

Owenriff

Desktop Assessment

Western Region

(AFA0148)





Acknowledgement

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

Disclaimer:

Although every effort has been made to ensure the accuracy of the material contained in this publication, complete accuracy cannot be guaranteed. The Local Authority Waters Programme (LAWPRO) nor the author(s) accept any responsibility whatsoever for loss or damage occasioned, or claimed to have been occasioned, in part or in full as a consequence of any person acting or refraining from acting, as a result of a matter contained in this publication.

Copyright ©LAWPRO, January 2020

This Report cannot be reproduced without the prior written consent of LAWPRO

Table of Contents

| | | |
|--------|--|----|
| 1 | Introduction | 1 |
| 1.1 | Background to PAA | 1 |
| 1.2 | PAA Summary Information | 4 |
| 1.3 | Information source consulted..... | 5 |
| 2 | Receptor Information and Assessment | 8 |
| 2.1 | Context and Setting..... | 8 |
| 2.2 | Receptor Information | 11 |
| 2.3 | Conclusions | 38 |
| 3 | Significant Pressures | 40 |
| 3.1 | Owenriff_010 | 40 |
| 3.1.1 | Hydromorphology | 40 |
| 3.1.2 | Other Non – Significant Pressures | 42 |
| 3.2 | Owenriff_020 | 43 |
| 3.2.1 | Hydromorphology..... | 43 |
| 3.2.2 | Other Non – Significant Pressures | 46 |
| 3.2.3 | Fish | 46 |
| 3.3 | Drimneen_010 | 47 |
| 3.3.1 | Forestry | 47 |
| 3.3.2 | Peat Extraction..... | 48 |
| 3.3.3 | Other Non – Significant pressures | 49 |
| 3.4 | Ballycurke_010..... | 50 |
| 3.4.1 | Hydromorphology..... | 50 |
| 3.4.2 | Domestic Wastewater Treatment Systems | 50 |
| 3.4.3 | Urban Wastewater..... | 51 |
| 3.5 | Lettercraffroe..... | 53 |
| 3.5.1 | Forestry | 53 |
| 3.6 | Ballyquirke Lough..... | 54 |
| 3.6.1 | Urban Wastewater – Moycullen WWTP..... | 54 |
| 3.6.2 | Invasive Species..... | 56 |
| 3.7 | Ross GY..... | 56 |
| 3.7.1 | Invasive Species..... | 56 |
| 3.8 | Acogga..... | 57 |
| 3.8.1 | Forestry | 57 |
| 3.9 | Parkyflaherty..... | 59 |
| 3.9.1 | Forestry | 59 |
| 3.9.2 | Agriculture..... | 59 |
| 3.10 | Buffy Lough | 60 |
| 3.10.1 | Water Abstractions and Water Treatment Discharges..... | 60 |

| | | |
|--------|---|----|
| 3.10.2 | Forestry | 61 |
| 4 | Pathways Information (Diffuse Pollution)..... | 63 |
| 5 | Interim Story of the PAA | 77 |
| 5.1 | Owenriff_010 | 77 |
| 5.2 | Owenriff_020 | 77 |
| 5.3 | Drimneen_010 | 77 |
| 5.4 | Ballycurke_010..... | 78 |
| 5.5 | Lettercraffroe..... | 78 |
| 5.6 | Ross GY..... | 79 |
| 5.7 | Ballyquirke Lough..... | 79 |
| 5.8 | Acogga..... | 79 |
| 5.9 | Parkylaherty..... | 79 |
| 5.10 | Buffy Lough | 80 |
| 6 | Work Plan..... | 81 |
| 6.1 | Owenriff_010 | 81 |
| 6.2 | Owenriff_020 | 81 |
| 6.3 | Drimneen_010 | 81 |
| 6.4 | Ballycurke_010..... | 82 |
| 6.5 | Lettercraffroe..... | 82 |
| 6.6 | Ross GY..... | 82 |
| 6.7 | Ballyquirke Lough..... | 82 |
| 6.8 | Acogga lake | 82 |
| 6.9 | Parkylaherty lake | 83 |
| 6.10 | Buffy Lake..... | 83 |
| 7 | Review of possible mitigation options..... | 89 |
| 7.1 | Hydro morphology | 89 |
| 7.2 | Agriculture | 89 |
| 7.3 | Forestry | 89 |
| 8 | Communications | 90 |

List of Figures

| | |
|---|----|
| Figure 1: Water Risk Status in the Owenriff PAA | 4 |
| Figure 2: Water Quality Status in the Owenriff PAA..... | 5 |
| Figure 3: Direction of flow in the Owenriff PAA | 8 |
| Figure 4: Monitoring points in the Owenriff PAA | 10 |
| Figure 5: BOD at the Monitoring Point "1KM U/S of Oughterard Bridge"(High status <1.3 (mean) or <2.2 (95%ile) | 20 |
| Figure 6: BOD graph of the Monitoring Point "Bridge U/S of Lough Corrib" | 21 |
| Figure 7: BOD graph at the Monitoring Point "D/S Sew Trtmt Wks – Oughterard" | 22 |
| Figure 8: BOD graph for the Monitoring Point "Railway Br D/S of Ballyquirke Lough" | 29 |
| Figure 9: BOD and Total Nitrogen graph from the Monitoring Point "Br U/S Ballycurke Lough" (Upstream of the Moycullen WWTP)..... | 30 |
| Figure 10: BOD and Total Nitrogen graph from the Monitoring Point "Downstream Monitoring of TPEFF1200D0191SW001"(downstream of the Moycullen WWTP)..... | 31 |
| Figure 11: Corrib - Headford Drainage Scheme in the Owenriff_010..... | 40 |
| Figure 12: New Drains leading into Lough Bofin..... | 41 |

| | |
|---|----|
| Figure 13: Peat Extraction in the Vicinity of the Owenriff_010 | 42 |
| Figure 14: Forestry in the Owenriff_010 area | 43 |
| Figure 15: OPW Drainage Scheme in the Owenriff_020..... | 44 |
| Figure 16: New Drains opened in the Owenriff_020 | 45 |
| Figure 17: Forestry in the Vicinity of the Owenriff_020 | 46 |
| Figure 18: Forestry in the Drimneen_010 Area | 47 |
| Figure 19: Peat Cutting in the Drimneen_010 | 48 |
| Figure 20: OPW Drainage scheme in the Drimneen_010 | 49 |
| Figure 21: OPW Drainage Scheme in the Ballycurke_010 | 50 |
| Figure 22: Monitoring Points around the Moycullen WWTP in the Ballycurke_010..... | 52 |
| Figure 23:Monitoring Point Br U/S of Ballycurke Lough | 52 |
| Figure 24: Monitoring Point Downstream Monitoring of TPEFF1200D0191SW00 | 52 |
| Figure 25: Forestry around the Lettercraffroe Lake | 53 |
| Figure 26: Sampling point during the Ballyquirke lake Assessment | 54 |
| Figure 27: Results from the Assessment..... | 55 |
| Figure 28: Forestry around Acogga..... | 58 |
| Figure 29: Forestry around Parkyflaherty Lake..... | 59 |
| Figure 30: Water Treatment Plant beside Buffy Lough | 61 |
| Figure 31: Forestry located around the Buffy Lough | 62 |
| Figure 32: Bedrock Aquifer in the Owenriff PAA | 66 |
| Figure 33: Wet/Dry Soils in the Owenriff PAA | 67 |
| Figure 34: Rock Units in the Owenriff PAA | 68 |
| Figure 35: Subsoils in the Owenriff PAA | 69 |
| Figure 36: Groundwater Vulnerability in the Owenriff PAA | 70 |
| Figure 37: Surface Nitrate Susceptibility in the Owenriff PAA..... | 71 |
| Figure 38: Subsurface Nitrate Susceptibility..... | 72 |
| Figure 39: Recharge Permeability in the Owenriff PAA..... | 73 |
| Figure 40: Phosphate PIP of the Owenriff PAA..... | 74 |
| Figure 41: Surface Water Nitrate PIP Map of the Owenriff PAA | 75 |
| Figure 42: Groundwater Nitrate PIP Map of the Owenriff PAA..... | 76 |
| Figure 43: Field work plan for the Owenriff..... | 84 |
| Figure 44: Chemistry sampling plan for the Drimneen_010..... | 85 |
| Figure 45: Biological sampling plan for the Drimneen_010..... | 86 |
| Figure 46: Ballycurke_010 chemistry sampling plan..... | 87 |
| Figure 47: Biological sampling point for the Ballycurke_010..... | 88 |

List of Tables

| | |
|--|----|
| <i>Table 1: Summary of Waterbodies in the OwenriffPAA.....</i> | 6 |
| Table 2: Outline of the Water Quality in the Owenriff_010, Owenriff_020 and Glengawbeg_010..... | 13 |
| Table 3: Outline of the Water Quality in the Drimneen_010 and the Ballycurke_010 | 23 |
| Table 4: Receptor Information Lettercraffroe, Ross GY, Ballyquirke, Acogga, Buffy lough and Parkyflaherty..... | 32 |
| Table 5: RHAT Survey of the Owenriff_010 at the Monitoring Point 1 KM D/S of Lough Agraffard | 41 |
| Table 6: RHAT Survey of the Owenriff_020 from the Monitoring Point 1km U/S Oughterard Bridge. | 45 |
| Table 7: Conceptual model table | 65 |
| Table 8: Attendees | 90 |

1 Introduction

1.1 Background to PAA

The Owenriff PAA is located in the West of Ireland in County Galway, within sub catchment 30_14 BallycurkeLoughStream_010 and the Corrib Catchment. There are two main urban centres in the Owenriff PAA, Oughterard and Moycullen. There are four river waterbodies in the Owenriff PAA, Owenriff_010, Owenriff_020, Drimneen_010 and the Ballycurke_010. There is also six lakes in the PAA, Lettercraffroe, Acogga, Buffy, Parkyflaherty, Ross GY and the Ballyquirke. The Owenriff river is part of the Lough Corrib SAC and includes a population of Freshwater Pearl Mussel (FPM) as one of the qualifying features of the SAC. One of the conservation objectives of the SAC is to restore the freshwater pearl mussel to a population of one million as there has been declines noted in the past number of years. The Owenriff river has been selected as one of the top eight priority freshwater pearl mussel catchments in Ireland and is currently the focus of an EIP project (www.pearlmusselproject.ie).

The area covering the Owenriff_010 and _020, as well as the western areas of the Drimneen_010 and Ballycurke_010 are dominated by peatland, with land use predominately agriculture or forestry. There are areas of poorly drained land which has improved grassland on it. The main farming enterprise, around the peat dominated areas would be sheep and upland farming. To the east there would be still sheep farming but there would also be a good population of suckler cattle, owing to the more productive land and its ability to carry these animals.

As mentioned above the main urban centres in the Owenriff PAA are Oughterard and Moycullen and both are considered commuter towns for Galway city. In the 2016 census there were 1,318 people living in Oughterard and 2,143 living in Moycullen. There are a number of housing developments proposed in the future, including planning permission for 60 houses in Moycullen and initial indications for over 150 houses in Oughterard.

A catchment assessment workshop was held in Castlebar on 26th – 28th of April 2017. It was attended by representatives of the local authorities (Galway, Mayo, Roscommon, Leitrim, Sligo) LAWCO, Irish Water, IFI, Forest Service, Coillte, Teagasc, GSI, DAFM, Marine Institute and EPA. Based on the draft River Basin Management Plan priorities, a set of agreed principles and the local priorities of the workshop attendees, 34 areas were recommended for action, of which the Owenriff PAA was one of these.

The Western Regional Operation Committee (WROC) identified the following reasons for the selection of the PAA:

- Three *At Risk* waterbodies
- Includes a top 8 Freshwater Pearl Mussel sensitive area
- Two *At Risk* High Ecological status objective water bodies
- Headwaters flowing into the Corrib
- One deteriorated waterbody

The LCAs assigned to these water bodies based on initial characterisation undertaken by the EPA are:

Owenriff_010 – Assigned to the EPA

- **IA8 High status RWB Pressures:**

Owenriff_020 – Assigned to the EPA

- **IA8 High status RWB pressures:**

Drimneen_010 – Assigned to LAWPRO

- **IA3 Determination of Water Quality (Unassigned Waterbody):**

Ballycurke_010 – Assigned to the EPA

- **IA1 Provision of Information**

Lettercraffroe – Assigned to the EPA

- **IA1 Provision of Information:**

Ballycurke – Assigned to the EPA

- **IA1 Provision of Information:**

Ross GY – Assigned to the IFI

- **IA1 Provision of Information:**

Buffy – Assigned to LAWPRO

- **IA3 Determination of Water Quality (unassigned waterbody)**

Acogga – Assigned to the EPA

- **IA1 Provision of Information:**

Parkylaherty – Assigned to LAWPRO

- **IA9: Lake Pressures:**

1.2 PAA Summary Information

Table 1 summaries the risk classification, environmental objectives, ecological status, significant pressures (and subcategory) and local catchment assessments (LCA) actions proposed within the Owenriff PAA. **Figure 1** and **Figure 2** illustrate the risk classification and status classification for Owenriff PAA water bodies.

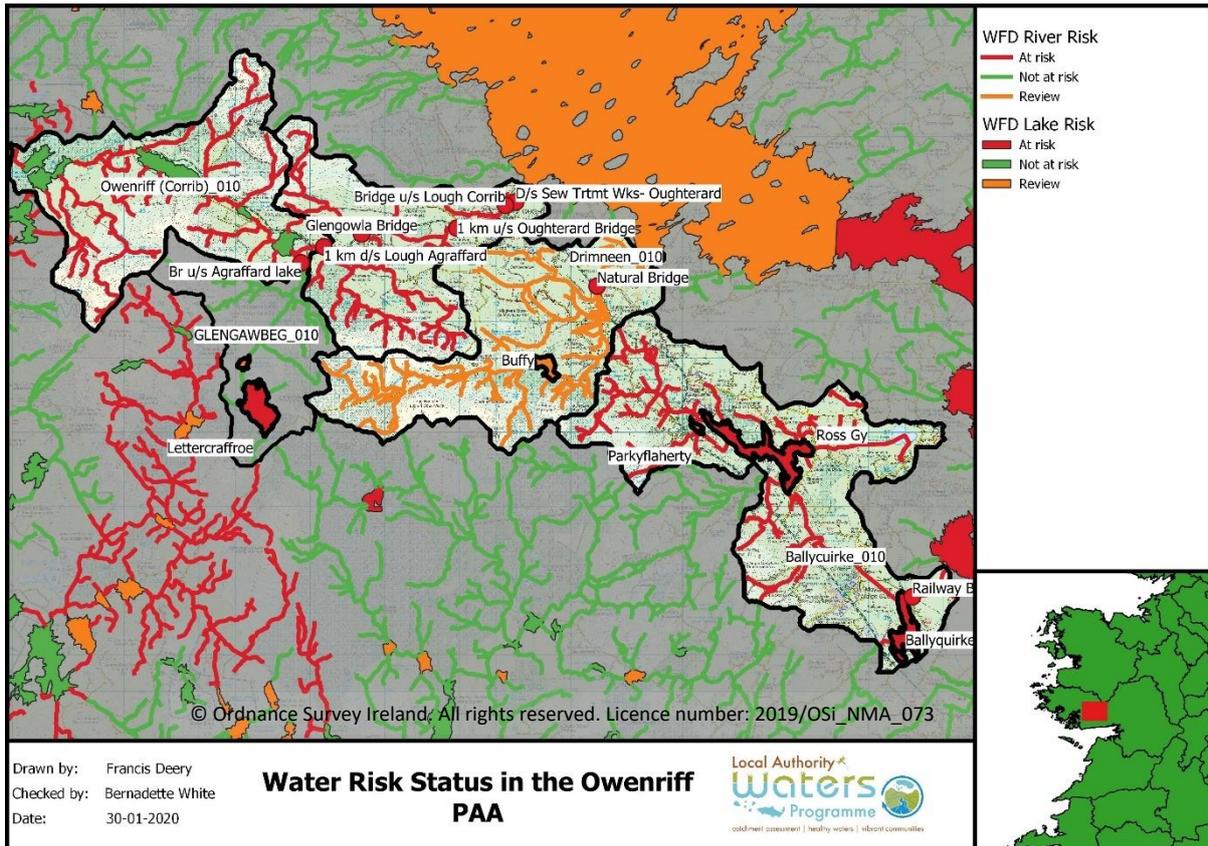


Figure 1: Water Risk Status in the Owenriff PAA

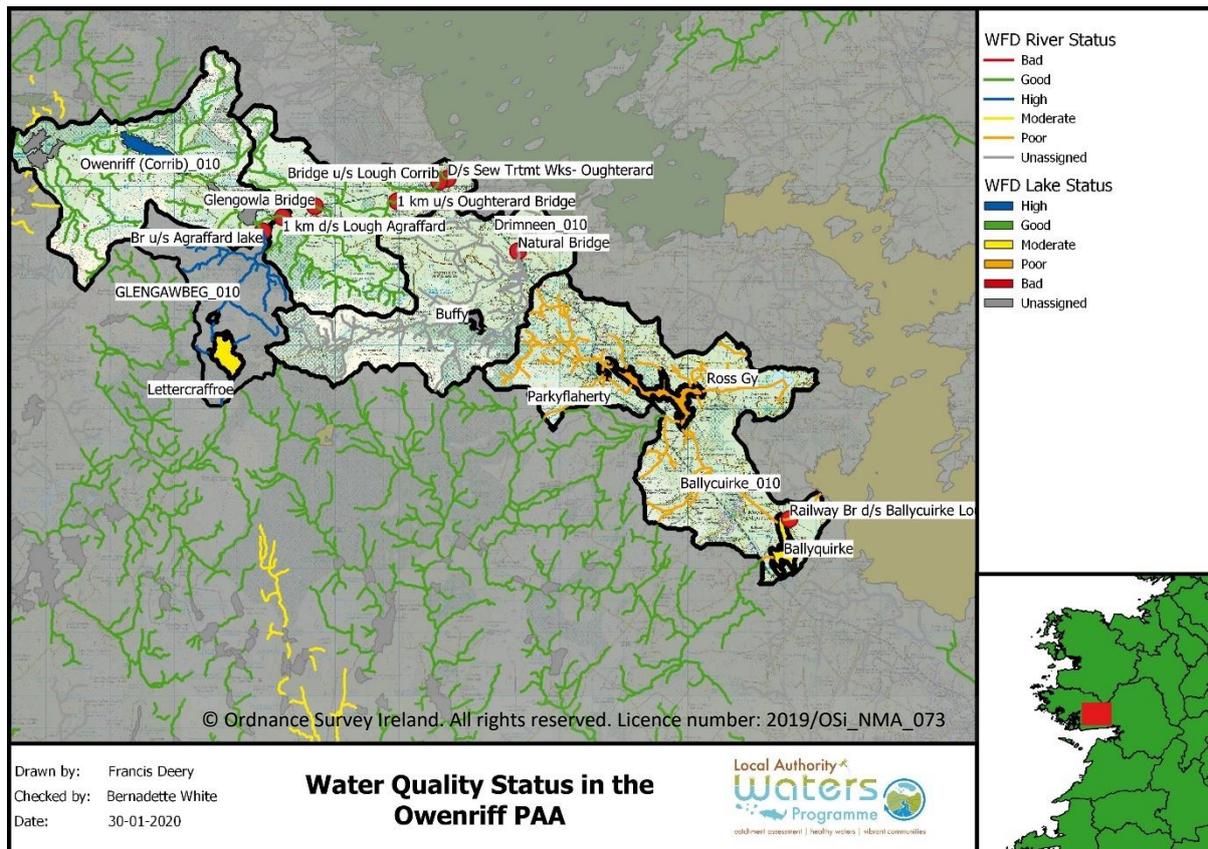


Figure 2: Water Quality Status in the Owenriff PAA

1.3 Information source consulted

- IFI (2017) Fish Stock Survey of Selected Lakes and River Sites in the Owenriff Catchment. National Research Survey Programme. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.
- IFI (2018) Owenriff Fish Population Rehabilitation Plan. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.
- IFI (2019) Fish stock survey of selected lakes and river sites in the Owenriff Catchment, 2018. National research survey programme, Inland Fisheries Ireland, 3044 lake drive, Citywest Business Campus, Dublin 24.
- Freshwater Pearl Mussel: Second draft – Owenriff Sub-Basin Management Plan. 2010.
- WFD web application – EPA characterisation data
- NPWS (2017) Conservation Objectives: Lough Corrib SAC 000297. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
- www.pearlmusselproject.ie
- www.cso.ie

Owenriff PAA Desktop Assessment

Table 1: Summary of Waterbodies in the OwenriffPAA

| WB_Name | WB Code | WB_Type ¹ | Risk ² | High status obj. ³ | Ecological Status ⁴ | | | | Pressure Category | Pressure Subcategory | Sig. Pressure | LCA ⁵ |
|-----------------|-----------------|----------------------|-------------------|-------------------------------|--------------------------------|-------------|-------------|-------------|---------------------|------------------------------------|---------------|------------------|
| | | | | | 2007 - 2009 | 2010 - 2012 | 2010 - 2015 | 2013 - 2018 | | | | |
| Buffy | IE_WE_30_315 | LWB | Re | No | UA | UA | UA | Unknown | Abstractions | Water Supply | Yes | IA3 |
| | | | | | | | | | Water Treatment | Discharges | Yes | |
| | | | | | | | | | Forestry | Forestry | Yes | |
| Acogga | IE_WE_30_325 | LWB | Re | No | UA | UA | UA | Unknown | Forestry | Forestry | Yes | IA1 |
| ParkFlaherty | IE_WE_30_336 | LWB | Re | No | UA | UA | UA | Unknown | Agriculture | Agriculture | Yes | IA9 |
| | | | | | | | | | Forestry | Forestry | Yes | |
| Ballyquirke | IE_WE_30_340 | LWB | AR | No | MES | PES | MES | Bes | Urban Wastewater | Agglomeration PE of 2001 to 10,000 | Yes | IA1 |
| | | | | | | | | | Invasive Species | Invasive Species | | |
| Lettercraffroe | IE_WE_30_344 | LWB | AR | No | GES | GES | MES | GES | Forestry | Forestry | Yes | IA1 |
| Ross GY | IE_WE_30_345 | LWB | AR | No | MES | PES | PES | PES | Invasive Species | Invasive Species | Yes | IA1 |
| Ballycuirke_010 | IE_WE_30B140100 | RWB | AR | No | PES | PES | PES | MES | Urban Wastewater | Agglomeration PE of 2001 to 10,000 | Yes | IA1 |
| | | | | | | | | | Domestic Wastewater | WasteWater Discharge | | |
| | | | | | | | | | Hymo | Channelization | | |
| Drimneen_010 | IE_WE_30D030600 | RWB | Re | No | GES | UA | UA | GES | Extractive Industry | Peat harvesting | Yes | IA3 |
| | | | | | | | | | Forestry | Forestry | | |

Owenriff PAA Desktop Assessment

| WB_Name | WB Code | WB_Type ¹ | Risk ² | High status obj. ³ | Ecological Status ⁴ | | | | Pressure Category | Pressure Subcategory | Sig. Pressure | LCA ⁵ |
|----------------|-----------------|----------------------|-------------------|-------------------------------|--------------------------------|-------------|-------------|-------------|-------------------|----------------------|---------------|------------------|
| | | | | | 2007 - 2009 | 2010 - 2012 | 2010 - 2015 | 2013 - 2018 | | | | |
| Owenriff_010 | IE_WE_30O020070 | RWB | AR | Yes | HES | GES | GES | GES | Hymo | Channelization | Yes | IA8 |
| Owenriff_020 | IE_WE_30O020200 | RWB | AR | Yes | GES | GES | GES | BES | Hymo | Channelization | Yes | IA8 |
| Glengawbeg_010 | IE_WE_30G060100 | RWB | NAR | Yes | GES | GES | HES | GES | N/A | N/A | N/A | N/A |

2 Receptor Information and Assessment

2.1 Context and Setting

The PAA consists of four river water bodies and six lake bodies. The Owenriff_010 flows into Lough Bofin (**Figure 3**) from the townland of An Leim from the west and from the Letterfore on the east. Lough Bofin outflows into the Owenriff_010, and flows into Adrehid lough, which flows into the Owenriff_010 through the Quiet man bridge and into Lough Agraffard and flows out of the lough into Owenriff_010 again. It is at this point that Glengawbeg_010 flows into the Owenriff_010. The Glengawbeg_010 flows from the west to east from above Lettercraffroe lake and flows into Acogga lake, flows out of that lake and flows onto the Owenriff_010. The Owenriff_010 then flows into the Owenriff_020, which flows towards Oughterard adjacent to the N59, with numerous tributaries flowing into the main Owenriff_020 channel. The Owenriff_020 flows through Oughterard and then flows into Lough Corrib.

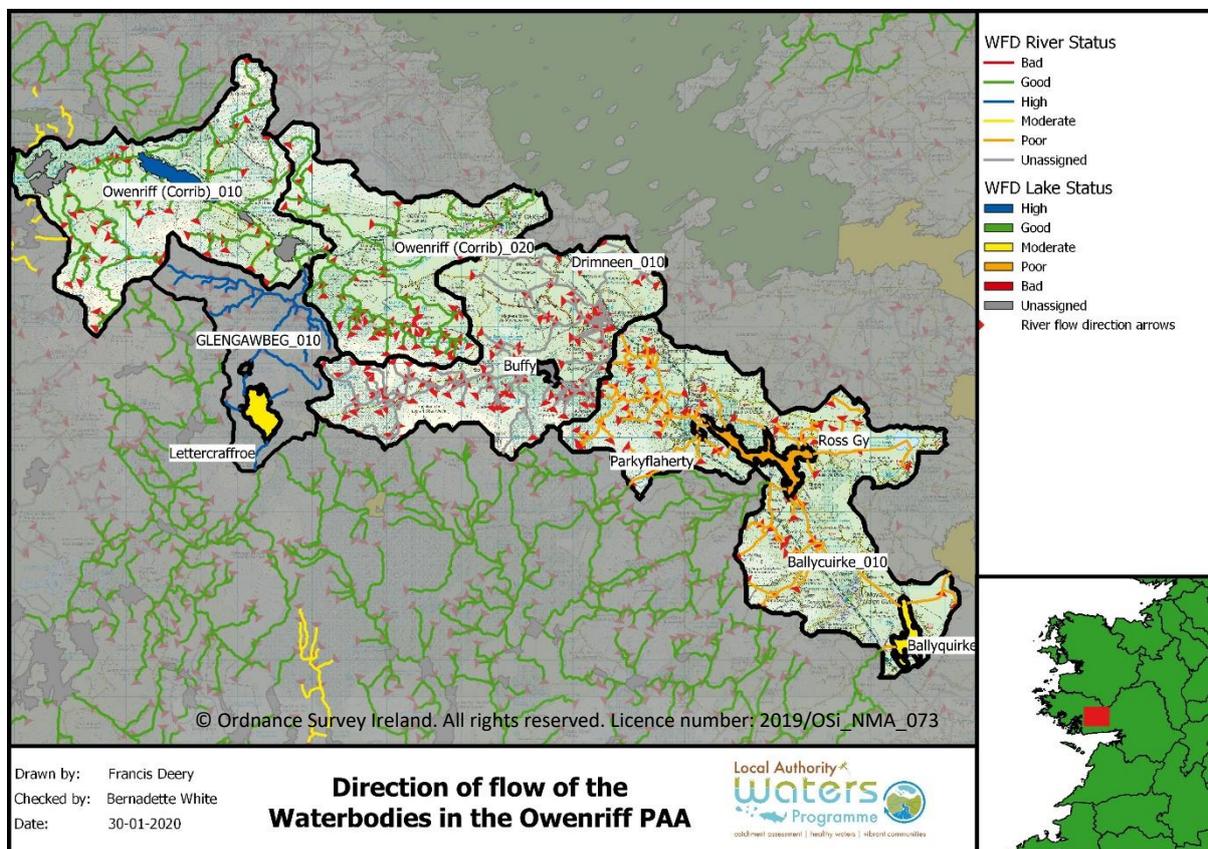


Figure 3: Direction of flow in the Owenriff PAA

The Drimneen_010 river water body rises in a forestry plantation in the west of the PAA, and flows through the townland of Luggakeeraun, and flows into Buffy lough, and flows out of the lough, flows past the Ross lake hotel, and flows on through agricultural land in the lower part of the river, under the N59 and flows out into Lough Corrib south – east of Oughterard

The Ballycurke_010 river water body is in the south of the Owenriff PAA. There are numerous tributaries leading into the main channel of the Ballycurke_010, it flows through Rosscahill, under the N59 and flows into Ross lake. There is another tributary coming from the west that flows into Parkyflaherty lake and flows out of that lake and into Ross lake. The river flows out of Ross lake and flows through numerous small lakes and continues on towards Moycullen. Beyond Moycullen it flows into Ballyquirke lake, and it exits the lake and finally flows into Lough Corrib south – east of Moycullen

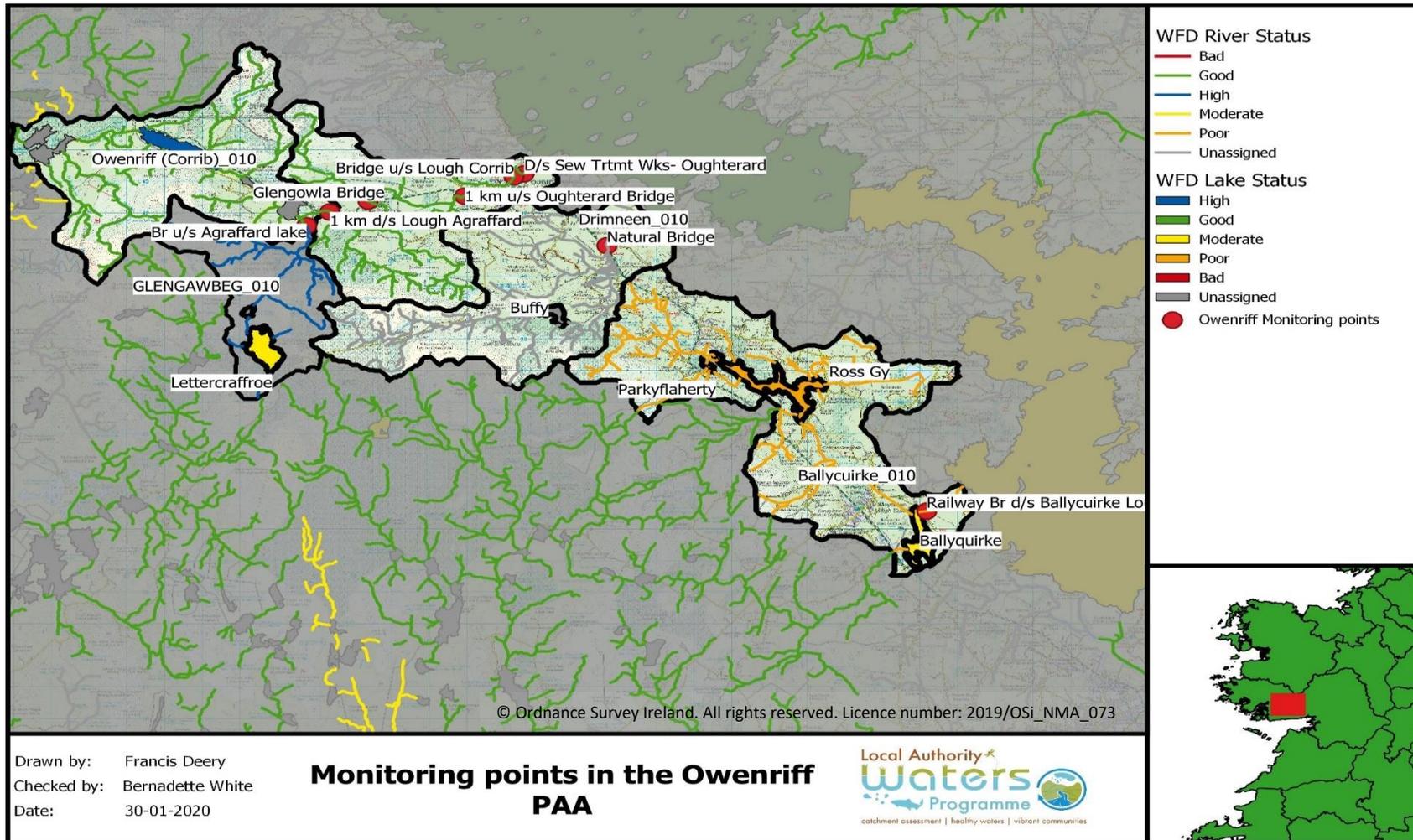


Figure 4: Monitoring points in the Owenriff PAA

2.2 Receptor Information

Table 2, Table 3 and Table 4 present water quality information for all the waterbodies in the Owenriff PAA, the status and trends of the quality elements monitored for the RWBs and LWBs and the significant issues that may be impacting on the water bodies.

The Owenriff_010 is being downgraded due to the hydro morphological pressures in the river, there are a number of attributes that are not at a high indicative status. These attributes include channel vegetation score, bank structure, bank vegetation and riparian vegetation. The bio is at high status, and there is no chemistry results at the EPA operational monitoring point.

The Owenriff_020 is being downgraded due to the fish status, which is at bad status, this fish status is due to mainly absence, lower than expected abundance or missing age classes of type specific indicator species (brown trout and salmon). There is also an issue with BOD at upstream and downstream of the WWTP. At the monitoring point “1km u/s of Oughterard Bridge” the BOD exceeded on the following dates, 17/10/2016 (1.9mg/l), 17/08/2017 (1.8mg/l), 18/01/2018 (2.1mg/l) and 6/6/2019 (1.4mg/l), see figure 4. At the monitoring point “bridge u/s of lough corrib” the BOD exceeds the surface water regulation on the following dates 6/09/2010 (1.7mg/l) and 5/09/2017 (2.6mg/l), see figure 5. These two monitoring points are upstream of the WWTP in Oughterard. While, the monitoring point downstream of the WWTP is having on going exceedances, the following dates had exceedances of BOD, 9/06/2016 (1.7mg/l), 6/09/2016 (1.8mg/l), 27/03/2017 (1.7mg/l), 8/05/2017 (1.6mg/l), 5/09/2017, (3.7mg/l) 2/07/2018, (2.3mg/l) 2/08/2018, (3.0mg/l) 4/09/2018, (3.5mg/l) 14/05/2019, (2.4mg/l) 01/08/2019 and (2.3mg/l) 14/10/2019. There are 4 EPA monitoring points on the Owenriff_020, two of these points are at high biological status and two are at good biological status. There are HYMO issues throughout the Owenriff_020 but are not an issue at the monitoring point in which the RHAT survey was carried out.

The Drimneen_010 was unassigned at the initial characterisation stage but as since been sampled in 2018, this sample returned a good biological status, giving this waterbody a good ecological status.

The Ballycurke_010 is downgraded due to the biological status of the waterbody, which is at moderate ecological status, which is monitored at the EPA monitoring point “Railway Br d/s Ballycurke Lough”, this is downstream of the Moycullen WWTP. The Moycullen wastewater treatment plant is a significant pressure on the Ballycurke_010. The monitoring point “Br u/s Ballycurke Lough” which is upstream of the Moycullen WWTP, there are exceedances in Ammonia in 2016 and 2018, there is also exceedances in BOD from June 2018 up to the present. The Monitoring point “Downstream Monitoring of TPEFF1200D0191SW001” which is downstream of the Moycullen WWTP, there is exceedances at this monitoring point for Ammonia (2013, 2016 & 2018) and Orthophosphate (2016 & 2018). Hydro – morphology is also a significant pressure on the Ballycurke_010, the Corrib – Clare arterial drainage scheme intersects this river.

Lettercraffroe lake is at good ecological status, at the time of initial characterisation it was at moderate ecological status, due to the moderate status of the phytobenthos but has moved up to good ecological status. Total Phosphorus, ammonia and chlorophyll are all below the EQS, however it is failing on the chemical status of the lake.

Owenriff PAA Desktop Assessment

Ross GY is at poor ecological status due to the status of the fish, total phosphorus, ammonia and chlorophyll are all below the EQS.

Ballyquirke lake is at bad ecological status due to the macrophytes, again total phosphorus, ammonia and chlorophyll are all below the EQS.

Acogga, Buffy and Parkyflaherty are all unassigned lakes in this PAA.

Owenriff PAA Desktop Assessment

Table 2: Outline of the Water Quality in the Owenriff_010, Owenriff_020 and Glengawbeg_010

| Waterbody | | Owenriff (Corrib)_010 | Owenriff (Corrib)_020 | | | | Glengawbeg_010 |
|--|------|---------------------------|--|---|---|------------------------------|------------------------------------|
| Risk Category | | At risk | At risk | | | | Not at Risk |
| Monitoring station | | 1 km d/s lough Agraiffard | 1 km u/s Oughterard Bridge RS300020100 | Bridge u/s Lough Corrib (& u/s of Sew Trtmt Wks – Oughterard) RS300020190 | D/s Sew Trtmt Wks- Oughterard RS300020200 | Glengowla Bridge RS30B080100 | Br U/S Agraiffard lake RS30G060100 |
| Monitoring station type | | Operational | Surveillance | Operational | Operational | Operational | Operational |
| Biological Status | | | | | | | |
| Q values | 2009 | 4-5 | 4-5 | 4 | | 4 | 4 |
| | 2010 | | | | | | |
| | 2011 | | | | | | |
| | 2012 | | | | | | 4 |
| | 2013 | | | | | | |
| | 2014 | | | | | | |
| | 2015 | 4-5 | 4-5 | 4 | 4 | 4 | 4 – 5 |
| | 2016 | | | | | | |
| | 2017 | | | | | | |
| 2018 | 4-5 | 4-5 | 4-5 | 4 | 4 | 4 | |
| Fish | | No data | Bad | | | | No data |
| WFD Objective | | High | High | | | | High |
| Water chemistry | | | | | | | |
| PO4+ Ecological Threshold 0.025(high status) | 2010 | | 0.015 | 0.011 | 0.019 | | No Data |
| | 2011 | | 0.011 | 0.015 | 0.016 | | |
| | 2012 | | 0.007 | 0.008 | 0.008 | | |

| Waterbody | | Owenriff (Corrib)_010 | Owenriff (Corrib)_020 | | | | Glengawbeg_010 |
|--------------------------|------|--------------------------|--|---|--|------------------------------|-----------------------------------|
| Risk Category | | At risk | At risk | | | | Not at Risk |
| Monitoring station | | 1 km d/s lough Agraftard | 1 km u/s Oughterard Bridge RS300020100 | Bridge u/s Lough Corrib (& u/s of Sew Trtmt Wks – Oughterard) RS300020190 | D/s Sew Trtmt Wks-Oughterard RS300020200 | Glengowla Bridge RS30B080100 | Br U/S Agraftard lake RS30G060100 |
| 0.035(good status) mgP/L | 2013 | | 0.009 | 0.010 | 0.006 | | |
| | 2014 | | 0.005 | 0.005 | 0.014 | | |
| | 2015 | | 0.005 | 0.005 | 0.007 | | |
| | 2016 | | 0.007 | 0.005 | 0.014 | | |
| | 2017 | | 0.005 | 0.005 | 0.011 | | |
| | 2018 | | 0.005 | 0.005 | 0.006 | | |
| Baseline PO4 | | | 0.008 | 0.008 | 0.011 | | |
| | 2010 | | 0.028 | 0.025 | 0.063 | | |
| | 2011 | | 0.022 | 0.015 | 0.026 | | |
| | 2012 | | 0.030 | 0.015 | 0.026 | | |
| NH4+ | 2013 | | 0.025 | 0.021 | 0.021 | | |
| | 2014 | | 0.037 | 0.015 | 0.044 | | |
| | 2015 | | 0.017 | 0.015 | 0.036 | | |
| Ecological Threshold | 2016 | | 0.035 | 0.021 | 0.038 | | |
| 0.065 | 2017 | | 0.029 | 0.024 | 0.063 | | |
| mgN/L | 2018 | | 0.036 | 0.024 | 0.052 | | |
| Baseline NH4 | | | 0.029 | 0.019 | 0.041 | | |
| | 2010 | | 0.20 | 0.20 | 0.20 | | |
| | 2011 | | 0.22 | 0.20 | 0.20 | | |
| | 2012 | | 0.20 | 0.20 | 0.20 | | |

Owenriff PAA Desktop Assessment

| Waterbody | | Owenriff (Corrib)_010 | Owenriff (Corrib)_020 | | | | Glengawbeg_010 |
|---|------|--|---|---|---|------------------------------|---|
| Risk Category | | At risk | At risk | | | | Not at Risk |
| Monitoring station | | 1 km d/s lough Agraiffard | 1 km u/s Oughterard Bridge RS300020100 | Bridge u/s Lough Corrib (& u/s of Sew Trtmt Wks – Oughterard) RS300020190 | D/s Sew Trtmt Wks- Oughterard RS300020200 | Glengowla Bridge RS30B080100 | Br U/S Agraiffard lake RS30G060100 |
| NO3- | 2013 | | 0.18 | 0.20 | 0.20 | | |
| | 2014 | | 0.10 | 0.10 | 0.13 | | |
| | 2015 | | 0.10 | 0.10 | 0.15 | | |
| Ecological Threshold | 2016 | | 0.11 | 0.10 | 0.12 | | |
| 3.5 | 2017 | | 0.10 | 0.10 | 0.17 | | |
| mgN/L | 2018 | | 0.10 | 0.10 | 0.10 | | |
| Baseline NO3 | | | 0.15 | 0.14 | 0.16 | | |
| Supporting Conditions: Chemical oxygenation and acidification conditions. | | No Data available | BOD exceeds the limits of the surface regulations in 2017, 2018, and 2019 once every year. As seen in figure 5. | There are BOD exceedances in 2010 and 2017, as seen in figure 6. | There are BOD exceedances from 2016 onwards at this monitoring point, see figure 7. | | No Data |
| Protected Area(s) | | Yes: Connemara Bog complex SAC and the Lough Corrib SAC. Margaritifera Sensitive area. Connemara Bod Complex Proposed Natural Heritage area. | Yes: Lough Corrib SAC Margaritifera Sensitive Area. | | | | Yes: Connemara Bog Complex SAC and the Connemara Bog Complex pNHA |

| Waterbody | Owenriff (Corrib)_010 | Owenriff (Corrib)_020 | | | | Glengawbeg_010 |
|-------------------------------|---|--|---|---|------------------------------|-----------------------------------|
| Risk Category | At risk | At risk | | | | Not at Risk |
| Monitoring station | 1 km d/s lough Agraftard | 1 km u/s Oughterard Bridge RS300020100 | Bridge u/s Lough Corrib (& u/s of Sew Trtmt Wks – Oughterard) RS300020190 | D/s Sew Trtmt Wks- Oughterard RS300020200 | Glengowla Bridge RS30B080100 | Br U/S Agraftard lake RS30G060100 |
| Hydromorphology | Yes - Arterial Drainage Scheme: Corrib; Sub scheme – Corrib – Headford (Minor scheme) Opw layers show benefitted lands and drainage channels on QGIS mapping. From viewing the Geohive historical maps there would appear to be new channels opened since the 1800s, leading into the lakes and the main channel of the Owenriff. | Yes - Arterial Drainage Scheme: Corrib; Sub scheme – Corrib – Headford and Corrib – Clare (Minor scheme) Opw layers show benefitted lands and drainage channels on GGIS mapping. From viewing the Geohive historical maps there would appear to be new channels opened since the 1800s, leading into the lakes and the main channel of the Owenriff. | | | | No |
| RHAT (2013-2015) | Yes (Good) – taken from WFD App. Channel Vegetation score – good Bank Structure left and right – good Bank Vegetation left and right – poor Riparian landcover left and right – moderate. | Yes (High) – taken from WFD App | None | None | None | No Data |
| Evidence of Arterial Drainage | Corrib – Headford Arterial Drainage Scheme. | Corrib – Headford and the Corrib – Clare Arterial Drainage Scheme | | | | No |

Owenriff PAA Desktop Assessment

| Waterbody | Owenriff (Corrib)_010 | Owenriff (Corrib)_020 | | | | Glengawbeg_010 |
|---|---|--|--|---|--|---|
| Risk Category | At risk | At risk | | | | Not at Risk |
| Monitoring station | 1 km d/s lough Agraftard | 1 km u/s Oughterard Bridge RS300020100 | Bridge u/s Lough Corrib (& u/s of Sew Trtmt Wks – Oughterard) RS300020190 | D/s Sew Trtmt Wks- Oughterard RS300020200 | Glengowla Bridge RS30B080100 | Br U/S Agraftard lake RS30G060100 |
| Conceptual model required (Y/N) | Yes | Yes | | | | Yes |
| Biological Status | High | High | High | Good | Good | Good |
| Overall Ecological Status (2013 – 2018) | Good | Bad | | | | Good |
| Comments | No chemistry data for the Owenriff_010, biology is high and has been since 2006. HYMO is the Status driver of this waterbody which is at good ecological status. The following categories in the RHAT assessment were deemed not high: -Channel Vegetation score – good -Bank Structure left and right – good -Bank Vegetation left and right – poor -Riparian landcover left and right – moderate. | Biology and chemistry indicators would suggest that this Monitoring point is at High ecological status. However, there are exceedances in BOD in 2017, 2018 and 2019. A RHAT survey was taken at this monitoring point, which resulted in a high RHAT score being produced. Fish is the status | This monitoring point has improved in 2018 from good in 2015 up to high in 2018. All the chemistry parameters are below the EQS for phosphate, ammonia and nitrates. However, there are exceedances in BOD. Fish is the status driver of this waterbody which at bad status. | This was a new monitoring point established in 2015 to monitor the effects of the Oughterard wastewater treatment plant, it was in good ecological status in 2015 and remains the same status in 2018. Fish is the status driver of this waterbody which at bad status. | This monitoring point is located outside Oughterard and is the first monitoring point on the Owenriff_020 after Owenriff_010, it monitors the upper reaches of the Owenriff_020 (Locally known as the Bunowen river). A biological assessment was carried out in 2015, which | At the time of the initial characterisation this waterbody was at high biological status, there it was determined high ecological status, however from a sample taken in 2018, it returned a good biological status, dropping the ecological status of this waterbody to good. It is included in this |

Owenriff PAA Desktop Assessment

| Waterbody | Owenriff (Corrib)_010 | Owenriff (Corrib)_020 | | | | Glengawbeg_010 |
|------------------------|---|---|---|---|--|--|
| Risk Category | At risk | At risk | | | | Not at Risk |
| Monitoring station | 1 km d/s lough Agraftard | 1 km u/s Oughterard Bridge RS300020100 | Bridge u/s Lough Corrib (& u/s of Sew Trtmt Wks – Oughterard) RS300020190 | D/s Sew Trtmt Wks- Oughterard RS300020200 | Glengowla Bridge RS30B080100 | Br U/S Agraftard lake RS30G060100 |
| | The site 300020070 on the OWENRIFF (CORRIB) river was sampled in 2015. A total of 23 invertebrate taxa were recorded. There were 2 sensitive mayfly and 1 sensitive stonefly found at the site. Sensitive taxa were found in high abundance, a feature most often associated with good and high-status sites. The results of an examination of key tolerant taxa found: Simuliidae (Few), Gammarus (Absent) and Baetis rhodani (Common). The Q value assigned to this site was 4-5, indicative of high conditions. the IFI surveyed this monitoring point in 2018 and returned a good fish status result. | driver of this waterbody which at bad status. | | | indicated that this site is in Good biological condition, there is no chemistry data for this site. It remains at good biological status after a biological sample was taken in 2018. Fish is the status driver of this waterbody which at bad status. | desktop assessment as it is the waterbody that links the Lettercraffroe and the Agraftard and flows into the Owenriff_010. |
| EPA Biologist comments | Continuing satisfactory with High and Good ecological quality along the length of the Owenriff in 2015, including at a new station downstream of the wastewater treatment plant in Oughterard. This is a continuation of the long-term | | | | | This river saw a deterioration to |

| Waterbody | Owenriff (Corrib)_010 | Owenriff (Corrib)_020 | | | | Glengawbeg_010 |
|-------------------------------------|--|---|---|--|------------------------------|---|
| Risk Category | At risk | At risk | | | | Not at Risk |
| Monitoring station | 1 km d/s lough Agraftard | 1 km u/s Oughterard Bridge RS300020100 | Bridge u/s Lough Corrib (& u/s of Sew Trtmt Wks – Oughterard) RS300020190 | D/s Sew Trtmt Wks-Oughterard RS300020200 | Glengowla Bridge RS30B080100 | Br U/S Agraftard lake RS30G060100 |
| | trend observed in this river, which is home to the freshwater pearl mussel <i>Margaritifera margaritifera</i> . As a Special Area of Conservation, the river catchment requires particularly careful management of land use to avoid siltation and eutrophication impacting <i>M. margaritifera</i> populations in this important river ecosystem. | | | | | Good ecological quality in 2018 after an improvement to High in 2015. |
| Significant issue: monitoring point | HYMO | Fish (Fish was monitored at 16 sites on the Owenriff_020, of these sites 3 sites were high, 3 were good, 5 sites were moderate, 4 sites were poor, and 1 site was bad, this exact EPA monitoring point was classed as bad fish status) BOD??? | BOD | BOD | Unknown | Unknown what is driving the biology status. |
| Significant issue: Waterbody | HYMO | Fish | | | | Unknown |

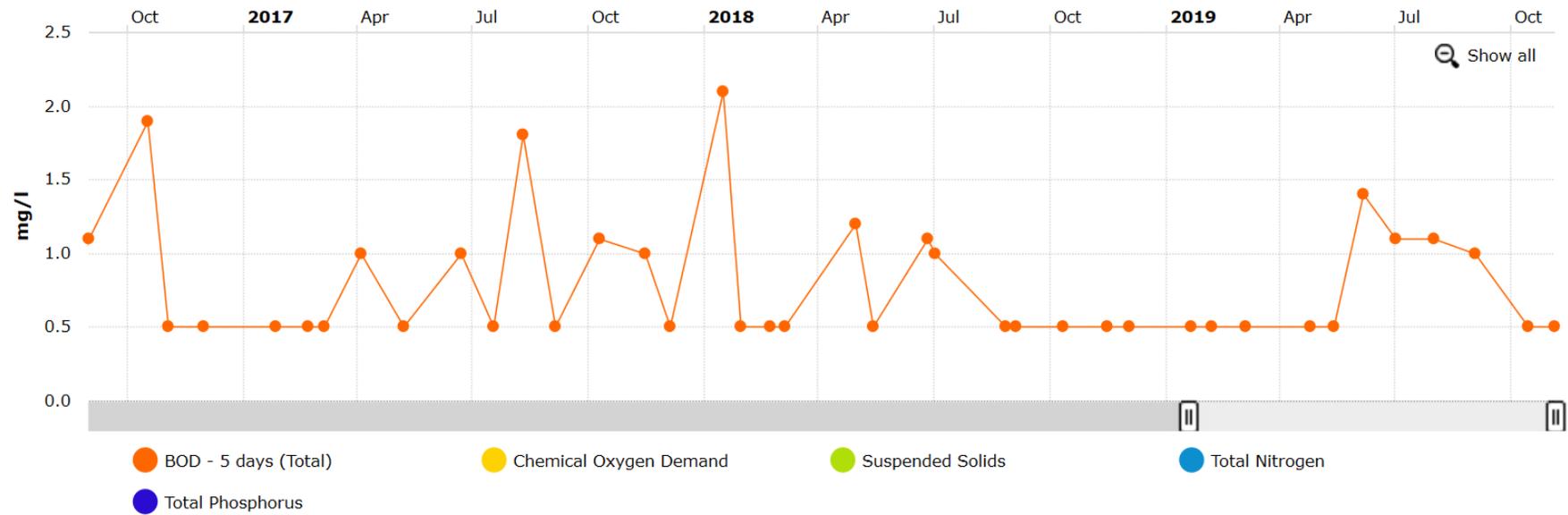


Figure 5: BOD at the Monitoring Point "1KM U/S of Oughterard Bridge"(High status <1.3 (mean) or <2.2 (95%ile)

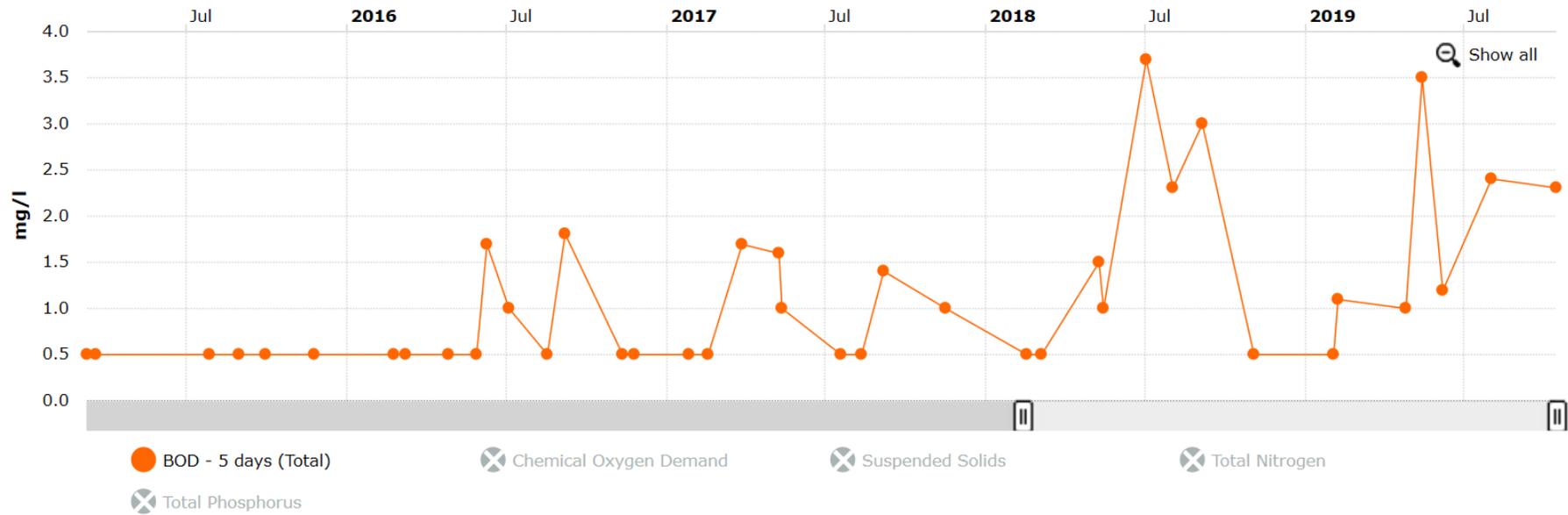


Figure 6: BOD graph of the Monitoring Point "Bridge U/S of Lough Corrib"

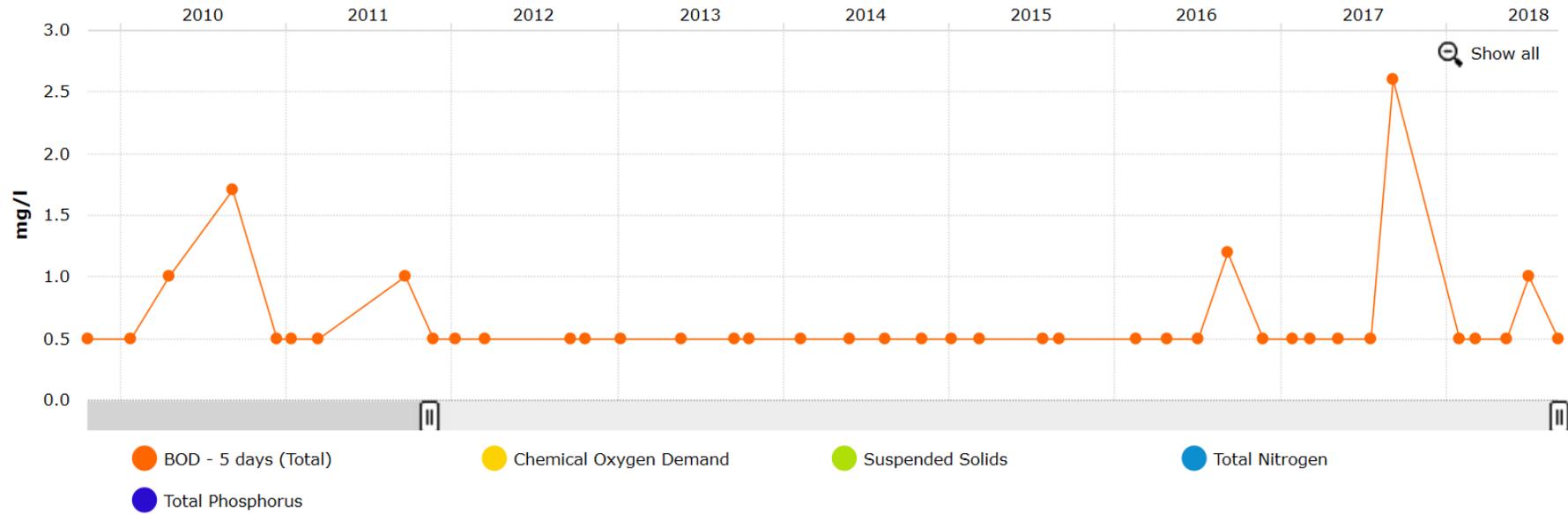


Figure 7: BOD graph at the Monitoring Point “D/S Sew Trtmt Wks – Oughterard”

Owenriff PAA Desktop Assessment

Table 3: Outline of the Water Quality in the Drimneen_010 and the Ballycurke_010

| Waterbody | | Drimneen_010 | Ballycurke_010 | | |
|--------------------------|------|-------------------------------|---|---|---|
| Risk Category | | Review | At risk | | |
| Monitoring station | | Natural Bridge RS30D030600 | Railway Br d/s Ballycurke Lough. Downstream of WWTP. RS30B140100 | Br u/s Ballycurke Lough – Upstream of Moycullen WWTP RS30B140050 | Downstream Monitoring of TPEFF1200D0191SW001 (Downstream of WWTP) RS30B140060 |
| Monitoring station type | | Operational | Operational | PreWfd | Investigative |
| Biological Status | | | | | |
| Q values | 2009 | Unassigned | 3 | | |
| | 2010 | | | | |
| | 2011 | | | | |
| | 2012 | Unassigned | 3 | | |
| | 2013 | | | | |
| | 2014 | | | | |
| | 2015 | Unassigned | 3 | | |
| | 2016 | | | | |
| | 2017 | | | | |
| | 2018 | 4 | 3 – 4 | | |
| Fish | | No Data | No Data | | |
| WFD Objective | | Good | Good | | |
| Water chemistry | | | | | |

Owenriff PAA Desktop Assessment

| Waterbody | | Drimneen_010 | Ballycurke_010 | | |
|---|------|-------------------------------|---|---|---|
| Risk Category | | Review | At risk | | |
| Monitoring station | | Natural Bridge RS30D030600 | Railway Br d/s Ballycurke Lough. Downstream of WWTP. RS30B140100 | Br u/s Ballycurke Lough – Upstream of Moycullen WWTP RS30B140050 | Downstream Monitoring of TPEFF1200D0191SW001 (Downstream of WWTP) RS30B140060 |
| Monitoring station | | | Railway Br d/s Ballycurke Lough | Br u/s Ballycurke Lough | Downstream Monitoring of TPEFF1200D0191SW001 |
| PO4+ Ecological Threshold 0.025 (high status) 0.035 (good status) mgP/L | 2010 | | 0.023 | | |
| | 2011 | | 0.024 | | |
| | 2012 | | 0.010 | | |
| | 2013 | | 0.006 | 0.005 | 0.092 |
| | 2014 | | 0.005 | 0.007 | 0.032 |
| | 2015 | | 0.005 | 0.012 | 0.020 |
| | 2016 | | 0.005 | 0.016 | 0.027 |
| | 2017 | | 0.005 | 0.010 | 0.017 |
| 2018 | | 0.005 | 0.008 | 0.036 | |
| Baseline PO4 | | | 0.010 | 0.010 | 0.038 |
| NH4+ Ecological Threshold 0.065 mgN/L | 2010 | | 0.039 | | |
| | 2011 | | 0.033 | | |
| | 2012 | | 0.015 | | |
| | 2013 | | 0.021 | 0.044 | 0.383 |
| | 2014 | | 0.031 | 0.035 | 0.057 |
| | 2015 | | 0.023 | 0.029 | 0.038 |

Owenriff PAA Desktop Assessment

| Waterbody | | Drimneen_010 | Ballycurirke_010 | | |
|--|-------------------|--|--|---|---|
| Risk Category | | Review | At risk | | |
| Monitoring station | | Natural Bridge RS30D030600 | Railway Br d/s Ballycurirke Lough. Downstream of WWTP. RS30B140100 | Br u/s Ballycurirke Lough – Upstream of Moycullen WWTP RS30B140050 | Downstream Monitoring of TPEFF1200D0191SW001 (Downstream of WWTP) RS30B140060 |
| | 2016 | | 0.032 | 0.073 | 0.094 |
| | 2017 | | 0.019 | 0.027 | 0.031 |
| | 2018 | | 0.022 | 0.084 | 0.083 |
| Baseline NH4 | | | 0.026 | 0.048 | 0.114 |
| NO3- Ecological Threshold 3.5 mgN/L | 2010 | | 0.25 | | |
| | 2011 | | 0.35 | | |
| | 2012 | | 0.20 | | |
| | 2013 | | 0.28 | | |
| | 2014 | | 0.23 | | |
| | 2015 | | 0.30 | | |
| | 2016 | | 0.32 | | |
| | 2017 | | 0.34 | | |
| | 2018 | | 0.20 | | |
| Baseline NO3 | | | 0.27 | | |
| Supporting Conditions: Chemical oxygenation conditions and acidification conditions | No Data available | There are exceedances in the BOD at this monitoring point in 2017, see figure 8. | There are spikes in the Total Nitrogen from July 2018 to June 2019. There are also exceedances in the BOD between the | There are spikes in the Total Nitrogen from July 2018 to June 2019. There are also exceedances in the BOD between the same | |

Owenriff PAA Desktop Assessment

| Waterbody | Drimneen_010 | Ballycurke_010 | | |
|-------------------------------|--|--|---|---|
| Risk Category | Review | At risk | | |
| Monitoring station | Natural Bridge RS30D030600 | Railway Br d/s Ballycurke Lough. Downstream of WWTP. RS30B140100 | Br u/s Ballycurke Lough – Upstream of Moycullen WWTP RS30B140050 | Downstream Monitoring of TPEFF1200D0191SW001 (Downstream of WWTP) RS30B140060 |
| | | | same period as the total nitrogen spikes. These two are correlated, see figure 9. | period as the total nitrogen spikes. These two are correlated, see figure 10. |
| Protected Area (s) | Yes: Lough Corrib SAC | Yes: Ross lake and woods SAC and the Lough Corrib SAC. Drimcong Wood, Ross Lake and Woods, and the Ballycurke Lough proposed NHA. | | |
| Hydromorphology | The Corrib – Headford arterial drainage scheme is in this waterbody. Aerial imagery from the Geohive historical maps would indicate that there are new drains opened since the 1800s that are leading into the main channel of the Drimneen_010. | The Corrib – Clare arterial drainage scheme is in this waterbody. Aerial imagery from the Geohive historical maps would indicate that there are new drains opened since the 1800s that are leading into the main channel of the Ballycurke_010 and the numerous lakes hydrologically linked to the Ballycurke_010. | | |
| RHAT Score | No Data | No Data | No Data | No Data |
| Evidence of Arterial Drainage | Arterial Drainage Scheme: Corrib; Sub | Yes - Arterial Drainage Scheme: Corrib; Sub scheme – Corrib – Clare (u/s and d/s of monitoring point) (Minor scheme). | | |

Owenriff PAA Desktop Assessment

| Waterbody | Drimneen_010 | Ballycurke_010 | | |
|------------------------------------|---|---|---|---|
| Risk Category | Review | At risk | | |
| Monitoring station | Natural Bridge RS30D030600 | Railway Br d/s Ballycurke Lough. Downstream of WWTP. RS30B140100 | Br u/s Ballycurke Lough – Upstream of Moycullen WWTP RS30B140050 | Downstream Monitoring of TPEFF1200D0191SW001 (Downstream of WWTP) RS30B140060 |
| | scheme – Corrib – Headford and Corrib – Clare (Minor scheme). | | | |
| Conceptual model required (Y/N) | Yes | Yes | | |
| Biological Status (2018) | Good | Moderate | No Data | No Data |
| Overall Ecological Status | Good | Moderate | | |
| Comments | This waterbody was unassigned and determined to be <i>At review</i> stage, during the initial characterisation stage. However, a sample value assessment was undertaken in 2018, and achieved good biological status. There is an OPW drainage scheme | In relation to chemistry data, Phosphate and Ammonia is below the ecological threshold, and is not statistically significant. The BOD has exceeded the EQS limits in 2017 and 2018. The biological conditions of the site are moderate. There are OPW arterial drainage schemes in this waterbody and various | Ammonia has exceeded the EQS threshold in 2016 and 2018 although the trend is currently not environmentally or statistically significant. There are also exceedances in BOD and Total phosphorus. | Ammonia and phosphate have exceeded the EQS for several years including in 2018, also total nitrogen has been seen to be high from July 2018 until December 2018, and also on a number of occasions in the years previous to that, see figure 10. |

Owenriff PAA Desktop Assessment

| Waterbody | Drimneen_010 | Ballycurke_010 | | |
|-------------------------------------|---|--|---|---|
| Risk Category | Review | At risk | | |
| Monitoring station | Natural Bridge RS30D030600 | Railway Br d/s Ballycurke Lough. Downstream of WWTP. RS30B140100 | Br u/s Ballycurke Lough – Upstream of Moycullen WWTP RS30B140050 | Downstream Monitoring of TPEFF1200D0191SW001 (Downstream of WWTP) RS30B140060 |
| | through the lower half of this waterbody, also there are several drains leading into the waterbody. There is no chemistry data for this waterbody. | | | |
| EPA Biologists Comments | Satisfactory conditions were recorded in August 2018. | The outflow from Ballycurke was again at unsatisfactory ecological conditions, despite a slight improvement from Poor to Moderate quality. | | |
| Significant issue: monitoring point | N/A. Monitoring point achieving good status and meeting its environmental objective. | HYMO, Nutrients | BOD, Total Phosphorus, Ammonia | BOD, Total Phosphorus, Ammonia |
| Significant issue: Waterbody | N/A | HYMO and nutrients (BOD, Total Phosphorus, Ammonia) are the significant issues affecting this waterbody. | | |

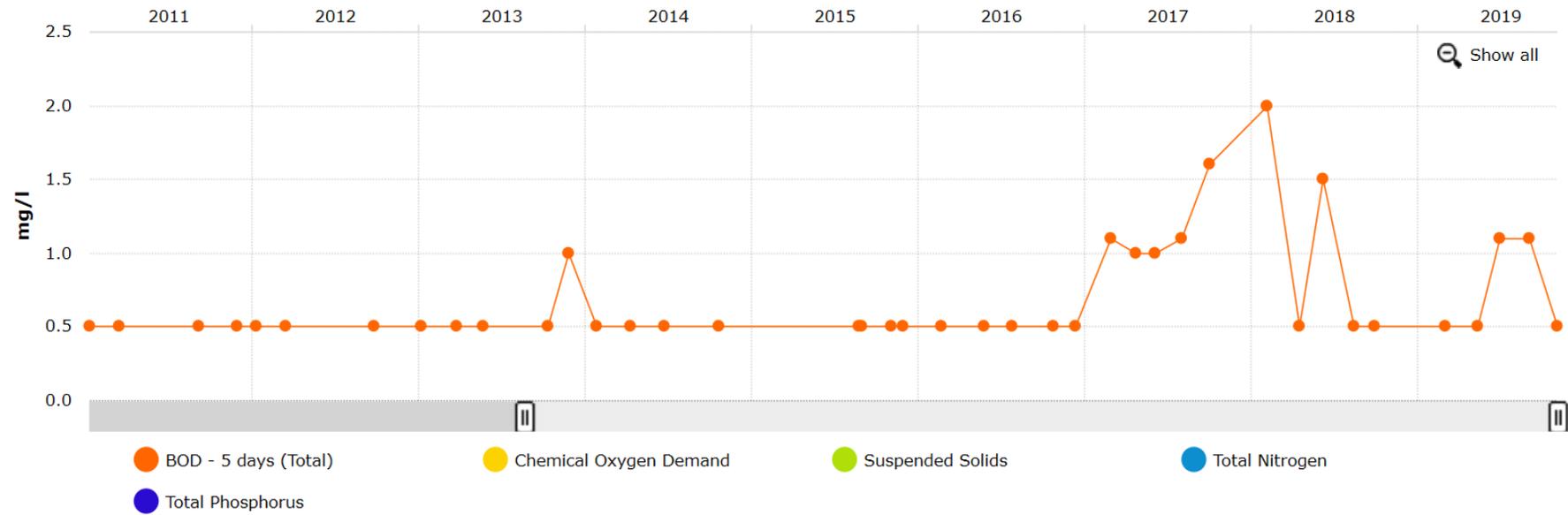


Figure 8: BOD graph for the Monitoring Point "Railway Br D/S of Ballyquirke Lough"

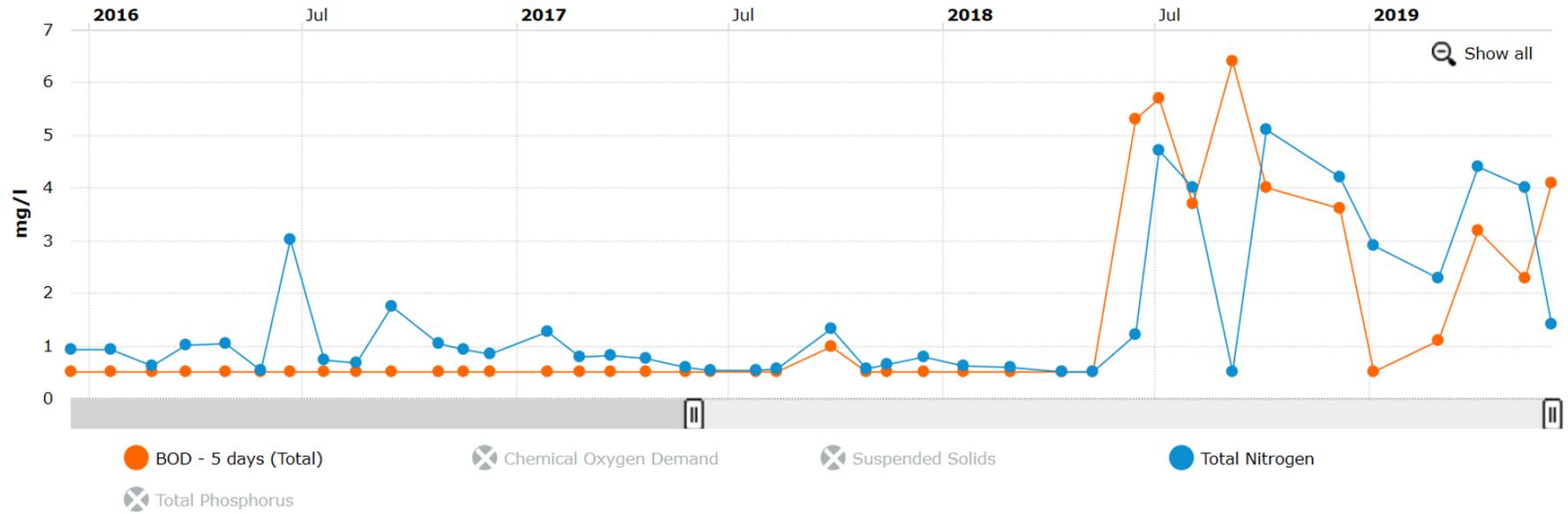


Figure 9: BOD and Total Nitrogen graph from the Monitoring Point “Br U/S Ballycurke Lough” (Upstream of the Moycullen WWTP)

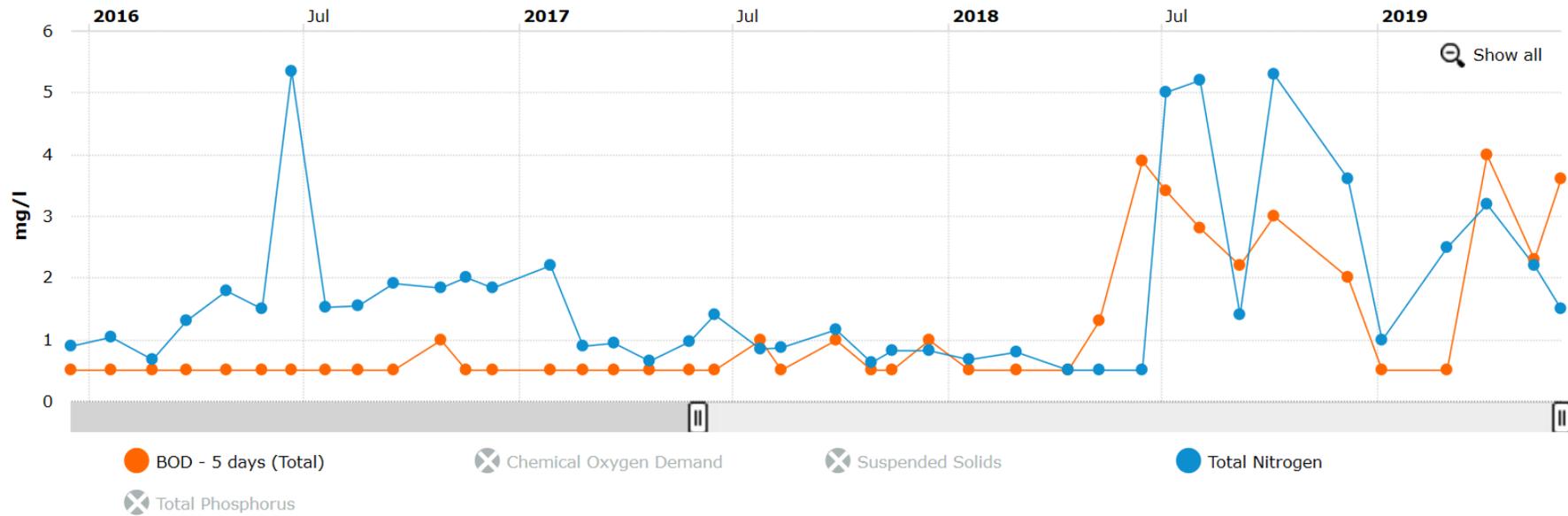


Figure 10: BOD and Total Nitrogen graph from the Monitoring Point "Downstream Monitoring of TPEFF1200D0191SW001"(downstream of the Moycullen WWTP)

Owenriff PAA Desktop Assessment

Table 4: Receptor Information Lettercraffroe, Ross GY, Ballyquirke, Acogga, Buffy lough and Parkyflaherty

| Waterbody | | Lettercraffroe | Ross GY | Ballyquirke | Acogga | Buffy Lough | Parkyflaherty |
|-------------------------|------|-------------------------|---------------------------------|------------------------|---------------------------------|---------------------------------|---------------------------------|
| Risk Category | | <i>At Risk</i> | <i>At Risk</i> | <i>At Risk</i> | <i>Review</i> | <i>Review</i> | <i>Review</i> |
| Monitoring station | | 4 sites | 2 sites | 2 sites | No monitoring points at present | No monitoring points at present | No monitoring points at present |
| Monitoring station type | | | | | | | |
| Lake Type | | 2 | 10 | 6 | 2 | 2 | 10 |
| Biological Status | | | | | | | |
| Lake Status Assessment | 2009 | Good | Moderate (Fish and Macrophytes) | Moderate (Macrophytes) | Unassigned | Unassigned | Unassigned |
| | 2010 | | | | | | |
| | 2011 | | | | | | |
| | 2012 | Good | Poor (Fish) | Poor (Macrophytes) | Unassigned | Unassigned | Unassigned |
| | 2013 | | | | | | |
| | 2014 | | | | | | |
| | 2015 | Moderate (Phytobenthos) | Poor (Fish) | Moderate (Macrophytes) | Unassigned | Unassigned | Unassigned |
| | 2016 | | | | | | |
| | 2017 | | | | | | |
| 2018 | Good | Poor (Fish) | Bad (Macrophytes) | Unassigned | Unassigned | Unassigned | |
| Fish | | Good | Poor | No Data | No Data | No Data | No Data |
| WFD Objective | | Good | Good | Good | Good | Good | Good |
| Monitoring station | | | | | | | |
| | 2010 | 0.012 | 0.007 | 0.018 | No Data | No Data | No Data |

Owenriff PAA Desktop Assessment

| Waterbody | | Lettercraffroe | Ross GY | Ballyquirke | Acogga | Buffy Lough | Parkyflaherty |
|--|------|----------------|----------------|----------------|---------------------------------|---------------------------------|---------------------------------|
| Risk Category | | <i>At Risk</i> | <i>At Risk</i> | <i>At Risk</i> | <i>Review</i> | <i>Review</i> | <i>Review</i> |
| Monitoring station | | 4 sites | 2 sites | 2 sites | No monitoring points at present | No monitoring points at present | No monitoring points at present |
| TP for Lakes | 2011 | 0.011 | 0.006 | 0.009 | | | |
| | 2012 | 0.011 | 0.015 | 0.020 | | | |
| | 2013 | 0.015 | 0.007 | 0.013 | | | |
| | 2014 | 0.015 | 0.007 | 0.009 | | | |
| | 2015 | 0.013 | 0.007 | 0.015 | | | |
| Lake ecological threshold High Status - <0.010 mg/l Good Status - <0.025mg/l | 2016 | 0.012 | 0.011 | 0.015 | | | |
| | 2017 | 0.016 | 0.011 | 0.017 | | | |
| | 2018 | 0.008 | 0.011 | 0.012 | | | |
| Baseline PO4 | | 0.012 | 0.009 | 0.014 | | | |
| NH4+ | 2010 | 0.015 | 0.031 | 0.034 | No Data | No Data | No Data |
| | 2011 | 0.015 | 0.019 | 0.025 | | | |
| | 2012 | 0.015 | 0.028 | 0.019 | | | |
| | 2013 | 0.016 | 0.032 | 0.029 | | | |
| | 2014 | 0.013 | 0.026 | 0.024 | | | |
| | 2015 | 0.010 | 0.024 | 0.013 | | | |
| | 2016 | 0.010 | 0.032 | 0.026 | | | |
| | 2017 | 0.010 | 0.031 | 0.026 | | | |

Owenriff PAA Desktop Assessment

| Waterbody | | Lettercraffroe | Ross GY | Ballyquirke | Acogga | Buffy Lough | Parkylaherty |
|---|------|--|--|--|--|----------------------------------|---|
| Risk Category | | <i>At Risk</i> | <i>At Risk</i> | <i>At Risk</i> | <i>Review</i> | <i>Review</i> | <i>Review</i> |
| Monitoring station | | 4 sites | 2 sites | 2 sites | No monitoring points at present | No monitoring points at present | No monitoring points at present |
| Ecological Threshold 0.065mgN/L | 2018 | 0.018 | 0.029 | 0.038 | | | |
| Baseline NH4 | | 0.013 | 0.028 | 0.026 | | | |
| Chlorophyll for lakes Micrograms per litre | 2010 | 8.996 | 2.417 | 7.150 | No Data | No Data | No Data |
| | 2011 | 8.000 | 2.350 | 2.200 | | | |
| | 2012 | 7.163 | 4.200 | 2.500 | | | |
| | 2013 | 7.665 | 3.492 | 3.100 | | | |
| | 2014 | 8.563 | 3.140 | 2.320 | | | |
| | 2015 | 9.175 | 1.850 | 1.733 | | | |
| Ecological Threshold Chlorophyll – 9 mg/l | 2016 | 5.768 | 1.671 | 2.233 | | | |
| | 2017 | 7.875 | 2.800 | 1.900 | | | |
| | 2018 | 5.283 | 2.175 | 2.450 | | | |
| Chlorophyll | | 7.609 | 2.677222 | 2.842889 | | | |
| Supporting conditions: | | Chemical status is failing for this waterbody. | Chemical status is failing for this waterbody. | No Data | No Data | No Data | No Data |
| Protected Areas | | Yes: Connemara Bog Complex | Yes: Ross Woods and Lake SAC and the Ross Woods and Lake Proposed NHA. | Yes: Lough Corrib SAC and the Ballyquirke Lough proposed NHA | Yes: Connemara Bog Complex and the Connemara Bog Complex proposed NHA. | Yes: Oughterard District Bog NHA | Yes: Ross lake and Woods SAC and the Ross lake and Woods proposed NHA |

Owenriff PAA Desktop Assessment

| Waterbody | Lettercraffroe | Ross GY | Ballyquirke | Acogga | Buffy Lough | Parkylaherty |
|-------------------------------|---|---|---|---|--|---|
| Risk Category | <i>At Risk</i> | <i>At Risk</i> | <i>At Risk</i> | <i>Review</i> | <i>Review</i> | <i>Review</i> |
| Monitoring station | 4 sites | 2 sites | 2 sites | No monitoring points at present | No monitoring points at present | No monitoring points at present |
| HYMO | Yes: From viewing the Geohive maps there would appear to be new channels leading into the lake. These channels were not there in the 1800s. | Yes: From viewing the Geohive maps there would appear to be new channels leading into the lake. These channels were not there in the 1800s. and the Corrib – Clare drainage scheme is located around this lake. | Yes: The Corrib – Clare drainage scheme is present in the Ballycuirke_010 waterbody which is the inflowing and outflowing waterbody from this lake. | There is no HYMO related pressures in the vicinity of the Lake. | The Oughterard water treatment plant sources the water from Buffy Lough. | Yes: The Corrib – Clare drainage scheme is present in the Ballycuirke_010 waterbody which is the inflowing and outflowing waterbody from this lake. |
| Lake MiMAS | Good | Good | Good | Unassigned | Unassigned | Unassigned |
| Evidence of Arterial Drainage | No scheme is present in or around this lake waterbody but there is evidence of drainage in the form of new channels opened since the 1800s. | Yes: The Corrib – Clare Drainage scheme is present in the vicinity of this waterbody. the Ballycuirke_010 river is the inflow and outflow of this lake and has been heavily modified over the years due to arterial drainage. | Yes: the Corrib – Clare is present in the Ballycuirke_010 river waterbody. | No scheme is present in the vicinity of the lake. | No scheme is present in the vicinity of the lake. | Yes: The Corrib – Clare Drainage scheme is present in the vicinity of this waterbody. the Ballycuirke_010 river is the inflow and outflow of this lake and has been heavily modified over |

Owenriff PAA Desktop Assessment

| Waterbody | Lettercraffroe | Ross GY | Ballyquirke | Acogga | Buffy Lough | Parkylaherty |
|---|---|---|--|--|--|--|
| Risk Category | <i>At Risk</i> | <i>At Risk</i> | <i>At Risk</i> | <i>Review</i> | <i>Review</i> | <i>Review</i> |
| Monitoring station | 4 sites | 2 sites | 2 sites | No monitoring points at present | No monitoring points at present | No monitoring points at present |
| | | | | | | the years due to arterial drainage. |
| Conceptual Model | Yes | Yes | Yes | Yes | Yes | |
| Biological Status | Good | Poor | Bad | Unassigned | Unassigned | Unassigned |
| Overall Ecological Status (2013 – 2018) | Good | Poor | Bad | Unassigned | Unassigned | Unassigned |
| Comments | At the time of the initial characterisation for the river basin management plan 2018 – 2021, this lake was a moderate ecological status due to phytobenthos, however in 2018 the phytobenthos were seen to have come back to good status therefore the lake has returned to good ecological status, which is its WFD objective status. Fish are also achieving good status; however, this waterbody is failing on chemistry status. | The status driver of this waterbody is fish, which is at poor status. There was no Salmon or Trout captured in a survey of the lake by the IFI in 2016. The chemical status of the waterbody is failing also. | At the time of the initial characterisation for the river basin management plan, Ballyquirke Lake was at moderate ecological status due to the macrophytes. In 2018, Ballyquirke lake was deemed to be at bad ecological | This lake waterbody is unassigned and the LCA will determine the status of the lake. | This lake waterbody is unassigned and the LCA will determine the status of the lake. | This lake waterbody is unassigned and the LCA will determine the status of the lake. |

Owenriff PAA Desktop Assessment

| Waterbody | Lettercraffroe | Ross GY | Ballyquirke | Acogga | Buffy Lough | Parkylaherty |
|-------------------------------------|--|----------------|---|---------------------------------|---------------------------------|---------------------------------|
| Risk Category | <i>At Risk</i> | <i>At Risk</i> | <i>At Risk</i> | <i>Review</i> | <i>Review</i> | <i>Review</i> |
| Monitoring station | 4 sites | 2 sites | 2 sites | No monitoring points at present | No monitoring points at present | No monitoring points at present |
| | | | status also due to the macrophyte component. | | | |
| EPA Biologists Comments | No Comments | No comment | No comments | No Comments | No Comments | No Comments |
| Significant issue: monitoring point | None at present | Fish | Macrophytes | Unknown | Unknown | Unknown |
| Significant issue: Waterbody | None at present. Issues associated with forestry or windfarm development are a potential risk to maintenance of good status in the absence of adequate environmental protection. | Fish | Zebra mussels BOD Ammonia Total Nitrogen | Unknown | Unknown | Unknown |

2.3 Conclusions

- The Owenriff_010 is a high-status objective river waterbody. The Owenriff_010 contain the EPA operational monitoring point 1km D/S of lough Agraffard. At this monitoring point the ecological status of the waterbody is determined. Currently the hydromorphological assessment has produced a good status for this waterbody, the biological assessment is achieving a Q4 – 5. There is no chemistry data for this waterbody. The main pressure in this waterbody is hydromorphology from channelisation, which changing the hydrological and morphological dynamics of the river. Based on the individual RHAT elements assessed by the EPA, it is difficult to identify a significant hydromorphological pressure. The results of the EPA morphological assessment is awaited to assist with the assessment of this waterbody.
- The Owenriff_020 is also a high-status objective river waterbody. The Owenriff_020 has four EPA operational monitoring points which are 1km U/S Oughterard Bridge (Q4 – 5), Bridge U/S Lough Corrib (Q4 – 5), D/S Sew Trtmt Wks – Oughterard (Q4) and the Glengowla Br (Q4). Water chemistry data for ammonia, phosphate and nitrates are all below the EQS, however the BOD has spiked on numerous occasions at the monitoring points 1km U/S of Oughterard bridge, Br U/S of Lough Corrib and the at the site D/S Sew Trtmt Wks – Oughterard. The Owenriff_020 is currently at bad ecological status due to fish status. The main pressure impacting upon the Owenriff_020 is hydro morphology.
- The Drimneen_010 is a river waterbody in the Owenriff PAA, it is a good status objective waterbody. The Drimneen_010 contains the EPA operational monitoring point Natural Bridge. Status is determined by macroinvertebrates (Q value) at this monitoring point for this water body. It is currently at good status (Q4) based on a survey undertaken in 2018. At the time of the initial characterisation, this waterbody was unassigned and hadn't been assessed since 2009. There is no chemistry data for the Drimneen_010. The significant pressures determined at initial characterisation were forestry and peat extraction.
- Ballycuirke_010 is a good status objective waterbody. There are three EPA monitoring sites within this river water body. The EPA operational monitoring point at Railway Br d/s of Ballycuirke lough, drives the ecological status for the waterbody, which is assessed using macroinvertebrates (Q value). The current ecological status of the Ballycuirke_010 is moderate ecological status. The two other monitoring points are the Bridge u/s Ballycuirke Lough and the site called 'Downstream Monitoring of TPEFF1200D0191SW001'. These monitoring points have had elevated phosphate and ammonium. Ammonia spiked at the Br u/s Ballycuirke Lough in 2016 and 2018, while phosphate and ammonia spiked in 2013, 2016 and 2018 at the site called 'Downstream monitoring of TPEFF1200D0191SW001'. Total Nitrogen and BOD has also spiked at these monitoring points in 2018 and 2019, (*WFD App*) The significant pressures identified at initial characterisation were DWWTS, Urban Wastewater and hydromorphology.
- Lettercraffroe lake is a good status objective waterbody. At the time of the initial characterisation, Lettercraffroe was at moderate ecological status, as determined by the phytobenthos monitoring element. The lake was sampled again in 2018 and was deemed to be at good ecological status. The total phosphorus, ammonia and chlorophyll are all below the EQS thresholds. The lake failed chemical status. The significant pressure identified at initial characterisation was forestry. The inputting and receiving waterbody are the Glengawbeg_010 which is at good ecological status.
- Ross GY lake (Galway) is a good status objective waterbody. The lake is at poor ecological due to the fish component. Chemical surface water conditions are failing in the lake. total phosphorus, ammonia and chlorophyll is all below the EQS. The significant pressure noted at

initial characterisation was invasive species. The inputting and receiving waterbody is the Ballycurke_010 which is at moderate ecological status.

- Ballycurke lough is a good status objective waterbody. The lake is currently achieving bad ecological status due to the macrophytes based on assessments between 2013 and 2018. General physico-chemical parameters are all below EQS thresholds. The significant pressures at initial characterisation were urban wastewater (Moycullen) and invasive species. The inputting and receiving waterbody is the Ballycurke_010 which is at moderate ecological status.
- Acogga lake is currently unassigned and *At Review* in terms of risk category. The LCA will determine if this waterbody is impacted or not. There is one significant pressure identified at initial characterisation stage which was forestry. The Glengawbeg_010 is the inputting and receiving waterbody and is currently achieving good ecological status.
- Buffy lake is currently unassigned and *At Review* in terms of risk category. The LCA will determine if this waterbody is impacted or not. Three significant pressures were identified at initial characterisation stage which are abstractions, water treatment discharges and forestry. The Drimneen_010 is the inputting and receiving waterbody and is currently achieving good ecological status.
- Parkyflaherty lake is currently unassigned and *At Review* in terms of risk category. The LCA will determine if this waterbody is impacted or not. Two significant pressures were identified during initial characterisation stage which were agriculture and forestry. The Ballycurke_010 is the inputting and receiving waterbody which is currently achieving moderate ecological status.
- The Glengawbeg_010 is a river waterbody, which is not in the Owenriff PAA, it is a high-status objective waterbody. It is included in this desktop assessment as it hydrologically links the two outlying lakes in the Owenriff PAA, Acogga and Lettercraffroe lakes. The Glengawbeg_010 contains the EPA monitoring point Bridge u/s Agraffard lake, and it is at this monitoring point which the ecological status of the river is determined, by the macroinvertebrate component. It is currently at good ecological status. There are no significant pressures identified in the WFD App for this waterbody as it was achieving its high-status objective at the time initial characterisation was undertaken.

3 Significant Pressures

3.1 Owenriff_010

3.1.1 Hydromorphology

Hydromorphology in the form of channelisation, is the significant pressure affecting the Owenriff_010 by changing the hydrological and morphological conditions of the river. The Corrib – Headford arterial drainage scheme is present in the Owenriff_010, which can be seen in **Figures 11** and **12**.

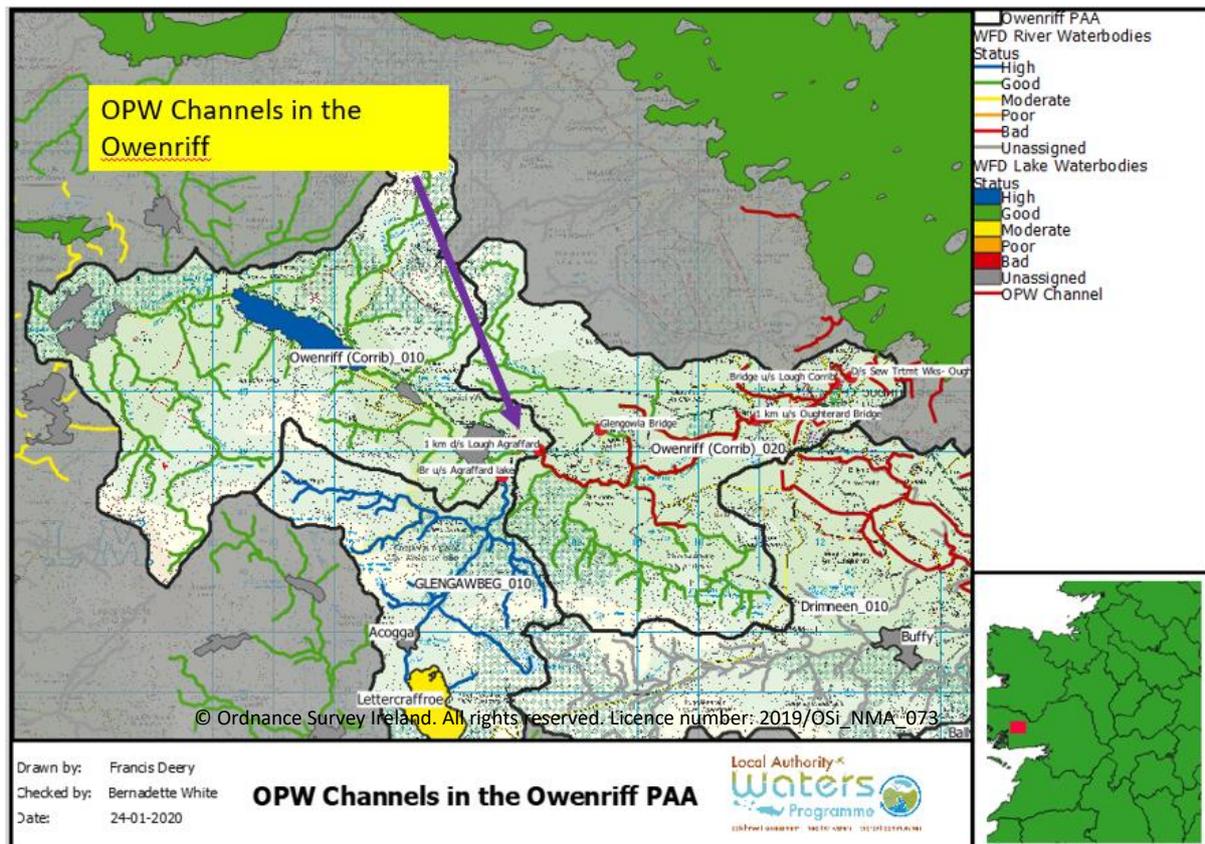


Figure 11: Corrib - Headford Drainage Scheme in the Owenriff_010

A RHAT survey from the EPA (see **Table 5** below) suggests that there is cattle access at the monitoring point and poaching around the banks which will need to be investigated during the LCA to identify if this pressures is locally significant or significant at the water body scale. The RHAT survey also identified poor bank vegetation and moderate riparian landcover. In an IFI report there is noted damage on the banks of several sections of the tributaries and the main channel of the Owenriff river itself, such as bank slippage and trampling caused by livestock having access to riverbanks. It is noted however that the Q value monitoring station within this water body consistently achieves a Q4-5 (see **Table 2**), therefore the pressures identified although not significant, may be affecting the potential of the site from achieving a Q5. The EPA have stated in the WFD App “Based on the individual RHAT elements, it is difficult to identify a significant hydromorphological pressure. The development of the EPA morphological assessment will help assess/address this.”

Table 5: RHAT Survey of the Owenriff_010 at the Monitoring Point 1 KM D/S of Lough Agraiffard

| Attribute | Indicative Status | Comments |
|--------------------------------------|-------------------|---|
| Channel Form Score | High | Looks good nice meander |
| Channel Vegetation Score | Good | Sparse but excepted dearth of WH |
| Channel Substrate Condition Score | High | Good, Slight Sediment |
| Channel Barriers to Continuity Score | High | |
| Bank Structure Left | Good | |
| Bank Structure Right | Good | Animal access, poaching, no tree layer |
| Bank Vegetation Left | Poor | Simple (grass) vegetation, horses grazing clumps of trees |
| Bank Vegetation Right | Poor | |
| Riparian Landcover Left | Moderate | RP u/s + d/s RHS + LHS |
| Riparian Landcover Right | Moderate | RP u/s + d/s RHS + LHS |
| Floodplain Connectivity Left | High | |
| Floodplain Connectivity Right | High | |

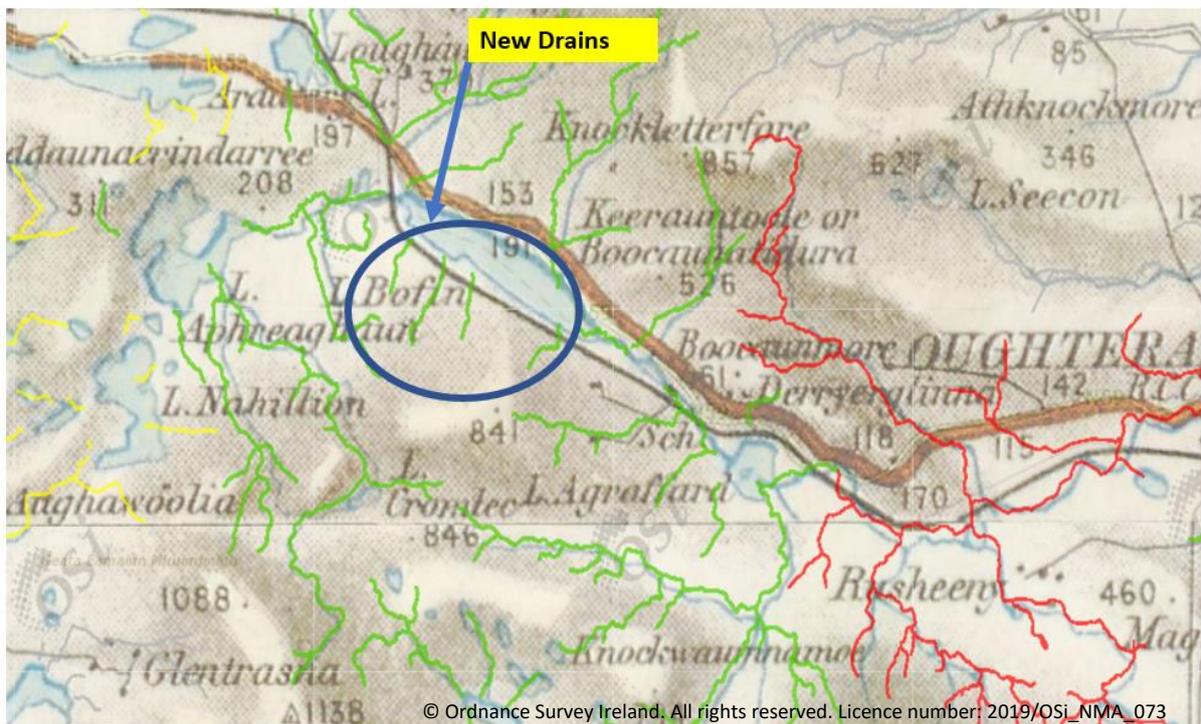


Figure 12: New Drains leading into Lough Bofin

3.1.2 Other Non – Significant Pressures

3.1.2.1 Peat Extraction

Peat is not listed as a pressure in the Owenriff_010, however there a number of areas of turf cutting located around the Agraffard lake which can be seen in **Figure 13**. Again, the water body is achieving a Q4-5 at the monitoring point, therefore this peat extraction area is likely only to be locally significant. The focus of the LCA will be to identify drains in this area and to assess the contributions they are making, if any, to Agraffard lake.

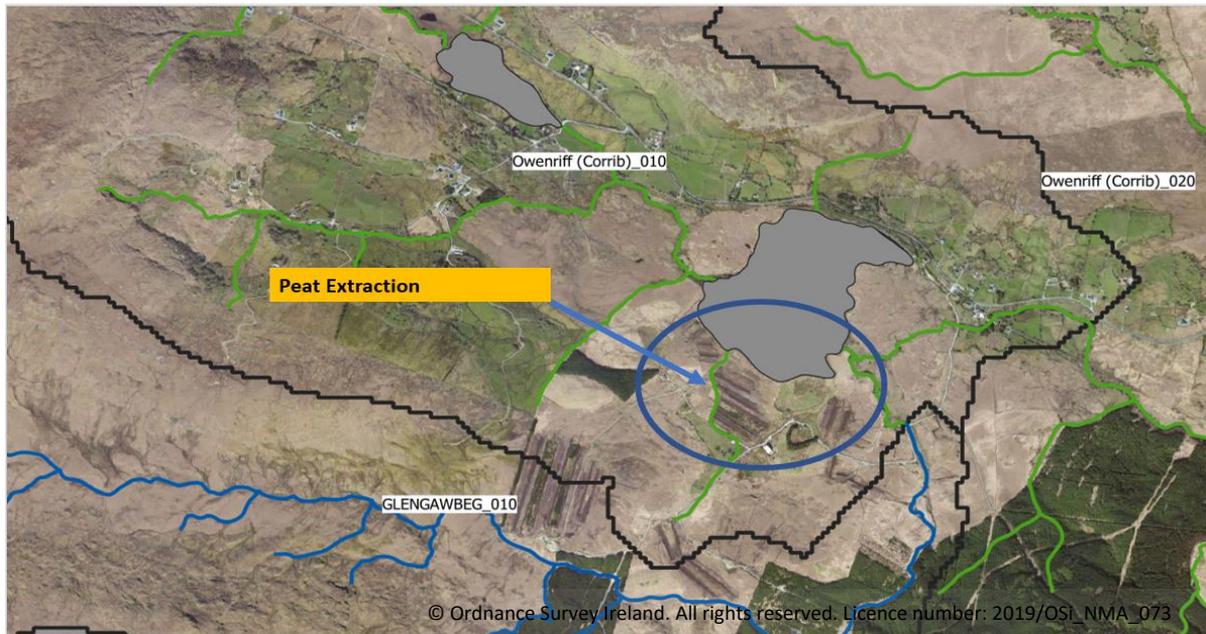


Figure 13: Peat Extraction in the Vicinity of the Owenriff_010

3.1.2.2 Forestry

As with peat extraction, forestry is not listed as a pressure, although there a number of plantations located in the vicinity of the Owenriff_010, which can be seen in **Figure 14** below.

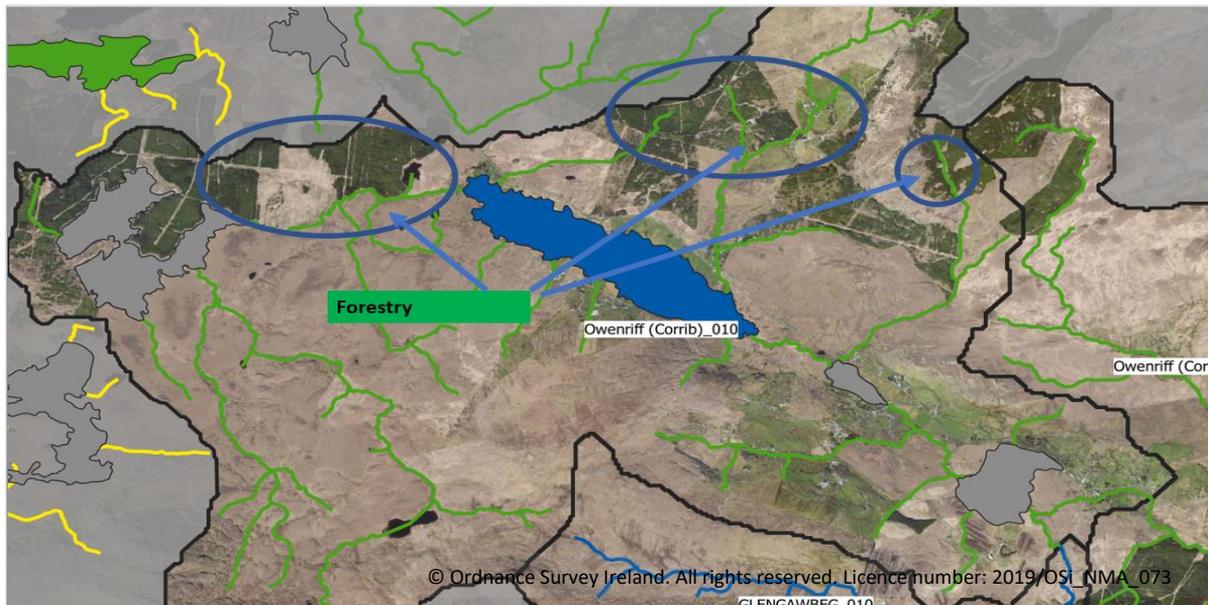


Figure 14: Forestry in the Owenriff_010 area

The dominant species in these plantations are Sitka Spruce and Lodge Pole Pine, and the ages of the plantation's range from the early 70s up to the 1990s. Most of the plantations are state owned forestry, but there is a small percentage of the forestry privately owned. Although unlikely to be causing a pressure at the moment, the focus of the LCA will be to identify areas of risk for future pressures e.g. where there is no buffers (pre 1990's plantations), tunnelling of streams/rivers etc.

3.2 Owenriff_020

3.2.1 Hydromorphology

Hydromorphology is the sole significant pressure identified for the Owenriff_020 in the form of channelisation, which is affecting the waterbody by changing the hydrological and morphological conditions of the river. The Corrib – Headford arterial drainage scheme is present in the Owenriff_020, which can be seen in **Figures 15 and 16**.

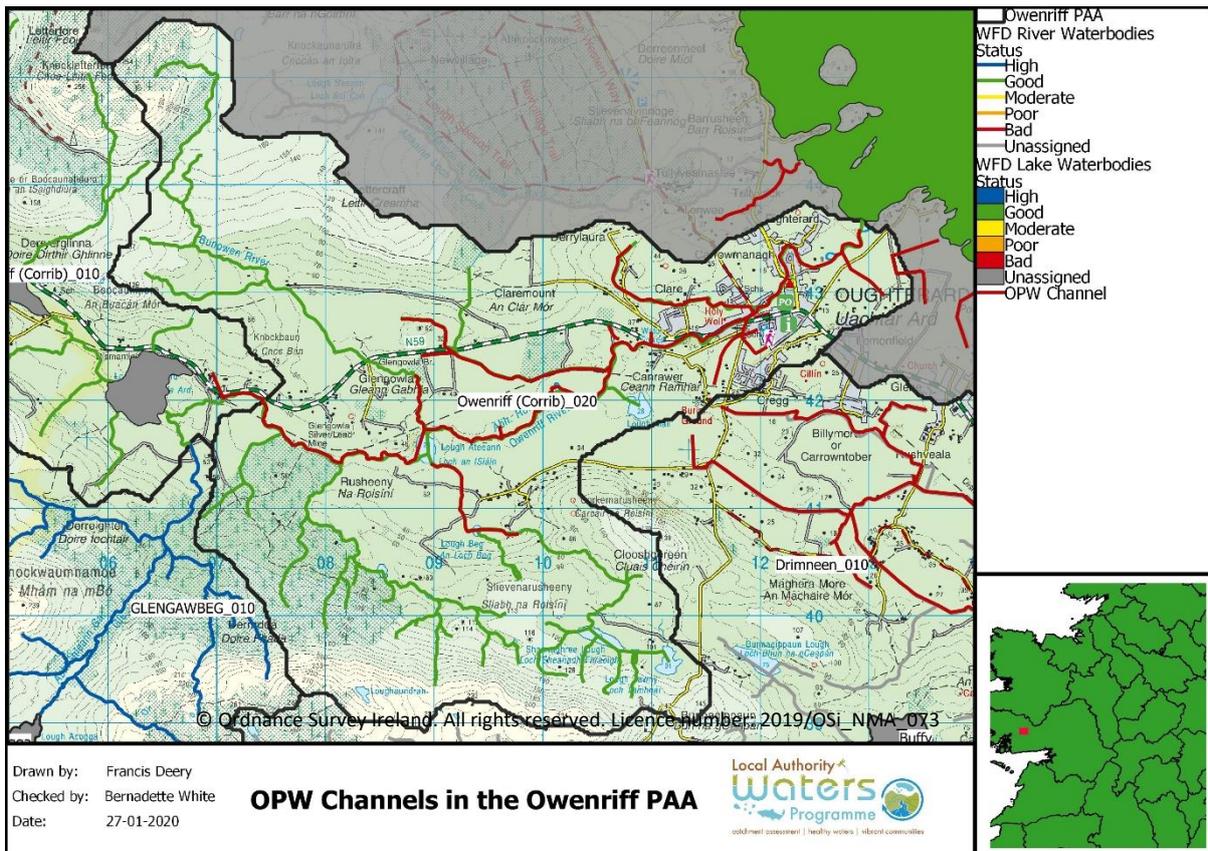


Figure 15: OPW Drainage Scheme in the Owenriff_020

The OPW Corrib-Clare arterial drainage scheme is a minor drainage scheme which was active from the 1950s. There are also several weirs on the main channel of the Owenriff_020 in the town of Oughterard, and number of the tributaries have road and land bridges constructed on them, as well as fords, culverts and other concrete structures. The EPA comments in the WFD App are “There is a High HYMO/bio status site within this water body - other four sites are of Good invert status - appears like this is reflecting localised conditions. EPA to develop a morphological assessment to assess/address this issue.” As for Owenriff_010, during the LCA the focus will be to identify if the pressures identified in the RHAT survey (**Table 6**) are locally significant or significant at the water body scale. These pressures are potentially preventing the monitoring points in this water body from achieve a high Q value status.

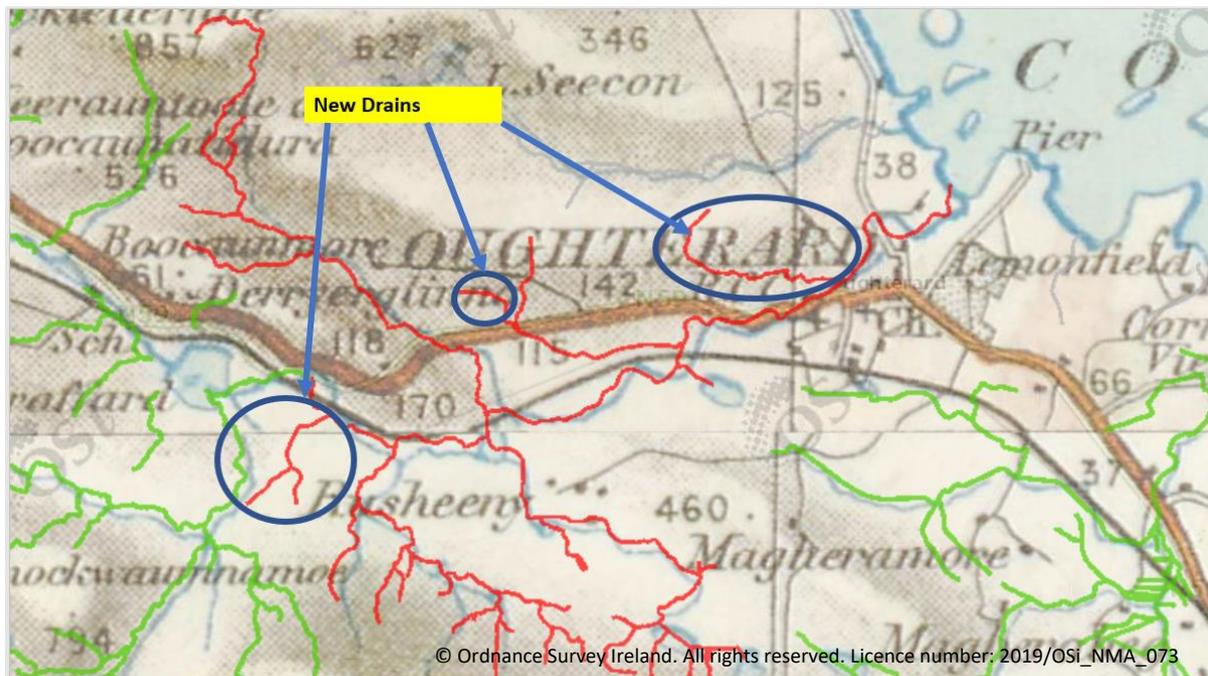


Figure 16: New Drains opened in the Owenriff_020

Table 6: RHAT Survey of the Owenriff_020 from the Monitoring Point 1km U/S Oughterard Bridge

| | | Owenriff_020 (Sampling point – 1km u/s Oughterard Bridge) | |
|--------------------------------------|--|--|---|
| Attribute | | Indicative Status | Comments |
| Channel Form Score | | High | Looks okay, following natural course |
| Channel Vegetation Score | | High | Typical of Water, small amounts of algae. |
| Channel Substrate Condition Score | | High | Slight sediment only bedrock, boulders, coble. |
| Channel Barriers to Continuity Score | | High | |
| Bank Structure Left | | High | Appear natural, no engineering |
| Bank Structure Right | | High | |
| Bank Vegetation Left | | Good | Semi continuous trees LHS isolated odd RHS |
| Bank Vegetation Right | | Moderate | |
| Riparian Landcover Left | | Moderate | Rough pasture + suburban gardens u/s and LHS respectively |
| Riparian Landcover Right | | Moderate | |
| Floodplain Connectivity Left | | High | |
| Floodplain Connectivity Right | | High | |

3.2.2 Other Non – Significant Pressures

3.2.2.1 Forestry

There are several forestry plantations in the Owenriff_020 area, both state – owned and privately-owned forestry as can be seen in **Figure 17**. The State-owned forestry has been planted since the 1970s, while the private forestry in the Owenriff_020 area has been planted in the early 1990s, the dominant species in all the forestry plantations is Sitka Spruce. The majority of the state-owned forestry was planted before the new forest service guidelines regarding buffer zone management along watercourses e.g. within the buffer zone, ground preparation and other forest operations curtailed in order to protect water quality. In addition, drainage channels leading from the site must taper out before entering the buffer zone.

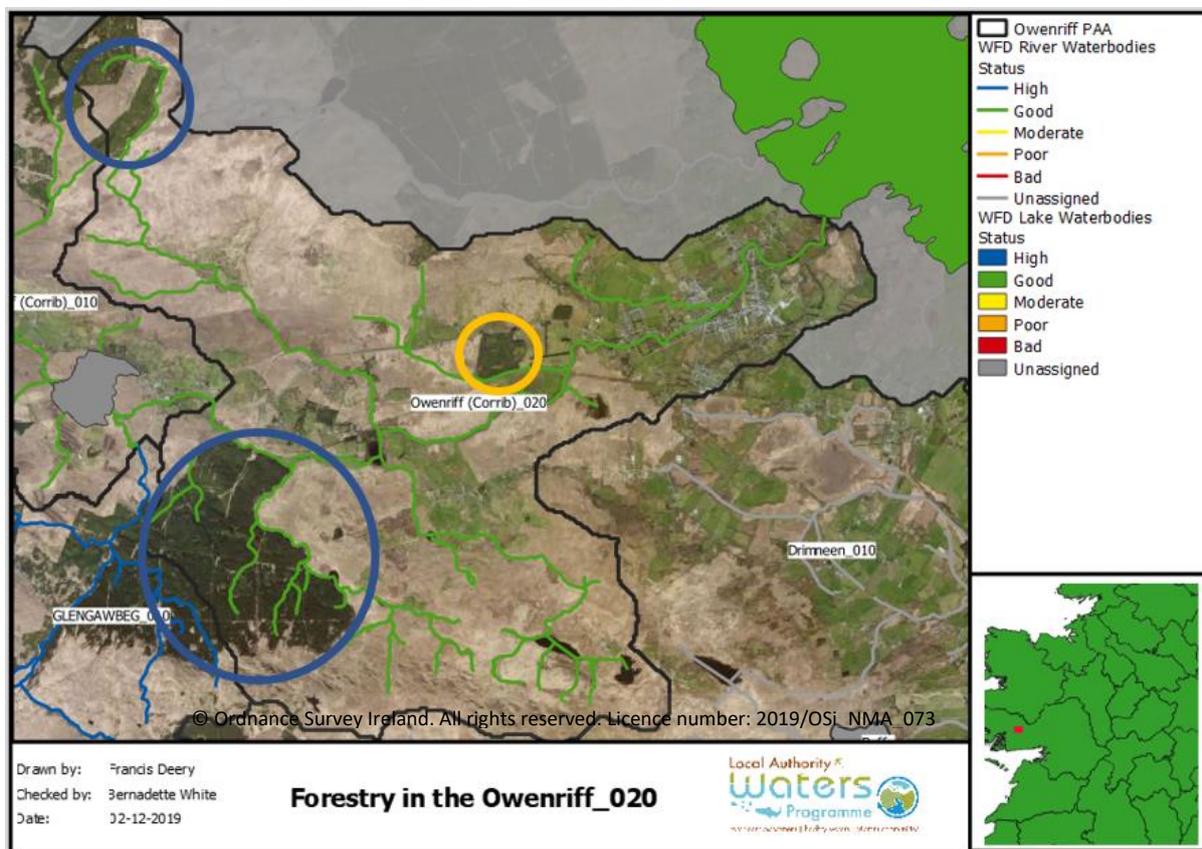


Figure 17: Forestry in the Vicinity of the Owenriff_020

3.2.3 Fish

Fish has dropped to bad ecological status in 2018, these failures were mainly due to the absence, lower than expected abundance or missing age classes of type specific indicator species (i.e brown trout and salmon). Predation pressure and some other minor factors, such as localised water quality or poor habitat issues may be contributing to the failures. (IFI, 2019). The focus of the LCA by LAWPRO will be to bring additional understanding to the water quality issues which may be contributing to this significant deterioration in fish status.

3.3 Drimneen_010

3.3.1 Forestry

Forestry is noted as a significant pressure that may be impacting upon the status of this unassigned river waterbody. There is a significant amount of forestry in the headwaters of the Drimneen_010, this forestry would be mainly state – owned forestry and there is a significant amount of forestry located around the Buffy Lough, which is also state – owned forestry. Some of this forestry has failed to establish properly. There are several standalone privately-owned forestry plantations towards the lower end of this waterbody. The forestry in the headwaters (see **Figure 18**) was planted in the early 1970s and dominated by Sitka Spruce, around the Buffy Lough the forestry was planted in the 1980s. Given that these forestry plantation were planted before the 1991, there will be no buffer zones beside the adjacent watercourses in the forestry stands.

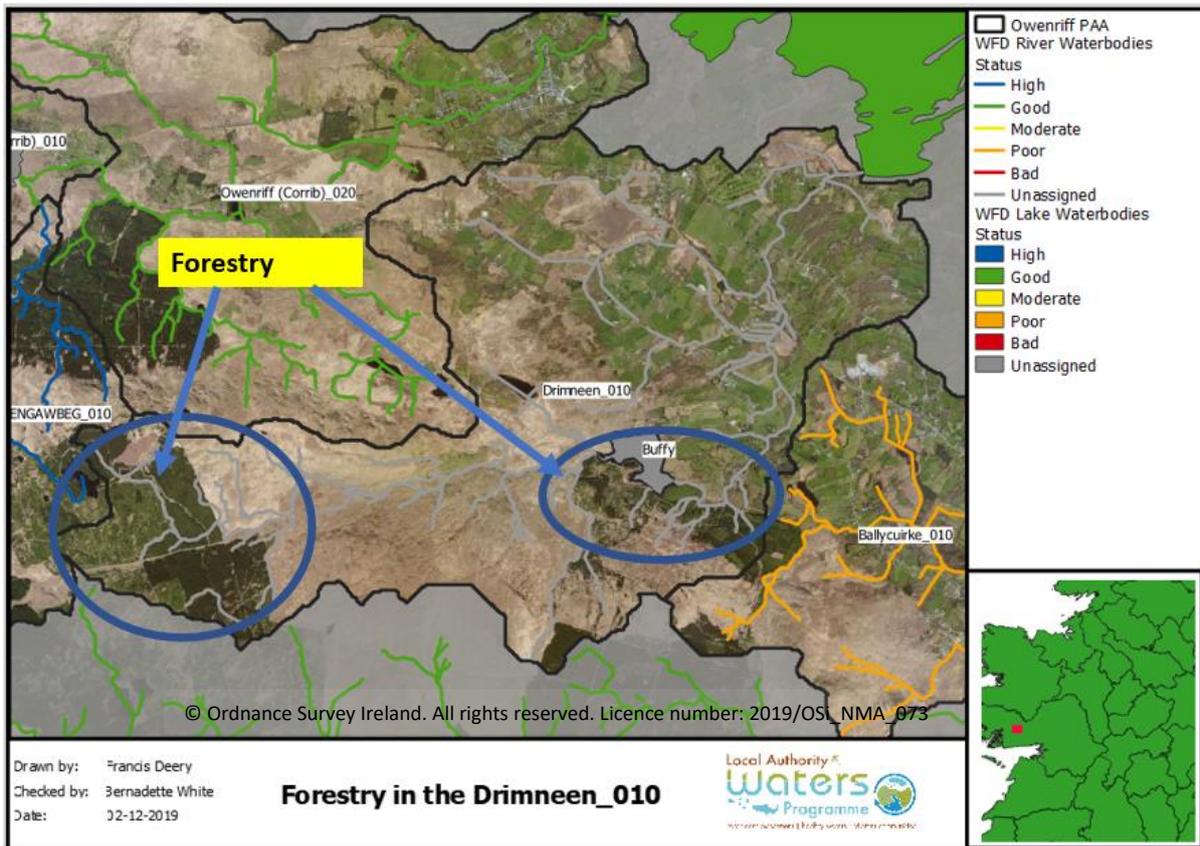


Figure 18: Forestry in the Drimneen_010 Area

3.3.2 Peat Extraction

Peat extraction is a significant pressure that is noted in the initial characterisation of the Drimneen_010, in the form of nutrient pollution and morphological changes. There are number of areas where peat cutting is being carried out on a small scale, near the headwaters of the Drimneen_010, which can be seen in the **Figure 19**. In comparison to the area of the Drimneen_010 catchment the areas of peat cutting are located in the headwaters and are small private peat cutting. This type of peat extraction will more than likely be impacting the river locally but not a catchment scale. The LCA will focus on sampling areas below the peat cutting and areas above the peat cutting.

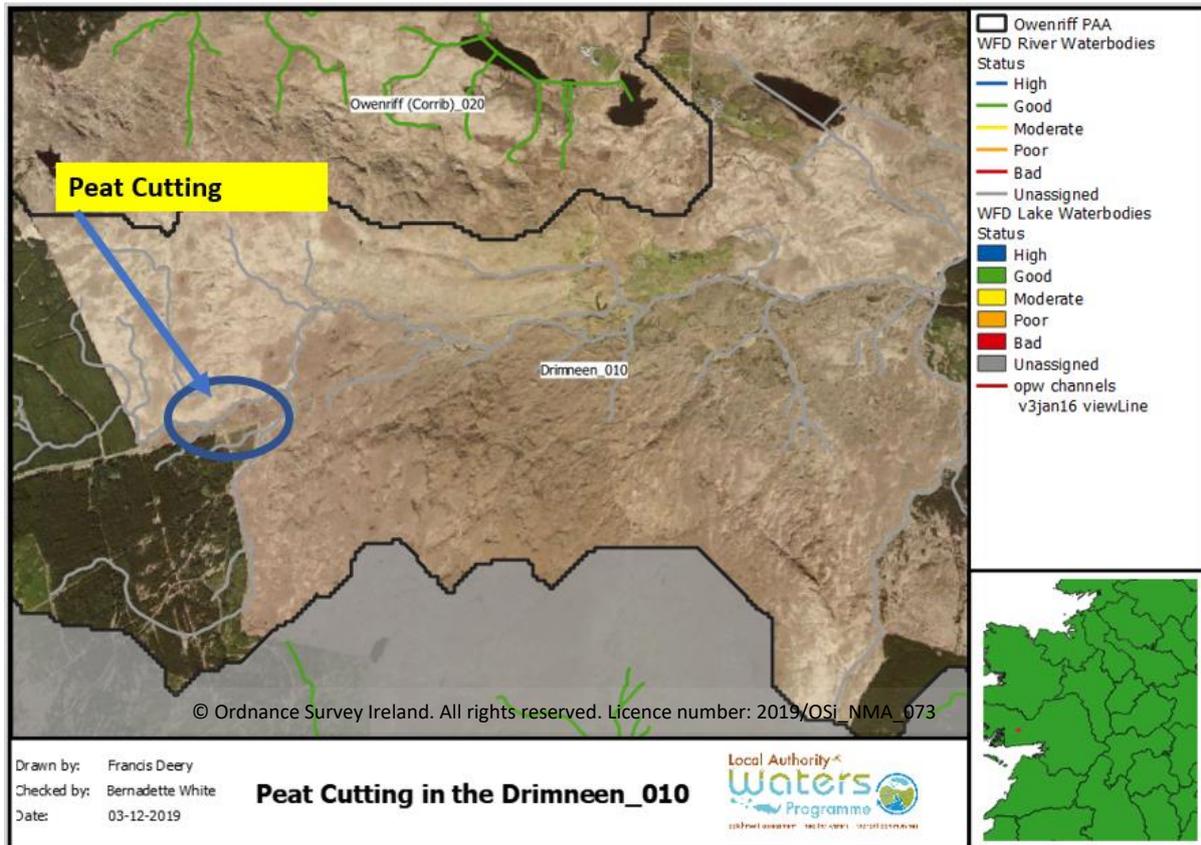


Figure 19: Peat Cutting in the Drimneen_010

3.3.3 Other Non – Significant pressures

3.3.3.1 Hydro morphology

There is an old OPW arterial drainage scheme in the Drimneen_010, the Corrib – Headford scheme (**Figure 20**), which started in the 1950s, it is a minor drainage scheme, the scheme may be affecting the flow regime of the river which may be impacting on the biological characteristics of the water in the Drimneen_010.

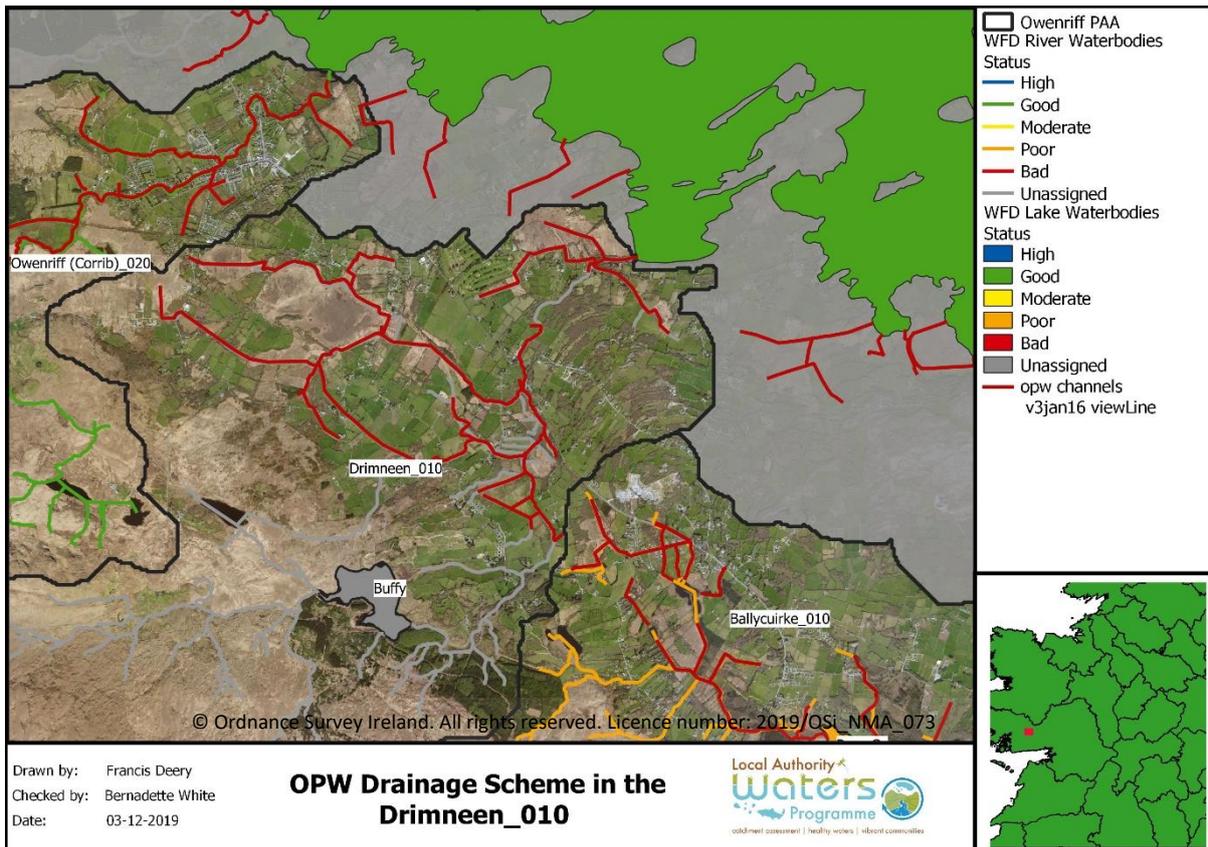


Figure 20: OPW Drainage scheme in the Drimneen_010

3.4 Ballycurke_010

3.4.1 Hydromorphology

Hydromorphology is a pressure that is impacting upon the Ballycurke_010, which is changing the morphological conditions of the waterbody. The Corrib – Clare OPW drainage scheme intersects this water body. **Figure 21** shows that the scheme covers almost the entirety of the Ballycurke_010 apart from a few tributaries coming in from the west of the catchment. The scheme may be affecting the flow regime of the river which may be impacting on the biological characteristics of the water in the Ballycurke_010.

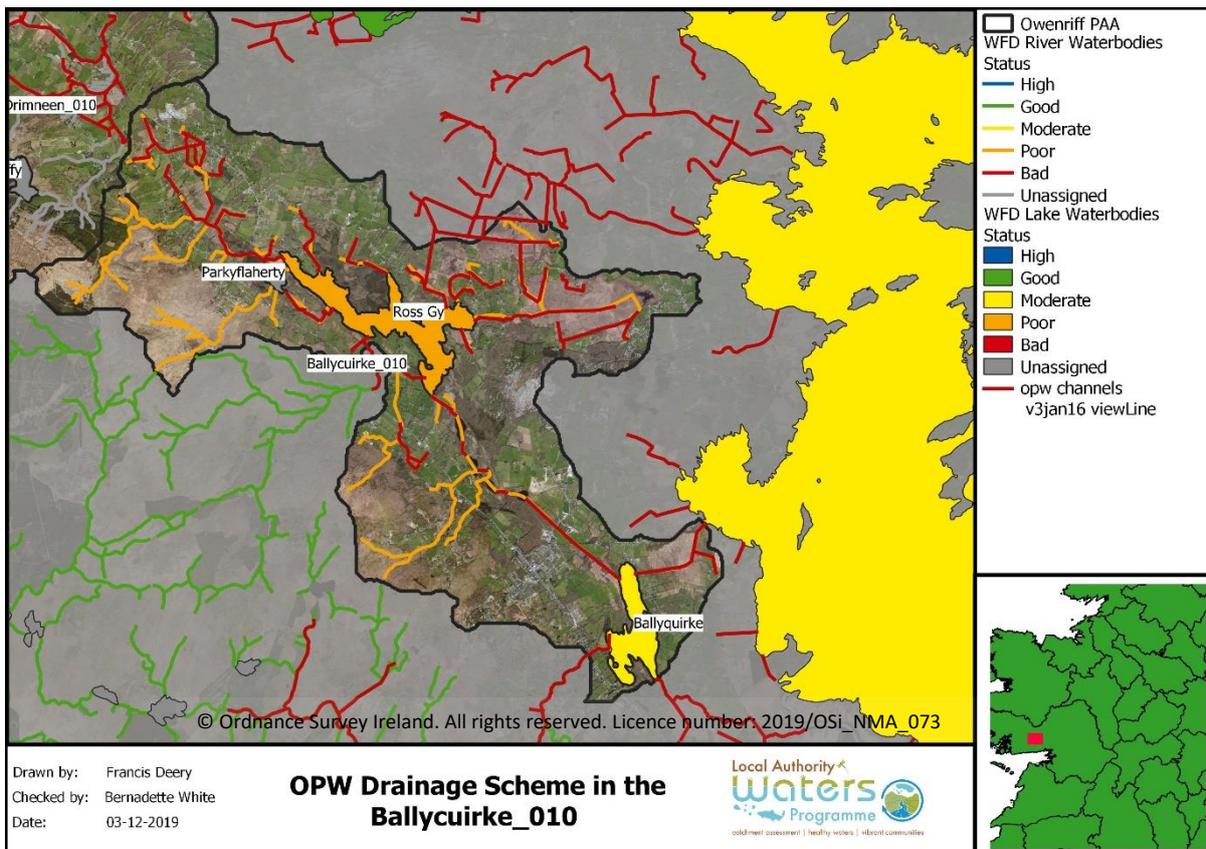


Figure 21: OPW Drainage Scheme in the Ballycurke_010

3.4.2 Domestic Wastewater Treatment Systems

DWWTS have been identified in the initial characterisation as a pressure that is impacting upon the Ballycurke_010, in the form of nutrient pollution. In terms of phosphate pollution potential impact there are treatment systems located throughout the Ballycurke_010 sub basin, this is also true for nitrates pollution impact potential.

3.4.3 Urban Wastewater

Urban wastewater treatment has been deemed a significant pressure in the Ballycurke_010 waterbody, in the form of nutrient and organic pollution. An IA1 was assigned to the EPA in the WFD App, to follow up on the Irish Water report on the Moycullen wastewater treatment plant. It is not clear what report is being referred to here. The 2017 AER has been reviewed nonetheless to provide further information on the WWTP. This is a licenced facility, code D0191-01. The plant has preliminary treatment (screening and grit removal), secondary treatment (conventional activated sludge), nutrient removal (chemical dosing for phosphorus removal) and tertiary treatment (integrated constructed wetlands).

The final effluent from the Primary Discharge Point was non – compliant with the Emission Limit Values in 2017. The following parameters exceeded the emission limit values in 2017:

- Ammonia N (mg/l)

The non – compliance is due to an exceedance on one occasion. It should be noted however that the discharge monitoring point at which the samples are currently retrieved is located at the inlet to the tertiary treatment stage. As a result, ammonia levels recorded are unlikely to accurately reflect ammonia levels in the final effluent. A technical amendment request has been submitted to change the discharge monitoring point to a correct location.

Two monitoring points on the Ballycurke_010, Br U/S of Ballycurke Lough and the Downstream monitoring point of the WWTP – as shown in **Figure 22**, are showing spikes in BOD and Total Nitrogen, as seen in **Figure 23** and **24**. There are also spikes in ammonia at these two monitoring points. The LCA will focus on the sources of the Ammonia, high BOD and total nitrogen and identify what is contributing to these parameters upstream of the WWTP.

The Ballycurke_010 flows into the Ballyquirke lough which is at bad ecological status due to macrophytes. The Moycullen WWTP is deemed to be a significant pressure on the lake.

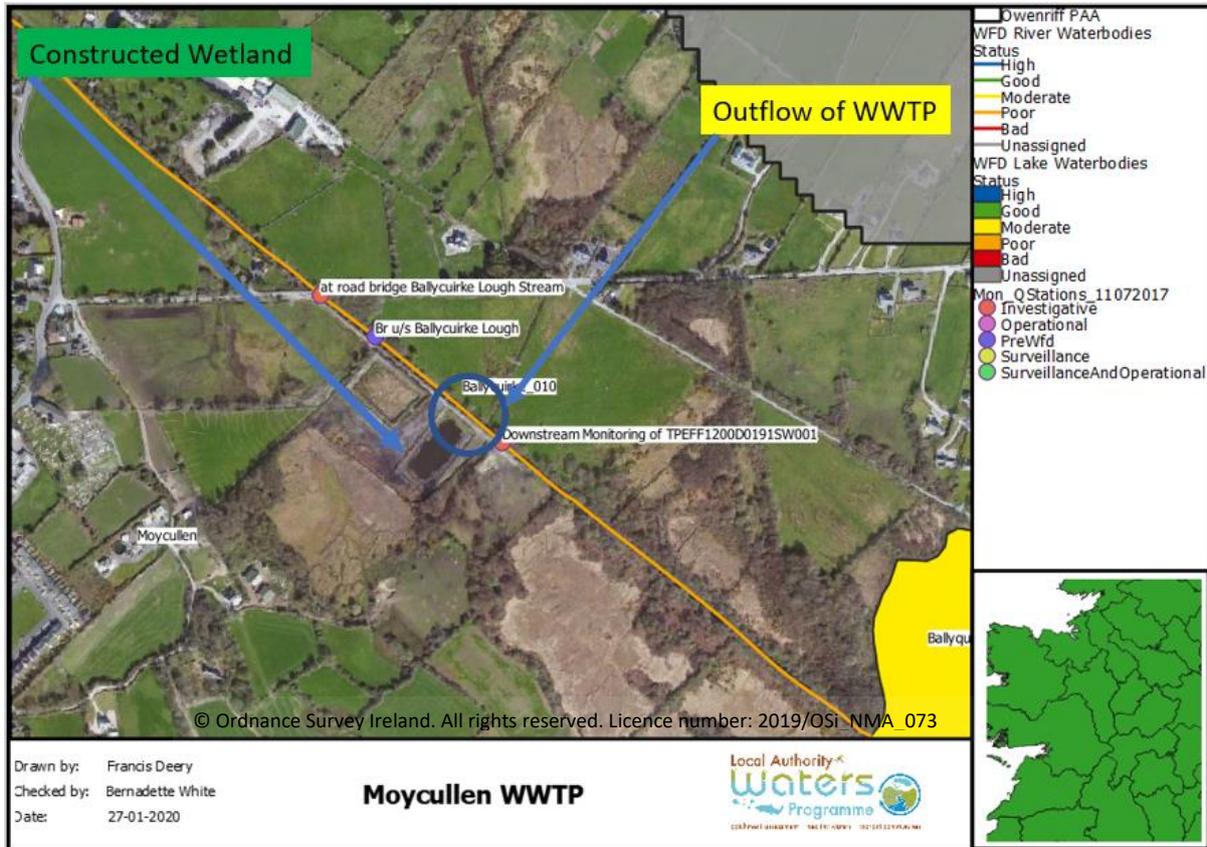


Figure 22: Monitoring Points around the Moycullen WWTP in the Ballycurke_010

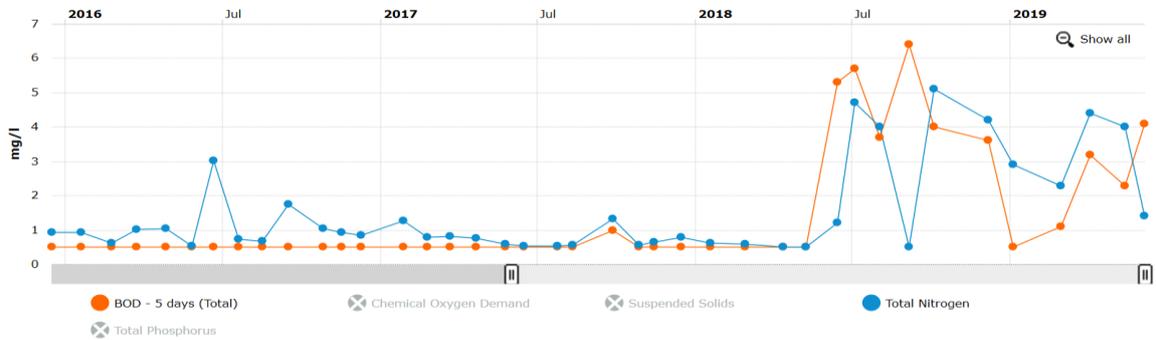


Figure 23: Monitoring Point Br U/S of Ballycurke Lough



Figure 24: Monitoring Point Downstream Monitoring of TPEFF1200D0191SW00

3.5 Lettercraffroe

3.5.1 Forestry

Forestry has been noted as a pressure that is impacting upon the Lettercraffroe lake, it is impacting it via nutrient pollution, and hydrological and morphological changes.

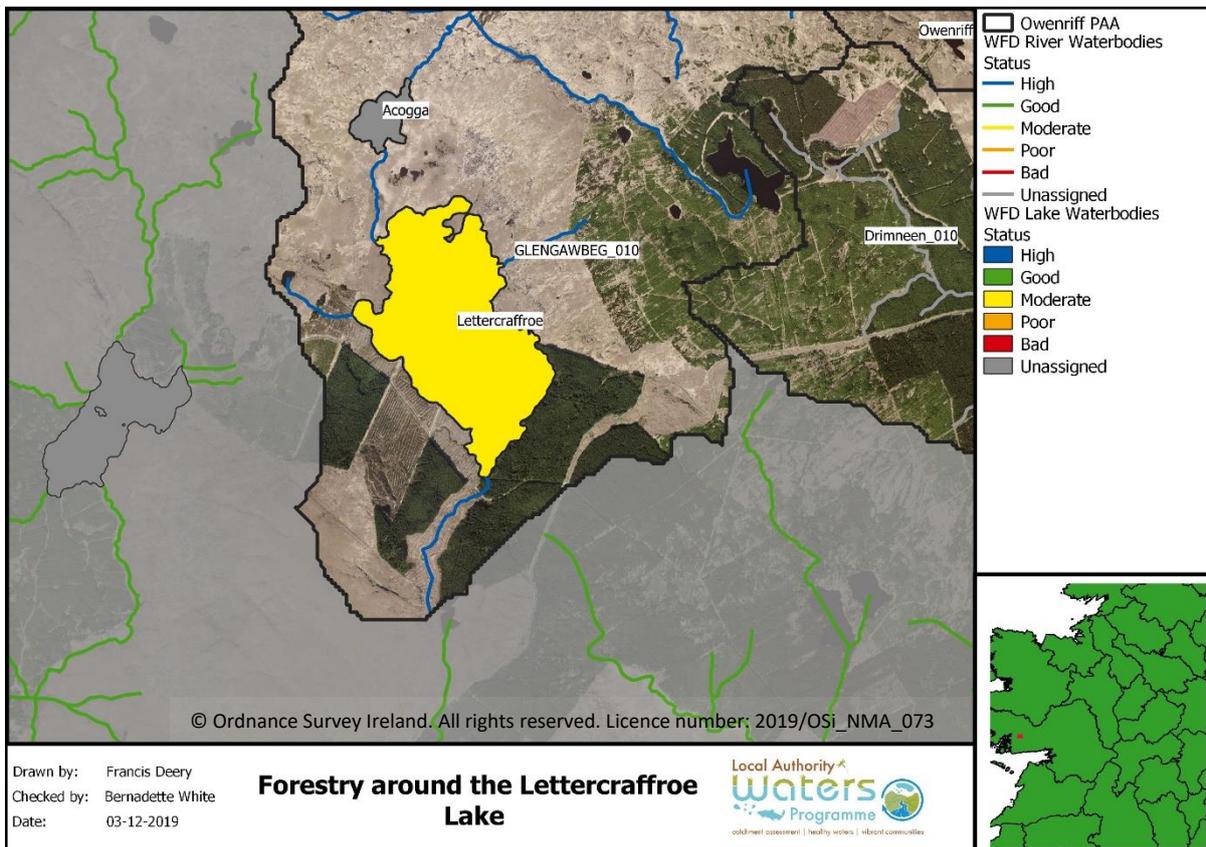


Figure 25: Forestry around the Lettercraffroe Lake

There is both state – owned and privately-owned forestry (**Figure 25**) located around Lettercraffroe the Coillte forestry has been planted since the 1960s and the main species is Sitka Spruce. To the right of the Lettercraffroe lake there is privately owned forestry that was planted in the 1990s and again the main species is Sitka Spruce. The majority of the state-owned forestry was planted before the new forest service guidelines regarding buffer zone management along watercourses e.g. within the buffer zone, ground preparation and other forest operations curtailed in order to protect water quality. In addition, drainage channels leading from the site must taper out before entering the buffer zone. While the privately-owned forestry would adhere to these regulations.

3.6 Ballyquirke Lough

3.6.1 Urban Wastewater – Moycullen WWTP

In 2014 and 2015 the EPA carried out a survey to investigate the issues that were causing the downgrading of the Ballyquirke lake. They focussed on six sampling point and carried out physio-chemical analysis on the samples taken from these sites. As seen in **Figure 26** with the results of the assessment shown in **Figure 27**.

| | Site No. | Description | EDEN Code |
|--------------------------|-----------------|--|-------------------|
| Inputs to Lake | 1 | Loughkip River – Bridge u/s Ballycuirke Lake | 30L01-0200 |
| | 8 | Ballycuirke inflow (old outflow) | 30L01-0320 |
| | 3 | Ballycuirke Canal d/s WWDL discharge | 30B14-0060 |
| | | | |
| Outputs from Lake | 6 | Ballycuirke Canal Bridge d/s lake outflow | 30B14-0090 |
| | | | |
| Inputs to Canal | 2 | Canal at road bridge u/s WWDL discharge | 30B14-0040 |
| | 5 | Piped discharge from WWTP 50 u/s of wetlands, SW001 | |
| | 4 | Piped outflow from wetlands to Canal | |

Figure 26: Sampling point during the Ballyquirke lake Assessment

| Site ID No | Date Collected | Ammonia (mg/l N) | Chloride (mg/l Cl) | Nitrite (mg/l N) | Ortho P (mg/l P) | T.O.N (mg/L N) |
|------------|----------------|------------------|--------------------|------------------|------------------|----------------|
| 1 | 20/03/2014 | <0.020 | 22 | <0.004 | <0.010 | <0.20 |
| 2 | 20/03/2014 | 0.025 | 31 | <0.004 | <0.010 | 0.35 |
| 3 | 20/03/2014 | 0.037 | 33 | <0.004 | <0.010 | 0.71 |
| 4 | 20/03/2014 | 0.066 | 32 | 0.012 | <0.010 | 0.41 |
| 6 | 20/03/2014 | <0.020 | 31 | <0.004 | <0.010 | 0.4 |
| 7 | 20/03/2014 | 0.072 | 34 | <0.004 | <0.010 | 0.61 |
| 2 | 29/04/2014 | 0.031 | 28 | <0.004 | <0.010 | 0.33 |
| 3 | 29/04/2014 | 0.14 | 29 | 0.005 | <0.010 | 0.39 |
| 4 | 29/04/2014 | 0.21 | 30 | 0.03 | <0.010 | 0.22 |
| 5 | 29/04/2014 | 2.1 | 49 | 0.035 | 0.4 | 0.51 |
| 6 | 29/04/2014 | <0.020 | 28 | <0.004 | <0.010 | 0.21 |
| 8 | 29/04/2014 | 0.046 | 32 | <0.004 | <0.010 | 0.5 |
| 1 | 24/06/2014 | <0.020 | 24 | <0.004 | <0.010 | 0.27 |
| 2 | 24/06/2014 | 0.041 | 26 | <0.004 | <0.010 | 0.2 |
| 3 | 24/06/2014 | 0.049 | 28 | 0.009 | 0.027 | 1.4 |
| 4 | 24/06/2014 | 0.12 | 27 | 0.03 | 0.016 | <0.20 |
| 5 | 24/06/2014 | 0.13 | 60 | 0.04 | 0.11 | 13 |
| 6 | 24/06/2014 | <0.020 | 24 | <0.004 | <0.010 | <0.20 |
| 8 | 24/06/2014 | 0.058 | 31 | 0.007 | <0.010 | 0.44 |
| 1 | 20/08/2014 | <0.020 | 23 | <0.004 | <0.010 | <0.20 |
| 2 | 20/08/2014 | 0.021 | 27 | <0.004 | <0.010 | <0.20 |
| 3 | 20/08/2014 | 0.053 | 37 | 0.023 | 0.13 | 6.5 |
| 4 | 20/08/2014 | 0.11 | 27 | <0.004 | <0.010 | <0.20 |
| 5 | 20/08/2014 | 0.14 | 65 | 0.043 | 0.41 | 20 |
| 6 | 20/08/2014 | 0.022 | 25 | <0.004 | <0.010 | 0.22 |
| 8 | 20/08/2014 | 0.04 | 28 | 0.007 | <0.010 | 0.23 |
| 1 | 19/11/2014 | <0.020 | 20 | <0.004 | <0.010 | <0.20 |
| 2 | 19/11/2014 | 0.036 | 23 | <0.004 | <0.010 | 0.39 |
| 3 | 19/11/2014 | 0.033 | 22 | <0.004 | 0.01 | 0.57 |
| 4 | 19/11/2014 | 0.36 | 23 | 0.033 | 0.035 | 0.48 |
| 5 | 19/11/2014 | 0.22 | 37 | 0.057 | 0.11 | 7.3 |
| 6 | 19/11/2014 | 0.031 | 22 | <0.004 | <0.010 | 0.32 |
| 8 | 19/11/2014 | 0.036 | 29 | <0.004 | <0.010 | 1.4 |
| 1 | 18/02/2015 | <0.020 | 28 | <0.004 | <0.010 | <0.20 |
| 2 | 18/02/2015 | 0.027 | 25 | 0.011 | <0.010 | 0.59 |
| 3 | 18/02/2015 | 0.033 | 26 | <0.004 | <0.010 | 1.1 |
| 4 | 18/02/2015 | 0.29 | 54 | 0.022 | 0.012 | 1.7 |
| 5 | 18/02/2015 | 0.04 | 53 | 0.022 | 0.11 | 13 |
| 6 | 18/02/2015 | 0.021 | 27 | <0.004 | <0.010 | 0.54 |
| 8 | 18/02/2015 | 0.057 | 36 | <0.004 | <0.010 | 0.97 |

Figure 27: Results from the Assessment

The data would show that a greater load of nutrient are transported to the lake by the Ballycurke_010 river as oppose to the Loughkip_010 river. The survey found that the WWTP was contributing to a large amount of nutrients in times of low flow, (40 – 80%), but in times of high flow the contribution was around 10%. The survey concluded that the nutrient loading from the Ballycurke river was not having a detrimental effect on the water quality of the lake.

3.6.2 Invasive Species

In the initial characterisation of the Ballyquirke lake the pressure of invasive species in the form of Zebra mussels was identified.

Zebra mussels can have an effect on fish populations by impacting on the food web structure. As they feed, zebra mussels deposit faeces and regurgitated food on the bottom of a lake. These substances become food for bottom – dwelling organisms making those invertebrate forms more abundant. Some fish may respond to this change benthic feeding or orienting to other prey that forages on the bottom.

As Zebra mussels feed, they filter phytoplankton from the water. This in turn makes the water clearer. Fish that are light – sensitive may seek deeper waters to find shelter from the penetrating rays of the sun. Zebra mussels make the water clearer but not cleaner, by filtering phytoplankton. As the sun penetrates deeper, aquatic macrophytes can take root in more extensive areas than they did before zebra mussels moved into the area. Vegetation provides small fish with more place to hide and makes it more difficult for large predators to feed, so this can in turn stunt fish populations or changes to the dominant age classes.

3.7 Ross GY

3.7.1 Invasive Species

Invasive species is the only pressure identified during initial characterisation impacting upon Ross lake. There are zebra mussels in the lake. The lake is classed at poor ecological status due to the fish status. In a recent survey of the lake in 2016, the IFI found no trout or salmon in the lake, the species that were captured were Pike, Roach, Bream, Perch and the European Eel¹. Further liaising with the IFI will be needed to understand the reasons for the lack of Salmon and Brown Trout in the lake.

¹ CITATION: Kelly, F.L., Connor, L., Coyne, J., Morrissey, E., Corcoran, W., Cierpial, D., Delanty, K., McLoone, P., Matson, R., Gordon, P., O' Briain, R., Rocks, K., O' Reilly, S., Kelly K., Puttharee, D., McWeeney, D., Robson S. and Buckley, S. (2017) Fish Stock Survey of Ross Lake, September 2016. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

3.8 Acogga

3.8.1 Forestry

Forestry was deemed to be a significant pressure during the initial characterisation of the Acogga lake, it is impacting via nutrient pollution and the morphological changes, as seen in

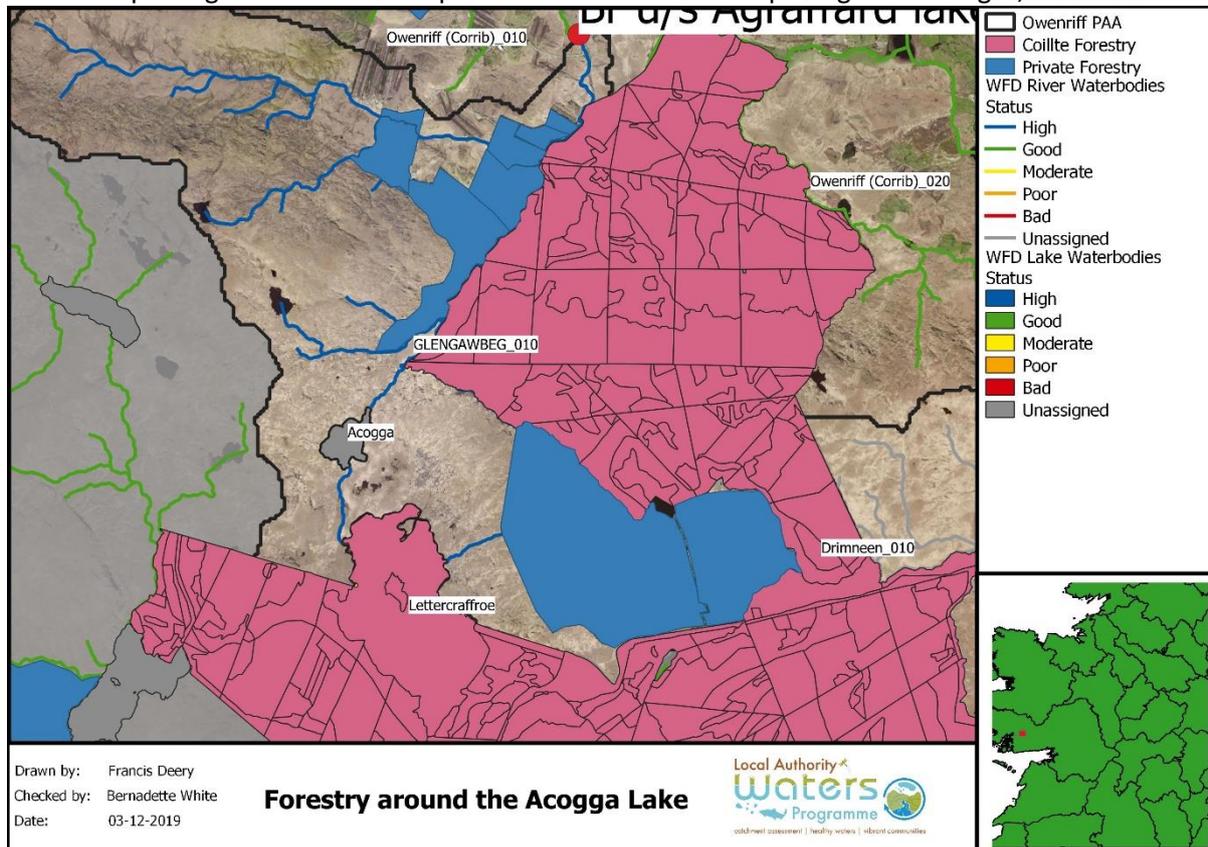


Figure 28. There is a significant amount of state-owned forestry within the area of the lake, this forestry was planted in the 1960s onwards, and the main species is Sitka Spruce. Given that these forestry plantation were planted before the 1991, there will be no buffer zones beside the adjacent watercourses in the forestry stands. There is also a good amount of private forestry in the region as well, this forestry was planted in the early 1990s and the dominant species is also Sitka Spruce. Acogga is an unassigned lake therefore there is no data to indicate that nutrients are causing an issue in the lake, the LCA will clarify this when carried out by LAWPRPO.

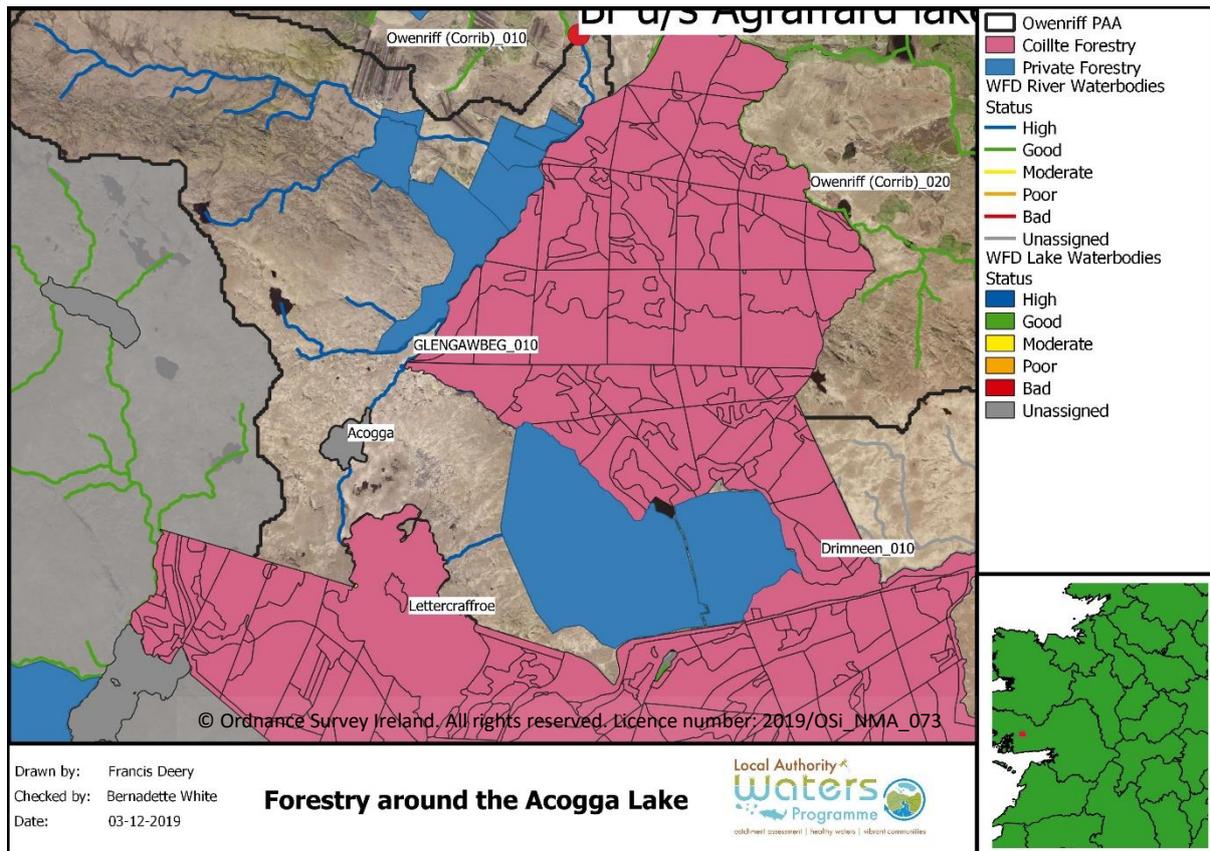


Figure 28: Forestry around Acogga

3.9 Parkyflaherty

3.9.1 Forestry

Forestry is seen as a significant pressure impacting upon this lake waterbody, in the form of nutrient pollution and altered habitat due to morphological changes.

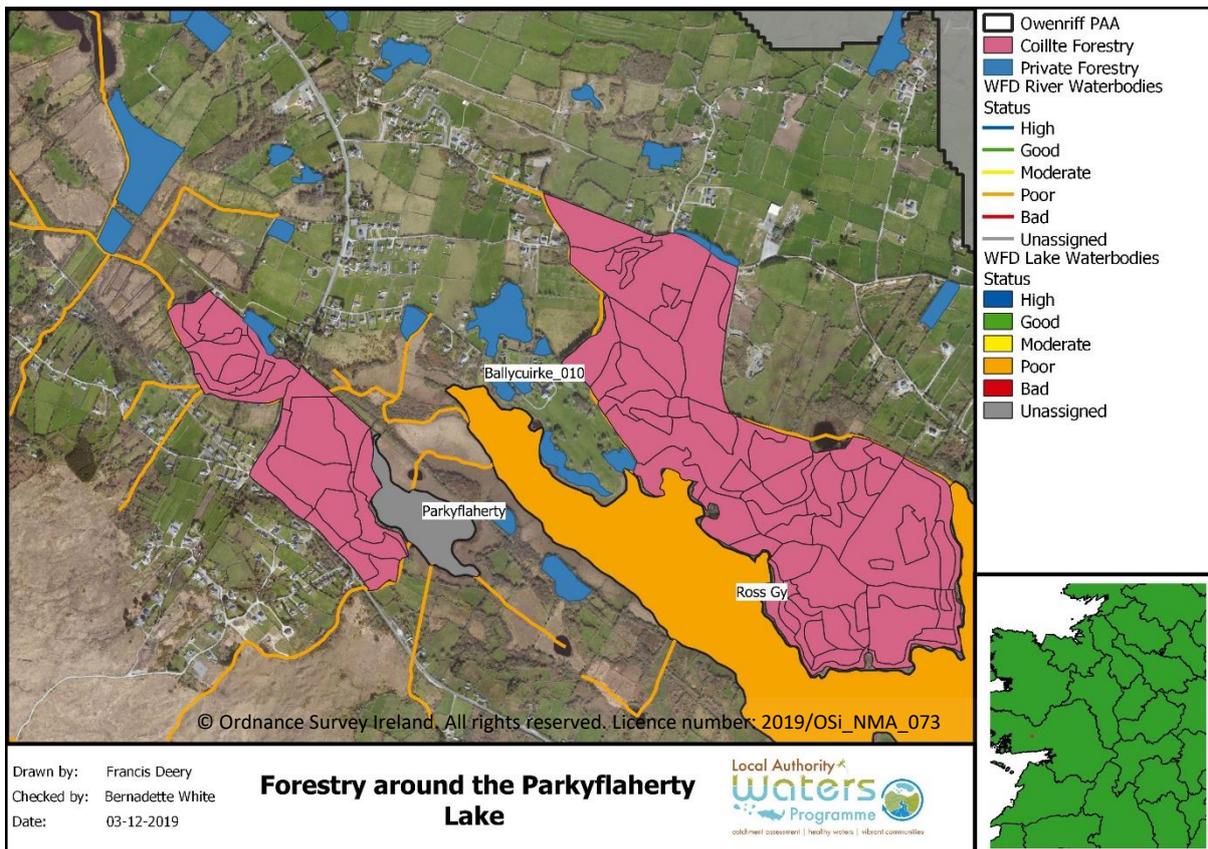


Figure 29: Forestry around Parkyflaherty Lake

The species that are in the state owned Coillte forestry is a mix of oak, birch and Sitka spruce, with varying dates of planting from the 1960s to the present day (**Figure 31**). Given that these forestry plantation were planted before the 1991, there will be no buffer zones beside the adjacent watercourses in the forestry stands. Parkyflaherty is an unassigned lake therefore there is no data to indicate that nutrients are causing an issue in the lake, the LCA will clarify this when carried out by LAWPRPO.

3.9.2 Agriculture

Agriculture is noted as a pressure on the Parkyflaherty lake, it is seen to be having an impact in the form of nutrient pollution. There are no derogation farms in the area, the PIP maps would indicate that there is a high chance of phosphate run off, and potential of nitrates reaching the waterbody via groundwater and overland flow, due to the mix of peat/poorly and well-drained soil in the area.

3.10 Buffy Lough

3.10.1 Water Abstractions and Water Treatment Discharges

Water abstraction has been identified as a significant pressure which is impacting on Buffy lake, in which the habitat is being altered hydrologically and morphologically, as seen in

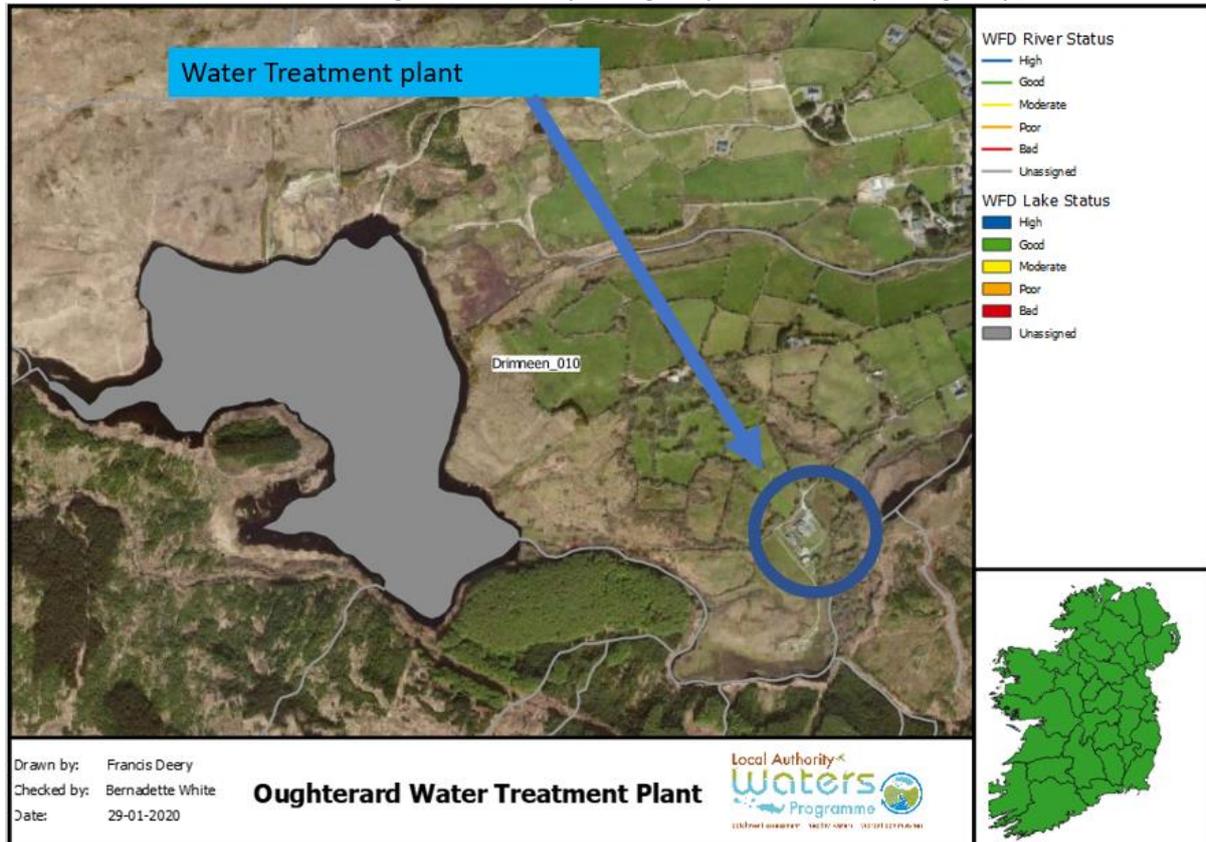


Figure 30. The WTP is Oughterard WTP. Buffy lake supplies water to Oughterard, parts of Moycullen and Killannin, and the daily abstraction from the lake is 2516m³/day. Inland Fisheries Ireland have indicated that there is a dam at the outlet of this lake and there is currently no fish pass at this point.

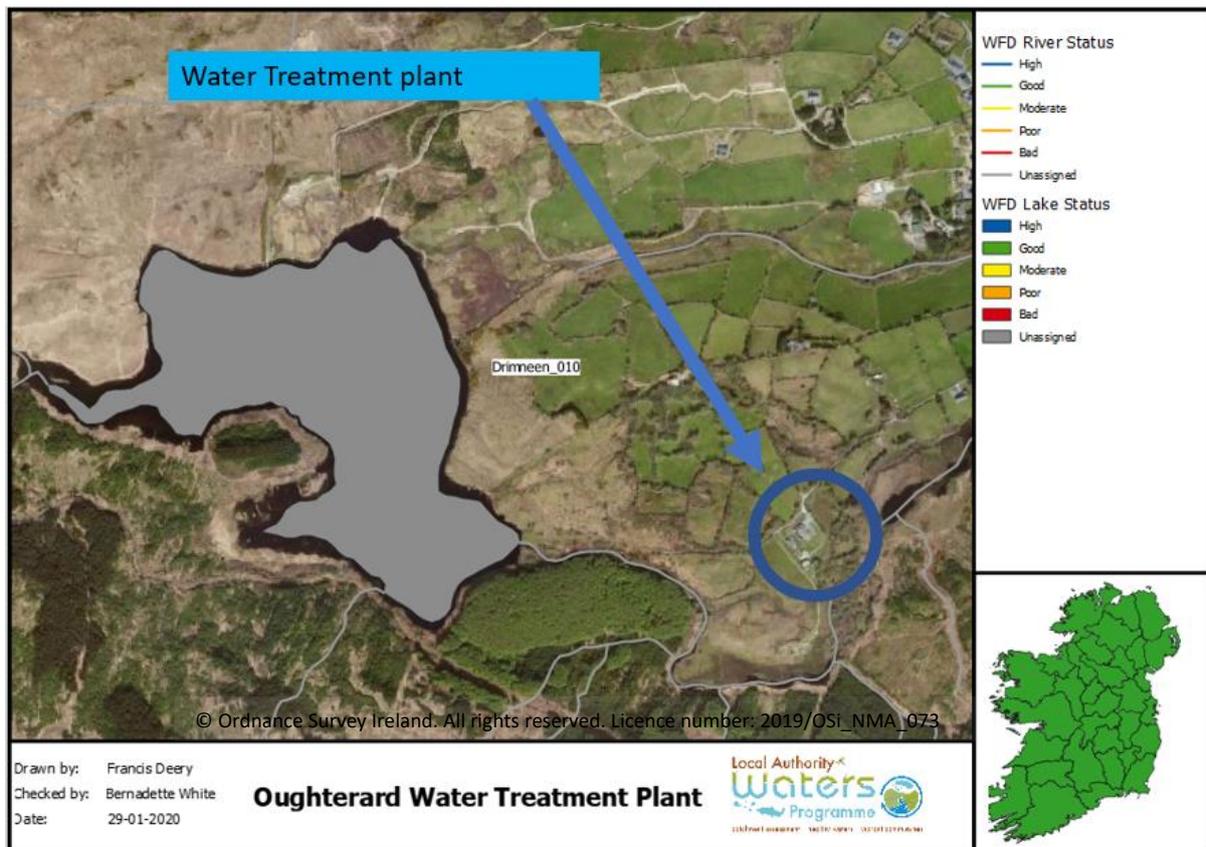


Figure 30: Water Treatment Plant beside Buffy Lough

Water treatment is identified as a significant pressure impacting Buffy lake via discharges inducing nutrient pollution and altering the habitat through morphological changes. The supernatant/wash water is returned to the Drimneen_010, and the sludge is removed from the WTP. During the initial characterisation workshop in May 2017, issues with sludge disposal were identified by Inland Fisheries Ireland. Buffy is an unassigned lake therefore there is no data to indicate that nutrients are causing an issue in the lake, the LCA will clarify this when carried out by LAWPRPO.

3.10.2 Forestry

Forestry is noted as a significant pressure impacting upon Buffy lake, in the form of nutrient pollution and morphological changes. The forestry located around the lough is all state – owned forestry, which has been planted since the 1980s, with the dominant species being Sitka Spruce. There are some areas where the forestry plantations have failed to establish. Given that these forestry plantation were planted before the 1991, there will be no buffer zones beside the adjacent watercourses in the forestry stands. Buffy is an unassigned lake therefore there is no data to indicate that nutrients are causing an issue in the lake, the LCA will clarify this when carried out by LAWPRPO.

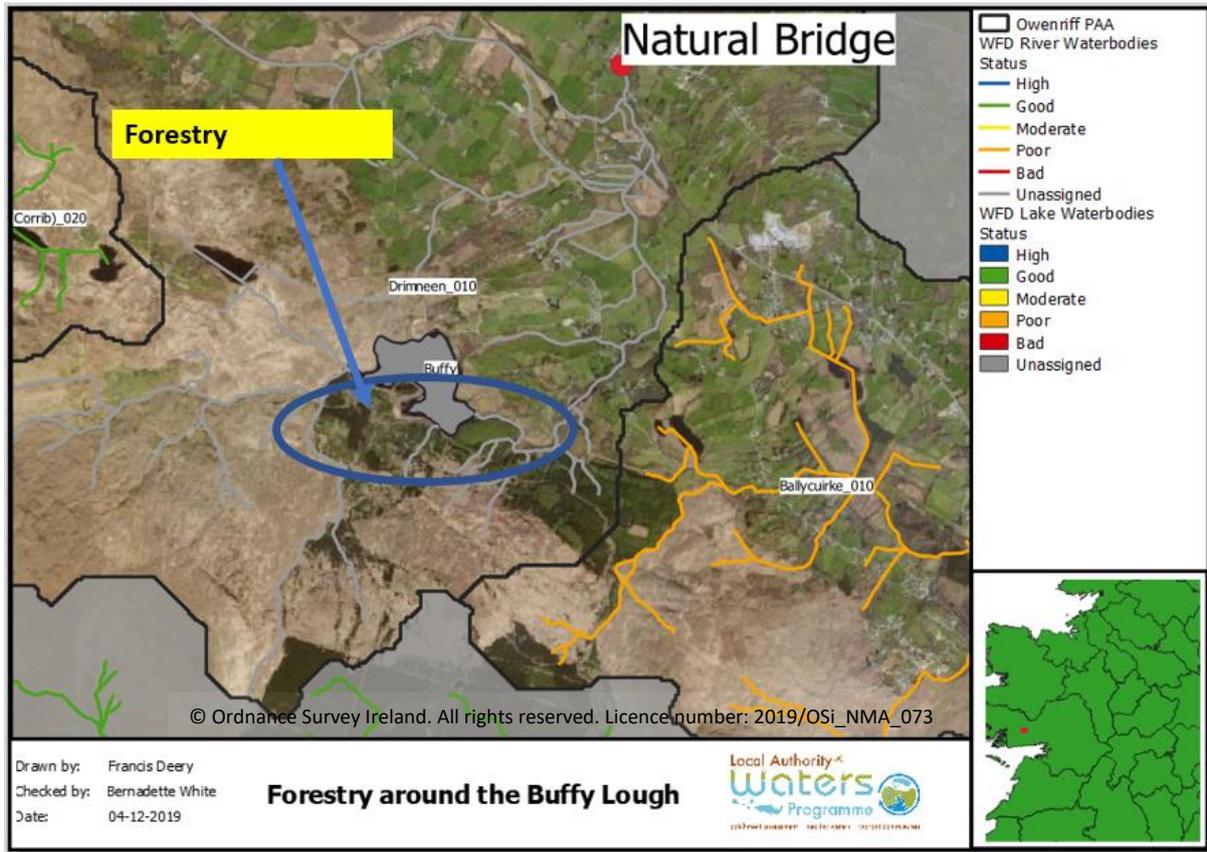


Figure 31: Forestry located around the Buffy Lough

4 Pathways Information (Diffuse Pollution)

The regional pathway framework is provided by the aquifer in the PAA and sub-compartments are determined by soil drainage and groundwater vulnerability.

The Owenriff PAA consists four different aquifer types which are the following:

- Poor Bedrock Aquifer, Moderately Productive only in Local Zones (PL)
- Locally Important Bedrock Aquifer, Generally Moderately Productive (LL)
- Locally Important Bedrock Aquifer, Moderately Productive only in Local Zones (LL)
- Regionally Important Aquifer – Karstified (conduit)

For the purposes of understanding the flow pathways within the Owenriff PAA, the PAA will be split into two compartments. Compartment One and Compartment Two. Compartment Two will be further split into Well drained soils and Peat/Poorly drained soils, whereas Compartment one only has Peat/Poorly drained soil present in it.

Compartment One

Compartment One, which occupies the west of the PAA, and contains the rivers Owenriff_010, Owenriff_020, the western areas of the rivers Drimneen_010 and the Ballycuirke_010 and the lakes Lettercraffroe, Acogga and Buffy. The Compartment comprises three aquifers which are Poor Bedrock Aquifer, Moderately Productive only in Local Zones (PL), Locally Important Bedrock Aquifer, Moderately Productive only in Local Zones (LL) and Locally Important Bedrock Aquifer, Generally Moderately Productive (Lm).

The rock units in this compartment comprise of Precambrian Quartzites Gneisses & Marbles, also Granites and other igneous rocks. Within these rock types the main flow paths are in a thin upper fractured zone, this would indicate that groundwater flow is limited. Also, the subsoil in Compartment one is dominated by blanket peat, this would also indicate that deep groundwater flow is limited and run off to rivers is flashy and the drainage density within this compartment is high.

Low permeability and DTB<3 metres dominates this compartment, given the low permeability a high proportion of the rainfall will quickly discharge to the rivers and streams in the Compartment. The low permeability soils will eliminate a pollutant such as nitrate reaching a waterbody due to denitrification, however if present phosphate, ammonia, pesticides and pathogens will runoff the soils and into the streams. Also, the phosphate PIP and phosphate susceptibility map would indicate in this compartment that there is a very high chance of phosphate runoff.

Given that the flow is restricted to a thin upper most fractured zone in the aquifer and there is low permeability soil the mean flow pathway in this compartment is overland flow/near surface runoff/drains/etc.

Pathway – Overland flow

Compartment Two

Compartment two contains the east side of the rivers Ballycurke_010, Drimneen_010 and a small part of the Owenriff_020 as it flows into Lough Corrib, it also contains the lakes Ross Gy, Parkyflaherty and Ballyquirke lough. The compartment comprises of one aquifer which is Regionally Important Aquifer – Karstified (conduit). The rock unit in this compartment is Dinantian pure bedded limestone. The sub soils are dominated granites sand and gravels, karstified limestone bedrock at surface and limestone till.

Permeability ranges from low to high permeability, there are large areas of DTB<3 in this compartment, high permeability is concentrated at the top of the Ballycurke_010, moderate permeability is located around Ross and Ballyquirke lake, low permeability is concentrated in the eastern side of the Ballycurke_010 and also runs along the either side of the Ballycurke_010 as it flows towards Ross lake. In the high permeability areas. Groundwater vulnerability in this compartment ranges from X extreme to low. The soil in compartment two is made up of well-drained soil and poorly drained soil.

The well-drained soil is located in the areas of high to moderate permeability, within these areas there will be minimal attenuation of nitrate and will reach the waterbody via vertical groundwater flow. Phosphate will be attenuated in high permeability areas, it will also be attenuated in moderate permeability areas as will ammonia, pesticides and pathogens, the drainage density in the moderate permeability soils will be generally low and the main flow path will be vertical and the pollutant, which will be nitrate will reach the waterbody via groundwater flow. In the low permeability soils, peat/poorly drained soils dominate, groundwater would be well protected from nitrate in these areas but if present, phosphate, ammonia, pesticides and pathogens will readily run off into streams/rivers if the pathway is not intercepted. The main pathways in this compartment is **groundwater flow** and **overland flow**.

Pathway - Groundwater flow

Pathway - Overall land flow in areas of low permeability soil

Owenriff PAA Desktop Assessment

Table 7: Conceptual model table

| | | Compartment 1 | Compartment 2 | |
|------------------------------|---|--|---|---|
| | | PI – Poor Bedrock Aquifer, moderately productive only in local zones LM – Locally important bedrock Aquifer, generally moderately productive LI – locally important bedrock Aquifer, moderately productive only in local zones | RKc – Regionally Important Karstified bedrock Aquifer | |
| | | Compartment 1.1 Peat/Poorly drained | Compartment 2.1 Peat/Poorly drained | Compartment 2.2 well drained |
| Pathway Info | Direct (e.g. pipe) | Oughterard WWTP | No | Moycullen WWTP |
| | Aquifer | PI, LM, Li | RKc | RKc |
| | Topography | Flat | Flat | Flat |
| | Soil | Peat and poorly drained | Peat/Poorly drained | Well drained |
| | Subsoil | Blanket Peat and Granite Till | Cut peat and limestone till (Carboniferous) | Granite sand and Gravels Acidic esker sands and gravels Karstified limestone bedrock at surface Limestone till (Carboniferous) |
| | Subsoil K | | | |
| | Rock Unit | Precambrian Quartzites, Gneisses & Schists Precambrian Marbles Granites & other Igneous Intrusive rocks | Dinantian Pure Bedded Limestone | Dinantian Pure Bedded Limestone |
| | Groundwater vulnerability | Moderate to X extreme | Mostly Moderate to X extreme | Mostly X extreme, with small pockets of extreme and high vulnerability |
| | Karst Features | Borehole | Swallow Hole Enclosed Depression | Swallow hole (8) |
| | PO4 Susceptibility | Moderate to high | High to very high | Mostly very low |
| | NO3 susceptibility | Subsurface = Very low Surface Water = Very low to Moderate | Subsurface = Very low Surface water = very low to high | Subsurface Water = high to very high Surface water = moderate to high |
| PO4 PIP | Predominantly Rank 4 to 7. Small pockets to the north of Lough Bofin along the Letterfore river with high Rank PIP of 1 and 2. High rank PIP also surround Lough Adrehid and Aggrafard. | Rank 4 to 7 | | |
| NO3 PIP | Rank 6 to 7 | Rank 1 to 5 | | |
| Flowpaths | Overland flow, near surface flow, Drains | Overland Flow | Groundwater flow | |
| Significant pressures | HYMO Forestry Peat Extraction Agriculture | HYMO Urban Wastewater DWWTS | | |

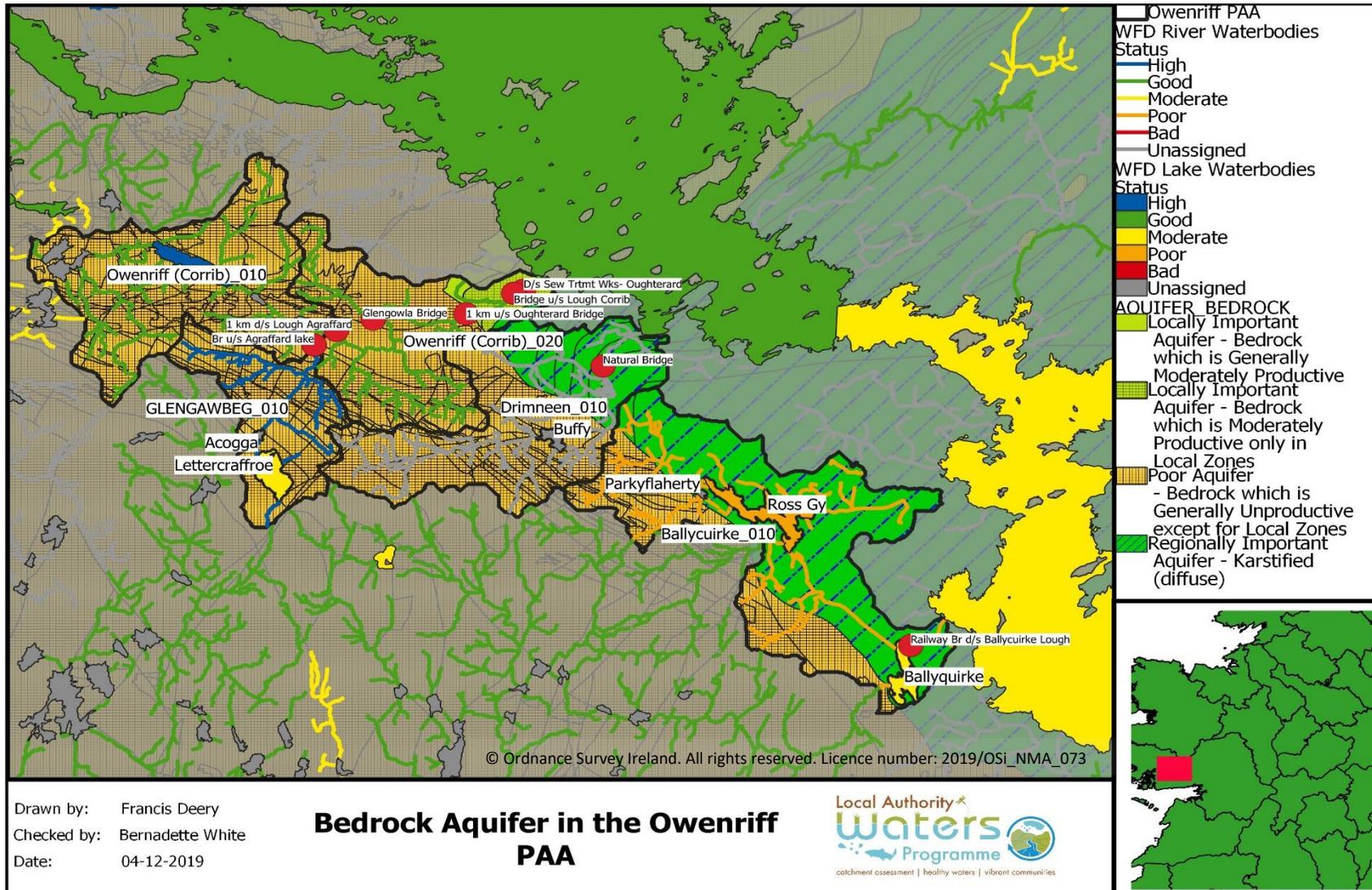


Figure 32: Bedrock Aquifer in the Owenriff PAA

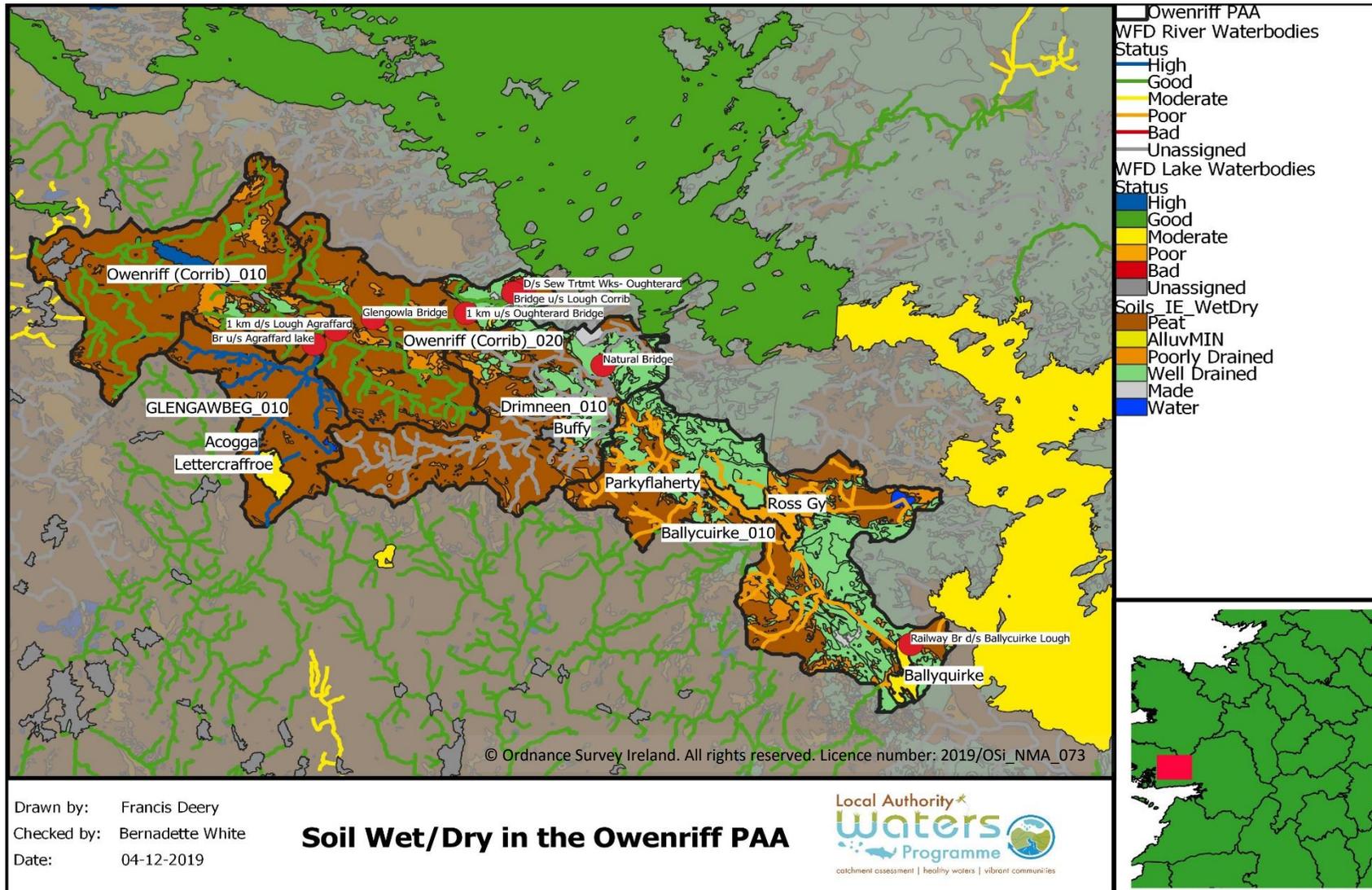


Figure 33: Wet/Dry Soils in the Owenriff PAA

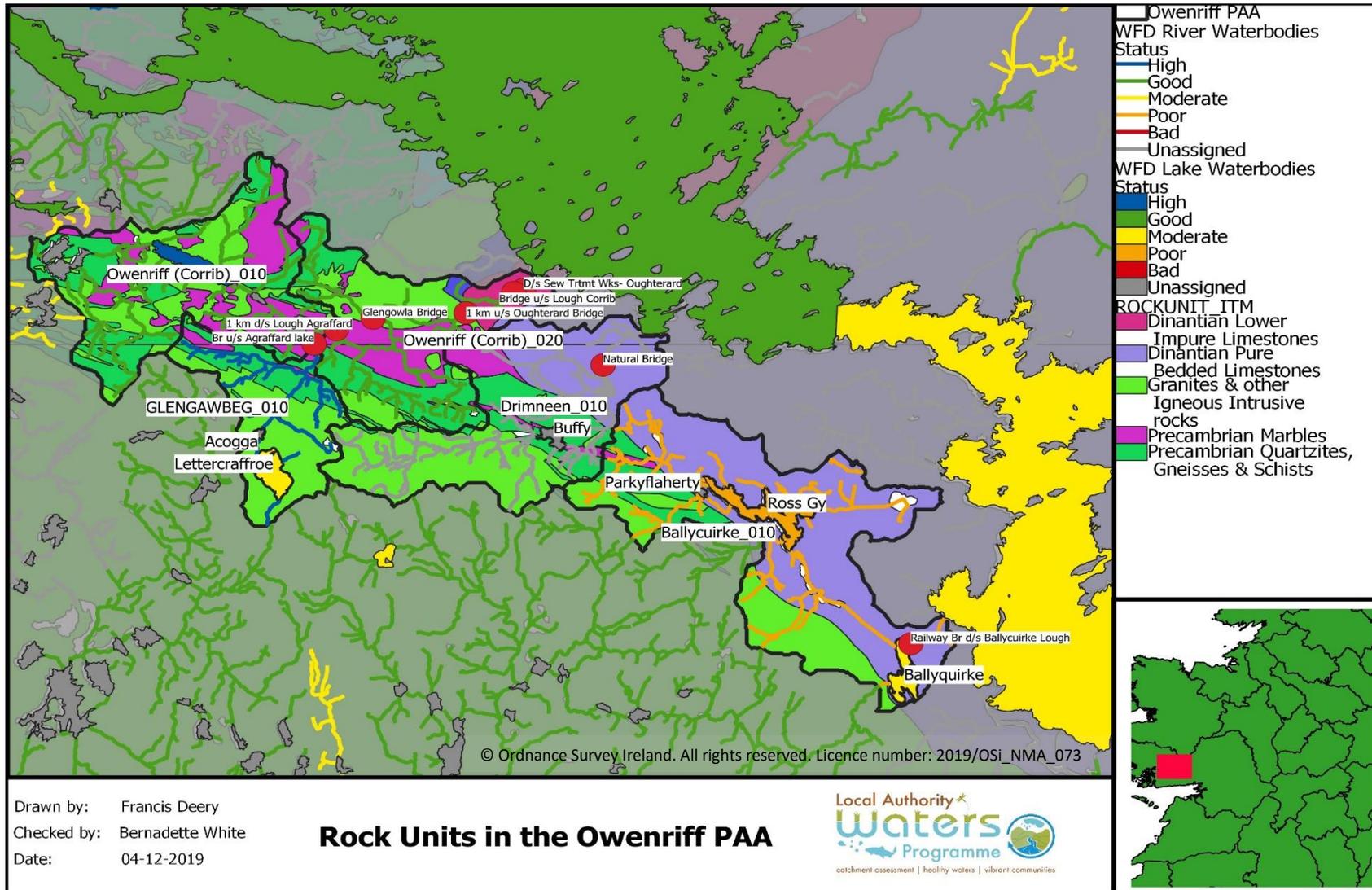


Figure 34: Rock Units in the Owenriff PAA

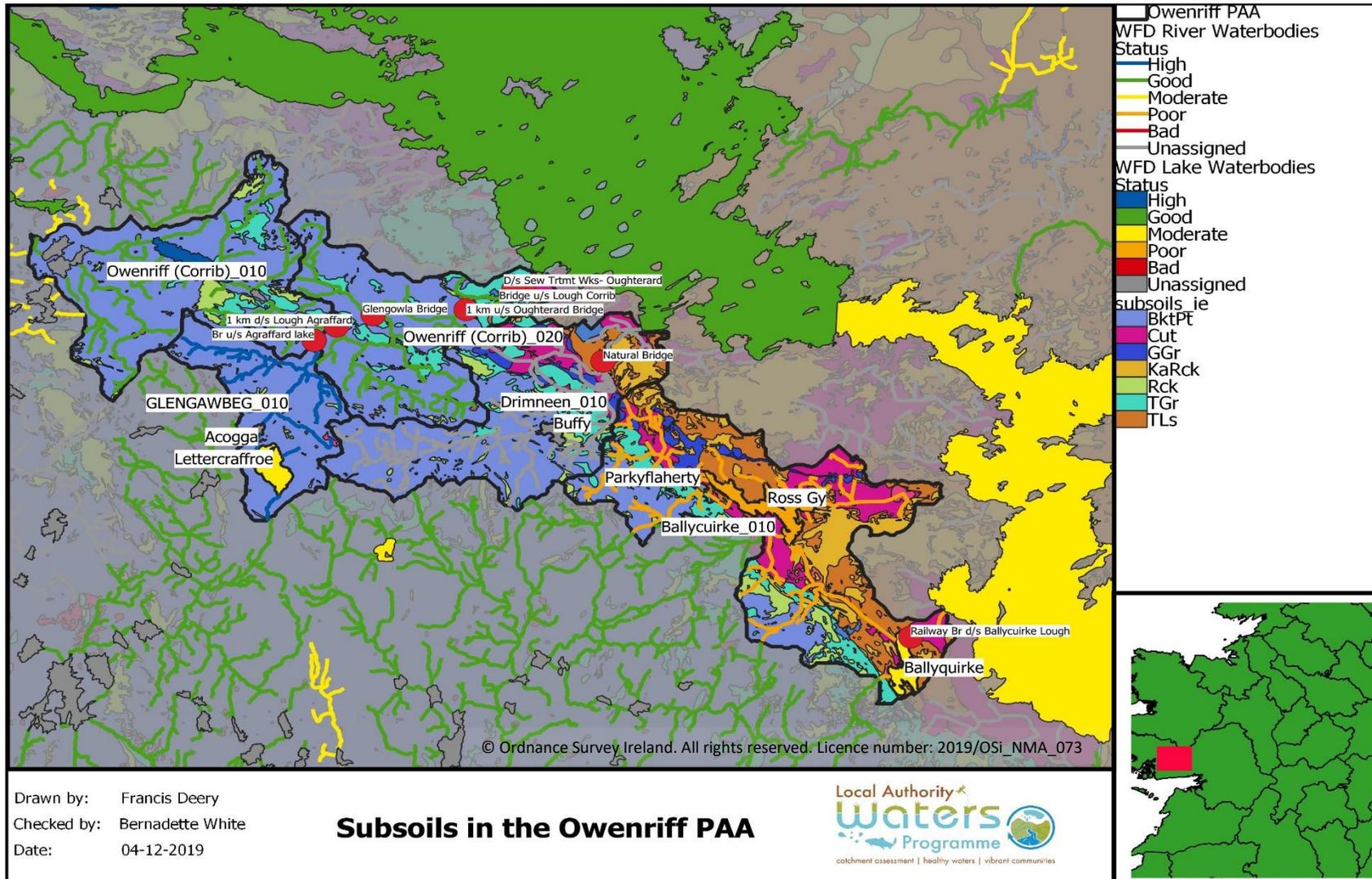


Figure 35: Subsoils in the Owenriff PAA

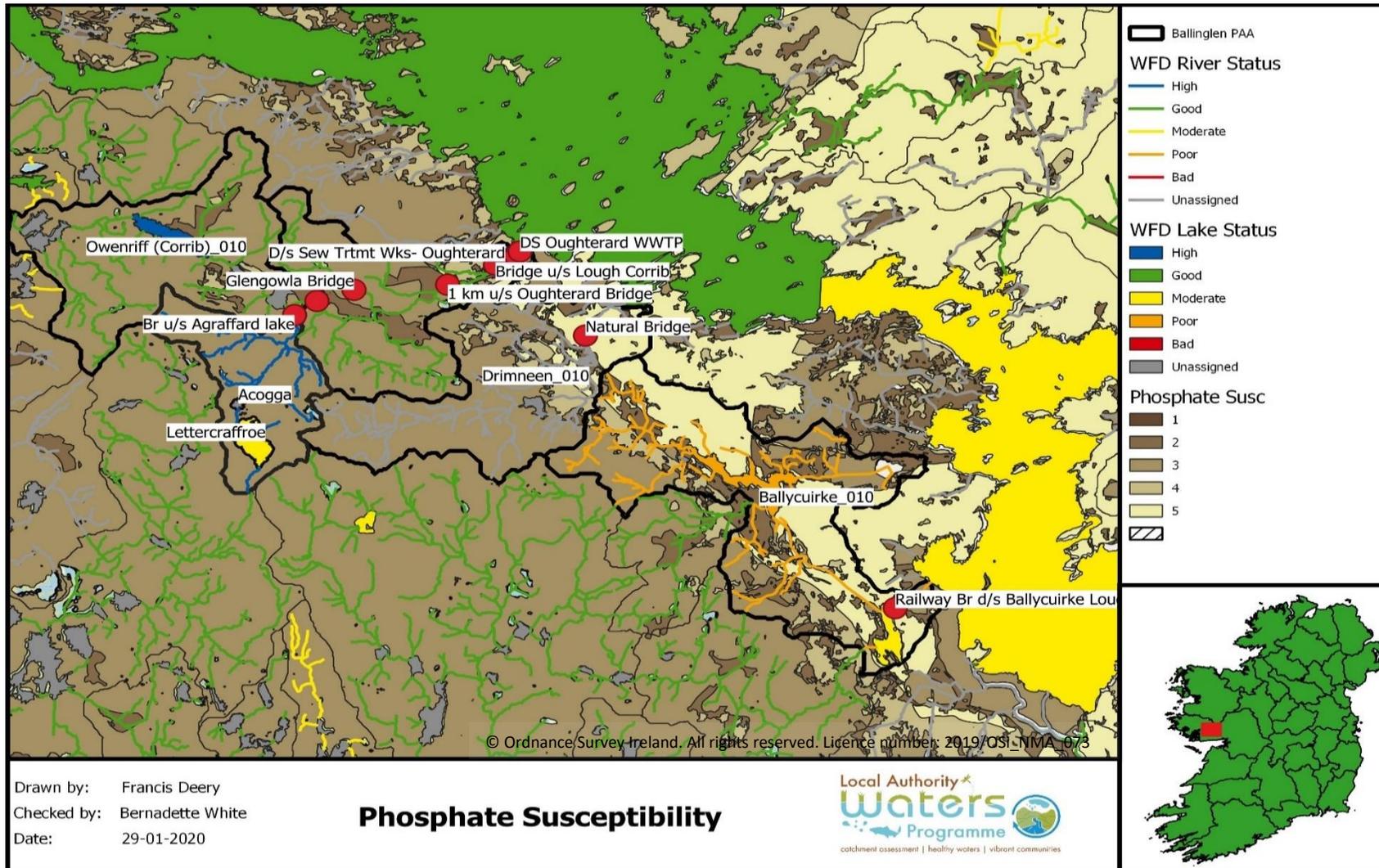


Figure 36: Groundwater Vulnerability in the Owenriff PAA

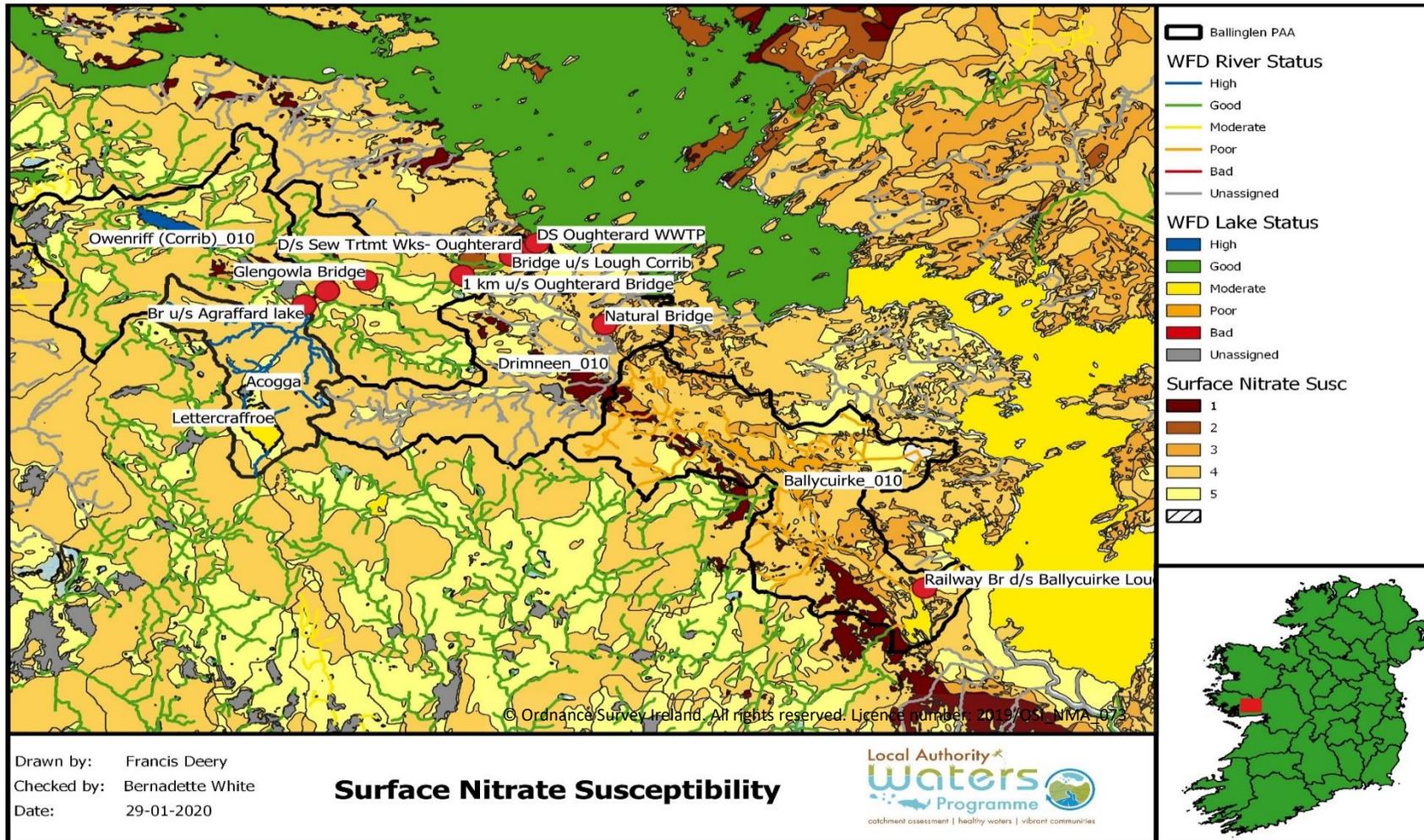


Figure 37: Surface Nitrate Susceptibility in the Owenriff PAA

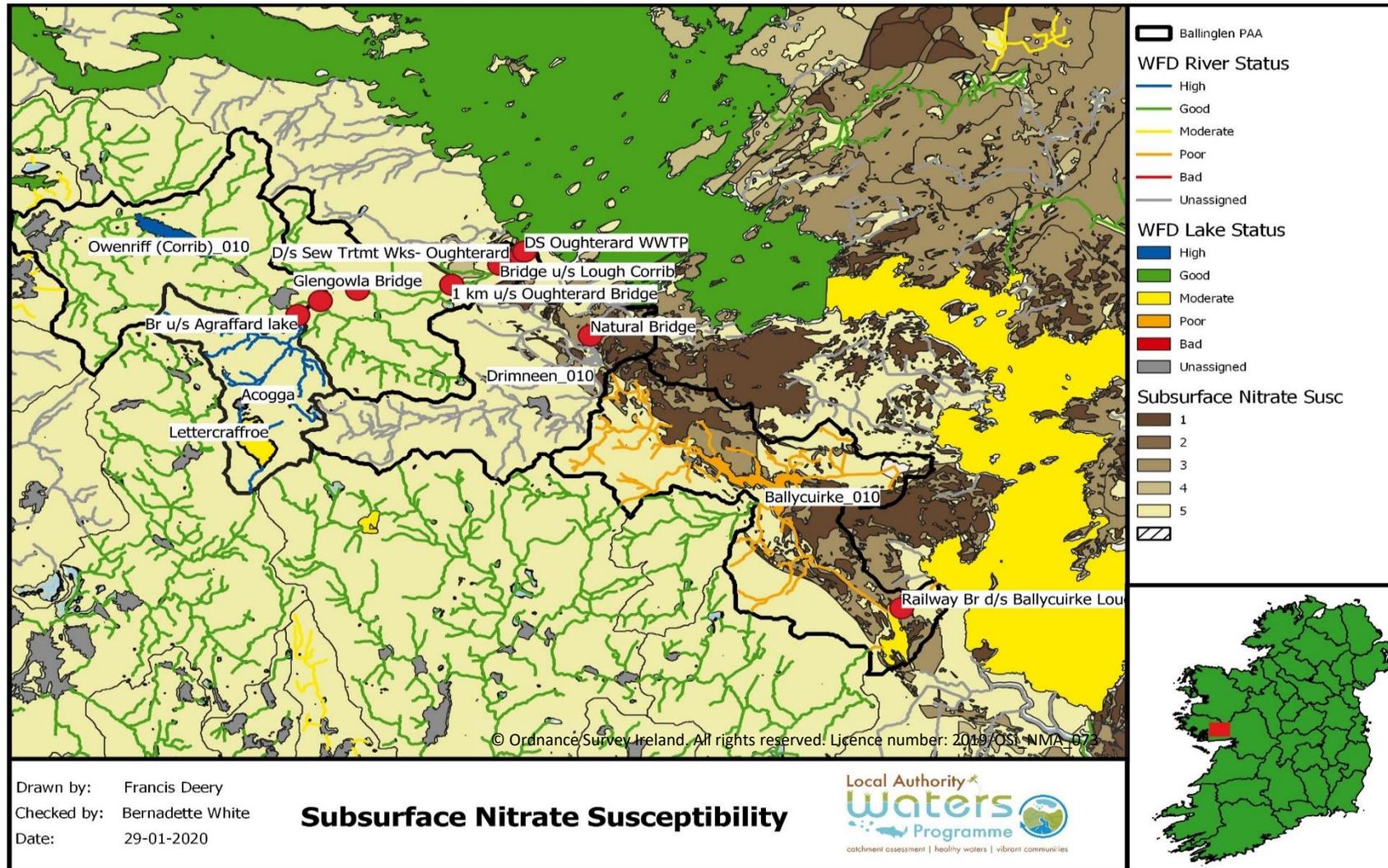


Figure 38: Subsurface Nitrate Susceptibility

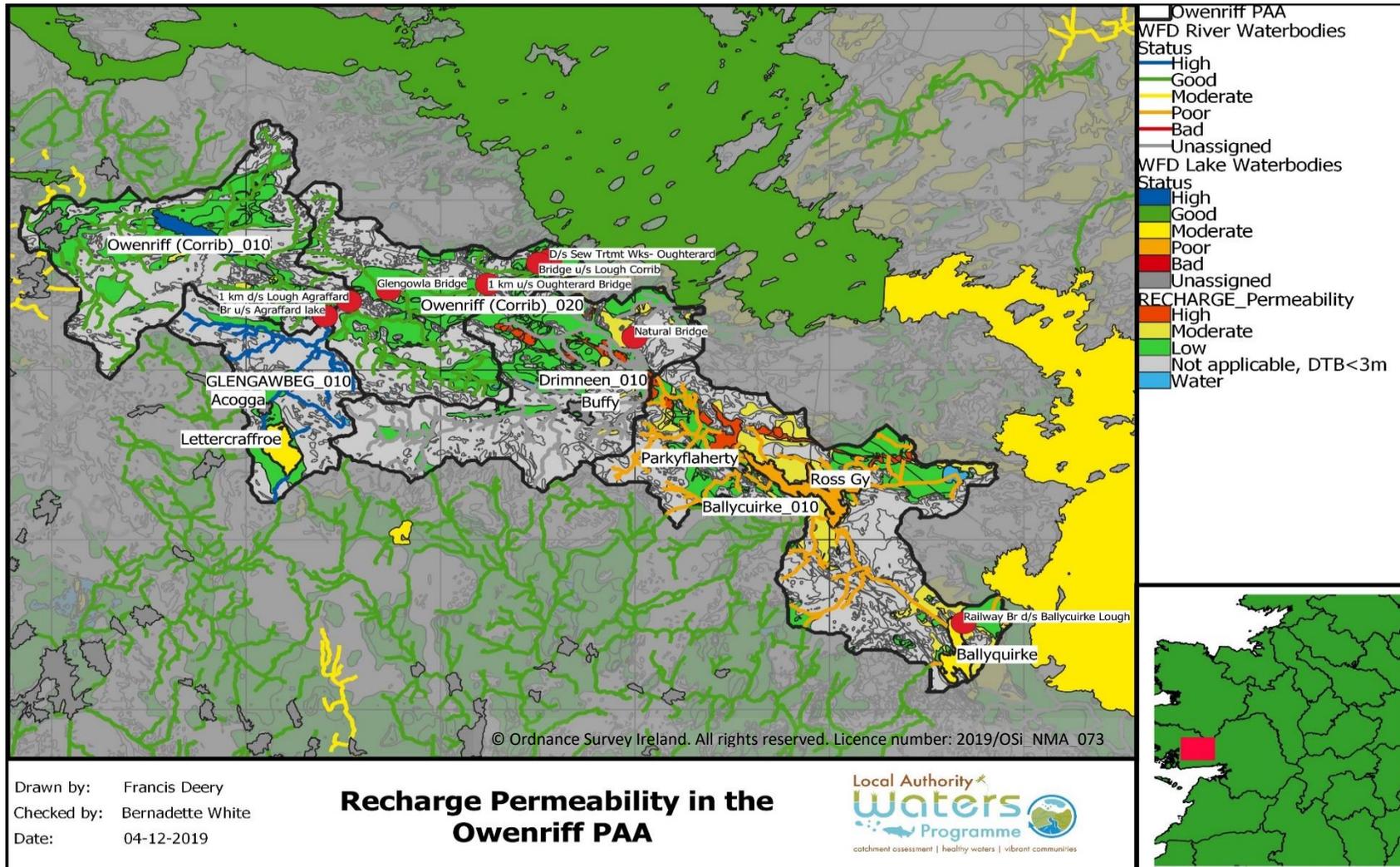


Figure 39: Recharge Permeability in the Owenriff PAA

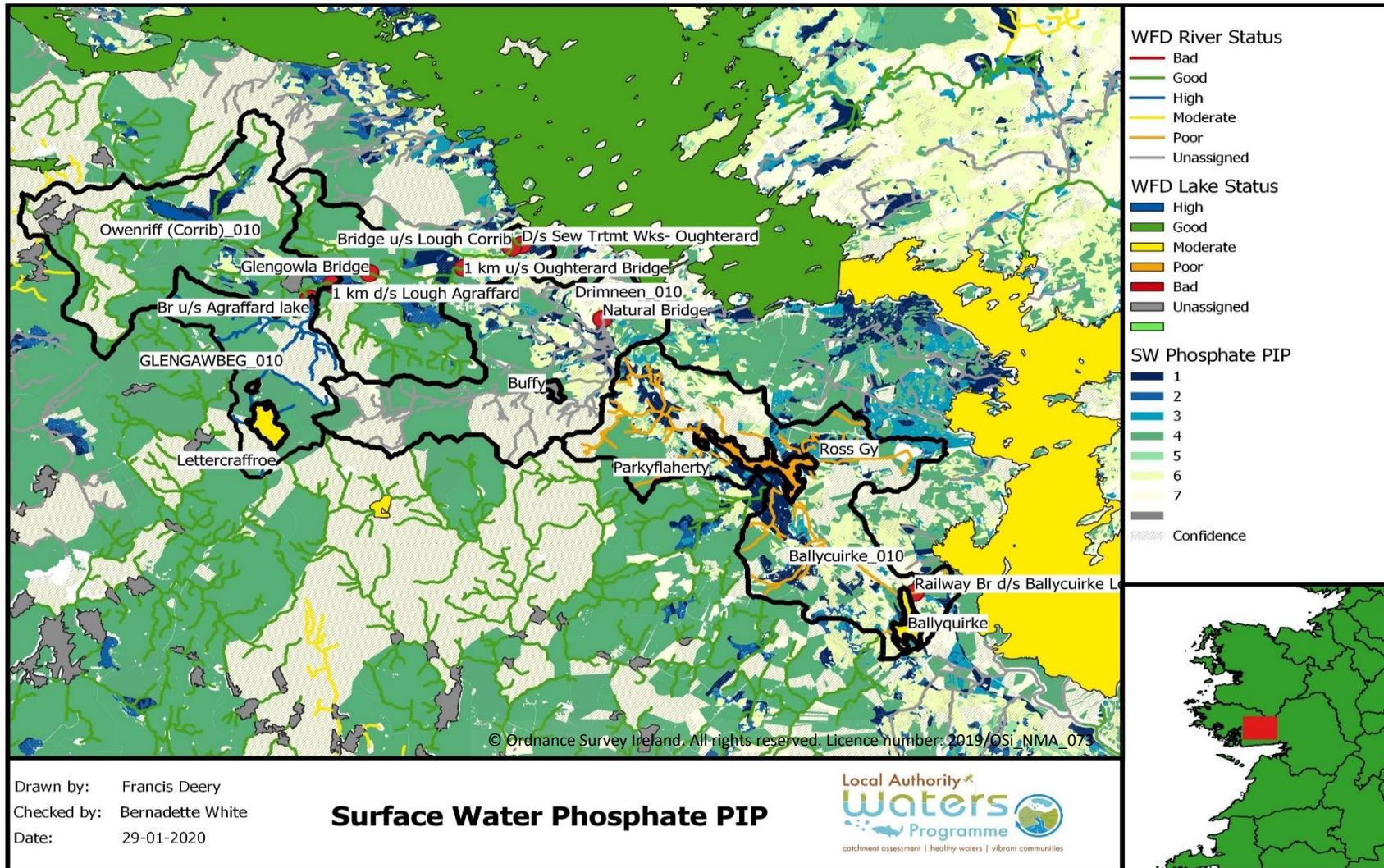


Figure 40: Phosphate PIP of the Owenriff PAA

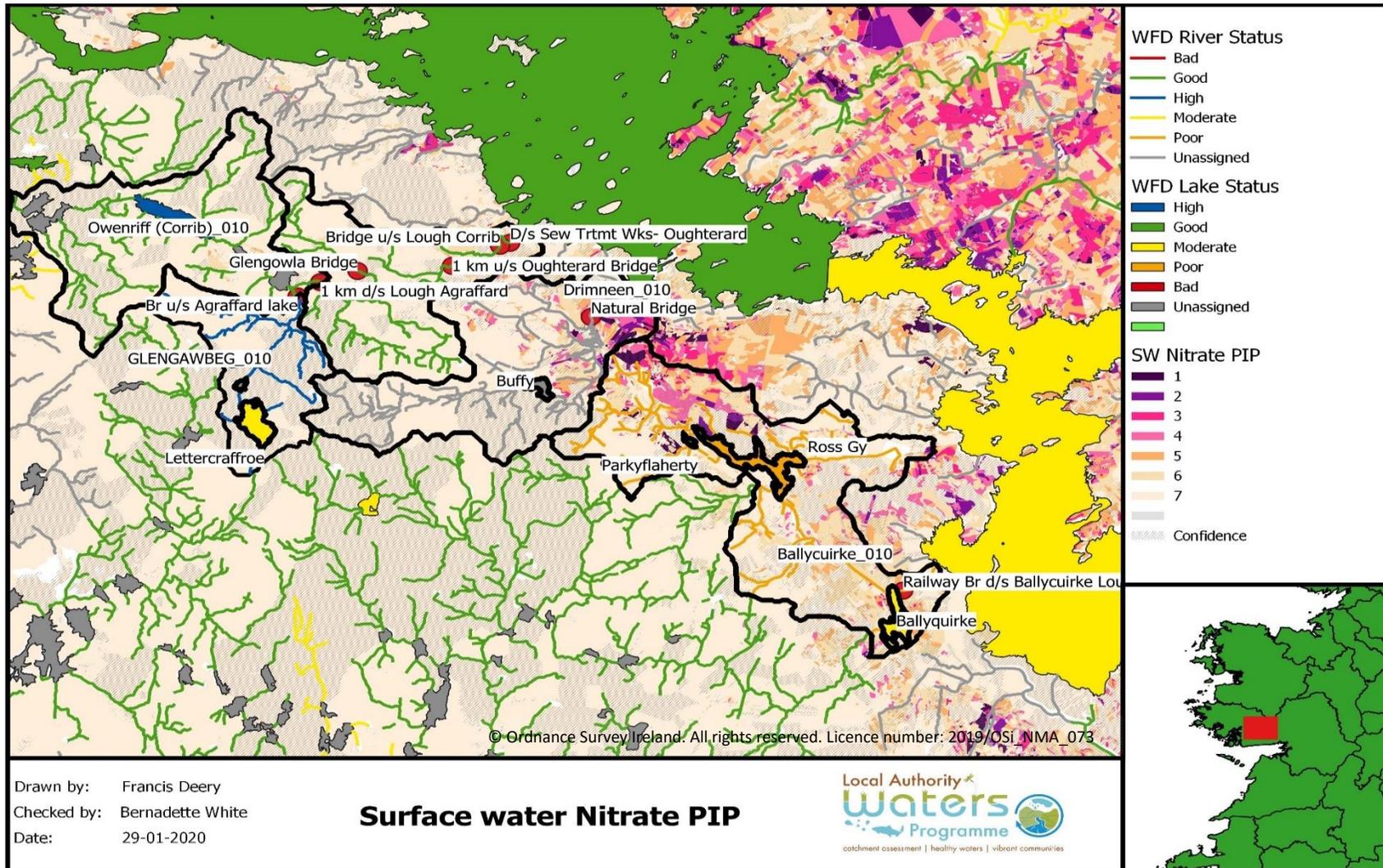


Figure 41: Surface Water Nitrate PIP Map of the Owenriff PAA

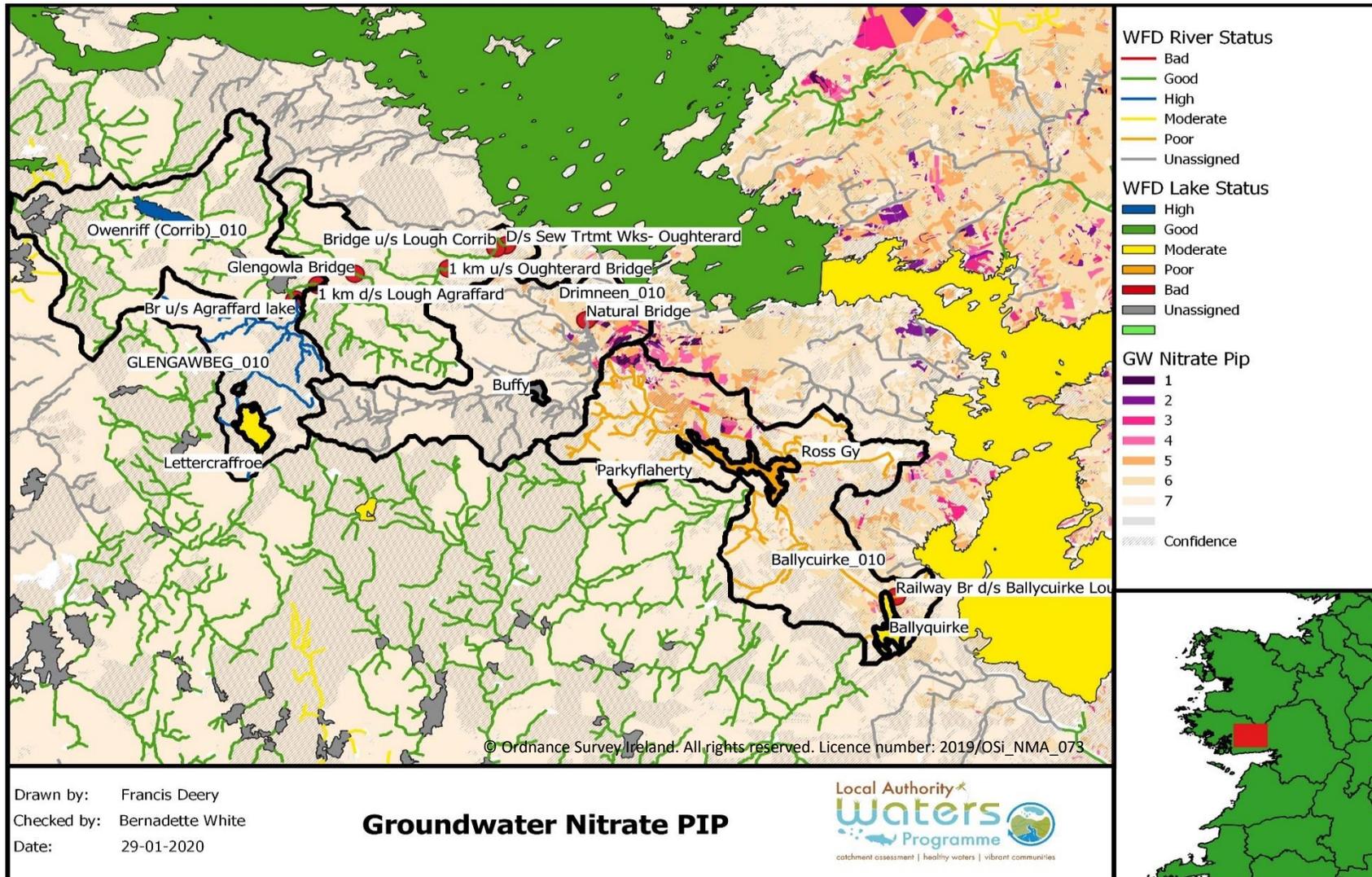


Figure 42: Groundwater Nitrate PIP Map of the Owenriff PAA

5 Interim Story of the PAA

5.1 Owenriff_010

- Owenriff_010 is at good ecological status. Hydromorphological is the driving element for this water body and is preventing the achievement of the high-status objective for this waterbody.
- The Owenriff_010 is monitored at the EPA operational monitoring point, “1km d/s of Lough Agraffard” where the Q value is Q4 – 5 and therefore achieving high status. There is no chemistry data for this waterbody.
- The significant pressure impacting on this waterbody is hydromorphology, which is altering the physical habitat of the river. The Corrib – Clare OPW arterial drainage scheme is present in this waterbody and there are historical land drains leading into the main river channel.
- The soil type in the Owenriff_010 is peat/poorly drained soil, indicating the main pathway of overland flow.
- There are areas through the Owenriff_010 where there is high phosphate PIP, indicating a high chance of diffuse phosphate entering the waterbody.
- The LCA will identify if there are significant hydromorphological pressures at the water body scale as opposed to the local scale at the monitoring point.
- Results will be made available to the EPA to assist with the validation of the National Hydromorphology Assessment work.

5.2 Owenriff_020

- The Owenriff_020 is at bad ecological status due to the fish status of 2018, the objective of this waterbody is high ecological status by 2027.
- The Owenriff_020 is monitored at 4 monitoring points, two of which are Q4 – 5 and the other two are Q4. All the chemistry is below the EQS for ammonia, nitrate and phosphate.
- At the monitoring points 1km u/s of Oughterard Bridge, bridge u/s Lough Corrib and D/S of the WWTP show incidences of high BOD.
- The main pressure impacting upon this waterbody is hydromorphology, which is altering the physical habitat of the river. The Corrib – Clare OPW arterial drainage scheme is present in this waterbody and there are new drains opened, leading into the main river channel.
- The soil type in the Owenriff_020 is peat/poorly drained soil, indicating overland flow would be the main pathway for nutrients/sediment to reach the waterbody.
- There are areas of high phosphate PIP in the Owenriff_020.
- The LCA will identify what effects the drainage scheme and the new drains are having on the ecological status of the Owenriff_020.

5.3 Drimneen_010

- At the time of the initial EPA characterisation the Drimneen_010 was at unassigned status, in 2018 a biological sample was taken by the EPA which returned a result of Q4. There it was assigned good ecological status. The Drimneen_010 is monitored at the monitoring point “Natural Bridge”.
- There are no chemistry data for this waterbody.

- The main pressures in this waterbody are noted as forestry and peat extraction in the initial characterisation.
- The Corrib – Clare arterial drainage scheme is present in the Drimneen_010, in the lower half of the waterbody, but did not extend up to the upper half of it. In the lower half of the waterbody, is productive agricultural land, while the upper half is dominated by blanket peat, and low intensity grazing by sheep and some cattle.
- The soil type in the Drimneen_010 is both peat/poorly drained and well-drained soil, the well-drained is in the lower part of the Drimneen_010 and the peat/poorly drained soil is in the upper part of the waterbody. Indicating both an overland flow and groundwater flow pathway.
- The LCA will include carrying out an SSIS and chemistry sample at the EPA monitoring point to confirm the good ecological status result from 2018.

5.4 Ballycuirke_010

- At the time of the initial EPA characterisation, the Ballycuirke_010 was at poor ecological status, however from 2018 the Ballycuirke_010 is at moderate ecological status. The Ballycuirke_010 is monitored at the EPA operational monitoring point, railway Br D/S Ballycuirke Lough.
- At the monitoring point Br u/s Ballycuirke Lough and the monitoring point Downstream Monitoring of TPEFF1200D0191SW001, there are exceedances in ammonia on a number of occasions in 2017, 2018 and 2019. It is also at these points where there are exceedances in BOD and high total nitrogen is recorded as well.
- The main pressures impacting this waterbody are DWWTS, Urban wastewater and hydromorphology.
- The soil type in the Ballycuirke_010 is both peat/poorly drained soil and well-drained soil, the peat/poorly drained soil is located in the western part of the waterbody while the well-drained soil is located in the south-east part of the waterbody. Overland flow pathway would be present in the west of the Ballycuirke_010 catchment while groundwater flow would exist in the east of the catchment.
- The LCA will identify what impact if any the DWWTS, Urban wastewater and hydromorphology is having on the Ballycuirke_010.

5.5 Lettercraffroe

- At the time of initial characterisation, the Lettercraffroe was a moderate ecological status due to the phytobenthos, however the lake has moved up to good ecological status from in 2018.
- The receiving and inputting waterbody is the Glencawbeg_010 river, which is at good ecological status.
- There are exceedances in chlorophyll in 2015 however chlorophyll concentrations have dropped since that year, the chemical status of the lake is failing.
- The main pressure impacting upon the lake is forestry, it is a mix of state owned and privately-owned forestry.
- The soil type located around the lake is peat/poorly drained soil.

5.6 Ross GY

- The Ross lake is at poor ecological status due to the fish, the fish has been at poor status since 2010.
- The chemistry is all below the EQS.
- The main pressure impacting on the lake is invasive species, Zebra Mussels.
- There are both peat/poorly drained soil and well-drained soil in the area of the lake, indicating both overland and groundwater flow pathways.

5.7 Ballyquirke Lough

- The Ballyquirke Lough was at the time of the initial characterisation at moderate ecological status due to the macrophytes, however in 2018 it has dropped down to bad ecological status once again due to the macrophytes. Total phosphorus, ammonia and the chlorophyll are all below the EQS.
- The inputting and receiving waterbody is the Ballycuirke_010 which is at moderate ecological status.
- The main pressures impacting upon the Ballyquirke lough are urban wastewater and invasive species.
- In an investigative assessment carried out in 2014 by the EPA, it was found that the Urban wastewater treatment plant in Moycullen was not significantly impacting on the lake.
- The main soil type around the Ballyquirke lough is well drained soil.

5.8 Acogga

- The Acogga is currently unassigned.
- The main pressure impacting seen to be impacting on the Acogga lake is forestry, there is both private and state-owned forestry in the vicinity of the lake.
- The Glencawbeg_010 is the inputting and receiving waterbody, which is at good ecological status.
- There is an IA1 for the EPA to liaise with the forest service in relation to the effects of the Galway wind park on the lake.

5.9 Parkyflaherty

- The Parkyflaherty is currently unassigned
- The main pressures seen to be impacting upon this lake are agriculture and forestry.
- The inputting and receiving waterbody are the Ballycuirke_010 which is at moderate ecological status.
- The LCA will determine what impacts if any are coming from the forestry and agriculture.

5.10 Buffy Lough

- The Buffy Lough is currently unassigned.
- The main pressures impacting upon the lough are water abstraction and treatment and forestry.
- The inputting and receiving waterbody is the Drimneen_010 which is currently at good ecological status.

6 Work Plan

6.1 Owenriff_010

IA8 High status RWB pressures - Hydromorphological status (Good) is driving overall ecological status (Good) and impacting this water body from meeting its High Ecological Status objective. Based on the individual RHAT elements, it is difficult to identify a significant hydromorphological pressure. The development of the EPA morphological assessment will help assess/address this.

Review the outcome of the EPAs hydromorphology assessment review in relation to the Owenriff_010 and the HYMO status of the Owenriff_010 which is downgrading the status of this high-status objective waterbody.

Carry out an SSIS and chemistry sample (currently no chemistry data available) at the EPA monitoring point and undertake a catchment drive to understand potential catchment wide hydromorphology issues.

6.2 Owenriff_020

IA8 High status RWB pressures - Arterial drainage exists within this water body. There is a High HYMO/bio status site within this water body - other four sites are of Good invert status - appears like this is reflecting localised conditions. EPA to develop a morphological assessment to assess/address this issue.

Carry out an SSISs and record landscape features at the EPA monitoring points in this waterbody. Also, SSISs will be carried out at other sites along the Owenriff_020, landscape features, simple chemistry and observations of instream vegetation such as macroalgae and macrophytes will be recorded.

Carry out stream walks to identify any issues arising from forestry, agriculture and to survey the impacts arising out of the hydro morphological pressures present in the river.

6.3 Drimneen_010

A3 Determination of Water Quality (unassigned waterbody) - Collect field parameters (DO, pH, conductivity and temperature), water quality and SSRS from the subbasin outlet. If pass, no further action. If fail, IA7 on forestry, peat and impacts from the lake.

The LCA will include carrying out an SSIS and chemistry sample at the EPA monitoring point to confirm the good ecological status result from 2018.

If impacted, this results will be recorded on the WFD App, and a future strategy will be developed by the EPA in regards to assigning a water framework directive status to unassigned waterbodies.

6.4 Ballycurke_010

IA1 Provision of Information - EPA to follow up on IW report on Moycullen WWTP.

IA1 Provision of Information - EPA to discuss whether or not the RWB should be classed as heavily modified. If not, complete IA7 on nutrient sources from DWWTS. Tie into work being completed on Baaile Ui Choic which discharges into the RWB, upstream of the monitoring station.

Carry out SSISs and record landscape features at the EPA monitoring points in this waterbody. Also, SSISs will be carried out at other sites along the Ballycurke_010 where there are high risk DWWTS, landscape features, simple chemistry and observations of instream vegetation such as macroalgae and macrophytes will be recorded also.

Carry out catchment walks to survey the impacts if any associated with land drainage.

6.5 Lettercraffroe

IA1 Provision of Information - EPA to liaise with the forest service regarding best practice procedures during large scale felling. EPA to ensure that the windfarm development follows best practice to ensure there is no impact on the FWPM downstream.

Lettercraffroe has returned to good ecological status, therefore no LCA will be carried out on this lake.

6.6 Ross GY

IA1 Provision of Information- What is driving fish status to Poor and what measures, if any, can be introduced to bring fish status to Good.

Further liaising with IFI will be required to gain an understanding of what effects the zebra mussel is having on the fish population in the lake.

Upon further liaising with the IFI it will be decided what LCA if any will be required.

6.7 Ballyquirke Lough

IA1 Provision of Information - EPA biologists have completed research in the LWB and will discuss internally the metrics that are driving status and what measures, if any, can be introduced to improve biological status in the lake. Zebra mussels present.

6.8 Acogga lake

Follow the procedures of sampling unassigned lakes as and when these procedures are produced by the LAWPRO/EPA lakes working group.

6.9 Parkyflaherty lake

Follow the procedures of sampling unassigned lakes as and when these procedures are produced by the LAWPRO/EPA lakes working group.

6.10 Buffy Lake

Follow the procedures of sampling unassigned lakes as and when these procedures are produced by the LAWPRO/EPA lakes working group.

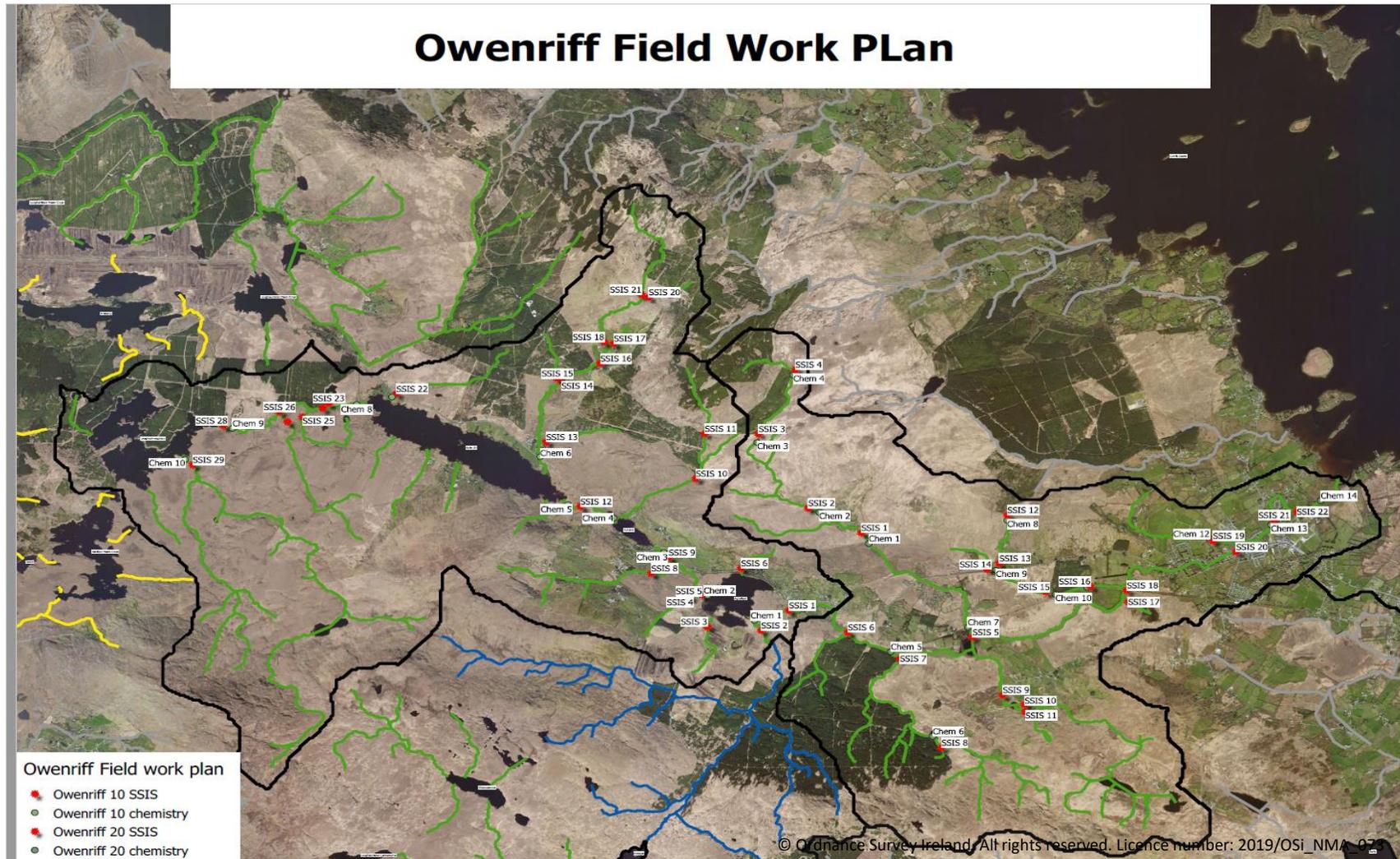


Figure 43: Field work plan for the Owenriff

Drimneen Field Work Plan



Figure 44: Chemistry sampling plan for the Drimneen_010

Drimneen Field Work Plan

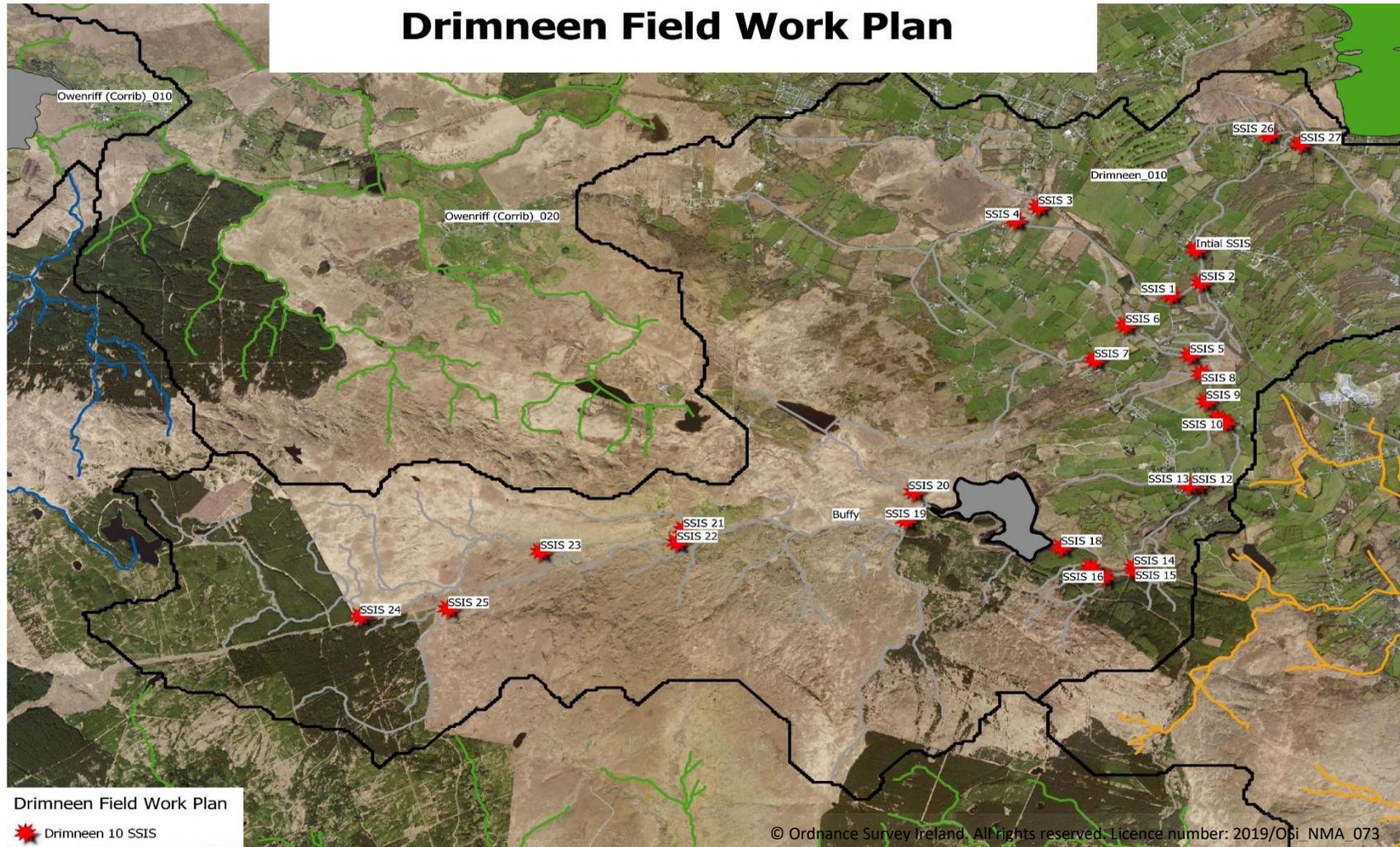


Figure 45: Biological sampling plan for the Drimneen_010

Ballycurke Field Work Plan

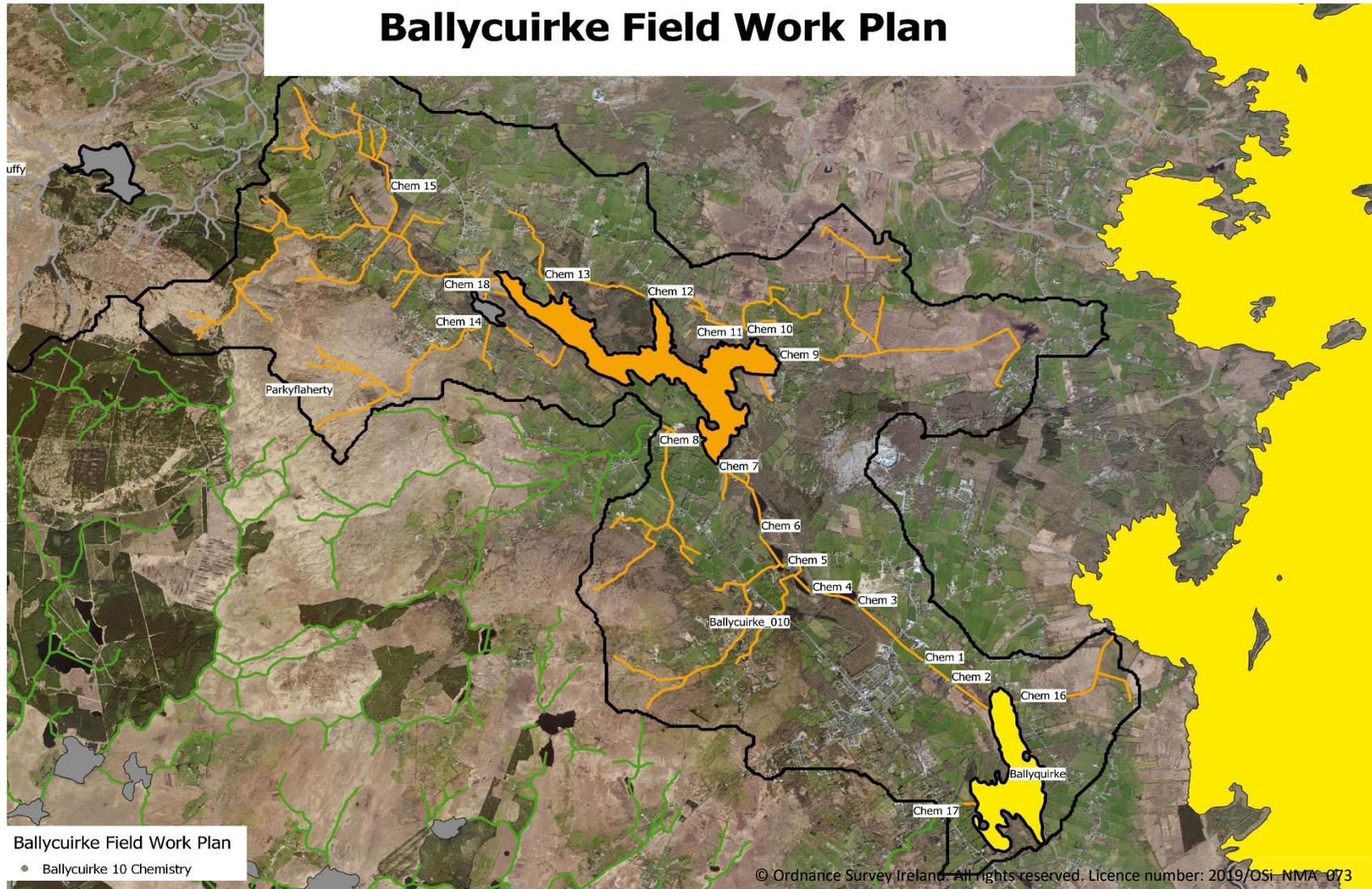


Figure 46: Ballycurke_010 chemistry sampling plan

Ballycurke Field Work Plan

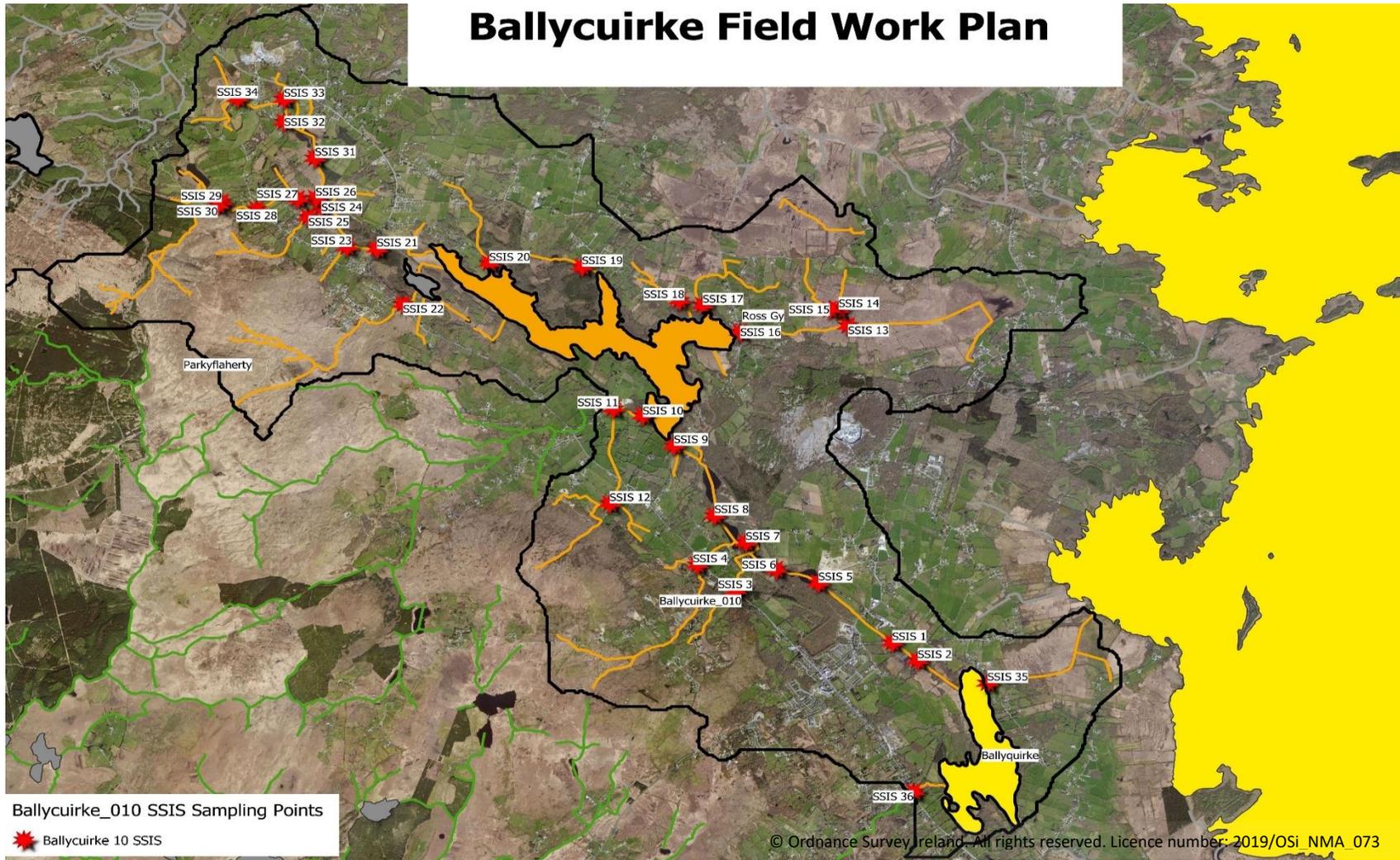


Figure 47: Biological sampling point for the Ballycurke_010

7 Review of possible mitigation options

7.1 Hydro morphology

In terms of hydro morphology, there are historic OPW arterial drainage schemes, liaising with the OPW will be required to determine how to restore the waterbodies affected in the Owenriff PAA to their natural habitat. There are also historic land drains leading into the four river waterbodies in the PAA that maybe transporting volumes of sediment to the waterbodies, drain blocking will be required in these cases.

7.2 Agriculture

Liaising with ASSAP will be required to identify the best mitigation options if any agricultural related issues are found while carrying out the LCA.

7.3 Forestry

Sediment loss is the main focus during forestry operations such as clear-felling. Mitigation measures may include inclusion of silt traps, drain blocking where appropriate.

General adherence to the Forest Service Regulations (2017) for other forestry operations such as afforestation and reforestation with the inclusion of sufficient riparian buffer zones and environmentally friendly constructed access roads.

8 Communications

A public meeting and farmers meeting was held in Killannin Community hall on the 21st of February 2019 the following table outline all the attendees.

Table 8: Attendees

| Organisation/affiliation | No. of attendees |
|--------------------------------------|-------------------------|
| LAWPRO | 4 |
| ASSAP | 1 |
| Moycullen fishing club | 1 |
| Carra, Mask, Corrib Water Protection | 3 |
| Residents Lean East | 1 |
| Galway CoCo | 1 |
| Lund University Sweden | 1 |
| NUIG/Resident | 1 |
| GMIT/Resident | 1 |
| Oughterard Anglers and Boating club | 4 |
| Aster Env. Consultants | 1 |
| Pearl Mussel Project | 1 |
| Lough Corrib Angling Federation | 1 |
| Tidy Towns Oughterard | 2 |
| Oughterard Anglers | 1 |
| Galway Course Angling Association | 1 |
| Moycullen Heritage | 2 |
| Other | 7 |

Following the presentation of the main points about the Owenriff PAA the audience had an opportunity to ask questions and make general commits on the presentation. The following is a list of the questions asked.

Q1 – asked during the presentation- Where is the Risk coming from, is it the 10% or the 20%? Note- This was in relation to Owenriff_010 and 020.

Q2 – Very passionate man described his long history of trying to protect the Owenriff and the Fresh Water Pearl Mussel. He runs a hatchery and while releasing fish into the system he identified several potential pressures including, a dead horse in the river and ring feeders.

The gentleman has been to the EU commission and High Court for various reason over the years all to protect the Owneriff. He is particularly concerned with forestry operation in the catchment.

Q3 – Man identified that there are drains into lough Kip, the water in these drains turns white in the summer and is chasing the trout out of the lake. He also said if we are not and enforcement agency then what are we going to do when we identify an issue.

Q4 – Very positive. A gentleman said it was great that we were there and giving our names and that the meeting was great. Now we can work together to fix the issues.

Q5 – Member of Moycullen Heritage Group spoke for a moment on the links between waterbodies and our shared heritage. His particular focus was on the canals and rivers near Moycullen. They have identified all the streams that cross the public roads in the area.

Q6 - The importance and rareness of some butterflies was outlined by a member of the audience and Catherine. They discussed the abundance of species and the habitats that it prefers. Methods to cut hedges without excessive harm were also outlined briefly.

Q7 – A gentleman identified “Section 8” housing development that is to be built in Oughterard. He said the development was near the river and would cause issues later.

Q8 – Asked “what happens if IFI ignore complaints”

Q9 – Do the council have plans for septic tanks?

Q10 – Is there any plan to use holding tanks and then pump sewage out of these rather than traditional septic tanks with soakage areas?

Q11 – Are there any plans for digestors for slurry?

There was also a farmers meeting held on the 1st of May 2019 in Oughterard in which up to 30 farmers attended the meeting. At this meeting issues such as nutrient pollution and good farmyard and good agricultural practice in relation to water quality was discussed.

Date of Completion: 31st January 2020