



McKenna Consulting Engineers
Civil & Structural

Proposed Housing Scheme,
Ardrahan,
Co. Galway

Flood Risk Assessment

October 2022



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1. INTRODUCTION

1.1 General

This Flood Risk Assessment Report has been prepared by Jennings O'Donovan & Partners Limited for McKenna Consulting Engineers to assess the flood risk associated with the site located in Ardrahan, Co. Galway. It is proposed to construct residential housing on the site, as well as upgrade the existing onsite waste water treatment works.

The site is located in Ardrahan, as outlined in red in Figure 1 below.

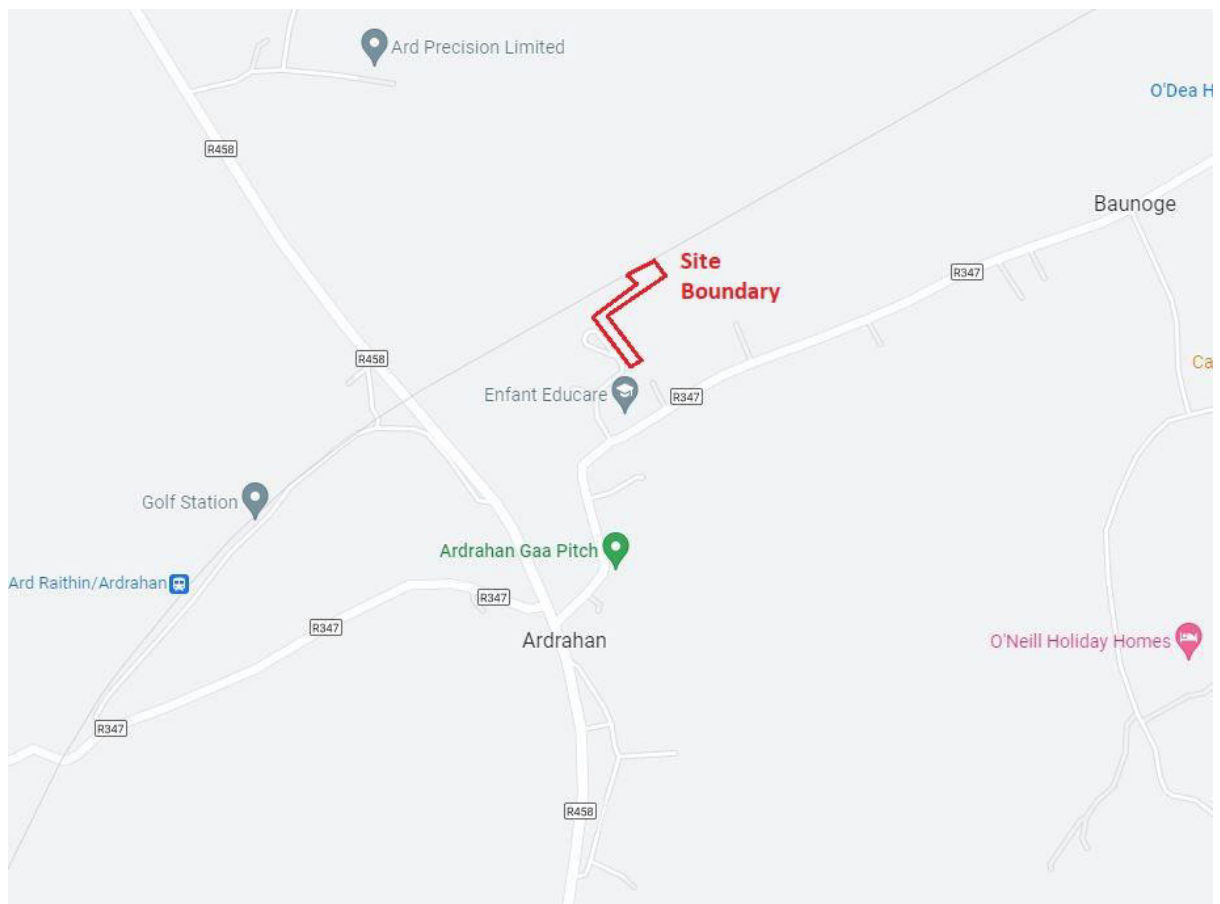


Figure 1.1: Aerial Site Location

Details of the site are outlined in Table 1.

Table 1 Proposed Development Works

Component	Proposed Works
Site Area	<ul style="list-style-type: none"> Approx. 0.549 ha

This Flood Risk Assessment covers the site in Ardrahan, Co. Galway. It was prepared in accordance with the report 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities' issued by the Department of Environment, Heritage and Local Government in November 2009. Flood risk from fluvial, surface water and ground water sources has been assessed based on existing available information.

The assessment methodology involved researching and collating flood related information from the following data sources:

- Base maps – Ordnance Survey of Ireland;
- Flood Hazard Maps and flooding information for Ireland, (www.floodmaps.ie);
- Office of Public Works (OPW);
- Geological Survey of Ireland (GSI) maps on superficial deposits;
- EPA hydrology maps;
- CFRAMS (Catchment Flood Risk Assessment & Management Study);
- Galway County Development Plan 2022 – 2028
- Ardrahan Housing Development 2022 Updated Tier 2 Hydrogeological Assessment
- Galway County Council Planning Viewer Flood Maps

1.2 Scope

This Flood Risk Assessment is based on the following:

- Department of Environment, Heritage and Local Government guidelines for Planning Authorities covering Flood Risk Management (*The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009*)
- Risk of flooding to the Proposed Development Site from flood flow from neighbouring watercourses.
- Risk of flooding resulting from direct rainfall.
- Risk of flooding from groundwater.

In addition to the above, the study also examined any possible impact the proposed works may have on the existing drainage regime locally adjacent to the Proposed Development Site. The impacts addressed under this heading comprise:

- The impact of surface water runoff on the flow regimes in neighbouring watercourses.
- Loss of floodplain.
- Review of historical flood records.

2. PLANNING GUIDELINES

In November 2009, the Department of Environment, Heritage and Local Government issued a guidance document to planning authorities in relation to flood risk management, titled '*The Planning System and Flood Risk Management*'. These guidelines set out the policy on development and flood risk in Ireland and provide a framework for the integration of flood risk assessment into the planning process. The objective is to ensure that flood risk is considered at all stages in the planning process and, as a result, to:

- Avoid inappropriate development in areas at risk of flooding,
- Avoid new developments increasing flood risk elsewhere,
- Ensure effective management of residual risks for development permitted in flood plains.

The guidelines set out a staged approach for the consideration of flood risk in relation to developments as follows:

Stage 1: Flood risk identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and Local Area Plans (LAP's) or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;

Stage 2: Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist, the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and

Stage 3: Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

The guidelines classify developments into three vulnerability classes based on the effects of flooding:

- Highly vulnerable development,
- Less vulnerable development,
- Water compatible development.

Residential housing is classed as being highly vulnerable.

The guidelines also classify land areas into three flood zones based on the probability of flooding. Flood zones are defined as follows in the guidelines:

- Zone A is at highest risk. In any one year, Zone A has a 1 in 100 year (1%) chance of flooding from rivers and a 1 in 200 year (0.5%) chance of flooding from the sea.
- Zone B is at moderate risk. The outer limit of Zone B is defined by the 1 in 1,000 year (or 0.1%) flood from rivers and the sea.
- Zone C is at low risk. In any one year, Zone C has less than 1 in 1,000 year (<0.1%) chance of flooding from rivers, estuaries or the sea.

It is stated in the guidelines that during the identification of flood zones, no account should be taken of any flood relief walls or embankments.

Table 2.1: Matrix of Vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test (reproduced from Table 3.2 of Planning Guidelines)

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 2.1, which is reproduced from the guideline document to Planning Authorities in relation to Flood Risk Management states that dwelling houses should be located within Flood Zone C. Section 4 of this Flood Risk Assessment document will consider the Flood Zone assignment for the proposed site.

Table 2.1 refers to the use of a Justification Test under certain circumstances. In cases where there are insufficient sites available to locate a development in the appropriate low flood risk zone, the guideline documents allow for consideration of sites within flood risk zones. A Justification Test is then required to assess such proposals in light of proper planning and sustainable development objectives.

This report considers the Flood Risk of the proposed development site in relation to Stages 1 and 2 of the staged approach outlined above.

3. PROPOSED DEVELOPMENT SITE

3.1 Site Description

The proposed development site is located within Ardrahan, Co Galway, at the back of the Caislean Raithlin Estate, just off the R347.

A topographical map of the proposed site and surrounding areas levels are shown in Figure 3.1 below.



Figure 3.1: Topographical map of the proposed development site.

The proposed development site is relatively flat with ground levels approximately 32m OD.

4. FLOOD RISK REVIEW

4.1 Approach

The risk of flooding to the proposed development site shall be assessed in relation to the following criteria:

- Fluvial Risk: Inundation from flow from neighbouring watercourses
- Pluvial Risk: Flooding due to direct rainfall.
- Groundwater Risk: Flooding due to a high-water table.
- History of Flooding
- Available Predictive Flood Risk Mapping
- Impact of presence of the proposed development on the existing flood risk regime at the proposed development site.

4.2 OPW Catchment Flood Risk Assessment and Management (CFRAM)

The OPW are continuously developing Catchment Flood Risk Assessment Management (CFRAM) maps to predict theoretical or “design” flood events with an estimated probability of occurrence, rather than information for actual floods that have occurred in the past – these are presented (where available) in a separate section of “past flood events”.

As indicated in Figure 4.1 below, no significant river or watercourse has been identified by the OPW in the vicinity of the proposed development site in Ardrahan.



Figure 4.1: Ardrahan Site

4.2.1 Fluvial Flood Risk.

The OPW have not identified any significant river or watercourse in the vicinity of the proposed development site, therefore there is no apparent risk of fluvial flooding to the proposed development site.

4.2.2 Historical Flood Risk.

The OPW's online Floodmaps portal provides information on reported floods, in the form of reports, photos, and newspaper articles.

The database does not provide any record of flood events occurring at the proposed development site. (Figure 4.2). The closest recorded flood event occurred approximately 1.5km to the South-West of the development site, on the 14th of April 2005. The source of the flooding was deemed to be an existing turlough in the region and is noted to be a recurring flood event

It should be noted that the proposed development site is circa 1.5km from the existing turlough flood plain.

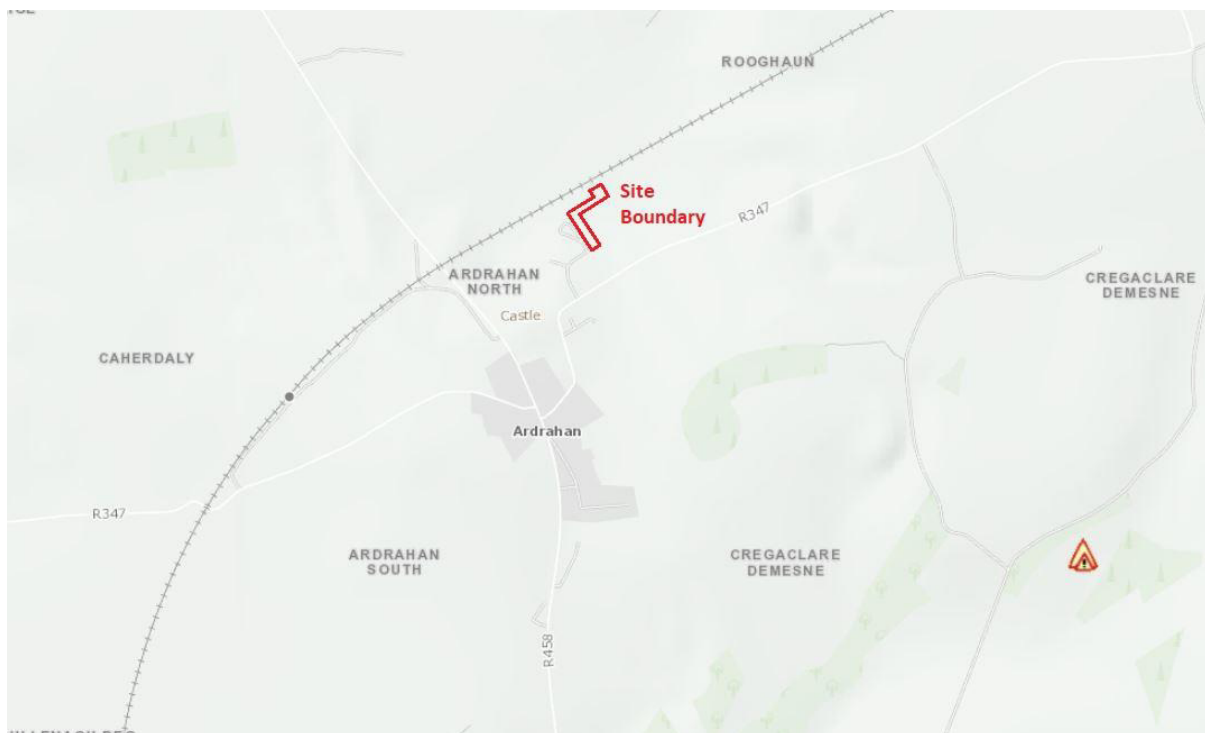


Figure 4.2: Ardrahan Historical Flood Events (Source: Floodinfo.ie)

4.3 Pluvial Flood Risk

As mentioned in Section 3 above, the proposed development site is relatively flat. The proposed development and associated works will increase the impermeable area of the existing site and therefore, surface water runoff from the site will be increased. As a result, pluvial flooding on site and downstream can occur if the proposed design and works is not managed correctly.

The average annual rainfall for this region is 1192.9mm, (<https://www.met.ie/climate/available-data/monthly-data>, Athenry, up to 26-Oct-2022). The mean Potential Evapotranspiration (PE) for Casement for the past four years is 489.4mm (www.met.ie/climate/available-data/monthly-data). Actual evapotranspiration is estimated at $0.95 \times PE = 464.9\text{mm}$. The effective rainfall represents the water available for run-off and groundwater recharge and equals the annual rainfall less the actual evaporation or $1192.9 - 464.9 = 728\text{mm}$.

The use of gravel surfacing and grassed areas in the amenity spaces, where appropriate, will allow rainwater to percolate to ground. The site surface water drainage system from roof and hard surfaces will be designed to best practice to provide protection from pluvial flooding. The use of SUDs techniques such as rainwater harvesting tanks and soakaways are considered to offer potential solutions. The drainage design should be such as to cater for short, intense rainstorms.

Galway County Council Planning Viewer indicates that the existing wastewater treatment plant is located in an area susceptible to a 1 in 100-year pluvial event. A review of the Ardrahan Housing Development 2022 Updated Tier 2 Hydrogeological Assessment carried out by BlueRock Environmental Limited suggests the cause of this localised ponding is down to very low infiltration rates in the surrounding soils. This issue can be resolved with the implementation of a suitably designed drainage network around the existing wastewater treatment plant.

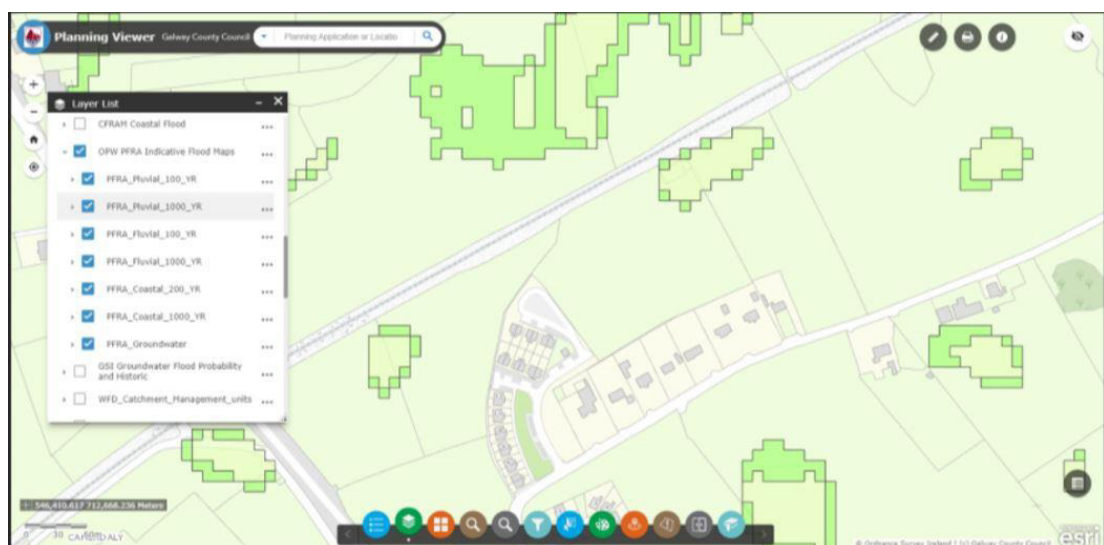


Figure 4.3: Galway County Council Planning Viewer Flood Maps

The proposed development site is not located in a floodplain, ensuring that the Development will not result in any loss of floodplain.

4.6 Summary of Flood Risk

Table 4.2 below provides a summary of the flood risk at the Proposed Development Site.

Table 4.2: Flood Risk Summary Table

Source	Pathway	Receptor	Comment
Tidal	-	-	There is no risk of Tidal flooding at the proposed development site.
Fluvial	Overbank	Proposed Development	There is no identified risk of fluvial flooding at the proposed development site.
Pluvial	Ponding of Rainwater on site	Proposed Development	There is no identified risk of pluvial flooding at the proposed development site. However, the existing wastewater treatment plant is currently in an area susceptible to 1 in 100 year storm events. It is recommended that the proposed storm drainage is designed with SuD's principles, where possible, to ensure best practices are upheld and the increase in flows from the development site are catered for.
Groundwater	Rising Groundwater Levels	Proposed Development	Based on the GSI mapping and OPW mapping, there is no apparent risk from groundwater flooding at the proposed development site.

5. CONCLUSION

There is no apparent risk of fluvial or tidal flooding at the proposed development site. It is reasonable to conclude that the site lies within Flood Zone C as defined by the guidance document '*The Planning System and Flood Risk Management*'. There is no apparent risk of pluvial flooding near the proposed houses in the development site, the existing wastewater treatment plant has been constructed in an area susceptible to 1 in 100 year storm events. Therefore, the provision of a stormwater run-off collection system incorporating SUDs features is recommended. There is no apparent risk of groundwater flooding at the proposed development site.

This research has concluded that there is no record of flooding previously occurring on the proposed development site. The proposed development site is not located in a floodplain; therefore, the proposed works will not result in a loss of floodplain. The proposed works are unlikely to increase the current flood risk in this catchment.

The conclusion of this FRA is that the proposed development site is not at risk of flooding (fluvial, tidal, pluvial or groundwater) and the proposed works will not result in any significant change in risk or flooding regime. Additionally, the Development is deemed to be appropriate (as set out in Table 3.2 of the guidelines for Flood Risk Management (DoEHLG/OPW, 2009). As such, no further stages of flood risk assessment are therefore required.

APPENDIX A
CFRAM Mapping

APPENDIX B
GSI Mapping

APPENDIX A
CFRAM Mapping



ROOGHAUN

Site Boundary

R347

ARDRAHAN NORTH

Castle

Ardrahan

CREGACLARE DEMESNE

CAHERDALY

ARDRAHAN SOUTH

CREGACLARE DEMESNE

R347

58



ROOGHAUN

Site Boundary

R347

ARDRAHAN NORTH

Castle

CREGACLARE DEMESNE

CAHERDALY

Ardrahan

R347

ARDRAHAN SOUTH

CREGACLARE DEMESNE

R458

MILLENAGH BEG

APPENDIX B
GSI Mapping

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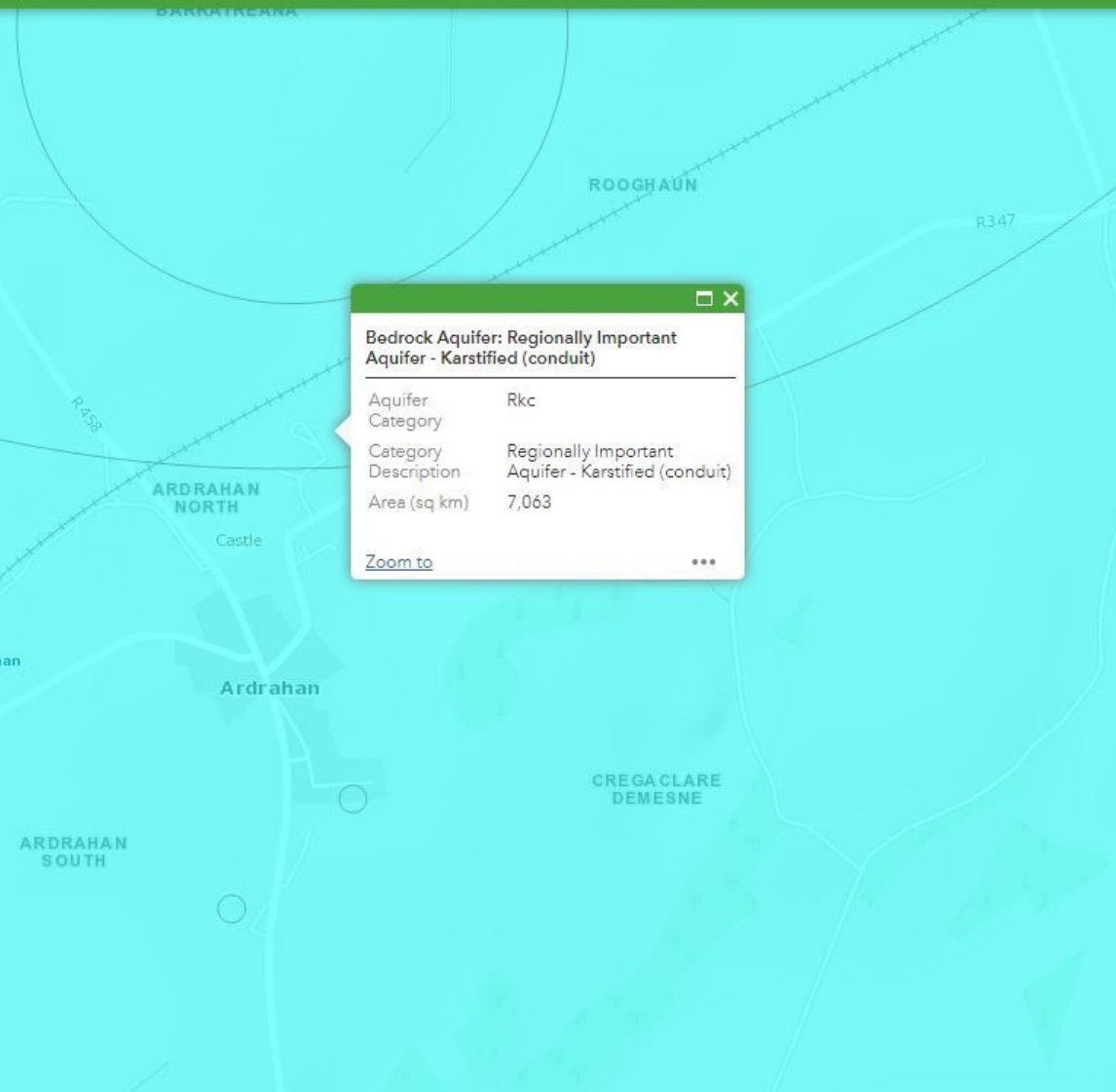
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Eircode, Address or Townla

CAHERATEIGE

CAHERDALY

CULLENAGH BEG



Bedrock Aquifer: Regionally Important Aquifer - Karstified (conduit)

Aquifer Category	Rkc
Category Description	Regionally Important Aquifer - Karstified (conduit)
Area (sq km)	7,063

[Zoom to](#) ...

Legend

Groundwater Wells and Springs

Groundwater Wells and Springs

Groundwater Resources (Aquifers)

Gravel Aquifer

- Locally important gravel aquifer
- Regionally important gravel aquifer

Bedrock Aquifer

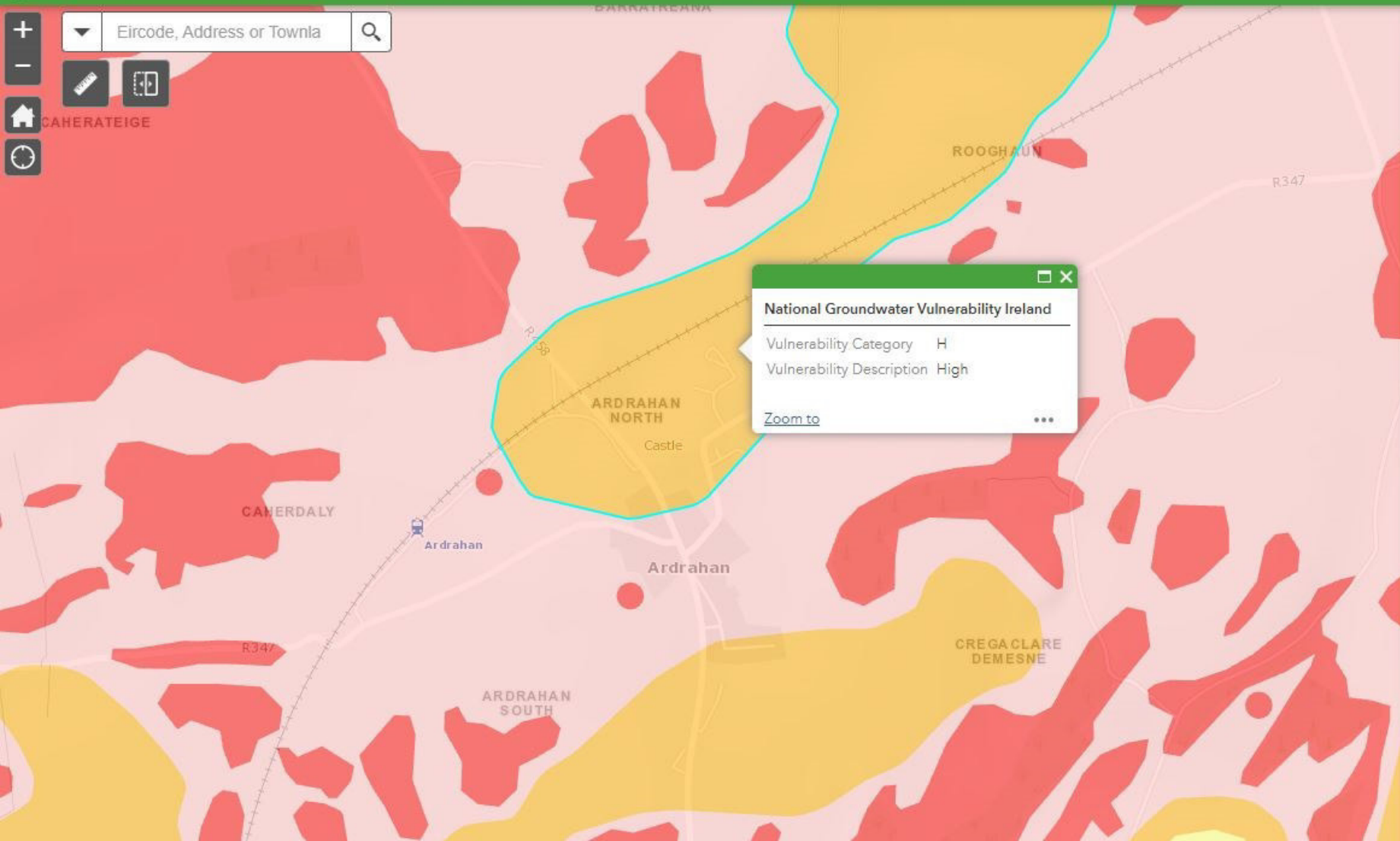
- Rkc - Regionally Important Aquifer - Karstified (conduit)
- Rkd - Regionally Important Aquifer - Karstified (diffuse)
- RK - Regionally Important Aquifer - Karstified
- Rf - Regionally Important Aquifer - Fissured bedrock
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Lk - Locally Important Aquifer - Karstified
- LI - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- PI - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Lake



Eircode, Address or Townla



CAHERATEIGE



National Groundwater Vulnerability Ireland

Vulnerability Category H
Vulnerability Description High

[Zoom to](#) ⋮

Legend

- Groundwater Vulnerability**
- Groundwater Vulnerability
- Rock at or near Surface or Karst
 - Extreme
 - High
 - Moderate
 - Low
 - Water