Boycetown Priority Area for Action

Desktop Assessment Report

Version 8

09/10/2019

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Acknowledgements

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

1 Non-technical Summary

Boycetown_010 is a headwater that inputs into Boycetown_020, which in turn inputs into the river Boyne_100. The waterbody Boyne_100 is located within the Boyne and Blackwater SAC (2299). Boycetown_010 has deteriorated in status from Moderate status (2007-2009) to Poor status (2010-2015). It's categorised as *At Risk* and its objective is to reach good status by 2027. The waterbody overlies a poor aquifer (Pl), Namurian Undifferentiated bedrock and is on predominantly poorly drained soils. The poor ecological status is causing the poor status for the waterbody. Water chemistry at the monitoring station is within the good status range but sediment has been noted on the biologist's report (2015). The WFD identify agriculture (nutrients & altered habitat due to morphological changes) and hydromorphology (channelisation) as the significant pressures in the waterbody.

The Boycetown_020 inputs into the river Boyne_100. The waterbody Boyne_100 is located within the Boyne and Blackwater SAC (2299). Boycetown_020 has deteriorated in status from Moderate status (2007-2009) to Poor status (2010-2015) and has improved to Moderate status (2013-2018).

Its objective is to return it to good status by 2027. The waterbody overlies a locally important aquifer (Lm), Dinantian Upper Impure Limestone and is on predominantly well drained soils. The poor ecological status, moderate nitrogen conditions and failing Dissolved Oxygen are causing the poor status for the waterbody. Water chemistry at the monitoring station is within the good status range but sediment has been noted on the biologist's report (2015). The WFD identify agriculture (nutrients & altered habitat due to morphological changes) and hydromorphology (channelisation) as the significant pressures in the waterbody.

2 Introduction

2.1 Background to the Priority Area for Action (PAA)

The Midlands and Eastern catchment assessment workshops were held in Ballycoolin, Dublin from the 9th to 12th May 2017. They were attended by representatives of local authority staff (operational staff on all days and both operational and senior staff on final day of the workshop), Local Authority Waters and Communities Office (LAWCO) (now part of the Local Authority Waters Programme LAWPRO), Irish Water, Inland Fisheries Ireland, Forest Service, Coillte, National Parks and Wildlife Service, Teagasc, Department of Housing Planning and Local Government, Geological Survey Ireland, National Federation of Group Water Schemes, Department of Agriculture, Food and Marine, Bord na Mona, Waterways Ireland and Environmental Protection Agency. The workshop was facilitated jointly by LAWCO and EPA.

Based on the draft River Basin Management Plan priorities, a set of agreed principles and the local priorities of the workshop attendees, 29 areas were recommended for action, of which the Boycetown PAA was one.

The Boycetown PAA was selected as priority area for action in the 2nd cycle. The EPA report includes the following reasons:

- Build on work completed by Meath County Council – stream walks completed on the lower portion: 80 cattle access points were identified (approx. 80 cattle access points were identified).
- Two deteriorated water bodies

The Boycetown_010 and Boycetown_20 rivers are part of the Boyne catchment located west of the town of Dunshaughlin, county Meath. They are part of the subcatchment Boyne_SC_060. The subcatchment is 165.54km² in area and consists of 10 rivers.

The two waterbodies in the Boycetown PAA were selected as Priority Area for Action (PAA) to build on the work already carried out by Meath County Council. The two waterbodies have deteriorated in status, Boycetown_010 from moderate status in 2007-2009 to poor status 2010 onwards and Boycetown_020 from moderate status in 2010-2012 to poor status in 2010-2015. Boycetown_010 is a headwater that inputs into Boycetown_020, which in turn inputs into the river Boyne_100. The waterbody Boyne_100 is located within the Boyne and Blackwater SAC (2299). The SAC is a protected area for alkaline fens, alluvial forests, Lamprey, otters and salmon. There are no bathing waters or drinking water abstraction points located in these two waterbodies. The EPA identified the

agriculture (nutrient & organic pollution) and hydromorphology (Channelisation) as the significant pressures in this PAA.

As the water chemistry typically is within the EQS range for good status, SSIS surveys and LCA field assessments will be initially undertaken in Boycetown PAA to narrow down the area to initially focus effort on the catchment walks.

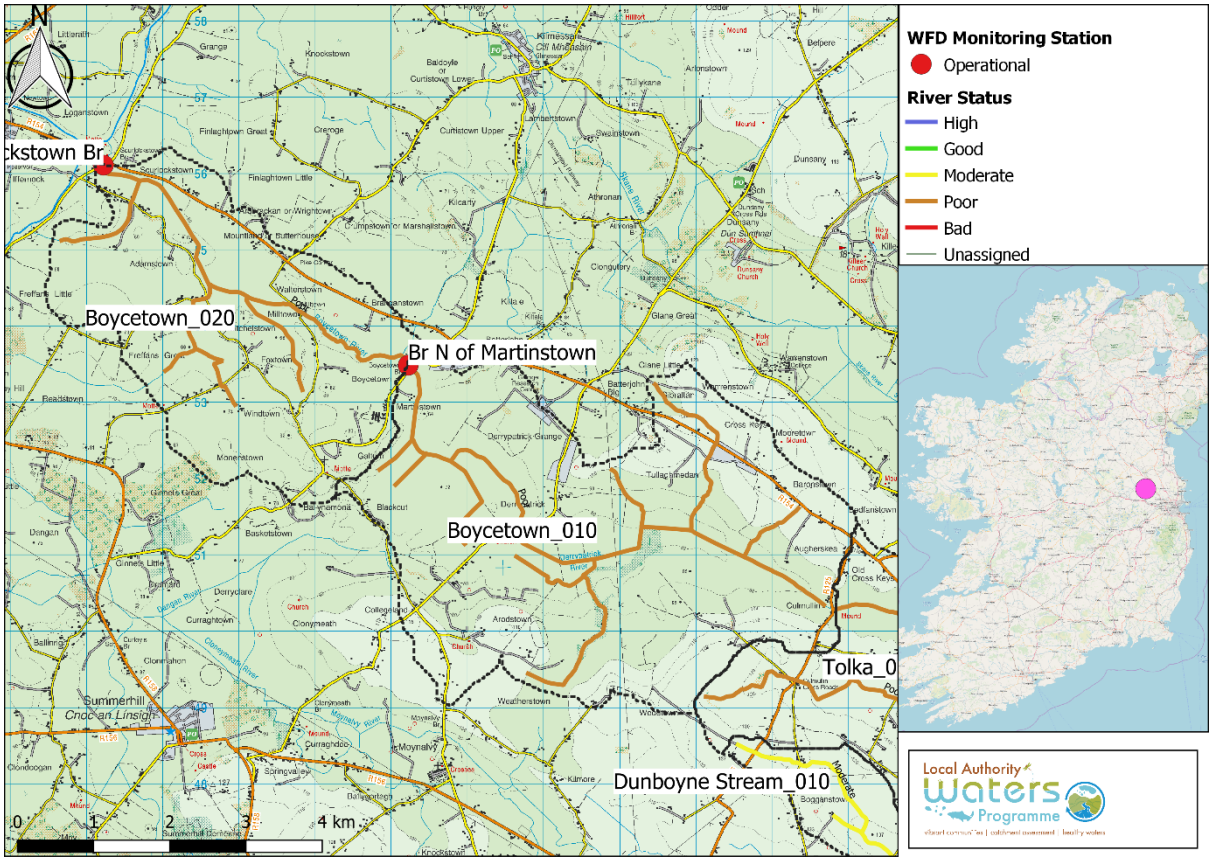


Figure 1: Location of EPA monitoring stations in the Boycetown PAA

2.2 Information Sources Consulted

Several information sources were consulted during the preparation of the desk study for the Boycetown PAA including:

- Eastern River Basin District (ERBD) Mobile Monitoring Unit Report 2011 MMU4
- Meath County Council
- WFD APP
- OPW

2.3 PAA Summary Information

A summary of risk, ecological status, known pressures and associated significance for the Boycetown PAA are presented in Table 1. The Boycetown_010 and the Boycetown_020 are poor status and are classified as *At Risk.* In 2009, the Q-Value for Boycetown_010 was moderate (3-4),

dropped to Poor (3) in 2012 & 2015. In 2009 & 2012, the Q-Value for Boycetown_020 was Moderate (3-4), dropped to Poor (3) in 2015 but returned to Moderate in 2018 (3-4).

Table 1:Summary of pressures in Boycetown PAA.

WB Code	WB name	WB Type	Risk	High status obj.	2009	2012	2015	2018	Pressure Category	Pressure Subcategory	Significant	LCA Action	Responsible Agency
IE_EA_07B030200	BOYCETOWN_010	River	At risk	No	M	P	P	P[1]	Agriculture HYMO	Agriculture Channelisation	Yes yes	IA1	EPA
IE_EA_07B030300	BOYCETOWN_020	River	At risk	No	M	M	P	M	Agriculture HYMO	Agriculture Channelisation	Yes yes	IA1	EPA

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

Waterbody Boycetown_010:

- *IA1 Provision of Information (Environmental Protection Agency)*
- *Measure: A national review of national policies regarding agriculture needs to be conducted to determine how to resolve issues of agriculture impacting waterbodies.*

Waterbody Boycetown_020:

- *IA1 Provision of Information (Environmental Protection Agency)*
- *Measure: A national review of national policies regarding agriculture needs to be conducted to determine how to resolve issues of agriculture impacting waterbodies.*

[1] According to the EPA, this status is being driven by 2012 Q-value survey at the monitoring location, which is no longer in the monitoring programme.

3 Receptor information & assessment

3.1 Context and Setting

The Boycetown river was selected as a PAA to build on the works carried out by Meath County Council including the stream walks carried out for the Mobile Monitoring Unit (MMU) report. The Boycetown river flows into the river Boyne, which is a Special Area of Conservation (SAC 002299). The objective for the Boycetown PAA is to improve the water quality to Good Status.

3.2 WFD Information

The two waterbodies, the Boycetown_010 and the Boycetown_020 had deteriorated in water quality from moderate (Q-Value 3-4, 2009) to poor (Q-Value 3, 2015). In 2015, their Q-Values returned to moderate (3-4) but both waterbodies have an objective of good water quality status by 2027. The Boycetown_010 is currently at Poor status (2013-2018). According to the EPA, this status is being driven by 2012 Q-value survey at the monitoring location, which is no longer in the monitoring programme. Based on the more recent Q values in 2015 and 2018 and the stations long survey record, status could be considered to be moderate.

Boycetown_020 has improved from Poor status (2010-2015) to Moderate status (2013-2018).

Table 2: **Summary of significant issues in Boycetown PAA.**

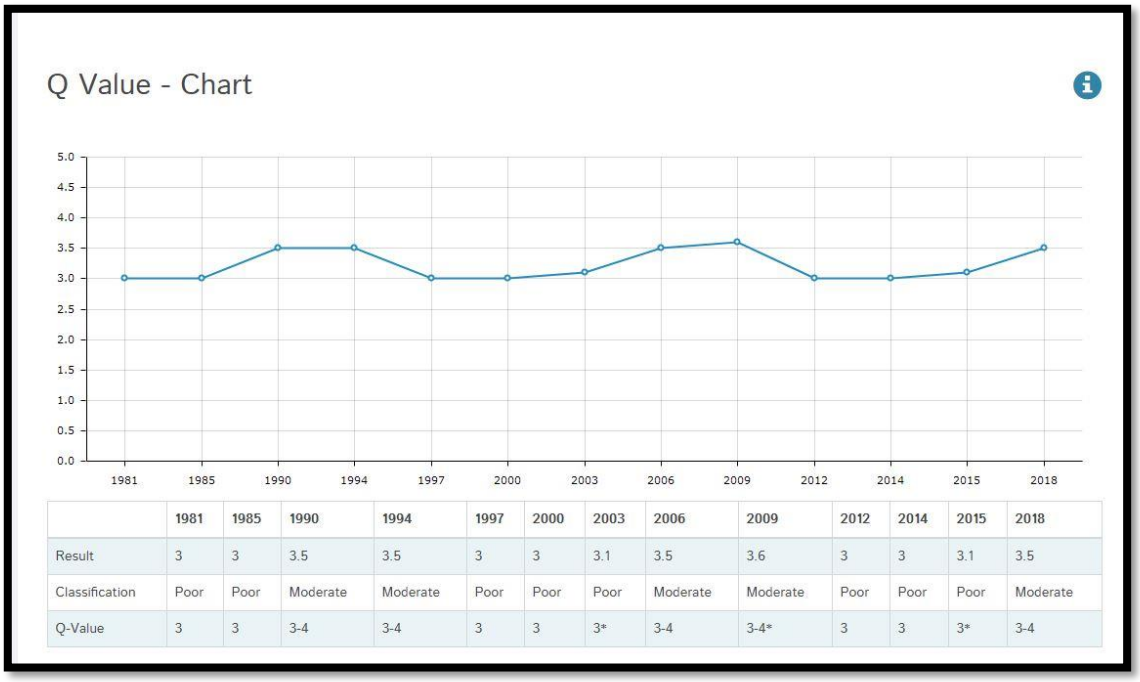
Waterbody		Boycetown_010	Boycetown_020
Risk Category		**At risk**	**At risk**
Monitoring station		Br N of Martinstown	Scurlockstown Br
Monitoring station type		Operational	Operational
Biological Status			
Q values	*2009*	3-4*	3-4
	2010		
	2011		
	2012	3	3-4
	2013		
	2014	3	3-4
	2015	3*	3*
	2016		
	2017		
	2018	3-4	3-4
Water chemistry			
Monitoring station		Br N of Martinstown	Scurlockstown Br
PO4+	*2010*	0.033	0.019
	2011	0.022	0.014
	2012	0.016	0.011

	2013	0.030	0.021
	2014	0.008	0.010
	2015	0.015	0.005
	2016	0.013	0.010
	2017	0.026	0.016
	2018	0.056	0.005
Baseline PO4		**0.032**	**0.010**
NH4+	*2010*	0.042	0.019
	2011	0.036	0.019
	2012	0.041	0.023
	2013	0.069	0.052
	2014	0.090	0.053
	2015	0.050	0.054
	2016	0.036	0.015
	2017	0.062	0.021
	2018	0.042	0.041
Baseline NH4		**0.046**	**0.026**
NO3-	*2010*	1.455	2.44
	2011	1.390	2.63
	2012	1.833	2.74
	2013	1.493	2.29
	2014	2.080	3.31
	2015	0.800	3.63
	2016	1.554	2.42
	2017	1.710	2.56
	2018	1.99	2.61
Baseline NO3		**1.75**	**2.53**
HYMO		yes	yes
Comments			
Conceptual model required (Y/N)		y	y
Ecological Status		Moderate	Moderate
EPA Biologist comments		Boycetown Bridge & Scurlockstown remain in unsatisfactory ecological condition, however both sites have improved to moderate ecological status. Siltation remains an issue at Boycetown Bridge.	
Significant issue: monitoring point		siltation, phosphate	Siltation, excessive macrophytes, unknown
Significant issue: Waterbody		Agriculture and Channelisation	

Boycetown_010:

Boycetown_010 chemistry data show that ammonium has been higher than the EQS standard for good nutrient conditions in 2013 and 2014 but has continuously improved since 2015. Total oxidised nitrogen (TON) (Appendix 15) has remained below the EQS standard. In 2018, phosphate failed the EQS standard in Boycetown_010 (0.056 mg/L). In the EPA biologist (2015) notes it is recorded that there is excessive macrophyte growth at the monitoring station location, which potentially is masking poorer phosphate conditions.

The Q-Value (Figure 2) has been recorded every 3 years since 1981 and has never improved beyond moderate status. In 2018, it returned to moderate status (3-4).



	1981	1985	1990	1994	1997	2000	2003	2006	2009	2012	2014	2015	2018
Result	3	3	3.5	3.5	3	3	3.1	3.5	3.6	3	3	3.1	3.5
Classification	Poor	Poor	Moderate	Moderate	Poor	Poor	Poor	Moderate	Moderate	Poor	Poor	Poor	Moderate
Q-Value	3	3	3-4	3-4	3	3	3*	3-4	3-4*	3	3	3*	3-4

Figure 2: **Q-Value for Boycetown_010 at Boycetown Bridge (*Excessive macrophyte growth and heavy siltation were still noted at Boycetown Bridge)**

Boycetown_020 chemistry data show that Total Oxidised Nitrogen (Figure 3) had been increasing (not significantly) since 2013 and was above the EQS standard for good nutrient conditions for TON (3.5 mg/) in 2015. It subsquently dropped in 2016 to 2.420 mg/l and in 2018 it was 2.61 mg/l. It is still on an upward trend but not considered envrionmental significant. Phosphate levels have remained below the EQS. Boycetown_020 was classed as moderate status in 2007-2009, it had failing nitrogen conditions and the biology was indicative of moderate quality. In 2010-2012, the status was classed as moderate again due to its biology. In 2010-2015 the status decreased to poor because of the poor biology and failing Dissolved Oxygen. The Q-Value for Boycetown_020 has been recorded every 3

years since 1976. It was last classed as good status in 2006 and has been moderate or poor status since.

However, the chemistry data has gradually improving over the years 2009-2015. TON is still on an upward trend but not considered environmentally significant (Figure 3). Therefore, chemistry might not be significantly impacting on the macro-invertebrates. Sediment has been observed in the waterbody and this has the potential to impact on the macro-invertebrates. The Q-value (figure 4) was assessed in 2018 and the status has improved to moderate status (3-4) again.

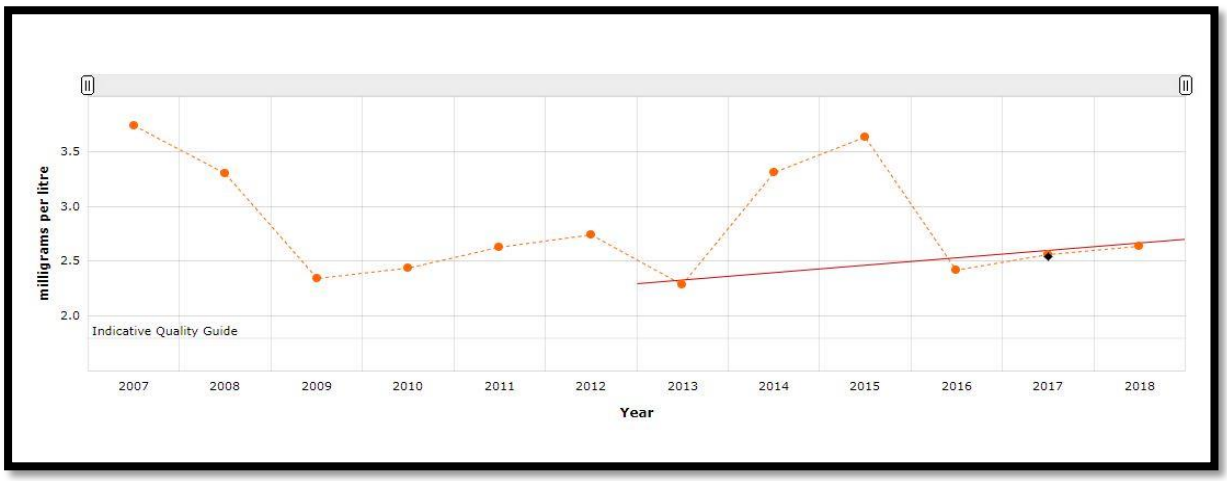
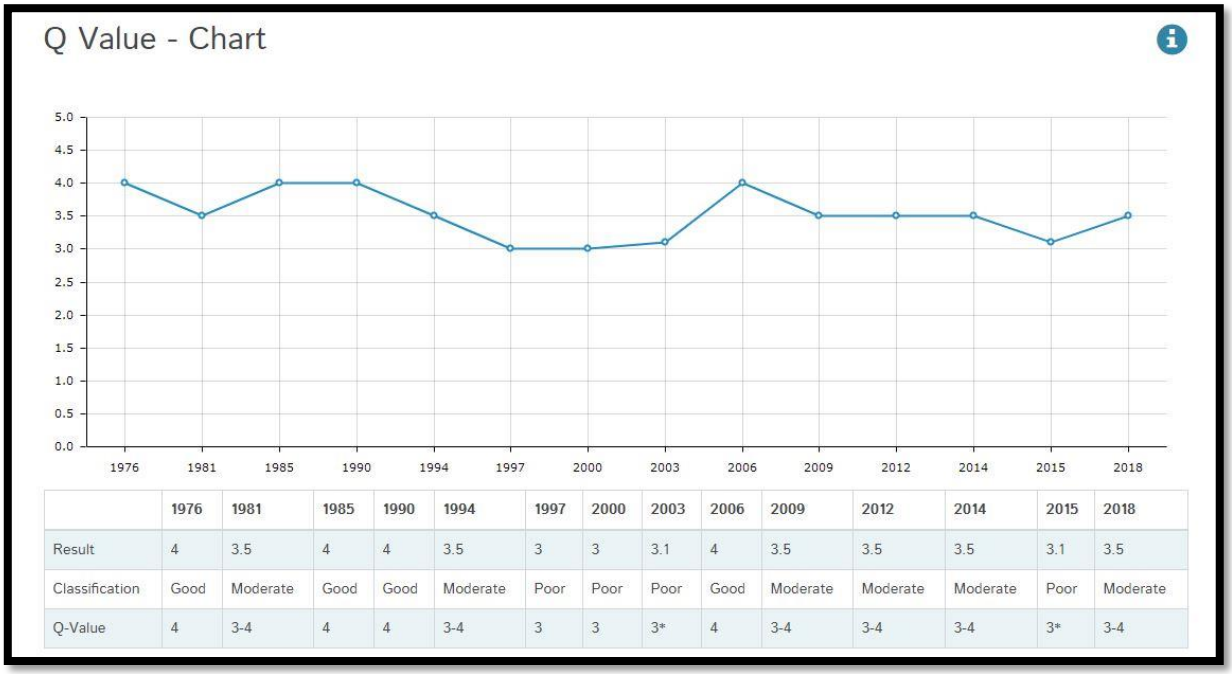


Figure 3: TON at monitoring station at Scurlockstown Bridge



	1976	1981	1985	1990	1994	1997	2000	2003	2006	2009	2012	2014	2015	2018
Result	4	3.5	4	4	3.5	3	3	3.1	4	3.5	3.5	3.5	3.1	3.5
Classification	Good	Moderate	Good	Good	Moderate	Poor	Poor	Poor	Good	Moderate	Moderate	Moderate	Poor	Moderate
Q-Value	4	3-4	4	4	3-4	3	3	3*	4	3-4	3-4	3-4	3*	3-4

Figure 4: **Q-Value for Boycetown_020 at Scurlockstown Bridge**

3.3 Supplementary Information

In 2011, the Boycetown river was selected for investigation by the Eastern River Basin District's Mobile Monitoring Unit (MMU). The investigation was carried out to establish a possible reason for the moderate macro-invertebrates scores attributed to the river by the EPA classification, with particular emphasis on investigating the potential impacts of animal access to the waterbody. Approximately 10km of the river was walked with some restrictions to access and 76 animal access points were observed and recorded. (Figure 5)

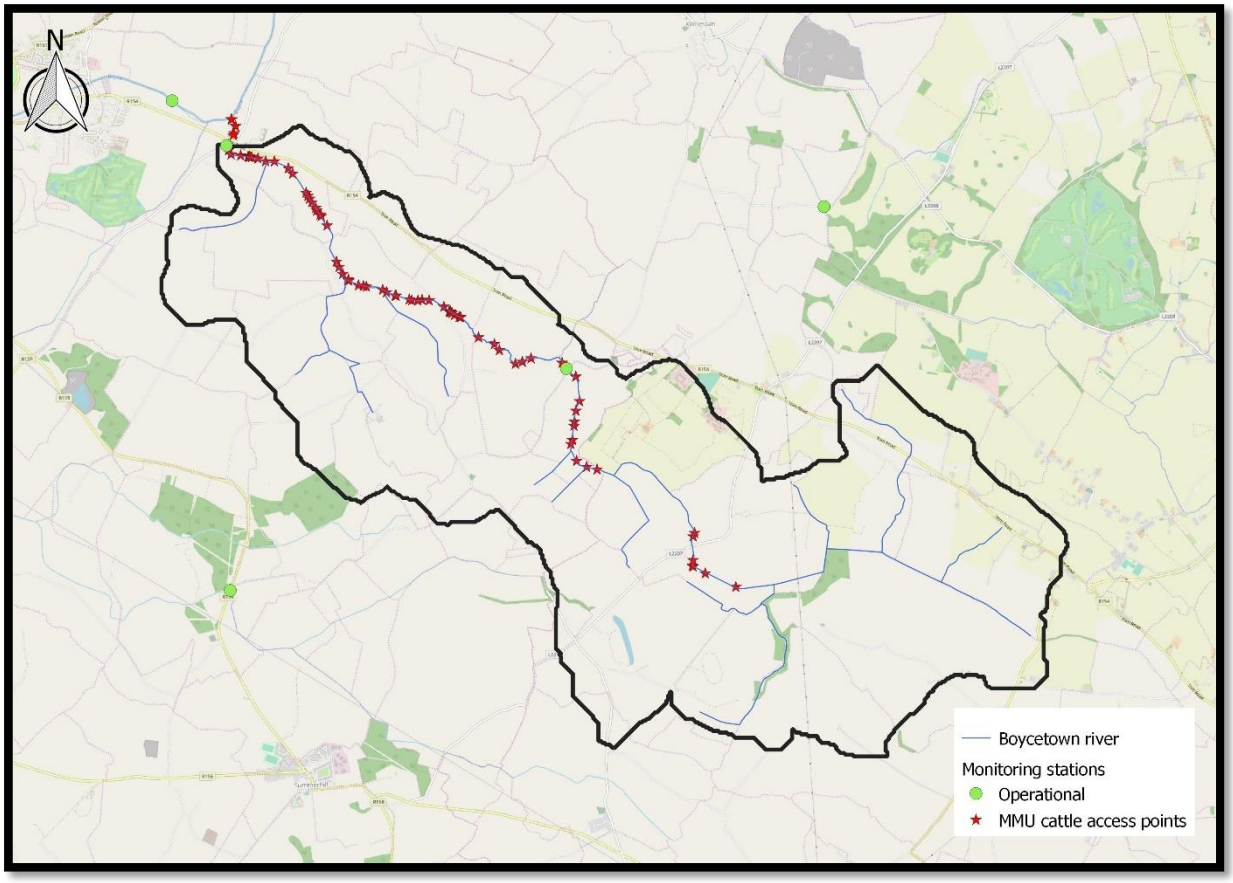


Figure 5: Cattle access points as recorded by the MMU in March/April 2011

Meath County Council:

Meath County Council confirmed that the 2 quarries, Mitchelstown Pit and Kieran Sand & Gravel Pit have both been closed and the land restored to agricultural land. There are no active quarries in Boycetown_010 and Boycetown_020.

Meath County Council followed up the MMU report by writing to the riparian landowners to advise them of the issues in the catchment and requesting them to limit the number of cattle access points they provided. Good Agricultural Practice (GAP) regulation inspections were carried out in the area and bar one issue with FYM located too close to the river no significant issues were observed.

Currently, cattle access points are only covered under the GAP regulations for farms grassland stocking rates greater than 170 kg/N/ha/yr.

Several SSRS monitoring were carried out by MCC (Table 3 & Figure 3) and none of these resulted in a good status for macro-invertebrates. Macro-invertebrates were sampled approximately 100 metres downstream of the river rising at Culmullin at the top of the catchment and result was poor biology. The start of the stream is piped under a field and across a road for the approximately the first 100 metres. Meath County Council believe that cattle access and inadequate buffer distances for ploughing and spreading of fertilizers are potentially impacting on the water quality. They also noted that they have received reports over the years of a yellow colour being observed in the water at Derrypatrick Bridge after rainfall. Meath County Council believe this to be because of run off from tillage ground located nearby.

Table 3: **SSRS results from Meath County Council (2009-2014)**

	17/04/2009	24/02/2012	06/05/2014	07/05/2014
Derrypatrick Bridge				
SSRS	3.2	1.6		0.8
Result	Stream at Risk	Stream at Risk	Stream at Risk	Stream at Risk
Boycetown Bridge				
SSRS	5.6	3.2	4.8	
Result	Stream at Risk	Stream at Risk	Stream at Risk	Stream at Risk
Miltown Bridge				
SSRS		3.2		
Result		Stream at Risk		
Adamstown				
SSRS		4		
Result		Stream at Risk		
Scurlockstown 100m u/s				
SSRS		2.4		
Result		Stream at Risk		
Scurlockstown 50m d/s				
SSRS		4		
Result		Stream at Risk		
Boyne Confluence 200 u/s				
SSRS			3.2	
Result			Stream at Risk	

Figure 6: **SSRS Monitoring Locations of Meath County Council**

3.4 Conclusion on Significant issues

Since 2010, chemistry in Boycetown_010 has within the EQS for good status with certain exceptions. Phosphate breeched the standard in 2018 and ammonia in 2013 and 2014. Currently, ammonia and phosphate are on a downward trend and TON is on an upward trend, but none are statistically significant. Since 2003, sediment at various years has been recorded at the monitoring station during the Q-Value assessment. Based on the current data, phosphate potentially is an issue, but sediment is the most significant issue in this waterbody.

Chemistry (2010-2018) in Boycetown_020 has continuously within the EQS except for nitrate in 2018. Ammonia and phosphate are on a downward trend and TON is on an upward trend, but none are statistically significant. Sediment has been recorded at the monitoring station in 2003, 2015 & 2018. Based on the current data available nitrate is potentially an issue but sediment is the most significant issue in this waterbody.

It is evident from maps that the two waterbodies in the Boycetown PAA have been artificially modified and straightened. This potentially has had a negative impact on the water quality in the PAA. The channelisation might have negatively altered the flow of the river and the habitats required for the most sensitive invertebrates.

4 Significant pressure information

4.1 Initial EPA Characterisation

The EPA identified agriculture and hydromorphology as the significant pressures in the Boycetown PAA.

Table 4: Initial EPA characterisation

Water body Name	Id	Category	Sub Category	Name	Significant	Pressure & Impact details
Boycetown_010	IE_EA_07B030300	Agriculture	Agriculture	n/a	yes	Nutrient pollution Altered habitats due to morphological changes
		Hydromorphology	Channelisation	n/a	yes	Altered habitats due to morphological changes
Boycetown_020	IE_EA_07B030200	Agriculture	Agriculture	n/a	yes	Nutrient pollution Altered habitats due to morphological changes
		Hydromorphology	Channelisation	n/a	yes	Altered habitats due to morphological changes

4.2 Hydromorphology

Channelisation is identified as a significant pressure in both waterbodies in the Boycetown PAA. The OSI historical 6" maps (1829-1842) show that the main channel of the river in Boycetown_010 (Figure 7) and Boycetown_020 (Figure 8) have been straightened over 150 years ago. This modification of the natural course of the waterbodies coupled with the agricultural practice of cleaning rivers and drains could accelerate the natural sediment loss in a river resulting in excess sediment loss issues. The over straightening and deepening of a stream, which can result in slower flows and the loss of riffle/run habitats. This has a negative impact on the macro invertebrates which can be exacerbated by the sediment losses. In order to improve grassland production areas of poorly drained soil within the PAA will have a high field/land drain density. The field drains are also a source of nutrients and sediment to the river.

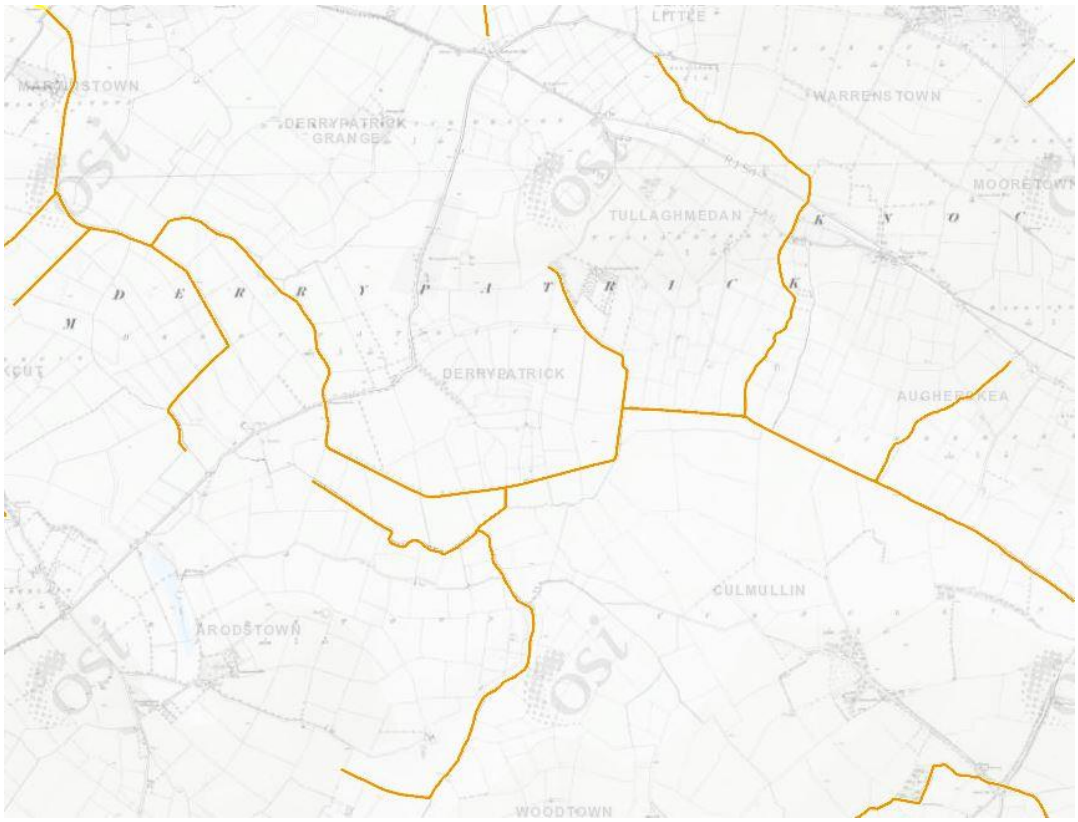


Figure 7 : Main channel of Boycetown_010 showing channelisation (1829-1842).

Figure 8 : Main channel of Boycetown_020 showing channelisation (1829-1842).

The OPW carry out arterial drainage schemes in catchments as required under the Arterial Drainage Act, 1945. The Boycetown is part of the Boyne arterial drainage scheme (Figure 7). The channel is subject to maintenance with sections of it being maintained in individual years. In 2008, the OPW and IFI carried out a walkover survey from the confluence with the Boyne main channel to Boycetown Bridge.

The stream walk report suggested several maintenance proposals:

- selective clearance/thinning of the bank cover – this will require removal of whole trees in a selective manner. Removal should be confined to hawthorn trees as these forms 95% of the tree canopy. Removal should fit in with NPWS 'tree cutting' window
- remove the briars and gorse bushes, to allow access to the river
- leave any sections of grasses and marginal vegetation intact
- cut away any low-lying branches within the channel as required throughout
- create riffle/pool sequences as appropriate
- may be possible to develop alternating deflectors in the newly opened sections that would narrow the channel and maintain a constant flow of water in low summer flows
- where appropriate increase the habitat diversity by adding some large rocks/boulders in the deeper sections if available on site
- remove "islands" of Iris but leave stands at bank edge
- add large rocks/boulders to the channel to increase habitat diversity in glide like reaches.

In 2019, OPW carried out works in the Boycetown_020. They removed vegetation to stop tunnelling and introduce light to the river. They also broke up the calcified artificial spawning gravels in the river.

A hydromorphological assessment will be carried out by LAWPRO to see if the drainage scheme is having any impact on the water quality.

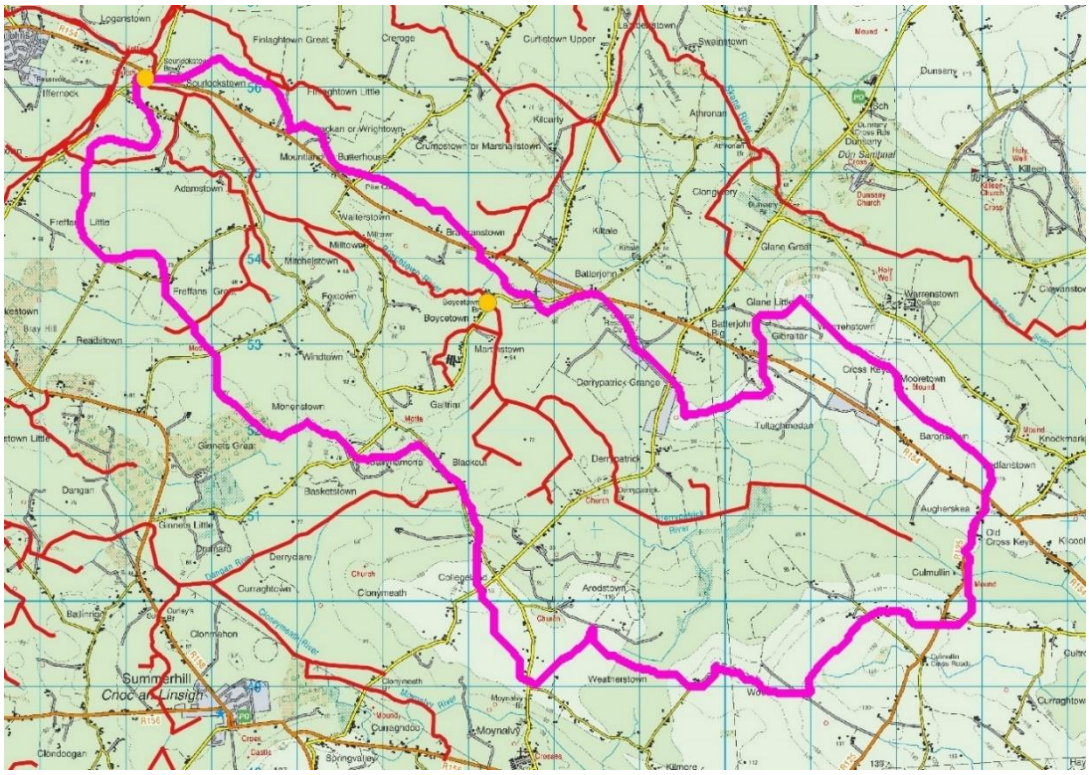


Figure 9: Arterial drainage scheme in Boycetown PAA.

4.3 Agriculture

Agriculture is the main land use in the Boycetown PAA. Permanent pasture is the dominant crop type as drystock farms are the predominate farm type in the PAA. There are several large tillage fields(>35ha) present in Boycetown as well with spring barley being the most common crop type. Teagasc have a large research farm (Grange) that borders the Boycetown_010 located within the PAA.

4.4 Conclusion on Significant Pressures

It is evident from the unnatural straightness of the river in Boycetown PAA that the rivers natural water course has been modified. Historic maps (Geohive 1837-1842) for the river show that the river was already straightened by the 1800s. During the Local Catchment Assessment (LCA) an assessment will be made to establish if hydromorphology (channelisation) is a significant pressure in this PAA.

Agriculture is the main land use in the Boycetown PAA and is therefore a significant pressure. Sediment has been recorded at the two EPA monitoring stations in the PAA. Similar to phosphate, sediment will enter the waterbody through overland flow. Using the Pollution Impact Potential (PIP) maps for phosphate (Figure 10), the area most vulnerable to sediment losses are in the poorly drained soils of Boycetown_010. The MMU report identified 76 cattle access points along the Boycetown river. If heavy poaching by animals is occurring at these locations this could be a pathway for sediment into

the waterbodies. The accumulation of the sediment present at the cattle access points should be assessed to ascertain if they are a significant pressure.

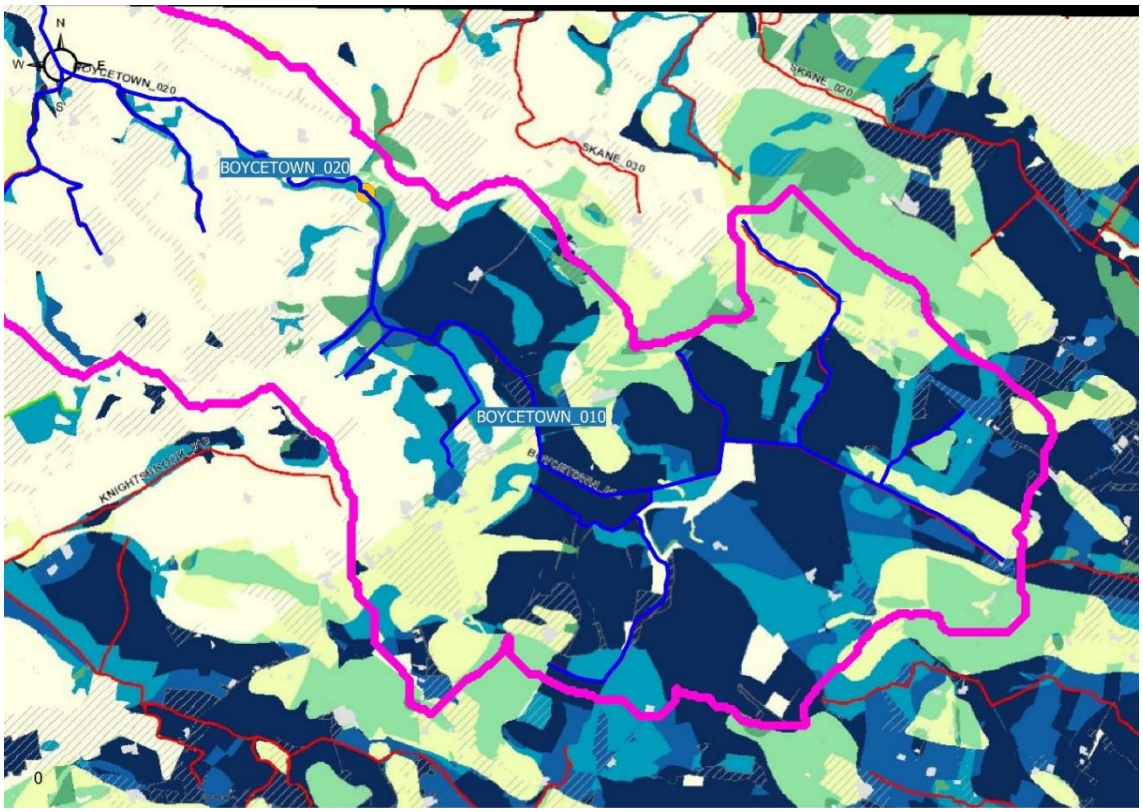


Figure 10: Pollution Impact Potential (PIP) phosphate map for Boycetown_010.

5 Pathway information & analysis

Several data layers including aquifer properties, soils and subsoils, bedrock and land use were used to inform the building of the conceptual model to identify the significant pathways of pollutants. The monitoring station at the bridge north of Martinstown is being possibly impacted by phosphate, sediment and ammonium. The dominant pathway of pollutants, where overland flow of phosphate and sediment is occurring in compartments C1B, C1C and C2B (Figure 11). The monitoring station at Scurlockstown at the end of the catchment is possibly being impacted with nitrate. The dominant pathway for nitrate is occurring in C2A.

Table 5 : Compartments of the conceptual model

		Compartment 1	**Compartment 2**
Pathway Information	**Source**	Diffuse	Diffuse
	Aquifer	Pl: Poor Aquifer: Bedrock which is generally unproductive for local zones	Lm: Locally Important Aquifer: Bedrock which is generally moderately productive
	Topography		
	Soil	Fine loamy drift with limestone	Fine loamy drift with limestone
	Subsoil	Shales and sandstone till, Limestone till	Limestone sands and gravels, Limestone till
	Subsoil K	Moderate	Moderate
	Rock Unit	Namurian Undifferentiated	Dinantian Upper Impure Limestone
	Groundwater Vulnerability	Predominantly High, moderate and low.	Predominantly High and moderate
	PO_4 Susceptibility	C1a-Low **C1b-High** **C1c-High**	C2a-Low **C2b-High**
	NO_3 Susceptibility	**C1a-High** C1b-Low C1c-Low	**C2a-High** C2b-Low
	NH_3 Susceptibility	C1a-Low C1b-Low **C1c-High**	C2a-Low C2b-Low
	PO_4 PIP	C1a-Low **C1b-High** **C1c-High**	C2a-Low **C2b-High**
	NO_3 PIP	C1a-**High/Moderate**	**C2a-High/Moderate**

		C1b-Low C1c-Low	C2b-Low
	Flowpaths	C1a-Nitrogen to groundwater C1b- overland flow of phosphorus C1c-Overland flow of phosphorus and ammonia	C2a- Nitrogen to groundwater C2b- overland flow of phosphorus
	Location of Monitoring Point	Bridge North of Martinstown	Scurlockstown
	Significant Pressures	Agriculture Hydromorphology Sediment	Agriculture Hydromorphology Sediment

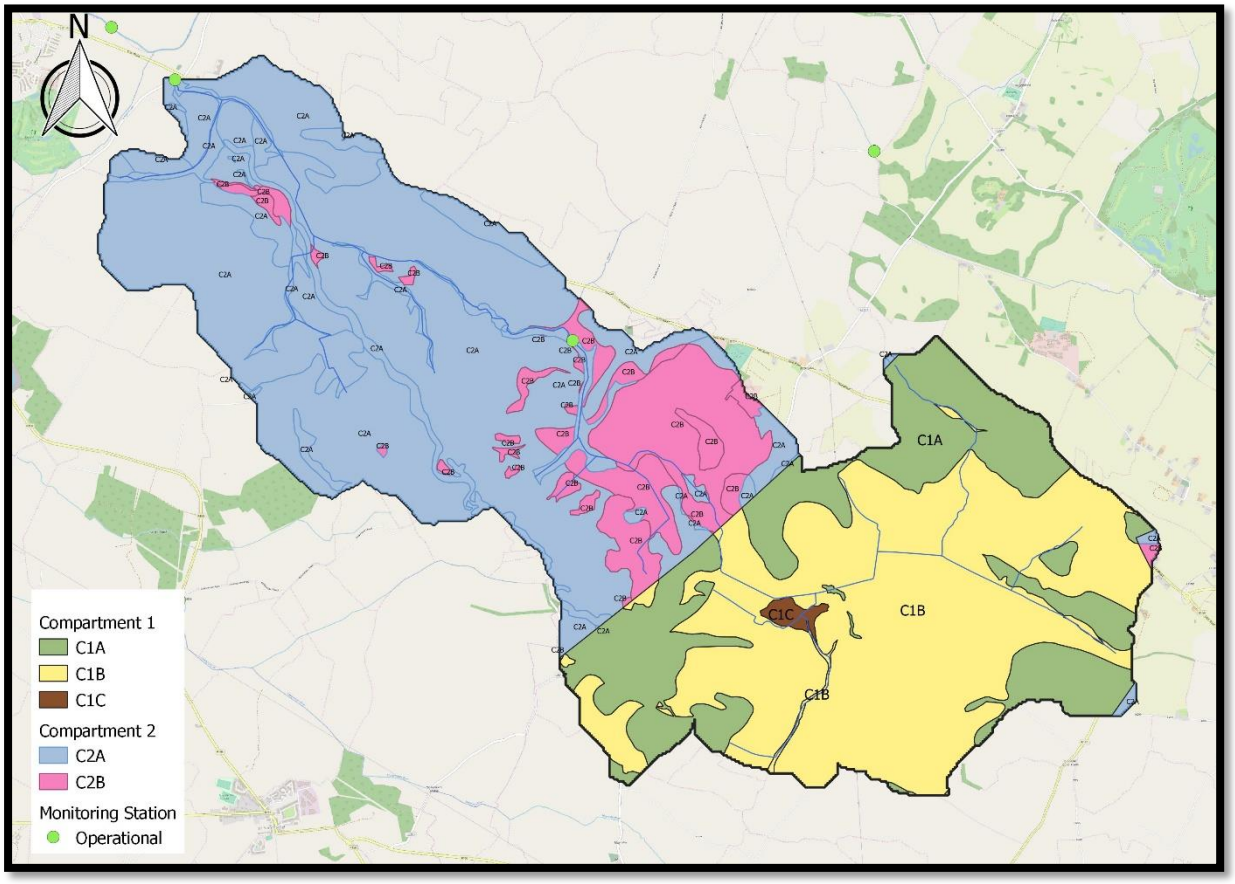


Figure 11: Conceptual Model for Boycetown_010 and Boycetown_020

6 Interim story of the Priority Area for Action based on the Desk study

Boycetown_010 and Boycetown_020 have been classified as *At Risk* and the biological and ecological status are classified as moderate for both. Agriculture is the main industry in these waterbodies with several farms present including Teagasc Research Farm at Grange. It is predominantly grassland but there is also tillage present in the area. There are number of ribbon developments and one-off housing but no main town or village.

Boycetown_010

The monitoring station at Martinstown has slightly elevated levels of ammonium, sediment and excessive macrophyte growth present in the water. The excessive macrophyte growth indicates that there may be elevated levels of phosphate entering the waterbody but being bound up in the aquatic plants. This indicates to the source of nutrients coming from sewage, slurry or soiled water entering the waterbody. As ammonium is not very mobile in soil or subsoil a short diffuse pathway or point source e.g. slurry spreading, FYM, chemical fertilizer. The potential pathways for these pollutants are in C1b, C1C and C2B (Figure 10). Excessive sediment has been observed at the monitoring points in this waterbody this too can be impacting on the macro-invertebrates' presence. The data collected by the MMU in 2011 recorded 17 animal access points. The remaining 15km of the Boycetown_010 was not walked to identify if animal access points were present at that time. The photos in the MMU report showed poaching of the ground at the animal access points that would be contributing the excess sediment in the stream and a pathway for overland flow of nutrients.

Boycetown_020

The MMU recorded 53 animal access points along the 11km stretch of Boycetown_020. Similarly, to Boycetown_010 the photos showed badly poached ground, which would result in excess sediment entering the watercourse. Scurlockstown monitoring station has elevated levels of nitrate. As nitrate is not adsorbed by clay or organic matter it is highly mobile in the soils and is leached easily through permeable soils and subsoils. High nitrate concentrations in water are associated with well drained areas, moderate to high permeable soils and subsoils and transmissive aquifers. Therefore, groundwater provides the main pathway for nitrate into a waterbody. The potential pathways for nitrate are in C2A (Figure 11).

Agriculture is the dominant land use and both diffuse and point source pollution from agriculture will be the focus of the Local Catchment Assessment (LCA), as per the nitrate PIP maps the areas of highest risk will be focused upon, chemistry sampling and stream walks will be carried out

where required. The cattle access points should be assessed as a source of sediment and phosphate.

7 Workplan

A number of bridge hops (Figure 11) will be needed in order to narrow down the locations of the stream walks. There are several tributaries that feed into Boycetown_10 and Boycetown_020 above the monitoring stations. The following should be assessed during the stream walks to narrow the focus of investigation:

- Biological indicators
- Temperature
- Dissolved Oxygen
- pH
- SEC
- Sediment observations

Boycetown_010

LAWPRO will carry out stream walks to assess if the cattle access points identified in the MMU report are a pathway for phosphate, ammonium and sediment. The stream walks will also be used to identify Critical Source Areas (CSA) for nutrients and sediment. During the field assessments, farming practices may be observed and assessed e.g. buffers for slurry, tillage, hedgerow removal etc to ascertain if they are having negative effects on the water quality.

Therefore, the ASSAP should be focused on the upper stretch implementing mitigation measures that result in halting sediment and phosphorus washing into the stream (C1b). The lower part of Boycetown_010 could provide suitable habitats for the invertebrates if sediment and phosphorus are stopped from entering the stream.

Boycetown_020

The significant issue in this waterbody is nitrate. Anything upstream of the monitoring station Boycetown_010 is having a diluting effect and should be excluded for nitrate mitigation. The area is Compartment C2A. Sediment is being observed at the EPA monitoring station. It needs be to ascertain if the sediment source is Boycetown_010. Is the sediment being slowly washed downstream into the Boycetown_020 only or is it an accumulation of sediment from the channelisation of both waterbodies? These are the questions that need to be answered during the LCA.

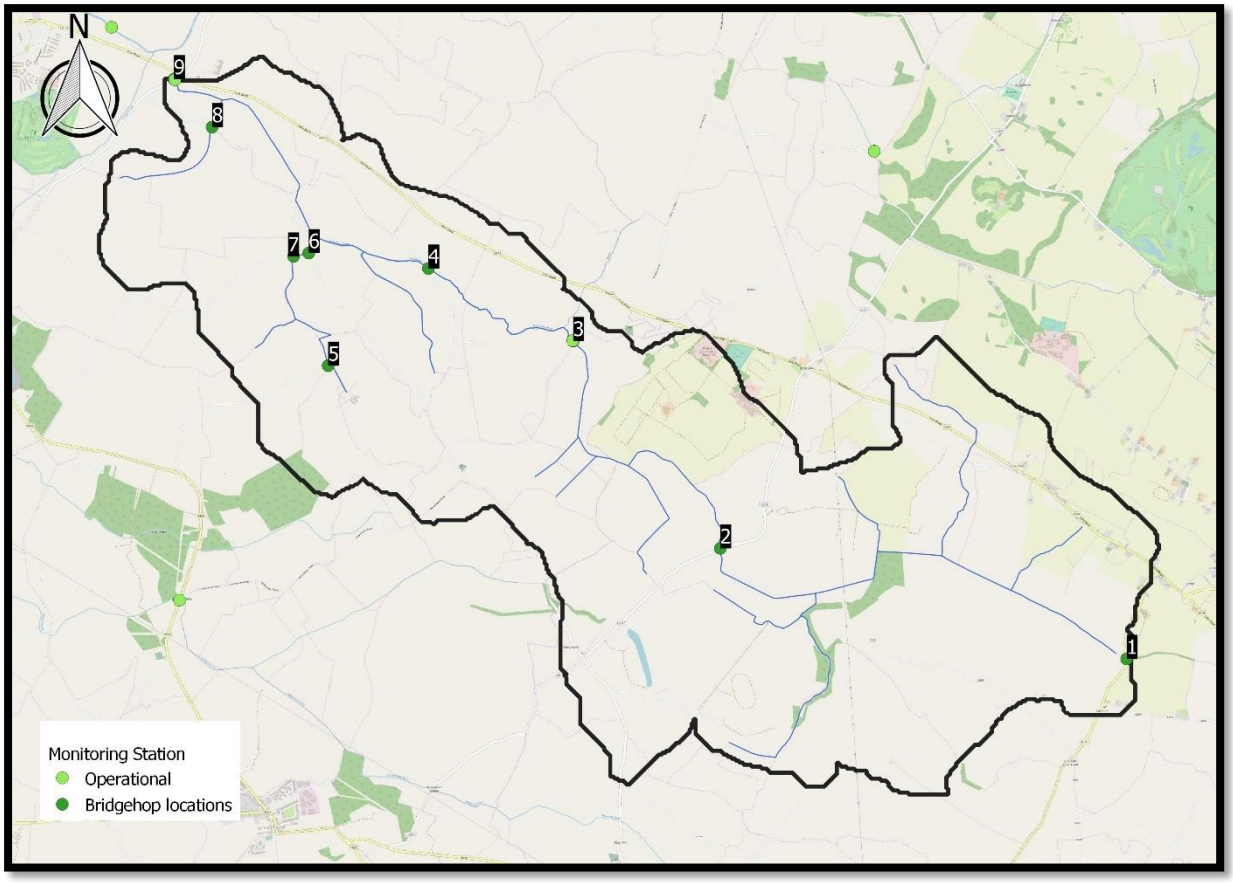


Figure 12: Potential location for Bridge hops in Boycetown_010 and Boycetown_020

The further characterisation for Boycetown_010 and Boycetown_020 was identified as IA1 the provision of information with the EPA as the responsible organisation. The measure required is a national review of national policies regarding agriculture needs to be conducted to determine how to resolve issues of agriculture impacting water bodies. However, in light of the desk study findings local catchment assessments will be undertaken to confirm the significant issues and to recommend measures where appropriate.

8 Review of mitigation options

Where mitigation measures are required, they will be discussed with the ASSAP advisors prior to the farm visits. Below are a number of suggested mitigation options that maybe suited for resolving the issues

- Fencing off watercourse from livestock
- Reducing/prohibiting fertilizer applications in susceptible areas
- Incorporation of organic manures – trailing shoe, injection
- Limiting poaching by farm animals, particularly close to watercourses
- Siting of manure heaps/bailed silage away from streams and vulnerable groundwater
- Good farmyard facilities and management: GAP measures
- Little & often approach to N fertilizer applications in areas prone to leaching
- Increasing slurry storage, where beneficial, to improve timing of slurry applications

Channelization was also identified as a significant pressure in this area. This area is channelised according to OPW drainage plans and is part of the Boyne drainage scheme. While carrying out maintenance the OPW's work should be in accordance with their environmental guidance for Drainage maintenance and construction manual and best management practices.

Mitigation measures for hydromorphological issues are being discussed at a national scale by the National Hydromorphology Working Group.

9 Communications

9.1 Community information meeting

Community information meeting held on the 11/06/2019 in the Trim Castle Hotel in County Meath.

Number of attendees excluding LAWPRO and ASSAP representatives: 12

Farmers meeting held on the 16/07/2019 in the Jack Quinn's pub in Scurlockstown, Co. Meath.

Number of attendees excluding LAWPRO and ASSAP representatives:9

Date of completion of Desk Study: 01/06/2019

10 Appendices

BOYCETOWN_010

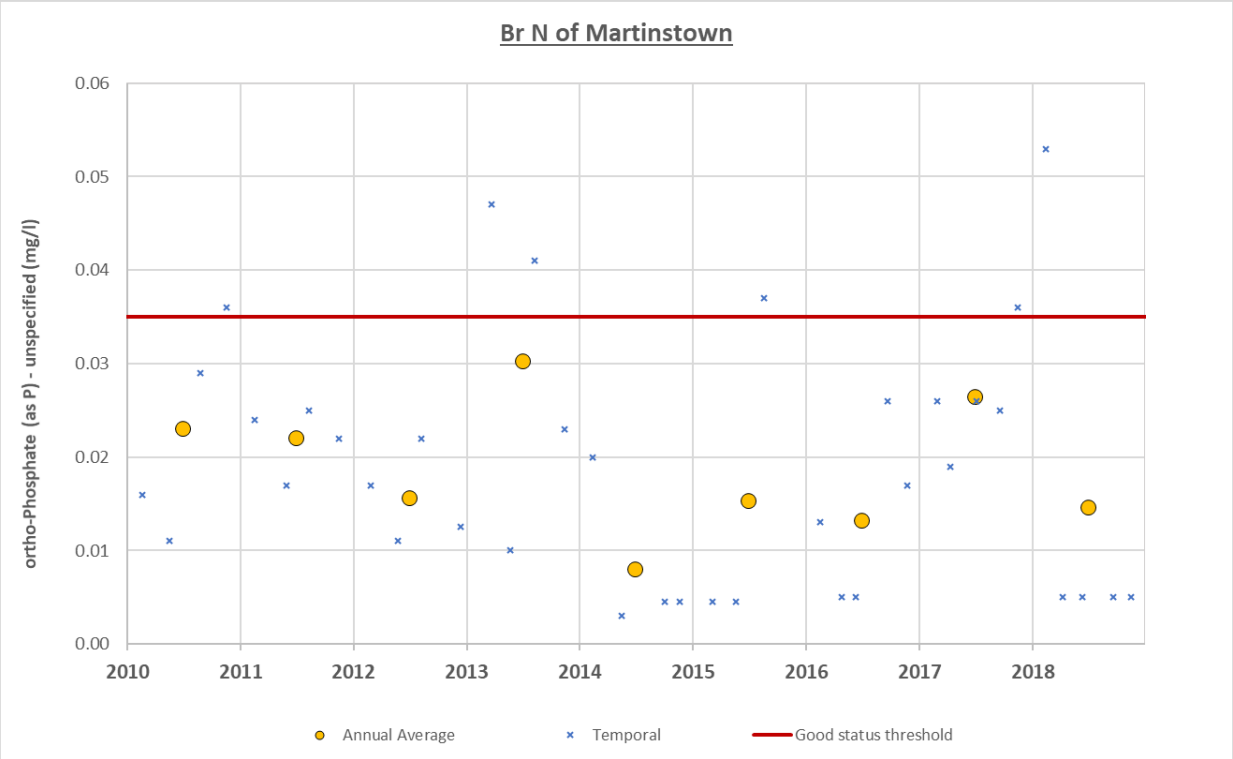


Figure 13 : ortho-phosphate at monitoring station for Boycetown_010

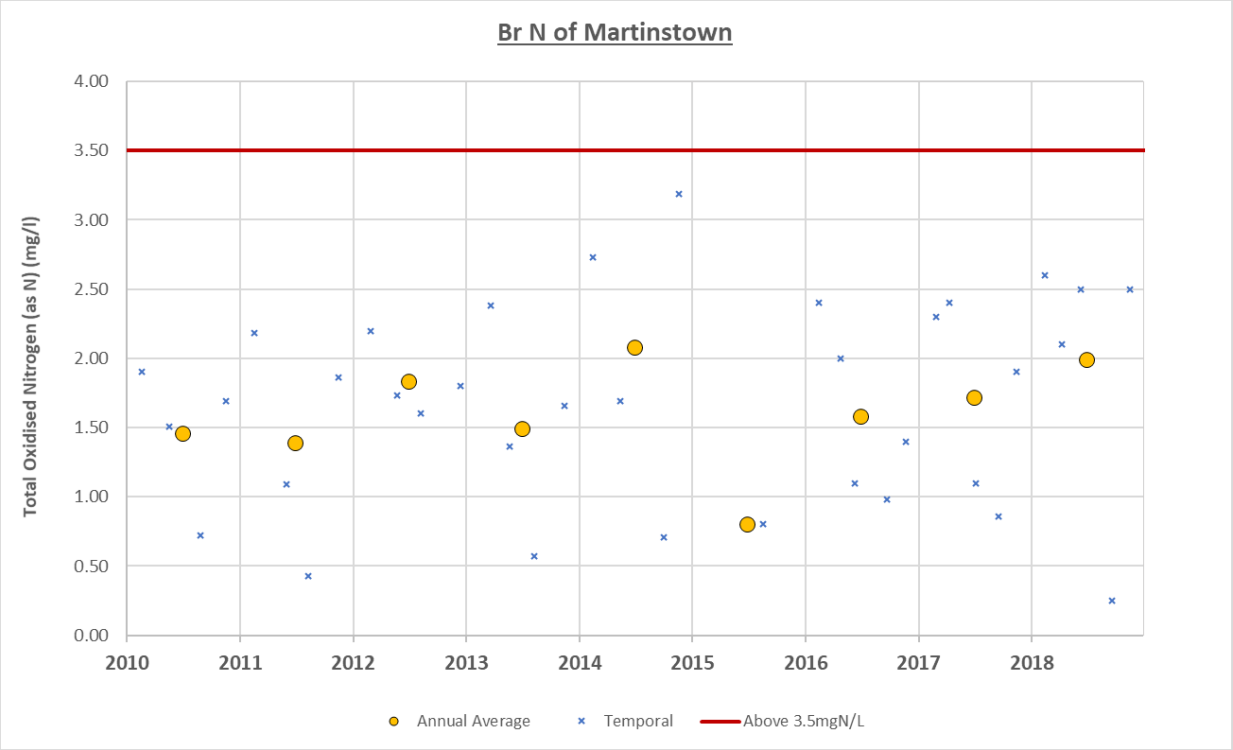


Figure 14 : TON at monitoring station for Boycetown_010

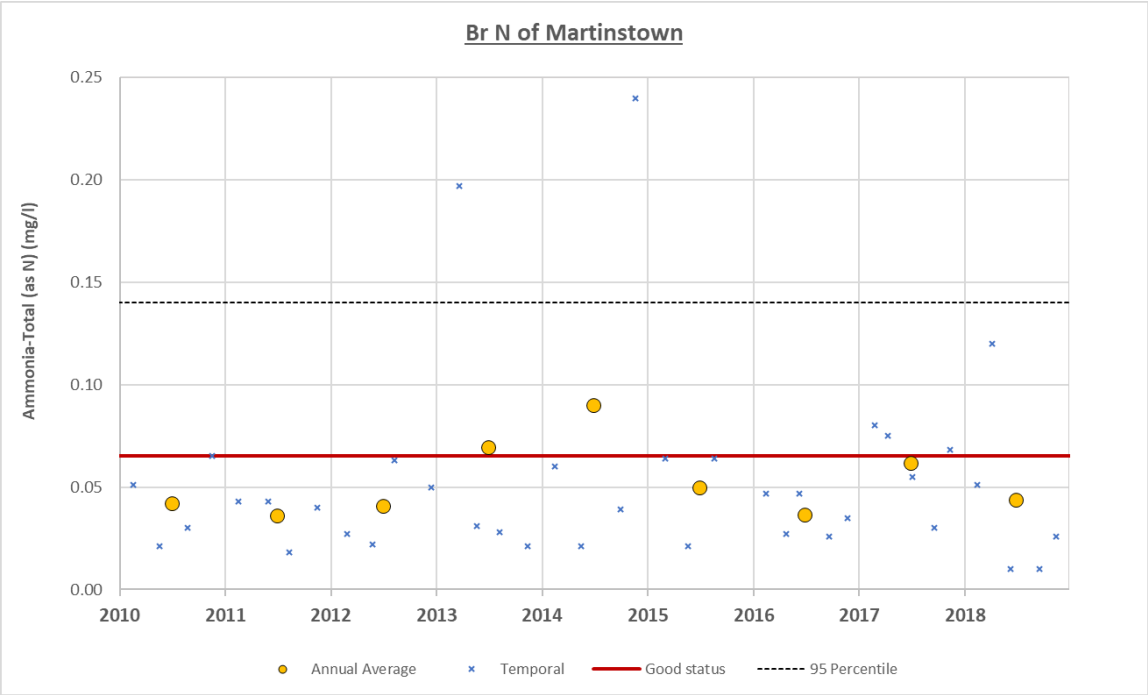


Figure 15 : Ammonia at monitoring station for Boycetown_010

BOYCETOWN_020

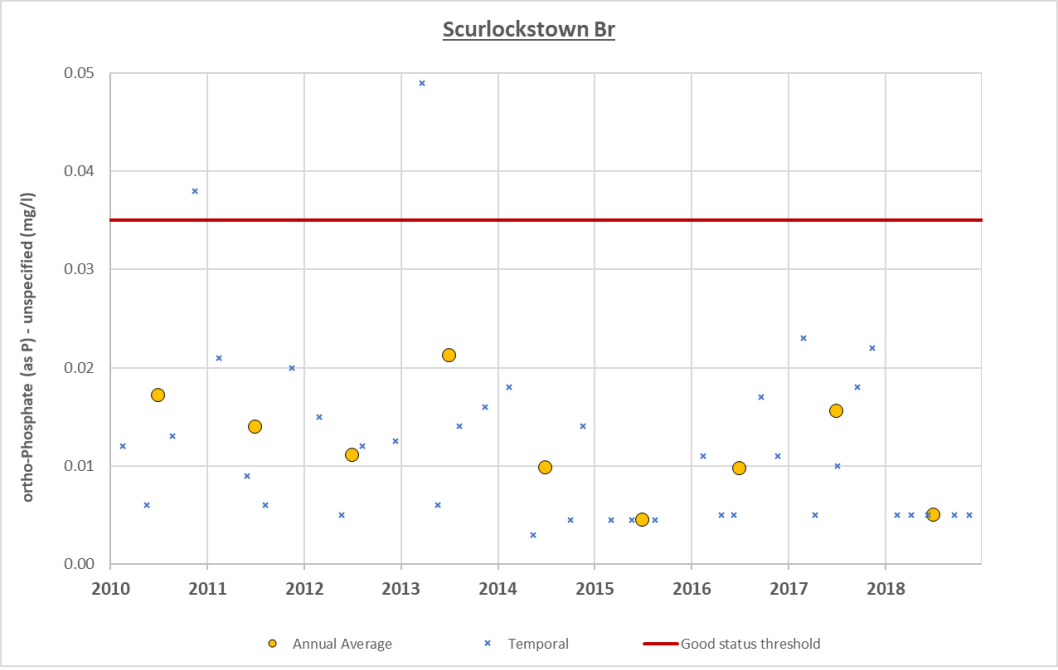


Figure 16 : ortho-phosphate at monitoring station for Boycetown_020

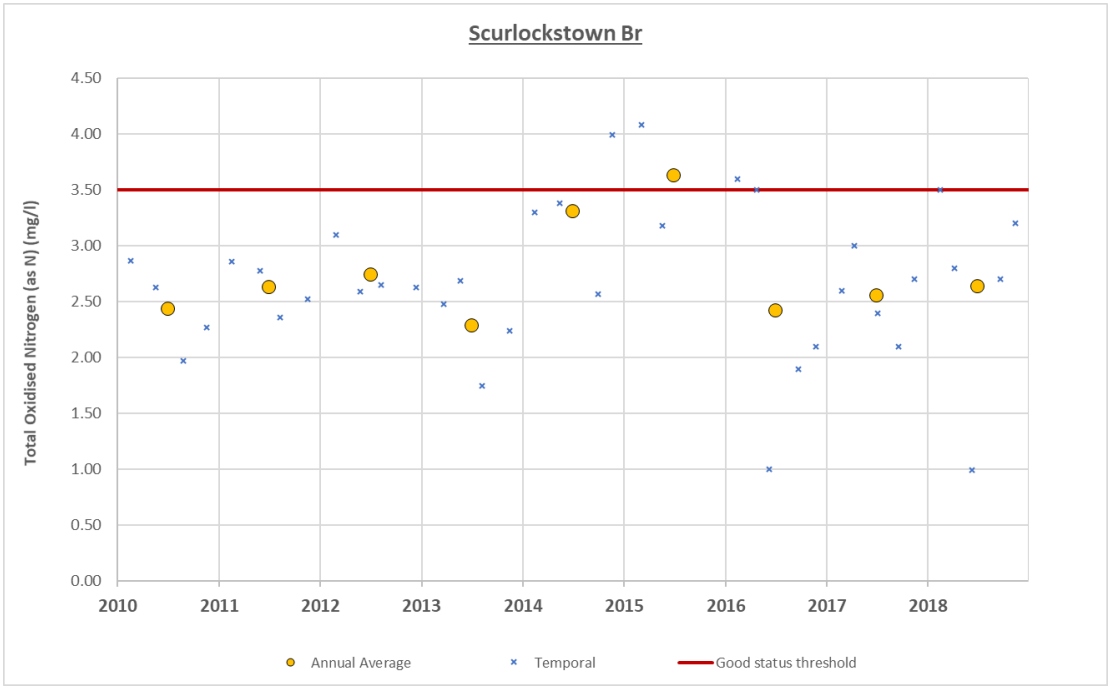


Figure 17 : TON at monitoring station for Boycetown_020

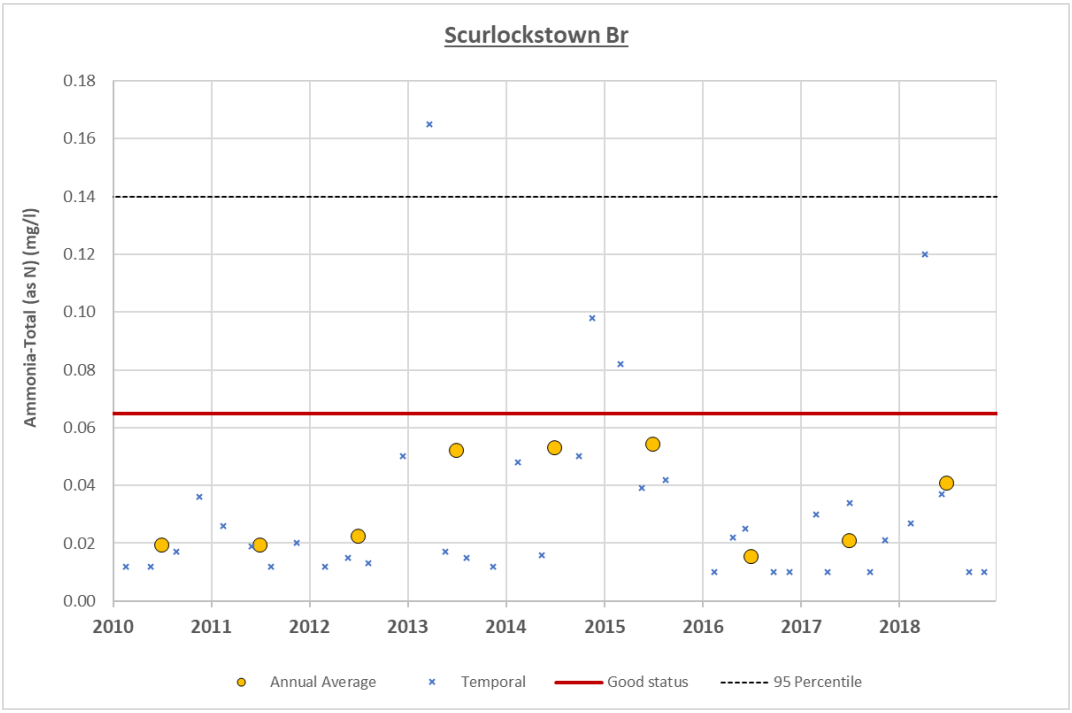
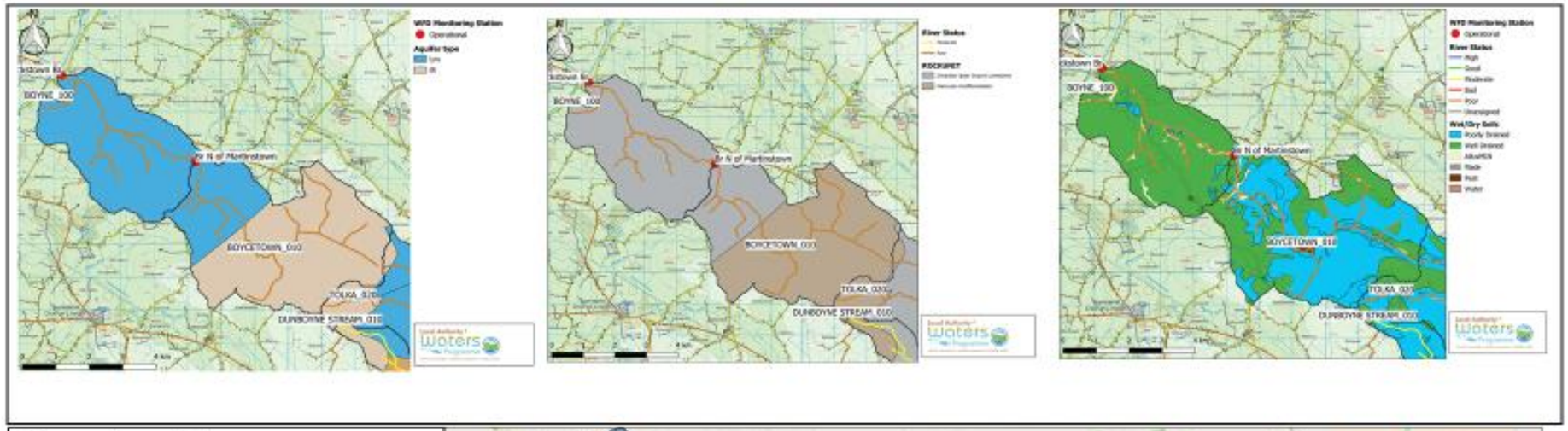


Figure 18 : Ammonia at monitoring station for Boycetown_020



Compartment 1

Soil Drainage:C1a-Well drained
C1b-Poorly drained
C1c-Peat

Land Use: grassland

Main Pathways:

C1b-Overland flow of phosphate and sediment

C1c-. Pathway overland flow of ammonia and phosphate

Compartment 2:

Soil Drainage: C2a-Well drained
C2b-Poorly drained

Land Use: grassland

Main Pathways:

C2a-Nitrate leaching to groundwater

C2b-Overland flow of phosphate and sediment

Figure 19 : Conceptual model of Boycetown PAA for public meeting