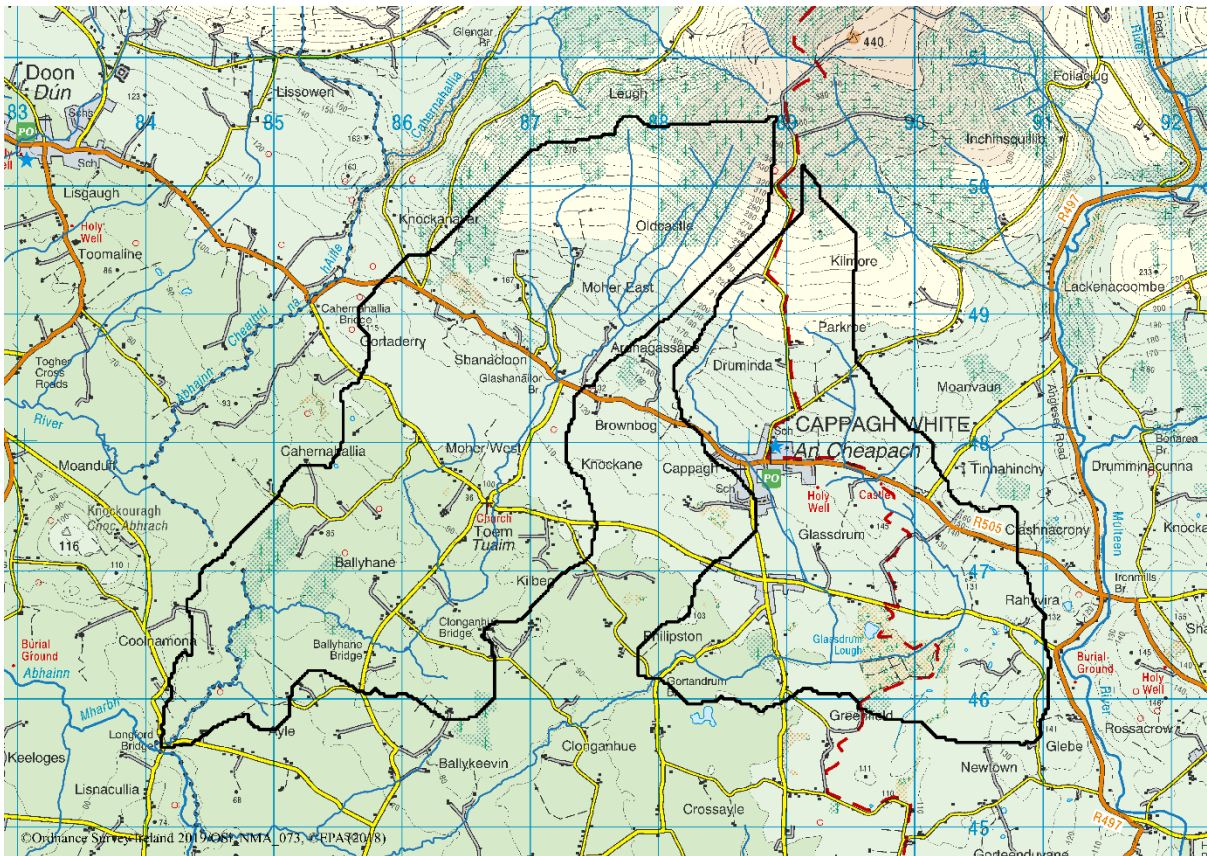


Toem and Cappawhite Priority Area for Action (AFA0172) Desk Study Report South East Region



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Acknowledgements

The author would like to acknowledge the contribution of Tipperary County Council who have carried out a significant amount of work in the Toem and Cappawhite catchment in recent years and their support of the Local Authority Waters Programme.

Toem and Cappawhite PAA

1 Background

The Toem and Cappawhite Prioritised Area for Action (PAA) is in Co. Tipperary and is part of the Lower Shannon catchment.

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

- Opportunity to look at integration of planning and forestry activities.
- Potential to link with the Mulkear After LIFE Plan.
- Important salmon spawning rivers.
- Headwaters to the river Dead.
- One deteriorated water body.

The Toem and Cappawhite PAA consists of two river waterbodies: Toem Stream_010 and Cappawhite Stream_010. These water bodies are illustrated in **Figure 1** and summarised in **Table 1**.

Toem and Cappawhite PAA

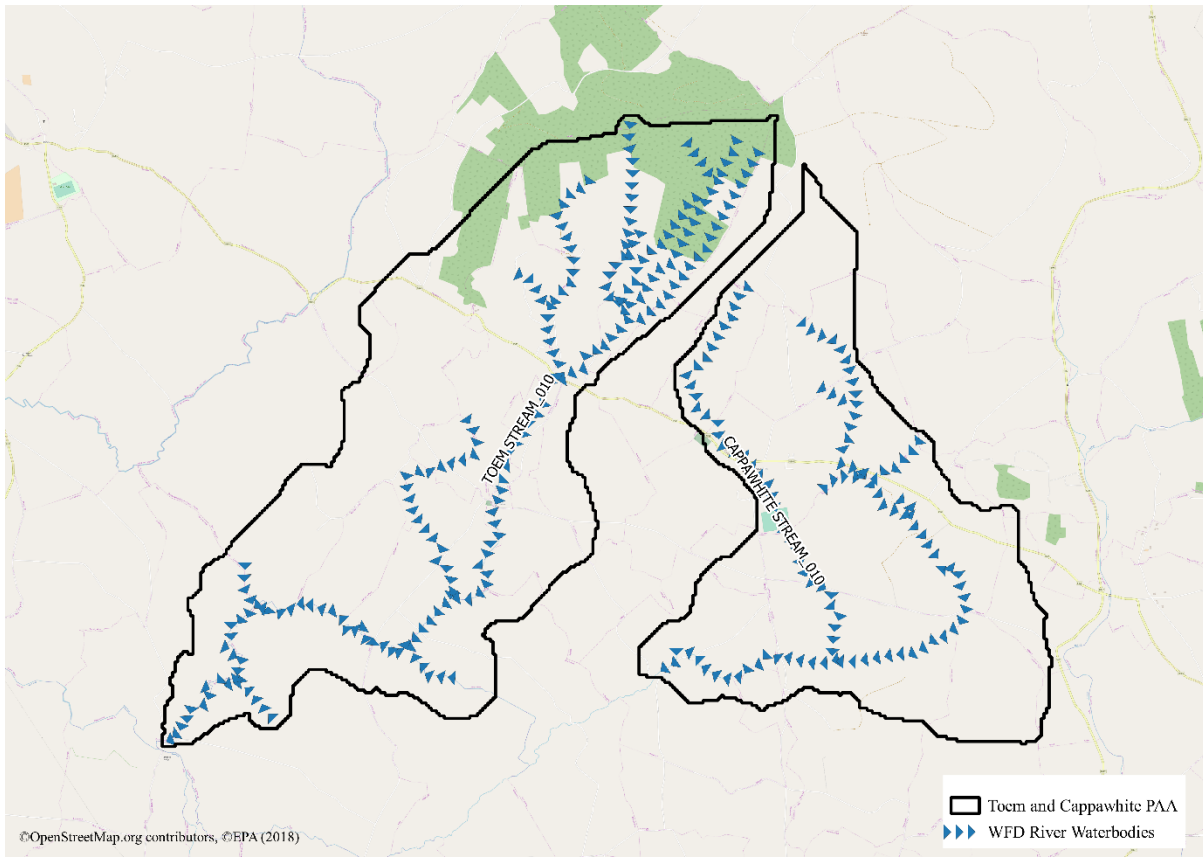


Figure 1 WFD river waterbodies within the Toem and Cappawhite PAA (The blue arrows indicate the water flow direction)

Table 1 Summary table of water bodies within the Toem and Cappawhite PAA

WB Code	WB Name	WFD Risk	Status Obj.	Status			Pressure Category	Pressure Subcat.	Sig. Pressure
				2009	2012	2015			
IE_SH_25T050600	Toem Stream_010	At Risk	Good	G	G	P	Forestry	Clearfelling	Yes
							Invasive Species	Invasive Species	Yes
IE_SH_25C100200	Cappawhite Stream_010	At Risk	Good	P	M	P	Agriculture	Pasture	Yes

Toem and Cappawhite PAA

The initial characterisation sub-catchment assessments by The Environmental Protection Agency recommended that the following actions be undertaken:

- **Toem Stream_010:** *IA5 Multiple Sources in defined rural area (1km) or waterbody or rural town. To determine if the clearfelling for the windfarm is responsible for the drop in biological status through siltation or other associated impacts. Investigative assessment upstream and downstream of windfarm/clearfelling.*
- **Cappawhite Stream_010:** *IA7 Multiple Sources in Multiple Areas. RWB: Cappawhite stream_010. Aim: to identify source of high ammonia. Details: Complete catchment walk, focus along area of high PIP (P via n/s pathways) and note field drainage. Collect field parameters, use field parameters to guide location of SSRS and water quality samples*

Toem and Cappawhite PAA

2 Receptor Information and Assessment

The two river waterbodies located within the Toem and Cappawhite PAA and the associated monitoring stations are illustrated in **Figure 2**.

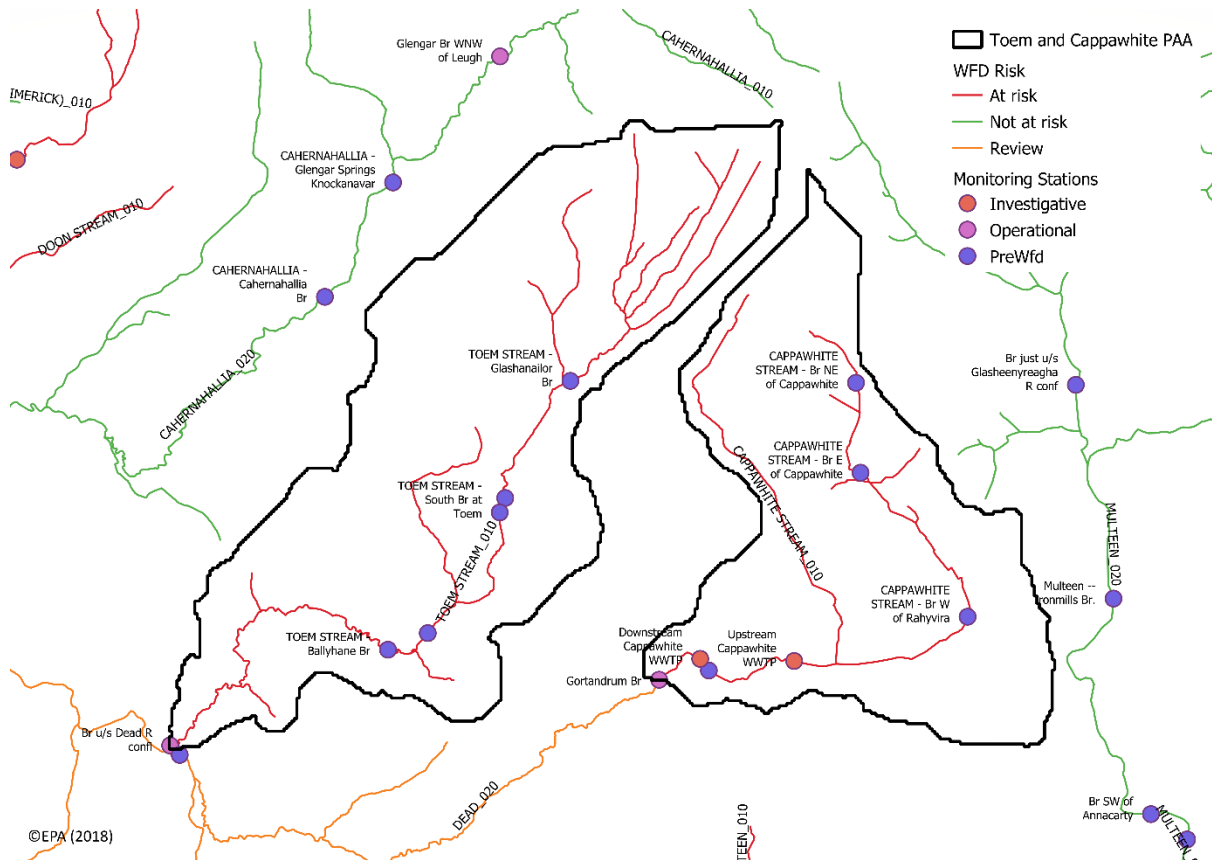


Figure 2 Monitoring stations located within the Toem and Cappawhite PAA

2.1 Toem Stream_010

- The Toem Stream_010 is situated in the headwaters of the river and is upstream of the Dead_020 (currently at Good Status). **Table 2** summarises the receptor information for the river water body and details the biological status. There are two monitoring stations for the river waterbody with monitoring data (**Figure 2**):
 - Toem Stream – South Br at Toem (RS25T050300): Pre WFD
 - Br u/s Dead R confl (RS25T050600): Operational
- Significant issue(s) cannot be determined at this stage due to the absence of hydrochemistry data.

Toem and Cappawhite PAA

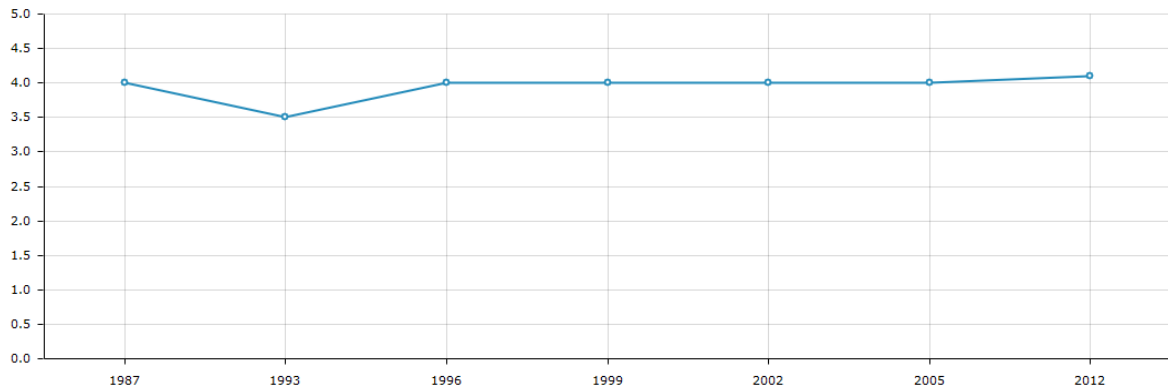
Table 2 Receptor information for the Toem Stream_010

Factor	Station		
	Figure	Toem Stream– South Br at Toem	Br u/s Dead R confl
Risk Category		<i>At Risk</i>	<i>At Risk</i>
Biological Status Monitoring Station(s) with Q-Values 2009-2015 Status Trends in Q value since 2009 2016-2018 Q value data	Fig. 3-4	1987-2012 Poor Q value 4* (2012)	1987-2015 Poor Decreased from 4 (2012) to 3 (2015)
Hydrochemistry Data Existing New		No supporting chemistry monitoring site in this water body	No supporting chemistry monitoring site in this water body
Summary & Trends in PO₄, NH₃ and NO₃ In App All available data Other water quality data Baseline Concentration (mg/l) 2014 Other relevant values Distance to threshold		No supporting chemistry monitoring site in this water body	No supporting chemistry monitoring site in this water body
Supporting Conditions Chemistry Conditions Oxygenation Conditions		No supporting chemistry monitoring site in this water body	No supporting chemistry monitoring site in this water body

Toem and Cappawhite PAA

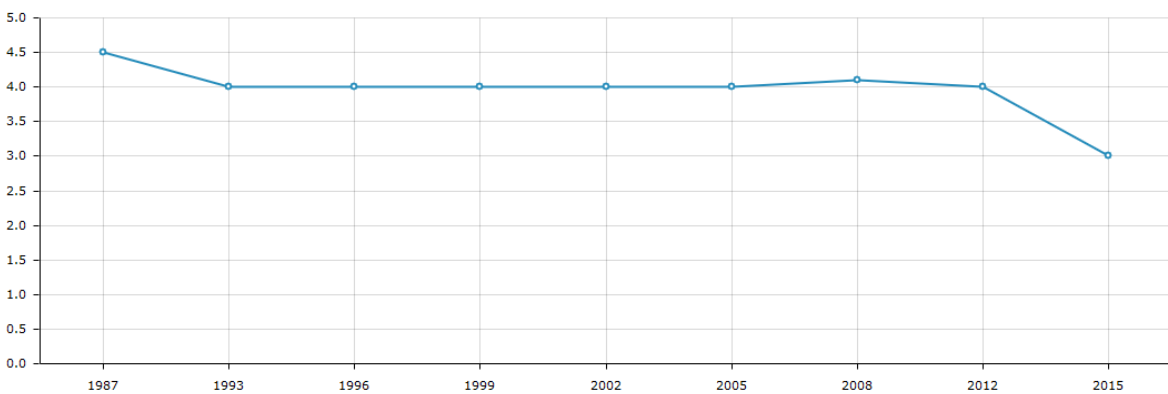
Acidification Conditions			
Hydromorphology RHAT Score Evidence of arterial drainage		No supporting RHAT data for this water body	No supporting RHAT data for this water body
Ecological Status (2010-2015) Trends 2010-2015			Poor Deteriorated Good to Poor
Protected Areas			
WFD Objective		Good	Good
EPA biologist notes (if any)			The macroinvertebrate fauna indicated poor ecological conditions at the station in the lower reach (0600) in September 2015. This decline of two points in the Q-value is the first record of significant deterioration from the good ecological conditions maintained since the early 1990s. Abundant instream filamentous algal growth and an absence of sensitive taxa were indicative of excessive nutrient enrichment.
Significant issue		Unknown as no hydrochemistry data available	Unknown as no hydrochemistry data available

Toem and Cappawhite PAA



	1987	1993	1996	1999	2002	2005	2012
Result	4	3.5	4	4	4	4	4.1
Classification	Good	Moderate	Good	Good	Good	Good	Good
Q-Value	4	3-4	4	4	4	4	4*

Figure 3 Q-Values recorded at the Toem Stream - South Br at Toem Monitoring Station



	1987	1993	1996	1999	2002	2005	2008	2012	2015
Result	4.5	4	4	4	4	4	4.1	4	3
Classification	High	Good	Good	Good	Good	Good	Good	Good	Poor
Q-Value	4-5	4	4	4	4	4	4*	4	3

Figure 4 Q-Values recorded at the Br u/s Dead R confl Monitoring Station

2.2 Cappawhite Stream_010

The Cappawhite Stream_010 is situated in the headwaters of the river and is upstream of the Dead_020 (currently at Good Status and *Not at Risk* of failing to meet its WFD objectives). **Table 3** summarises the receptor information for the river water body and details the biological status, hydrochemistry data, water quality trends and significant issues. There are three monitoring stations for the river waterbody with monitoring data (**Figure 2**):

- Gortandrum Br (RS25C100200): Operational
- Upstream Cappawhite WWTP (RS25C100090): Investigative
- Downstream Cappawhite WWTP (RS25C100130): Investigative

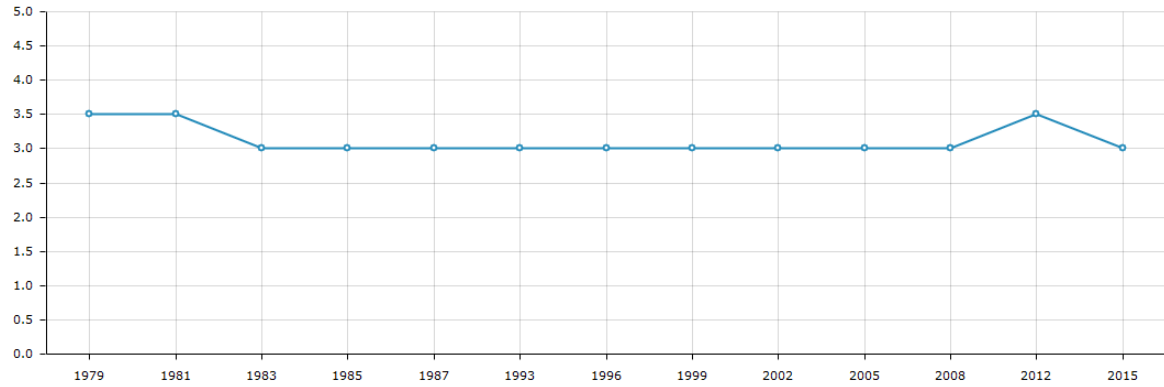
Table 3 Receptor information for the Cappawhite Stream_010

Factor	Station			
	Figure	Upstream Cappawhite WWTP	Downstream Cappawhite WWTP	Gortandrum Br
Risk Category		<i>At Risk</i>	<i>At Risk</i>	<i>At Risk</i>
Biological Status Monitoring Station(s) with Q-Values 2009-2015 Status Trends in Q value since 2009 2016-2018 Q value data	Fig. 5			1979-2015 Poor Decreased from 3-4 (2012) to 3 (2015)
Hydrochemistry Data	Fig. 6-8, 11 & 14			PO ₄ , NH ₃ , TON: 2007-2015
Existing		TN & BOD: 2015-2017 TP & SS: 2015	TN & BOD: 2015-2017 TP: 2015	BOD: 2007-2018 TP: 2017
New	Fig. 9-10, 12-13 & 15-16	PO ₄ & NH ₃ : 2015-2018	PO ₄ & NH ₃ : 2015-2018	PO ₄ , NH ₃ , TON: 2016-2018

Toem and Cappawhite PAA

Significant issue		Phosphate	Phosphate and Ammonia	Phosphate and Ammonia
--------------------------	--	-----------	-----------------------	-----------------------

Toem and Cappawhite PAA



	1979	1981	1983	1985	1987	1993	1996	1999	2002	2005	2008	2012	2015
Result	3.5	3.5	3	3	3	3	3	3	3	3	3	3.5	3
Classification	Moderate	Moderate	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Moderate	Poor
Q-Value	3-4	3-4	3	3	3	3	3	3	3	3	3	3-4	3

Figure 5 Q-Values recorded at the Gortandrum Br Monitoring Station

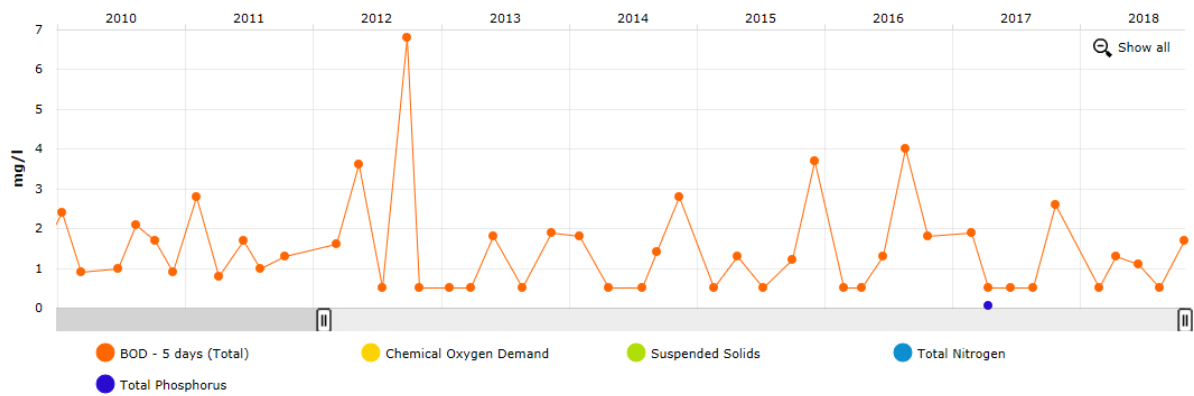


Figure 6 Chemistry data recorded at the Gortandrum Br Monitoring Station

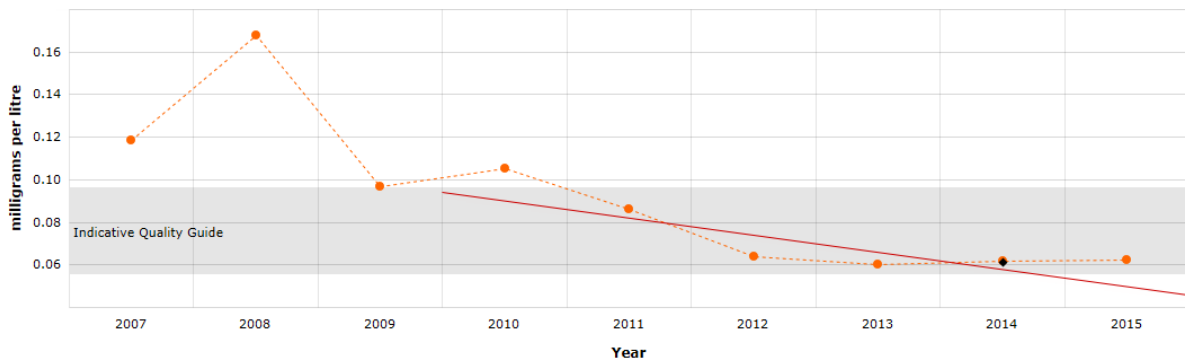


Figure 7 Average Ortho-Phosphate concentrations recorded at the Gortandrum Br Monitoring Station

Toem and Cappawhite PAA

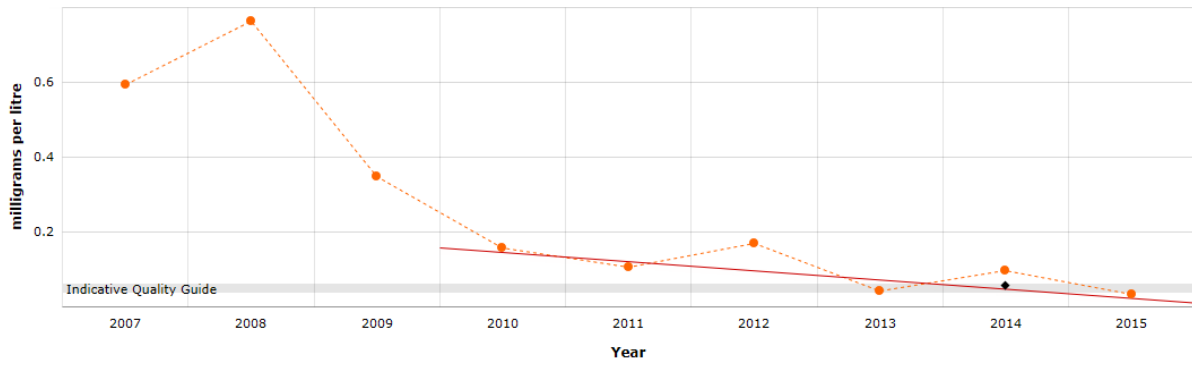


Figure 8 Average Total Ammonia concentrations recorded at the Gortandrum Br Monitoring Station

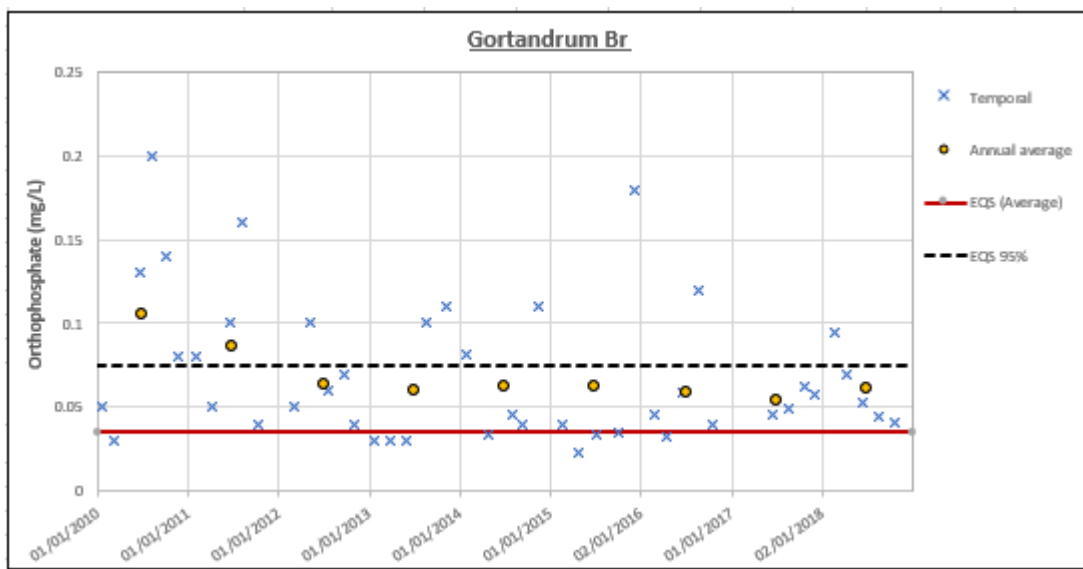


Figure 9 Orthophosphate concentrations recorded at the Gortandrum Br Monitoring Station

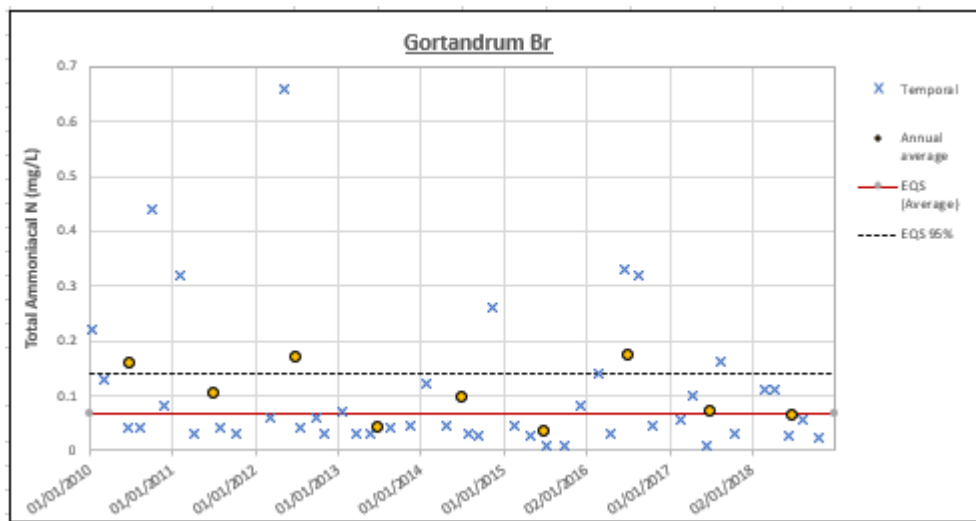


Figure 10 Total Ammonia concentrations recorded at the Gortandrum Br Monitoring Station

Toem and Cappawhite PAA

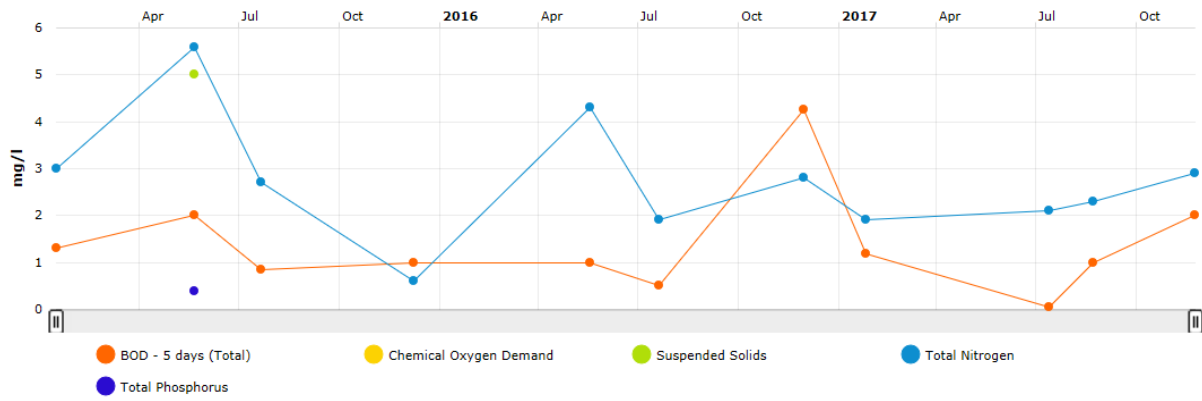


Figure 11 Chemistry data recorded at the Upstream Cappawhite WWTP Monitoring Station

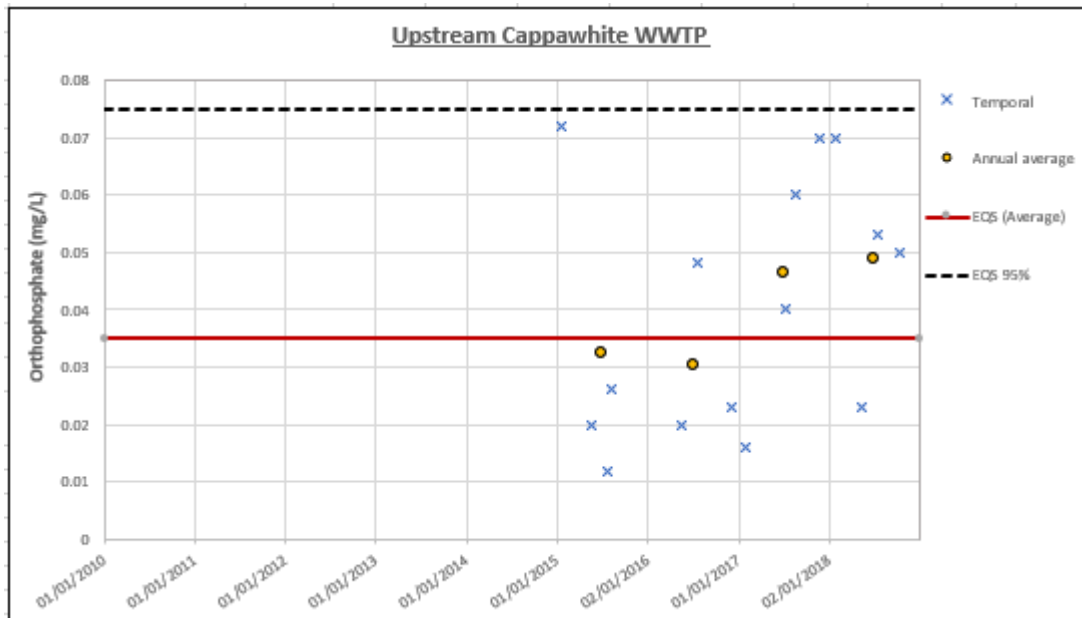


Figure 12 Ortho-Phosphate concentrations recorded at the Upstream Cappawhite WWTP Monitoring Station

Toem and Cappawhite PAA

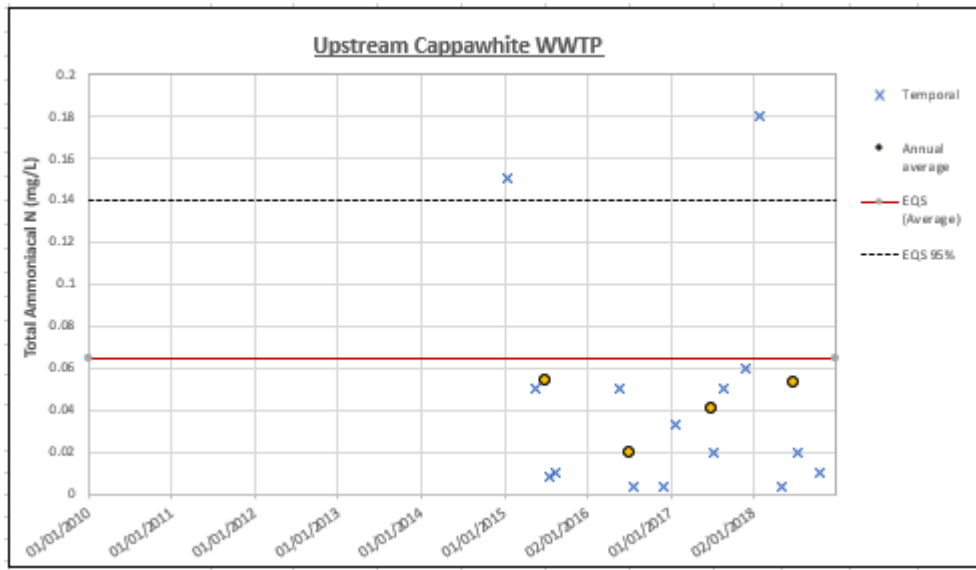


Figure 13 Total Ammonia concentrations recorded at the Upstream Cappawhite WWTP Monitoring Station

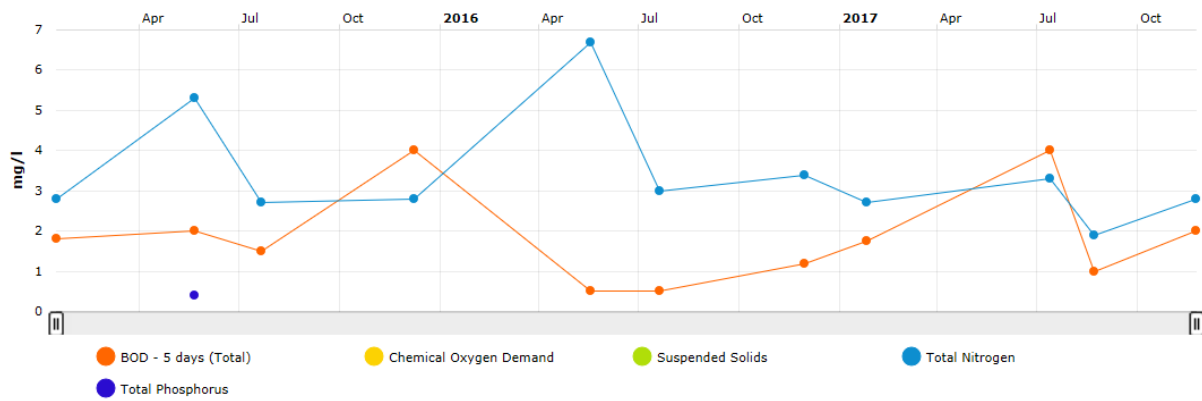


Figure 14 Chemistry data recorded at the Downstream Cappawhite WWTP Monitoring Station

Toem and Cappawhite PAA

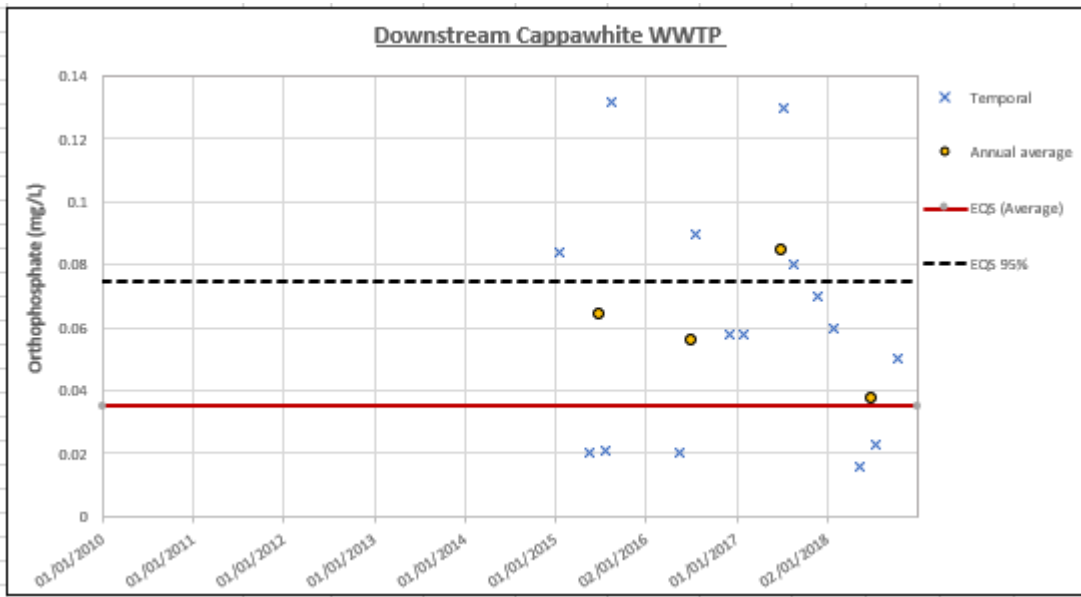


Figure 15 Ortho-Phosphate concentrations recorded at the Downstream Cappawhite WWTP Monitoring Station

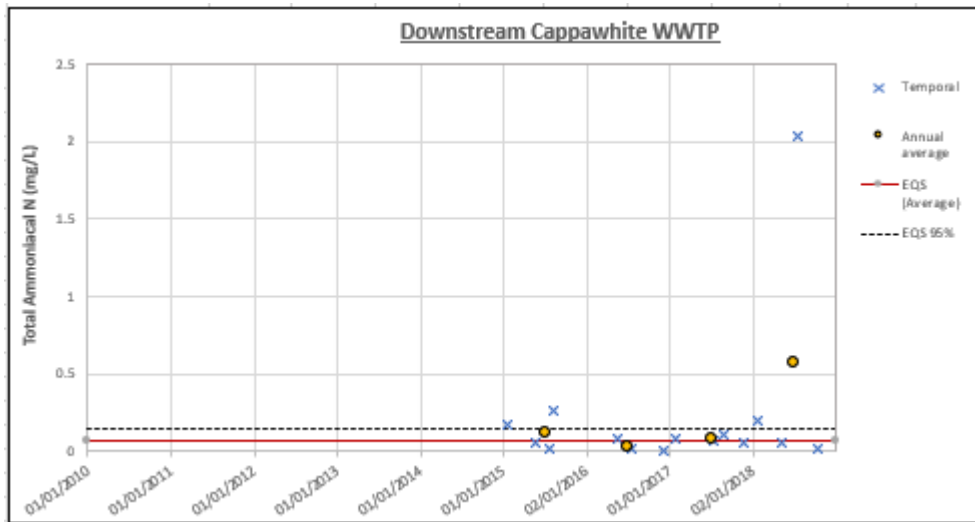


Figure 16 Total Ammonia concentrations recorded at the Downstream Cappawhite WWTP Monitoring Station

Toem and Cappawhite PAA

2.3 Protected Areas

Table 4 Protected Areas within the Toem and Cappawhite PAA

Water Body	Protected Area	Type	Association Type
Cappawhite Stream_010	Philipston Marsh SAC	SAC	Within the Protected Area

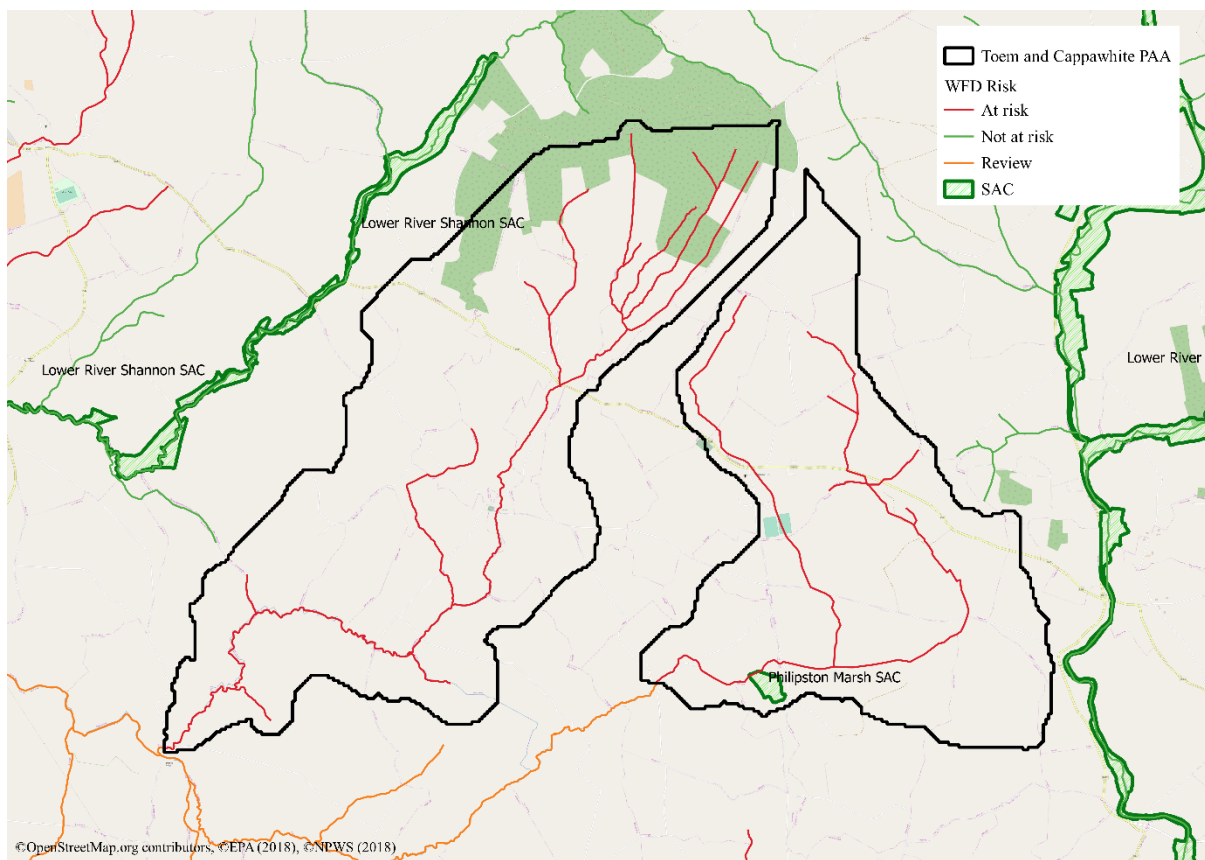


Figure 17 Special Areas of Conservation within the Toem and Cappawhite PAA

Toem and Cappawhite PAA

3 Significant Pressures

The significant pressures identified by EPA for the Toem and Cappawhite PAA through the initial characterisation process are presented in **Table 5**. The Pollution Impact Potential (PIP) maps for Phosphate and Nitrate are illustrated in **Figures 20-21**.

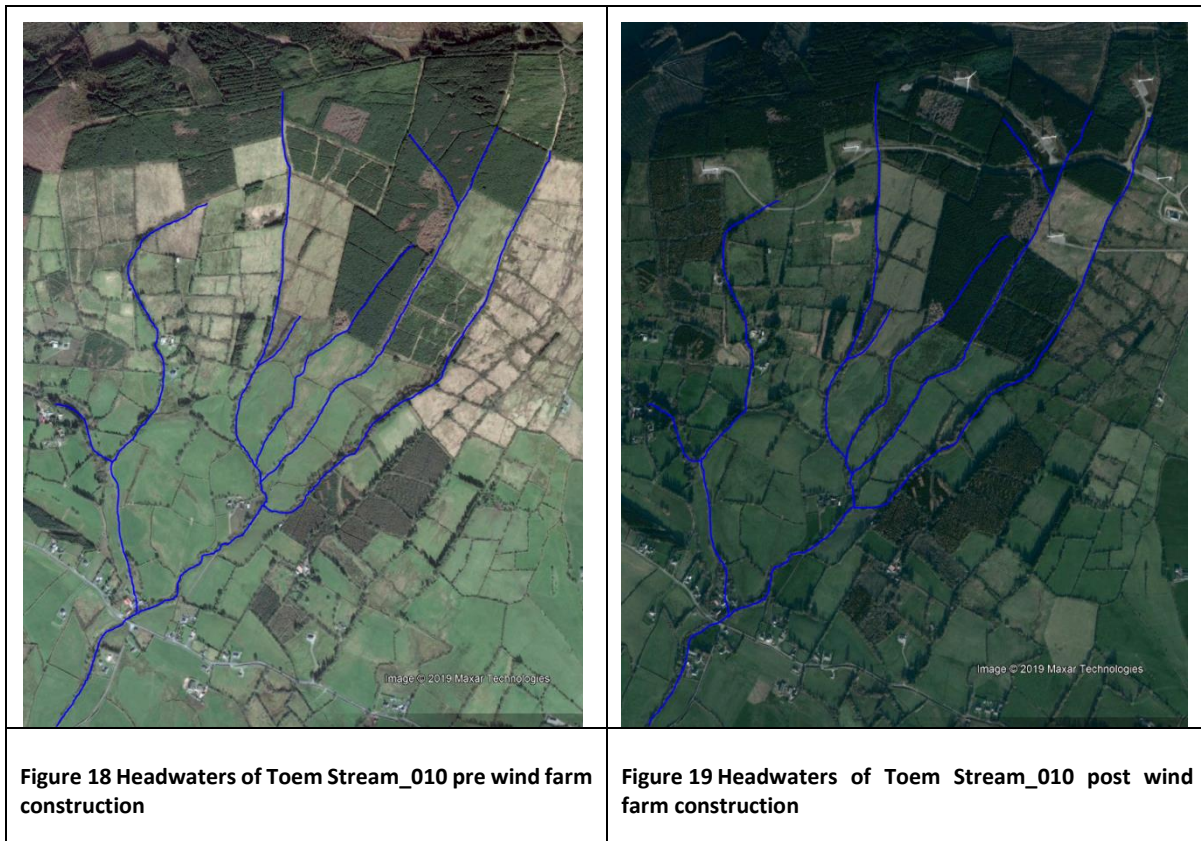
Table 5 Significant Pressures identified for the Toem and Cappawhite PAA by the Initial Characterisation process

Waterbody	Pressure Category	Sub-category	Significant Pressure
Toem Stream_010	Forestry	Clearfelling	Yes
	Invasive Species	Invasive Species	Yes
Cappawhite Stream_010	Agriculture	Pasture	Yes

3.1 Toem Stream_010

- Due to an absence of hydrochemistry data for the Toem Stream_010, significant issue(s) cannot be identified for this waterbody.
- The EPA identified Forestry and Invasive Species as the likely significant pressures for the Toem Stream_010 during the initial characterisation stage.
- At the Toem Stream – South Br at Toem pre WFD monitoring station, the 2012 Q value was 4* (**Figure 3**). This suggests that sediment was observed at the site.
- The 2008 Q value for the Br u/s Dead R conf monitoring station was 4* (**Figure 4**), indicating that sediment was present at this location.
- Forestry clearfelling and/or invasive species may be causing the release of sediment to the waterbody.
- The construction of a wind farm resulted in the clearfelling of some forestry as seen in **Figures 18-19**. This would indicate that Forestry is a possible significant pressure for this waterbody. The wind farm construction took place in the period between June 2017 and November 2018.
- There are high risk PIP rankings for phosphate in areas of the waterbody, particularly the middle section and parts of the south and south west (**Figure 20**). PIP rankings for nitrate are mostly low risk in the waterbody apart from areas in the north west and south east (**Figure 21**). Agriculture is the main land use surrounding this waterbody and may act as a possible pressure. Based on the PIP maps, elevated concentrations of phosphate as opposed to nitrate are more likely in the Toem Stream_010.

Toem and Cappawhite PAA



3.2 Cappawhite Stream_010

- Phosphate and Ammonia are the significant issues affecting water quality in the Cappawhite Stream_010.
- At the Upstream Cappawhite WWTP monitoring station, annual average concentrations for ortho-phosphate were greater than the Environmental Quality Standard (EQS) of 0.035 mg/l in both 2017 and 2018 (**Figure 12**).
- At both the Gortandrum Br and Downstream Cappawhite WWTP monitoring stations, annual average concentrations for ortho-phosphate are consistently greater than the EQS (**Figures 9 and 15**).
- Annual average concentrations for ammonia exceeded the EQS (0.065 mg/l) at both the Gortandrum Br and Downstream Cappawhite WWTP monitoring stations in 2017 and 2018 (**Figures 10 and 16**). One particularly high result in 2018 (2.04 mg/l 18/07/18) at the Downstream Cappawhite WWTP location is the main factor causing an elevated annual average for the year.
- High levels of Ammonia (0.054 mg/l annual average) were also recorded at the Upstream Cappawhite WWTP monitoring station in 2018 (**Table 3**).
- The EPA identified Agriculture as the likely significant pressure for the Cappawhite Stream_010 during the initial characterisation stage.
- Agriculture may be contributing to elevated levels of phosphate in the waterbody and high risk PIP ranking areas for phosphate can be seen throughout the Cappawhite Stream_010 (**Figure 20**).

Toem and Cappawhite PAA

- Cappawhite WWTP is having an observable negative impact on the water quality of the Cappawhite Stream_010. In both 2016 and 2017 the WWTP was non-compliant with the ELV's for Ortho-phosphate and Suspended Solids as set out in the discharge licence.
- Agriculture, Cappawhite WWTP, Domestic Waste Water and Peaty soils in the waterbody may be contributing ammonia to the Cappawhite Stream_010.

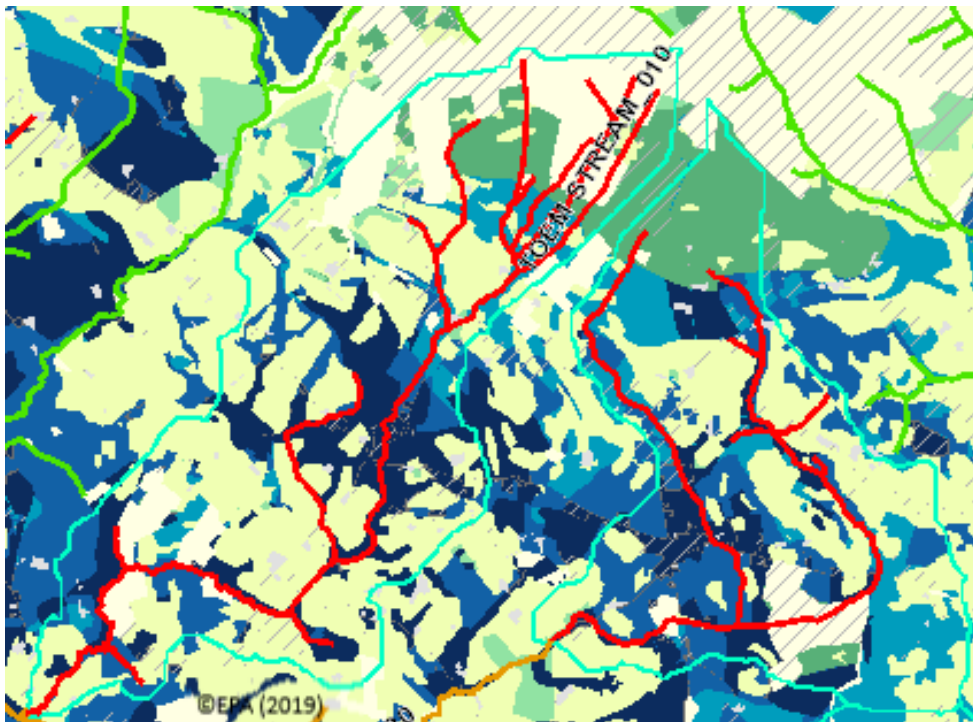


Figure 20 Surface water Phosphate PIP map

Toem and Cappawhite PAA

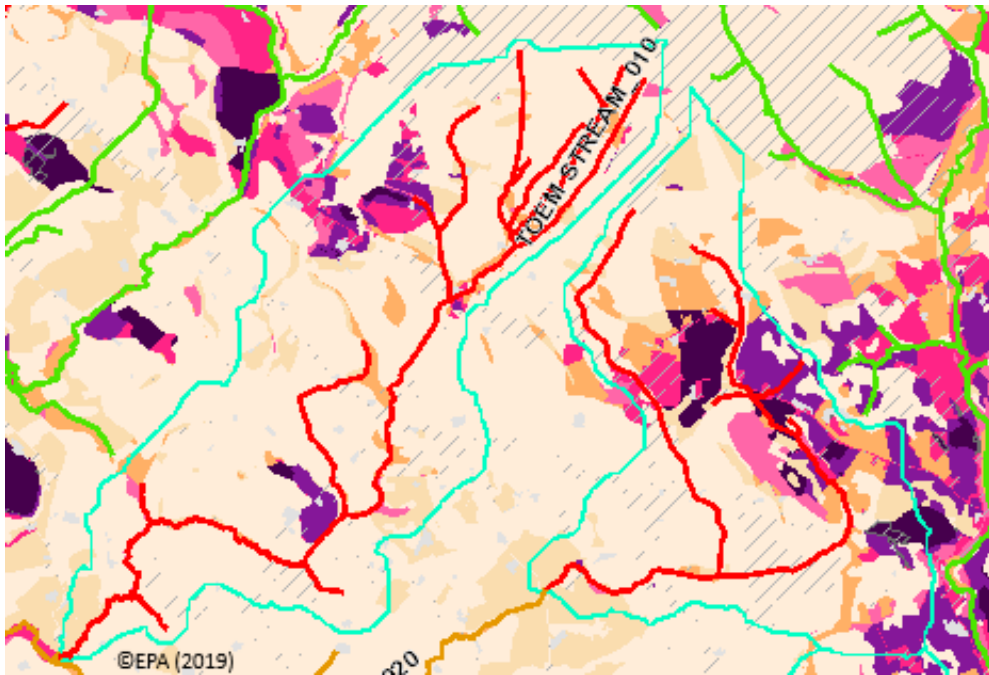


Figure 21 Surface water Nitrate PIP map

4 Pathway Information and Analysis

4.1 Overview of Pathways in the PAA

Two main pathway compartments and two sub-compartments have been identified for the significant issues (PO₄ and NH₃) in the Toem and Cappawhite PAA and they are described in **Table 6**. The regional pathway framework is provided by the aquifer map (**Figure 22**) and the soil type map (**Figure 23**) as follows:

- Compartment 1 is made up of a locally important aquifer which is moderately productive only in local zones. The main flow paths in this aquifer are in the upper fractured zone, along fault zones and in the transition zone where present. Compartment 1 is divided into two sub-compartments: poorly-drained soils (Sub-Compartment 1A) and peat soils (Sub-Compartment 1B). The principal pathway for Compartment 1 is overland flow.
- Compartment 2 is made up of a poor aquifer, which are generally unproductive except for in some local zones. The main flow paths in this aquifer are in the upper fractured zone, along fault zones and in the transition zone where present. The principal pathway for Compartment 2 is overland flow.

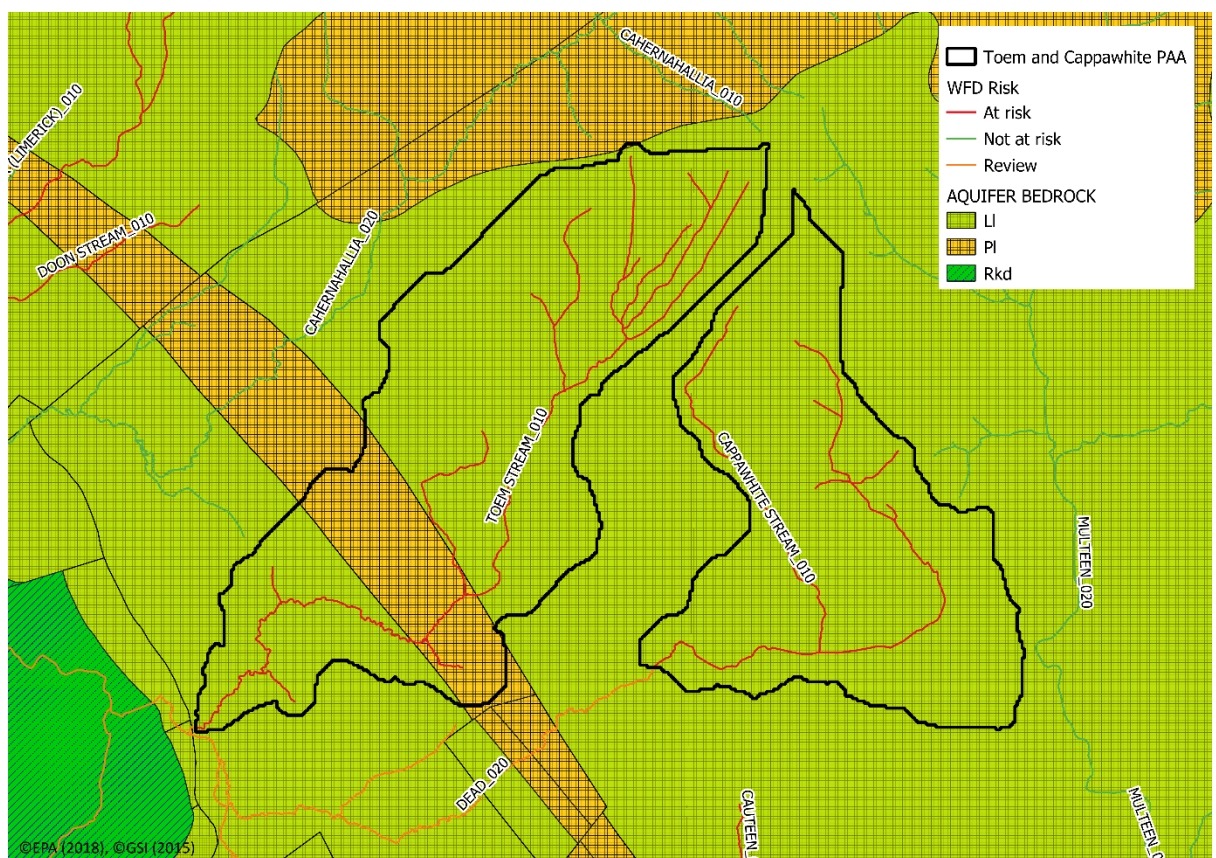


Figure 22 Aquifer map for the Toem and Cappawhite PAA

Toem and Cappawhite PAA

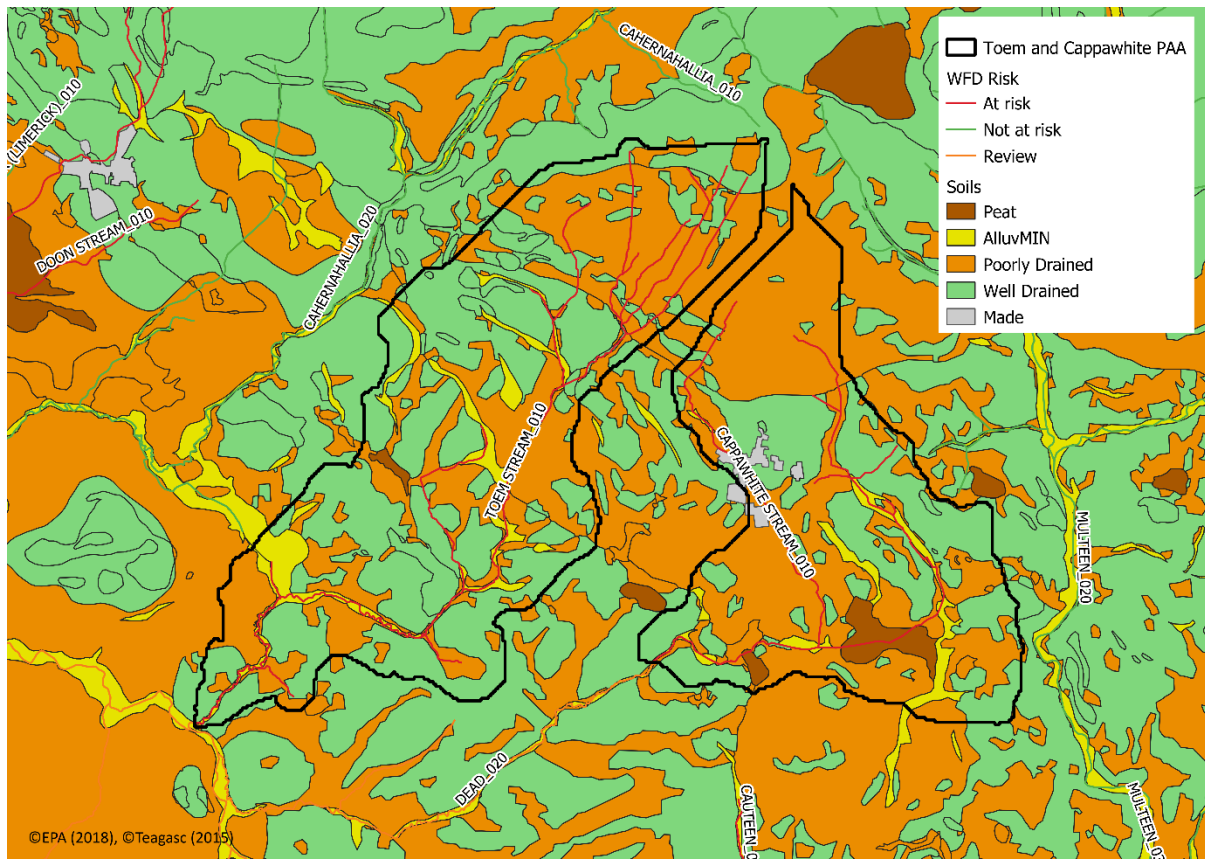


Figure 23 Soils map for the Toem and Cappawhite PAA

Table 6 Main pathways identified in each compartment

	Compartment 1		Compartment 2
Direct ¹	Cappawhite WWTP		
Aquifer	LI		PI
Rock Units	Devonian Old Red Sandstones, Dinantian Lower Impure Limestones		Dinantian (early) Sandstones, Shales and Limestones
	Sub-Compartment 1A	Sub-Compartment 1B	
Soil type	Poorly Drained	Peat	Poorly Drained
Subsoil	Sandstone and shale till, Sandstone till, Sandstone sands and gravels, Sandstone till	Fen Peat	Sandstone till
Groundwater Vulnerability	X, E, H, M, L	E, H, M, L	X, E, H, M, L
PO ₄ Susceptibility	High to Medium, some Low	Low, some High	High to Medium
Main Flow Paths	Overland	Overland	Overland

¹ Point discharges to the water body

Toem and Cappawhite PAA

Another relevant pathway which may be present in the catchment is sediment loss from poorly drained soils in the headwaters of the Toem Stream_010. This will be in the form of overland flow or direct connectivity through drains and streams and may occur during forestry clear felling operations and/or wind farm construction. Sediment loss may also be occurring due to bank destabilisation caused by the growth of invasive species.

4.2 Toem Stream_010

- Significant issue: Unknown
- Significant pressure: Possibly Forestry/Wind Farm construction, Invasive Species and Agriculture
- Relevant pathways: Overland flow and direct connectivity through drains and streams

4.3 Cappawhite Stream_010

- Significant issues: Phosphate and Ammonia
- Significant pressure: Urban Waste Water, Agriculture, Domestic Waste Water and Peat Soils
- Relevant pathways: Direct discharge, overland flow via poorly drained soils and possibly by surface drains.
- Critical source areas are: High risk PIP ranking areas for phosphate adjacent to the waterbody in Compartment 1 and possibly drained areas in peat soils.
- Point Source: Cappawhite WWTP and possibly DWWTS on poorly drained soils.

4.4 Pathways Conceptual Model and Likely Critical Source Areas

- Possible pressures for Toem Stream_010 are Forestry, Invasive Species and Agriculture. The significant issue for this waterbody is unknown; it is not known if the deteriorated water quality is due to elevated nutrients, sediment or other issues. The poorly draining soils in the headwaters of the waterbody may act as pathways for sediment transfer during times of forestry clear felling or wind farm construction. Also, areas populated by Invasive Species may cause river bank erosion and sedimentation of the waterbody in areas where they prevail. The agricultural areas in the waterbody may be contributing to nutrient pollution of the stream. Phosphate would be the nutrient of most concern as shown by the areas of high risk PIP ranking in **Figure 20**. The pathway for phosphate is overland flow from poorly drained soils in these high risk PIP ranking areas.
- For Cappawhite Stream_010 the significant pressures are Urban Waste Water, Agriculture and possibly Domestic Waste Water and Peat Soils. The main pathways are discharges from Cappawhite WWTP and DWWTS; overland flow from poorly drained soils close to the waterbody and surface water drains in areas of peat soils. The main point source for the waterbody is Cappawhite WWTP and possibly DWWTS. The critical source areas are high PIP ranking areas for phosphate that are on poorly draining soils and peat soils which may have been subjected to drainage.

5 Interim Story of the Toem and Cappawhite PAA

5.1 Toem Stream_010

- The Toem Stream_010 is *At Risk* of not achieving Good Status.
- The waterbody is currently at Poor Status with a 2015 Q-value of 3 recorded at the Br u/s Dead River confluence monitoring station. It was at Good Status in 2012.
- There is no hydrochemistry data available for this waterbody.
- No significant issues can be determined from the available water data.
- No significant pressures could be identified for this waterbody, but Forestry, Invasive Species and Agriculture are all possible pressures.
- A wind farm has been constructed in the upland area of the waterbody in recent years and this resulted in the clear felling of forestry and access road construction.
- Any sediment arising from clear felling is likely to be transferred to the waterbody via overland flow in the areas of poorly draining soils or by direct connectivity through drains and streams.
- Sediment was noted in the Toem Stream_010 during previous ecological assessments. These assessments took place at South Br at Toem in 2012 and at Br u/s Dead River confluence in 2008 (**Figures 3-4**).
- Phosphate is the most likely issue to arise from Agriculture in this waterbody. The main pathway for phosphate will be by overland flow in areas of poorly draining soils. This will occur in both Compartments 1 and 2 where poorly draining soils overlay the locally important and poor aquifers.
- The critical source areas (CSA) for phosphate are likely to be in areas of poorly draining soils with high risk PIP rankings (**Figure 20**). These can be found throughout both compartments but in particular the middle area of the waterbody.

5.2 Cappawhite Stream_010

- The Cappawhite Stream_010 is *At Risk* of not achieving Good Status.
- The waterbody is currently at Poor Status with a 2015 Q-value of 3 recorded at the Gortandrum Br monitoring station. It was at Moderate Status in 2012.
- At the Gortandrum Br Operational monitoring station, annual average concentrations for ortho-phosphate are consistently higher than the EQS of 0.035 mg/l. Also, annual average concentrations for Total Ammonia exceeded the EQS between 2016 and 2018. Concentrations of Total Oxidised Nitrogen are consistently below 3.5 mg/l at this monitoring station.
- At the Upstream Cappawhite WWTP monitoring station, annual average concentrations for ortho-phosphate were greater than the EQS in both 2017 and 2018. Annual average concentrations for Total Ammonia have not exceeded the EQS in recent years but high values (0.054 mg/l and 0.055 mg/l) were recorded in 2018 and 2015 respectively.
- Annual average concentrations for ortho-phosphate are consistently greater than the EQS at the Downstream Cappawhite WWTP monitoring station. Also, annual average concentrations for Total Ammonia exceeded the EQS in both 2017 and 2018.
- Spikes in BOD of 4 mg/l or greater have been recorded at all three monitoring stations in recent years.
- Phosphate and Ammonia are the significant issues identified for this waterbody.

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- Cappawhite WWTP and Agriculture are the significant pressures for this waterbody. Cappawhite WWTP exceeded the ELV's for ortho-phosphate and suspended solids in 2017. Agriculture is likely to be responsible for elevated phosphate levels upstream of the discharge from Cappawhite WWTP. Agriculture, Domestic Waste Water and possible drainage from peat soil areas may be contributing to elevated ammonia levels at the Upstream Cappawhite WWTP monitoring station. At the Downstream Cappawhite WWTP monitoring station, Urban Waste Water and Agriculture are the likely pressures causing elevated phosphate in the waterbody. Total Ammonia exceedances at this monitoring location may be attributed to Urban Waste Water, Domestic Waste Water, Agriculture and possible drainage from peat soils. Agriculture, Domestic Waste Water and Urban Waste Water are all likely pressures contributing to the exceedance of the EQS for both phosphate and ammonia at the Gortandrum Br monitoring station.
- The main pathways for phosphate entering the waterbody will be by direct discharge from the waste water treatment plant and by overland flow. Overland flow will occur in areas of poorly drained soils. This will be the case in Sub-Compartment 1A where poorly drained soils overlay the locally important aquifer. The main pathways for ammonia in the waterbody will be direct discharge from the waste water treatment plant and by overland flow. Overland flow will occur in both Sub-Compartments 1A and 1B where poorly drained soils and peat overlay the locally important aquifer. In both these sub-compartments, surface water drains, if present, will act as a conduit for the transfer of ammonia to the waterbody.
- The critical source areas (CSA) for phosphate are likely to be areas of poorly draining soils with high risk PIP rankings (**Figure 20**). These can be found throughout both sub-compartments. The CSA for ammonia are likely to be areas of poorly draining soils and peat soils located near the waterbody. Poorly draining soils are widespread throughout the waterbody, whilst two areas of peat soils are in the southern part of the waterbody (**Figure 23**).
- Cappawhite WWTP is likely to be acting as a point source for both phosphate and ammonia to the waterbody.
- The primary effluent emission point for Cappawhite WWTP (TPEFF2900D0440SW001) is situated approximately 840 m upstream of the Gortandrum Br monitoring station.
- Domestic Waste Water is also a possible point source for both phosphate and ammonia to the waterbody.

5.3 Overview

- The two waterbodies in the PAA are at a poor ecological status.
- Both Toem Stream_010 and Cappawhite Stream_010 have seen a deterioration in their status since 2012.
- Both waterbodies are *At Risk* of not achieving Good Status.
- Toem Stream_010 was last at Good Status in 2012. There are no records of Cappawhite Stream_010 being at Good Status.
- Significant issue(s) cannot be determined for Toem Stream_010. The significant issues for Cappawhite Stream_010 are Phosphate and Ammonia.
- Forestry, Invasive Species and Agriculture are possible pressures affecting Toem Stream_010.

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- A wind farm has been constructed in the upland area of the PAA in recent years. The resulting clearfelling of forestry and access road construction may have caused a sedimentation issue in the Toem Stream_010.
- Urban Waste Water, Domestic Waste Water, Agriculture and drainage from peat soils are the likely significant pressures driving the phosphate and ammonia issues in the Cappawhite Stream_010.

6 Work Plan

6.1 Toem Stream_010

- Fulfil the requirements of the IA5 assigned to this waterbody in the EPA further characterisation process.
- To determine if the clearfelling for the windfarm is responsible for the drop in biological status through siltation or other associated impacts. Investigative assessment upstream and downstream of windfarm/clearfelling.
- Carry out an SSIS at Glashanailor Br (**Figure 2**) to assess the waterbody's ecological status. Depending on the results, further SSIS's may be required on the two upstream tributaries. Look for evidence of clear felling, invasive species and sedimentation at this location.
- Carry out an SSIS at a location south of South Br at Toem to assess the ecological status. Also, perform an SSIS on the tributary to the west of this location (**Figure 24**). Depending on the results, water samples may be taken for the analysis of phosphate and/or nitrate. Look for evidence of invasive species and/or sedimentation at this location.
- Carry out an SSIS at the Br u/s Dead R confl to assess the ecological status. Depending on the results, a water sample may be taken for the analysis of phosphate and/or nitrate. Look for evidence of invasive species and/or sedimentation at this location.

6.2 Cappawhite Stream_010

- Fulfil the requirements of the IA7 assigned to this waterbody in the EPA further characterisation process.
- Identify source of high ammonia. Complete catchment walk, focus along areas of high PIP P and note field drainage. Collect field parameters, use field parameters to guide location of SSIS and water quality samples
- Perform SSIS at locations upstream and downstream of the discharge point from Cappawhite WWTP and take water samples for the analysis of phosphate and ammonia.
- Carry out a stream walk from the discharge location of Cappawhite WWTP to the Upstream Cappawhite WWTP monitoring location. Note any evidence of discharge from peat areas entering the waterbody. Water samples for phosphate and ammonia analysis may be taken along this stretch of the stream if anything of significance noted.
- Carry out an SSIS on the tributary entering the waterbody at a location upstream of the Upstream Cappawhite WWTP monitoring station. Further SSIS's along this tributary may be required dependent on the results at this location. Water samples for phosphate and ammonia analysis may be taken as this tributary flows through high risk PIP ranking areas for phosphate.
- Carry out a stream walk through the forested area to the east of the Upstream Cappawhite WWTP monitoring station. Note any evidence of drainage from peat areas entering the waterbody. Water samples for phosphate and ammonia analysis may be taken along this stretch of the stream if anything of significance noted.
- Perform an SSIS at the Br west of Rahyvira (**Figure 2**). Dependent on the results, further SSIS's may be required upstream of this location such as at Br East of Cappawhite. Water samples

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for phosphate and ammonia analysis may be taken as this tributary flows through high risk PIP ranking areas for phosphate.

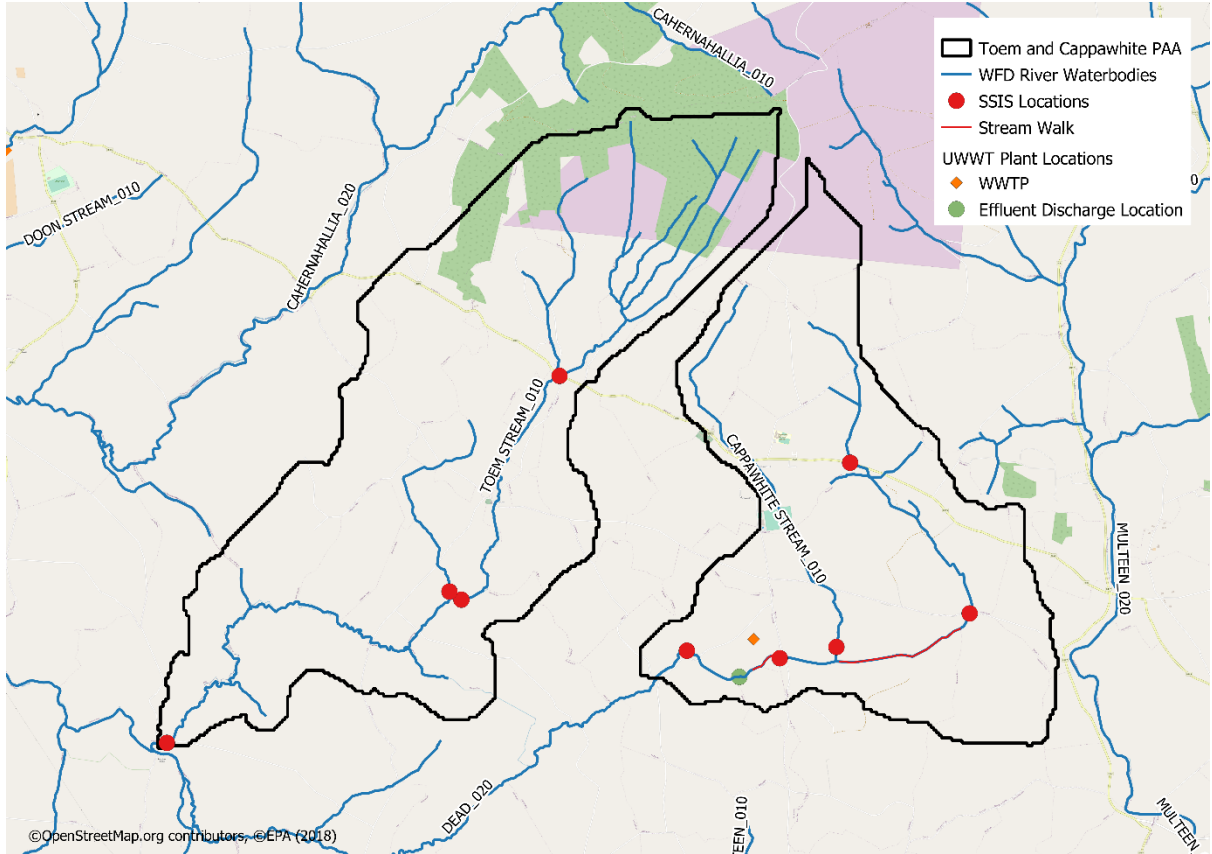


Figure 24 Work Plan for the Toem and Cappawhite PAA

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7 Possible Mitigation Options

Discharges from urban wastewater that are impacting on the achievement of WFD objectives will be referred to the Environmental Protection Agency for follow-up with Irish Water.

The implementation of basic measures (GAP Regs) overseen by ASSAP will be needed where elevated levels of phosphate and ammonia in the waterbody are determined to be from diffuse agriculture. Diffuse sources of phosphate may also be mitigated by using buffer zones, field drain interception ponds, planting of hedgerows etc.

Any diffuse pollution attributed to DWWTS will require remediation. Grants may be available to homeowners for the upgrade of DWWTS where it is determined that they are having a significant impact on water quality.

If clearfelling or drainage in forested areas are found to be pressures then need to liaise with Forest Service to ensure that appropriate mitigation measures are implemented. These will include buffer zones, log bridges, brush mats, interception ponds, silt traps and/or silt fences.

If invasive species are found to be a significant pressure then landowners, voluntary groups and relevant agencies may need to be engaged to implement an eradication programme.

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8 Communications

8.1 Community Information Meeting

- Held on 21st March 2019 at Cappawhite Community Resource Centre, Co. Tipperary.
- There were 11 attendees present including representatives of LAWPRO and ASSAP.
- Issues raised included: Invasive Species, decline in water quality, monitoring of rivers, identification of pollution and actions taken and cattle access to streams.

8.2 Farmers Information Meeting

- Held on 23rd May 2019 at Solohead Farm, Donohill, Co. Tipperary.

Date of completion of Desk Study: April 20th, 2020.