

Desk Study

Bunow Priority Area for Action

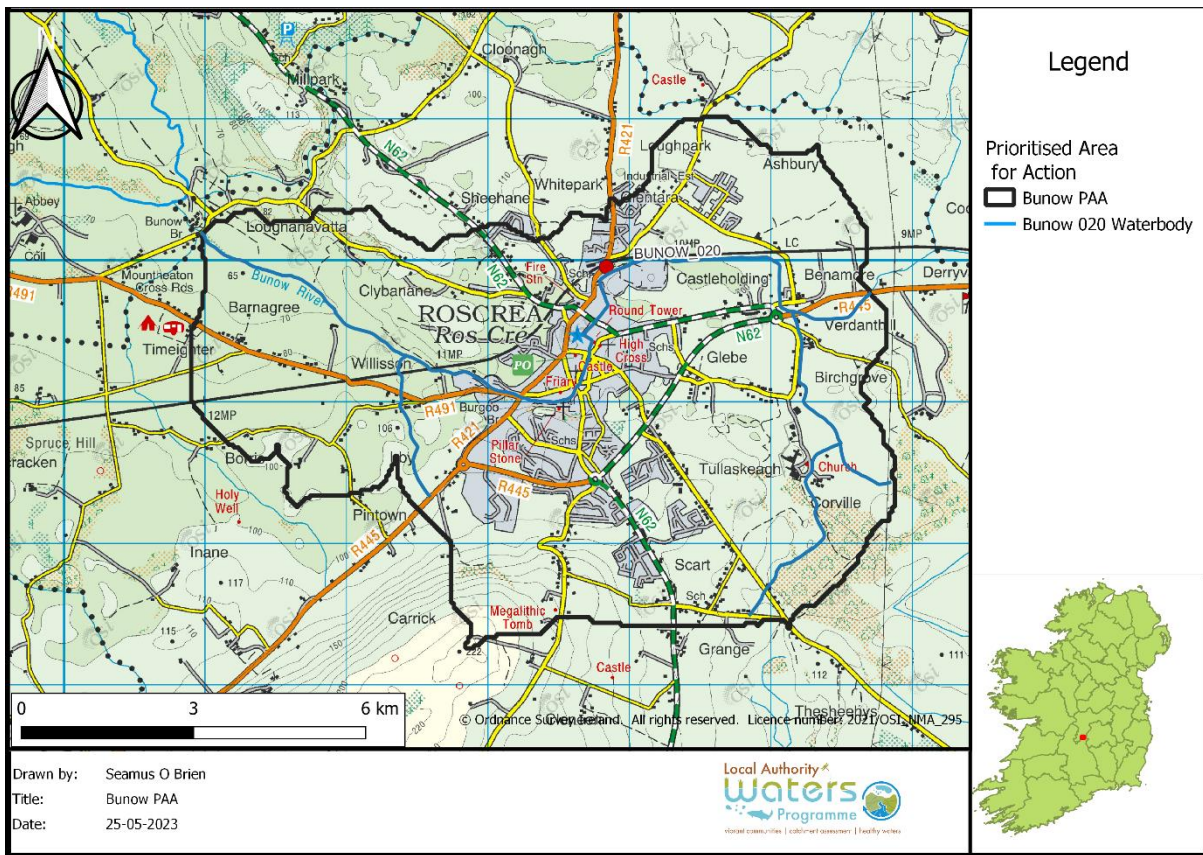


Table of Contents

1	Background	3
1.1	Background to Priority Area for Action	3
1.2	PAA information	4
2	Receptor Information and Assessment	6
2.1	Context and setting	6
2.2	Bunow_020.....	6
2.3	Protected Areas	13
3	Significant Pressures	14
3.1	Bunow 020.....	14
4	Pathway Information and Analysis	18
4.1	Overview of Pathways in the PAA	18
4.2	Pathways Conceptual Model and Likely Critical Source Areas.....	21
5	Interim Story of the (Bunow) PAA	22
5.1	Bunow 020.....	22
5.2	Overview.....	22
6	Work Plan.....	23
6.1	Chemistry sampling	23
6.2	Biological Assessment.....	24
6.3	River Walks	24
7	Possible Mitigation Options	25
8	Communications	26
8.1	Community Information Meeting	26
8.2	Farmers Information Meeting	26

List of Figures

Figure 1-1	Bunow 020 river with flow directional arrows	5
Figure 2-1	Monitoring stations located within the Bunow 020 PAA.....	6
Figure 2-2	Bunow_020 Bridge d/s of Roscrea train station (RS25B250250) Q value results	9
Figure 2-3	Ortho Phosphate Results for Bunow Bridge (RS25B250400) on Bunow 020	10
Figure 2-4	Total Ammonia Results for Bunow Bridge (RS25B250400) on Bunow 020	11

Bunow PAA Desk Study

Figure 2-5 T.O.N results for Bunow Bridge (RS25B250400) on Bunow 020	12
Figure 2-6 Ground water Drinking water Protected area Bunow 020.....	13
Figure 3-1 Ortho Phosphate PIP risk map for Bunow 020	15
Figure 3-2 Nitrate Loss PIP maps for Bunow 020.....	16
Figure 3-3 Stormwater Overflow locations in Bunow 020.....	17
Figure 4-1 Sand and Gravel Aquifer in the Bunow 020 PAA.	18
Figure 4-2 Wet/Dry soils map for Bunow 020.	19
Figure 4-3 Vulnerability map for the Bunow 020	20
Figure 4-4 Bedrock units in Bunow 020	21
Figure 6-1 proposed sampling points Bunow 020	24

List of Tables

Table 1	Summary of Risk, Ecological Status, Pressures and Significance for the Bunow PAA	4
Table 4	Significant Pressures identified for the Bunow 020 PAA by the Initial Characterisation process	14

Acknowledgements

The authors would like to acknowledge the contribution of Tipperary County Council staff and thank them for their support of the Local Authority Waters Programme. The Council has carried out a significant amount of work in the Bunow catchment in recent years.

1 Background

1.1 Background to Priority Area for Action

The Bunow PAA is located in Co. Tipperary and includes the section of the Bunow river flowing through Roscrea Town. It is a one waterbody PAA consisting of the Bunow_020 waterbody.

Catchment assessment workshops to collaboratively undertake a prioritisation process to select areas to be addressed during the 2nd river basin management planning cycle (2018-2021) were held in Limerick on the 29th of June 2017, Ballincollig on 4-5 June 2017 and Killarney on 6-7 June 2017. They were attended by representatives of the local authorities (Kerry, Cork City, Cork County, Tipperary, Limerick City and County, Clare and Galway), LAWCO, Irish Water, IFI, Forest Service, Coillte, NPWS, DHPLG, GSI, NFGWS, DAFM Marine Institute, Bord Iascaigh Mhara, Sea Fisheries Protection Authority, Waterways Ireland, National Water Forum, Raptor Life IRD Duhallow, Kerry Life Project, ESB and EPA. Based on the draft River Basin Management Plan priorities, a set of agreed principles and the priorities of the workshop attendees, 59 areas were recommended for action in the South West region and this PAA was selected for the following reasons:

- Build on ongoing work by Tipperary County Council.
- Important for rural town (Roscrea) that it flows through
- In the catchment of two water supplies Shinrone and the Roscrea Gravels.

Table 1-1 Background on the Bunow PAA

Priority Area for Action	Catchment Number	Catchment Name	Sub catchment	Region	Local Authority
Bunow PAA	25 B	Lower Shannon	25B_6 LittleBrosna_SC_010	South East	Tipperary Co. Co.

Table 1-2 Bunow Waterbody status

Priority Area for Action	No. of At Risk WBs	No. of Review WBs	No. of dRBMP Prioritised WBs	No of WBs for Status Improvement:		
				2021	2027	Beyond 2027
Bunow	01	00	01	0	0	1

1.2 PAA information

The Bunow Priority Area for Action consists of a single water body, Bunow_020. The risk classification, environmental objectives, ecological status, significant pressures (and sub-category) for the waterbody are detailed in Table 1-3 below. Figure 1 1 Bunow Priority Area for Action Ecological Status (2018) Figure 1 1 and Figure 1 2 below illustrate the ecological status (2013-2018) and risk classification for water bodies within the PAA.

Table 1 Summary of Risk, Ecological Status, Pressures and Significance for the Bunow PAA

WB Code	WB Name	WFD Risk	Status Obj.	Ecological Status				Pressure Category	Pressure Subcategory	Sig. Pressure
				2009-2011	2012-2014	2015-2017	2018-2021			
IE_SH_25B250400	Bunow_020	<i>At Risk</i>	Good	Good	Mod.	Mod.	Mod.	Urban Waste water Industry Hymo	Agglomeration PE > 10,000 Section 4	Yes

Bunow PAA Desk Study

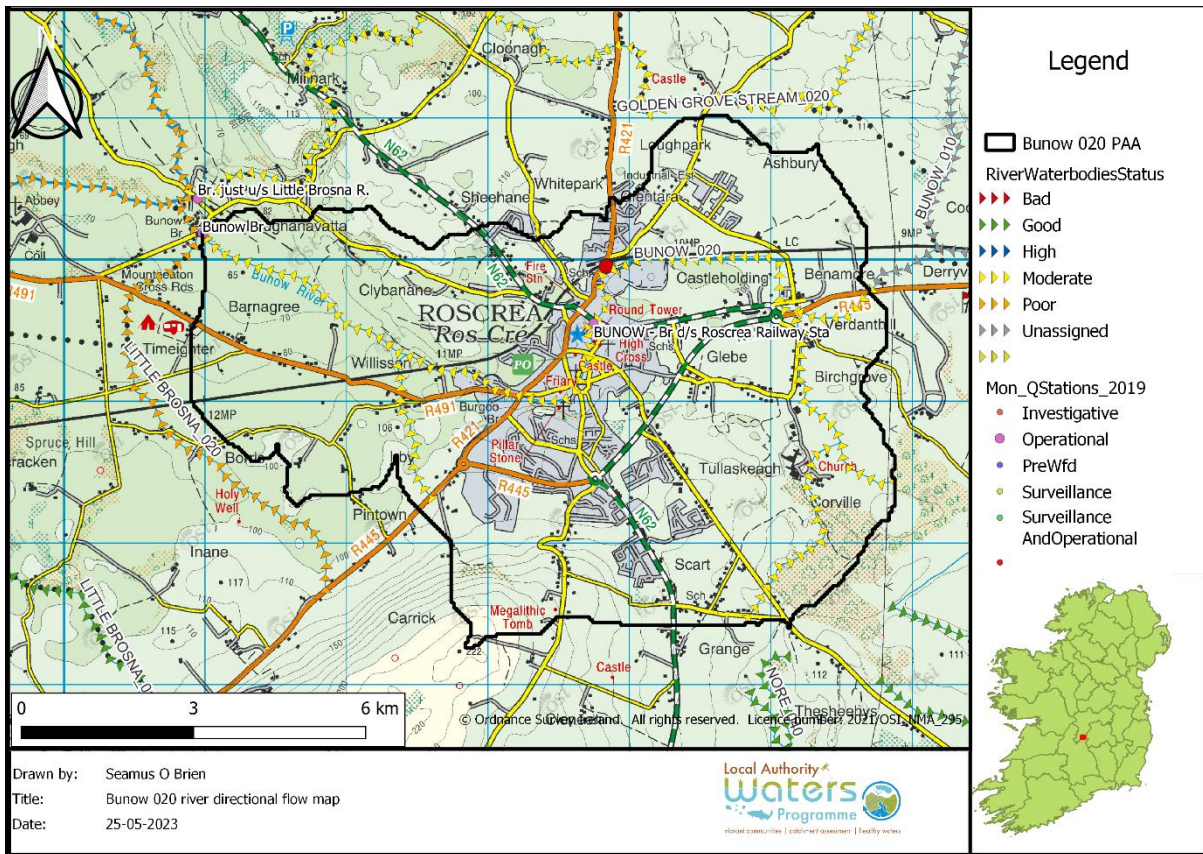


Figure 1-1 Bunow 020 river with flow directional arrows.

2 Receptor Information and Assessment

2.1 Context and setting

The PAA is a single waterbody PAA, the Bunow_020.

This waterbody has two monitoring points. These monitoring points as seen in Figure 2-1 and are the basis for the receptor assessment.

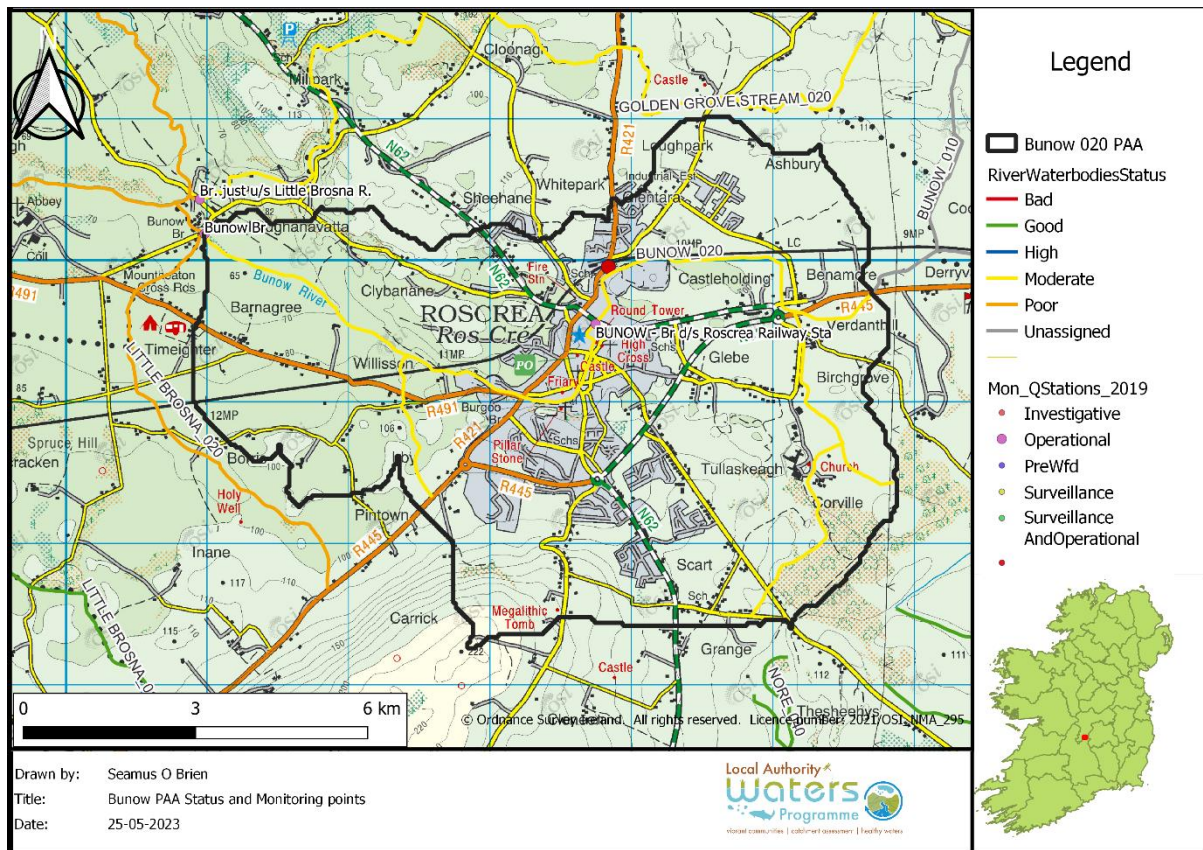


Figure 2-1 Monitoring stations located within the Bunow 020 PAA

2.2 Bunow_020

- This waterbody is the second waterbody in the Bunow river. The inputting water is the Bunow 010, status has not been assigned to this waterbody as there is no monitoring data available. Bunow_020 starts just above Roscrea town and flows through the town to Bunow Bridge located about 5km downstream of the town. Information on the Bunow_020 and its monitoring stations is seen in Table 2-1.
- There are two monitoring points in the Bunow 020. Only one of the waterbodies monitoring sites has chemical monitoring data, that is RS25B250400 Bunow Bridge. Biological assessments are done at both sites.
- The EPA's initial characterisation identified four significant pressures in this water body:
 - Urban Waste Water: Agglomeration PE > 10,000 Roscrea

- Industry: Section 4 Licensed Discharge
- Hydromorphology: Embankments
- Aquaculture: Aquaculture

A review of the mapping within the PAA shows that the potential aquaculture pressure is not located within the PAA.

Table 2: Receptor information for Bunow PAA

Factor	Figures Tables	Bunow 020 RS25B250250 bridge d/s of Roscrea Train station.	Bunow 020 RS25B250400 Bunow Bridge
Risk Category		<i>At Risk</i>	<i>At Risk</i>
Biological Status 2010-2015 2016-2018 trends in Q values 2016-2018 Q value data Fish status (where rel)	Fig 2-2 & 2-3	Q4 Good (2011) Q3-4 Moderate (2014) Q3-4 Moderate (2017) Q3-4 Moderate (2021)	Q4 Good (2011) Q3-4 Moderate (2014) Q3-4 Moderate (2017) Q3-4 Moderate (2021)
		Moderate	Moderate
		Trend: Moderate since 2014 No fish status data	Trend: Moderate since 2014 No fish status data
Hydrochemistry Data			
Ortho-P (mg/l P)	Baseline 2020 indicative quality Trends - significant? Dist to threshold	Fig 2-3 N/A	0.041733 Moderate Upward near
NH4-N (mg/l N)	Baseline 2020 indicative quality Trends - significant? Dist to threshold	Fig 2-4 N/A	0.027467 High Downwards far
TON (mg/l N)	Baseline 2020 indicative quality Trends - significant? Dist to threshold	Fig 2-5 N/A	2.406667 Moderate Downwards Near
Supporting Conditions	Chemical conditions? Oxygenation Conditions Acidification Conditions	N/A	Pass Pass
Hydromorphology			
RHAT score			None
Evidence of Arterial drainage			None
Ecological Status (2010–2015)		Good (2011) to moderate (2014)	
Trends (2010-2015)		Downwards	
Protected Areas		Groundwater protection areas for Shinrone and Roscrea gravels	
WFD Objective		Good	
EPA biologist notes (if any)		As was the case in 2014 and 2017, both sites assessed on the Bunow were in unsatisfactory Moderate condition in 2021.	
Significant issue/impact for receptor (e.g. PO₄)		The significant issue is nitrogen in the form of (T.O.N.), the latest trend for phosphate is also upwards but this is due to two very high results, one in each year (0.29 in 2021 and 0.24 in 2022)	

2.2.1 Biological assessment

The waterbody has shown signs of impact since 1971 with both monitoring sites only reaching good ecological status once in 2011. The sites match each other in terms of change of status. The sites are currently at Moderate biological status and have been since 2014, details of their ecological status are outlined in Figures 2-2 and 2-3.

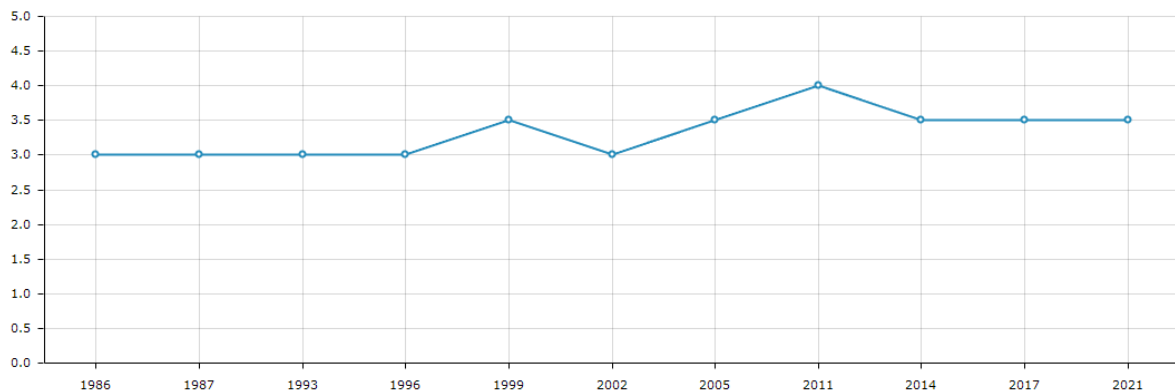


Figure 2-2 Bunow_020 Bridge d/s of Roscrea train station (RS25B250250) Q value results

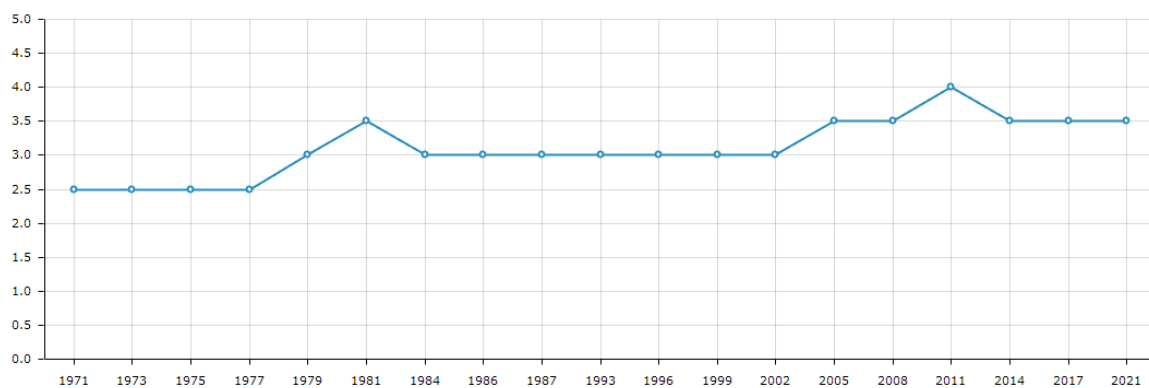


Figure 2 3 Bunow_020 Bunow Bridge (RS25B250400) Q value results

2.2.2 Chemical assessment

There is only one hydro chemistry monitoring site within the PAA. This is located at Bunow Bridge (RS25B2504000) near the end of the waterbody. There are no monitoring results for the Bunow_010 so Bunow Bridge results are the results of the flow and nutrient load within both waterbodies.

Up to the period 2021-2022 the ortho-phosphate concentration in the waterbody was within the good status thresholds. However a number of high results in 2021 and 2022 have pushed results over the environmental quality standard (EQS) for good status. The results for 2021 showed two very high results for ortho P with results of 0.29mg/l and 0.1mg/l.

A result of 0.24mg/l was also noted in the 2022 results. This is seen in Figure 2 3 and is well above the other results for the year.

The ammonia results (Figure 2-4) show levels that are generally within the Good status threshold. However the results for Total Oxidised Nitrogen (T.O.N) (Figure 2-5) show levels that are above the indicative quality threshold for T.O.N. of 1.8mg/l.

The chemistry results for Bunow Bridge as mentioned above takes in two waterbodies. LAWPRO fieldwork will need to identify if this nutrient load for nitrogen as T.O.N and in recent years Phosphorus is generated within the Bunow_020 or coming from the headwaters of the Bunow_010.

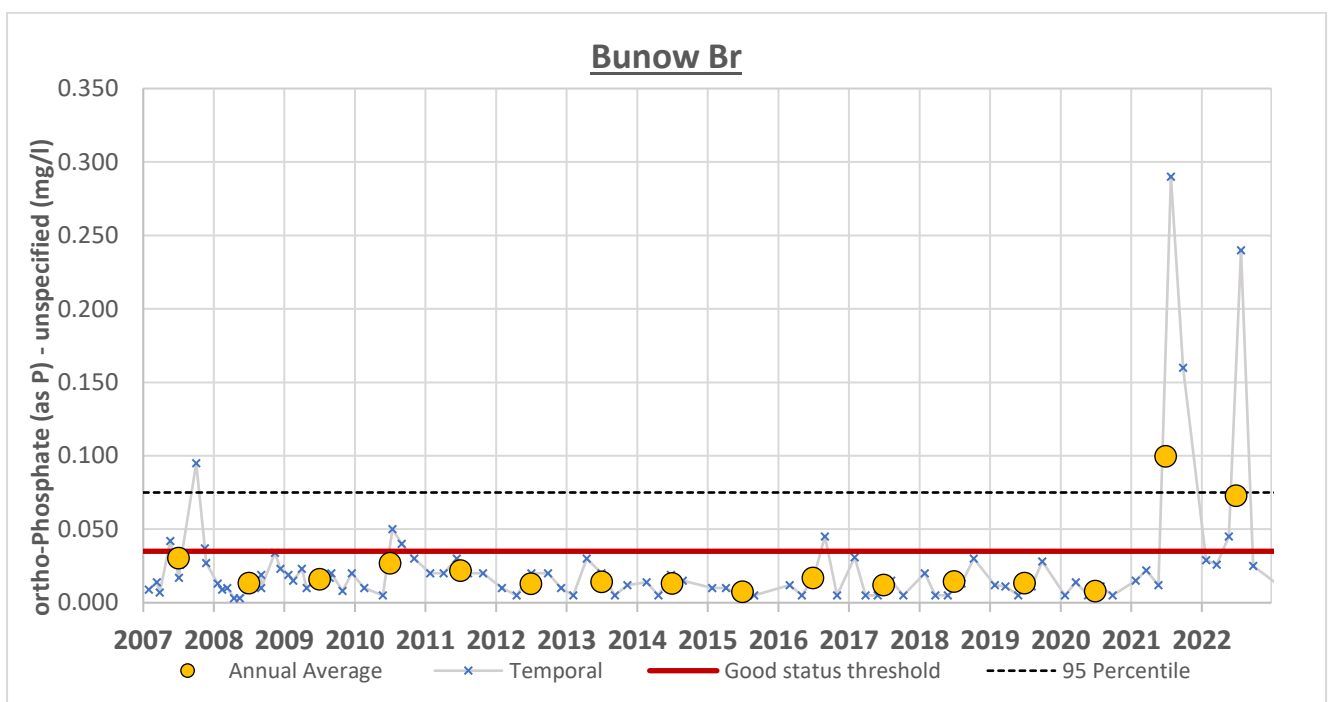


Figure 2-3 Ortho Phosphate Results for Bunow Bridge (RS25B250400) on Bunow 020

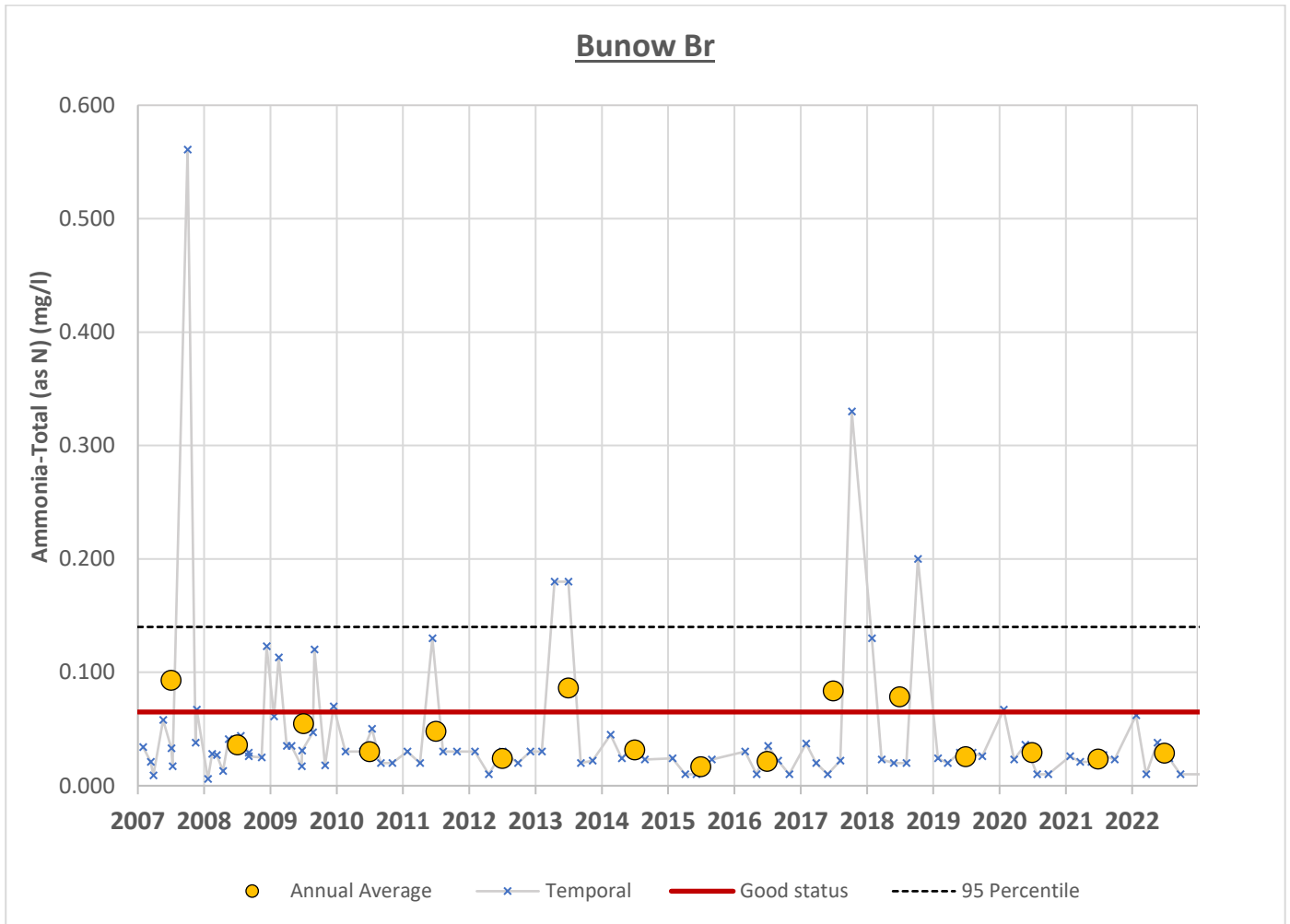


Figure 2-4 Total Ammonia Results for Bunow Bridge (RS25B250400) on Bunow 020

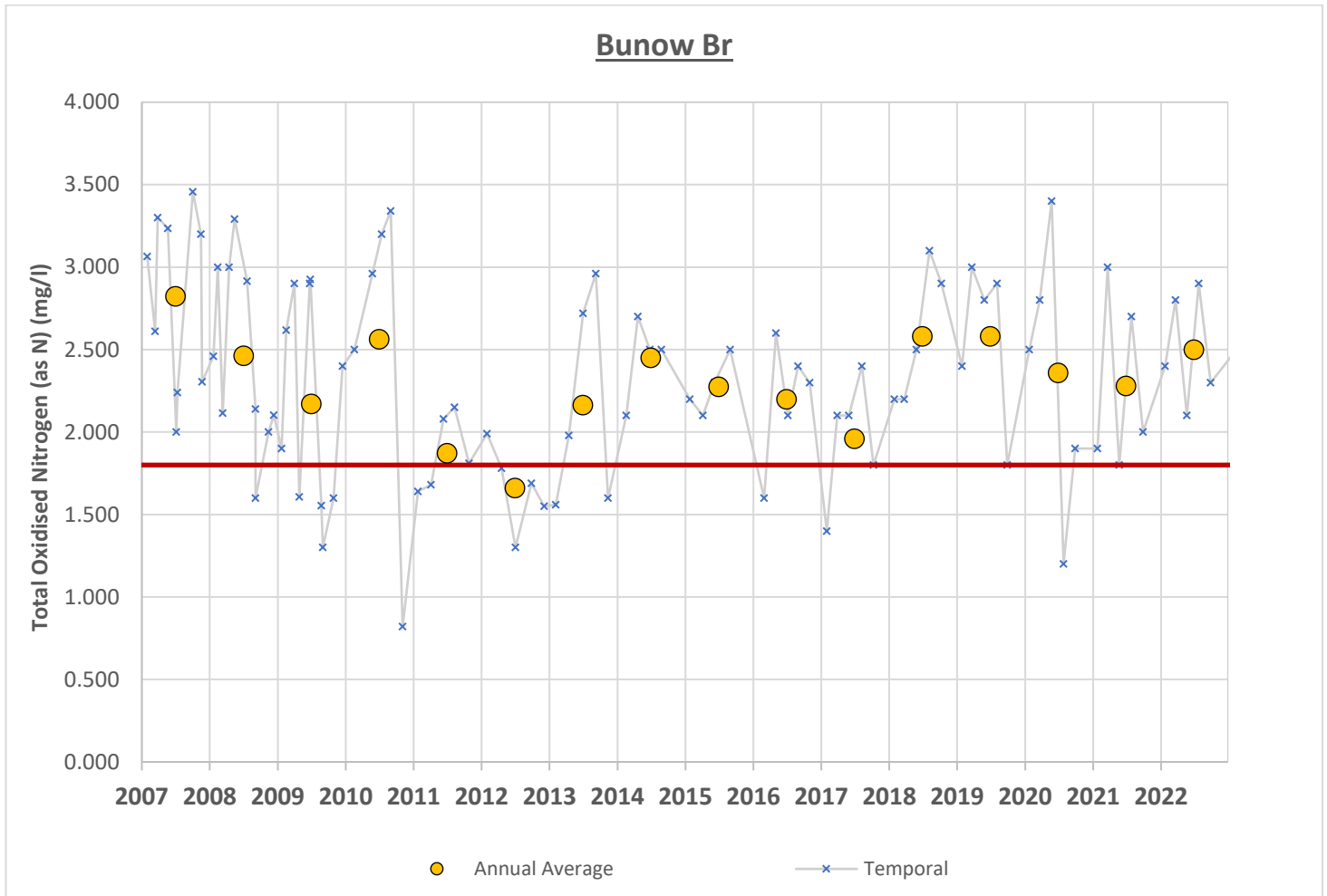


Figure 2-5 T.O.N results for Bunow Bridge (RS25B250400) on Bunow 020

2.3 Protected Areas

The PAA is in the protected area for two ground water drinking water supplies. This is seen in figure 2-6.

Table 3 Protected areas in Bunow PAA

Protected Area	Water Body	Type	Association Type
Shinrone	Bunow 020	Drinking Water	Within Protected Area
Roscrea Gravels	Bunow 020	Drinking Water	Within Protected Area

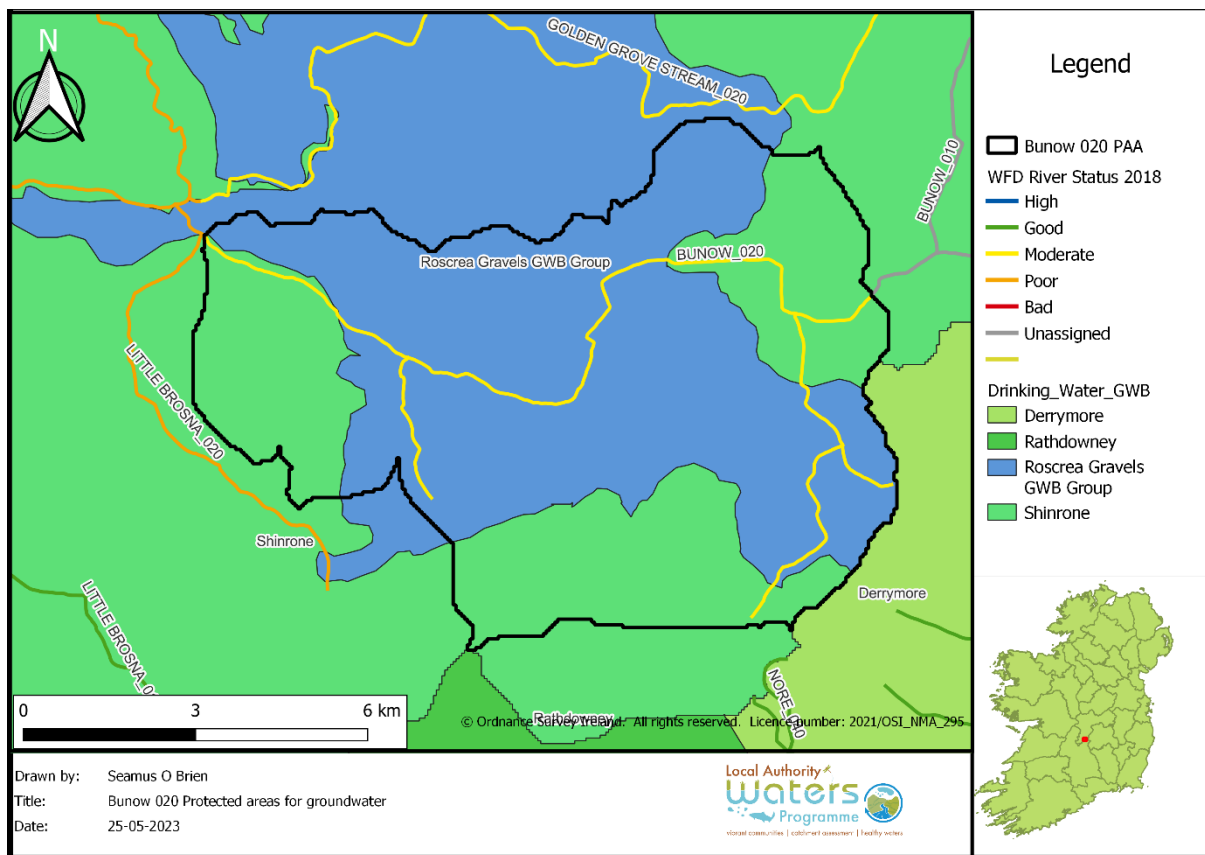


Figure 2-6 Ground water Drinking water Protected area Bunow 020

3 Significant Pressures

As part of the preparation for the second cycle of the WFD, the EPA prepared a characterisations on the different waterbodies and PAA's. This allowed for the identification of pressures in the different PAA's and the classification as to the significance of the pressure. These are outlined in Table 4 below.

Table 2 Significant Pressures identified for the Bunow 020 PAA by the Initial Characterisation process

Water body name	Water Body Code	Pressure category	Pressure subcategory	Significant?	
Bunow 020	WBP0003046	Urban Waste Water	Agglomeration PE > 10,000 (Roscrea)	Yes	WFD Cycle 2
	WBP0004148	Industry	Section 4	Yes	WFD Cycle 2
	WBP0004149	Hydromorphology	Embankments	Yes	WFD Cycle 2
	WBP0004150	Aquaculture	Aquaculture	Yes	WFD Cycle 2

3.1 Bunow 020

The pressures outline in Table 4 above point largely to point sources as being issues in the waterbody. The point source from Roscrea WWTP is not from the outfall from the treatment plant but from discharges from the sewer network in the town possibly including storm water overflows (SWO's). The location of the SWO's are seen in Figure 3-3.

The fish farm/hatchery that is linked to the Aquaculture and down for the Industry pressure is not discharging to the Bunow 020. This fish farm/hatchery operated by Inland Fisheries Ireland is located outside of the waterbody and discharges to the Little Brosna_020. However there are EPA licenced facilities within the waterbody whose potential impact on the waterbody will need to be assessed.

The Hydromorphology pressure is based on bank erosion and river wall collapse. There is significant modification to the river as it flows through the middle part of town. Funding has been granted for a project led by the local angling club to remove barriers in this stretch. Signs of river straightening can also be seen in the waterbody.

The orthophosphate Pollution Impact Potential (PIP) risk maps (Fig 3-1) show an area with high risk of ortho phosphate loss just upstream from the chemical monitoring point at Bunow Bridge. The area upstream also shows area of high risk of Nitrate loss as shown in Figure 3-2. While this area is near the monitoring point the potential pressures of concern are still the point sources outlined in Table 4 above. As noted in Section 2.2.2 the inputting waterbody the Bunow 010 is an unassigned waterbody that has no chemical or biological data.

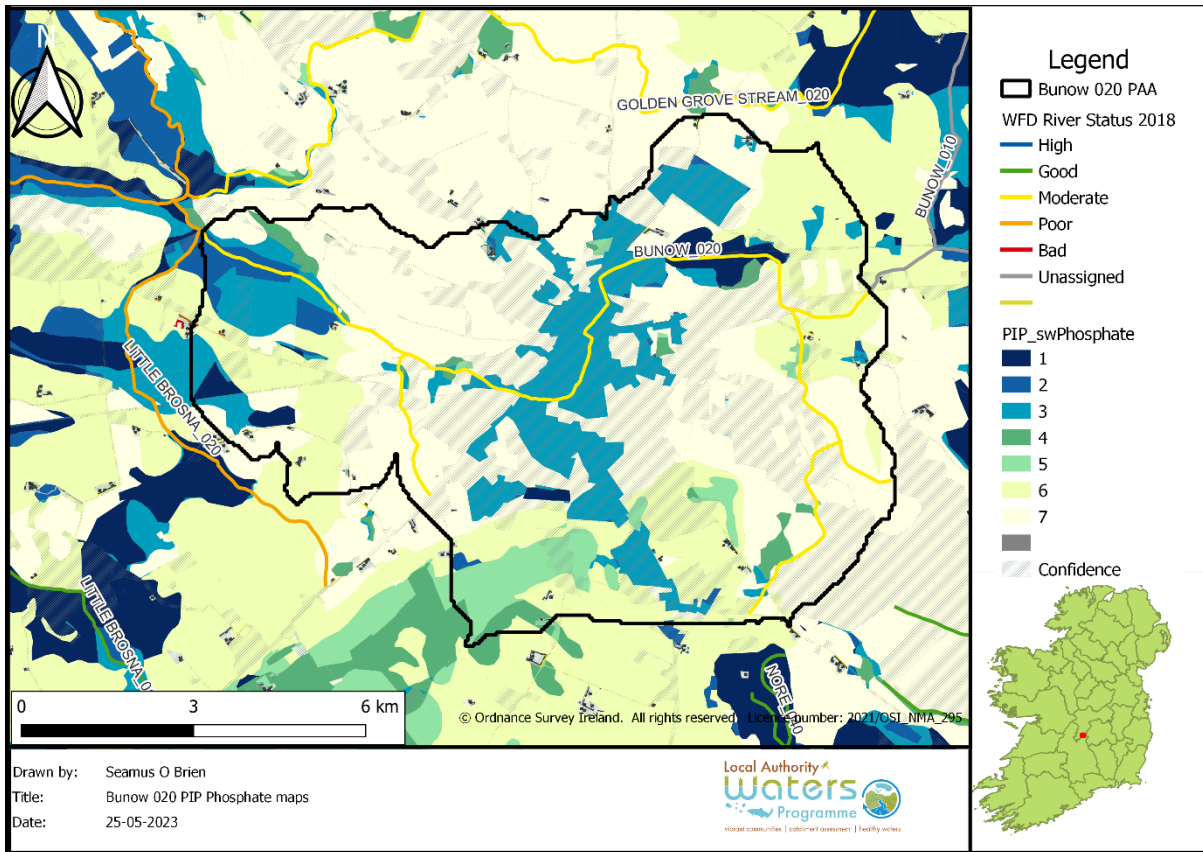


Figure 3-1 Ortho Phosphate PIP risk map for Bunow 020

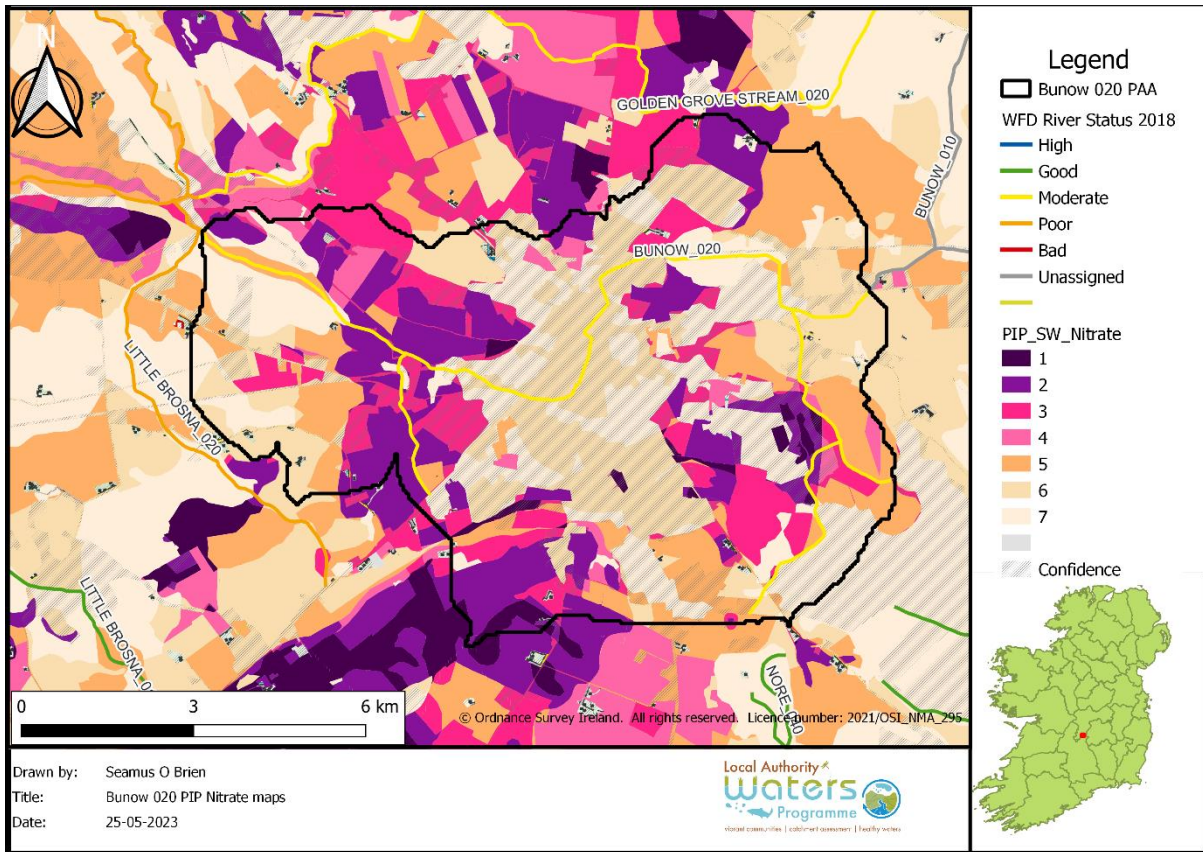


Figure 3-2 Nitrate Loss PIP maps for Bunow 020

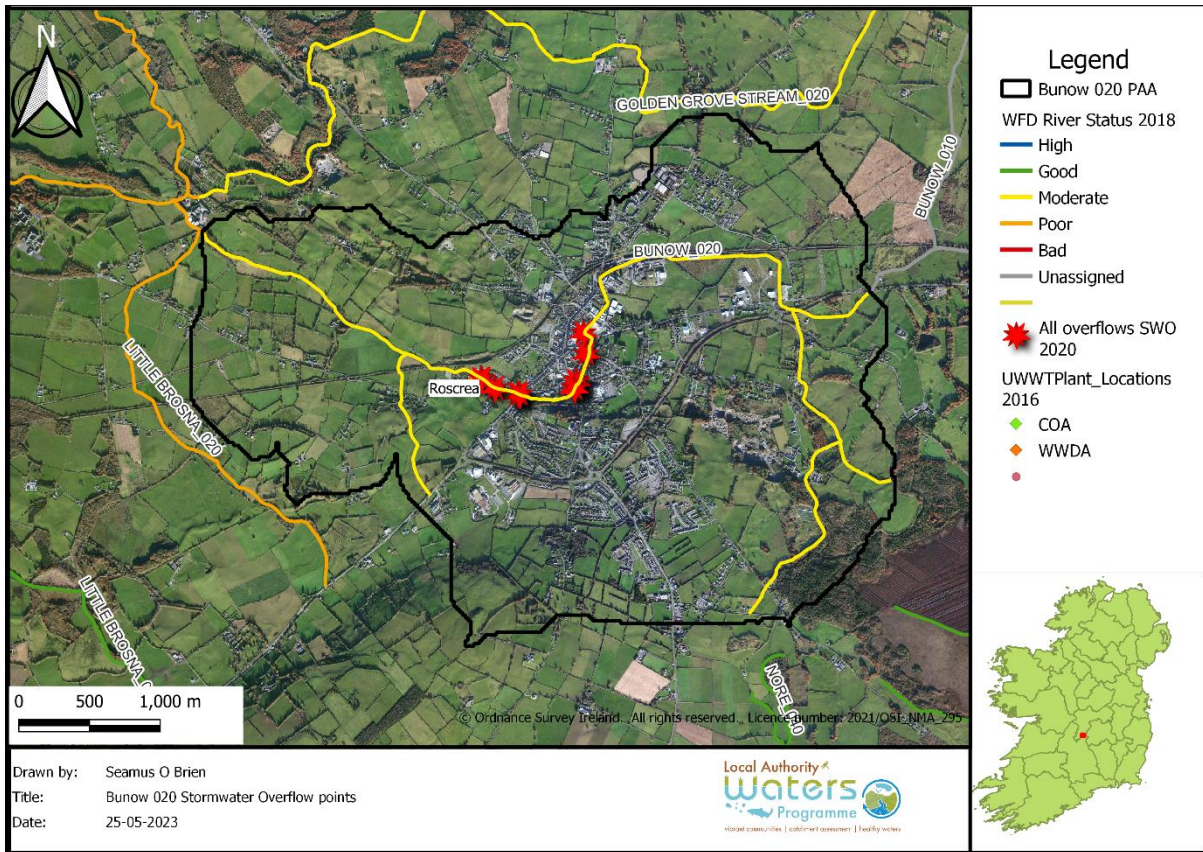


Figure 3-3 Stormwater Overflow locations in Bunow 020

4 Pathway Information and Analysis

4.1 Overview of Pathways in the PAA

The analysis of the chemical data shows Nitrogen to be the nutrient of concern in the catchment. As outlined in Figure 3-2 there are areas at high risk of nitrogen loss within the PAA. This is backed up by the presence of a large sand/gravel aquifer as shown in Figure 4-1, which flows along a large stretch of the Northern bank of the river above the monitoring point. The soils map in Figure 4.2 show this as a well-drained area and the potential for Nitrogen loss by leaching is supported by the vulnerability map in Figure 4-3 which shows much of the area as high to extreme vulnerability.

Despite the different bedrock units that underlie the PAA as outlined in Figure 4-4. All of the bedrock in the waterbody is classed as Bedrock which is Moderately Productive only in Local Zones (LI). Bedrock is therefore not a factor in the pathway analysis as it is all in the same category and has the same fractured upper zones which is largely overlain with a sand gravel aquifer.

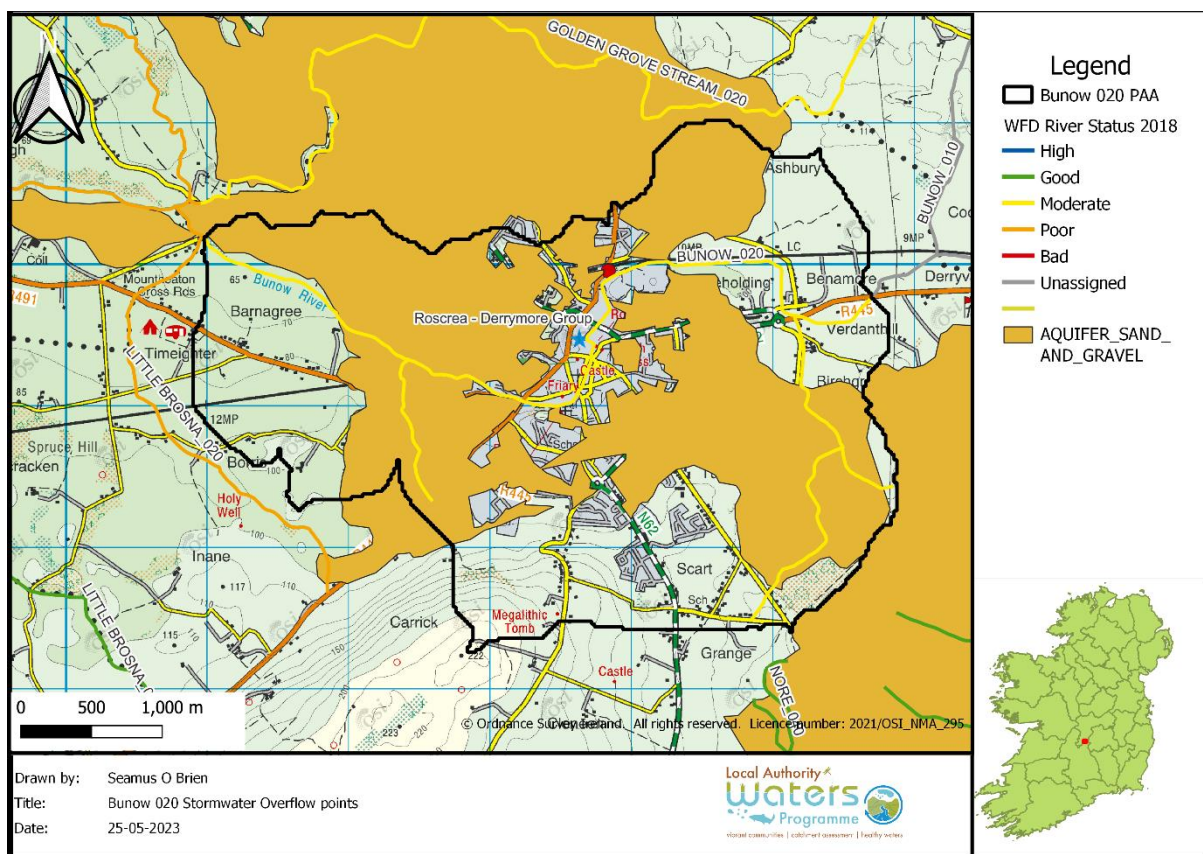


Figure 4-1 Sand and Gravel Aquifer in the Bunow 020 PAA.

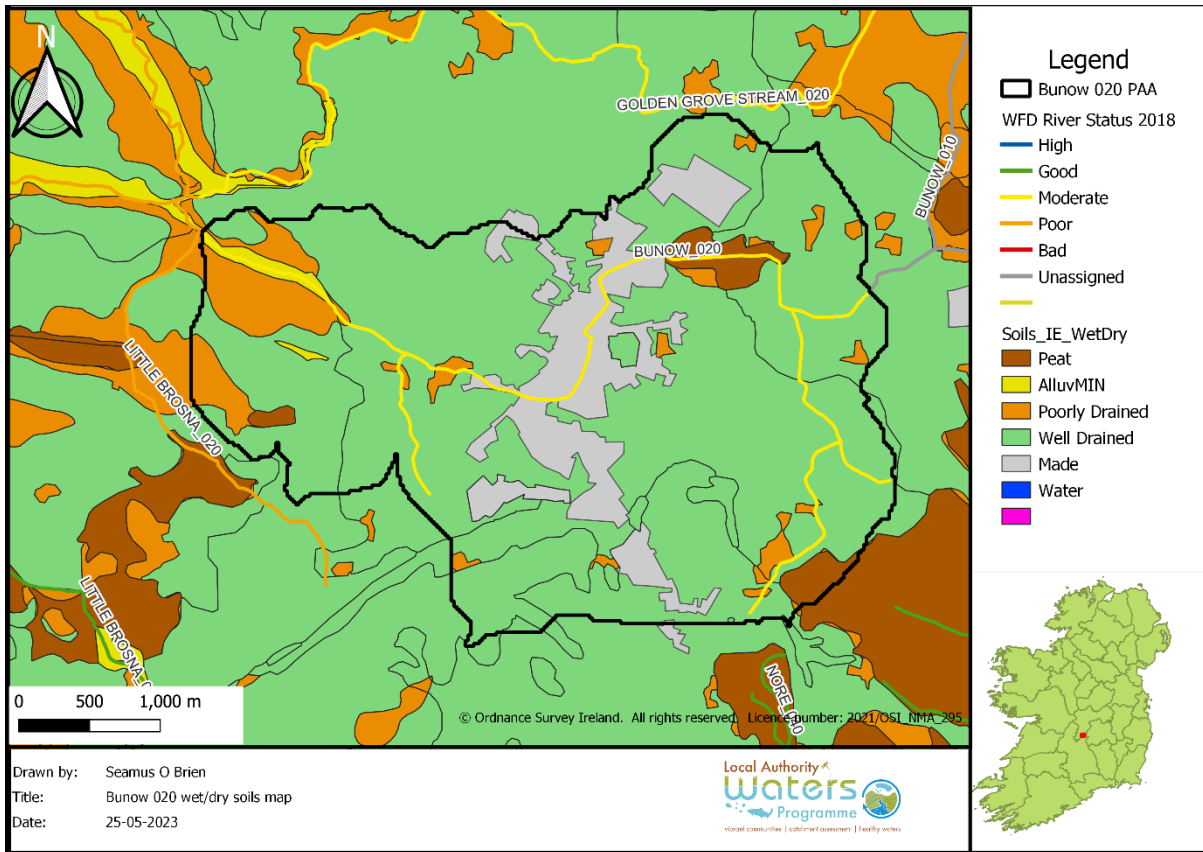


Figure 4-2 Wet/Dry soils map for Bunow 020.

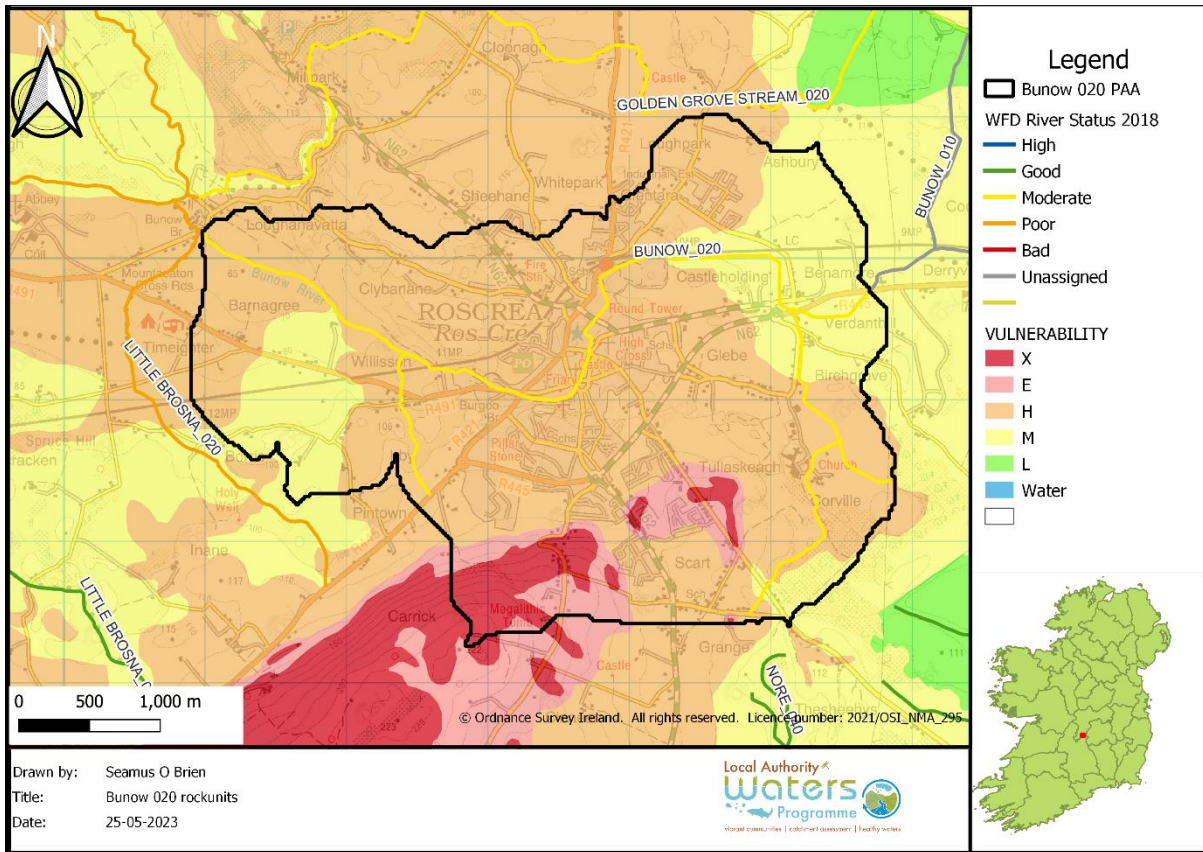


Figure 4-3 Vulnerability map for the Bunow 020

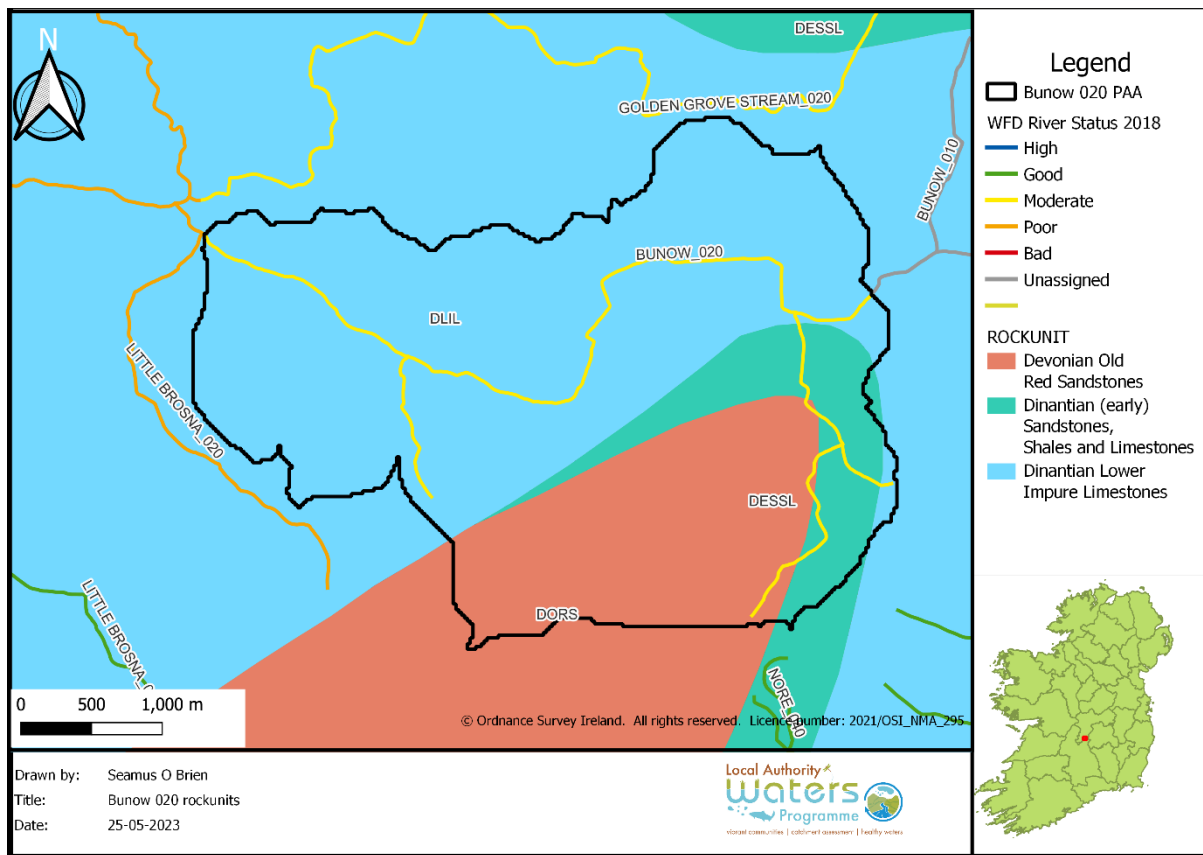


Figure 4-4 Bedrock units in Bunow 020

4.2 Pathways Conceptual Model and Likely Critical Source Areas

Based on the information outlined in the above pathway analysis and also the pressures outline in section three above the conceptual model of this waterbody and PAA are as follows:

- The prime sources of pressure in the PAA are from point sources located mainly within the towns footprint.
- A possible secondary pathway for nitrogen leaching has been identified in the high risk Nitrogen loss areas south of the Roscrea Wastewater Treatment Plant and upstream of Bunow Bridge. The flowpath is near surface flow and groundwater flow. This area has a sand/gravel aquifer, well draining soils and a high risk of loss of nitrogen to waters. This area is also the area where the main land use is agriculture.

5 Interim Story of the (Bunow) PAA

The Bunow PAA consists of the one waterbody the Bunow 020. This waterbody is outlined below

5.1 Bunow 020

- This is an at risk waterbody.
- This waterbody is at moderate status.
- The hydrochemistry for the waterbody shows some elevated results for T.O.N. and a spike for orthophosphate in the second half of 2021.
- The significant issues appear to be nitrogen loss and hydro morphology. The likely source for the Nutrient issues appears to be point source.
- The significant pressure identified in the waterbody are Urban Waste Water in the form of the sewer network and Storm Water Overflows, Industry in the form of licenced activities; Hydro morphology and Aquaculture. The Aquaculture has to be confirmed as discharging to the waterbody.
- There are two potential critical source areas, one is in relation to the stretch of the waterbody downstream and south of the Roscrea WWTP which has a high potential for Nitrate loss and the area above the wastewater treatment plant that has an industrial discharge, channelisation of the river and also a number of Storm water Overflow points.
- There are no significant point sources near the monitoring point.

5.2 Overview

As this is a single waterbody PAA the outline of the PAA is as above in section 5.1. The pressures in the waterbody appear to be potentially from point sources. This is not surprising given the largely urban nature of the Bunow 020 which includes Roscrea town. The area between the town and the monitoring point does show a high risk of loss of Nitrogen from the mainly agricultural lands. It should be noted that the monitoring point is located about 200m before the Bunow 020 enters the Little Brosna River.

Bunow PAA

6 Work Plan

The initial characterisation sub-catchment assessment by the Environmental Protection Agency Catchments Units recommended that the following investigative assessment actions be undertaken by LAWPRO catchment scientists to identify what measures are required:

- IA7 - there are a number of issues: hydromorphology/ sediment/ nutrients. Look at upstream and downstream of the plant to rule in/out in first instance. It was noted that a small tannery inputting to Roscrea plant was potentially triggering the total nitrogen exceedances and it is believed that this is a significant pressure.

The proposed workplan for the Bunow 020 will consist of the following elements:

6.1 Chemistry sampling

- There are no chemistry data for the inputting waterbody, the Bunow 010. Sampling will be needed to see if there is a nutrient pressure/load coming from outside the PAA.
- The monitoring is at the end of the waterbody and 5km downstream from Roscrea town. Physio-chemical sampling will be required through out the town to see the impact of potential point sources and misconnections in the town and side tributaries.
- Sampling at different stages will help detect any higher nutrient concentrations and potential contribution to nutrient loadings.

Proposed sampling points are seen in Figure 6-1.

Bunow PAA

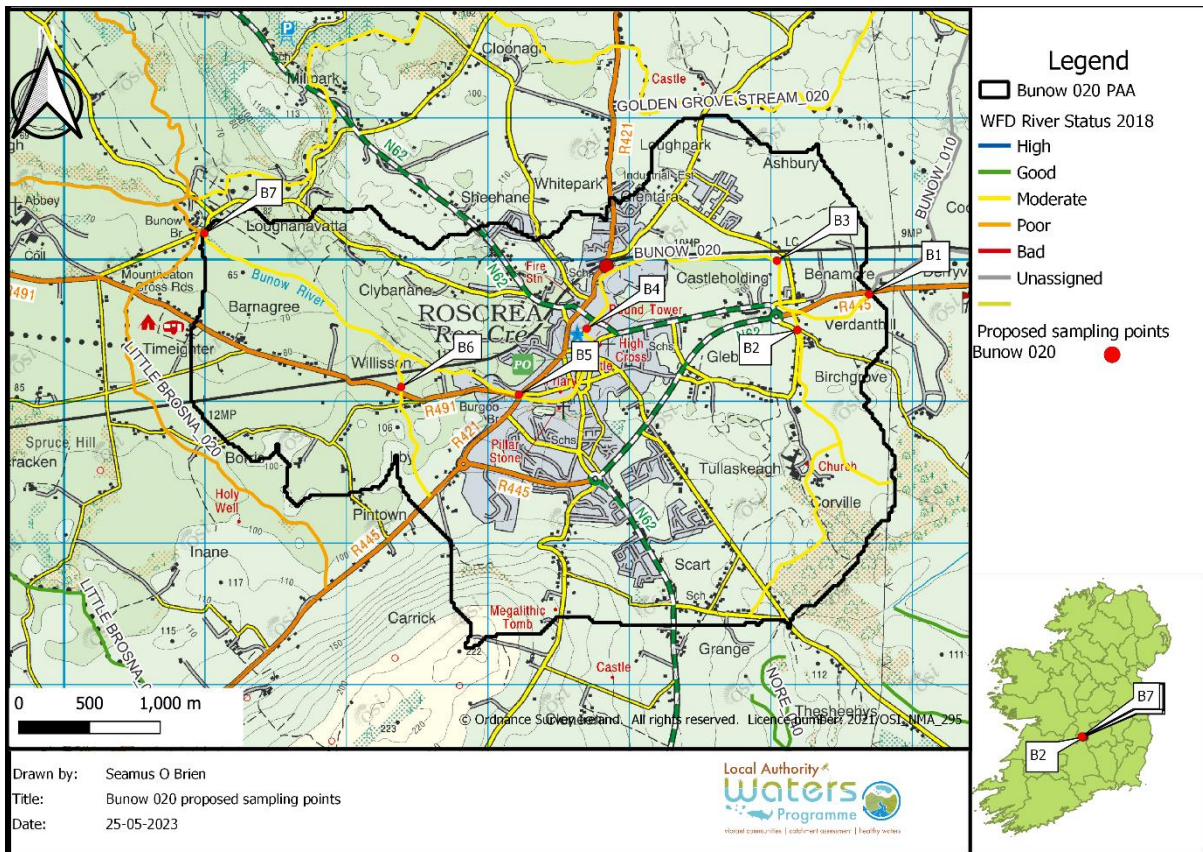


Figure 6-1 proposed sampling points Bunow 020

6.2 Biological Assessment

There are two biological monitoring points in the waterbody/PAA. It is proposed to carry out a number of SSIS assessments near the point source pressures between B4 and B6 as outlined in Figure 6-1. It is also proposed to carry out SSIS on the side tributaries flowing into the main channel and also in the areas at high risk of nitrate loss located between B7 and B9 in the above Figure.

6.3 River Walks

There are a number of potential points sources located in Roscrea town and also areas of hydro-morphological pressures caused by historic channelisation and in river works. This will mean river walks to be carried out in the town along the main river channel and also along the High PIP area below the town. These will have to be carried out with consideration of river flow and seasonal nature of any discharges or potential discharges.

7 Possible Mitigation Options

Based on the information provided in the earlier sections, in particular the pressures outlined in Section 3 and the pathways in Section 4, the following are potential mitigation options.

- Mitigation at source, if fieldwork confirms point source discharges the mitigation of these at source, by eliminating the source or treating it. This will involve other agencies such as Tipperary County Council or the EPA.
- In the high risk PIP areas Nitrogen loss is the potential pressure, work with farmers on raising awareness of good chemical and organic fertiliser spreading. This is to reduce the potential source load of nitrogen that may be leached into ground and surface water.
- Following river walks and review of any modifications to the water course and potential fish barriers. These will have to be reviewed in conjunction with Inland Fisheries Ireland, Tipperary County Council, national parks and Wildlife Services and other relevant stakeholders.

These are potential mitigation options which may be added to or amended based on the results of the fieldwork to be carried out in the PAA.

Document Title

8 Communications

8.1 Community Information Meeting

The public meeting for this PAA was held via zoom on 16th June 2021. The turn out for the meeting was small and those attending represented the local angling club and some farmers in the waterbody. Based on the small numbers attending a quick overview of the PAA was given and not the full presentation. Some feedback was given from the anglers on barriers within the town.

8.2 Farmers Information Meeting

A decision was made not to hold a farmers meeting in this PAA. This was based on the following reasons:

- Approximately 50% of the PAA is Roscrea town
- The pressures identified are largely urban based.
- The number of farmyards between the town and the monitoring point is very small.

Based on the above reasons the ASSAP team have agreed to instead visit the approximately 10 farmers with lands near the river channel and raise awareness within the PAA.