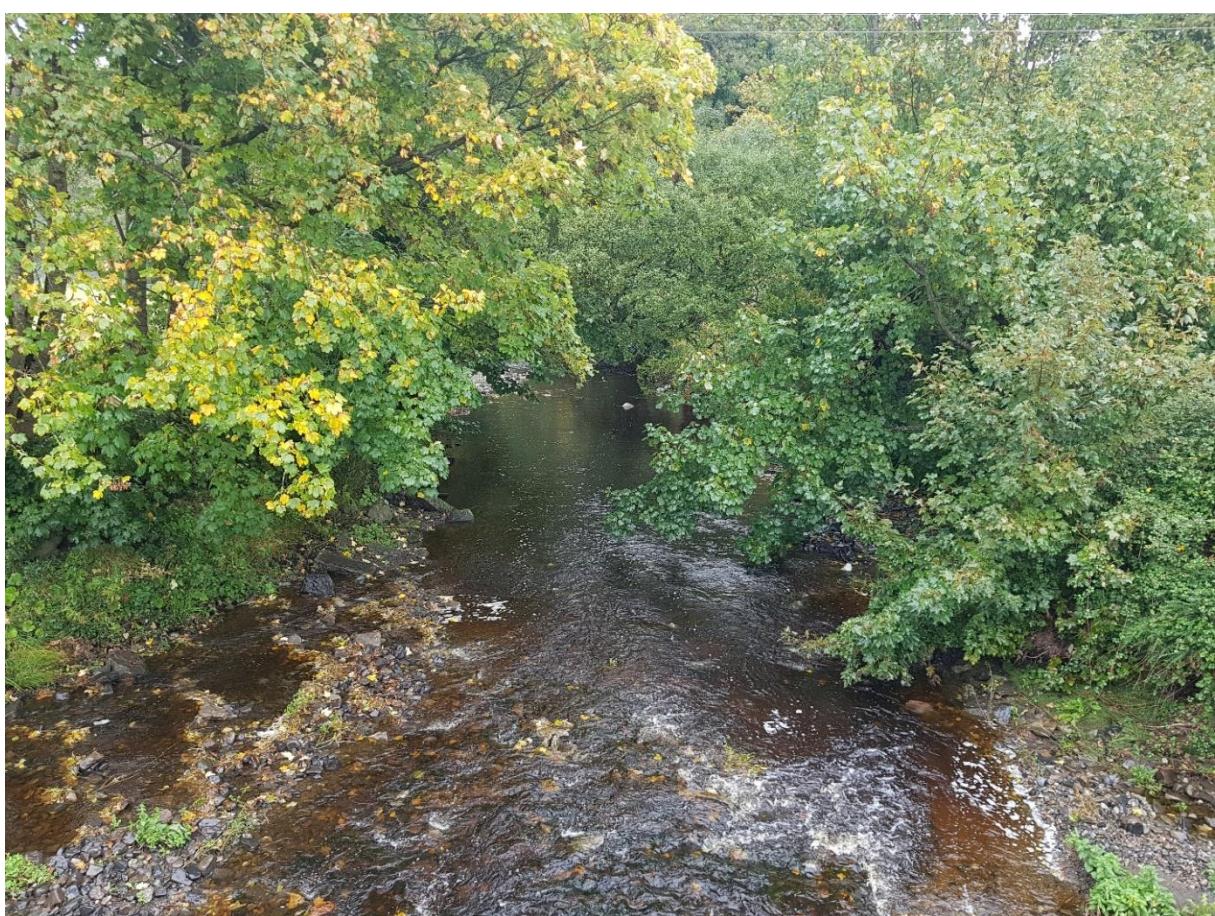


Owvane Priority Area for Action (AFA0151)

Desk Study



Surveillance monitoring station on Owvane 30 (Br u/s (S/E of) Loghill), looking north, 4th October 2018

Disclaimer:

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Table of Contents

Acknowledgements	4
Data attribution	4
Summary.....	5
1 Background.....	6
1.1 Background information on the Ovvane PAA	6
1.2 Waterbody Information	7
2 Receptor Information	8
2.1 Receptor overview	8
2.2 Assessment of Results	10
2.3 Summary of Issues.....	15
3. Significant Pressures.....	15
3.1 Initial EPA characterisation.....	15
3.2 Conclusion on the Significant Pressures:.....	16
4. Pathways Information and Analysis	16
4.1 Conceptual Model Development	16
5. Interim Conclusions on the PAA.....	19
6. Work Plan	20
6.1 Further Characterisation Actions from WFD App	20
6.2 Additional information requirements	20
6.3 Local Catchment Assessment	20
7. Review of possible mitigation options	23
8. Communications.....	23
Appendix I: Ovvane Aerial and Land Use Maps.....	24
Appendix II: Soils and PIP Maps.....	25

List of Figures

Figure 1-1: Aerial map of Ovvane catchment	5
Figure 2-1: Ovvane PAA waterbody risk map	7
Figure 2-2: Ovvane PAA status map, shown with monitoring point locations	7
Figure 2-3: Annual average orthophosphate levels, Ovvane 20 (West Bridge south of Gortadroma)	9
Figure 2-4: Orthophosphate levels, Ovvane 20 (West Bridge)	10
Figure 2-5: Biological monitoring results, Ovvane 30 (Cloonlahard Stream)	11
Figure 2-6: Annual average Ammonia-N and TON levels, Ovvane 30 (Loghill)	11
Figure 2-7: Annual average orthophosphate levels, Ovvane 30	12
Figure 2-8: Orthophosphate results (2015 to 2018), Ovvane 30	12
Figure 2-9: BOD results Ovvane 30 (Loghill surveillance station)	13
Figure 4-1: Ovvane PAA conceptual model compartments	16
Figure 6-1: Bridge hop and sample locations, Ovvane_020 and Cloonlahard Stream	21
Figure 6-2: Bridge hop and sample locations, Ovvane 30	21

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Data attribution

The following data sources were consulted in the preparation of this report:

- Catchment boundaries, waterbodies and areas for action: EPA (2018)
- Bedrock Unit: GSI (2008)
- Aquifer Category: GSI (2015)
- Groundwater body: EPA Catchments Unit (2018)
- Soils & Subsoils Maps: Teagasc-EPA (2015)
- IFS Soils: EPA (2006)
- Susceptibility and Pollution Impact Potential Maps: EPA (2018)
- WFD waterbody status: EPA (2018)
- Pollution Impact Potential Maps: EPA (2016)

Summary

The Ovvane River (also known as White river and Abha Bhan river) rises in County Limerick to the north of Carrigkerry townland and flows north through Ballyhahill into the Shannon estuary at Loghill. The river comprises three waterbodies: Ovvane_010 (headwaters), Ovvane_020 and Ovvane_030.

- Ovvane_010 (headwaters) is at Good ecological status and is categorised as *Not at Risk* of failing to meet the objectives of the Water Framework Directive (WFD).
- Ovvane_020 (PAA waterbody) is at Good ecological status but is categorised as *At Risk* because of increasing orthophosphate levels.
- Ovvane_030 (PAA waterbody) is at Moderate status and *At Risk*.

Macroinvertebrates are driving the Moderate status on Ovvane_030 due to results at an upstream location on the waterbody (first order stream in the headwaters of Cloonlahard stream). More recent results indicate a deterioration to Poor status here. Land use, soil type and PIP maps indicate that the significant issue impacting on water quality at this site is most likely to be sediment and/or ammonia from forestry on peat.

Downstream, elevated orthophosphate levels at the WFD surveillance monitoring point close to the waterbody outlet are also driving the *At Risk* characterisation of Ovvane_030 although biological monitoring results here are consistently Q4 (Good status).

Increasing orthophosphate levels are driving the *At Risk* characterisation on Ovvane_020 although biological monitoring results here are also consistently Q4 (Good status).

The major P sources need to be identified in both waterbodies so that measures for phosphate reduction can be targeted at the areas contributing highest P loadings to the catchment.

The soils and geology in the catchment indicate potential for phosphorus loss via overland flow and land drains, with some (possible) contribution from small point sources.

EPA assessments and desk study conclusions indicate that the significant pressures are:

- Agriculture on Ovvane_020 and on Ovvane_030, close to the waterbody outlet.
- Unknown upstream on Ovvane_030 but possible forestry, peat and point sources from farmyards.

Recommended Actions

- On Ovvane_020, focus upstream of the West Bridge station to identify areas of highest P loading, to inform the work programme of the ASSAP team. Note that up to 20% of the P contribution may be arising outside the PAA (from Ovvane_010).
- On Ovvane_030 at Cloonlahard, the EPA monitoring station appears to be on a first order headwater stream (Cloonlahard stream). The significant issue is unknown but the stream drains forestry on peat therefore sediment and possibly ammonia may be the significant issue/s here. Undertake SSIS upstream of this station, assessing sediment extent and type. If results indicate impact and no sediment/hydro issue is identified, sample for ammonia and P upstream.
- At the Ballyhahill wastewater treatment plant on Ovvane_030, undertake SSIS upstream and downstream to assess impact.
- Upstream of the Loghill station on Ovvane_030, P loading information from tributaries will help to focus the ASSAP work programme by identifying the tributaries contributing the highest load.

Information from this first LCA will inform the extent of additional assessment and stream walks needed.

1 Background

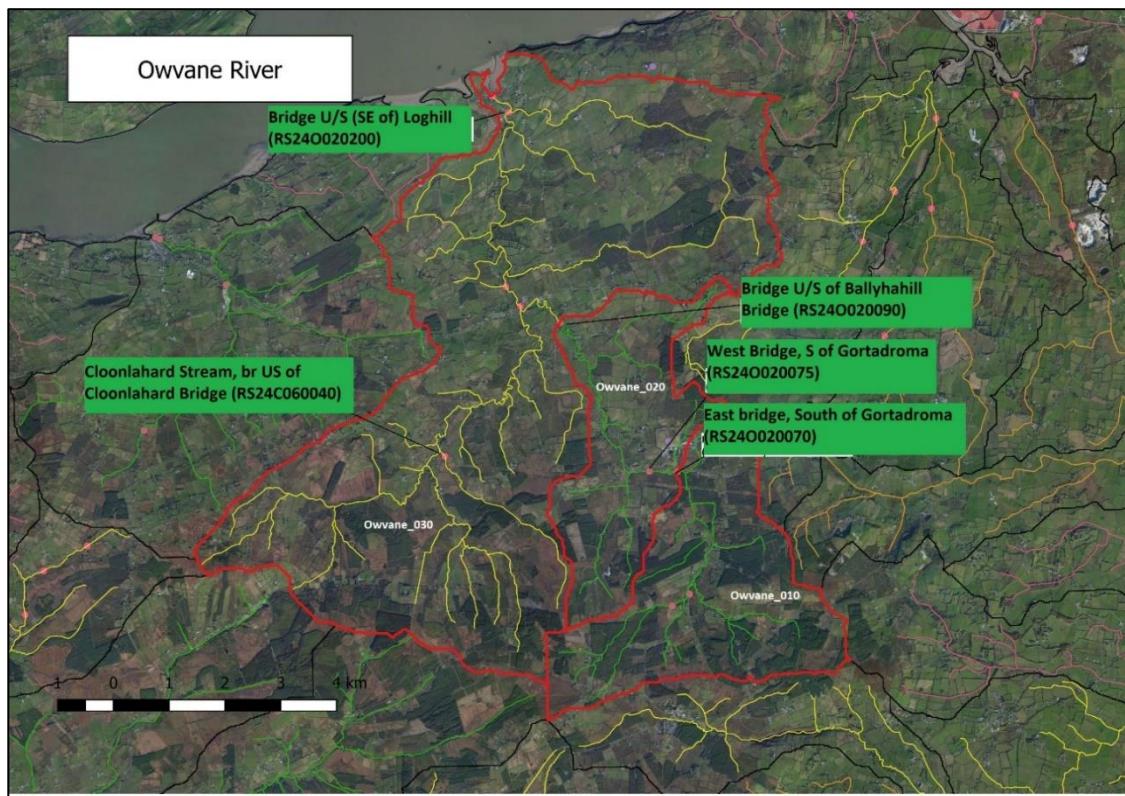
1.1 Background information on the Owvane PAA

Priority Area for Action	Catchment Number	Catchment Name	Sub catchment	Region	Local Authority
Owvane	24	Shannon Estuary South	24_7 Owvane [Limerick]_SC_010	South West	Limerick City and County Council

Priority Area for Action	No. of At Risk WBs	No. of Review WBs	No. of dRBMP Prioritised WBs	No of WBs for Status Improvement:		
				2021	2027	Beyond 2027
Owvane	2	0	1	2	0	0

Reason for selection	<ul style="list-style-type: none">Potential to build on improvement works completed by Inland Fisheries IrelandOne deteriorated water body
----------------------	---

Figure 1-1: Aerial map of Owvane catchment



1.2 Waterbody Information

Table 1.1: Summary information from WFD App

WB Code <i>(Monitoring Point Code)</i>	WB Name	WB Type	Risk	Status Objective	2007-2009	2010-2012	2010-2015	Pressure Category	Pressure subcategory	Significant Pressure	Action
IE_SH_240020070 <i>(RS240020070)</i>	Ovvane_010	River	Not at Risk	Good	Good	High	Good	No pressure impacts data available		N/A	
IE_SH_240020090 <i>(RS240020075 RS240020090)</i>	Ovvane_020	River	At Risk	Good	Good	Good	Good	Industry Agriculture	IE Agriculture	No No	IA7
IE_SH_240020200 <i>(RS24C060040 RS240020200)</i>	Ovvane_030	River	At Risk	Good	Good	Good	Mod	Forestry Agriculture	Forestry Agriculture	No Yes	IA7

Table 1.2: Monitoring point locations

Waterbody	Monitoring Point Code	Name	Type	Comments
Ovvane_010	RS240020070	East bridge south of Gortadroma	Operational	Q only
Ovvane_020	RS240020075	West bridge South of Gortadroma	Operational	Includes Q and chemistry data
	RS240020090	Bridge upstream of Ballyhahill Bridge	Operational	Q only
Ovvane_030	RS24C060040	Cloonlahard Stream Br upstream of Cloonlahard bridge	Pre-WFD? but current Q	Q only (<i>Cloonlahard stream WB merged with Ovvane_030?</i>)
	RS240020200	Br u/s (SE of) Loghill	Surveillance	Includes Q and chemistry

2 Receptor Information

2.1 Receptor overview

Figure 2-1: Owvane PAA waterbody risk map

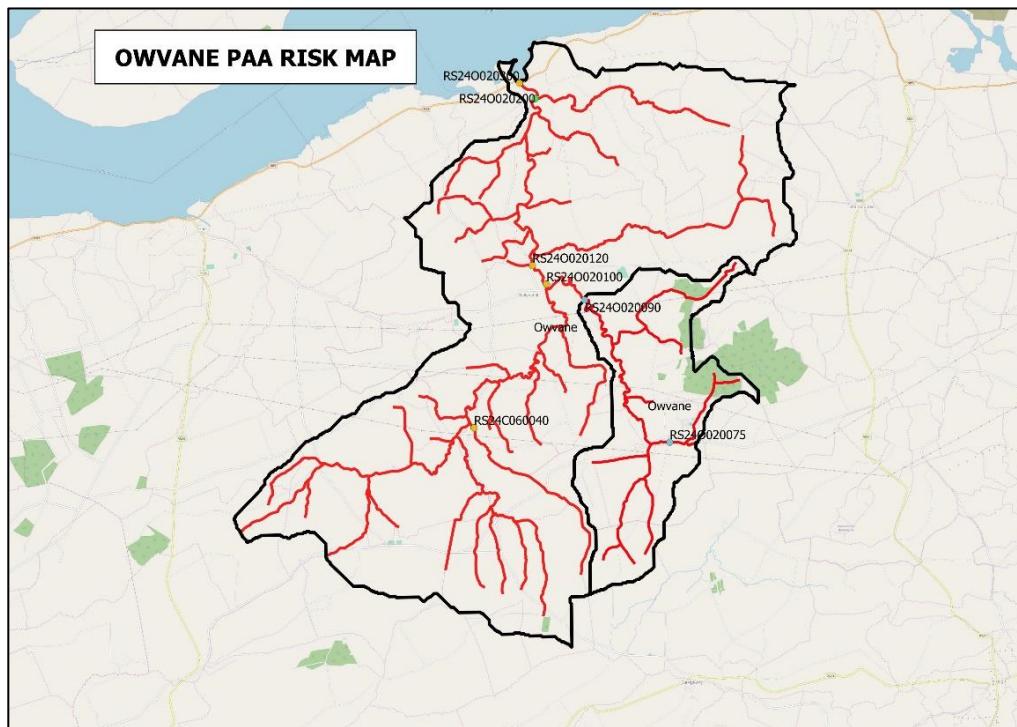


Figure 2-2: Owvane WFD status map, shown with monitoring point locations

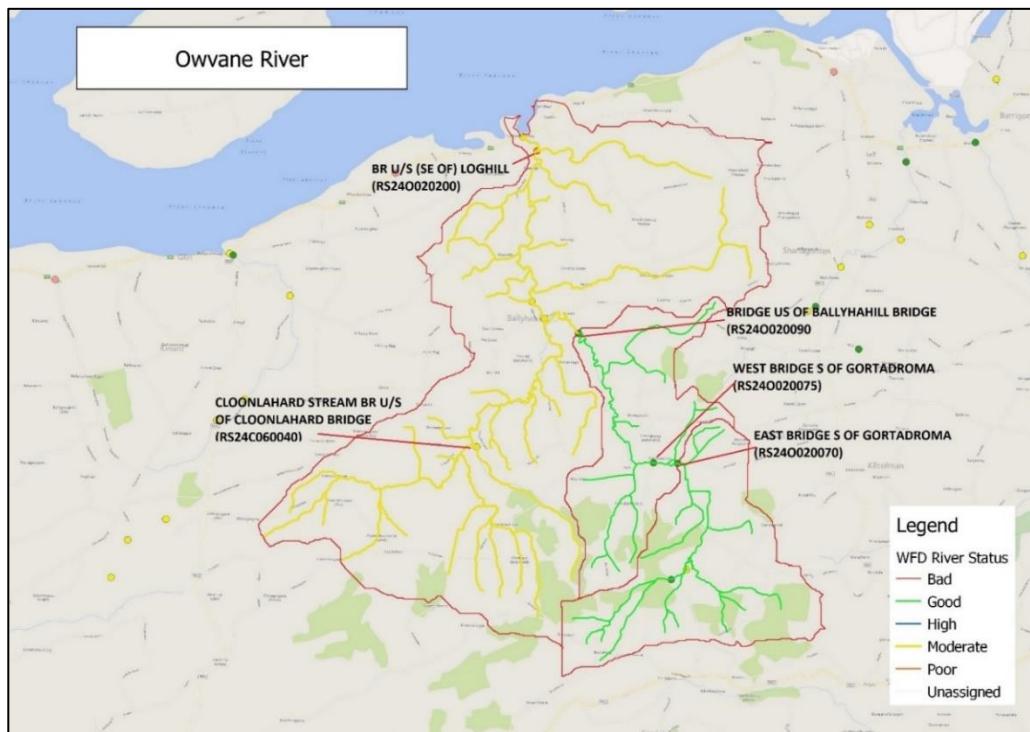


Table 2-1: Receptor information for Owvane River

Factor	Plot Graph Y/N	Map Y/N	Owvane_010	Owvane_020		Owvane_030					
Risk Category		2.1	Not at Risk	At Risk		At Risk					
Monitoring Point		1.1 2.2	RS24O020070 East Bridge S of Gortadroma	RS24O020075 West Bridge S of Gortadroma	RS24O020090 Bridge US of Ballynahill Br	RS24C060040 Cloonlahard Stream Br US of Cloonlahard Br (separate trib)	RS24O020200 Br US (SE of) Loghill				
Biological Status	2009-2015	2.2	Good	Good	Good	Moderate	Good				
	Variations/trends in Q data	Y	Yes-drop. High status 2011	No	No. consistent Q4 1988-2017	Yes	No				
	2016-2018 data		Q4 (2017)	Q4 (2017)	Q4 (2017)	Q3 (2017)	Q4 (2017)				
Hydro-chemistry	Existing	Y	No data	PO4P:0.048ppm 2015 (baseline:0.046) NH4N:0.024ppm 2015 (baseline:0.074) TON: 1.075ppm 2015 (baseline: 3.456)	No data	No data	PO4P:0.055ppm 2015 (baseline: 0.046) NH4N:0.025ppm 2015 (baseline:0.035) TON: 0.067ppb 2015 (baseline: 0.814)				
	New		No data	PO4 results available to 2018	No data	No data	No				
Trends in PO4, NH3, other	In App	Y	No data	Increasing PO4	No data	No data	Increasing PO4				
	From all available data	Y	No data	Decreasing P trend from 2013.*	No data	No data					
	Other WQ data		Q only	NH4 ok downward trend TON upwards but drop in 2015. Also BOD increasing 2016-2018	Q only	Q only. Deterioration in 2017	NH4 ok downward trend TON downward trend. BOD fluctuates				
	Distance to threshold		NA	Far	NA	NA	Far				
Hydro-morphology	RHAT score		moderate	No data	no data	no data	good				
	Evidence of arterial drainage										
Ecological Status			Good	Good		Good					
Protected areas											
Owvane river discharges to Lower R Shannon SAC (River Shannon and River Fergus estuaries SPA)											
WFD Objective			Good	Good		Good					
Relevant info from biologists' notes			Historic Q fluctuates between Good and High. (storyboard)	historic Q good. Mod heavy siltation 2014. bio and chem stations not the same		Historic Q fluctuates between good and moderate.					
Significant issue (from initial characterisation)			None identified	increasing Ortho-P		increasing Ortho-P					

2.2 Assessment of Results

Monitoring results for each waterbody are outlined below. Waterbody monitoring stations are shown in Figure 2.2.

Ovwane_010 (not part of PAA)

Biological results for the monitoring point on Ovwane_010 (East Bridge S of Gortadroma) have been consistently Good (Q4) since 2002 (High (Q4.5) in 2011). There are no chemistry data available for this station. However, there are chemistry results available for the station a short distance downstream at West Bridge, Ovwane_020 (see below).

Ovwane_020

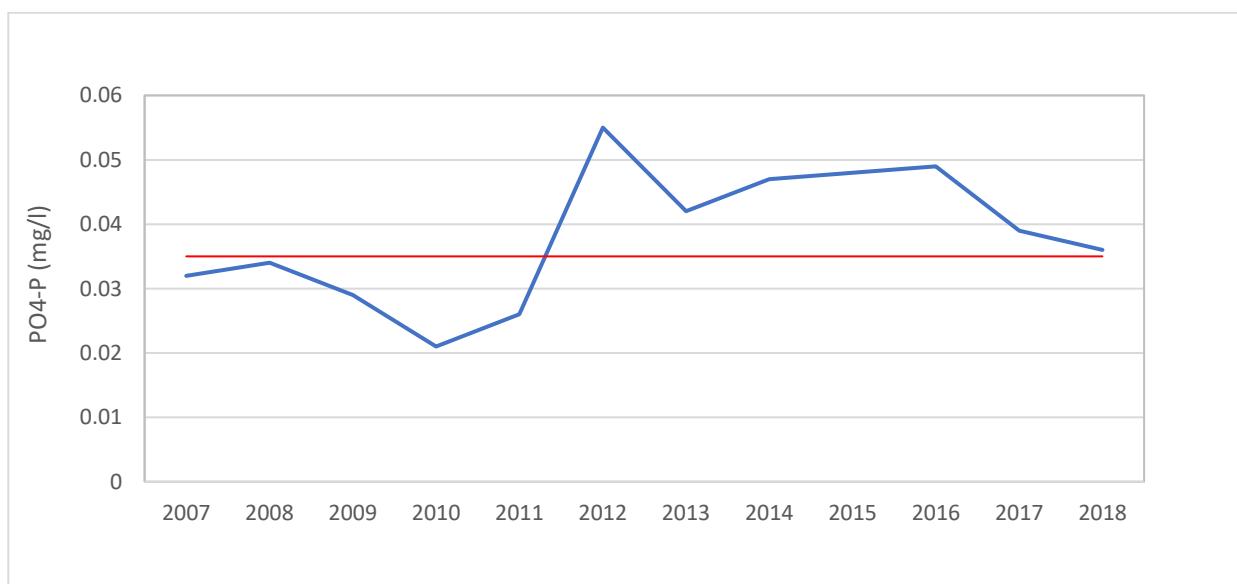
There are two WFD operational monitoring stations on Ovwane_020:

- West Bridge south of Gortadroma, RS24O020075.
- Bridge upstream of Ballyhahill Bridge, RS24O020090

West Bridge south of Gortadroma

West Bridge operational station is located close to the boundary with Ovwane_010. Biology and supporting chemistry data are available for this site. Biology has been consistently Good (Q4) since 1999. However annual average orthophosphate levels have exceeded the mean EQS for Good status waters since 2012 (see figure 2.3 below). This is the driver for the *At Risk* characterisation for Ovwane_020.

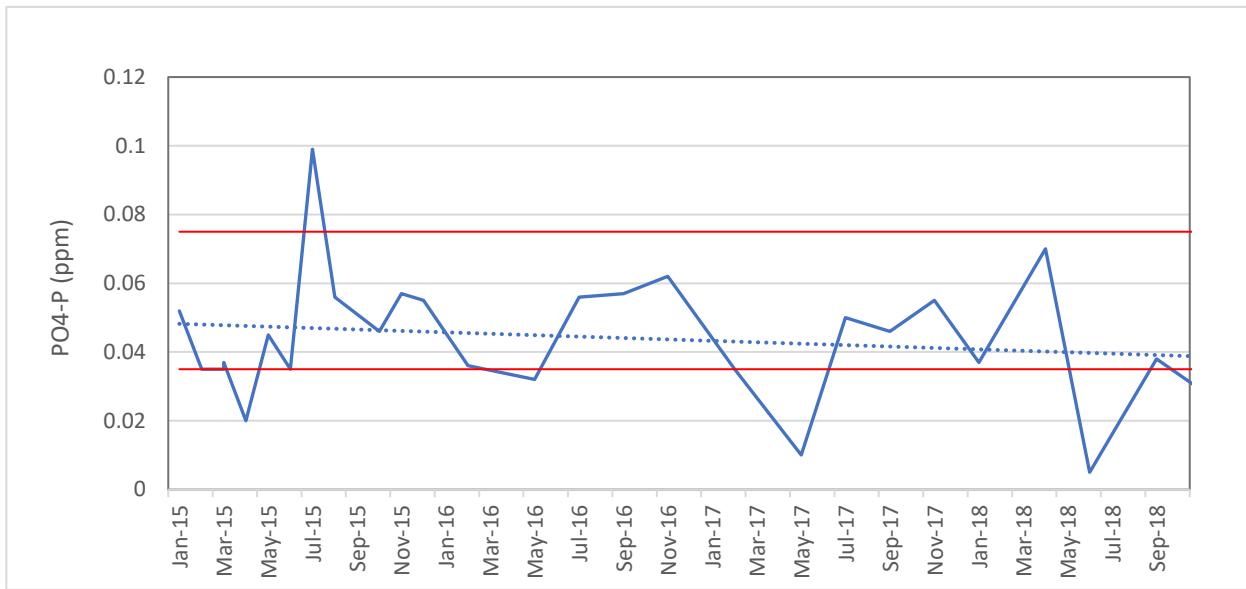
Figure 2-3: annual average orthophosphate levels on Ovwane 20 (West Bridge south of Gortadroma)



Individual orthophosphate results and trendline (2015 to 2018) for West Bridge are graphed in Figure 2.4. Also shown on the graph are the 0.035mg/l (mean) and 0.075mg/l (95%ile) EQS's for Good status waters. Results indicate a gradually reducing trend in P at this site for this more recent period.

As can be seen from the graph, lowest P results were measured after prolonged dry weather in April/May 2017 and June 2018, indicating (as expected) that phosphate pathways are via overland flow.

Figure 2-4: Orthophosphate levels at West Bridge monitoring station



Annual mean ammonia and total oxidised nitrogen results at West Bridge were indicative of an increasing trend prior to 2015 but, according to information in the WFD App, a decline has been seen in both parameters since aftercare measures were put in place at the landfill.

Bridge upstream of Ballyhahill Bridge

The bridge upstream of Ballyhahill Bridge (RS24O020090) is the most downstream monitoring point on Owvane_020, located close to the boundary with Owvane_030. There are no chemistry data available for this location but biological status has been consistently Good (Q4) since 1988.

In summary, Owvane_020 is at Good Ecological Status with both monitoring points at Q4. The significant issue in this waterbody is phosphate; the waterbody is categorised as *At Risk* because of elevated orthophosphate levels at the West Bridge monitoring station. More recent data indicate a reduction in orthophosphate levels at the West Bridge station

Owvane_030

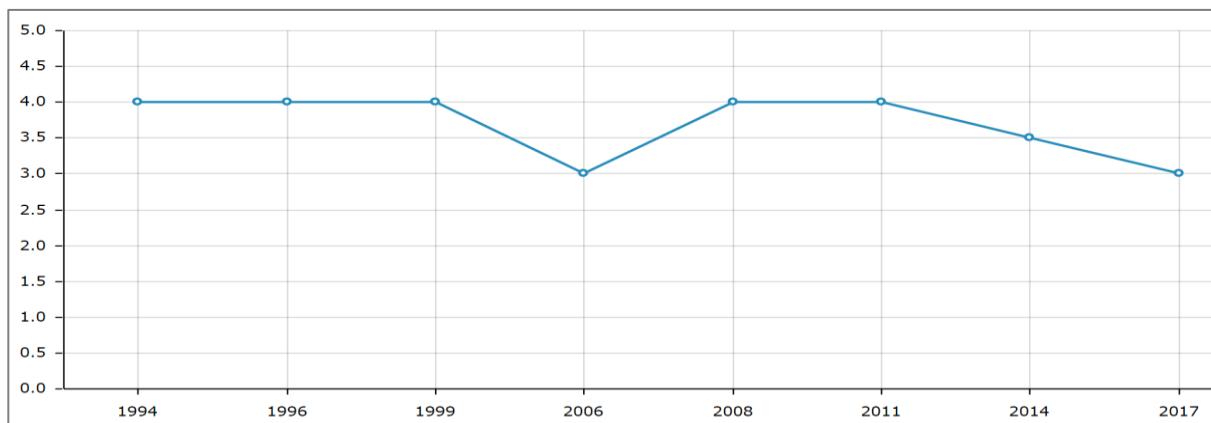
There are two WFD monitoring stations on Owvane_030:

- RS24C060040 (Cloonlahard Stream): operational station in the headwaters, formerly a separate waterbody.
- RS24O020200 (Bridge u/s (SE of) Loghill): surveillance station close to the mouth of the river.

Cloonlahard Stream (RS24C060040)

The Cloonlahard Stream monitoring point is located in the headwaters of Owvane_030, unconnected to Owvane_020 and downstream of an area of peat with some forestry (see Figure 1.1 and Appendix I). Biological monitoring results deteriorated from Good (Q4) in 2011 to Moderate (Q3.5) in 2014 and Poor (Q3) in 2017. Note that biological monitoring results here are driving status on Owvane_030. There are no chemistry data available for this station. Q values are graphed below in figure 2.5:

Figure 2-5: Biological monitoring results on Ovvane_30 (Cloonlahard Stream)



Bridge upstream of Loghill (RS240020200)

The WFD surveillance station, located upstream of Loghill near the outlet of Ovvane_030, is monitored for biology, supporting chemistry, specific pollutants and priority pollutant substances. Biological monitoring results have been consistently Good (Q4) since 1999. Chemistry status is Good at the time of writing this report and Specific Pollutant conditions are Pass.

Annual average ammonia, TON and orthophosphate results are graphed in Figures 2-6 and 2-7. Annual average ammonia and TON results are satisfactory and showing a downward trend from 2010 to 2018.

Figure 2-6: Annual average Ammonia-N and TON levels on Ovvane 30 (Loghill surveillance station)

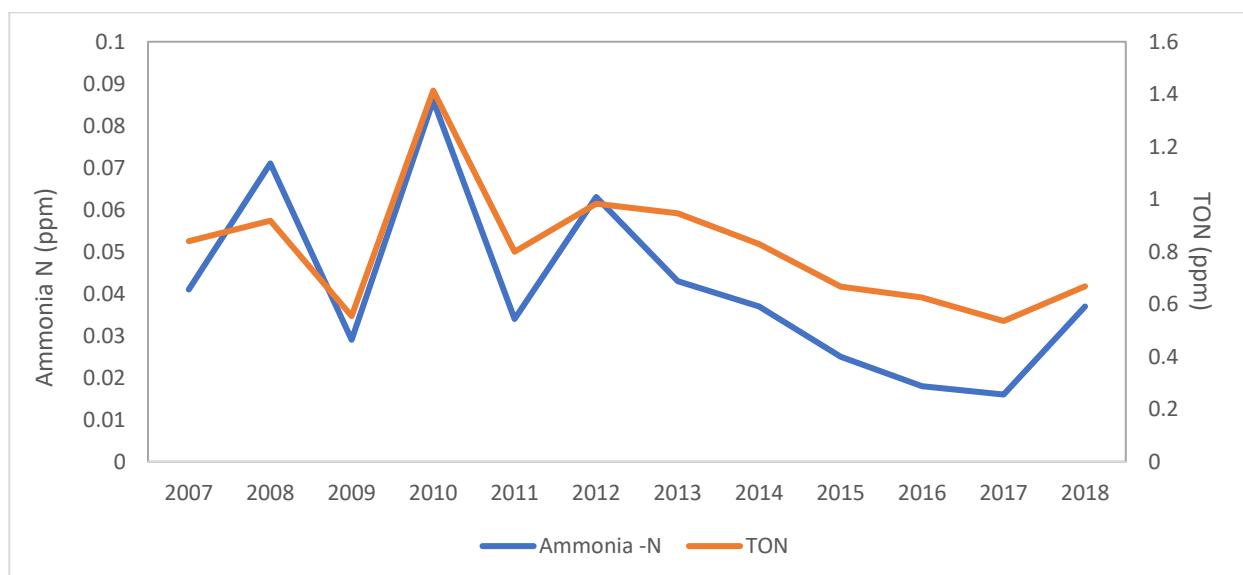
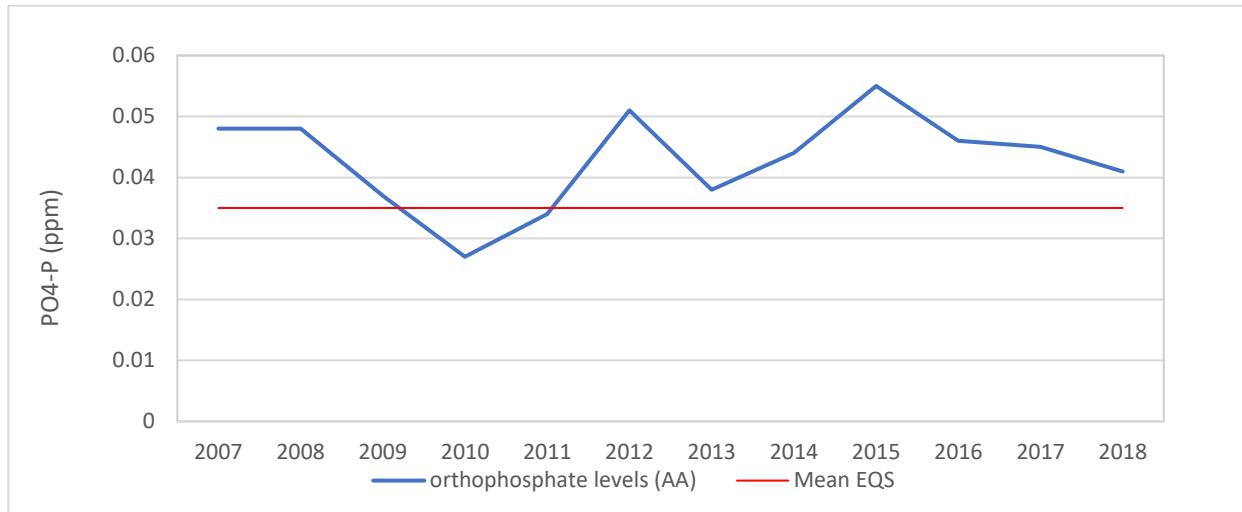


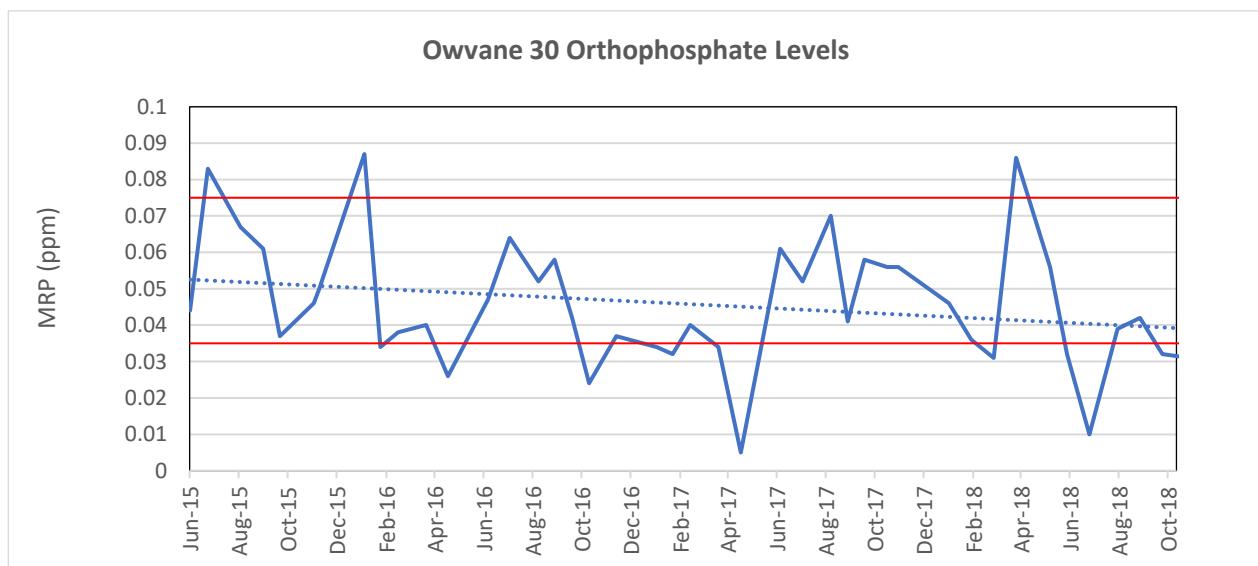
Figure 2-7: Annual average orthophosphate levels on Ovvane 30 (loghill surveillance station)



As can be seen from fig 2-7, annual average orthophosphate levels exceeded the mean EQS for Good status waters consistently since 2012.

Individual orthophosphate results for the Loghill surveillance station from 2015 to 2018 are graphed in figure 2.8. The trendline extrapolated from these results and the mean and 95%ile EQSs are also shown on the graph.

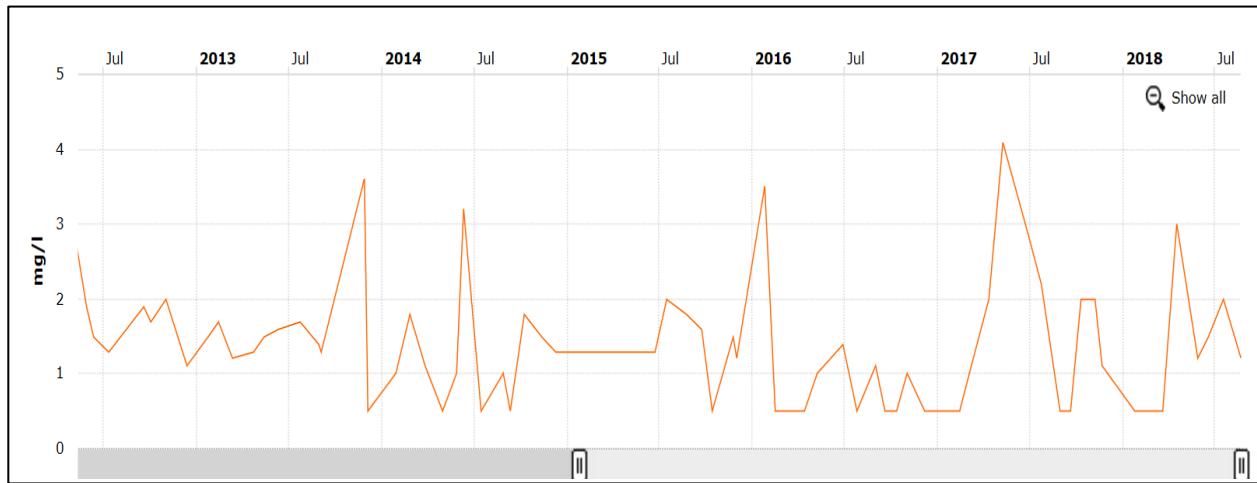
Figure 2-8: Ovvane 30 orthophosphate results (2015 to 2018)



There appears to be a downward trend in orthophosphate concentration between 2015 and October 2018. As for Ovvane_020, lowest phosphate concentrations were measured in the May 2017 and July 2018 monitoring surveys, both occurring after periods of very dry weather. This indicates that phosphate loss to the river is via diffuse overland flow.

BOD results for the Loghill station are graphed in Figure 2.9. Approximately 90% of results were below the 95%ile EQS of 2.6mg/l BOD. There are periodic spikes apparent, up to 3.5 to 4mg/l, but these don't appear to be seasonal.

Figure 2-9: BOD results on Ovvane 30 (Loghill surveillance station)



In summary, Owvane_030 is at Moderate status due to biological results at Cloonlahard Stream and is *At Risk* due to deterioration in biological status at Cloonlahard and to increasing orthophosphate levels on the Loghill surveillance station. The 2017 biological result for Cloonlahard stream was Q3 (Poor) indicating a further deterioration in status for this waterbody.

The significant issue at the Loghill station is orthophosphate. The significant issue at Cloonlahard is not known. There is forestry and peat upstream, indicating possible sediment or hymo issues. Phosphate susceptibility maps show high susceptibility areas, therefore point P sources may also be an issue.

The estimated P loading at West Bridge was compared to the P loading at the Loghill station using the annual average P concentration and 30%ile flows from the EPA hydrotool. Results indicate that the P contribution at West Bridge is approximately 20% of the total loading at Loghill (see Table 2-2 below). Note that West Bridge data are more representative of Ovvane_010 loadings as this station is located close to the headwaters of Ovvane_020. There are no chemistry data available for the outlet of Ovvane_020 but PIP maps indicate that Ovvane 20 may deliver a significant P load to Ovvane 30.

Table 2-2: Estimated P contribution from West Bridge (Ovwane_020) to Loghill (Ovwane_030)

Monitoring location	Mean Flow (30%ile) m ³ /sec <i>from EPA hydrotool</i>	Year	Annual Average Ortho P Conc ⁿ (mg/l)	Estimated mean daily load (Kg per day)	Estimated P contribution from Owvane 20 (West Br) to P loading Owvane 30 (Loghill) (%)	
West Bridge Owvane 20	0.461	2015	0.048	1.91	20	21%
		2016	0.049	1.95	24	
		2017	0.039	1.55	20	
		2018	0.036	1.43	20	
Loghill, Owvane 30	2.042	2015	0.055	9.70		
		2016	0.046	8.12		
		2017	0.045	7.94		
		2018	0.041	7.23		

2.3 Summary of Issues

Ovvane_020

Ovvane_020 is *At Risk* due to:

- Increasing orthophosphate levels at one monitoring station. Annual average results are above the mean EQS for Good status waters.

Ovvane_030

Ovvane_030 is at risk due to:

- Increasing orthophosphate levels at the surveillance site near the waterbody outlet.
- Deterioration in biological status at a second (u/s) monitoring point on Ovvane_030 (deteriorated to Moderate in 2014 and to Poor in 2017). Land use and soil type indicate that the significant issue here may be sediment, hydromorphology or ammonia. P from point sources may also be an issue here, in the high P susceptibility areas.

3. Significant Pressures

3.1 Initial EPA characterisation

Table 3.1: *EPA Characterisation (from WFD App)*

Water body Name	Id	Category	Sub Category	Name	Significant?	Pressure & Impact details
Ovvane_010						
Ovvane_020	WBP0001760	Agriculture	Agriculture	NA	Yes	Nutrient Pollution Organic Pollution
	WBP0005149	Industry	IE	Gortadroma Landfill Site	No	
Ovvane_030	WBP0001759	Agriculture	Agriculture	NA	Yes	Nutrient Pollution
	WBP0001758	Forestry	Forestry	n/a	No	

The WFD App characterises the significant pressure on both Ovvane_020 and Ovvane_030 as Agriculture. The landfill was previously identified as a possible significant pressure on Ovvane_020 due to nutrients (ammonia mainly) from leachate. However, aftercare measures undertaken since closure are believed to have addressed this issue.

There is a Section 4 licensed facility located a short distance upstream of the Loghill surveillance site. Current status of this needs to be checked.

There is an urban wastewater treatment plant discharging to Ovvane_030, fifty metres downstream of Ballyhahill Bridge (A0206-01, PE 268). This is downstream of the Cloonlahard monitoring station driving biological status on Ovvane_030 and upstream of the Loghill surveillance station where increasing phosphate levels are an issue. The Ballyhahill WWTP is unlikely to be the significant pressure delivering

increasing P to the river at Loghill. The estimated maximum P loading from the plant is 0.4kg per day, which is insignificant in terms of the total daily P load estimated at the Loghill site (approximately 5% of this figure - see table 2-2). The required P reduction at the Loghill station to bring annual average results in line with the Good status EQS, is approximately 2kg/day (2015-2018 data indicates that required reduction ranges from 1.06 to 3.53 kg/day).

Land use in the PAA is agricultural over approximately 60% of the catchment (lands to the north). Lands to the south are mainly under forestry and the soil type is peat (see Appendix I and II). Streams in Owvane_010 (headwaters upstream of the PAA) flow mainly through forested areas with blanket peat. Cloonlahard stream on Owvane_030 also flows through forestry and peaty soil. Felling records would be useful for the upstream lands to assist in determining whether forestry is a significant pressure here.

3.2 Conclusion on the Significant Pressures:

Available information indicates that the significant pressure on this PAA is agriculture, specifically in relation to the two monitoring stations where chemistry data indicate P issues (West Bridge S. of Gortadroma and bridge U/S of Loghill). PIP maps and monitoring results indicate potential for diffuse P losses from agriculture. At the monitoring station on Owvane_030 which is at Poor biological status with deterioration (Cloonlahard stream), the significant pressure is not known but could be forestry, peat or possibly small point sources from agriculture (farmyards).

4. Pathways Information and Analysis

4.1 Conceptual Model Development

Phosphorus is the significant issue in both waterbodies (Owvane_020 and Owvane_030) in the PAA, except possibly at Cloonlahard stream (headwaters of Owvane_030).

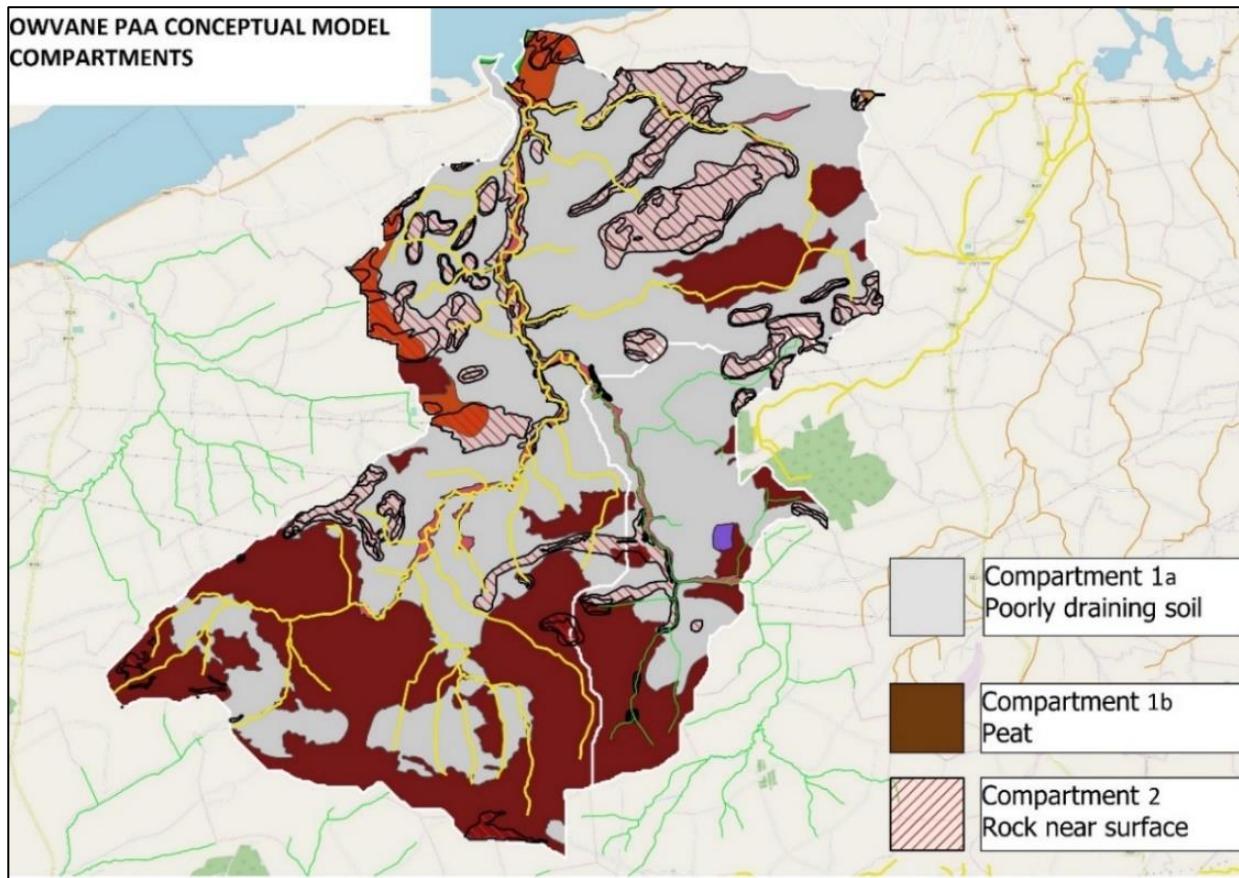
The following information supports the conclusion that the phosphate pollution is diffuse via overland flowpaths, with small point sources (e.g. farmyards and septic tanks) potentially also contributing:

- Land use (see appendix I)
- Soil type (see appendix II)
- PIP and susceptibility maps (see appendix II)
- Absence of known significant point sources
- Significantly lower P levels observed after periods of prolonged dry weather

The inputs from larger point sources (such as the wastewater treatment plant (WWTP) at Ballyhahill and the landfill) will be assessed in the LCA process but are unlikely to be significant pressures.

In terms of the critical source areas and pathways for diffuse pollution, the PAA has been divided into two compartments: Soils in compartment 1 are poorly draining (1a) and peat (1b) and compartment 2 covers areas with very thin soils/rock outcrops. The conceptual model is shown in Figure 4.1 below with details provided in Table 4.1.

Figure 4-1: Ovwane PAA conceptual model compartments



Compartment 1a (poorly draining soil) covers more than two-thirds of the catchment, with potential for surface P runoff from land and land drains and increased possibility of P from small point sources connected via drains/pipes to streams. The surface P PIP map (Appendix II) has areas of high PIP Rank (1 to 3) in the northern half of the catchment. These areas should be the focus for stream walks in assessing phosphate loadings upstream of the Loghill monitoring station.

Compartment 1b (peat) is of most significance upstream of the Cloonlahard monitoring station, where the significant issue is not known and where forestry on peat carries a risk of sediment and ammonia loss to the river. Phosphate is also potentially an issue in peaty areas where land use is agricultural.

Ammonia has been a contaminant of concern in the past, specifically on Ovwane_020. Pathways for ammonia movement are overland flow and land drains in Compartment 1b. However as more recent results indicate a downward trend in this parameter, ammonia pathways are not the focus of this assessment, other than potentially at Cloonlahard.

In Compartment 2 (rock outcrops and extreme vulnerability), there may be limited subsurface flow across the top of the bedrock but the phosphate contribution via this pathway is likely to be insignificant in comparison to the overall loadings on the catchment. Therefore, these areas are not considered focus areas for assessment.

In summary, considering that orthophosphate is the significant issue in both waterbodies in the Ovwane PAA (except upstream of Cloonlahard where the issue is not yet known), compartments 1a and 1b are of most significance in terms of pollutant pathways, with overland flow (including land drains) being the most likely pathway for orthophosphate with most of the losses expected during/after periods of heavy rainfall.

Table 4.1: Conceptual model information

		Compartment 1a (poorly draining soil)	Compartment 1b (peat)	Compartment 2 (rock near surface)	
Diffuse or point source?		Both possible. Diffuse at Loghill and West bridge stations. Cloonlahard may be diffuse or point (small point sources from farm yards)			
Pathway Information	Aquifer		Li		
	Topography		sloping		
	Soil	wet	wet	wet	
	Subsoil	Shale and sandstone till, (surface water gley, kilrush)	peat	Shale and sandstone till, (surface water gley, kilrush)	
	Subsoil K				
	Rock unit	mudstone, siltstone and sandstone. Namurian undifferentiated			
	GW vulnerability	mainly moderate to low	mainly moderate to low, some areas of high vulnerability to the north	extreme	
	PO4 susceptibility	High	High	High (ground and surface-proximity to poorly draining soils).	
	NO3 susceptibility	low	low	high (ground)	
	PO4 PIP	High	High	High (ground and surface)	
NO3 PIP					
flowpaths		Low transmissivity bedrock overland flow and drains mainly.	Low transmissivity bedrock overland flow, drains mainly .	Areas of rock outcrops are small. Risk of overland flow, drains in wider environment. Also shallow GW flow	
Location of monitoring point:		240020200 (surveillance monitoring point at outlet of Owvane _030) (<i>note: PAA is separated into compartments based on soil type and presence of rock outcrops. Downstream monitoring point for entire PAA is the surveillance point at the outlet from Owvane_030 (240020200). Other points are also relevant including RS24C060040 (Cloonlahard Stream, Owvane_030 and on Owvane _020: RS240020090 (br upstream of Ballyhahill Br) and RS240020075 (West Bridge south (d/s) of Gortadroma Landfill site).</i>			
Landuse		mainly agriculture	Mainly forestry	mainly agriculture	
comments on linkages & overview from WFD App		High P to SW across water body, particularly stretches closest to Owvane _030. look more closely at peat areas in upper reaches. focus on agriculture. there has been elevated ammonia in the past from Gortadroma Landfill, since addressed. Joint IA7 with Owvane (Limerick)_030).			

5. Interim Conclusions on the PAA

The Ovvane River (also known as White river and Abha Bhan river) rises in County Limerick to the north of Carrigkerry townland and flows north through Ballyhahill into the Shannon estuary at Loghill village. The river comprises three waterbodies: Ovvane_010 (headwaters), Ovvane_020 and Ovvane_030. Ovvane_020 and Ovvane_030 make up the Priority Area for Action.

Ovvane_020.

- Ovvane_020 is at Good ecological status but is categorised as *At Risk* of failing to meet the objectives of the Water Framework Directive.
- The significant issue on Ovvane_020 is phosphate, with elevated orthophosphate levels driving the *At Risk* characterisation of this waterbody.
- The significant pressure on this waterbody is agriculture. Note that supporting chemistry is monitored at a station located in the headwaters of Ovvane_020 very close to Ovvane_010, therefore the pressure may be agriculture on Ovvane_010, upstream of the PAA.
- Pathways for pollutant transfer are likely to be via overland flow (including land drains).
- There is one large point source on Ovvane_020, Gortadroma landfill, located a short distance upstream of the WFD monitoring point at West Bridge. However, the landfill is closed and capped and phosphate would not normally be associated with landfill leachate so this facility is unlikely to be a significant pressure here.

Ovvane_030

- Ovvane_030 is at Moderate ecological status and *At Risk*. Macroinvertebrates are driving status.
- There are two WFD monitoring points on the waterbody: one operational monitoring station in the headwaters (Cloonlahard Stream), which is monitored for biology only and the second (surveillance monitoring) station located upstream of Loghill village, close to the mouth of the river.
- The Moderate biological status of Ovvane 30 is driven by results for the Cloonlahard Stream monitoring point. Biological quality here deteriorated further from Moderate to Poor in 2017.
- The significant issue at Cloonlahard is not known but may be sediment and/or ammonia.
- The significant pressure is likely to be forestry.
- Biological monitoring results on the surveillance monitoring station upstream of Loghill are indicative of Good status (Q4).
- The significant issue at the Loghill site is phosphate; annual average phosphate levels consistently exceed the Good status EQS. This is contributing to the *At Risk* characterisation of the waterbody.
- The significant pressure delivering phosphate to the catchment is agriculture.
- Soils and geology indicate potential for phosphate loss via overland flow and land drains, with some (possible) contribution from small point sources.

6. Work Plan

6.1 Further Characterisation Actions from WFD App

The further characterisation actions given in the WFD App are:

Waterbody	Action	Description
Ovwane_020	IA7 Multiple Sources in Multiple Areas	Aim: Identify the source of elevated phosphate. Full investigative assessment with focus on agriculture. It should be noted that there has been elevated ammonia in the past from Gortadroma Landfill, however this is closed and aftercare measures have seen a decline in ammonia levels. Phosphate still needs to be addressed. This should be a joint IA7 with Ovwane (Limerick)_030.
Ovwane_030	IA7 Multiple Sources in Multiple Areas	Aim: Identify the source of elevated phosphate. Full investigative assessment with focus on agriculture/farmyards. It should be noted that there has been elevated ammonia in the past from Gortadroma Landfill, however this is closed and aftercare measures have seen a decline in ammonia. Phosphate still needs to be addressed. This should be a joint IA7 with Ovwane (Limerick)_020.

The estimated resource for this local catchment assessment is 60 days.

6.2 Additional information requirements

- Talk to Limerick County Council and IFI to get more detailed local knowledge of this PAA, including (LCC) up to date information on the S4 facility.
- Check monitoring results for the Ballyhahill CoA.
- For comparative purposes re P loadings, use hydrotool for calculating relative flows from each tributary in the catchment, particularly in the higher PIP areas.
- Felling history may be useful in the catchment upstream of Cloonlahard.

6.3 Local Catchment Assessment

Field investigations to be undertaken at ten locations as outlined below and as shown on Fig. 6.1 and 6.2. The focus is on P loadings for stretches other than Cloonlahard stream area. This approach is taken because the monitoring stations (other than at Cloonlahard) are at Good status but *At Risk* due to increasing phosphate levels. Identification of tributary streams contributing highest P loading will help to focus the work of ASSAP in this PAA. For Cloonlahard Stream, the issue that is driving status needs to be identified. The significant pressures information, conceptual model compartments and land use suggest that the issue may be sediment, ammonia or possibly point source nutrients (phosphate or ammonia) from farmyards. However, note that the location of the EPA WFD operational site appears to be a headwater first order stream rather than the main channel of Cloonlahard Stream.

Point 1 (Ovvane_020, West Bridge, Q4 but P possibly still increasing)

Phosphate issue is identified at the West bridge station, located a short distance from Ovvane_010 (*Not at Risk*). Initial focus should be on the short stretch between West Bridge station on Ovvane_020 and the East Bridge station on Ovvane_010, but the higher P ranked areas upstream in Ovvane_010 are also worth looking at.

- Undertake RA/SSIS at West bridge S of Gortadroma and at the upstream station (East bridge, on Ovvane_010). Phys chem sampling will also be useful here.
- Sampling for P and measuring/estimating flow at both locations will provide information on whether the P load is related to the waste facility here or is coming from high PIP areas upstream on Ovvane_010.

Points 2, 3, 4, 5 (Ovvane_030, Cloonlahard Stream).

Note that the Cloonlahard monitoring point appears to be a small tributary rather than the main channel.

- Undertake RA and SSIS at this location and upstream.
- The tributary is flowing through an area of forestry upstream. If SSIS indicates an impact on this tributary, walk upstream to identify risk areas, looking for sedimentation and hydromorphological changes. Also consider sampling for ammonia, particularly if the stream walk indicates that sediment is not an issue.

Points 6, 7, 8 (Ovvane_030, Ballyhahill)

Looking for information on phosphate loadings here. Also need to assess the impact of the COA facility at Ballyhahill (to address public concerns raised at the community meeting).

- Check SSIS upstream and downstream of point 6.
- SSIS/RA on both tributaries (7 and 8). Also sample for P and measure/estimate flow here as it will enable better assessment of P loading downstream at Loghill station.

Points 9, 10 (Ovvane_030, Loghill and upstream tributaries)

Status is Good (Q4) but P is increasing at the Loghill site. P loading information from upstream locations may help to focus areas for ASSAP by identifying the tributaries contributing the greatest load.

- Measure P and flow at both 9 and 10. Also, undertake SSIS or Rapid Assessment at both locations.

Figure 6-1: Bridge hop and sample locations, Ovwane_020 and Cloonlahard Stream on Ovwane_030

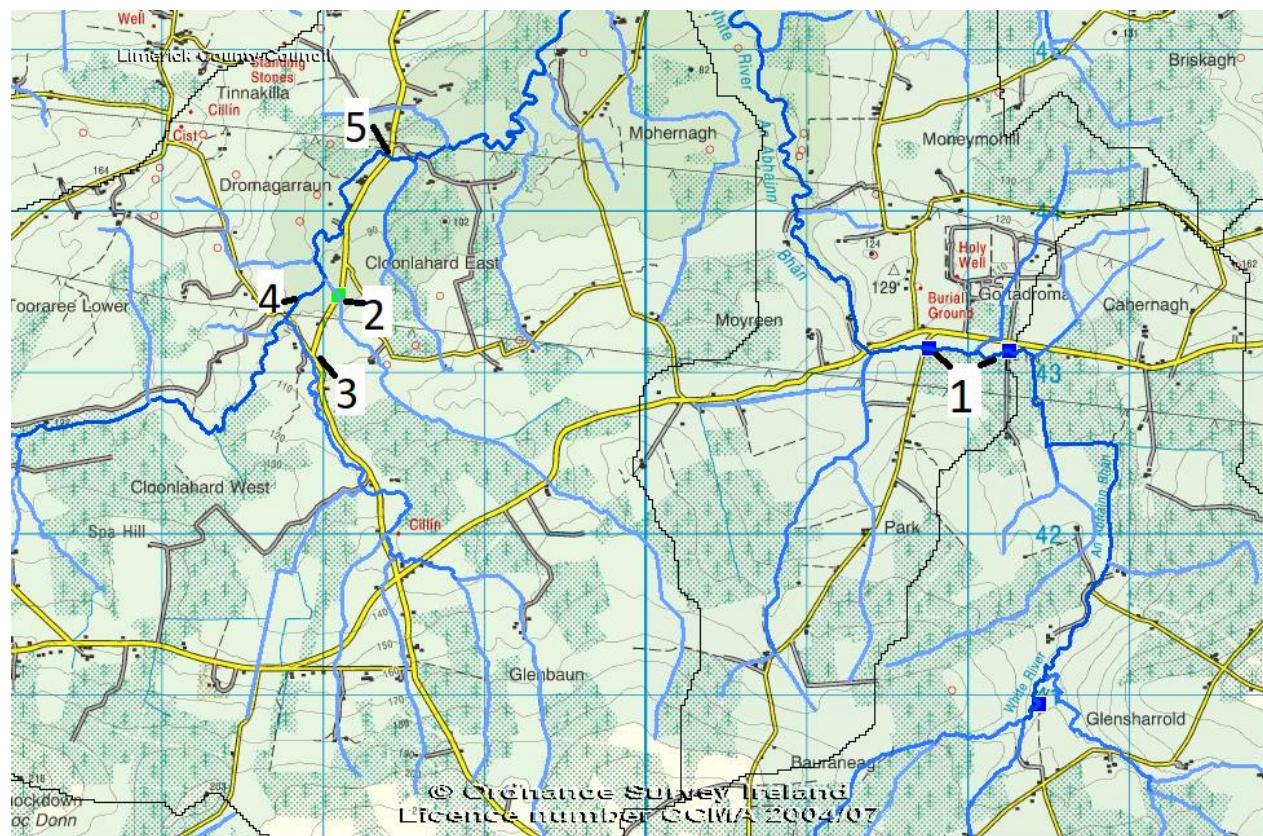
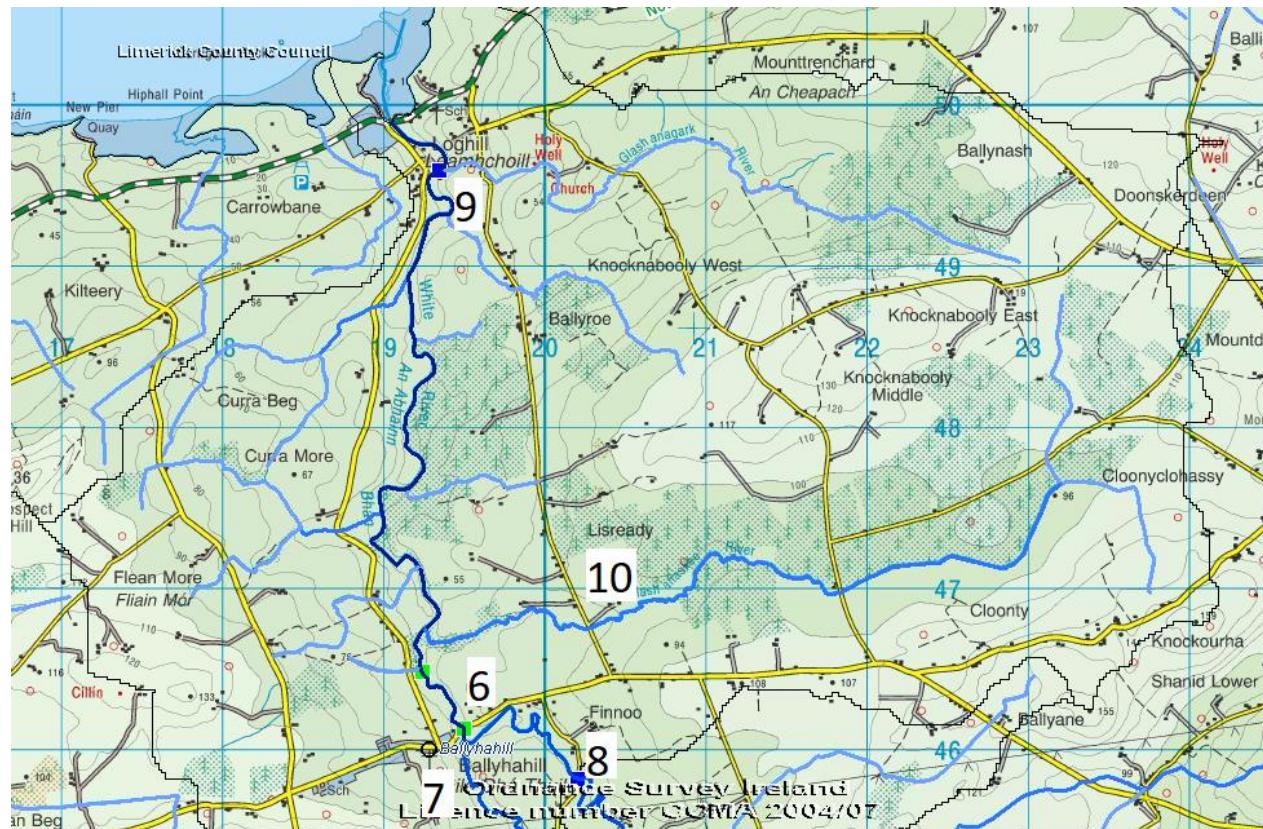


Figure 6-2: Bridge hop and sample locations, Ovwane_030 from Ballyhahill downstream towards Loghill



7. Review of possible mitigation options

The type of the mitigation measures will be determined by the significant issues and significant pressures in this catchment.

Available information indicates that the increasing phosphate levels on Ovwane 20 and Ovwane 30 (downstream of Cloonlahard stream) are due to agriculture. Critical source areas need to be mapped at field scale and measures should be focussed on breaking the pathways here.

If forestry is identified as the significant pressure on Ovwane 30 at Cloonlahard stream, consider blocking drains to break the pathways for sediment and nutrient loss.

The wastewater treatment plant at Ballyhahill is unlikely to be a significant pressure in this catchment as it is a secondary treatment plant serving less than 300PE. However assessments will be undertaken upstream and downstream of the plant discharge to confirm.

Communications

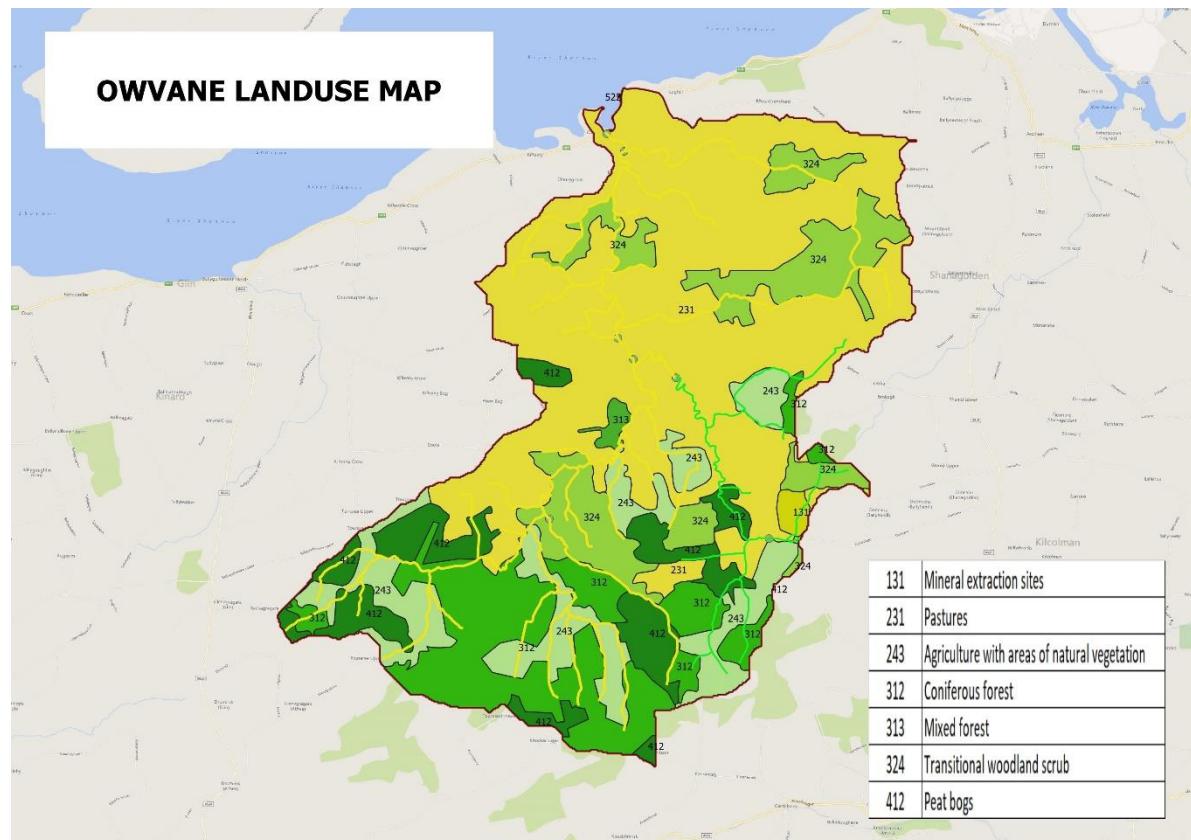
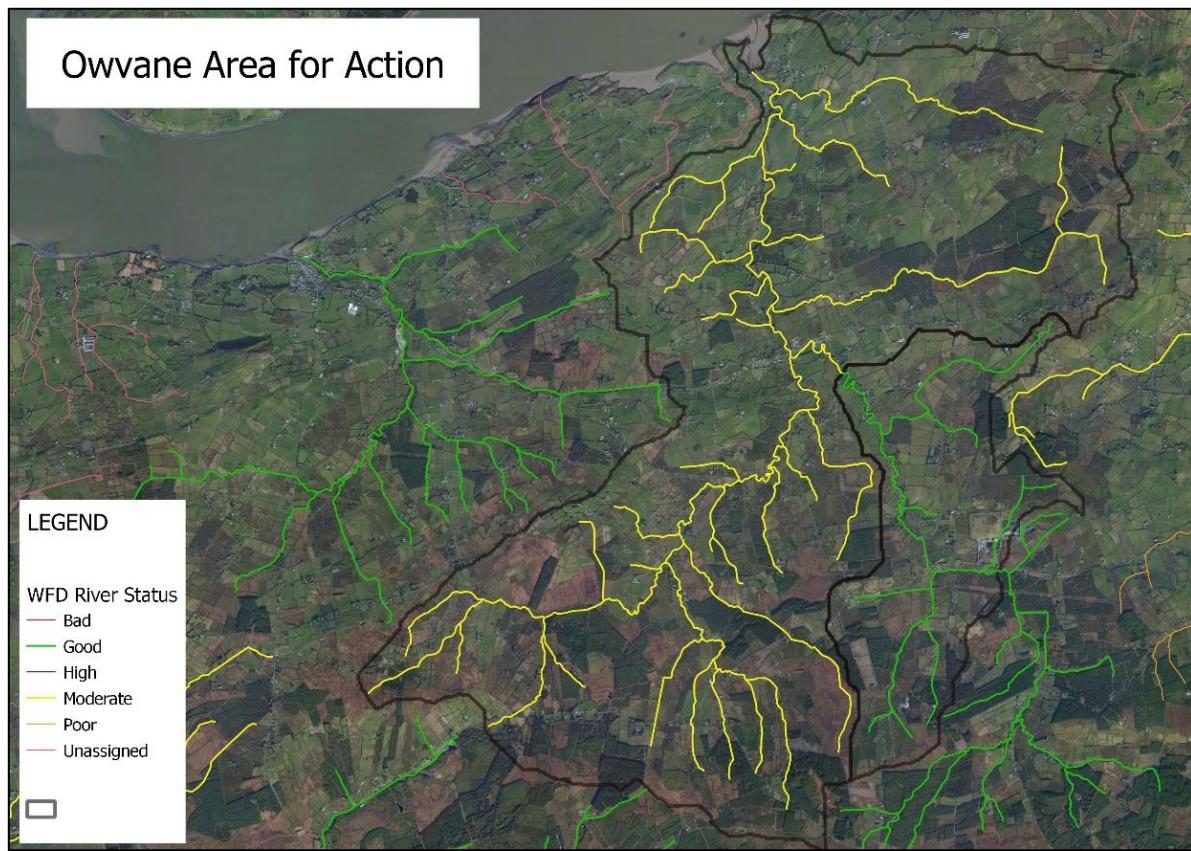
Public meetings required for this PAA. First public meeting was a community meeting held on 1st November 2018 in Ballyhahill Community Centre.

As agriculture is the significant pressure, farm engagement also required. ASSAP worked with their contacts to encourage attendance by farmers at public meeting and a follow up farmer streamside engagement event was held in December 2018 on a tributary near the mouth of Ovwane (Limerick)_030.

Key messages:

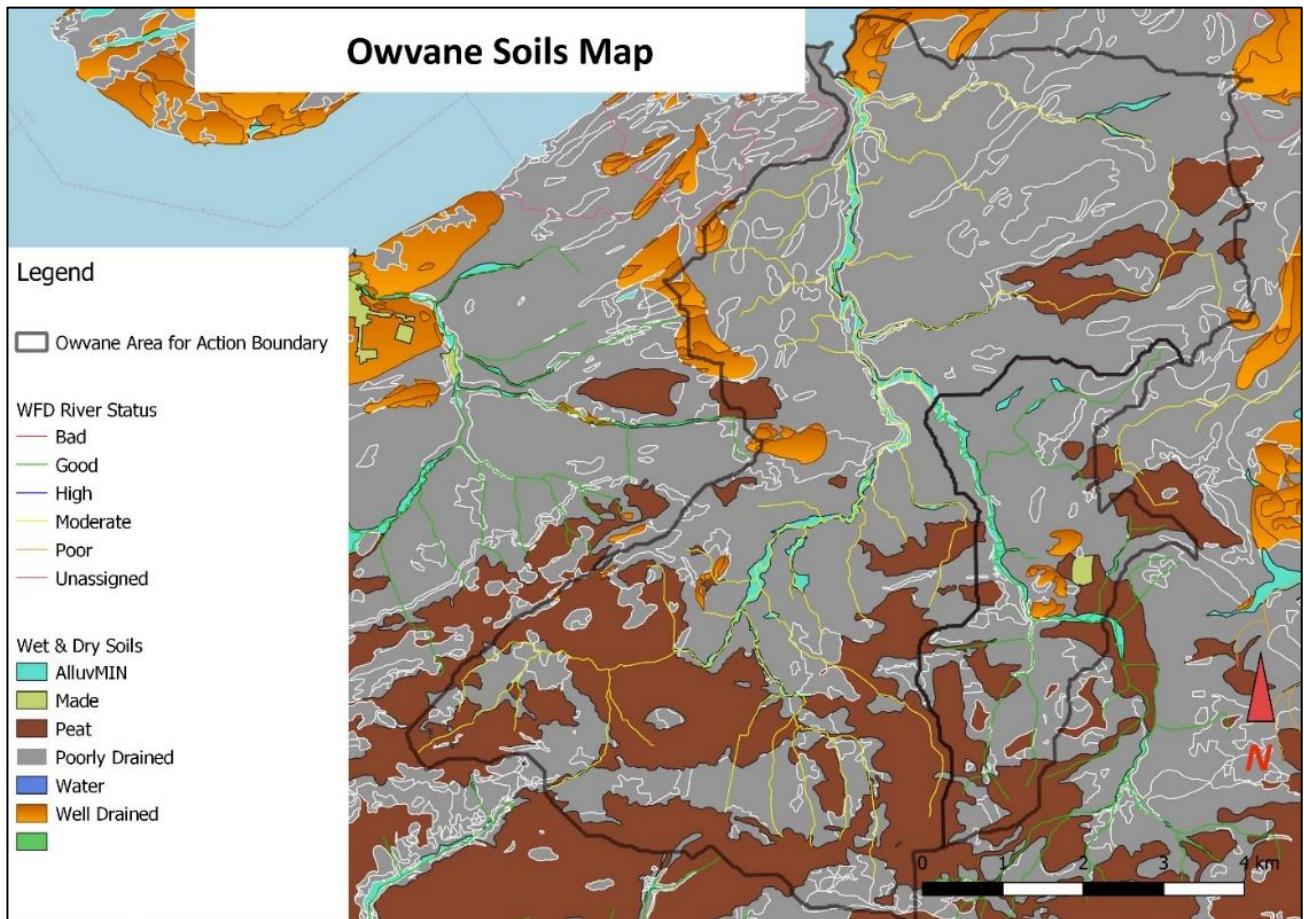
- Nutrients, mainly orthophosphate, are affecting water quality. The risk associated with the larger point sources in this catchment will be assessed by means of local catchment assessment but, given the nature of the environment here, it is likely that the orthophosphate is making its way to the river via overland flow and land drains. Small point sources may also be contributing nutrients, considering the low permeability soils in the area.
- The LAWPRO team will undertake local catchment assessment to identify what the significant pressures are. We will work with the relevant stakeholders/implementing bodies to identify the appropriate local measures for the catchment, applying *the right measure in the right place*.

Appendix I: Ovvane Aerial and Land Use Maps



Appendix II: Soils and PIP Maps

Ovvane Soils Map



Ovwane Surface Phosphate PIP Map

