



Portarlinton Priority Area for Action

AFA0153

Desktop Assessment

29th January 2021

AFA0153 Portarlington PAA

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1 Non-Technical Summary

The Portarlington Priority Area for Action (PAA) is located between Portarlington Co. Laois and Monasterevin Co. Kildare. The PAA consists of two waterbodies. These include the Barrow_080 and Barrow_090. The water quality in these waterbodies are assessed, based on different factors such as ecology, chemistry and physiochemical sampling, a water quality status is applied. This is known as an ecological status. There are five water quality bands, High, Good, Moderate, Poor and Bad status. The aim under the Water Framework Directive is to get all waterbodies up to High/Good water quality status. The Barrow_080 is Moderate Ecological Status (2013-2018) and is categorised as *At Risk*. This water quality status is driven by ecological (macroinvertebrate-aquatic insects) status. The Barrow_090 is Poor Ecological Status (2013-2018), this is driven by fish status.

The waterbodies predominantly overlay locally important aquifers; however, a regional important aquifer is located in the lower reaches of the Barrow_090 just after Pass bridge. The aquifers are made up of two different types of limestones. The soils within the catchment consist of well-draining, poorly draining, peaty soils and alluvium. Therefore, nitrate may leach from the well-draining land into the groundwater and discharge into the surface waters and the main pathways for phosphorus and sediment are through overland flow and along drains and ditches, where poorly draining soils exist.

The chemistry data for the Barrow_080 indicates that there have been elevated concentrations of Ammonia, Ortho P and BOD based upon the annual averages between 2010 and 2019. Since 2018 along the Barrow_090 all parameter annual averages are all below their respective mean EQS.

An ecological assessment (Q rating) was carried out by the EPA at monitoring station "Ford S of Trascaun" along the Barrow_080 in July 2019. Despite increases in sensitive macroinvertebrates, the pollution tolerant groups still dominated the sample and filamentous algae in the river was excessive; as such this monitoring station remained at moderate water quality status. The upstream monitoring location Spa bridge remained at Good water quality status; this is the last Q value monitoring location on the Barrow_070 before entering the PAA along the Barrow_080. On the Barrow_090 in 2017 at Pass Bridge there was a decline in macroinvertebrate status from Good to Moderate.

The Figile_080 flows into the Barrow_090 just above the Barrow_90 monitoring point. An assessment will be undertaken to determine whether the decline in water quality is a result of activities along the Barrow network or from the inputting Figile_080.

The significant pressures in the PAA have been identified by the EPA as Urban Wastewater (UWW) and hydromorphology. Portarlington WWTP discharges into the Barrow_080 downstream of the

town. This plant serves an agglomeration of >10,000 PE. Hydromorphology has been assigned as the sole pressure to the Barrow_090. The hydromorphological issue is classified as channelisation.

The water quality will firstly be assessed at each of the bridges along the Barrow_080 and Barrow_090. Due to the size of the waterbody access is limited due to health and safety issues. Therefore, chemistry and flow data will be heavily relied upon during this assessment. Flow measurements will be generated through assistance from the EPA hydrometric unit using field analysis and modelling. Ecological assessments such as Small Stream Risk Scoring (SSIS) sampling will be carried out if required once low flows can be obtained. SSIS is a biological assessment tool which assists in determining water quality based on the presence/absence of macroinvertebrates (aquatic insects).

The Portarlinton WWTP was upgraded in 2017, there have been some positive improvements regarding the annual averages however issues remain in the waterbody. The chemistry and biological monitoring results will continue to be reviewed. Hydromorphology was deemed a significant issue in the Barrow_090, the historic and current maps were reviewed, there were no clear signs of channelisation or alteration to the channel. This will be verified during field assessment and the potential impact will be determined.

2 Background

2.1 PAA background information

There are two waterbodies included in the Portarlinton PAA: Barrow_080 and Barrow_090. Both waterbodies fall within 2 sub-catchments. The Barrow_080 falls within 14_1 Barrow_SC_030 and 14_11 Barrow_SC_020. The Barrow_090 is within sub-catchment 14_17 Barrow_SC_050 and 14_20 Barrow_SC_040. All four sub-catchments are within the catchment area 14_Barrow.

The South Eastern catchment assessment workshops for the 2nd Cycle RBMP were held in Roscrea from the 6th to 9th of June 2017. They were attended by representatives of local authority staff (operational staff on all days and both operational and senior staff on the final day of the workshop), Local Authority Waters and Communities Office (LAWCO) (now part of the Local Authority Waters Programme LAWPRO), Bord Iascaigh Mhara, DHPLG, National Dairy Sustainability Forum, National Federation for Group Water Schemes, Sea Fisheries Protection Authority, Waterways Ireland, Irish Water, IFI, Forest Service, Coillte, NPWS, Teagasc, GSI, DAFM, Marine Institute and the EPA. The workshop was facilitated jointly by LAWCO and the 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. The Portarlinton PAA was selected as a priority area for action in the 2nd cycle. The EPA report includes the following reasons:

- Building on planned improvements at Portarlinton WWTP (Barrow_080).
- One deteriorated waterbody (Barrow_090).
- Protected area objectives not met (Crayfish and salmonids) for two water bodies (Barrow_080 and Barrow_090).
- Community interest.
- One potential ‘quick win’

As part of this characterisation process each waterbody has been assigned investigative actions (IAs) to assist in the overall WFD objective of meeting good status. These actions have been assigned accordingly based upon the action required. Within this PAA actions have been assigned to LAWPRO and IFI, and therefore must be completed as part of the local catchment assessment process. The following IA’s apply to this PAA:

Waterbody	Investigative Assessment No.	Assigned Organisation	Description of IA
Barrow_080	IA1	LAWPRO	Watching brief - plant works underway.
Barrow_090	IA1	Inland Fisheries Ireland	Query to IFI as to why fish status is Poor - driving overall ecological status.

Table 1: Investigative assessment actions required within each waterbody

Description of catchment

Barrow_080 begins at Spa bridge in Portarlinton, it is 4.65km long, running through the town (**Figure 1**). A large section (approx. 70%) of this waterbody’s route is through land dominated by agriculture. This section of river then flows into the Barrow_090 at Lea, Co. Laois. The last EPA monitoring station on this waterbody is the Ford S of Trascaun. The Barrow_090 is 5.41km long, flowing mainly through agricultural land, until it reaches the monitoring point Pass Bridge on the outskirts of Monsterevin, Co. Kildare. There are two small pockets of privately-owned forestry adjacent to the waterbody along this stretch. There are additional Coillte and privately-owned forestry within the catchment, however, they are not located within close proximity of the waterbody. Peatlands are located within the catchment boundary although the waterbody does not flow directly through this land type. The land use/type is

shown in **Figure 2** below. The Figile_080 is an inputting waterbody into the Barrow_090, it is unassigned, and is not included within the PAA boundary. This waterbody enters just upstream of the EPA monitoring point Pass Bridge (**Figure 1**).

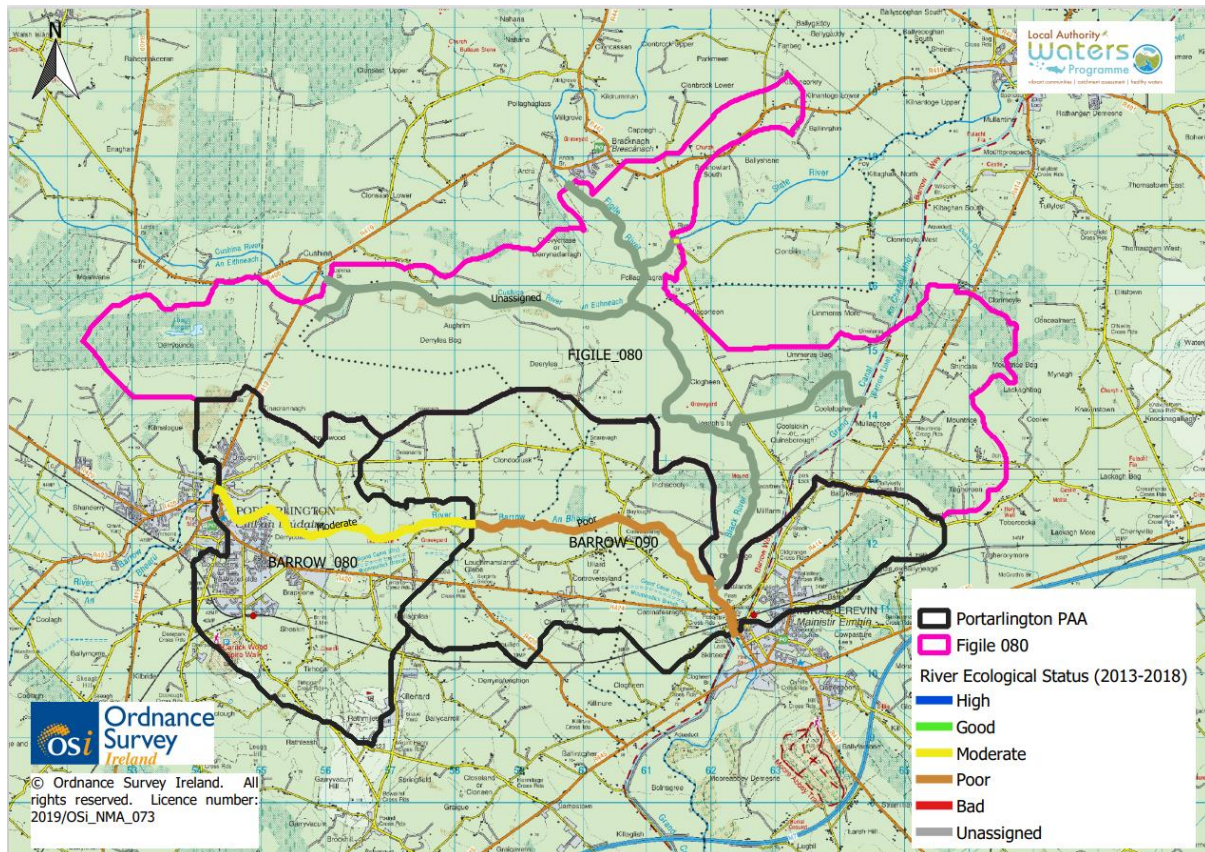


Figure 1: Location of the waterbodies within the Portarlinton PAA and their assigned Ecological Status (Inc. Figile_080).

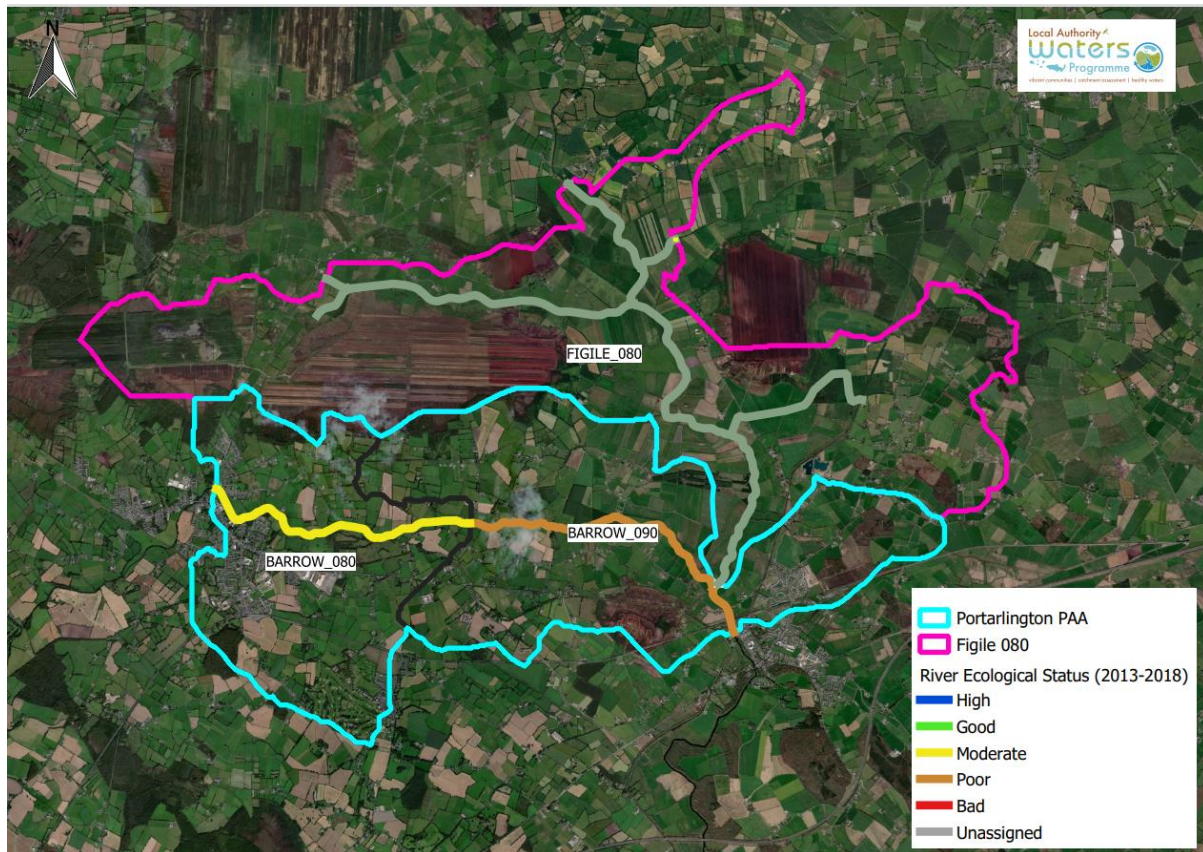


Figure 2: Ortho map of the Portarlington PAA

2.2 Information Sources Consulted

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

- WFD web application – EPA characterisation data
- Data from Laois County Council
- Data from Kildare County Council
- Data from Offaly County Council
- Data from Irish Water
- Data from Inland Fisheries Ireland
- Data from the Office of Public Works
- GEOHIVE OSi
- MQI – EPA

2.3 PAA Summary Information

A summary of risk, ecological status, known pressures and associated significance for the Portarlinton PAA are presented in **Table 2** below. All the waterbodies within the PAA are characterised as *At Risk*. The ecological status of the Barrow_080 is Moderate and there have been no changes in the last four ecological assessment iterations (**Table 2**). The Barrow_090 is at Poor ecological status. Its status dis-improved from Good to Poor between 2013 and 2015. The Barrow_090 has remained at Poor ecological status based on the 2018 results. **Table 3** identifies the EPA's three monitoring stations within the PAA: two along the Barrow_080 and one on the Barrow_090. Chemistry sampling is carried out at all three monitoring stations; biological sampling is carried out at two stations with the exception of "u/s UWW Portarlinton".

Table 2: Summary of status and pressure for the Portarlinton Priority Area of Action.

WB Code	WB name	WB Type	Risk	High status obj.	2009	2012	2015	2018	No of pressures	Pressure category	Pressure subcategory	Pressure name	Significant pressure (Y/N)
IE_SE_14B010900	BARROW_080	River	At risk	No	M	M	M	M	1	UWW	Agglomeration PE > 10,000	Portarlinton	Yes
IE_SE_14B011000	BARROW_090	River	At risk	No	G	G	P	P	1	HYMO	Channelisation	-	Yes

(AR= At Risk, G=Good, M= Moderate, P= Poor)

Waterbody	Monitoring Point Code	Name	Type	Comments
Barrow_080	RS14B010900	Ford S of Traskan	Operational	Q & Chemistry
	RS14B010790	u/s UWW Portarlinton	Investigative	Chemistry Only
Barrow_090	RS14B011000	Pass Bridge	Operational & Surveillance	Q & Chemistry

Table 3: EPA monitoring locations within the Portarlinton PAA

3 Receptor information & assessment

3.1 Context and Setting

The Barrow was selected as a PAA as neither of the two waterbodies within the PAA are meeting the WFD objective of Good status. There are five protected areas associated with the Barrow_080, these include:

Code	Name	Type	Other ID	Association Type	Water Qualifying Interest
IE0002162	River Barrow And River Nore SAC	SAC	002162	Overlapping / partly within Protected Area	Not Applicable
IEPA1_SE_G_005	Industrial Facility (P0274-01)	Drinking Water		Within Protected Area	Not Applicable
IEPA1_SE_G_048	Cushina	Drinking Water		Within Protected Area	Not Applicable
IEPA1_SE_G_153	Bagenalstown Upper	Drinking Water		Within Protected Area	Not Applicable
IERI_SE_2001_0015	Barrow (River)	Nutrient Sensitive Area	PA4_0015	Overlapping / partly within Protected Area	Not Applicable
IERI_SE_2010_0001	Barrow (River)	Nutrient Sensitive Area	PA4_0015	Overlapping / partly within Protected Area	Not Applicable

The River Barrow is part of a Special Area of Conservation (SAC) and therefore must be protected. This will be considered throughout the assessment of the Portarlinton PAA. The Industrial Facility (P0274-01) is located in Portarlinton. The facility has been demolished; the site is undergoing groundwater and soil remediation works, this is being driven by the EPA. Cushina and Bagenalstown Upper are groundwater waterbodies. There are no groundwater drinking sources within the PAA area (public or group water schemes). The Barrow_080 has been designated within two nutrient sensitive areas under the Urban Wastewater Treatment Regulations, 2001 as amended. This imposes additional requirements for discharges from urban wastewater treatment plants that discharge into nutrient sensitive areas. This designation applies from downstream of the Portarlinton sewage outfall to Graiguenamanagh Bridge on the Carlow/Kilkenny border. Primary discharges should meet a Total Phosphorous Emission Limit Value (ELV) of 2 mg/l and a 80% minimum reduction value of the influent concentration. Portarlinton's Wastewater Treatment Plant authorisation includes a Total Phosphorus ELV of 2mg/l which is in accordance with the requirements in nutrient sensitive areas as set out in the urban wastewater treatment regulations, 2001 as amended. It must be noted all the above protected areas are deemed "not applicable" based on the water qualifying interest.

As to prevent impacting the above protected areas, the right measures need to be implemented in the right place and at the right time to curtail possible impacts associated with activities in sensitive areas within the catchment. For example, regarding diffuse pollution in free draining soils there is a higher risk of nitrate losses and poorly draining soils would be more susceptible to phosphorus and

sediment losses. Point source pollution can occur throughout the catchment and needs to be addressed at source, if detected.

Similarly, there are protected areas associated with the Barrow_090. There are four in total, all of which were listed in the Barrow_080 above. Two groundwater waterbodies a nutrient sensitive area and an SAC, all of which need to be protected. Similar measures need to be considered as mentioned above.

Code	Name	Type	Other ID	Association Type	Water Qualifying Interest
IE0002162	River Barrow And River Nore SAC	SAC	002162	Overlapping / partly within Protected Area	Not Applicable
IEPA1_SE_G_048	Cushina	Drinking Water		Within Protected Area	Not Applicable
IEPA1_SE_G_153	Bagenalstown Upper	Drinking Water		Within Protected Area	Not Applicable
IERI_SE_2001_0015	Barrow (River)	Nutrient Sensitive Area	PA4_0015	Overlapping / partly within Protected Area	Not Applicable

3.2 WFD Information

Table 4 provides 2017 Q value data for the EPA monitoring stations along the Barrow_080 (Ford S of Trasca) and the Barrow_090 (Pass bridge). The 2019 Q ratings have shown no change at Ford S of Trasca when compared to 2017 data. The Q value data along the Barrow_090 showed a deterioration from Good status in 2015 to Moderate status in 2017 at Pass bridge. All waterbodies within the PAA are characterised as *At Risk* of failing to meet the WFD objective of good ecological status. Chemistry monitoring is recorded at both Q value sites and one additional monitoring point along the Barrow_080 “u/s UWW Portarlinton”. Q-Value and nutrient sampling results for active EPA monitoring stations are summarised in **Table 4** below. Selected relevant plots with the individual sampling results are shown thereafter.

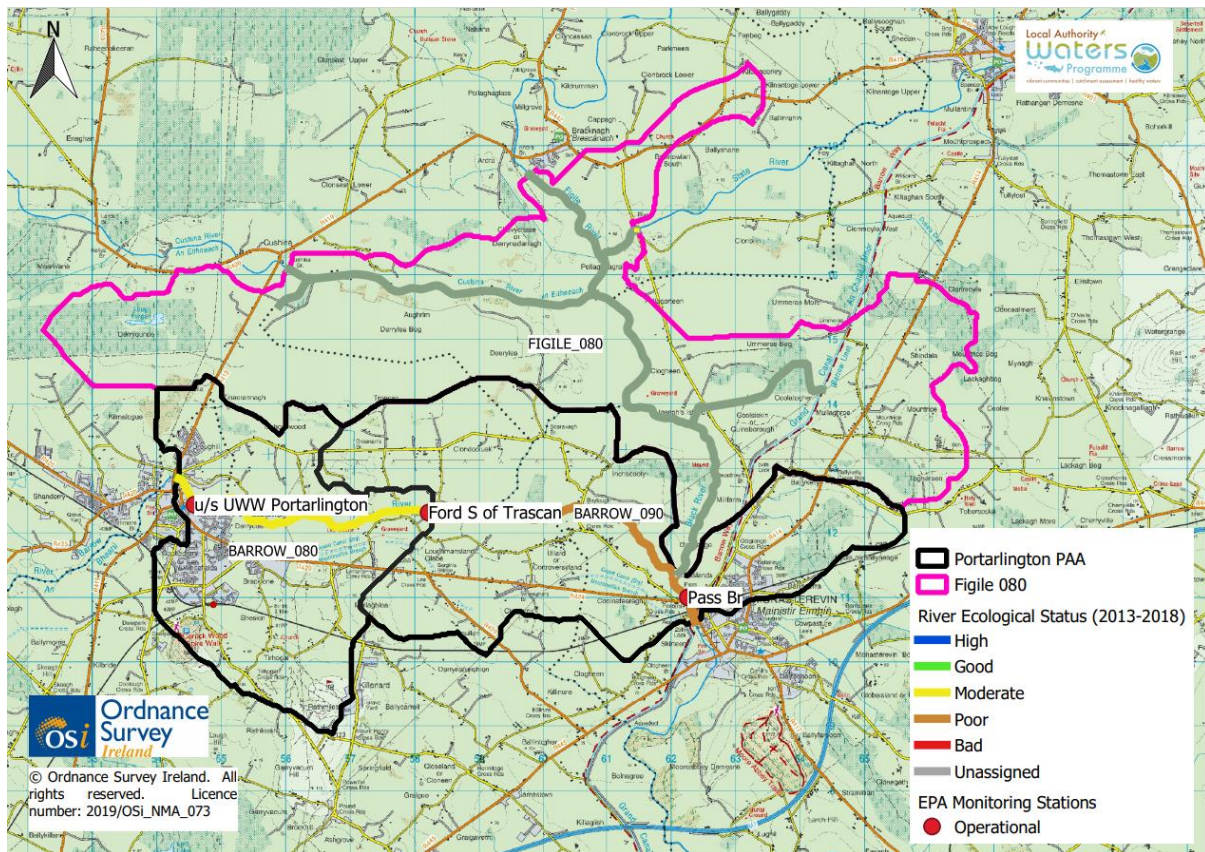


Figure 3: Locations of active EPA monitoring stations along the Barrow_080 and Barrow_090 waterbodies (Inc. Figle_080)

Table 4: Outline of parameters influencing water quality in the Portarlinton PAA

Waterbody		BARROW_080	BARROW_080	BARROW_090
Risk Category		At risk	At risk	At risk
HYMO				
Monitoring station		u/s UWW Portarlinton	Ford S of Trascaan	Pass Br
Monitoring station type		Investigative	Operational	Surveillance
Biological Status				
Variations/trends in Q values	2009		3-4	4
	2010			
	2011		3-4	4
	2012			
	2013			
	2014			
	2015		3-4	4
	2016			
	2017		3-4	3-4
	2018			
2019		3-4		
Water chemistry				
Monitoring station		u/s UWW Portarlinton	Ford S of Trascaan	Pass Br
PO ₄ ⁺ (EQS: 0.035mgN/L) Years with EQS exceedances highlighted in blue	2010		0.030	0.030
	2011		0.053	0.044
	2012	0.43	0.048	0.060
	2013	0.028	0.072	0.037
	2014	0.029	0.031	0.031
	2015	0.015	0.055	0.036
	2016	0.047	0.056	0.049
	2017	0.025	0.038	0.035

Waterbody		BARROW_080	BARROW_080	BARROW_090	
	2018	0.018	0.021	0.025	
	2019	0.033	0.078	0.029	
NH ₄ ⁺ (EQS: 0.065mgN/L) Years with EQS exceedances highlighted in blue	2010		0.070	0.078	
	2011		0.063	0.059	
	2012	0.054	0.058	0.046	
	2013	0.055	0.071	0.058	
	2014	0.062	0.051	0.068	
	2015	0.025	0.073	0.034	
	2016	0.038	0.090	0.086	
	2017	0.037	0.029	0.048	
	2018	0.053	0.046	0.048	
	2019	0.035	0.031	0.036	
	NO ₃ ⁻	2010			
		2011			
2012					
2013		2.13	2.53		
2014		1.58	2.88		
2015		1.30	2.05		
2016			2.80		
2017			3.08		
2018			3.10		
2019			3.21		
BOD (EQS: 1.5mgN/L) Years with EQS exceedances highlighted in blue	2010		1.38	1.59	
	2011		1.21	1.69	
	2012	2.13	1.90	2.00	
	2013	1.38	1.98	1.53	
	2014	2.00	0.95	1.35	
	2015	1.83	1.66	0.97	
	2016	1.64	1.86	1.28	

Waterbody		BARROW_080	BARROW_080	BARROW_090
	2017	2.25	1.40	1.25
	2018	2.13	1.36	1.27
	2019	2.85	2.08	1.32
Conceptual model required (Y/N)		N	N	N
Ecological Status		M		P
EPA Biologist comments		No biologist assessment	The site 14B010900 on the Barrow river was sampled in 2017. A total of 17 invertebrate taxa were recorded. There was 1 sensitive mayfly and no 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 (Numerous), Gammarus (Few) 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. The site was resampled in 2019, however there was no change in status. The biologist sheet is not available to review at this time.	The site 14B011000 on the Barrow river was sampled in 2017. A total of 18 invertebrate taxa were recorded. There were 0 sensitive mayfly and 0 sensitive stonefly found at the site. This absence of sensitive taxa is most often a key indicator of failure to achieve good ecological status or higher. The results of an examination of key tolerant taxa found: Simuliidae (Few), Gammarus (Few) and Baetis rhodani (Absent). The Q value assigned to this site was 3-4, indicative of moderate conditions.
Significant issue: monitoring point		Ortho P & BOD	Ammonia, Ortho P & BOD	Ammonia & Ortho P
Significant issue: Waterbody		Urban Wastewater		Hydromorphology

3.2.1 Data Assessment

3.2.1.1 Q value

According to the EPA biological assessments there has been no changes in status at the EPA monitoring point “Ford S of Trascaan” for invertebrates along the Barrow_080. This station has been at Moderate status for the last 5 monitoring events (2009-2019).

The Barrow_090 has shown a drop in biological status at “Pass Bridge” deteriorating from Good invertebrate status in 2015 to Moderate status in 2017. The fish status was classified as Good based on the ecological status in 2010-2012, this dropped to Poor between 2013 and 2015 and remains at poor to date. This would indicate some changes within the waterbody resulting in a decline in fish stocks. Although the invertebrate status is Moderate in this waterbody the overall ecological status is Poor as it is driven by fish status.

3.2.1.2 Annual Averages - Barrow_080

The chemistry data is displayed in annual averages in **Table 4** above, the monitoring station “u/s UWW Portarlinton” showed no exceedances of ammonia or nitrate annual averages based upon the monitored years. Ortho P levels exceeded the mean EQS of 0.035mg/l in 2012 and 2016. Although the Barrow_070 upstream is Good status, similar mean EQS exceedances were noted in the annual average data from 2012 and 2016. This would indicate there is a load of P coming from outside the PAA and that additional pressures within the PAA boundary are causing the EQS to be exceeded. The BOD was above the mean EQS of 1.5mg/l in 2012, 2014, 2015, 2016, 2017 and 2018. In 2019 the 95%ile (2.6mg/l) was exceeded. This indicates there is an organic source entering the water column upstream of the monitoring point.

At the Ford S of Trascaan there has been an ongoing issue with ortho P since 2011, with the exception of 2014 and 2018. The mean EQS was exceeded throughout this time period, however in 2019 the 95%ile was exceeded. Ammonia exceeded the mean EQS on 4 occasions (0.065mg/l) between 2010 and 2016, there have been no exceedances of the annual averages between 2017 and 2019. Based on the annual averages there is a consistent increase in PO₄ concentrations between u/s UWW Portarlinton and the Ford S of Trascaan. This indicates there is an additional source of PO₄ entering the waterbody between both locations.

BOD showed elevations between 2012 and 2016, there were two compliant years in 2017 and 2018, however, 2019 resulted in a further elevation of the mean EQS. Nitrate was below the surrogate mean

EQS of 3.5mg/l throughout the monitoring period. However, there is positive increasing trend in the annual averages of NO₃ conc. These results indicate there remains an issue with ortho P and BOD at this monitoring point.

3.2.1.3 Annual Averages - Barrow_090

The annual averages at Pass bridge (Barrow_090) were compared to concentrations at EPA monitoring station Ford S of Trascaan (Barrow_080), between 2010 and 2019, the annual average concentrations of ammonia were higher over 5 years (2007, 2010, 2014, 2017 and 2018) at Pass bridge, this would indicate that an additional source of pollutants are entering the water column between both locations. The ortho P concentrations are lower at Pass bridge based on annual averages when compared to Ford S of Trascaan with the exception of 2018, where there was a slight elevation. There is just one inputting waterbody between both EPA monitoring locations, which is the Figile_080 this is unassigned. This waterbody is not included within the PAA. The most recent biological assessment was carried out on this waterbody in 2006 and it was classified as Moderate status.

3.2.1.4 Temporal Data - Barrow_080

The ammonia levels at monitoring station u/s UWW Portarlinton showed 5 spikes above the mean EQS in 2018 as per **Figure 4** below. The exceedances varied between seasons, this suggests that the source may not be rain mobilised. Ammonia presence in the waterbody would indicate based upon the land use in the area a misconnection or an SWO. There were no exceedances in 2019.

The Ford S of Trascaan is the EPA monitoring station downstream of the Portarlinton WWTP. The raw data exceeded the mean EQS and 95%ile EQS on a regular basis up until 2017. There has been just one exceedance of the 95%ile in the raw data between 2017 and 2019 and this was recorded in November 2018. This represents a 2-fold exceedance of the 95%ile and a 3 and half fold exceedance of the annual average EQS. This can be seen as per **Figure 5** below. The Portarlinton WWTP underwent improvement works in 2017 and this reduction in exceedances may correlate with the upgrade works.

These results would indicate there is a source of ammonia entering the water column upstream of the treatment plant causing the elevation at monitoring location u/s UWW Portarlinton. These elevations are not being seen at the Ford S of Trascaan, this could be due to a potential dilution factor.

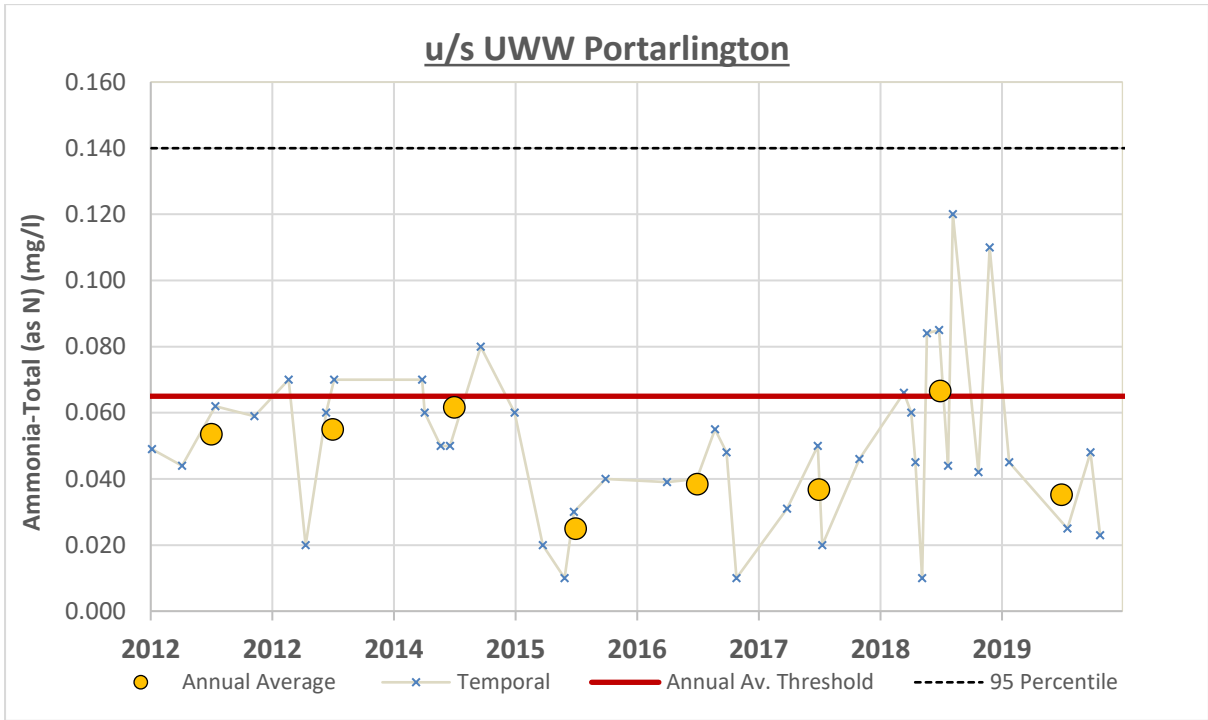


Figure 4: Ammonia concentrations between 2012 and 2019 at u/s UWW Portarlington

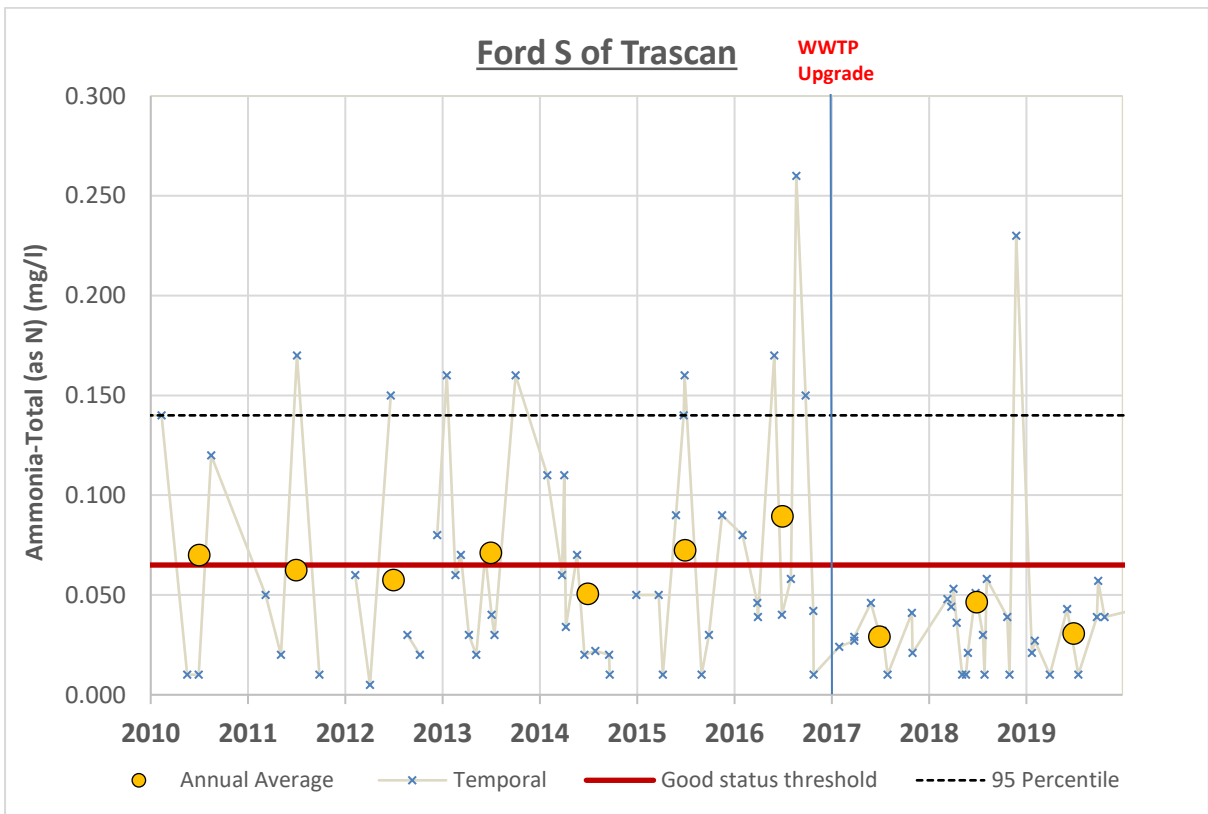


Figure 5: Ammonia concentrations between 2010 and 2019 at the Ford S of Trascan

BOD was identified as an issue within the Barrow_080 at both EPA monitoring points based on the annual averages. The raw data at station u/s UWW Portarlinton showed 1 exceedance above the 95%ile EQS (2.6mg/l) in 2014, 2015, 2017, 2018 and 2019. These exceedances took place between June and September; therefore, they would not typically correlate with high rainfall events. However, this time of year would usually be drier and therefore the water levels in the river would be lower resulting in a lower dilution factor. The highest BOD concentration was recorded in July 2019, which was 5mg/l almost twice the 95%ile EQS (2.6mg/l). The number of sampling events were low in 2019 however just one was below the mean EQS. In 2018, the samples were predominantly over the mean EQS also, as can be seen in **Figure 6** below.

At the Ford S of Trasca there were 4 exceedances over the 95%ile between 2017 and 2019. There was an exceptionally high BOD in October 2019 of 6.7mg/l almost 3 times the 95%ile EQS of 2.6mg/l. There were several exceedances of the mean EQS throughout 2018 and 2019 varying throughout the calendar year. This could indicate a continuous source of BOD rather than weather dependant; therefore, it is likely a direct discharge such as the wastewater treatment plant or a misconnection. The treatment plant was upgraded in January 2017 and therefore these exceedances are all post upgrade works.

Like the ammonia concentrations, it is evident there is a source of BOD entering the water column upstream of the monitoring location u/s UWW Portarlinton. However as per **Figure 7**, there is an additional source of BOD between both EPA sampling locations, which likely coincides with the WWTP.

Based on the annual averages Ortho P does not appear to be a significant issue u/s of the treatment plant as the mean EQS was exceeded just twice, in 2012 and 2016. However, although the annual averages are under the mean EQS (0.035mg/l), the raw data is showing an elevation above the mean EQS per year between 2017 and 2019. There is no correlation in the time of year in which exceedances occur. This would indicate there is a source of P entering the water column, however it may be coming from the Barrow_070 or alternatively there may be an additional source. The Barrow_070 cannot be compared with the Barrow_080 during this time period as the sampling dates do not correlate. However, the Barrow_070 raw data does show a number of exceedances of the mean EQS (0.035mg/l) between 2017 and 2019, the average ortho P concentration between this period on the Barrow_070 is 0.04mg/l. Therefore, it is evident the Barrow_070 is contributing a load of Ortho P to the Barrow_080.

Ortho P has been a consistent issue at the EPA monitoring station “Ford S of Trasca”, this station is located downstream of the Portarlinton WWTP’s discharge point. The Ortho P mean EQS of 0.035mg/l was exceeded regularly up until 2017. Between 2017 and 2019 the number of exceedances of the mean EQS did reduce, although there remained elevations in the raw data throughout the year. There were two exceedances of the 95%ile, one of which was in October 2019, the concentration recorded was over 5 times the 95%ile EQS. LAWPRO have made a request to IW for the WWTP discharge raw data.

The WWTP underwent upgrade works to the ferric dosing plant in 2017. Since the upgrades have been completed at the plant, there have been no exceedances of the annual averages of Ortho P. However, it was noted the raw data for this monitoring location between 2018 and 2019 did show 5 exceedances of Ortho P, indicating there is a source of ortho P present, whether it is from the plant or upstream is unknown as the sampling dates do not coincide between both locations.

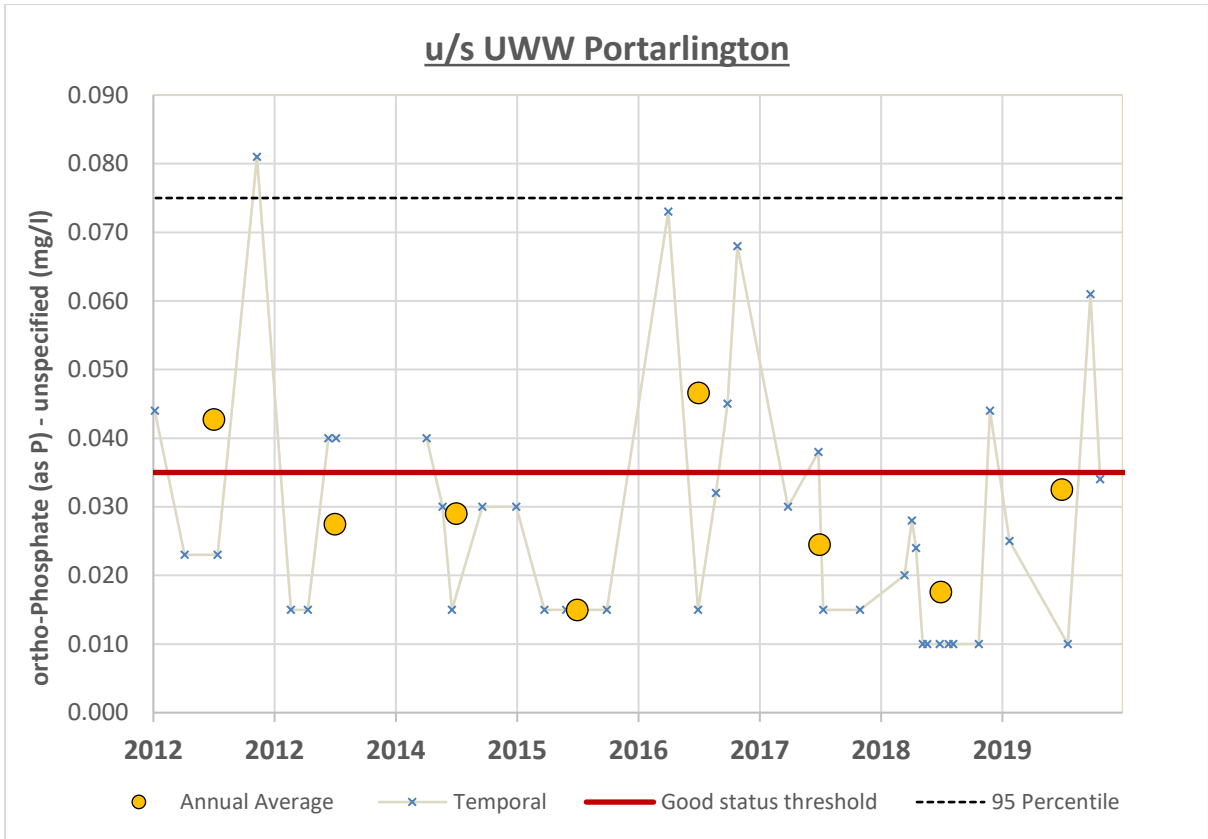


Figure 8: Ortho P concentrations u/s UWW Portarlington

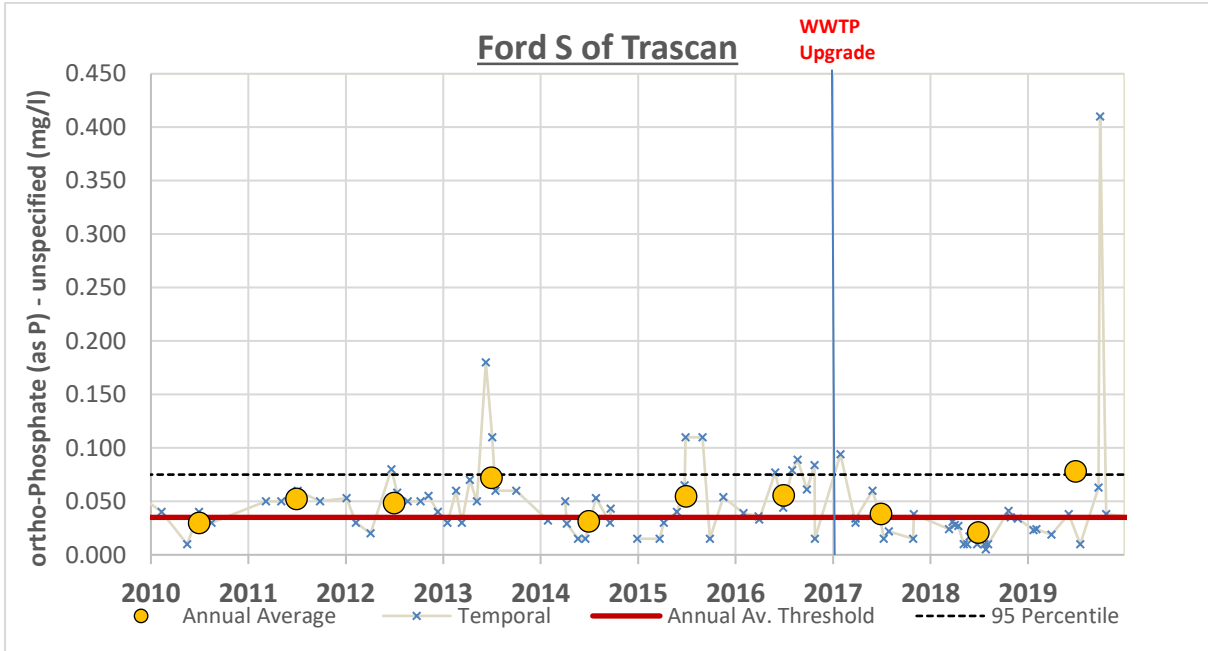


Figure 9: Ortho P concentrations at the Ford S of Trascan

3.2.1.5 Temporal Data - Barrow_090

BOD between 2017 and 2019 varies fluctuating above and below the mean EQS, with one exceedance in 2017 above the 95%ile EQS. The raw data between the Ford S of Trascaan (upstream) and Pass bridge (downstream) were compared to identify whether there was a correlation in the concentrations of ammonia, BOD and ortho P. This data is based on results from 2007-2016, with the exception of one record from 2018. Post 2016 the sample dates did not correlate and therefore could not be compared.

As these results are based on data prior to the treatment plant being upgraded (2017) it is not unexpected the concentrations remain at this level. However, it is unknown based on the data gap (different sampling dates at each location) between 2017 to date whether the Barrow_080 is still the main contributor at the Pass bridge or whether the Figile_080 is now contributing a larger load due to potential reduction in pollutant load as a result of compliance at the treatment plant. It is proposed by LAWPRO that Laois Co. Co. and Kildare Co. Co. coordinate these sampling events together to allow for further comparison.

As per **Figure 10** the data states that although the annual averages are not exceeding the mean EQS in 2018 and 2019 there are a number of occurrences throughout these monitoring years when the individual events exceeded the EQS (1.5mg/l) on a regular basis. However, it has been noted there were no exceedances of the 95%ile in 2018 or 2019.

There is a strong correlation in the BOD concentrations between EPA monitoring stations the Ford S of Trascaan and Pass Bridge as the R^2 value was 0.7572 (**Figure 10**). This correlation means when BOD is high at one monitoring point it is also high at the other. Based on the two highest correlations in **Figure 11** below highlighted in red shows the BOD peak upstream is causing a downstream peak. There is a reduction downstream on both sampling events, however, this is likely due to dilution.

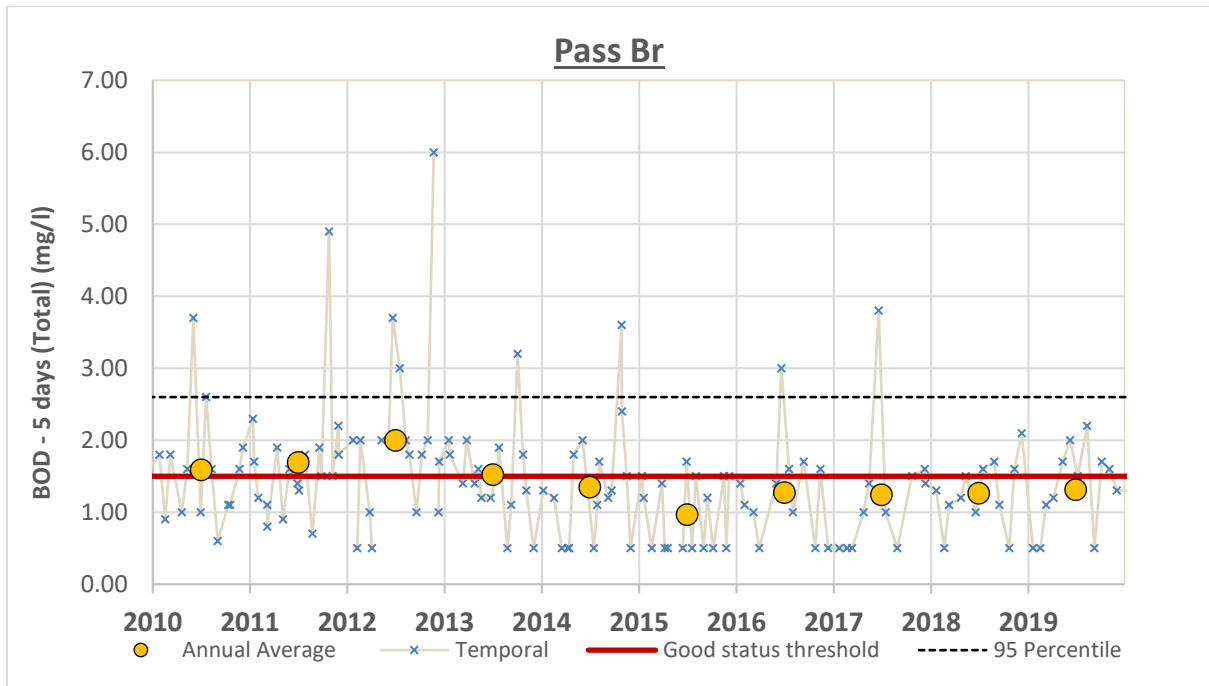


Figure 10: BOD concentrations at Pass bridge between 2010 and 2019

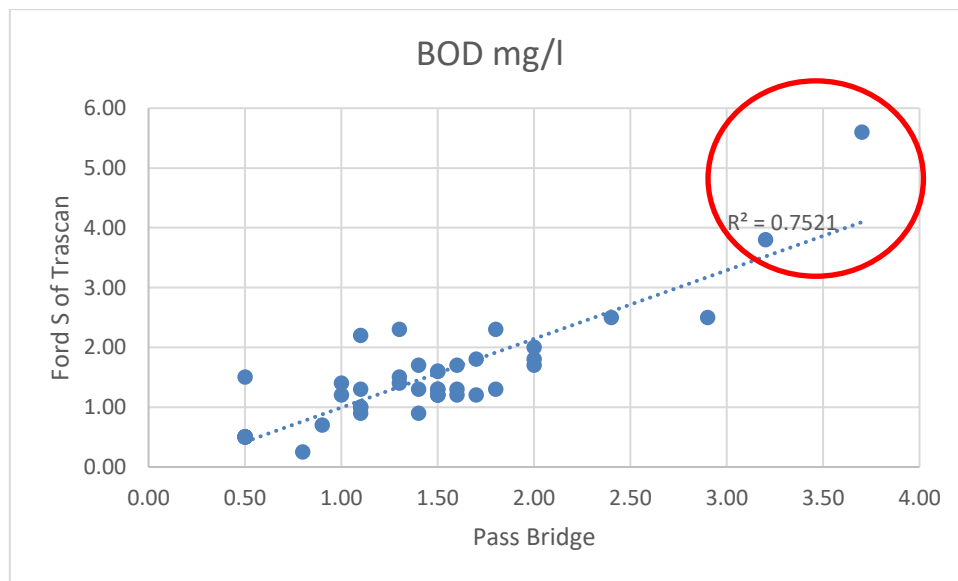


Figure 11: Ford S of Trascan & Pass bridge BOD concentrations (2007-2016 data)

The ammonia temporal data for Pass bridge is largely compliant, with 4 exceedances of the mean EQS and 2 breaches of the 95th EQS between 2017 and 2019 (**Figure 12**). All exceedances occurred between October and December therefore suggesting there may be an association with heavy rainfall events. However, the rainfall data was assessed, and a strong correlation was not identified between ammonia concentrations and the rainfall data from Lullymore Nature Centre weather station, Co.

Kildare. It must be noted this station is approximately 20km from Pass bridge, therefore rainfall patterns may not always match up. There was no alternative weather station based on proximity and available data. The ammonia data between monitoring locations Ford S of Trascan and Pass bridge show a relatively strong correlation based on the R^2 value 0.4912 (Figure 13). Similarly, as per the BOD assessment above the concentrations at Ford S of Trascan seem to be dictating the concentrations downstream at Pass bridge. This data is based on monitoring between 2007 and 2016. In 2017 the Portarlinton Wastewater Treatment underwent upgrades. Therefore, there may no longer be a correlation between these two locations, however as the two monitoring locations are now sampled on different days further comparisons cannot be made.

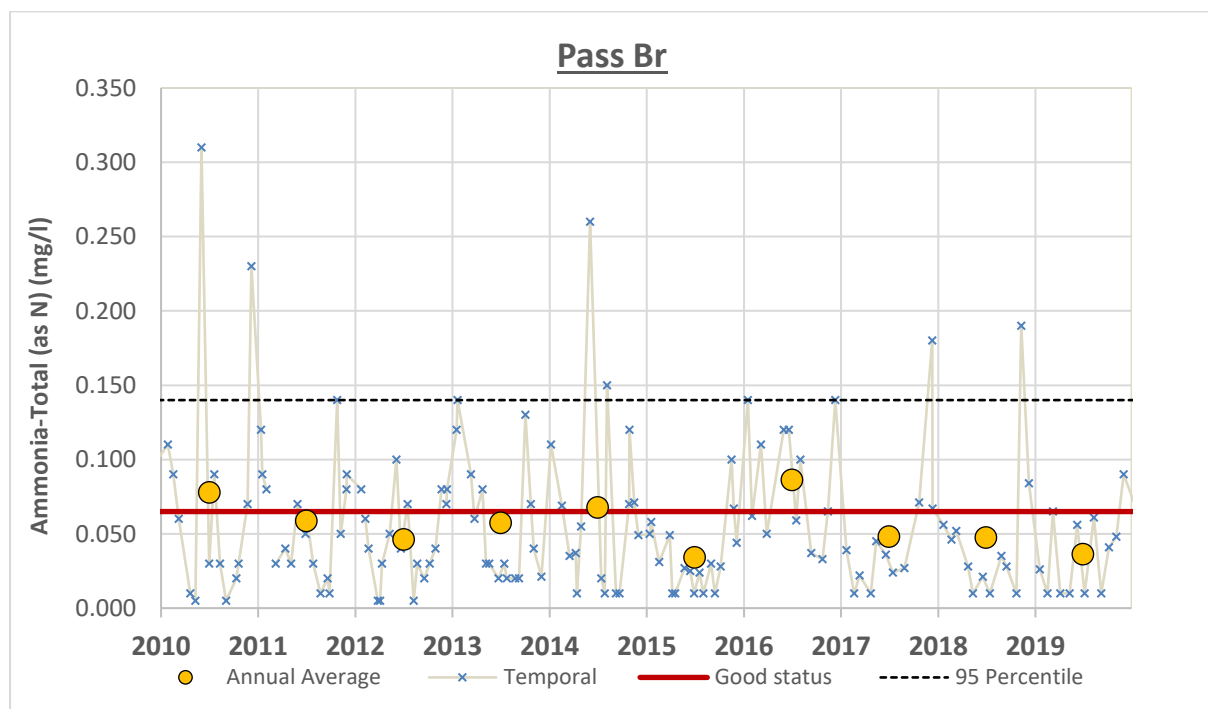


Figure 12: Ammonia concentrations at Pass bridge between 2010 and 2019

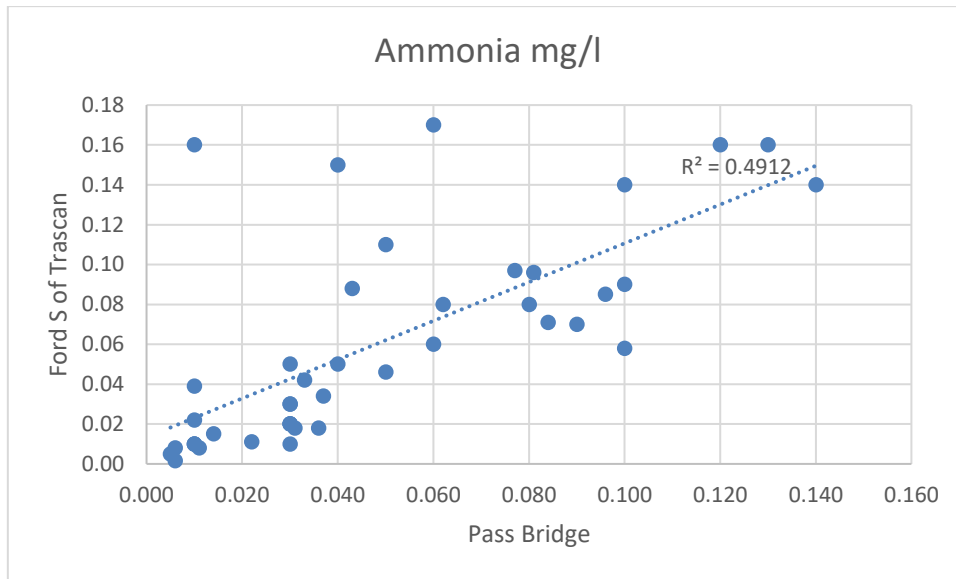


Figure 13: Ford S of Trascaan & Pass bridge Ammonia concentrations (2007-2016 data)

Ortho P shows elevations above the mean EQS in 2017, the individual sampling events were compliant throughout 2018, increasing above the mean EQS (0.035mg/l) again in the later part of 2019, as per **Figure 14** below. Again, it must be noted **Figure 15** displays data between Ford S of Trascaan and Pass bridge between 2007 and 2016 as the sampling days correlated, there was a change to the monitoring programmes in 2017 and onwards, therefore not allowing for comparison post 2016. There were two sampling events as per **Figure 15** which showed a correlation between both points. As this graph is based on data pre Portarlinton WWTP upgrade works, there may be a further decline in comparison between both sites in future. The increasing trend noted in 2019 will require field assessment, it may be linked to the Barrow_080 or potentially the Figile_080 which there is no data for.

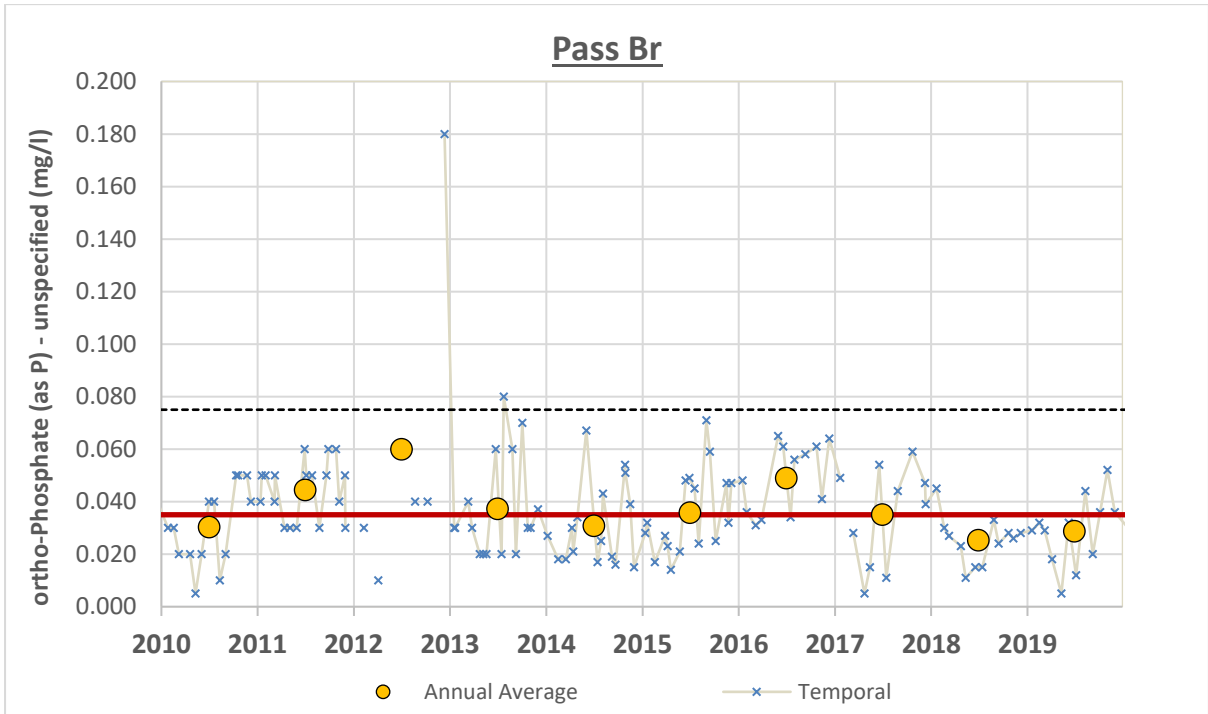


Figure 14: Ortho P concentrations at Pass bridge between 2010 and 2019

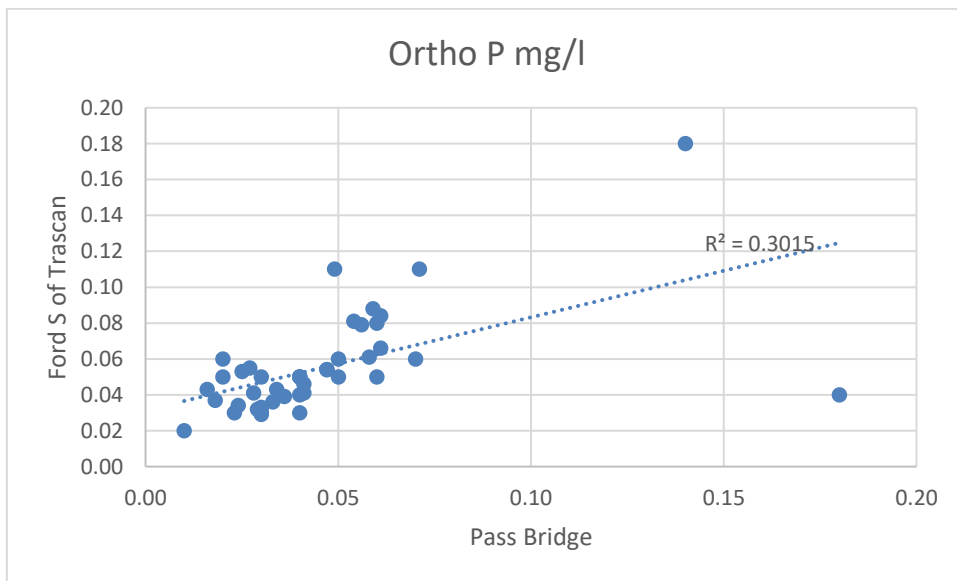


Figure 15: Ford S of Trascaan & Pass bridge Ortho P concentrations (2007-2016 data)

3.3 Supplementary information

Inputting Waterbodies

The Figile_080 flows into the Barrow_090, just upstream of the EPA monitoring point “Pass bridge”, this is an unassigned river. The pressures which have been identified along this waterbody are domestic wastewater and hydromorphology. This was last biologically monitored in 2006 and was Moderate status, it had shown a drop from its previous sampling event in 1993 when the monitoring point was classified as Good status. Further assessment is required at the confluence of these two rivers to identify whether the Figile_080 is a contributing factor to the less than Good ecological status at Pass bridge (Barrow_090).

Fish Status

The Barrow_090 is at Poor status and this is driven by fish stocks. The Barrow catchment was surveyed in 2015 by IFI (National Research Survey Programme, Rivers 2015, River Barrow Catchment Survey). The survey identified high fish status was only assigned to five (6%) of the 83 subcatchment sites surveyed, while 36% were assigned Good status. Unfortunately, 52% were assigned Moderate status or less across the subcatchment, the Barrow_090 was included in this figure. The main reasons for less than good fish status was poor water quality, poor habitat, the presence of artificial barriers impeding migratory fish passage and possibly competition from the invasive dace. IFI deem that this trend mirrors the overall trend for ecological status in the catchment based on all biological elements and physio-chemical parameters.

The Figile_080 is the inputting waterbody into the Barrow_090 and therefore is possibly an influencing factor. Based on the IFI assessment in 2015 the most unproductive rivers for brown trout and salmon were the Figile and Philipstown rivers. The likely reason for this was poor water quality, poor habitat and possibly competition from coarse fish species, particularly dace are the main reasons for this.

As displayed under **Table 4** above there has been an issue with ortho P, BOD and ammonia over the years however the quality did not affect the fish stocks as Good status was achieved at this site between 2010 and 2012.

Poor habitat related to hydromorphological changes within the waterbody was explored to determine whether there may have been an impact on fish stocks. The Barrow is not part of the OPW drainage scheme. The Local Authorities of Laois, Kildare and Offaly (formerly acting through the joint committee previously known as the Barrow Drainage Board (established under the Barrow Drainage Acts 1927

and 1933)) are responsible for maintaining the River Barrow and its tributaries from its source in the Slieve Bloom mountains in Co. Laois to the Horse Bridge in Athy, Co. Kildare. The EPA and Local authorities also monitor water quality and regulate discharges to the river. As the Barrow Drainage Committee was abolished in December 2014, some of the staff have been maintained by Offaly and Kildare County Councils. It was clarified by Kildare Co. Co. that no works were completed along this river in the last 10 years.

As discussed above there has been an improvement in water quality over the period and so it is not thought to be the significant factor driving fish status. Similarly, hydromorphology is not deemed to be significant as no works have been carried out on the river since 2010. Therefore, it is expected this decrease in fish stocks correlates with invasive species out competing other fish species. IFI notes from 2015 indicate the reasons for the downgrade is due to lower than expected counts of salmon, brown trout and other species such as eel and pike. The high presence of Dace and Roach also caused a downgrade at the site (high status not possible). The Barrow catchment was surveyed in 2015 and will be surveyed again in 2020. Further discussion will be had with IFI to determine proposed actions, if any, to improve the fish status.

3.4 Conclusions on Significant issues

The EPA monitoring station “u/s of the Portarlinton WWTP” annual average WQ data in **Table 4** above shows elevations in ammonia and BOD above their respective mean EQS. The BOD exceedances are re-occurring and were recorded up to 2019. Ammonia, annual averages have been compliant from 2017 to date. However, the raw data did show some exceedances in 2018. Ortho P has had only three exceedances in the last three monitoring years. Therefore, indicating BOD is the significant issue at this monitoring location. Upstream of this monitoring point is urbanised by Portarlinton town. There are a number of storm water overflows throughout the town, which are not alarmed and do not have flow monitors in situ.

The EPA monitoring station “Ford S of Trascaun” is located downstream of Portarlinton WWTP. IW carried out upgrade works at the Portarlinton WWPT in 2017. The chemistry data has been reviewed in an aim to identify whether the improvement works have resulted in reducing parameter concentrations d/s of the treatment plant. The annual averages for Ortho P and Ammonia did not exceed their respective mean EQS in 2018 and 2019. The raw data (2017-2019) showed a small number of exceedances of Ortho P and one exceedance of ammonia, there has been a significant improvement in the number of breaches of the mean EQS for both parameters. The remaining exceedances could indicate there may be an input of nutrients from the WWTP from time to time,

however, this cannot be determined as the raw data is not included in the AER, it is based upon annual averages. BOD however continues to exceed the annual average mean EQS (1.5mg/l) at this location.

At the EPA monitoring location “Pass Bridge” along the Barrow_090 there are no exceedances of any of the parameter’s annual averages from 2017 to date. However, the raw data does show a small number of exceedances of BOD, ammonia and Ortho P between 2018 and 2019. The Figile_080 flows into the Barrow_090 just upstream of the EPA monitoring point “Pass bridge”. Therefore, the source of these nutrients is either coming from upstream on the Barrow or the Figile_080. The Figile_080 requires assessment to determine whether it is contributing to the Poor ecological status at Pass bridge, this status is driven by Poor fish stocks and has recently dropped from Good to Moderate invertebrate status. Further discussions will be held with IFI regarding the Poor Fish status and ways to combat it.

4 Significant pressure information

4.1 Initial EPA Characterisation

The significant pressures within each PAA were determined by the EPA during the initial characterisation process. In the Portarlinton PAA, UWW and hydromorphology were the main pressures as per **Table 5** below. The associated impacts from these pressures included nutrient and organic pollution and altered habitat due to hydrological and morphological changes.

WB name	Significant Pressures		Impact
	No.	Type	
Barrow_080	1	Urban Waste Water - Portarlinton Agglomeration PE > 10,000	Nutrient and Organic Pollution
Barrow_090	1	Hydromorphology (Channelisation)	Altered habitat due to Hydrological and Morphological changes

Table 5: EPA Initial Characterisation

4.2 UWW

The Portarlinton UWWT plant was upgraded in January 2017 under the IW investment program as set out under the RBMP 2018-2021. The upgrade included an upgrade of pipework, improved aeration systems, new storm water control & reinstated ferric dosing at the plant. There was also a big improvement in operational practices on site, based on EPA OEE feedback and they have deemed the

plant is well managed and no issues were identified at the plant on the most recent inspection (EPA Site Visit Report, 2019).

There were a number of licence condition exceedances for Ortho P and Total P based upon the 2017 Annual Environmental Report (AER) data. The plant was upgraded in Qtr 1 2017, therefore these exceedances may be related to the commencement of the new systems. However, the 2017 annual averages displayed in **Table 4** above did begin to show the positive effects of the treatment plant improvements on the receiving waters.

The 2018 AER was reviewed, there was one incident regarding a spillage resulting from ragging/blocking, this was rectified. The 2019 AER was also reviewed, which highlighted 4 incidences, 3 of which were due to equipment going offline and one was a spillage due to adverse weather conditions.

The plant has shown compliance with the ELVs in 2018 and 2019 as set out under the licence conditions, this is based on annual means and does not identify possible exceedances of the ELVs based on raw data throughout the year. Potential exceedances of the raw data at the WWTP may correlate with the exceedances from time to time in ambient raw monitoring data at Ford S of Trascaan. It is difficult to determine whether there is a correlation between the plant discharge and the receiving waters without the WWTP discharge raw data, this has been requested from IW.

Ortho P, ammonia and BOD concentrations between upstream and downstream of the Portarlinton WWTP were reviewed to identify whether there was a correlation between the two sites. This would highlight whether an issue upstream is impacting downstream or whether there is an additional pressure which needs to be addressed. There was no correlation identified based on data between 2012 and 2019. The R^2 values for all three parameters were below 0.1 and therefore there was no strong correlation between both locations. If there was a strong correlation between both locations an R^2 value of 0.5 or higher would be expected. This would indicate the issues upstream of the treatment plant are not having an impact on the exceedances identified downstream of the treatment plant, therefore there is a nutrient source between both locations causing the exceedances at the Ford, likely the treatment plant. As the treatment plant was upgraded in 2017, the BOD, ammonia and Ortho P between 2017 and 2019 were assessed to identify whether there was a strong correlation between the upstream and downstream locations post WWTP upgrades. Ortho P showed a strong correlation with an R^2 value of 0.73. There was a slight correlation with ammonia, with an R^2 value of 0.35, BOD however showed no correlation. This suggests that upstream concentrations are impacting the downstream location after the upgrade works at the treatment, therefore indicating the treatment plant may no longer be a significant issue. A mass balancing assessment on the significance

of the impact of the WWTP based on 2018 data (post upgrade works) on the monitoring point Ford S of Trascaan will be carried out below.

Mass Balancing Assessment

A mass balancing calculation was carried out on the WWTP using the EPA hydrotool, 95%tile flow estimate. This calculation aids in identifying whether the treatment is having an impact on the receiving waters. This assessment is based on data post the 2017 WWTP upgrade works. The upstream monitoring location 2019 annual averages were used as the background concentration, the annual average discharges from the WWTP in 2019 are added to this figure, these combined and based on flows indicate whether the parameters such as ammonia, ortho P and BOD have any headroom within the receiving waters. Headroom indicates whether the receiving waters can support the addition of the discharge based on background concentrations.

XXXX Point source licensed discharge (only enter data in yellow cells!)											
1) 95%ile river flow at nearest downstream WFD monitoring point <i>either enter lps data in cell B3 or enter lpd data into cell D3, overwriting cell formula (1m³= 1000 litres)</i>											
River Flow	0.961326	m ³ /sec	83058566	lpd							
2) Effluent Dry Weather Flow (DWF) <i>usually determined by PE *200lpd</i>											
Effluent D ¹	2600	m ³ /day	2600000	lpd							
Total DIS flow			85658566	lpd							
3) Resultant concentration calculations for the discharge at nearest downstream WFD monitoring point											
	Upstream conc using notional clean conc (mg/l)	U/S Conc (actual) mg/l	Upstream load using notional clean conc (mg/l)	U/S Load (actual) (mg/d)	Annual Average Effluent Conc	Effluent Load (mg/d)	Total Load using notional clean (mg/d)	Real Total Load (mg/d)	Final DIS Conc using notional clean (mg/l)	Final DIS conc using actual results (mg/l)	95%ile EQS (Cmax)
BOD (mg/l)	0.26	2.85	21595227	2.4E+08	1.83	4758000	26353227	241474914	0.31	2.819	2.60
P (mg/l)	0.005	0.033	415292.83	2740933	0.11	286000	701292.83	3026932.7	0.008	0.035	0.075
NH4-N (mg/l)	0.008	0.035	664468.53	2907050	0.25	650000	1314468.5	3557049.8	0.02	0.042	0.14
4) Headroom assessment (at nearest downstream WFD monitoring point), using existing water quality or adjusted background:											
Head Room mg/l = Cmax-C			Cmax = Max permissible conc (EQS) (mg/l)						Upstream conc (mg/l)		
			C = Background upstream conc. (mg/l)						Final DIS Conc mg/l		
									Percentage Headroom		
BOD Headroom =	-0.25					BOD			2.85		
MRP Headroom =	0.04					MRP			0.033		
Ammonia N Headroom =	0.11					NH4N			0.035		
5) Headroom assessment (at nearest downstream WFD monitoring point), using notional clean figures:											
Head Room mg/l = Cmax-C			Cmax = Max permissible conc (EQS) (mg/l)						conc (notional clean) (mg/l)		
			C = Background upstream conc. (mg/l)						Final DIS Conc mg/l		
									ge Headroom utilised		
BOD Headroom =	2.34					BOD			0.260		
MRP Headroom =	0.07					MRP			0.005		
Ammonia N Headroom =	0.13					NH4N			0.008		

The mass balancing indicates that the effluent from the treatment plant is using 12% of the BOD headroom, 6% of the phosphorus and 6% of the ammonia based on the existing water quality data. This would indicate that the Portarlinton primary discharge is not likely to be the significant issue within the Barrow_080. This data is based upon the 2019 AER discharges annual averages, there may have been individual spikes within the year, the raw data has been requested from IW. This information is deemed important as there are spikes in the raw data on occasion at the Ford S of Trascaan, retaining the raw discharge data will clarify whether the treatment plant may be the source of these elevations. However, it is evident the impact associated with the WWTP has greatly reduced post upgrade works (2017).

There remains an issue upstream of the UWWTP as the annual average BOD continues to exceed the mean EQS, there are several SWOs throughout Portarlinton town, which could be a source of the BOD at sampling location “u/s UWW Portarlinton”. Therefore, as there are overflows above the upstream monitoring point, they could be skewing the data and therefore the impact from the WWTP primary discharge may not be fully representative.

The EPA biologists carried out a Q value assessment in August 2019 as part of OEE compliance, to determine whether the upgrade works had resulted in any biological improvements downstream at the EPA station “Ford S of Trascaan”. It was deemed there was no change in Q value.

Storm water overflows

The evidence seems to indicate that there may be an additional pressure impacting the waterbody. There are a number of SWO’s and possible misconnections throughout Portarlinton, which need to be investigated during the LCA. These SWO’s have not been assessed to determine compliance with the DoEHLG criteria. Any potential misconnections will need to be identified and rectified.

There are eight storm water overflows throughout Portarlinton town, five are located along the Barrow_070 just before flowing into the Barrow_080. There are 6 SWO’s located above the upstream monitoring location u/s UWW Portarlinton and 2 downstream. These may be having a potential impact on the water quality during heavy rainfall events. There are 3 pumping stations within the town, one at Barrow bridge, one in the town square and the 3rd at Portarlinton Leisure Centre, all pumping stations are alarmed and have emergency overflows. The pumping stations have approximately 2-3 hours storage before the emergency overflow is activated. The storm water overflows (SWOs) are not alarmed or flow monitored, these discharge to the receiving waters in high rainfall events. These discharges will be assessed during the LCA in dry and wet conditions.



Figure 16: Map identifying the Storm Water Overflows (SWO's) throughout the Portarlington Urban area

SWOs are being thought to result in an impact at the EPA monitoring stations “us UWW Portarlington” and “Ford S of Trascaan”. They were analysed in conjunction with weather data to identify whether there was a correlation between high rainfall events and elevations in the chemistry. It is expected that high rainfall would lead to max capacity in the pumping stations, which would in turn result in a direct overflow of sewage into the receiving waters.

The rainfall data was taken from the Met Eireann station in Clonslee. An accumulation of the rainfall data for two days prior to sampling was used. Rainfall data was compared to concentrations of BOD, ammonia and Ortho P to determine if a correlation was present. The R^2 value for all three parameters at both locations were below 0.5 and therefore there was not a strong correlation. However, there were a few sampling occasions at the Ford S of Trascaan where the elevation in BOD and Ammonia spiked at the same time as high rainfall. This would indicate that high rainfall events can result in impacts on water quality. As per **Figure 17** and **18** below there are three monitoring events in which the BOD and ammonia were elevated along with high rainfall. Samples were not taken u/s on these dates; therefore, it is unknown whether there was a spike u/s also. As there are a limited number of samples taken per year upstream approx. 4/5 there may be correlations, however, timing of sampling is not aligning or alternatively there may be an additional source for example misconnections.

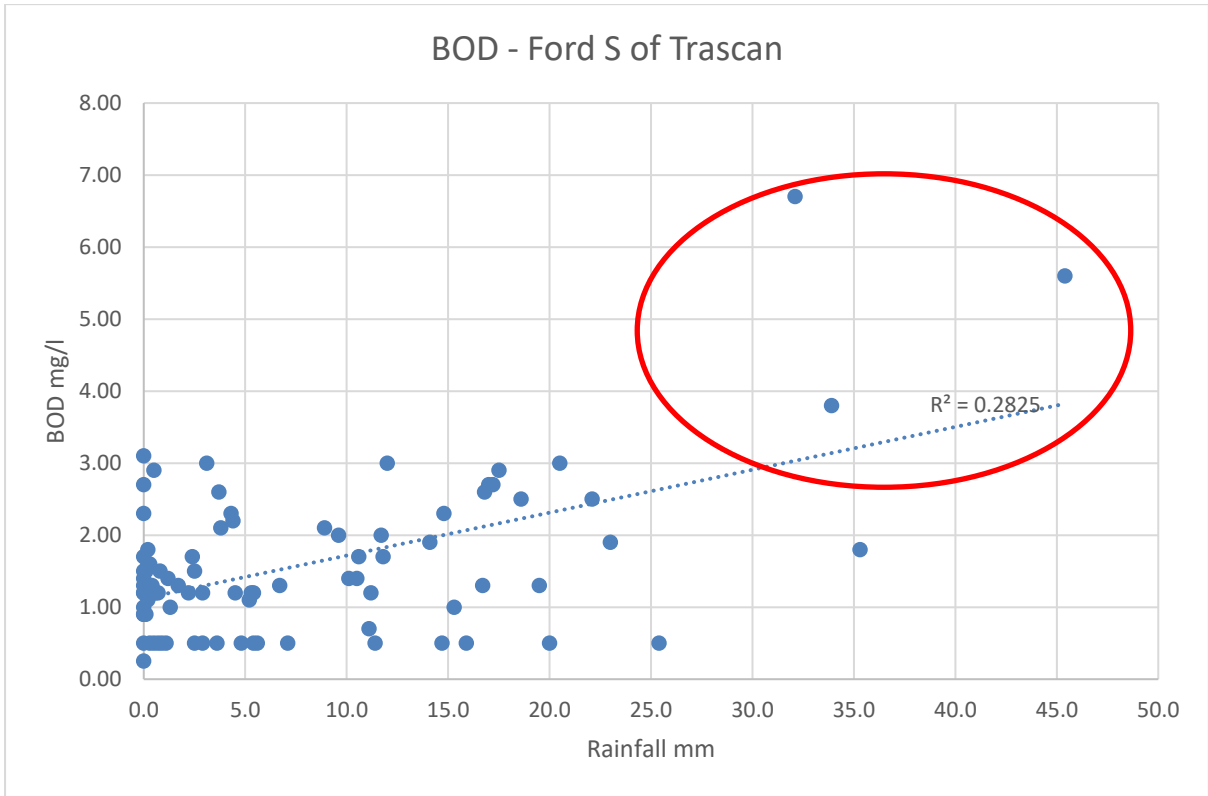


Figure 17: Correlation between rainfall data and BOD

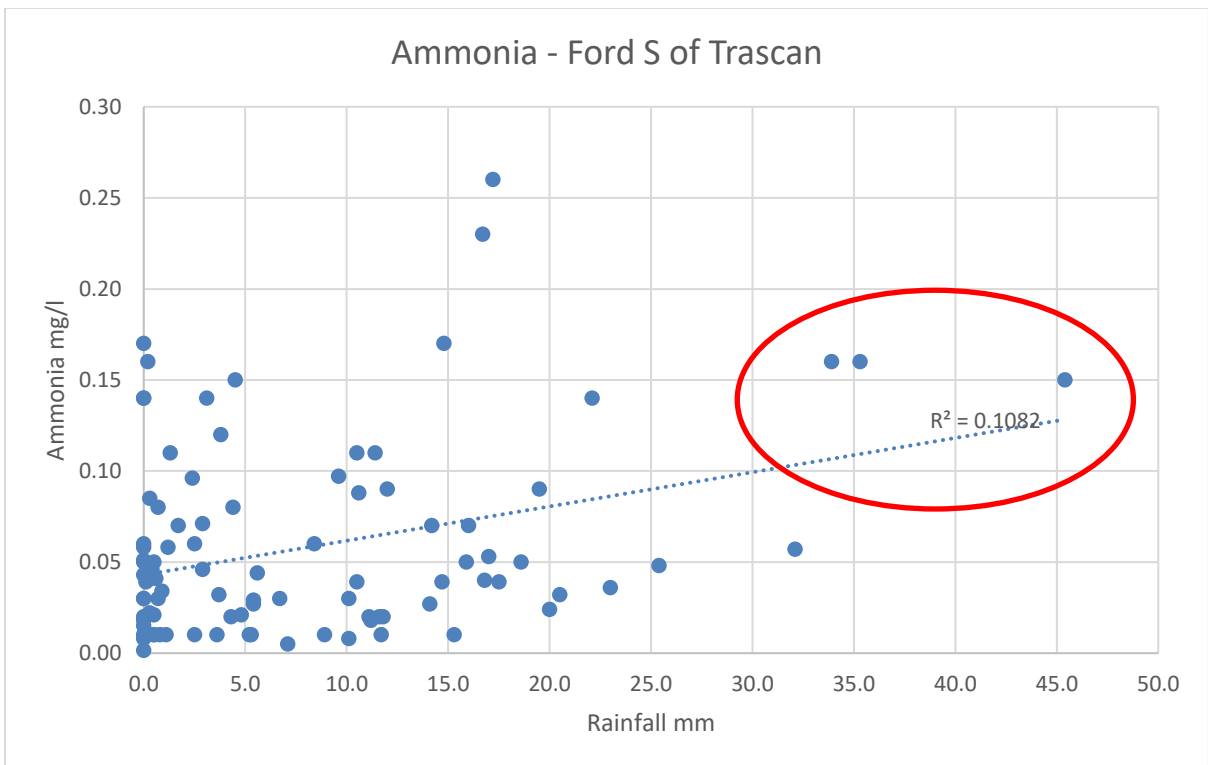


Figure 18: Correlation between rainfall data and ammonia

4.3 Hydromorphology

Hydromorphology (Channelisation) has been listed as the significant pressure along the Barrow_090. This waterbody was meeting Good ecological status between 2010 and 2012, this would indicate the deterioration or impacts on the waterbody arose between 2013 and 2015. As hydromorphology was selected as the main pressure it would be expected that some changes to the waterbody occurred during this timeframe (2013-2015). The historic maps below have identified that there have been no significant changes to the channel dating back to 1837 (**Figure 19, 20, 21**). This would therefore indicate channelisation may not be having a significant impact on the waterbody. The presence/absence of hydromorphological pressures will require verification in the field. However, based on review there seems to be no significant changes, this would indicate there may be an additional pressure, which will be considered during field assessment.



Figure 19: Historic 6 inch maps (1837-1842)



Figure 20: Historic 25 inch Map (1888-1913)

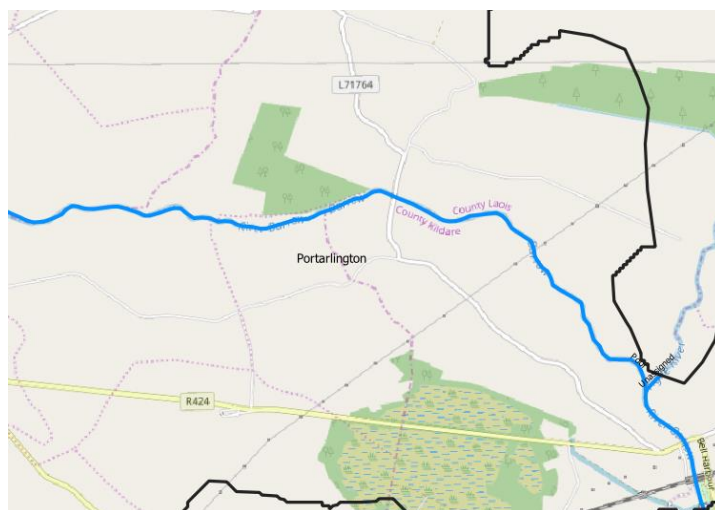


Figure 21: Up to date river network map for the Barrow_090

The MQI for the Barrow_090 is at Moderate status (**Figure 22** below). The waterbody is affected on a medium basis by river-corridor connectivity and presence of a potentially erodible corridor. River-corridor connectivity is based on consideration of development (e.g. buildings, roads) impacting the interaction between the river corridor and channel, including sediment and wood delivery. The associated features include buildings; embankments; fishery enhancement (bank protection); pavements; roads; rail; bridge walls and OPW flood protection structures. Presence of a potentially erodible corridor is consideration of development (e.g. buildings, roads) impacting lateral mobility of a river.

Hydromorphological features associated are similar to river-corridor connectivity it includes buildings; embankments; fishery enhancement (bank protection); pavements; roads; rail; bridge walls and OPW flood protection structures. Artificial embankments are highly impacting this waterbody based on the MQI assessment. This accounts for the presence of embankments. Embankments have an effect on lateral connectivity as they can reduce interaction between the channel and the floodplain. Also reduces habitat diversity.

The associated hydromorphological features include OPW Embankment schemes and Embankments outside schemes. This waterbody is not under an OPW arterial drainage scheme. It fell under the Barrow Drainage Board, this committee was abolished in 2014. It is now the responsibility of Laois, Offaly and Kildare County Councils to look after the upper reaches of the Barrow. No drainage/maintenance work has been carried out along this waterbody in approx. 10 years. Therefore, it does not correlate with the decline in ecological status between 2013-2015 as no works were carried out post 2010.

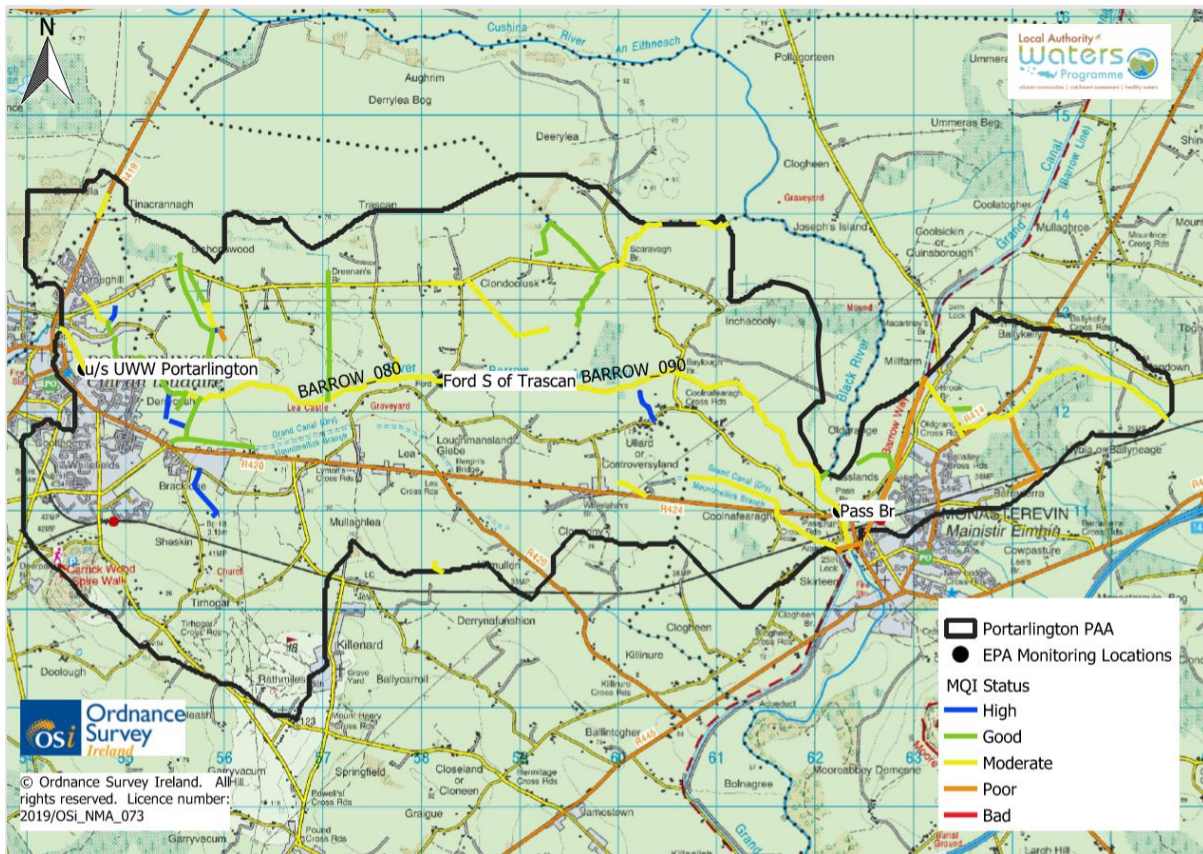


Figure 22: MQI status throughout the Portarlington PAA

4.4 Conclusions on Significant Pressures

UWW appears to remain an issue within the Barrow_080. Although improvement works were completed on the plant, it is likely there are further issues upstream of the plant discharge. There are several storm water overflows (SWO's) both upstream and downstream of the upstream monitoring point. Therefore, as the upstream monitoring point is potentially impacted by SWOs it doesn't allow for a true reflection of the contribution of the WWTP to the downstream monitoring point. During heavy rainfall events these SWOs are potentially transporting large volumes of untreated effluent into the waterbody. These overflows need to be assessed during wet and dry periods.

Along the Barrow_090 there has been a drop-in macroinvertebrate status and poor fish status. As the fish status is Poor it brings the overall ecological status of the waterbody to Poor, even though the invertebrate status is Moderate. The historical maps MQI have been reviewed and no significant hydromorphological (channelisation) issues have been identified. This waterbody achieved good status with the existing hydromorphology pressures there it may not be in itself a significant pressure

driving status change. This will be assessed further during field assessment. The possible cause of the deterioration in Fish Status based on IFI feedback is due to lower than expected counts of salmon, brown trout and other species such as eel and pike and also high presence of Dace and Roach. IFI will be consulted regarding proposed actions to improve fish status within the Barrow River.

5 Pathway information & analysis

The catchment consists of alluvium soils running along the river channel. There are peaty soils present, however, they tend to be located on the outskirts of the catchment boundary. The soils surrounding the river course are a mix of poorly and well-draining soils. The river flows predominately over a locally important aquifer. There is a regionally important aquifer located in the upper most reaches of the Barrow_080. The bedrock in the area is Dinantian upper impure limestone. Dinantian Pure bedded limestone is located in the upper most reaches of the Barrow_080. The Barrow_080 has moderate groundwater vulnerability, whilst the Barrow 090 has a mix of moderately and highly vulnerable groundwater. Please see Appendix 1 below with aquifer, soil and bedrock maps. The Pollution Impact Potential maps as displayed in Appendix 1 **Figures 30 and 31** indicate the catchment is most at risk from phosphorus losses than nitrate. The catchment has a very low nitrate ranking throughout the PAA. There are number patches of high sensitivity towards Phosphorus, these areas need to be addressed.

The Figile_080 flows into the Barrow_090 just upstream of the EPA monitoring point Pass bridge, there is no chemistry for the Figile_080. However, the maps as per Appendix 1 (**Figure 27-29**) indicate this subcatchment lies predominantly over a locally important aquifer, the bedrock is predominantly Dinantian upper impure limestone and the soils are mainly peaty or poorly draining. This would indicate phosphorus and sediment would be the main issues in this waterbody based upon overland flow. Similar to the Portarlinton PAA the Figile_080 is at highest risk from Phosphorus losses based on **Figures 30 and 31**.

6 Interim Conclusions on the Priority Area for Action based on the desk study

In summary, the Barrow_080 is classified as *At Risk* of not achieving the WFD objective of Good status. This waterbody has been moderate status for the last 4 sampling events dating back to 2009, this status is driven by invertebrates. The Water Framework Directive target for the Portarlinton PAA, is to return it to good status by 2021. The significant pressure for this waterbody was identified through the EPA characterisation process, there was just one sole pressure assigned, which was Urban Wastewater. The main issues affecting the water quality are Ortho-P, Ammonia and BOD. Portarlinton WWTP was upgraded in 2017 and the ambient water quality has shown slight improvements. However, there are elevations in BOD, Ortho-P and Ammonia detected upstream of the treatment plant discharge also, this is expected to be related to the urban network as there are a number of surface water and emergency overflows throughout the town. The sub catchment is a mix of poorly and well-draining soils with alluvium soils running along the river channel. The waterbody flows over a locally important aquifer with Dinantian upper impure bedrock below and the groundwater is moderately vulnerable. LAWPRO will conduct a watching brief on the plant to determine whether the upgrade works in the WWTP have resulted in a positive impact on the receiving waters. Local catchment assessment will be required to assess potential upstream sources in more detail.

The Barrow_090 is classified as *At Risk* of not achieving the WFD objective of Good status. This waterbody has Poor ecological status 2013-2018. The fish status is driving down the ecological status as this went from Good to Poor between 2013 and 2015. The fish status has been downgraded due to lower than expected counts of salmon, brown trout and other species such as eel and pike and also high presence of Dace and Roach. The invertebrate status has also recently dropped from Good to Moderate (2017). The Water Framework Directive target for the Portarlinton PAA, is to return it to good status by 2021. The sub catchment is a mix of poorly and well-draining soils with alluvium soils running along the river channel. The waterbody flows over a locally important aquifer with Dinantian upper impure bedrock below and the groundwater has a mix of between high and moderate vulnerability. The sole significant pressure for this waterbody identified through the EPA characterisation process is hydromorphology subcategory channelisation. The main issues affecting the water quality up until 2017 were Ammonia and Ortho-P. Since 2017 there has been no annual average exceedances of either of these parameters and the number of exceedances in the raw data has significantly reduced also. Due to improvement works at Portarlinton WWTP in 2017 it is hoped this has had positive knock on effects downstream along the Barrow_090. A short distance upstream of the EPA monitoring point (Pass bridge) is an inputting waterbody the Figile_080. This river is

unassigned, however, sampling was conducted in 2006 and it was deemed Moderate invertebrate status. Load proportion modelling is proposed to be undertaken to determine the relative loads in the different waterbodies to assist in assigning appropriate measures.

7 Work Plan

- Awaiting final sole pressure report from IW regarding Portarlinton WWTP.
- SWO assessment
- Assess impact of the Figile_080
- Assess the Barrow_090 during the LCA to identify whether hydromorphology is/not an issue. Whilst also allowing for additional pressures, if present, to be detected.
- Discuss possible mitigation, if any, for improving Fish Status with IFI.
- Speak with angling groups in the area and see whether they have any knowledge of changes along the river since 2012.
- Carryout chemical analysis throughout the PAA.
- Contact the EPA hydrometrics unit to discuss carrying out flow analysis/modelling in conjunction with the chemical sampling.
- Review of rainfall data during LCA

8 Review of Mitigation Options

Regarding the Barrow_080 the pressure is the Portarlinton Wastewater treatment plant and will require working with both Laois Co. Co. and IW to ensure all license limits are complied with and improvements are made along the river stretch. Field assessment will identify other possible sources dependent on the LCA and assessment of the SWO's.

Possible mitigation measures cannot be assigned currently for the Barrow_090 as the likely significant pressures which caused a status drop for macroinvertebrates and change in fish populations have not been identified, field assessment is necessary.

9 Communications

9.1 Community Information Meetings

No public meeting required, due to the significant pressures identified within the waterbodies. The investigative assessment assigned to this waterbody was a watching brief on the treatment plant to identify whether upgrade works improved the water quality in the receiving waters. Discussions were held with the LAWPRO CWO, Laois and Kildare County Councils.

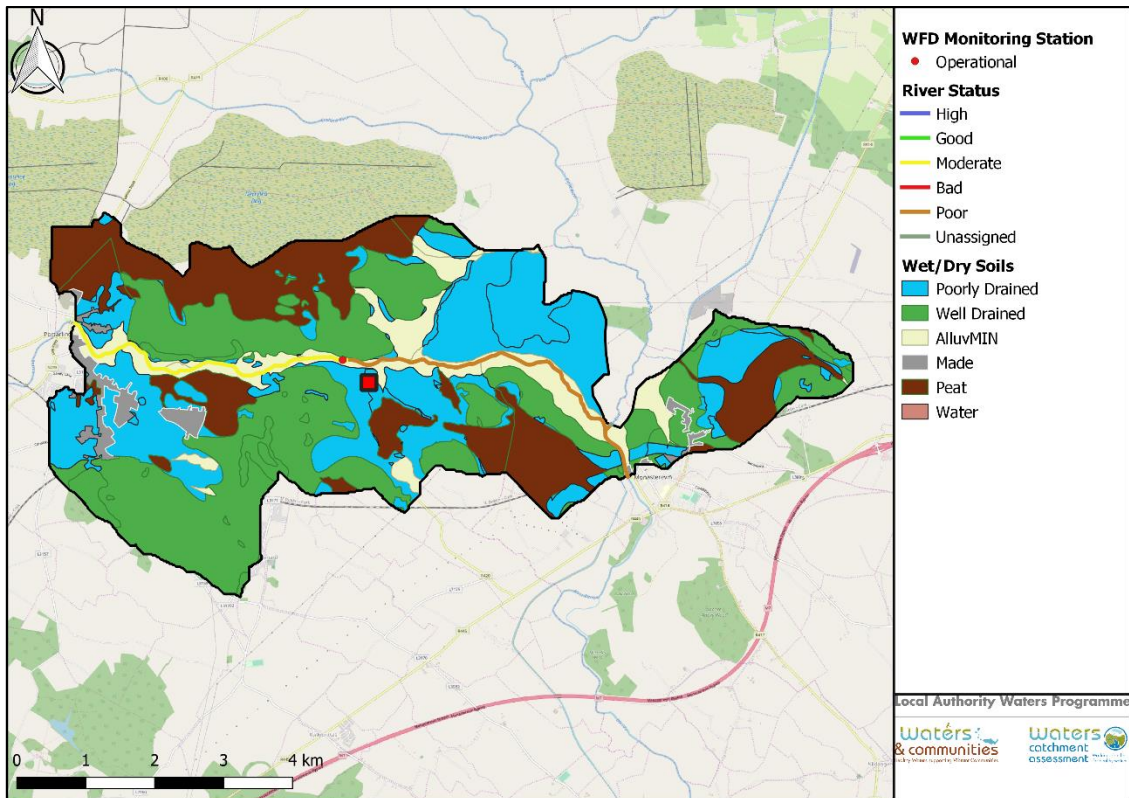


Figure 23: Wet /Dry soils within the Portarlington PAA

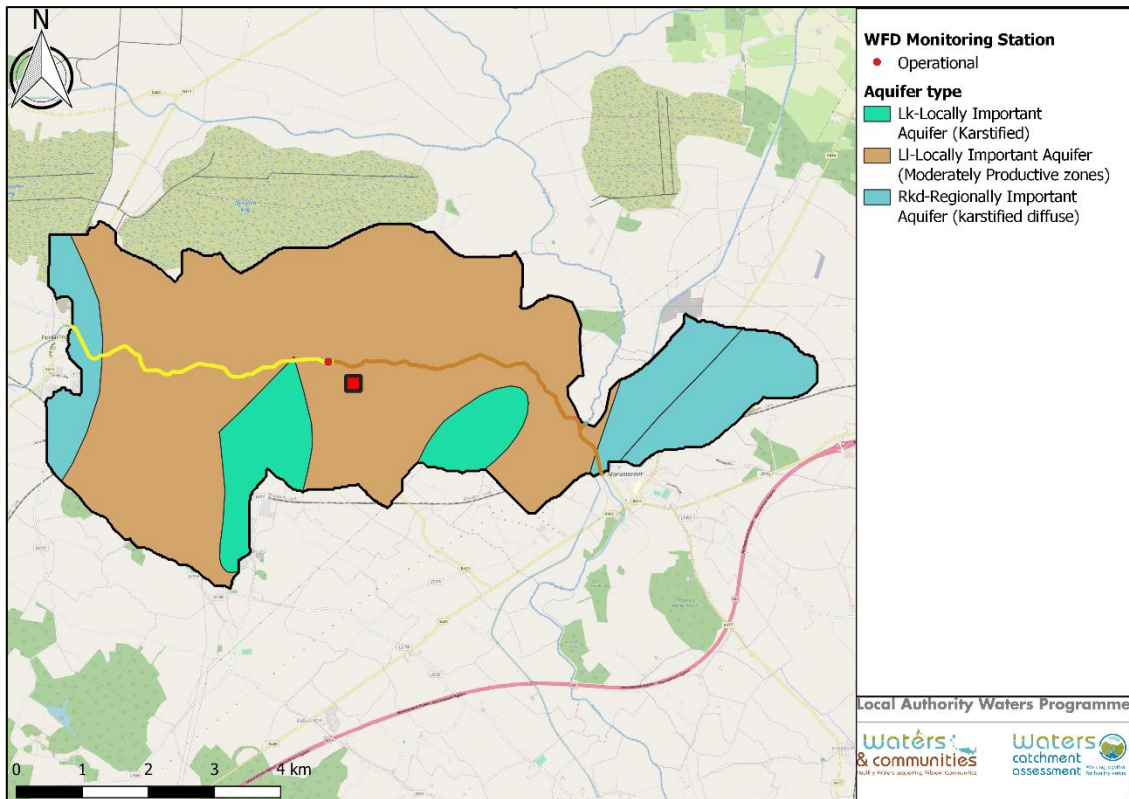


Figure 24: Aquifer types within the Portarlington PAA

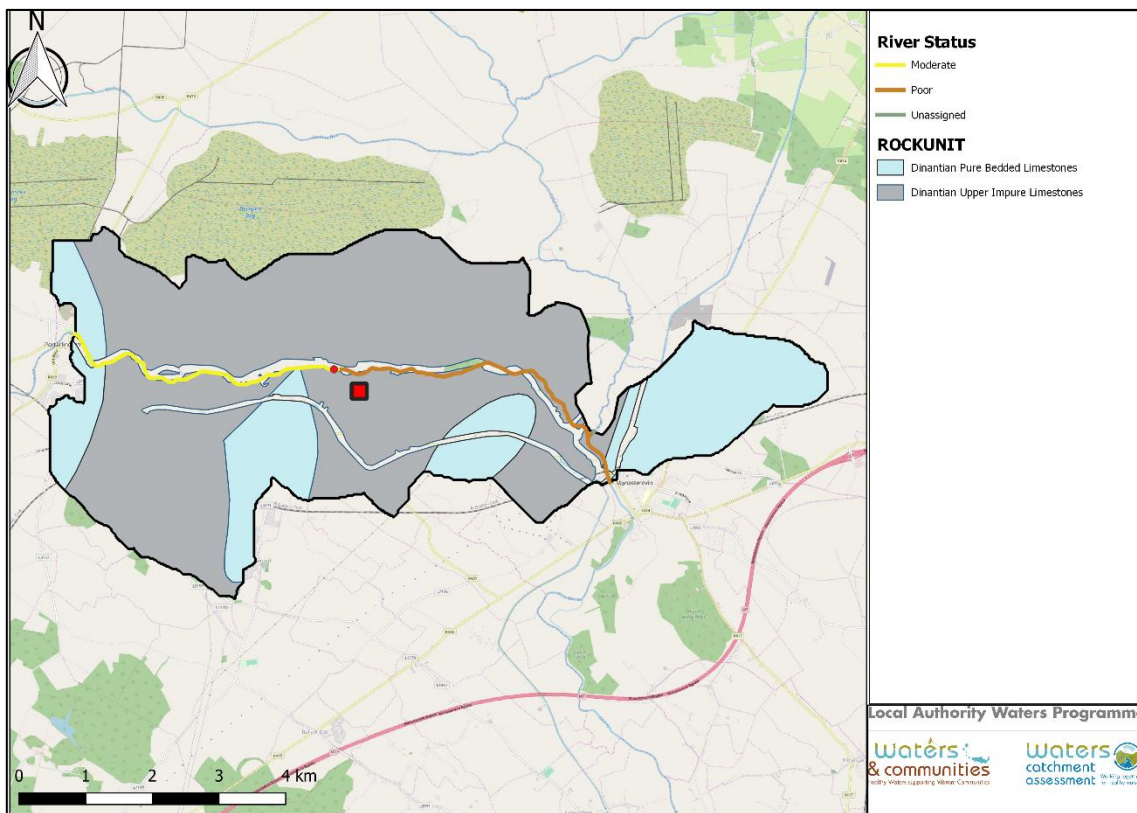


Figure 25: Bedrock types within the Portarlington PAA

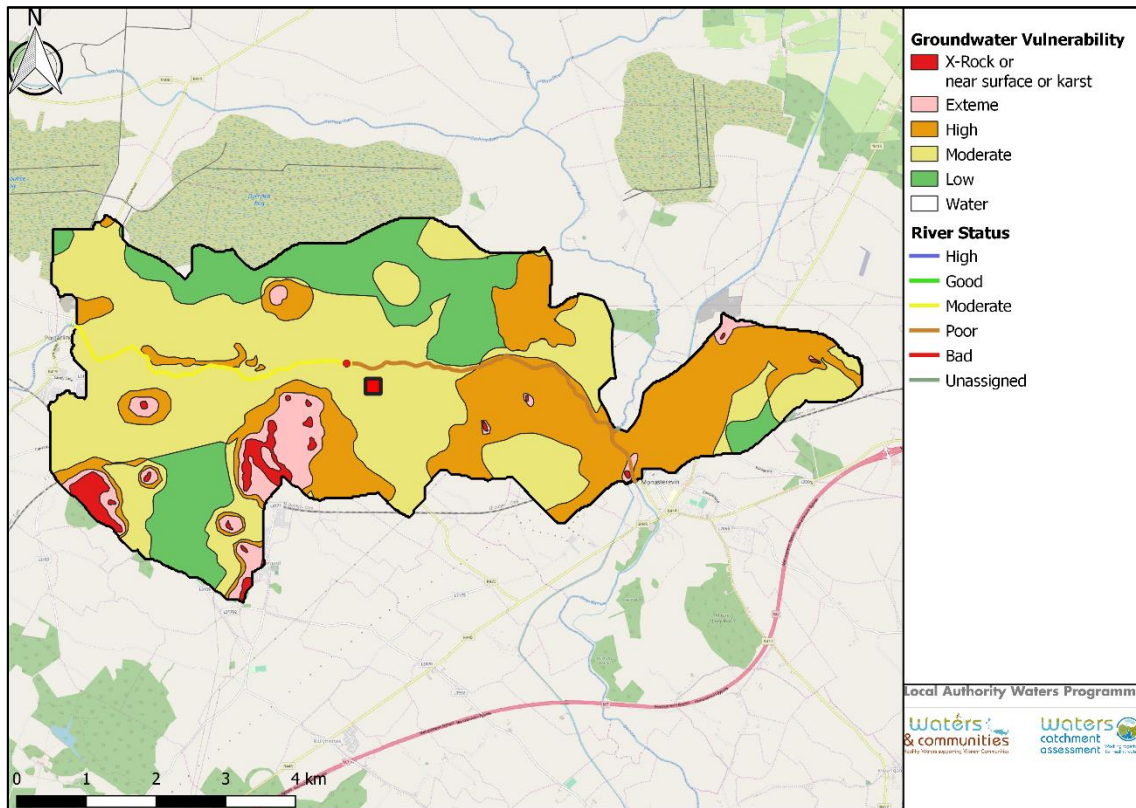


Figure 26: Groundwater vulnerability within the Portarlington PAA

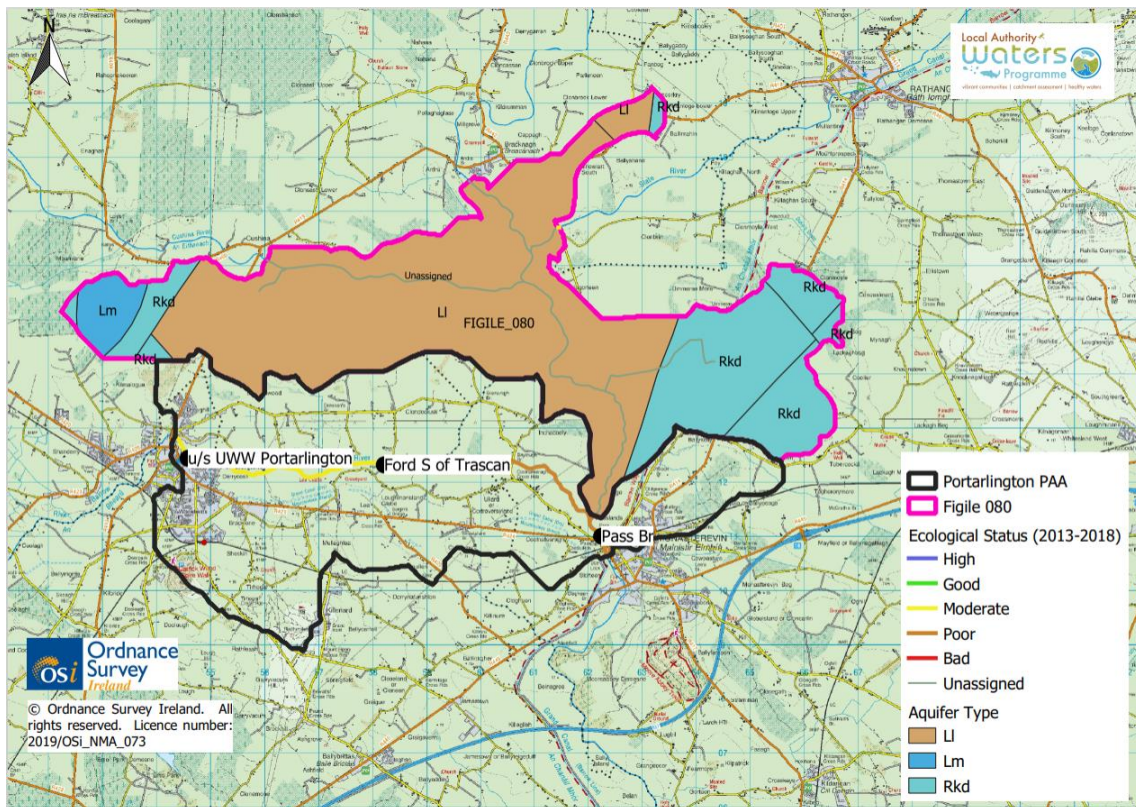


Figure 27: Aquifer types within the Figile_080 subcatchment

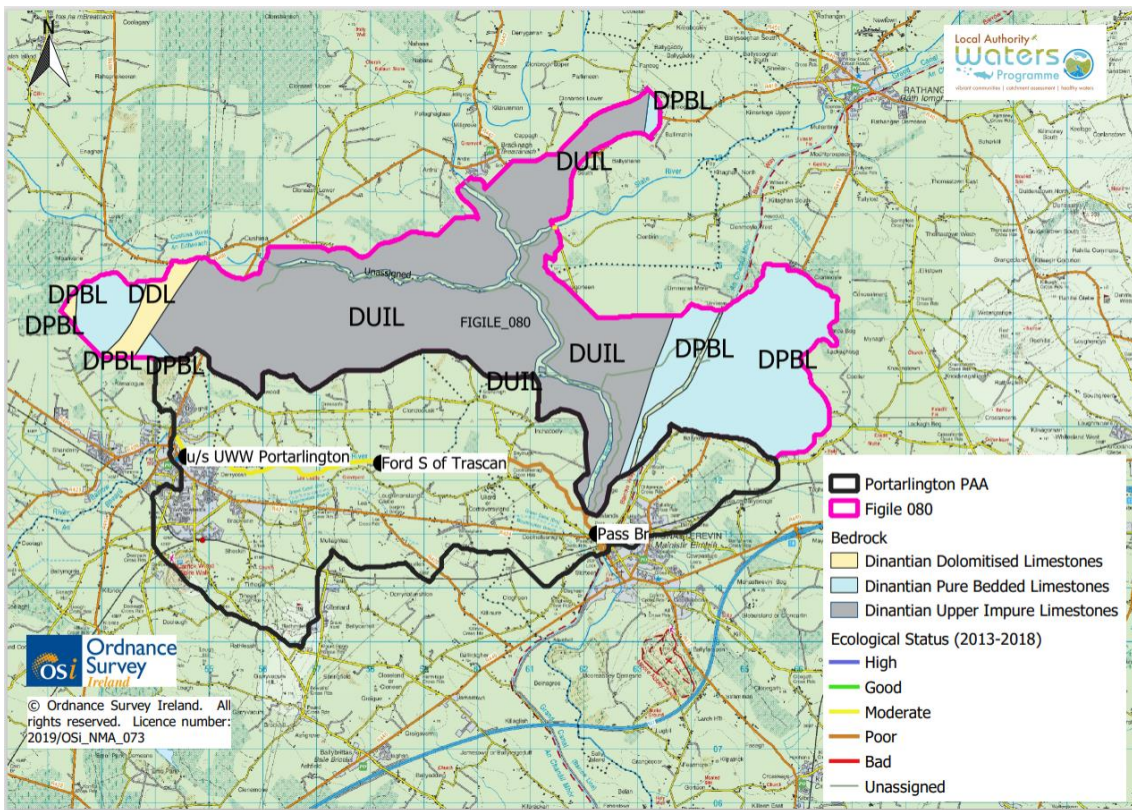


Figure 28: Bedrock types within the Figure_080 subcatchment

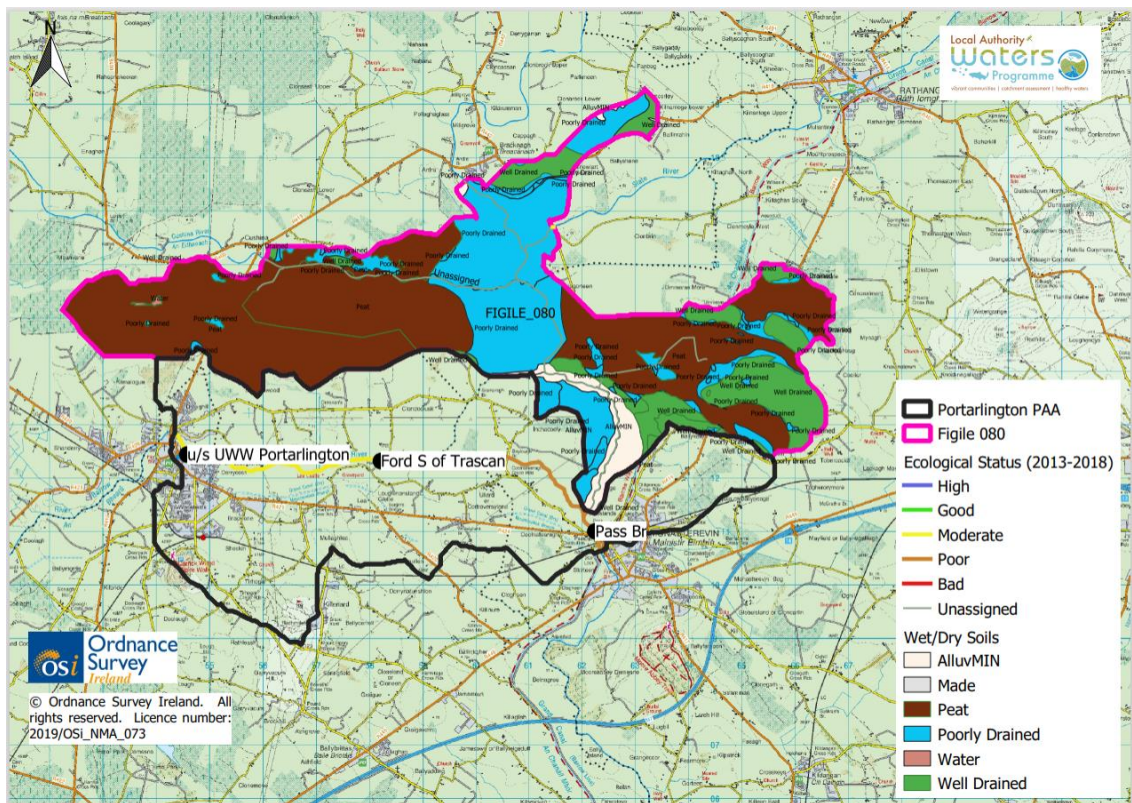


Figure 29: Wet/Dry soils within the Figure_080 subcatchment

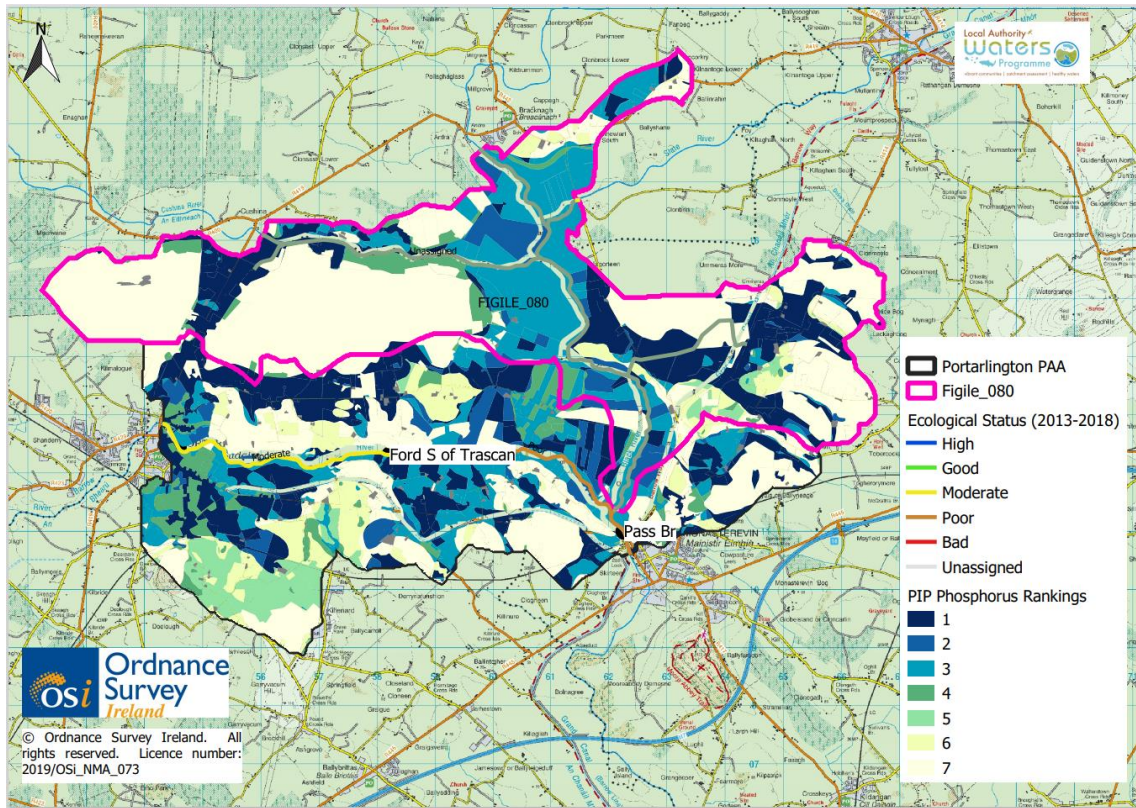


Figure 30: Phosphorus Pollution Impact Potential map of both the Portarlington PAA and inputting waterbody the Figile_080

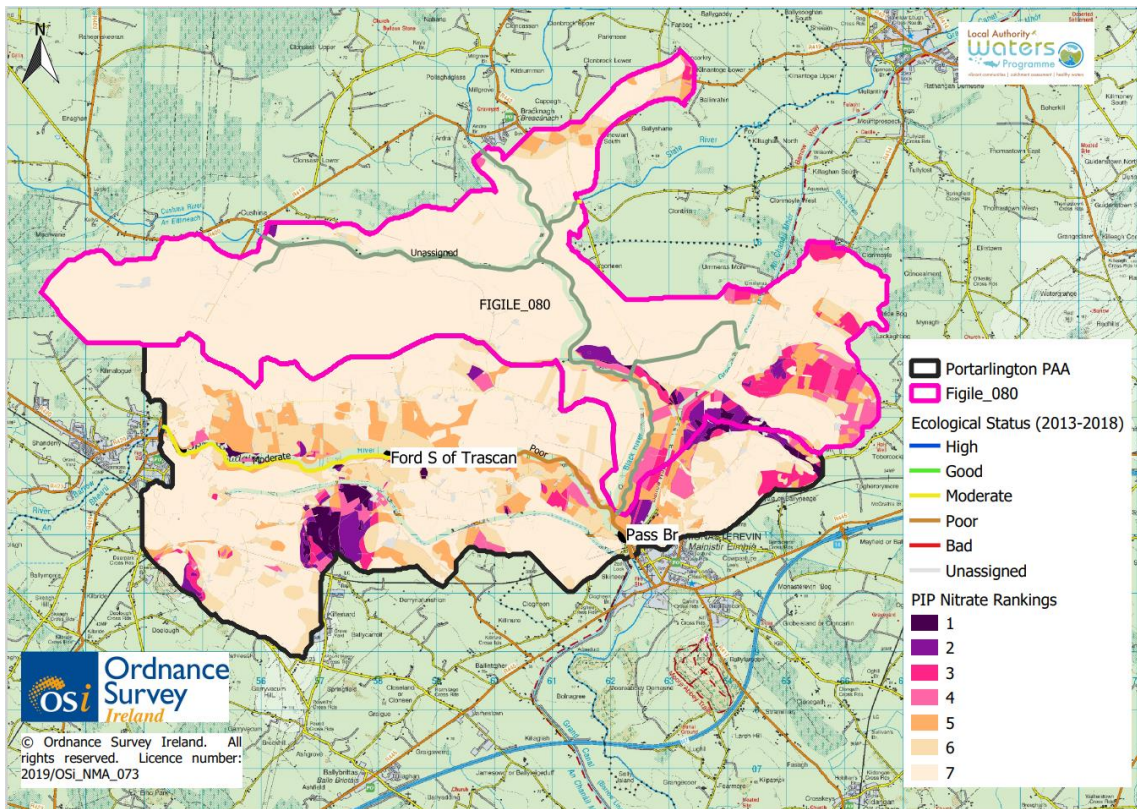


Figure 31: Nitrate Pollution Impact Potential map of both the Portarlington PAA and inputting waterbody the Figile_080
