Clareen Priority Area for Action–Desk Study Summary

Below, we summarise the desk study findings for the Clareen Priority Area for Action (PAA), county Offaly. Desk study reports are, as the name suggests, written at our desks. To write these reports, we use information about each of the rivers that we assess. This is a water based assessment at a particular point in time (up to February 2019) to identify the issues and pressures. We get our information from:

- The Environmental Protection Agency (EPA)
- Local Authorities
- Inland Fisheries Ireland
- Irish Water
- The Department of Agriculture, Food and the Marine
- Other public agencies.

The desk study also includes information learned from the public where we hold a community information meeting specific to the catchment. We held a community information meeting in the Aghancon Community Centre, Aghancon in County Offaly on the16th May 2019.

In our desk studies, we examine a number of things:

- Quality–how the water quality has changed in the last 3 to 6 years.
- Importance–for example, if its water is used for drinking water, and if there are any rare plants or animals in it that we need to protect.
- Impacts from human activity–here we focus on impacts that damage water quality such as wastewater treatment, agriculture, forestry, physical changes to the water etc.

We complete desk studies first before starting our field-based assessments or local catchment assessments (LCAs). The accompanying LCA report contains the most up-to-date information on results from these assessments. This desk study was written in 2019.

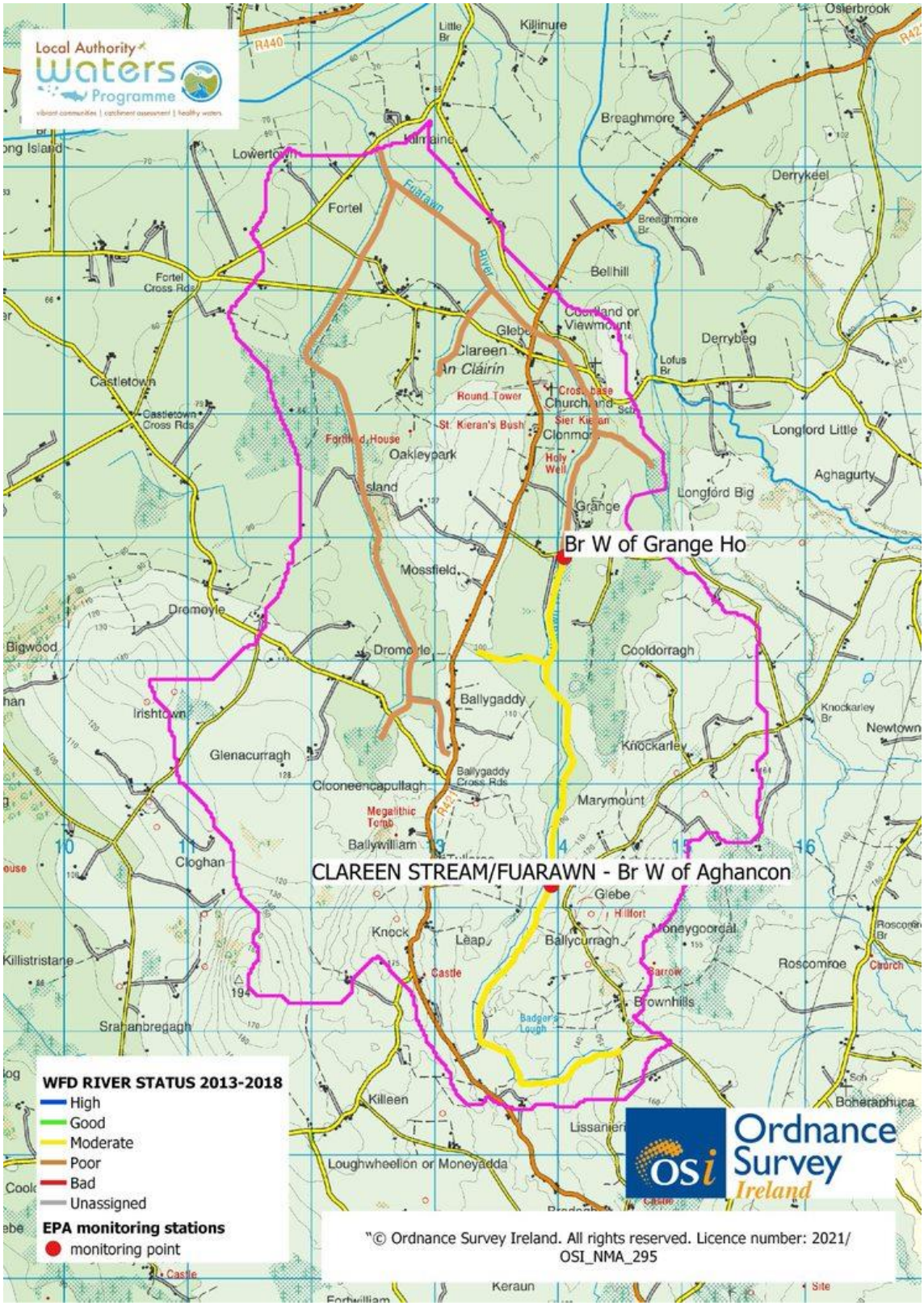
1. Background and Location

LAWPRO catchment scientists work in specific catchment areas called Priority Areas for Action (PAAs). A catchment is an area of land around a river, lake, or other body of water. Rainwater that falls within a catchment eventually flows into rivers, lakes, or directly into estuaries or coastal waters bringing with it any contaminants that may be in the landscape.

The total land area included in the PAA is based upon the combined catchment areas of each of the rivers. A river's catchment is derived from the topography of the landscape, where all water that falls onto that catchment area flows into one river. When the river is large, we spilt it into smaller, more manageable sections. Each of these river sections has a smaller catchment area with a unique code, which we call waterbodies. At the bottom of these waterbodies, there are monitoring points, which are used to measure the quality of the incoming water.

The Clareen PAA is in county Offaly and it is divided into two sections or waterbodies, which are distinguished by a unique number (shown in Map 1). The combined area of the waterbodies sub-basins is approximately 24 km². The Clareen stream is also known locally as the Fuarawn River.

- **Clareen Stream_010**: This waterbody rises at the south-eastern extent of the Camcor sub-catchment in an area known as Brownhills.
- **Clareen Stream_020:** This waterbody rises in the townland of Dromoyle and flows due north to where it joins with the Fuarawn River approximately 1.5 km north-west of the village of Clareen.



Map 1 **Clareen PAA 2013-2018 ecological status, location of monitoring points and waterbody catchment areas.**

2. Catchment Description

The main settlement in the catchment area of the Clareen PAA is Clareen village itself.

Agriculture is the main land-use in the catchment, with grassland making up the majority of the area. The geology and soil type within a catchment determines how water moves. The catchment has predominantly well-drained soils with some poorly drained soils and peat in places. The poorly draining soils are in the lowlands close to the river with drier soils in the higher areas, especially in the southern part of the catchment. There is an extensive area of peat and an associated fen in the north-west part of the catchment.

On the poorly draining soils in the PAA, water cannot easily soak into the ground and ponds. On the well-drained soils in the PAA, water is able to soak into the ground. From there it travels vertically into the underlying bedrock and to the groundwater. The water then moves horizontally through the bedrock and flows upward into the streams in the PAA. Groundwater contributes a lot of flow to the surface waterbodies.

The sub-catchment has a Special Area of Conservation (SAC), known as the Island Fen SAC, and is an important habitat for many protected aquatic plants, especially calcareous grasslands, and alkaline fens. Clareen Stream (Fuarawn)_020 runs adjacent to the SAC but the waterbody itself is not in the Natura area.

The sources for the Clareen/Aghancon Group Water Scheme (GWS) are outside the PAA boundary but supplies drinking water to customers within the PAA. The Aghancon well is currently not a source of water for the group water scheme.

3. Water Quality history in the Clareen PAA

Rivers are classified into five quality classes (status), with high being unpolluted and bad being the most polluted.

High	Good	Moderate	Poor	Bad

The Environmental Protection Agency assign status at (approximately) 3-yearly intervals based on the standards set out in European legislation, the Water Framework Directive. Status is based on many elements that altogether show the overall health of the river, for example, the ecology recorded in river habitats, the physico-chemical condition of the river (oxygen levels, nutrient concentrations, indicators of organic and chemical pollution etc) and also the physical condition of the riverbed and bank.

We need to make sure that the Clareen PAA achieves Good Status. We have reviewed water quality data available for each of the waterbodies (Table 1) and we have found that:

Waterbody	Status (2013–2018)	Our findings
Clareen stream_010	Moderate	The Moderate ecological status in 2013-2018 is as a result of Moderate Invertebrate Status. Invertebrates are insect species and include mayfly, stonefly, caddisfly and various worms and bivalves. They are food for fish and aquatic birds and are vital for healthy rivers. The upper monitoring point of the river last achieved Good status in 2011, while the lower monitoring point has remained at moderate since 2005. Slight siltation was noted by the EPA biologist. An assessment of one round of chemistry shows that nitrate is an issue to be investigated.
Clareen_020	Poor	The Poor ecological status in 2013-2018 is because of the Poor Invertebrate Status. This monitoring point fluctuates between Poor and Moderate since 2007. Moderate siltation was noted by the EPA biologist. An assessment of one round of chemistry shows that nitrate is an issue to be investigated.

Table 1: Water quality status and findings.

4. Sources of Pollution

Pollutants find their way to rivers by several paths:

- They can be through pipes directly connected to the river from large sources such as wastewater treatment plants, or small sources such as faulty septic tanks, farmyards, roadside drains.
- They can flow across the ground to the river when nutrients applied to the land as fertiliser wash off by rainfall before the crop and soil has absorbed them. This is usually a problem where soils are wetter and poorly draining, particularly during wet weather.
- Groundwater losses occur when pollutants move down through the soil and rock into groundwater and eventually into rivers, lakes, and coastal waters. This usually occurs when too much fertiliser is applied to land, or when the soil is not ready to absorb the nutrient (e.g., temperatures too cold, incorrect soil pH etc) and is common in free draining/ light soils.

From our desk study (Table 2), we have identified three potential pollution sources in the Clareen PAA, which we will examine further. These are agriculture, quarries, and hydromorphology (physical condition of the waterbody).

- Agriculture is a likely source of the elevated nutrient nitrate in both the Clareeen _010 and _020. On a well-drained soil, rather than ponding or travelling across the surface of the ground, water moves downwards through the soil and into the bedrock. From there it flows along groundwater flowpaths into the rivers. With nitrate issues we try to reduce amount lost to groundwater. We do this by reducing application on vulnerable areas and ensuring that the timing of applications follows best practice.
- Quarries have been identified as possible significant pressures by the EPA, however, the desk study indicates that the landowners may have been completed work to minimise the impact on the river. This will be investigated during fieldwork.
- Hydromorphology is where the river and land adjacent to the river are physically changed from their natural conditions. There is evidence of sedimentation at the monitoring point. Bank erosion and animal access are examples identified by the EPA as possible sources of sediment. These practices have consequences as sediment is released and settles in some places on the riverbed. This sediment affects fish and other life in the river.

We will examine further these sources and new potential pollution sources during field visits.

WB Name	WB Code	WB Type	Risk	Ecological Status				EPA Characterisation Significant Pressure Category (Sub-category) (2013-2015)	EPA Characterisation Significant Issue (2013-2015)	Desk Study Review Potential additional pressures (2019)	Desk study Review Potential Significant Issue (2019)
				2007-09	2010-12	2010-15	2013-18				
Clareen Stream/Fuarawn_010	IE_SH_25C130200	River	At risk	M	M	M	M	Pasture Quarries	Nutrients Sediment	Animal access	Nitrates
Clareen Stream/Fuarawn _020	IE_SH_25C130600	River	At risk	P	M	M	P	Pasture Quarries	Nutrients Sediment	Bank erosion	Nitrates

Table 2: Ecological status, pressures, and significance in the Clareen PAA

5. Engagement

Community Engagement Meeting

We held a community information meeting on the16th May 2019, in the Aghancon Community Centre, Aghancon in County Offaly, to tell the public about our work and to hear about water quality concerns from people living in the area.

There was interest in the proposed DWWTS grant and it surprised some that there was a lack of fish in the river. The maps of the area received a lot of attention and prompted excellent discussion on local issues such as new springs appearing within the catchment.

Farmers' Meetings

Agricultural Sustainability Support and Advice advisors from Teagasc and Arrabawn Co Op held an information meeting for farmers within the PAA. During this meeting, the advisors gave details of the supports available for farmers in this catchment.

6. Local Catchment Assessment

The desk study helps us inform our approach for undertaking our own fieldwork or local catchment assessment (LCA). LAWPRO's catchment scientists will carry out fieldwork to identify areas with highest impact. We will collect water samples to learn about the nutrient levels in the rivers. We will walk selected stretches of the river to identify where nitrate, ammonium, ortho-phosphate, and other pollutants are being lost from the land. We will measure the dissolved oxygen, pH, temperature, and conductivity at each site.

As part of the LCA we will also be undertaking streamflow analysis and water chemistry analysis. Using this approach, we can calculate the nutrient load (nitrates) coming from different stretches and tributaries along the streams.

Based upon the results of the scientific methods outlined above, we will carry out focused stream walk on the worst affected sections of main channel and incoming tributaries.

If agricultural activity is confirmed as a significant source of pollution, LAWPRO will communicate the LCA findings to the ASSAP advisor for the area who will work closely with farmers providing them with a free and confidential advice to address the activity.

We will publish a summary of this work, when available.