Ashbourne (Broadmeadow) Priority Area for Action: Desk Study Summary

Below, we summarise the desk study findings for the Ashbourne Priority Area for Action (PAA), Co. Meath. 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 December 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 Ashbourne Public Library on the 29th October, 2019. In our desk studies, we examine a number of things:

- Quality–how the water quality has changed since 2007.
- 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.

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 in the catchment flows to the river, lake, or coastline. 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 Ashbourne Priority Area for Action (PAA) is located in south-east County Meath, approximately 20 kms north of Dublin. The PAA covers an area of approximately 12 km^2 including the town of Ashbourne. Based upon the work carried during the desk study, it was found that the PAA boundary was insufficient. That is, improvement works carried out within the PAA boundary alone would not be sufficient to improve the water quality downstream of Ashbourne. It was proposed therefore to expand the boundary of the PAA to include the rivers, which flow into the town. This expanded area has been included in the draft River Basin Management Plan (RBMP) and hopefully will be the focus for LAWPRO work in the next cycle. For this summary, when referring to the PAA, we will refer to the expanded PAA, which is described as the as proposed Broadmeadow PAA.

The total land area included in the proposed Broadmeadow PAA is based upon the combined catchment areas of each of the PAA 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 (Figure 1).

The Broadmeadow river rises near Ratoath and flows in an easterly direction through Ashbourne and Rowlestown, eventually flowing into the Broadmeadow Water, north of Swords. The Dunshaughlin stream enters the Broadmeadow river upstream of Ashbourne town, while the Fairyhouse stream enters the main river downstream of the town.

In the proposed Broadmeadow PAA, there are five river waterbodies

- RATOATH STREAM_010 – this is the headwaters of the Broadmeadow river includes the towns of Dunshaughlin and Ratoath.
- DUNSHAUGHLIN STREAM_010 – is a tributary off the main Broadmeadow river, north of Ratoah and includes the townlands of Rackenstown and Cookstown.
- BROADMEADOW_010 – the boundary of the BROADMEADOW_010 waterbody extends from the centre of Ratoath to the outskirts of Ashbourne.
- FAIRYHOUSE STREAM_010 – The Fairyhouse stream enters the Broadmeadow river downstream of Donaghmore bridge. The catchment area of the waterbody includes the Rathcool, Fleanstown and Peackockstown.
- BROADMEADOW_020 – The Broadmeadow_020 waterbody is the section of the Broadmeadow river that flows through Ashbourne, extending as far as the confluence with the Dunwater river. The Dunwater is not included in the Broadmeadow PAA. This was the original Ashbourne PAA.

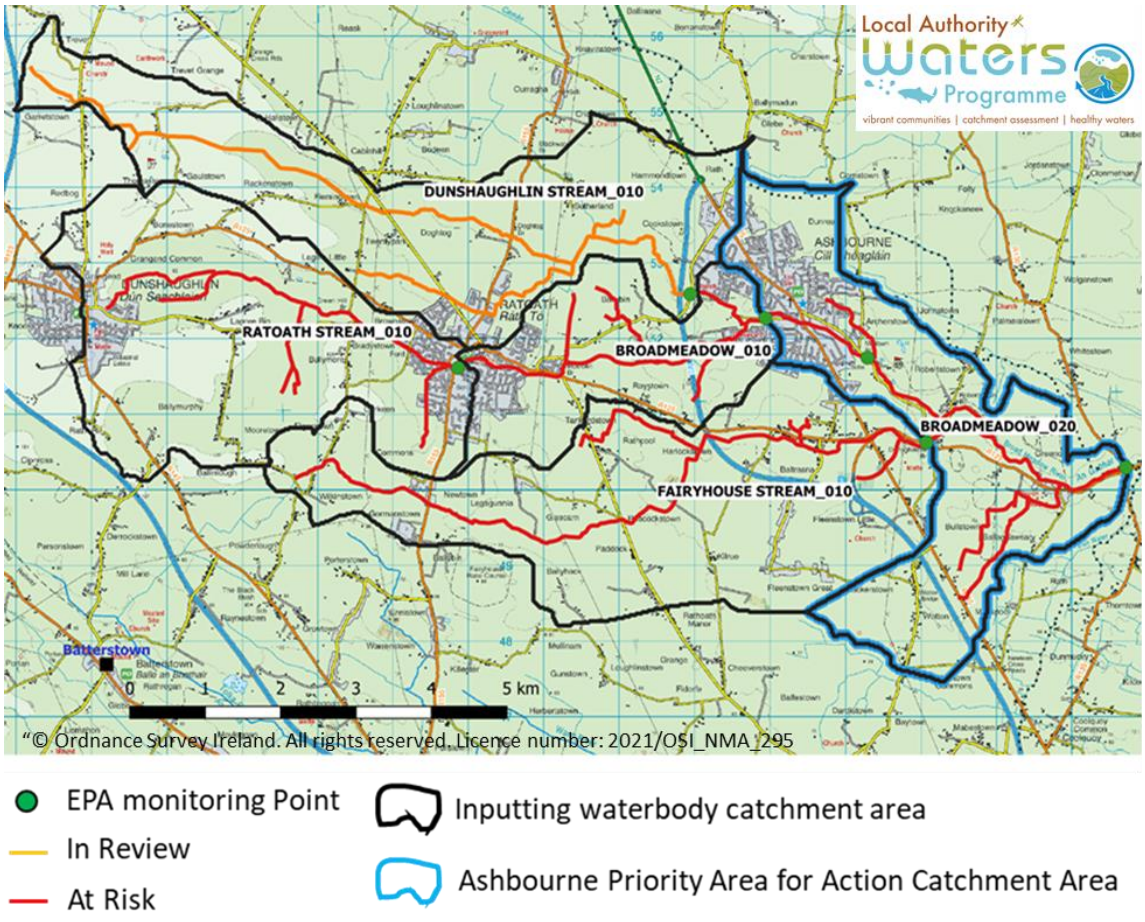

Figure 1: proposed Broadmeadow PAA, EPA assigned Risk, location of monitoring points and inputting waterbody catchment areas and original Ashbourne PAA boundary (blue outline).

2. Catchment Description

Each of the rivers in the proposed Broadmeadow PAA is a valuable asset to the community. Currently, the rivers are not reaching their potential to provide a diverse habit for animals, insects, fish and plants. There exists fantastic engagement with the Ashbourne community regarding water quality, including the commissioning of a report carried out by consultants CDM Smith and other biodiversity studies. LAWPRO are building upon the result of that report on catchment scale.

The geology, soil type and topography within a catchment determines how water moves. On poorly draining soils in the proposed PAA, water cannot easily soak into the ground and collects. On the well-drained soils in the proposed PAA, water is able to soak into the ground. From there, it travels vertically into the underlying bedrock. The water then moves horizontally through the bedrock and flows upward into the streams in the proposed PAA.

The majority of the land in the proposed PAA is agricultural, with a mix of both pasture and tillage enterprises. The largest urban areas in the proposed PAA are Ashbourne, Dunshaughlin and Ratoath.

3. Water Quality History in the Rogerstown Estuary PAA

Rivers and lakes are classified into five quality classes (status), with high status being unpolluted and bad status 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 different elements that altogether indicate 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 river bed and bank or lake shore.

In the proposed Broadmeadow PAA, all of the river waterbodies have been characterised and have Poor ecological status. Additional comments on each of the classified waterbodies are shown in Table 1. The waterbodies are organised in order of upstream to downstream.

Waterbody	2013-2018 Status	Our findings
RATOATH STREAM_010	Poor	The Poor ecological status in 2010-2015 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. Status in the RATOATH STREAM_010 has been either Bad or Poor for the last 33 years. Our investigation revealed that high nutrient levels at this location on the river are unlikely to have resulted in Poor status. This part of the river is part of the Broadmeadow Water Drainage Scheme. This may have resulted in modification to the natural profile of the river.
DUNSHAUGHLIN STREAM_010	Poor	The Poor ecological status in 2013-2018 is because of Moderate Invertebrate Status. From 1971 to 2010, status in the river was either Poor or Bad. Encouragingly, status improved to Good in 2013, but has since dropped back down to Poor. Our investigation revealed that high nutrient levels at this location are a likely contributing factor to status. This part of the river is part of the Broadmeadow Water Drainage Scheme. This may have resulted in modification to the natural profile of the river.
BROADMEADOW_010	Poor	The Poor ecological status in 2013-2018 is because of Poor Invertebrate Status. Status has been Poor along this stretch of the river for the last 40 years. Our investigation revealed that nutrient levels at this location are a likely contributing factor to status.

Waterbody	2013-2018 Status	Our findings
		This part of the river is part of the Broadmeadow Water Drainage Scheme. This may have resulted in modification to the natural profile of the river.
FAIRYHOUSE STREAM_010	Poor	The Poor ecological status in 2013-2018 is because of Poor Invertebrate Status. This section of the river has had Poor status since 1988. Our investigation revealed that high nutrient levels and low stream oxygen levels at this location are a likely contributing factor to status. Encouragingly, the biology of the stream was measured in 2020 and suggests a potential return to Good status. This part of the river is part of the Broadmeadow Water Drainage Scheme. This may have resulted in modification to the natural profile of the river.
BROADMEADOW_020	Poor	The Poor ecological status in 2013-2018 is because of Poor Invertebrate Status. Status has been Poor along this stretch of the river for the last 40 years, Our investigation revealed that nutrient levels, siltation, and low stream oxygen levels, at this location are a likely contributing factor to status. This part of the river is part of the Broadmeadow Water Drainage Scheme. This may have resulted in modification to the natural profile of the river.

4. Sources of Pollution

Pollutants find their way to rivers by a number of paths:

- They can be piped directly to the river from large sources such as wastewater treatment plants, or small sources such as faulty septic tanks, farmyards, roadside drains etc.
- They can flow across the ground to the river when nutrients which are applied to the land as fertiliser are washed 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 isn't ready to absorb the nutrient (e.g. temperatures too cold, incorrect soil pH etc) and is common in free-draining/ light soils.

In all the proposed Broadmeadow PAA rivers, excessive amounts of nutrients and sediment have caused the Poor ecological status. In rivers, nitrogen and phosphorus loss can cause excessive plant and algal growth. This reduces the amount of oxygen in the river and suffocates sensitive fauna. Excessive fine sediment in a river can smother the streambed habitat and clog the gills of many sensitive mayfly species. In the rivers of the proposed Broadmeadow PAA, the nutrients phosphate and ammonium are the main concerns. To place the severity of impact in perspective, the 2019 average phosphate concentration in the Fairyhouse stream exceeded acceptable levels by a factor of four. Stream phosphate levels are high throughout all the PAA rivers, indicating multiple and extensive sources.

- Approximately 83% of the land cover in the proposed Broadmeadow PAA is agriculture with a mix of tillage and grassland enterprises. Of that land area, about 66% has poorly draining soils.
- On poorly draining soils, rainwater cannot soak into the ground and accumulates. When this occurs on sloped land, overland flow of water occurs. When this overland flow gets focused through specific pathways over the land, it can enter the river at distinct points along the landscape. If these focused points coincide with a phosphate

source, we refer to it as a critical source area. Several of these critical source areas have been identified throughout the Broadmeadow rivers.

- After slurry or fertiliser spreading, phosphate tends to accumulate in the shallow soil or the land surface if the land is poorly drained. Focusing our resources on blocking or preventing these phosphate rich pathways reaching the stream will be the focus of our efforts to improve river water quality.
- Besides agricultural pressures, there is also evidence to suggest that domestic waster, e.g., septic tanks, piped domestic and industrial misconnections and channel alteration via drainage works may have an adverse effect on water quality.

5. Next Steps

Community Engagement Meeting

We held a community information meeting in Ashbourne Public Library on the 29th October 2019 to tell the public about our work and to hear about water quality concerns from people living in the area. Concerns were expressed over rubbish in the river and pipes discharging to the river.

Farmers' Meeting

A farmers meeting has not yet been held in the catchment, as prior to expanding it, the pressures considered were primarily urban. We will hold a meeting as part of the next phase of work in the PAA.

Local Catchment Assessment

The deskstudy helps us inform our approach for undertaking our own fieldwork or local catchment assessment (LCA). Bearing in mind the potential sources of pollution indicated above, our efforts will be centred around the critical source areas for phosphate loss, point sources such as urban pipes and misconnections, waste water and industry. Characterising the impact of drainage on the river will also form an important part of the investigation. LCA commenced in 2021, where a high level water chemistry and water flow analysis. Using this approach, we can calculate the nutrient load coming from different stretches and tributaries along the streams. (approximately forty sites) was carried out. Work in the proposed PAA will continue into 2022 and will include: biological assessments using the Small Streams Impact

Score (macroinvertebrates, macroalgae and macrophytes) plus water quality probes to record dissolved oxygen, stream conductivity, temperature and pH.

For the point pressures outlined above, we will carry out upstream and downstream assessments to determine impact. 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.

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