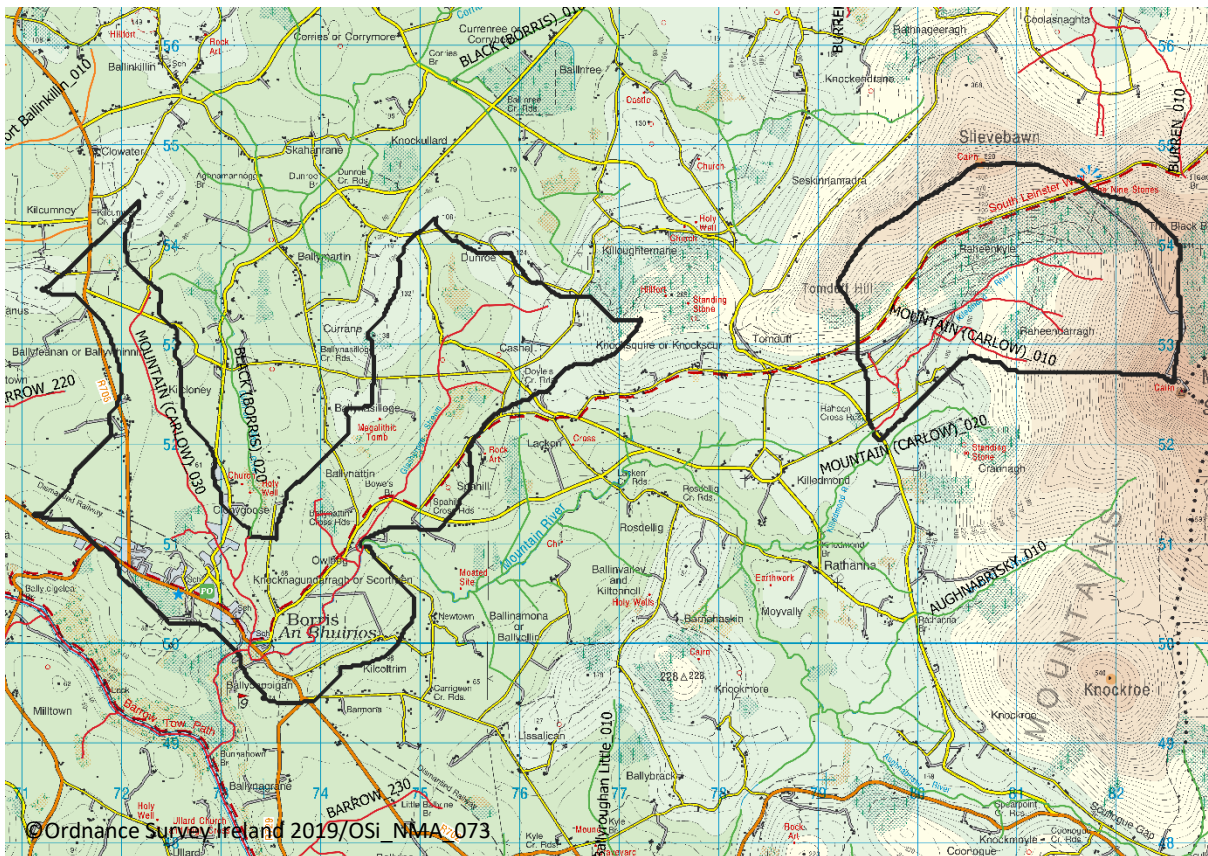


Desk Study

Mountain (Carlow) Priority Area for Action



Disclaimer:

Although every effort has been made to ensure the accuracy of the material contained in this publication, complete accuracy cannot be guaranteed. The Local Authority Waters Programme (LAWPRO) nor the author(s) accept any responsibility whatsoever for loss or damage occasioned, or claimed to have been occasioned, in part or in full as a consequence of any person acting or refraining from acting, as a result of a matter contained in this publication. All or part of this publication may be reproduced without further permission, provided the source is acknowledge

Table of Contents

1	Background	3
2	Receptor Information and Assessment	2
2.1	Mountain (Carlow)_010	2
2.2	Mountain (Carlow)_030	4
3	Significant Pressures	11
3.1	Mountain (Carlow)_010	11
3.2	Mountain (Carlow)_030	11
4	Pathway Information and Analysis	12
4.1	Overview of Pathways in the PAA	12
4.2	Mountain (Carlow)_010	12
4.3	Mountain (Carlow)_030	12
4.4	Pathways Conceptual Model and Likely Critical Source Areas.....	12
5	Interim Story of the Mountain PAA	14
5.1	Mountain (Carlow)_010	14
5.2	Mountain (Carlow)_030	14
5.3	Overview.....	14
6	Work Plan.....	16
6.1	Mountain (Carlow)_010	16
6.2	Mountain (Carlow)_030	16
7	Possible Mitigation Options.....	17

List of Figures

Figure 1.	Monitoring stations located within the Mountain (Carlow) PAA.	2
Figure 2.	Q-value data at Br u/s of Killedmond Br on the Mountain (Carlow)_010.	4
Figure 3.	Ammonia concentrations at Ballycoppigan Bridge on Mountain (Carlow)_030.	6
Figure 4.	Ammonia concentrations at Borris Downstream on Mountain (Carlow)_030.	6
Figure 5.	Ammonia concentrations at Borris Upstream on Mountain (Carlow)_030.	7
Figure 6.	Ortho-phosphate concentrations at Ballycoppigan Br on Mountain (Carlow)_030.	8
Figure 7.	Ortho-phosphate concentrations at Borris Downstream on Mountain (Carlow)_030.	8
Figure 8.	Ortho-phosphate concentrations at Borris Upstream on Mountain (Carlow)_030.	9

Figure 9. TON concentrations at Ballycoppigan Bridge on Mountain (Carlow)_030..... 10

Figure 10. Wet and dry soils map. 13

Figure 11. Aerial photograph from 2009 showing extent of forestry in Mountain (Carlow)_010 catchment. 15

Figure 12. Aerial photograph from April 2018 showing current extent of forestry in Mountain (Carlow)_010 catchment. 15

List of Tables

Table 1. Summary table of water bodies within the Mountain (Carlow) PAA. 1

Table 2. Receptor information for the Mountain (Carlow)_010. 3

Table 3. Receptor information for Mountain (Carlow)_030. 5

Table 4. Significant Pressures identified for the Mountain (Carlow) PAA by the Initial Characterisation process. 11

1 Background

The Mountain (Carlow) PAA is located in County Carlow and includes two waterbodies: Mountain (Carlow)_010 and Mountain (Carlow)_030.

Regional workshops were held in Roscrea on 6-9 June 2017 and were attended by representatives of local authorities (Kilkenny, Tipperary, Waterford City and County, Kildare, Laois, Offaly, Carlow, Wexford & Wicklow), and other agencies (Bord Iascaigh Mhara, DHPCLG, EPA, National Dairy Sustainability Forum, National Federation for Group Water Schemes, Sea Fisheries Protection Authority, Waterways Ireland, LAWCO, Irish Water, IFI, Forest Service, Coillte, NPWS, Teagasc, GSI, DAFM, Marine Institute and EPA). Based on the draft River Basin Management Plan priorities, a set of agreed principles and the priorities of the workshop attendees, 34 areas were recommended for action in the South East region and the Mountain (Carlow) PAA was selected for the following reasons:

- Two water bodies are failing to meet protected area objectives for Freshwater Pearl Mussel (19 of 27 catchments of S.I. 296 2009).
- Important fish habitat.
- Recently formed community group.
- Strong local tidy towns.
- Native oak woodland at downstream end of the Mountain River.
- Woodland riparian scheme to improve riparian zone around the native woodland.
- Teagasc EIP looking at sheep farming practices.
- Building on completed and ongoing works by Blackstairs farming group.
- One deteriorated water body.
- One potential 'quick win'.

The initial characterisation sub-catchment assessments recommended that the following actions be undertaken.

Mountain (Carlow)_010: IA8 high status river waterbody pressures

- Focus on point and diffuse sources of nutrients from agriculture and sediment from forestry. Walk along the RWB, identify point (drains, discharge pipes) and diffuse (lack of buffer strips) sources of nutrients. Also identify areas where sheep access may be contributing to bank erosion.

Mountain (Carlow)_010: IA1 provision of information

- This water body has undergone recent drainage works (2012-2013). Overgrazing also noted. EPA to consider this water body when assessing hydromorphological conditions once morphological assessment (MQI) implemented.

Mountain (Carlow)_030: IA7 Multiple Sources in Multiple Areas

- 1) Focus on Borris WWTP and urban diffuse sources. Calculate load from WWTP. Collect field parameters (DO, pH, temperature and conductivity), water quality and SSRS. Establish if the

WWTP and/or misconnections is the significant pressure. 2) If the WWTP and urban diffuse pressures are ruled out focus on point and diffuse sources of nutrient from agriculture. Walk along the RWB, identify point (drains, discharge pipes) and diffuse (lack of buffer strips) sources of nutrients. Collect field parameters, use results to guide the selection of water quality, SSRS sample locations.

Mountain (Carlow)_030: IA6 Multiple Sources in Large Urban Area

- Diffuse Urban pressure to be investigated.

Mountain (Carlow) PAA Desk Study

Table 1. Summary table of water bodies within the Mountain (Carlow) PAA.

WB Code	WB Name	WFD Risk	Status Obj.	Status				Pressure Category	Pressure Subcat.	Sig. Pressure
				2009	2011	2014	2017			
IE_SE_14M010020	Mountain (Carlow)_010	At Risk	Good	Good	High	Moderate	Good	Agriculture	Agriculture	Yes
								Hydromorphology	Channelisation	Yes
								Hydromorphology	Overgrazing	Yes
								Forestry	Forestry	Yes
IE_SE_14M010160	Mountain (Carlow)_030	At Risk	Good	Unassigned	Unassigned	Unassigned	Unassigned	Urban Waste Water	Borris UWWTP	Yes
								Urban Run-off	Diffuse sources run-off	Yes
								Agriculture	Pasture	Yes

2 Receptor Information and Assessment

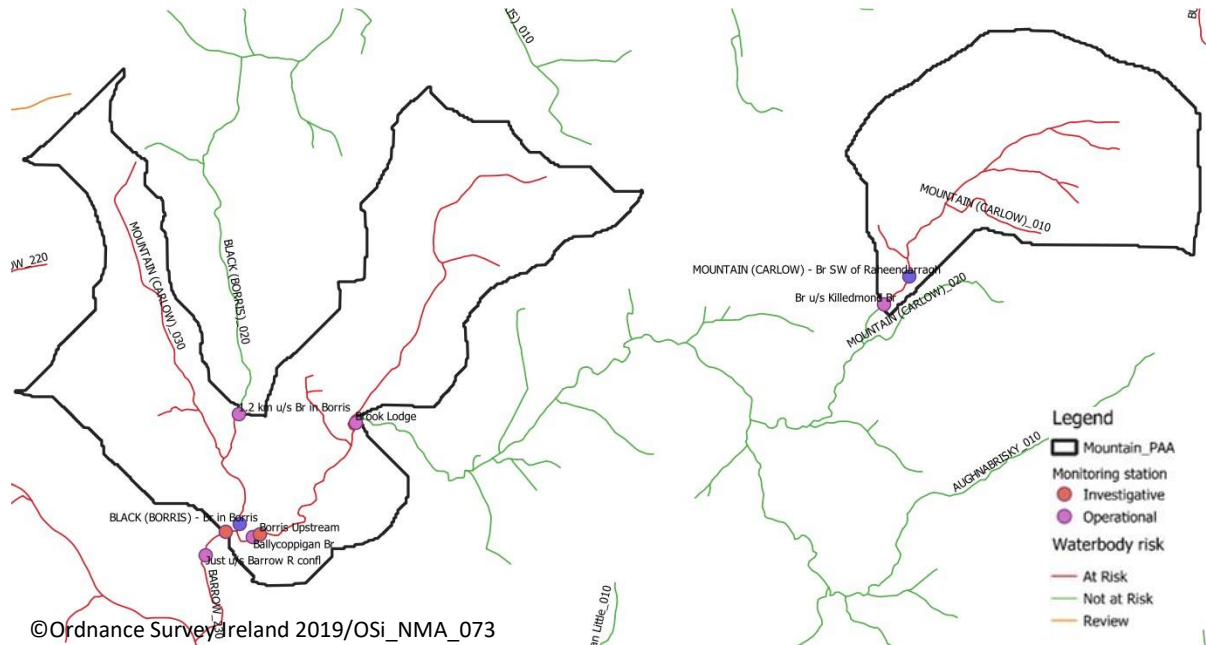


Figure 1. Monitoring stations located within the Mountain (Carlow) PAA.

2.1 Mountain (Carlow)_010

- The Mountain (Carlow)_010 is located in Carlow on the slopes of Mount Leinster.
- It is currently at good biological status as monitored in 2017.
- It was previously at moderate biological status in 2014 and high biological status in 2011.
- Agriculture, hydromorphology and forestry have all been identified as significant pressures on the waterbody.
- Chemistry is not currently monitored in this waterbody. However, nutrients and sediment may be significant issues based on information from the initial characterisation carried out by the EPA.

Table 2. Receptor information for the Mountain (Carlow)_010.

Factor	Comment/Description
Risk Category	<i>At Risk</i>
Biological Status Monitoring Station(s) with Q-Values 2009-2015 Status Trends in Q value since 2009 2016-2018 Q value data	Br u/s of Killedmond Br Moderate Fluctuating Good
Hydrochemistry Data Monitoring Station(s) with data Existing New	None
Summary & Trends in PO₄, NH₃ and NO₃ In App All available data Other water quality data Baseline Concentration (mg/l) Other relevant values Distance to threshold	N/A N/A N/A N/A N/A
Supporting Conditions Chemical Conditions Oxygenation Conditions Acidification Conditions	N/A N/A N/A
Hydromorphology RHAT Score Evidence of arterial drainage	High None
Ecological Status 2017	Good
Protected Areas	Blackstairs Mountains SAC; FWPM Protected Area
WFD Objective	Good
EPA biologist notes (if any)	After a decline from High to Moderate ecological quality in 2014, Station 0020 showed sign of recovery with a welcome improvement to Good quality in 2017. Further downstream Station 0070 declined from its previous High ecological quality to Good in 2017.
Significant issue	Unknown but possibly sediment and nutrients if any

Mountain (Carlow) PAA Desk Study

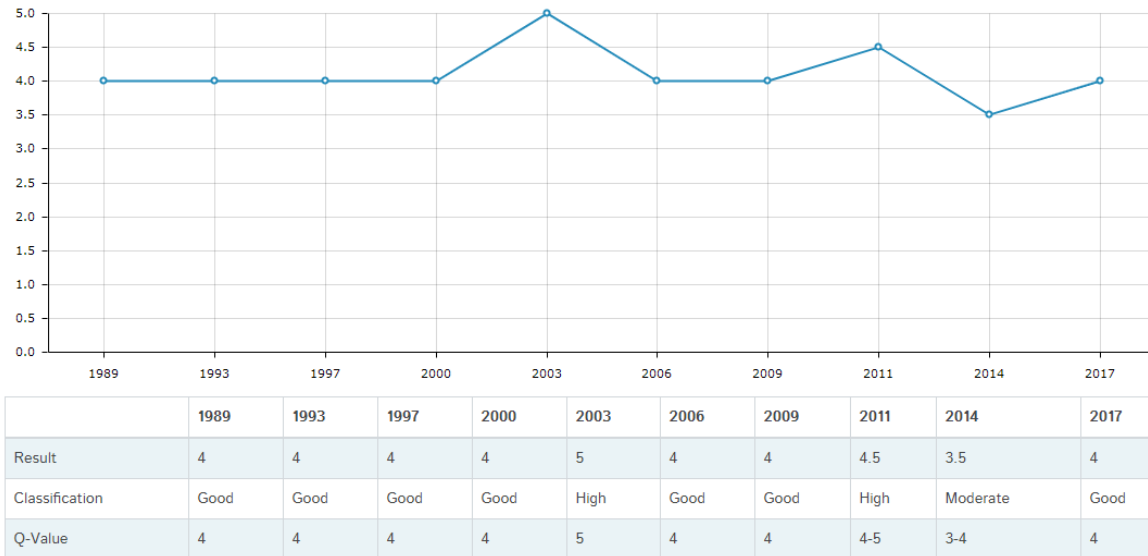


Figure 2. Q-value data at Br u/s of Killedmond Br on the Mountain (Carlow)_010.

2.2 Mountain (Carlow)_030

- The Mountain (Carlow)_030 is located in Carlow near Borris.
- Its current status is unknown and it has not been monitored since 1993 when it was at high status.
- Urban waste water, urban runoff and agriculture were identified as significant pressures in this catchment during the EPAs initial characterisation process.
- Based on the further characterisation actions nutrient pollution from Borris UWWTP, which is located near the catchment outlet, may be a significant issue.
- Chemistry is monitored at Ballycoppigan Br where ammonia and orthophosphate concentrations are both indicative of high status and TON concentrations are below the good status indicative threshold. Ammonia and orthophosphate are also monitored upstream and downstream of Borris UWWTP. At both sites, ammonia is indicative of good status and phosphate is indicative of high status conditions.

Table 3. Receptor information for Mountain (Carlow)_030.

Factor	Comment/Description
Risk Category	<i>At Risk</i>
Biological Status Monitoring Station(s) with Q-Values 2009-2015 Status Trends in Q value since 2009 2016-2018 Q value data	None Unassigned Unassigned
Hydrochemistry Data Monitoring Station(s) with data Existing New	Ballycoppigan Br, Borris d/s, Borris u/s Ammonia, ortho-phosphate, TON, BOD, chromium, copper, zinc, lead, nickel, cadmium, COD, SS, TN, TP
Summary & Trends in PO₄, NH₃ and NO₃ In App Other water quality data Baseline Concentration (mg/l) NH3 PO4 TON Other relevant values Distance to threshold	NH3: Downwards PO4: Downwards TON: Downwards BOD: Spike to 2.5 mg/l in 2017. COD: High levels (~ 40 mg/l) u/s and d/s of Borris. 0.012 0.012 1.557 COD of 40 mg/l at times NH3: Far; PO4: Far; TON: Near
Supporting Conditions Chemical Conditions Oxygenation Conditions Acidification Conditions	N/A N/A N/A
Hydromorphology RHAT Score Evidence of arterial drainage	N/A None
Ecological Status 2017	N/A
Protected Areas	River Barrow and Nore SAC; Mountain (Carlow) drinking water protected area; FWPM Protected Area
WFD Objective	Good
EPA biologist notes (if any)	
Significant issue	Unknown

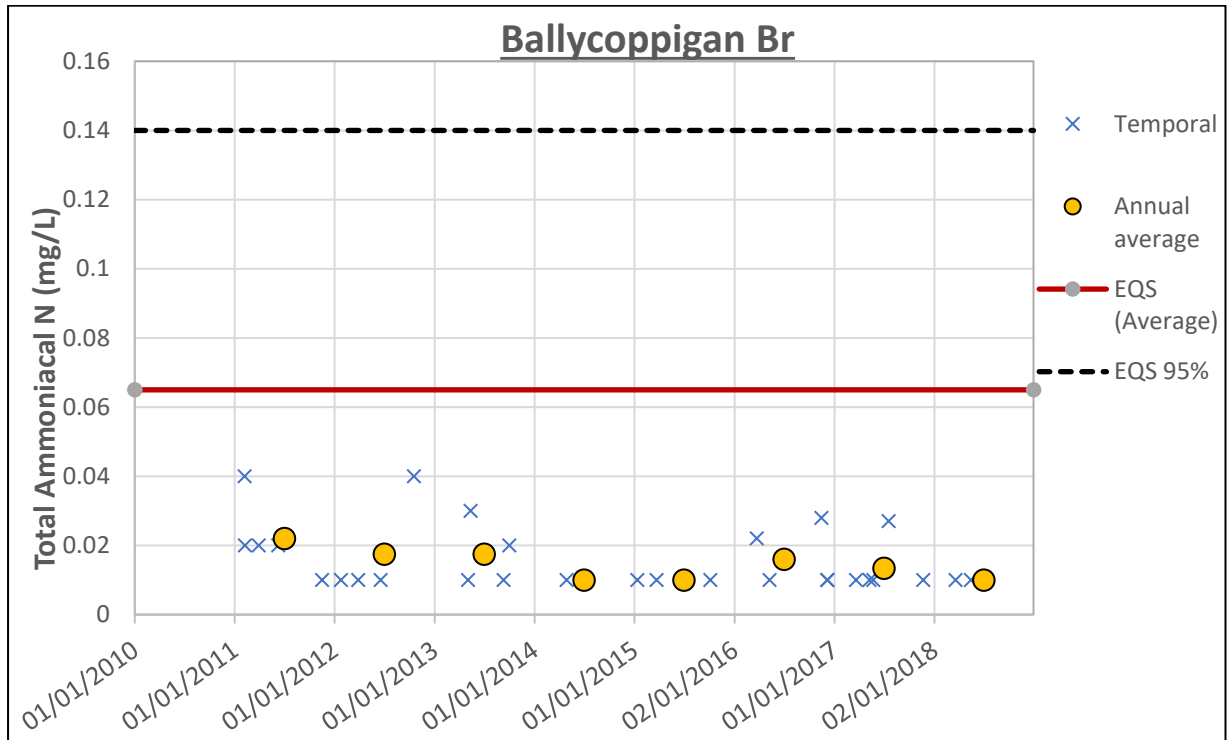


Figure 3. Ammonia concentrations at Ballycoppigan Bridge on Mountain (Carlow)_030.

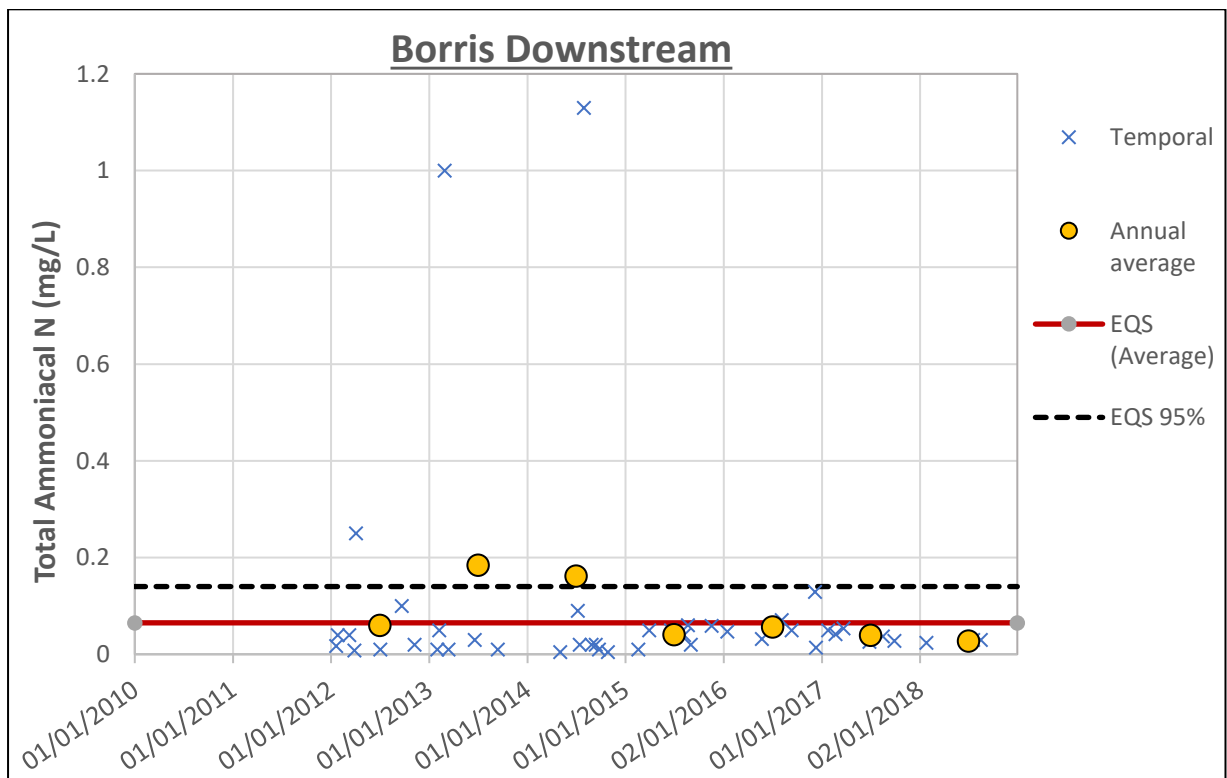


Figure 4. Ammonia concentrations at Borris Downstream on Mountain (Carlow)_030.

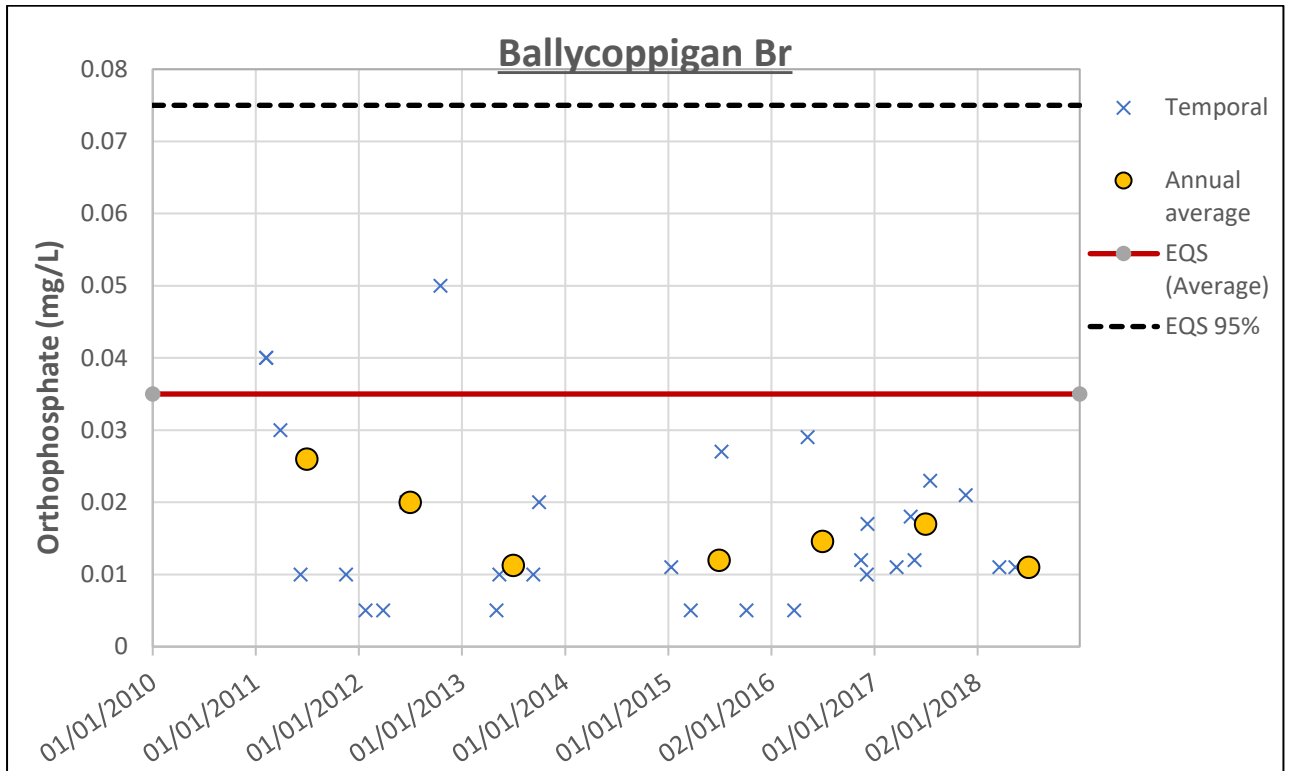


Figure 6. Ortho-phosphate concentrations at Ballycoppigan Br on Mountain (Carlow)_030.

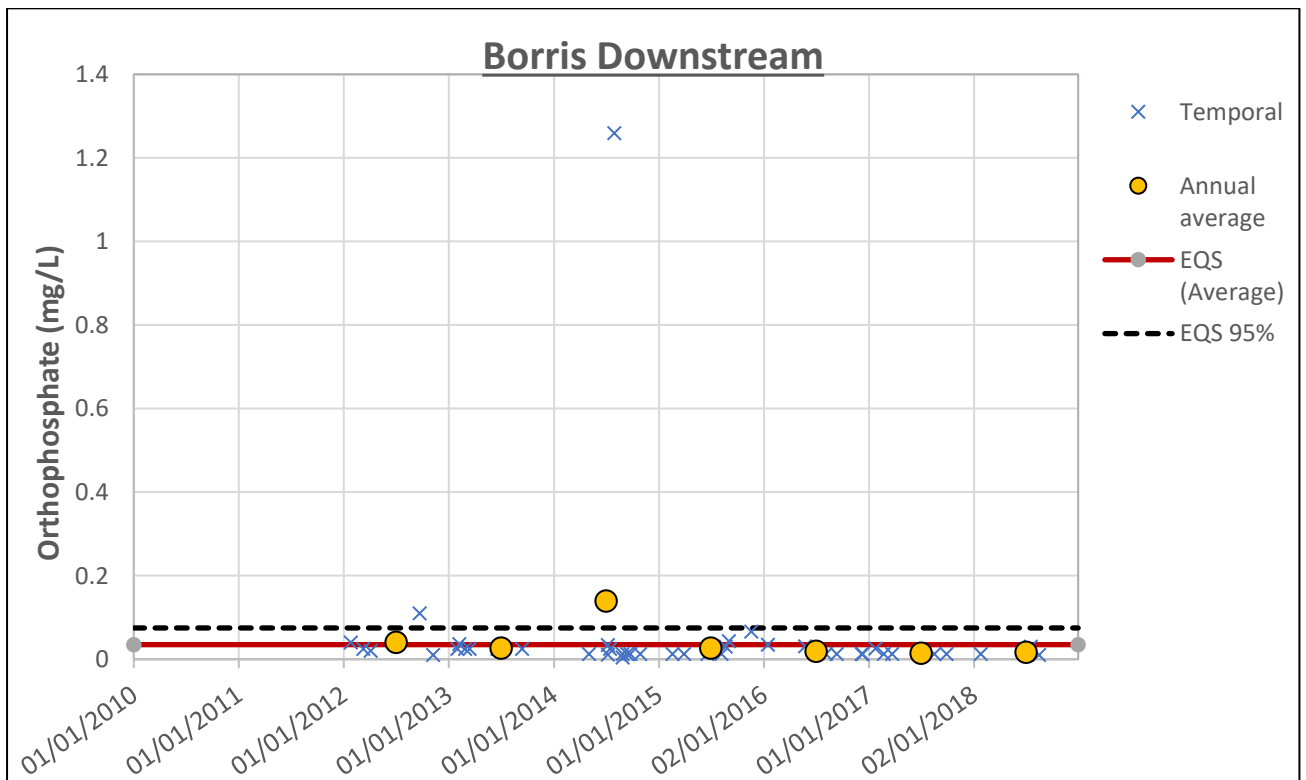


Figure 7. Ortho-phosphate concentrations at Borris Downstream on Mountain (Carlow)_030.

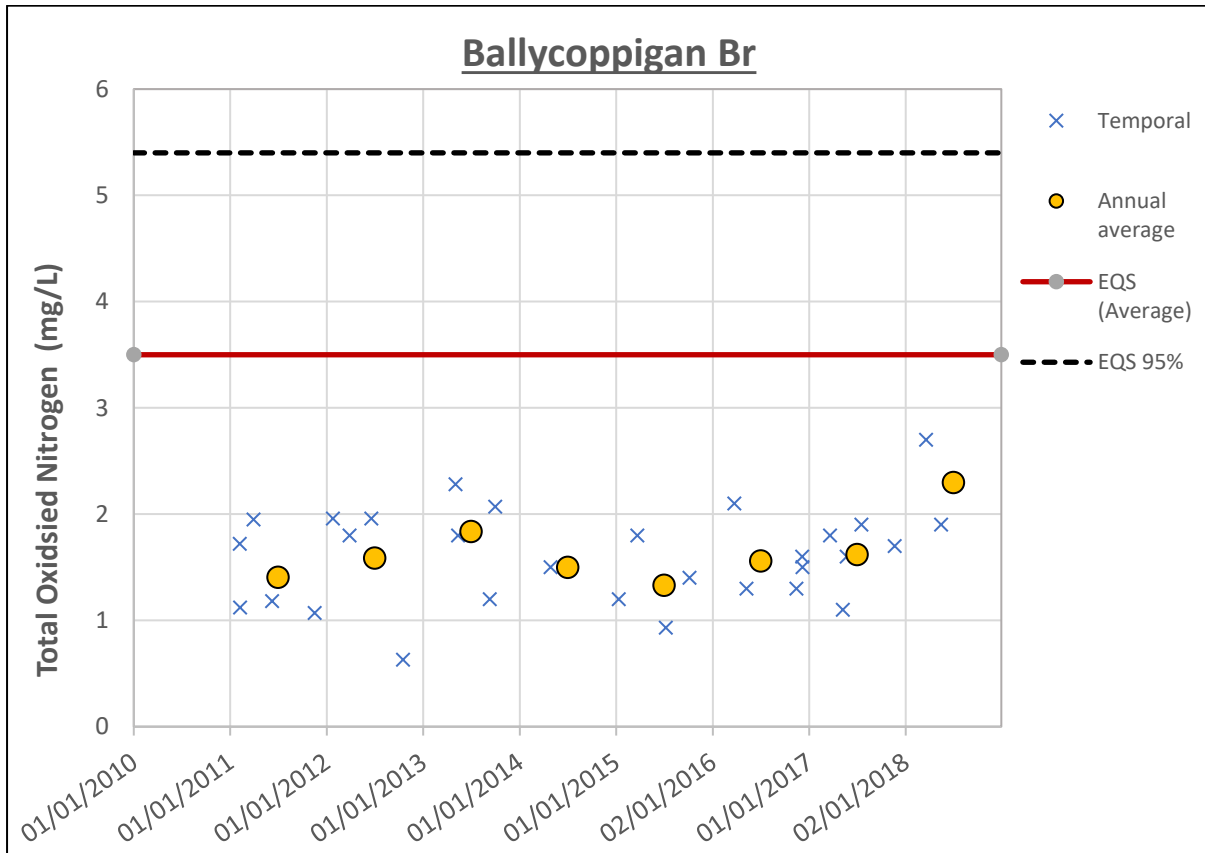


Figure 9. TON concentrations at Ballycoppigan Bridge on Mountain (Carlow)_030.

3 Significant Pressures

Table 4. Significant Pressures identified for the Mountain (Carlow) PAA by the Initial Characterisation process.

Waterbody	Pressure Category	Sub-category	Significant Pressure
Mountain (Carlow)_010	Agriculture	Agriculture	Yes
	Hydromorphology	Channelisation	Yes
	Hydromorphology	Overgrazing	Yes
	Forestry	Forestry	Yes
Mountain (Carlow)_030	Urban waste water	Borris UWWTP	Yes
	Urban runoff	Diffuse sources runoff	Yes
	Agriculture	Pasture	Yes

3.1 Mountain (Carlow)_010

- Due to the lack of chemistry data for the Mountain (Carlow)_010 the significant issue affecting the catchment could not be identified.
- Due to the large area of forestry in the catchment (**Fig. 4** and **Fig. 5**) this should be investigated as it may be a source of sediment and nutrients.
- However, the waterbody has returned to good status in the 2017 monitoring period and as such there may no longer be any significant issues in the catchment.
- Previous forest felling operations are a possible explanation for the decline to moderate status in 2014.

3.2 Mountain (Carlow)_030

- The current status of the Mountain (Carlow)_030 is unknown as it has not been monitored since 1993.
- The chemistry monitoring results show that ammonia, ortho-phosphate and TON are generally below the EQS at the Ballycoppigan Br monitoring point.
- Borris UWWTP which discharges below Ballycoppigan Bridge failed it's ELV for ammonia in 2017 and there have been a number of spikes in ammonia, ortho-phosphate and COD recorded downstream of the UWWTP. The discharge is located at the outlet of the catchment and should be investigated.

4 Pathway Information and Analysis

4.1 Overview of Pathways in the PAA

- There have been no significant issues resulting from diffuse pressures identified in the PAA and as a result no relevant pathways have been identified during this desk study. The only possible relevant pathway is the poorly draining soils in the Mountain (Carlow)_010 for sediment loss during forestry operations.

4.2 Mountain (Carlow)_010

- Significant issue: Unknown. Possibly sediment and/or nutrients
- Significant pressure: Possibly forestry
- Relevant pathways: Unknown

4.3 Mountain (Carlow)_030

- Significant issue: Potentially short-lived spikes of ammonia and ortho-phosphate at site downstream of Borris UWWTP
- Significant pressure: The most likely significant pressure is Borris UWWTP
- Relevant pathways: Direct

4.4 Pathways Conceptual Model and Likely Critical Source Areas

- It is unclear if there are any relevant pathways for the Mountain PAA as the significant issues are unknown.
- There are no chemistry data available for the Mountain (Carlow)_010. However, it has returned to good status in the 2017 monitoring and as such there are unlikely to be any significant chemistry pressures acting on the waterbody.
- The status of Mountain (Carlow)_030 is unknown but the chemistry data shows that ammonia, ortho-phosphate and nitrate are all well below the EQS. Therefore, it is unclear if any pathways are relevant for this catchment.
- The most likely significant issue in the PAA is a direct discharge from the Borris UWWTP.

Mountain (Carlow) PAA Desk Study

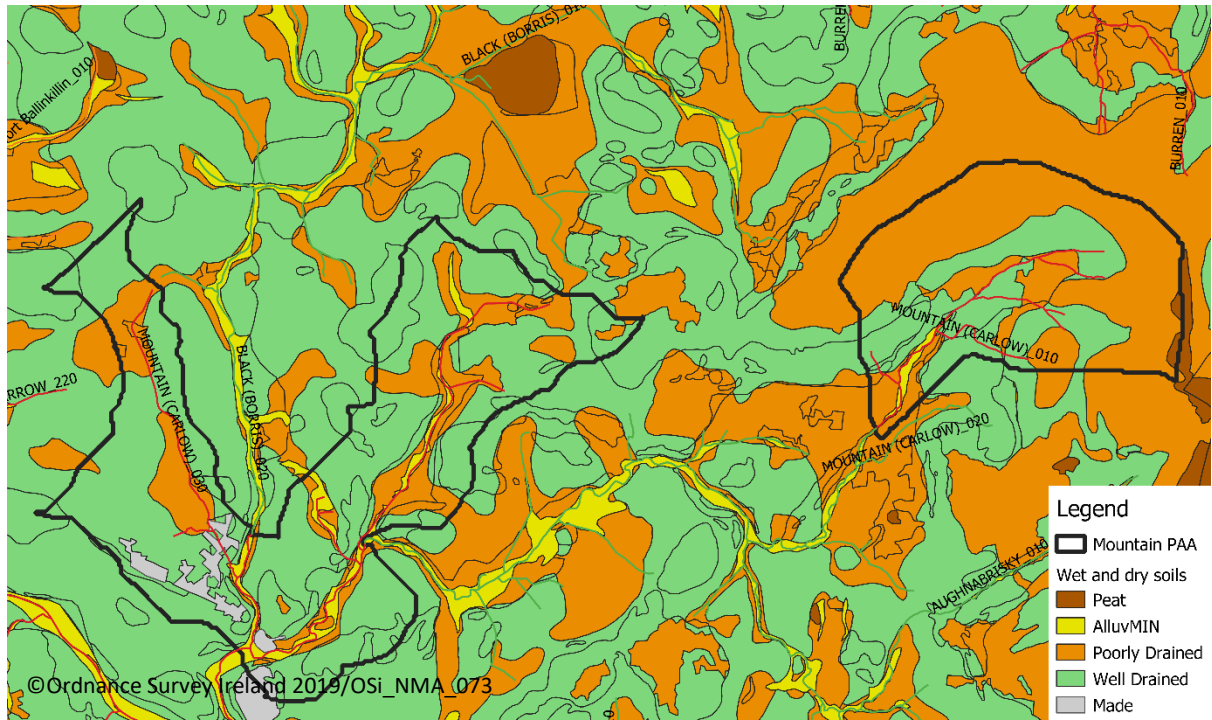


Figure 10. Wet and dry soils map.

5 Interim Story of the Mountain PAA

5.1 Mountain (Carlow)_010

- The Mountain (Carlow)_010 is classified as *At Risk*.
- The waterbody improved to good status in 2017 having been moderate status in 2014.
- There is no hydrochemistry data available for this waterbody.
- Therefore, significant issues, if any, cannot be determined.
- If there are any significant pressures in this catchment they are most likely resulting from the large area of forestry at the top of the catchment.
- The decline in status in 2014 was likely due to an impact from a large area of forestry which had been felled (see **Fig. 11** and **Fig. 12**). This was a once-off pressure and water quality has since returned to good status in 2017.

5.2 Mountain (Carlow)_030

- The Mountain (Carlow)_030 is classified as *At Risk*.
- The waterbody status is unassigned and has not been monitored since 1993 when it was found to be at high status.
- Hydrochemical results from the Ballycoppigan Br monitoring site indicate that the waterbody is at high status for ammonia and ortho-phosphate and at good status for TON. Ammonia concentrations are indicative of good status and orthophosphate concentrations are indicative of high status both upstream and downstream of Borris UWWTP.
- From the available data no significant issues have been identified which would affect the Ballycoppigan Br monitoring point. However, the Borris UWWTP should be investigated due to past breaches of ELVs.

5.3 Overview

The desk study identified no significant issues which are likely to be affecting the overall status of the Mountain (Carlow)_010 or Mountain (Carlow)_030 waterbodies. The Mountain (Carlow)_010 has recently returned to good status. One possible explanation for the drop to moderate status in 2014 could be the large area of tree felling in the upper reaches of the waterbody (**Fig. 11** and **Fig. 12**) that took place after 2009 (exact date currently unknown). Borris UWWTP should be investigated due to breaches of ELVs which could be affecting water quality in the lower section of the Mountain (Carlow)_030.



Figure 11. Aerial photograph from 2009 showing extent of forestry in Mountain (Carlow)_010 catchment.



Figure 12. Aerial photograph from April 2018 showing current extent of forestry in Mountain (Carlow)_010 catchment.

6 Work Plan

6.1 Mountain (Carlow)_010

- Confirm that Mountain (Carlow)_010 is not at risk at monitoring point at Br U/S of Killedmond Br.
- Contact Forest Service for felling records for this waterbody.
- Liaise with Forest Service in relation to best practice being implemented during future forestry operations in this catchment as forestry is the likely cause for decline in status in 2014.

6.2 Mountain (Carlow)_030

- Investigate Borris UWWTP. SSIS upstream and downstream of outfall. May need to carry out mass balance calculations if issues detected.

7 Possible Mitigation Options

- Buffer strips, sediment traps and general best practice being implemented during forestry operations in the catchment.
- Possible upgrade works on Borris UWWTP.