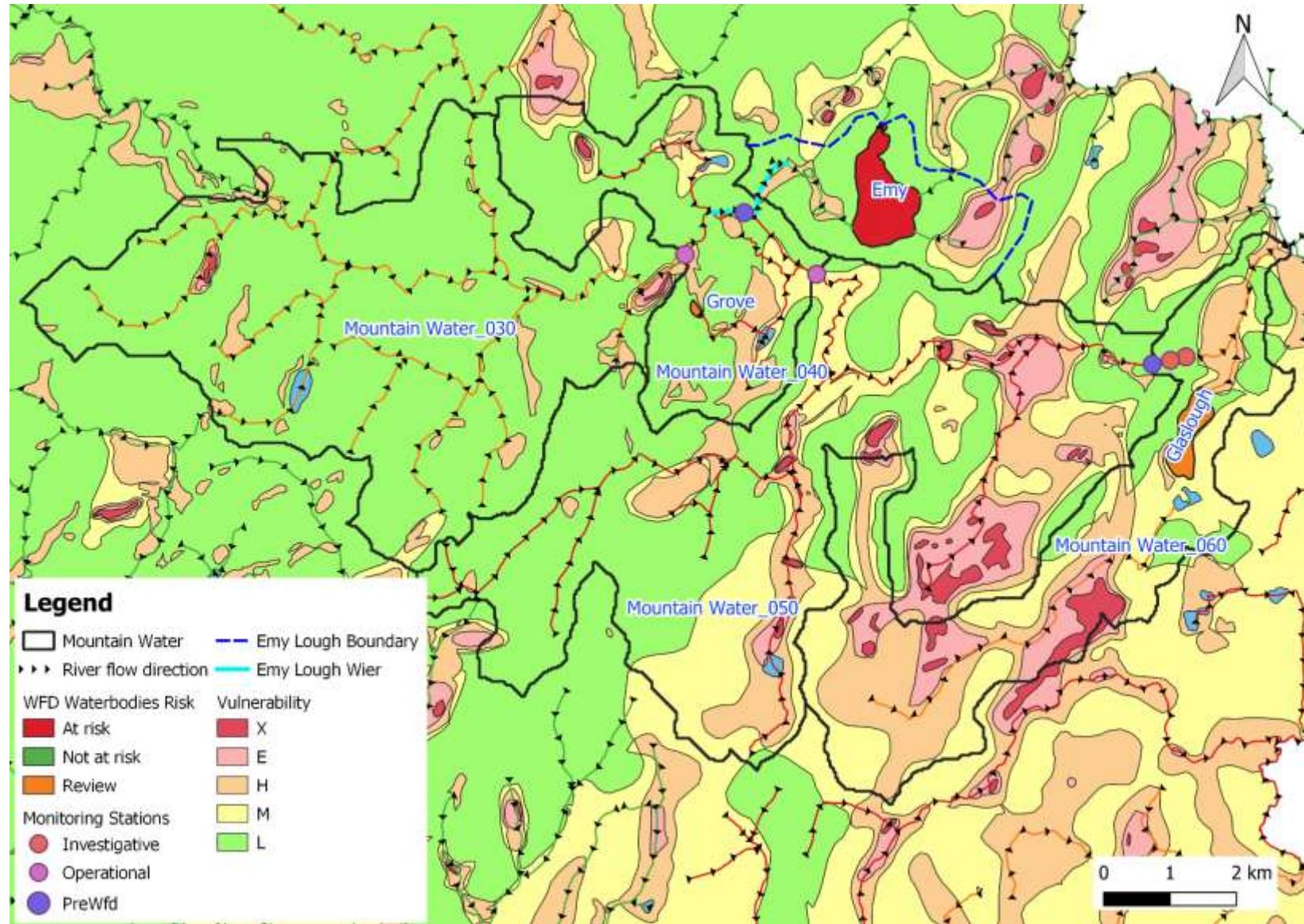


Figure 30 The groundwater vulnerability for the Mountain Water and Emy Lough waterbodies.

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Figure 31 The near surface PO₄ susceptibility map for the Mountain Water and Emy Lough waterbodies.



Figure 32 The sub-surface NO₃ susceptibility map for the Mountain Water and Emy Lough waterbodies.

5 Interim 'Story' of the Priority Area for Action

The desktop study for the Mountain Water and Emy Lough sub-catchment has identified several significant pressures (Agriculture, Hydromorphology, DWW, UWW and Urban runoff). Both the Mountain Water_010 and Mountain Water_020 are not included in the PAA, however, the ecological status in both waterbodies is currently at High Ecological Status. It is important to note that in the latest Q-Value monitoring programme (2017) for the Mountain Water River, the biology has remained high for the Mountain Water_010 waterbody, however, in the Mountain Water_020 the Q-Value has dropped from a Q4-5 in 2013 to a Q4 in 2017.

5.1 Mountain Water_030

Risk category: *Review*

Status: This waterbody has come up from moderate status in the 2010-2012 monitoring cycle to Good Status in the 2010 – 2015 monitoring cycle.

Hydrochemistry summary: St. 400 (2018): NH₃ 0.029 mg/l, **PO₄ 0.033 mg/l**, TON 0.664 mg/l

Baseline Concentration: St. 400: NH₃ 0.021 mg/l, PO₄ 0.034 mg/l, TON 0.573 mg/l

Significant issue: PO₄

Significant pressure: None identified

Relevant pathways: Overland flow and land drains

5.2 Grove Lake

Risk category: *Review*

Status: Unassigned

Hydrochemistry summary: None

Baseline Concentration: N/A

Significant issue: No data available, however based on the PIP and P susceptibility maps PO₄ may be a significant issue particularly around the lake shore. In addition, MCPA has been reported as an issue for Emy Lough which may also be potentially affecting Grove Lake.

Significant Pressure: Pressures identified but not significant (Diffuse Agriculture, Anthropogenic Pressures).

Relevant Pathways: Overland flow and land drains.

5.3 Mountain Water_040

Risk category: *At Risk*

Status: Poor

Hydrochemistry summary: St. 450 (2018): NH₃ 0.038 mg/l, **PO₄ 0.022 mg/l**

St. 500 (2018): **NH₃ 0.055 mg/l, PO₄ 0.041 mg/l**, TON 0.802 mg/l

Baseline Concentration: St. 450: NH₃ 0.041 mg/l, PO₄ 0.027 mg/l

St. 500: NH₃ 0.072 mg/l, PO₄ 0.038 mg/l, TON 0.817 mg/l

Significant issue: The PIP and P susceptibility map highlight the impact of PO₄ from diffuse agriculture (Pasture). In addition, PO₄ from the Emyvale WWTP has also been identified as a significant issue which can be seen at the downstream monitoring location (St. 500). As PO₄ has been highlighted as a significant issue it may be important to keep sediment in mind due to the typology and flashy nature of the waterbody. In relation to NH₃, the desk study has highlighted this as a significant issue due to Emyvale WWTP being non-compliant with the ELV's set in the wastewater discharge licence on six of the sampling occasions in 2017. There is currently an open compliance (C1001271) regarding recurring breaches of emission limit values (ELVs) in the waste water discharge licence for the Emyvale WWTP. In addition, MCPA has been reported as an issue for Emy Lough which is supplied by the Mountain Water_040 waterbody, through the provision of the weir.

Significant Pressure: Hydromorphology (Channelisation, Dams, Barriers, Locks and Weirs), Agriculture (Pasture and Agriculture), DWW (Waste Water Discharge), UWW (Agglomeration PE of 1001 to 2000)

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and Urban Run-off (Diffuse Source Run-off). In relation to the weir in Emyvale (update August 2018 EPA installing new flow monitoring station upstream of the weir) we need to speak with IFI.

Relevant Pathways: Point Sources and overland flow are the main pathways within this waterbody, with land drainage pipes and discharge pipes also identified as a potential pathway particularly as groundwater flow is not an issue.

5.4 Emy Lough

Risk category: *At Risk*

Status: The status of Emy Lough has come up from Bad (2010 - 2012) to Moderate (2010 - 2015) Status.

Hydrochemistry summary: (2018) NH₃ 0.019 mg/l, TP 0.011 mg/l, Chl-*a* 6.6 µg/l

Baseline Concentration: NH₃ 0.037 mg/l, TP 0.015 mg/l, Chl-*a* 5.8 mg/l

Significant issue: While TP is currently not breaching its EQS limit of 0.025 mg/l it is important to note that it may still be a significant issue for the lake as TP is currently trending upwards. The low nutrient results for the lake maybe due to the possible presence of the invasive zebra mussel in the lake. Furthermore, MCPA has been highlighted as an issue in the lake.

Significant Pressure: Urban Run-off (Diffuse Source Run-off) and DWW (Waste Water Discharge).

Relevant Pathways: Overland Flow and discharge pipes.

5.5 Mountain Water_050

Risk category: *At Risk*

Status: Poor

Hydrochemistry summary: St. 650 (2017): NH₃ **0.048** mg/l, PO₄ **0.051** mg/l, TON **0.724** mg/l

Baseline Concentration: NH₃ 0.040 mg/l, PO₄ 0.050 mg/l, TON 0.798 mg/l

Significant issue: TON, NH₃ PO₄ and sediment

Significant Pressure: Agriculture (Agriculture) and Hydromorphology (Channelisation).

Relevant Pathways: To the north of the waterbody overland flow would be the main flow path, with near surface and groundwater flow paths within the south. As agriculture is prevalent within this waterbody point sources from agriculture also need to be considered.

5.6 Mountain Water_060

Risk category: *Review*

Status: Unassigned

Hydrochemistry summary: St. 670 (2018): NH₃ **0.056** mg/l, PO₄ **0.029** mg/l, TON 1.70 mg/l

St. 680 (2018): NH₃ **0.062** mg/l, PO₄ **0.033** mg/l, TON **1.66** mg/l

Baseline Concentration: St. 670: NH₃ 0.065 mg/l, PO₄ 0.053 mg/l, TON 1.272 mg/l

St. 680: NH₃ 0.109 mg/l, PO₄ 0.072 mg/l, TON 1.270 mg/l

Significant issue: The main issues in the waterbody are PO₄, TON and NH₃. The PIP and P susceptibility map indicate a PO₄ issue in the north of the waterbody, which is susceptible to overland flow and PO₄ release from land drains due to the poorly drained soils in this area. Ammonia and PO₄ from the Glaslough ICW has also been identified as a pressure. Due to there not being a monitoring station on the main Mountain Water_060 waterbody the significant issue and pressures cannot be determined in the south of the waterbody.

Significant Pressure: Pressures identified but not significant (Agriculture (Pasture), UWW (Agglomeration PE of 1001 to 2000), Hydromorphology (Channelisation) and Anthropogenic pressures (Unknown)).

Relevant Pathways: Point Sources, overland flow, land drains, near surface and groundwater flow have been identified as the main pathways based on the aquifer and wet/dry soils maps.

5.7 Glaslough

Risk category: *Review*

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Status: Unassigned

Hydrochemistry summary: None

Baseline Concentration: N/A

Significant issue: The significant issues have not been identified for Glaslough as the lake is currently in *Review*. However, based on the PIP and susceptibility maps, PO₄ appears to be an issue in the northwest and south of the lake boundary, whilst NO₃ appears to be an issue to the east of the lake.

Significant Pressure: Agriculture can be deemed the main pressure due to its proximity within the Mountain Water_060.

Relevant Pathways: Overland, land drains, near surface and groundwater flow have been identified as the main pathways based on the aquifer and wet/dry soils maps.

The environmental objective date for all the waterbodies in the Mountain Water and Emy Lough sub-catchment is 2027.

6 Communications Plan

A community information meeting will be held in Oakland Centre, Glaslough Village, Co. Monaghan on Thursday the 31st of January 2019 from 7:30 – 8:30 pm.

Review the finding of the desktop with Monaghan County Council for their input and knowledge of the sub-catchment. Discuss with Monaghan County Council on whether they have any additional information for both the Mountain Water and Emy Lough.

Review the finding of the desktop with IFI for their input and knowledge of the sub-catchment.

We will work closely with the CatchmentCARE Project, due to their interest in the Blackwater Catchment.

Discuss with the National Federation of Group Water Schemes about the group water schemes in the catchment and the septic tank desludging programme which took place in the catchment. Also consult with the NFGWS on the desktop assessment and on any further pilot projects carried out for the Emyvale/Glaslough GWS.

7 Work Plan

7.1 Further Characterisation Actions Assigned:

Mountain Water_030:

- **IA1:** *“This waterbody has returned to Good Status in 2013-2015 but the Ortho-phosphate concentrations, while currently supporting Good Status, would appear to be increasing. Review the ongoing chemistry samples as they are recorded and take further investigative action as necessary.”*
- **IA1:** *“Internal liaison with the Office of Environmental Enforcement on the significance of the industrial discharge on this water body and downstream on the Mountain Water_040.”*

Grove Lake:

- **IA3:** *“Agriculture in the area. No water quality data available. Need to undertake small stream risk scores of the feeder stream entering the lake and water quality samples to be taken, as well as water quality samples from the lake. Lake appears turbid from aerial photography. Consideration also of the impacts of the abstraction regime”.*

Mountain Water_040:

- **IA5:** *“Urban wastewater discharges, suspected misconnections in the Emyvale Town/Village, as ammonia is elevating somewhere around the town. Investigative assessment to focus around the Emyvale Town/Village where stream passes through.”*
- **IA1:** *“Internal liaison on biological conditions in order to look at site condition (weir present, arterial drainage and flow diversion to Emy Lough) and to assess how much these factors are impacting the water body.”*
- **IA6:** *“Key sources of diffuse urban pressure to be investigated.”*

Mountain Water_050:

- **IA1:** *“Measure - Compliance Checks: carry out follow up farm visits and problem areas identified previously from surveys.”*

Glaslough:

- **IA3:** *“Noted to be eutrophic. No water quality data available therefore, small stream risk scores of the stream feeding the lake and take water quality samples need to be taken. If water quality issues are identified investigate diffuse urban runoff from Glaslough”.*
- **IA6:** *“Diffuse Urban pressure to be investigated”.*

Mountain Water_060:

- **IA3:** *“Assess the water quality at the downstream end of this water body initially using chemistry and small stream risk scores. Areas of high pollution impact potential from phosphate and the upstream stream water quality suggests problems are likely. Take additional investigative action as necessary if water quality results indicate issues.”*

Emy Lough:

- **IA5:** *“Assess the water quality at the downstream end of this water body initially using chemistry and small stream risk scores. Areas of high pollution impact potential from phosphate and the upstream stream water quality suggests problems are likely. Take additional investigative action as necessary if water quality results indicate issues.”*
- **IA1:** *“Internal liaison to check biological information on the impact of abstraction on the lake.”*
- **IA6:** *“Diffuse Urban pressure to be investigated and identify the main sources.”*

7.2 Further Information Required

- The 2018 Annual Environmental Reports for both Emyvale WWTP and Glaslough ICW have been requested from the EPA.
- Discuss with the National Federation of Group Water Schemes about the group water schemes in the catchment and the septic tank desludging programme which took place in the catchment.
- Discuss with both Monaghan Co. Co. and the NFGWS regarding the high levels of MCPA detected in Emy Lough.
- Contact the IFI regarding further information and proposals in relation to the weir in Emyvale.
- Contact Irish Water in relation to the interpond sampling programme undertaken at the Glaslough ICW WWTP in 2017, to see if any further action was deemed required at the plant.

7.3 Local Catchment Assessment

7.3.1 Mountain Water_030

The Mountain Water_030 has come up from Moderate to Good in the 2010 – 2015 river water body status. The 2017 biological data has shown a further improvement from Q4 in 2013 to Q4-5 in 2017. The current PO₄ baseline concentration (0.034 mg/l) and the average 2018 PO₄ concentration (0.033 mg/l, n = 5) is below the EQS of 0.035 mg/l for PO₄, however, the current trend for PO₄ is going upwards (Table 4, Figure 4). Therefore, carry out a SSIS/RA at St 400 to monitor ecological status.

The EPA have outlined their planned monitoring for the Mountain Water_030 for the next three years on the EDEN App which is summarised in Table 16.

Table 16 Planned EPA monitoring for the Mountain Water_030 (2019 – 2021).

	1 st Br. u/s Emyvale (St. 10400)		
	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)	1	0	0
Macrophyte Status or Potential	0	0	0
Phytobenthos Status or Potential	0	0	0
Specific Pollutant Conditions	0	0	0

7.3.2 Grove Lake

Grove lake is currently under *Review* and would require mid-lake sampling of TP, Chl-*a* and NH₃ to determine status. However, access to this lake appears to be a problem. An improvement in status for Grove Lake, which is shallow in depth and small in size, may be achievable by the work plan suggested for the Mountain Water_040. This is mainly due to the issue (PO₄), pressure (agricultural diffuse) and pathways (overland flow) identified in the desktop being like that of the Mountain Water_040. Carry out SSIS/RA on the outflow from Grove Lake. MCPA has also been highlighted as an issue in Emy Lough, therefore, if agricultural issues are identified this needs to keep this in mind.

7.3.3 Mountain Water_040

- Within the Mountain Water_040 do a SSIS/RA at monitoring St. 450 (Bridge in Emyvale) to determine the status at this point as no Q-values are available at this monitoring station. This could potentially eliminate a section of the main river and incoming tributary above St. 450. If the SSIS/RA at this site indicates a drop-in status, it would be reasonable to suggest that based on the water chemistry data, PIP and P susceptibility maps, phosphorus is the significant issue, with urban run-off, DWW, diffuse agricultural and IPC licenced facilities contributing to the significant pressure in this area. Carrying out a 1 km stream walk upstream of St. 450 might draw the conclusion on what the significant pressure might be. Stream walk may also further pinpoint areas where agriculture is an issue, this will be communicated to ASSAP.
- Carry out SSIS/RA at monitoring St. 500 (1.1km d/s of Emyvale) to identify the current ecological status. If there is no change, there are two possible potentials: (1) Emyvale WWTP or (2) the inflowing tributary.
- To eliminate the inflowing tributary, carry out a SSIS/RA to determine status and if status deterioration is indicated carry out a 1 km stream walk up the inflowing tributary.

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- Furthermore, if the inflowing tributary is causing a potential threat carrying out an SSIS/RA up and downstream of the IPC licensed facilities in the waterbody to assess any impact downstream.
- To assess the impact from Emyvale WWTP carry out a stream walk (approximate stretch 835 m) to include DO, conductivity and SSIS/RA analysis upstream and downstream of the discharge (St. 500) in normal and low flow conditions.
- Communicate with Irish Water/EPA on any upgrades planned or made to the Emyvale WWTP.
- MCPA has also been highlighted an issue in Emy Lough, therefore, if agricultural issues are identified this needs to keep this in mind.

The EPA have outlined their planned monitoring for the Mountain Water_040 for the next three years on the EDEN App which is summarised in Table 17.

Table 17 Planned EPA monitoring for the Mountain Water_040 (2019 – 2021).

	Br. 1.1km d/s Emyvale (St. 10500)		
	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)	1	0	0
Macrophyte Status or Potential	0	0	0
Phytobenthos Status or Potential	0	0	0
Specific Pollutant Conditions	0	0	0

7.3.4 Emy Lough

Emy Lough has come up from Bad to Moderate in the 2010 – 2015 lake waterbody status. The current issue identified in the lake is TP. The desktop also concluded that the significant pressures Urban Run-off and DWW do not appear to be influencing the lakes status. Therefore, it may be reasonable to suggest reviewing the latest chemistry data from both the EPA, Glaslough/Tyholland GWS and Monaghan County Council to see the current Chl-*a* and TP trends and exceedances from the baseline concentrations, before suggesting a sampling program for the lake. Additionally, MCPA has been highlighted as an issue for the lake. Furthermore, Zebra Mussels have also been identified in Emy Lough.

The EPA have outlined their planned monitoring for Emy Lough for the next three years on the EDEN App which is summarised in Table 18.

AFA0134_Mountain Water and Emy Lough PAA

Table 18 Planned EPA monitoring for Emy Lough (2019 – 2021).

	LS03000680060 0030 (M_1)			LS03000680060 0040 (M_2)			LS03000680060 0050 (M_3)			LS03000680060 0060 (M_4)			LS03000680060 0010 (Midlake)		
	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	0	0	0	0	0	0	0	0	0	4	4	4	4	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	1	0	0	1	0	0	1	0	0	1	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	0	0	0	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 Mountain Water_050

Carry out RA at St. 650 (Br. N of Glaslough) to determine the current ecological status. If deterioration is noted do a 1 km walk carrying out DO, conductivity and pH measurements upstream to see if any agricultural point sources can be identified. If no significant agricultural pressures are identified carry out an SSIS/RA at the two inflowing tributaries to determine their status. Depending on the status determined carryout a 1 km walk upstream of these two tributaries with the conductivity meter to again determine any agricultural point sources focusing on both PO₄ and NH₃ pollution. Critical Source Areas or agricultural issues identified will be communicated to ASSAP.

The EPA have outlined their planned monitoring for the Mountain Water_050 for the next three years on the EDEN App which is summarised in Table 19.

Table 19 Planned EPA monitoring for the Mountain Water_050 (2019 – 2021).

	Br. 1.1km d/s Emyvale (St. 10500)		
	2019	2020	2021
Chemical Surface Water Status	0	0	0
Fish Status or Potential	0	0	0
General Conditions	0	0	0
Hydromorphological Conditions	0	0	0
Invertebrate Status or Potential (AWIC)	0	0	0
Invertebrate Status or Potential (Q-Value)	1	0	0
Macrophyte Status or Potential	0	0	0
Phytobenthos Status or Potential	0	0	0
Specific Pollutant Conditions	0	0	0

7.3.6 Mountain Water_060

- The Glaslough ICW is in this waterbody. Need to do a SSIS/RA at St. 670 and St. 680 to determine the potential impact from the ICW. Communicate with Irish Water/EPA on any works which have been carried out on the ICW and on the non-compliances.
- The status of this waterbody is in review. To identify ecological status, samples need to be collected at the Mountain Water_060 outflow for PO₄, NH₃ and TON on a quarterly basis. In addition, measurements for pH, DO, temperature, conductivity as well as conducting SSIS/RA assessments need to be carried out.

7.3.7 Glaslough

The status of Glaslough is Undermined. Mid-lake samples need to be collected for TP, NH₃ and Chl-*a* on three separate occasions throughout a year to try to determine the lake water quality status. In addition, measurements for pH, DO and temperature need to be collected in conjunction to the chemical data.

8 Review of Mitigation Options

- EPA installing new flow monitoring station upstream of the weir which will provide continuous flow data for the river, to determine the impacts of the weir.
- Throughout the Mountain Water_030, Mountain Water_040 and to the north of the Mountain Water_050 waterbodies where phosphate has been identified as the significant issue, mitigation options in relation to overland land flow and land drainage pathways interception will need to be considered .
- Regarding the Unassigned Mountain Water_060 waterbody if this waterbody is deemed to be probably impacted any pollution pathways identified need to keep sub-surface and groundwater flow mitigations options in mind.
- Due to a number of non-compliances with the ELV's for both NH₃ and PO₄ at the Glaslough ICW WWTP, an interpond sampling programme (to include provision of composite samples and flow measurements between ponds), was undertaken at the plant in 2017 by Irish Water. The results of this programme are said to determine whether further action at this facility will be required.

Date of Completion of Desk Study: 25/11/2019

Work Plan Summary:

1. Review updated chemistry data for Mountain Water_030 and Emy Lough to see for improvements and non-deterioration.
2. Include Grove Lake as part of the Mountain Water_040 work plan.
3. Carry out initial SSIS/RA (Total 26) at:
 - 3.1. St. 450 (Bridge in Emyvale).
 - 3.2. Tributary flowing into the Mountain Water main channel within the village.
 - 3.3. Effects of the weir.
 - 3.4. Two tributaries flowing into Emy Lough.
 - 3.5. Upstream and downstream Emyvale WWTP.
 - 3.6. Upstream and downstream of the IPC licensed facilities.
 - 3.7. The inflowing tributary above St. 500.
 - 3.8. St. 500 (Br. 1.1km d/s Emyvale).
 - 3.9. Tributary at Letgonnelly.
 - 3.10. Tributary at Corracrin.
 - 3.11. Tributary at Gortmoney.
 - 3.12. The two inflowing tributaries above St. 650.
 - 3.13. St. 650 (Br. N of Glaslough).
 - 3.14. Tributary at Tonyhamington.
 - 3.15. St. 680 (d/s from the Glaslough ICW).
 - 3.16. The Mountain Water_060 outflow on a quarterly basis for 2019 – 2020.
4. Stream walk will be carried out based on the findings of the first round of SSIS/RA results.
5. Carry out conductivity, DO, pH measurements on stream walks:
 - 5.1. From St. 500 to Emyvale WWTP.
 - 5.2. Upstream and downstream of the IPC Licensed facilities.
 - 5.3. Upstream of St. 650.
 - 5.4. Upstream of the two inflowing tributaries above St. 650.
6. Measure pH, DO, conductivity and temperature data at the Mountain Water_060 outflow on a quarterly basis for 2019 - 2020.
7. Collect samples for PO₄, NH₃ and TON at the Mountain Water_060 outflow on a quarterly basis for 2019 - 2020.
8. Collect samples for TP, NH₃ and Chl-*a* and measure for pH, DO and temperature in Glaslough on three separate occasions throughout a year.
9. Advise the ASSAP coordinator for the region on areas where agriculture has been identified as the significant pressure once the initial catchment assessment has been carried out. Relaying that mitigation measures in this waterbody will be specific to run-off and near surface flow pathways. Additionally, ASSAP advisors for the area needs to be made aware of the MCPA issue in Emy Lough and potentially Grove Lake.

Appendix A

The catchment area for the Glaslough/Tyholland GWS has been outlined for the Mountain Water and Emy Lough PAA (Figure 33).

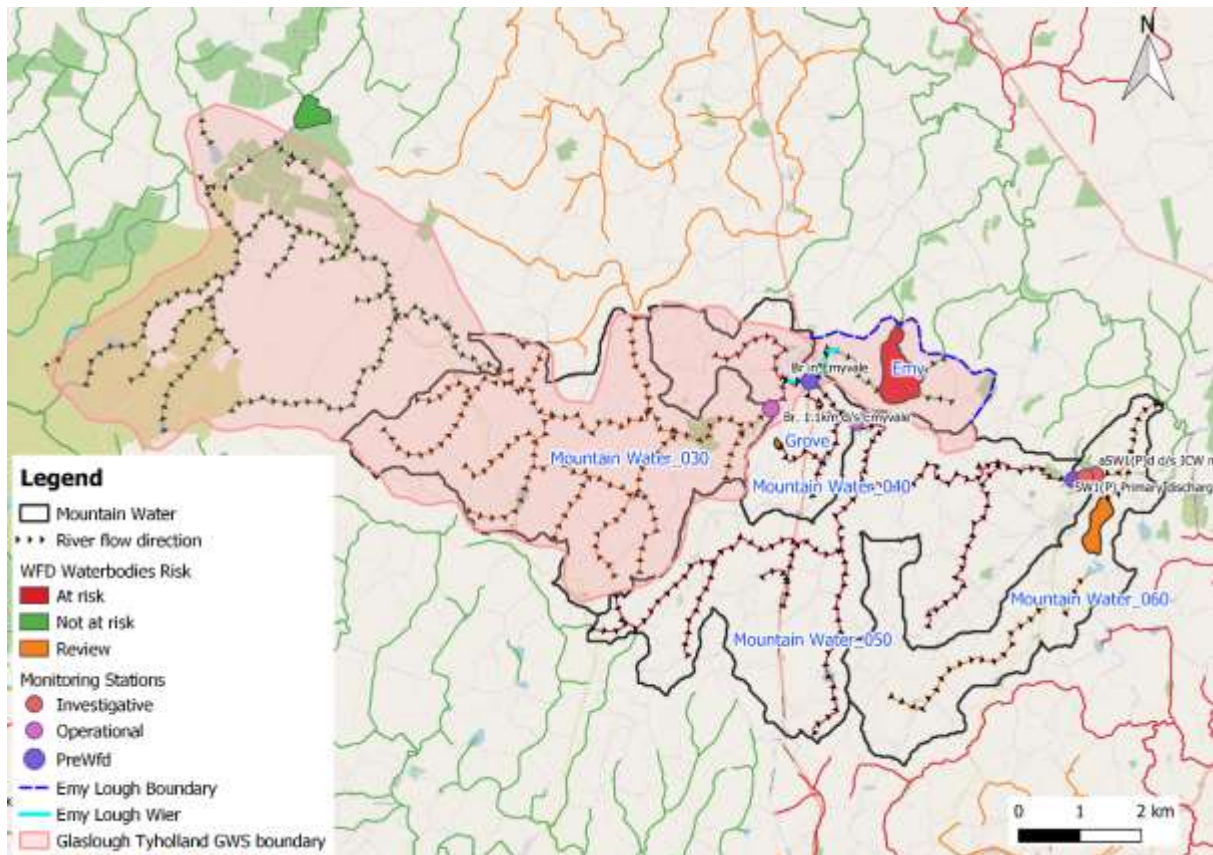


Figure 33 The catchment boundary area for the Glaslough/Tyholland GWS located within the Mountain Water and Emy Lough PAA.

Appendix B



WFD Waterbody Code IE_NB_03M010400	WFD Waterbody Name MOUNTAIN WATER_030	Station Name 1st Br. u/s Emyvale		
River code and year: 03M010400 sampled in 2017	River: MOUNTAIN WATER	Easting: 267070	Northing: 343349	Sample date: 30/08/17 05:30 PM
Access and H&S rating:	Right Hand Side	Downstream	Low Hazard site	

Filamentous algae, macrophytes & shading		Station type, sediment, livestock access & erosion	
Cladophora		Station Type	Typical riffle-glide
Vaucheria	<0.1%	Substrate Features	Normal
Filamentous algae - Total		Substrate Siltation	Slight
Total Macrophytes	5%	Livestock Access	None; None
		Livestock Access Impact	None
Shading	Light to Moderate	Bank Erosion	
		Bank Erosion Extent	
		Recent Flood	No
		Flow/Discharge	Normal

Overview of macroinvertebrate data

The site 03M010400 on the MOUNTAIN WATER river was sampled in 2017. A total of 16 invertebrate taxa were recorded. There were 3 sensitive mayfly and 0 sensitive stonefly found at the site. Sensitive taxa were found in high abundance, a feature most often associated with good and high status sites. The results of an examination of key tolerant taxa found: Simuliidae (Few), Gammarus (Numerous) and Baetis rhodani (Dominant). The Q value assigned to this site was 4-5, indicative of high conditions. Trend data and river summary assessments are available at <http://www.epa.ie/QValue/webusers/>. Text is autogenerated, represents a simplification and adjustments for specific typologies/habitat are not represented (e.g. acidified sites / non-riffle-glide habitats).

River code and year
03M010400 sampled in 2017

Group	Taxon	Sensitivity	Abundance	
Mayfly	Ecdyonurus	Sensitive	Numerous	4
Mayfly	Rhithrogena	Sensitive	Numerous	4
Mayfly	Heptagenia	Sensitive	Common	3
Mayfly	Baetis scambus	Less sensitive	Few	2
Stonefly	Leuctra	Less sensitive	Few	2
Beetle	Elmis aenea	Tolerant taxa	Common	3
Blackfly larvae	Simuliidae	Tolerant taxa	Few	2
Caseless Caddis	Hydropsyche	Tolerant taxa	Common	3
Caseless Caddis	Rhyacophila	Tolerant taxa	Few	2
Caseless Caddis	Polycentropus	Tolerant taxa	Few	2
Mayfly	Baetis rhodani	Tolerant taxa	Dominant	5
Shrimp	Gammarus	Tolerant taxa	Numerous	4
True fly larvae	Dicranota	Tolerant taxa	Few	2
Worms	Eiseniella	Tolerant taxa	Few	2
Crayfish	Austropotamobius pallipes	Tolerant taxa	Few	2
Worms	Tubificidae	Most tolerant taxa	Common	3

Figure 34 The 2017 EPA biologist report for the Mountain Water_030.



WFD Waterbody Code IE_NB_03M010500	WFD Waterbody Name MOUNTAIN WATER_040	Station Name Br. 1.1km d/s Emyvale		
River code and year: 03M010500 sampled in 2017	River: MOUNTAIN WATER	Easting: 268458	Northing: 343141	Sample date: 30/08/17 06:30 PM
Access and H&S rating:	Left Hand Side	Downstream	Moderately Hazardous	

Filamentous algae, macrophytes & shading		Station type, sediment, livestock access & erosion		
Cladophora		Station Type	Typical riffle-glide	
Vaucheria	<0.1%	Substrate Features	Normal	
Filamentous algae - Total	1 - 2.5%	Substrate Siltation	Slight to Moderate	
Total Macrophytes	5%	Livestock Access	None; None	
		Livestock Access Impact	None	
Shading	Light to Moderate	Bank Erosion		
		Bank Erosion Extent		
		Recent Flood	No	
		Flow/Discharge	Normal	

Overview of macroinvertebrate data

The site 03M010500 on the MOUNTAIN WATER river was sampled in 2017. A total of 15 invertebrate taxa were recorded. There were 1 sensitive mayfly and 0 sensitive stonefly found at the site. However, the abundance of sensitive taxa was low, often a sign that conditions may be less than good. The results of an examination of key tolerant taxa found: Simuliidae (Few), Gammarus (Excessive) and Baetis rhodani (Common). When high numbers of tolerant taxa are found like this, especially when combined with a low density or absence of sensitive taxa, it is usually indicative of moderate or lower status. The Q value assigned to this site was 3, indicative of poor conditions. Trend data and river summary assessments are available at <http://www.epa.ie/QValue/webusers/>. Text is autogenerated, represents a simplification and adjustments for specific typologies/habitat are not represented (e.g. acidified sites / non-riffle-glide habitats).

River code and year
 03M010500 sampled in 2017

Group	Taxon	Sensitivity	Abundance	
Mayfly	Ecdyonurus	Sensitive	Few	2
Stonefly	Leuctra	Less sensitive	Few	2
Beetle	Elmis aenea	Tolerant taxa	Numerous	4
Beetle	Limnius volckmari	Tolerant taxa	Few	2
Blackfly larvae	Simuliidae	Tolerant taxa	Few	2
Caseless Caddis	Hydropsyche	Tolerant taxa	Common	3
Caseless Caddis	Rhyacophila	Tolerant taxa	Few	2
Caseless Caddis	Polycentropus	Tolerant taxa	Few	2
Chironomids	Chironomidae	Tolerant taxa	Common	3
Mayfly	Baetis rhodani	Tolerant taxa	Common	3
Shrimp	Gammarus	Tolerant taxa	Excessive	6
Snails	Ancylidae	Tolerant taxa	Common	3
Tipulidae	Tipulidae	Tolerant taxa	Few	2
Clam	Sphaerium	Very tolerant taxa	Few	2
Worms	Tubificidae	Most tolerant taxa	Few	2

Figure 35 The 2017 EPA biologist report for the Mountain Water_040.

WFD Waterbody Code IE_NB_03M010650	WFD Waterbody Name MOUNTAIN WATER_050	Station Name MOUNTAIN WATER - Br N of Glaslough		Sample date: 30/08/17 03:30 PM
River code and year: 03M010650 sampled in 2017	River: MOUNTAIN WATER	Easting: 272001	Northing: 342192	
Access and H&S rating:	Left Hand Side	Upstream	Low Hazard site	

Filamentous algae, macrophytes & shading		Station type, sediment, livestock access & erosion	
Cladophora		Station Type	Typical riffle-glide
Vaucheria		Substrate Features	Normal
Filamentous algae - Total		Substrate Siltation	Moderate
Total Macrophytes		Livestock Access	Equine; Equine
		Livestock Access Impact	Mild
Shading	Moderate to Heavy	Bank Erosion	U/S Both Banks
		Bank Erosion Extent	Mild
		Recent Flood	No
		Flow/Discharge	Normal

Overview of macroinvertebrate data

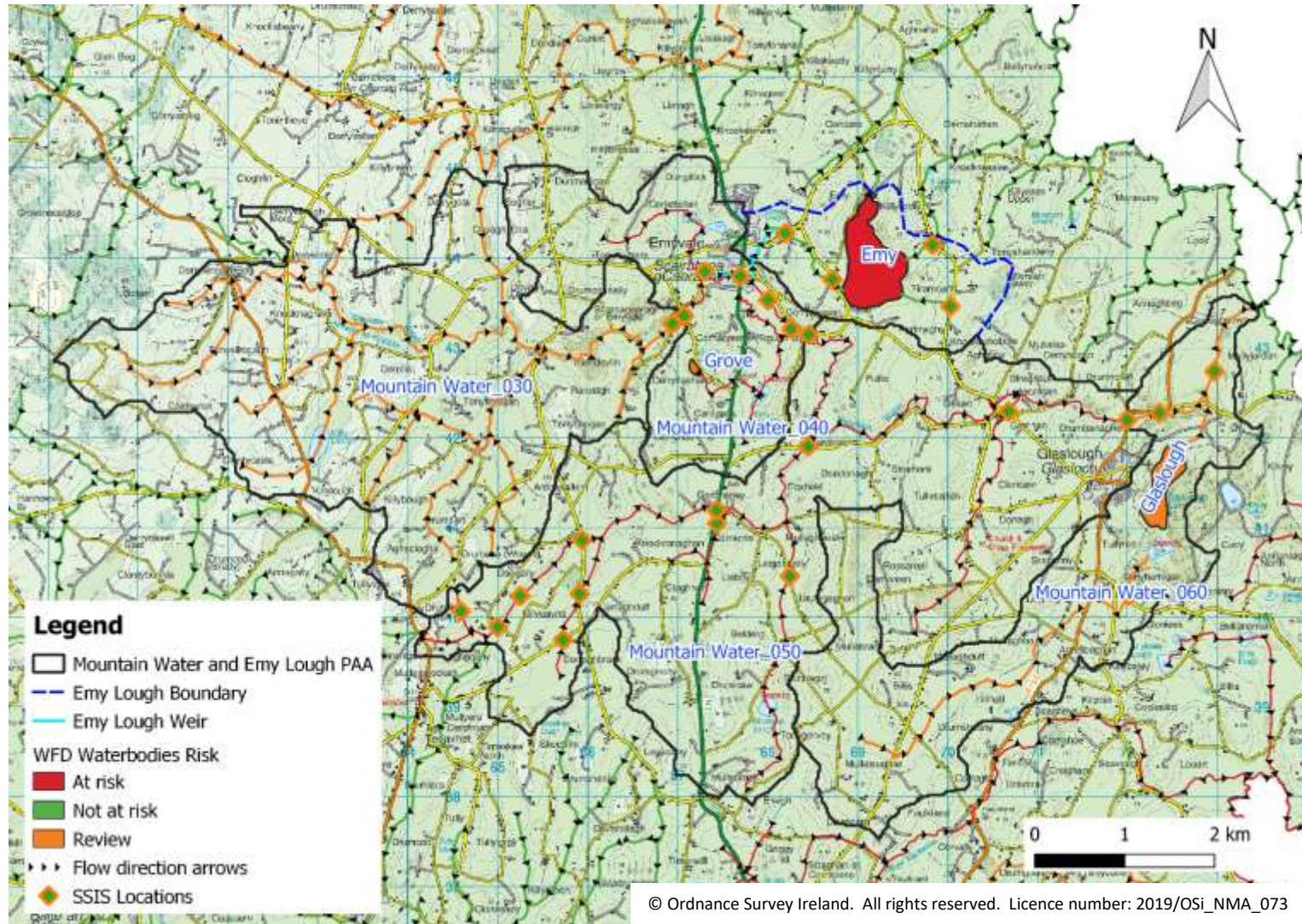
The site 03M010650 on the MOUNTAIN WATER river was sampled in 2017. A total of 18 invertebrate taxa were recorded. There were 1 sensitive mayfly and 1 sensitive stonefly found at the site. However, the abundance of sensitive taxa was low, often a sign that conditions may be less than good. The results of an examination of key tolerant taxa found: Simuliidae (Absent), Gammarus (Dominant) and Baetis rhodani (Common). When high numbers of tolerant taxa are found like this, especially when combined with a low density or absence of sensitive taxa, it is usually indicative of moderate or lower status. The Q value assigned to this site was 3-4, indicative of moderate conditions. Trend data and river summary assessments are available at <http://www.epa.ie/QValue/webusers/>. Text is autogenerated, represents a simplification and adjustments for specific typologies/habitat are not represented (e.g. acidified sites / non-riffle-glide habitats).

River code and year
 03M010650 sampled in 2017

Group	Taxon	Sensitivity	Abundance	
Mayfly	Ecdyonurus	Sensitive	Single	1
Stonefly	Chloroperla	Sensitive	Few	2
Caddisfly	Glossosomatidae	Less sensitive	Few	2
Caddisfly	Sericostomatidae	Less sensitive	Few	2
Caddisfly	Goeridae	Less sensitive	Few	2
Stonefly	Leuctra	Less sensitive	Few	2
Beetle	Elmis aenea	Tolerant taxa	Common	3
Beetle	Limnius volckmari	Tolerant taxa	Few	2
Caseless Caddis	Hydropsyche	Tolerant taxa	Few	2
Caseless Caddis	Polycentropus	Tolerant taxa	Few	2
Chironomids	Chironomidae	Tolerant taxa	Common	3
Mayfly	Baetis rhodani	Tolerant taxa	Common	3
Shrimp	Gammarus	Tolerant taxa	Dominant	5
Snails	Potamopyrgus antipodarum	Tolerant taxa	Common	3
True fly larvae	Dicranota	Tolerant taxa	Few	2
Worms	Lumbriculidae	Tolerant taxa	Few	2
Sponges	Porifera	Tolerant taxa	Common	3
Worms	Tubificidae	Most tolerant taxa	Common	3

Figure 36 The 2017 EPA biologist report for the Mountain Water_050.

Appendix C



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Figure 37 Initial sampling locations for SSIS/RA analysis.