Summary: Carrigdrohid Priority Area for Action Desk Study

This is a non-technical summary of the desk study on the Carrigdrohid Priority Area for Action (PAA).

A desk study is the first step in our work. We gather available information about the river/lake into a single document. The information comes from many public bodies including the Environmental Protection Agency, local authorities, Inland Fisheries Ireland, Irish Water and the Department of Agriculture, Food and the Maine. It also includes information learned from the public at a local community meeting. The community meeting for Carrigdrohid PAA was held in November 2021 via zoom.

The study helps us to understand:

- The quality of the water in the river
    - Has it changed in the last few years?
- The importance of the river
    - Are there any rare plants, animals or habitats that must be protected?
    - Is it used to supply our drinking water?
- The human-made impacts
    - Is there a wastewater treatment plant?
    - Is land used for agriculture or forestry?
    - Has the river/lake been changed physically?

Background and location

The Carrigdrohid PAA is in County Cork. The PAA currently contains just Carrigdrohid lake or reservoir itself (shown in figure 1) but LAWPRO has recommended expanding the PAA in cycle 3 to include the rivers flowing into the lake.

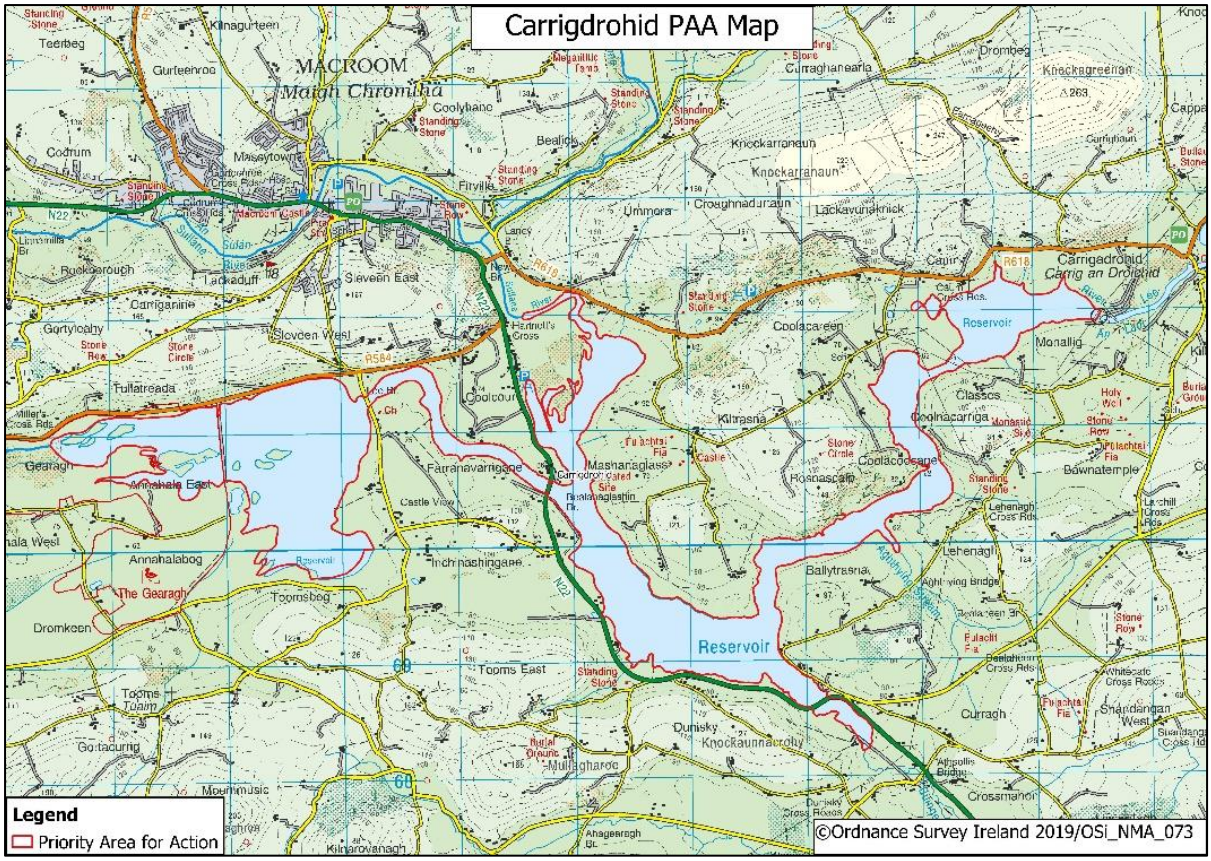


Figure 1 The Carrigdrohid PAA

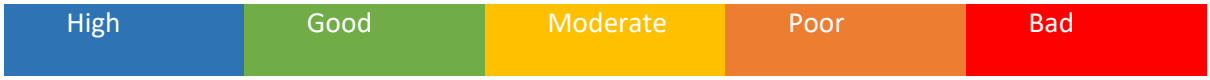
Catchment Description

The lake is situated to the south and south east of the town of Macroom, Co. Cork and is situated partly within the Gearagh Special Area of Conservation (SAC) (Site Code 000108) and the Gearagh Special Protection Area (SPA) (Site Code 004109). Carrigdrohid lake is located within protected areas for drinking water Ballinhassig East and Ballinhassig West. Land use in the catchment is mainly under agriculture, with significant areas of natural vegetation and pockets of forestry (private), particularly to the south west of The Gearagh Nature Reserve. Soils in the PAA are mostly dry soils (well draining) although there are some areas of wet (peaty soils) to the west of the lake.

The Carrigdrohid lake was selected as a PAA as it is a Heavily Modified Water Body (HMWB) with the opportunity to examine the ecological potential, as opposed to status. It was also selected for; the potential to tie in with Environmental Protection Agency (EPA) project that will examine nutrient release from lake sediments. The PAA was also proposed because of the opportunity to tie in with management plan that is currently being developed for the Gearagh and the opportunity to address fish passage at the dam.

Water Quality in the Carrigdrohid PAA

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



The EPA assigns status at (approximately) 3-yearly intervals based on the standards set out in European legislation, the Water Framework Directive (WFD). Status is based on many different elements that altogether indicate the overall health of the river or lake, for example the type and range of plants and animals in the lake (algae, aquatic plants, invertebrates, fish), the physico-chemical condition of the lake (oxygen levels, nutrient concentrations, temperature, water clarity, colour etc) and the physical condition of the lake shore, lake water level and also how much water is flowing into or out of the lake.

We need to make sure that the Carrigdrohid PAA achieves Good Status. We have reviewed water quality data available for the PAA waterbody and we have found that:

- The Carrigdrohid is currently at Moderate status. This is due to nutrients (total phosphorus), pH and hydromorphology (physical modification) on the lake. It found that the lake plant community was characterised by a small number of tolerant taxa, low numbers of plant counts and patchy distribution. This waterbody experiences large fluctuations in water levels which can make it difficult for a stable macrophyte community to be maintained. It is also possible that there is recycling of phosphorus from lake sediment contributing to the phosphorus issue here.

Sources of Pollution

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

- They can be piped directly 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 or lake 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.

We have identified potential sources of pollution in the Carrigdrohid PAA which we will examine further. These are hydromorphology, agriculture, forestry, and other anthropogenic pressures.

Hydromorphology

Hydromorphology is where the river or lake and the land beside them are physically changed from their natural condition. The hydro-electric dams are an example of a hydromorphological pressure on Carrigdrohid. This is a heavily modified waterbody created by the damming of the River Lee with

Carrigdrohid Dam to create a reservoir. This lake is a drinking water abstraction lake and was created originally for the purpose of electricity generation. The ESB constructed two hydro-electric dams on the River Lee, downstream of The Gearagh in 1953. The operation of the generating stations at Carrigdrohid and Inniscarra influence water levels in their associated reservoirs.

Anthropogenic pressures
Anthropogenic pressure is where an environment changes because of human activity. The nature of the anthropogenic pressures impacting on Carrigdrohid lake is not yet known and will be need to be investigated in our local catchment assessment.

Forestry
Forestry needs to be considered as a potential source of sediment in this waterbody. This sediment can also carry nutrients to the river from previous fertilisation of the forestry lands. There are some areas of land under older forestry plantations adjacent to the lake and to the inputting rivers. These areas wouldn't have been subject to the more recent guidelines on buffer zone management along watercourses.

Agriculture
Agriculture needs to be considered as a potential source of elevated nutrients and/or sediment in the lake. Sediment and nutrients can be lost to the river due to agricultural activities, particularly from the areas in the catchment where soils are wet and peaty, where lands have been drained.

Other sources may also be identified during our fieldwork.

Next Steps

Community Engagement Meetings

We held a virtual community information meeting on the 2nd of November 2020 to tell the public about our work and to hear about water quality concerns from people living in the area. The normal LAWPRO approach of public meetings in the local community was not an option due to Covid 19 concerns. The virtual meeting was supported by newspaper notice and public information leaflets. The meeting was recorded, and the meeting link is available on www.lawaters.ie.

Comments and issues raised at the meeting include:

- Farmyards can be as significant a source of pollution as diffuse pollution from fields.
- Management of slurry and soiled water is NB.
- Discussion around buy in from farmers.
- Discussion around conflicting advice for farmers (e.g., advice around getting water off the land as soon as possible).
- Algal blooms in the lake in summertime, are these due to nutrients?
- This is a dam not a reservoir but that some locals still call it a river. For monitoring purposes it's a heavily modified waterbody (HMWB).
- Comment from ESB representative that they would be happy to assist in any way they can with this process.

Agricultural Sustainability Support and Advice advisors from Teagasc and Dairygold will hold an information meeting for farmers within the PAA. During this meeting, the advisor will give details of the supports available for farmers in this catchment.

Local Catchment Assessment

LAWPRO's catchment scientists will carry out fieldwork to identify the areas which present the highest risk of total phosphorus and sediment loss on all inputting rivers/streams to the lake. These areas are called critical source areas for phosphate and/or sediment loss.

We will collect water samples to learn about the nutrient levels on all inputting rivers/streams to the lake. We will assess biology by taking kick samples and sediment levels on all inputting streams and rivers into the lake. These assessments will help identify which rivers and streams are delivering the greatest load of phosphorus to the lake. However, the phosphorus causing the water quality problems in the lake may be bound to and recycled from lake sediments so historic losses may be continuing to impact here.

A report on the outcome of this local catchment assessment work will be published here when available.

Photograph of Carrigdrohid Lake, taken on 7th September 2020 by Catherine Seale-Duggan

Photograph of The Gearagh, taken on 7th September 2020 by Catherine Seale-Duggan

The table below gives some summary information on waterbody status, possible water quality issues and sources of pollution for the Carrigdrohid PAA.

Table 1 Ecological status, pressures, and significance in the Carrigdrohid PAA

WB Code	WB Name	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)
				2007-2009	2010-2012	2010-2015	2013-2018				
IE_SW_19_139	Carrigdrohid	Lake	*At risk*	Good	Mod	Poor	Good	Hydromorphology (Dams, barriers, locks, weirs)	Altered habitat due to hydrological changes and altered habitat due to morphological changes	Agriculture/forestry. Point sources may also be a pressure here	Nutrients (total phosphorus), pH and altered habitat due to hydromorphological changes
								Anthropogenic Pressures (Unknown)	Nutrient pollution		