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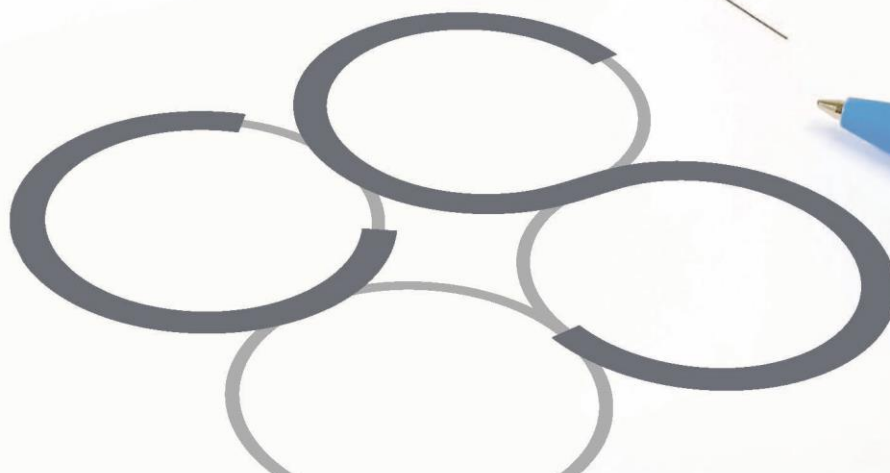
LIMERICK
LONDON
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**Site Specific Flood Risk Assessment
Proposed Residential Development
Bruff, Co. Limerick**

Client: Limerick City and County Council

Job No. L105L

May 2023



CS CONSULTING GROUP
www.csconsulting.ie

SITE SPECIFIC FLOOD RISK ASSESSMENT

PROPOSED RESIDENTIAL DEVELOPMENT, BRUFF, CO. LIMERICK

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1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by Limerick City and County Council to prepare Site Specific Flood Risk Assessment for a proposed residential development at Bruff, Co. Limerick.

In preparing this report, CS Consulting has referred to the following:

- Limerick Development Plan 2022–2028;
(including Strategic Flood Risk Assessments)
- Office of Public Works Flood Maps;
- Department of the Environment Flooding Guidelines;
- Geological Survey of Ireland Maps;
- Local Authority Drainage Records.

The Site Specific Flood Risk Assessment is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting and with the various additional information submitted by the other members of the design team, as part of the Planning Submission.

2.0 SITE LOCATION AND PROPOSED DEVELOPMENT

2.1 Site Location

The proposed development site is located in Ardykeohane, Bruff, Co Limerick. The site is in the administrative jurisdiction of Limerick City and County Council (LCCC) and has a total area of circa 0.82ha.

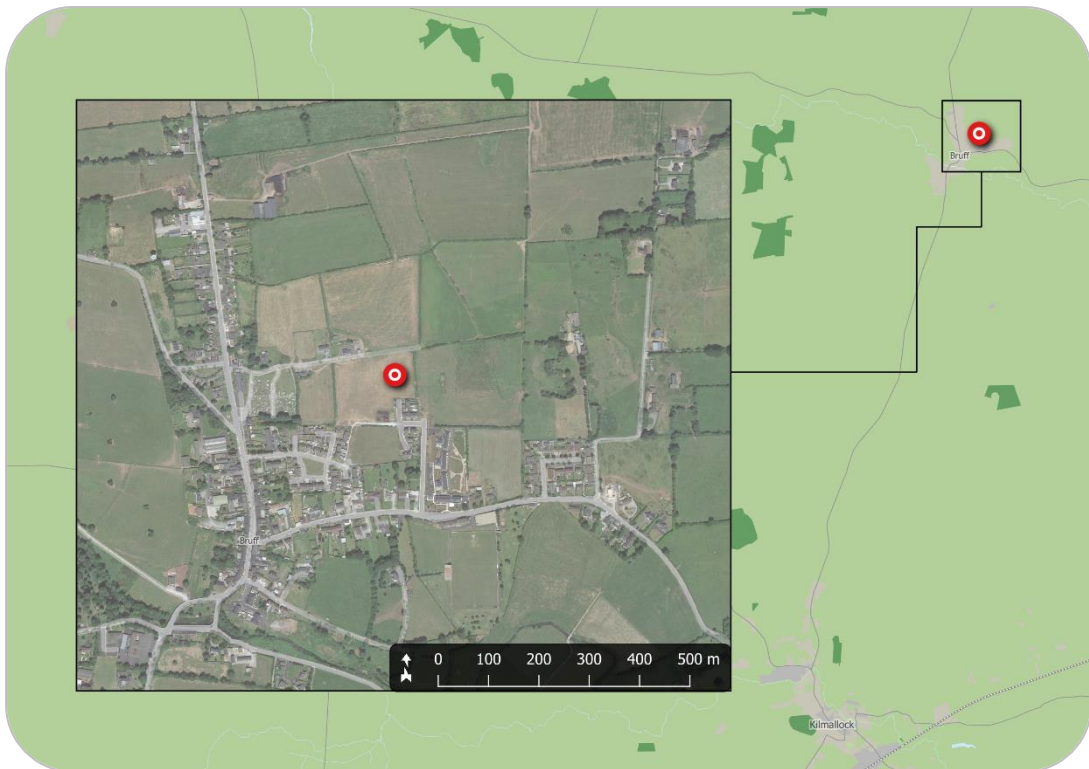


Figure 1 – Location of proposed development site
(map data & imagery: EPA, OSi, OSM Contributors, Google)

The location of the proposed development site is shown in Figure 1 above; the indicative extents of the development site, as well as relevant elements of the surrounding road network, are shown in more detail in Figure 2.



Figure 2 – Indicative site extents
(map data & imagery: OSM Contributors, Google)

The proposed development site is bound by existing single dwelling residential property to the north-west, existing residential buildings to the south-east, and on all other sides by greenfield.

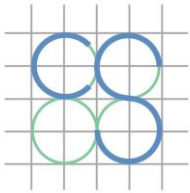
In the Limerick Development Plan 2022-2028, the development site is zones as 'New Residential Zone'.

2.2 Existing Site Condition

The subject development site is currently greenfield. River Morningstar is located approx. 580m to the south of the development site.

2.3 Description of the Proposed Development

The proposed development primarily consists of:



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The construction of 18no. dwellings, provision of an access road connecting to Brugh na nDeise, 30no. car parking spaces, bicycle parking, infrastructural works, hard and soft landscaping and ancillary works.

3.0 LEVEL OF SERVICE

There is an existing inherent risk of any flood event occurring during any given year. Typically, this likelihood of occurrence was traditionally expressed as a 1-in-100 chance of a 100-year storm event happening in any given year.

A less ambiguous expression of probability is the Annual Exceedance Probability (AEP), which may be defined as the probability of a flood event being exceeded in any given year. Therefore a 1-in-100-year event has a return period of 1% AEP flood event, similarly a 100% AEP can be expressed as a 1-in-1-year event.

The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Flood Risk Management Guidelines), published in 2009 set out the best practice standards for flood risk assessment in Ireland. These are summarised in Table 1 below (Table 8.1 from Flood Risk Management Guidelines document).

Table 1 – Summary of Level of Service: Flooding Source

Development Category	Flooding Source		
	Drainage	River	Tidal/Coastal
Residential	1% AEP	0.1% AEP	0.1% AEP
Commercial	1% AEP	1% AEP	0.5% AEP
Water-compatible (docks, marinas)	-	>1% AEP	>0.5% AEP

Under these guidelines a proposed development site has first to be assessed to determine the flood zone category it falls under.

It is a requirement of Limerick City and County Council, and the Flood Risk Management Guidelines that the predicted effects of climate change are

incorporated into any proposed design. Table 2 below indicates the predicted climate change variations.

Table 2 – Predicted climate change variations

Design Category	Predicted Impact of Climate Change
Drainage	20% Increase in rainfall
Fluvial (river flows)	20% Increase in flood flow
Tidal / Coastal	Minimum Finished Floor Level 4.0 – 4.15m AOD

The flooding guidelines categorise the risks associated with flooding into three areas, Zone A, B & C. This categorisation is indicated below.

- **Zone A** – High Probability of Flooding. Where the average probability of flooding from rivers and sea is highest (greater than 1% annually or 1 in 100 for river flooding or 0.5% annually or 1 in 200 for coastal flooding).
- **Zone B** – Moderate Probability of Flooding. Where the average probability of flooding from rivers and sea is moderate (risk between 0.1% annually or 1 in 1000 years and 1% annually or 1 in 100 years for river flooding, and between 0.1% or 1 in 1000 years and 0.5% annually or 1 in 200 for coastal flooding).
- **Zone C** – Low Probability of Flooding. Where the probability of flooding from rivers and sea is moderate (risk is less than 0.1% annually or 1 in 1000 years for both rivers and coastal flooding).

In accordance with the Flood Risk Management Guidelines, dwellings are classified as 'highly vulnerable developments' and commercial developments are classified as 'less vulnerable developments'. The proposed development is within the **Zone C** designation. See **Figure 3** and **Appendix A**.

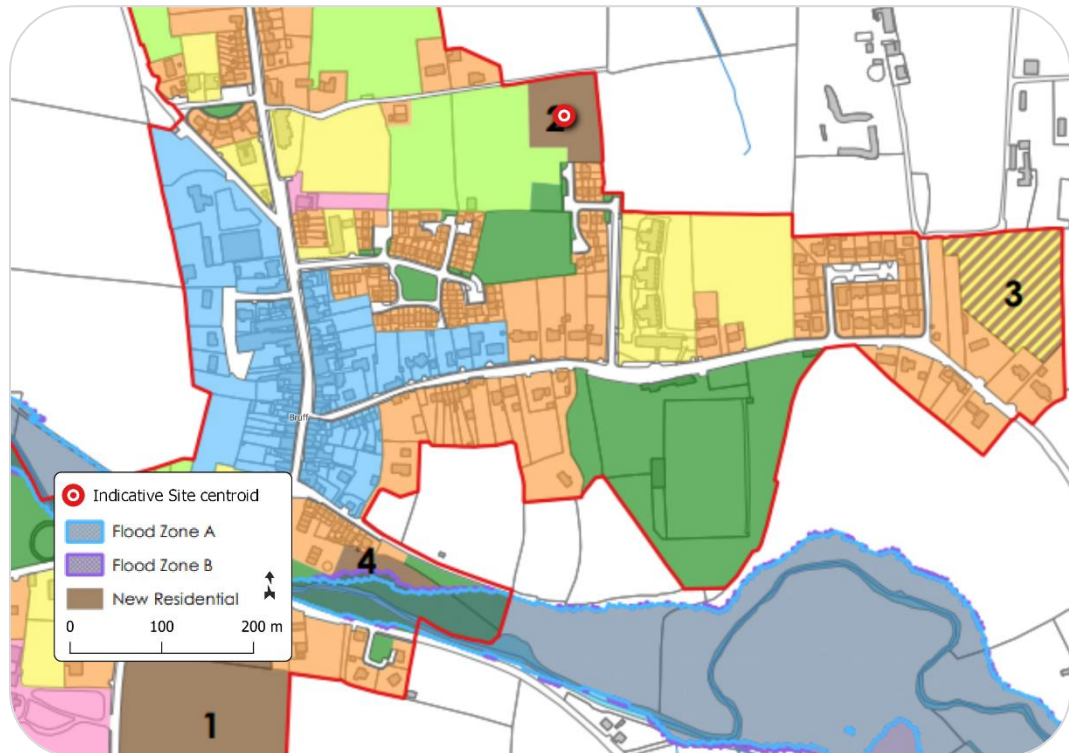


Figure 3 – Extract from LCCC Flood Zone Mapping
(background image source: Limerick City and County Council)

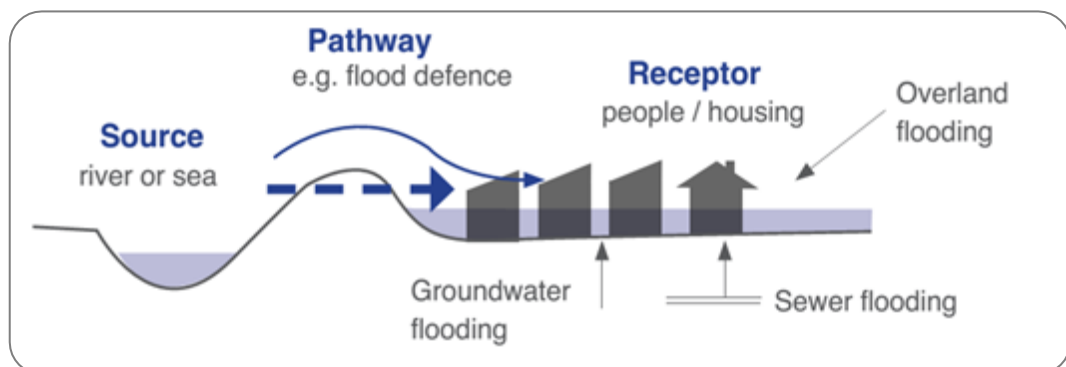


Figure 4 – Source-pathway-receptor model
(The Planning System and Flood Risk Management Guidelines)

The Flood Risk Management Guidelines have developed an 'appropriateness' matrix for various developments and their potential risk factor. The table indicates if further analysis is required in the form of a justification test. Table 3 below outlines the conditions that require a justification test.

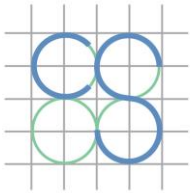


Table 3 – Flood Zone vs. Justification Test Matrix

Development Category	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable Development	Justification Test Required	Justification Test Required	Appropriate
Less Vulnerable Development	Justification Test Required	Appropriate	Appropriate
Water-compatible Development	Appropriate	Appropriate	Appropriate

As noted above, the subject site is located within **Flood Zone C**. As such, no justification test is required.

4.0 FLOOD RISK AND MITIGATION MEASURES

4.1 Historic Flooding

A review of the Office of Public Works flood maps database, www.floodmaps.ie, for the area does not indicate historical flooding at the site. See the OPW Map-report in **Appendix B**.

4.2 Fluvial Flooding

Recent modelling of the area as part of Limerick City and County Council's Strategic Flood Risk Assessment, indicates that the subject lands are deemed to be located outside of the 0.1% AEP fluvial floodplain, based on the currently available maps. Therefore, the risk of fluvial flooding is not deemed to be significant. Refer to **Appendix A** for Flood Maps.

Therefore, the risk of fluvial flooding is not an issue and no mitigation measures are required.

4.3 Tidal Flooding

The sites elevated location indicates that the subject lands are not going to be affected by tidal flooding, the council's flood risk map does not indicate that the site is located in a tidal flood zone.

4.4 Pluvial Flooding

Pluvial flooding is flooding which has originated from overland flow resulting from high intensity rain fall. The historical flood mapping indicates a past flood event to the south (approx. 600m) of the development site. However, due to the topography of the surrounding area there shall be no potential effect on the proposed development lands. See the OPW Map-report in **Appendix B**.

Therefore, the risk of pluvial flooding is not an issue, and no mitigation measures are required.

4.5 Groundwater Flooding

According to the Geological Survey of Ireland interactive maps, the subject site is underlain with Dark muddy limestone, shale (Ballysteen Formation). The groundwater vulnerability assessment of the site shows that the vulnerability of groundwater in the area is high. The proposed development and the general geology of the subject lands means that the potential risk from groundwater is deemed acceptable. Please refer to **Appendix C** for GSI mapping information.

Therefore, the risk of groundwater flooding is not an issue, and no mitigation measures are required.

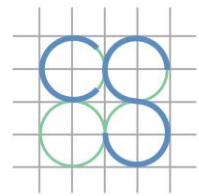
4.6 Potential for Site to Contribute to Off-Site Flooding

The site is currently developed but does not have any attenuation systems in place. As such the proposed redevelopment of the site shall require attenuation to be provided. The attenuation tank shall be sized for a 1-in-100-year storm event (including 20% increase for climate change) and shall release the storm water in a controlled manner after the peak storm duration has passed. By restricting the flow, the likelihood of the proposed development adversely affecting the public drainage system or contributing to downstream flooding is mitigated.

Therefore, the risk of off-site flooding is not an issue, and no mitigation measures are required.

5.0 CONCLUSION

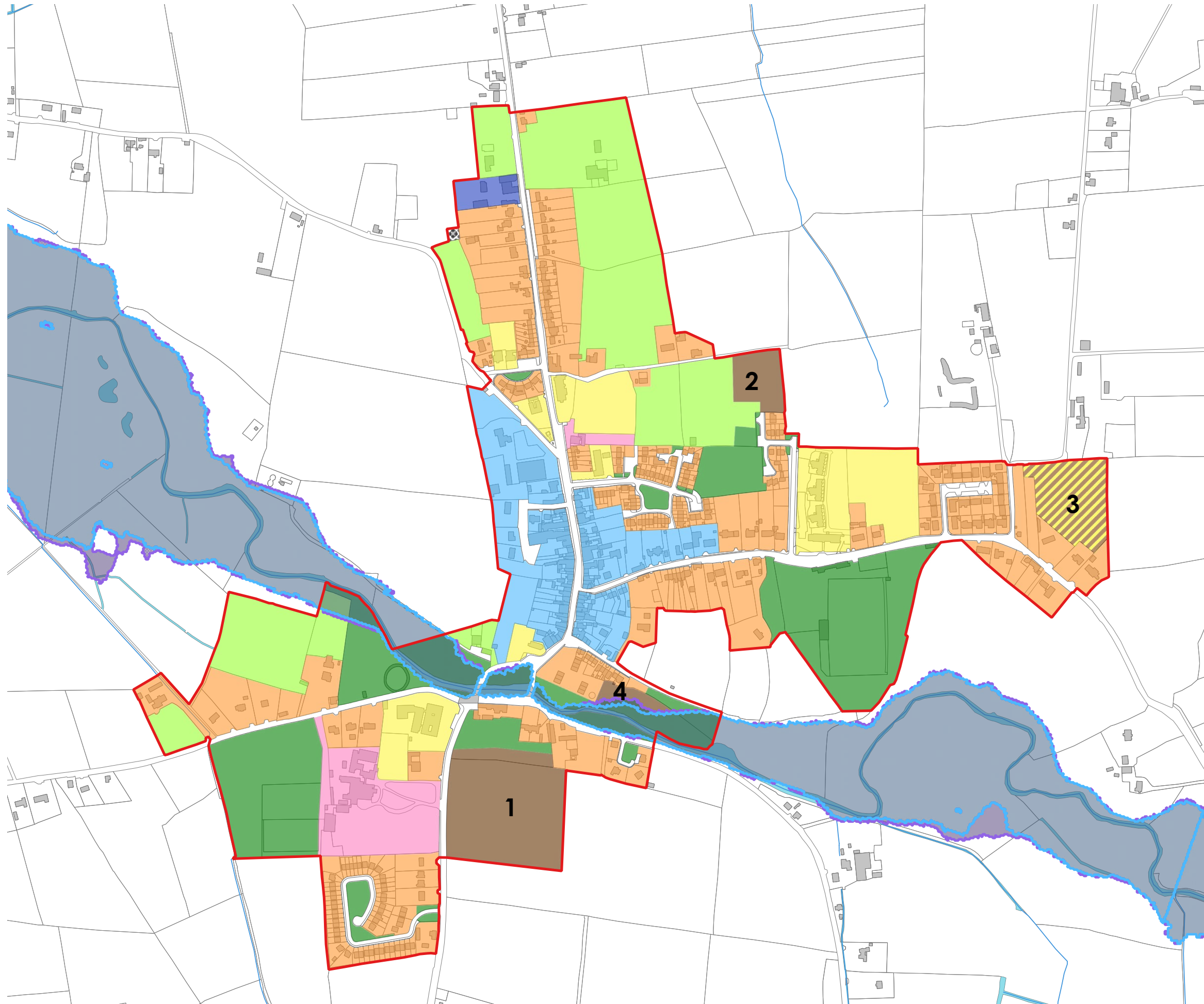
- The site historically has no recorded flood events as noted in the OPW's flood maps. The Limerick City and County Council Flood Risk Maps has indicated that the subject lands are located outside the 0.1% AEP Zone i.e., **Flood Zone C**.
- Predicted flood mapping for pluvial/tidal & fluvial flood events shall not affect the subject lands.
- The proposed development shall have a storm water attenuation system to address a 1-in-100-year extreme storm events increased by 20% for predicated climate change values. This shall significantly reduce the volume of storm water leaving the site during extreme storms which in turn shall have the effect of reducing the pressure on the existing public drainage system.
- The likelihood of onsite flooding from the hydrogeological ground conditions are deemed to be minor and within acceptable levels.



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Appendix A: Limerick City and County Council Flood Risk Maps

Bruff Flood Map



**Limerick
Development Plan
2022-2028**

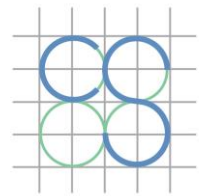
Bruff Flood Map

LEGEND

- Existing Residential
- New Residential
- Residential Serviced Sites
- Education & Community Facilities
- Village Centre
- Local Centre
- Enterprise & Employment
- Agriculture
- Open Space & Recreation
- Utilities
- Settlement boundary
- Flood Zone A
- Flood Zone B

DATE: Adopted June '22 | DWG. No.: CDP-V2-L4-BR-02
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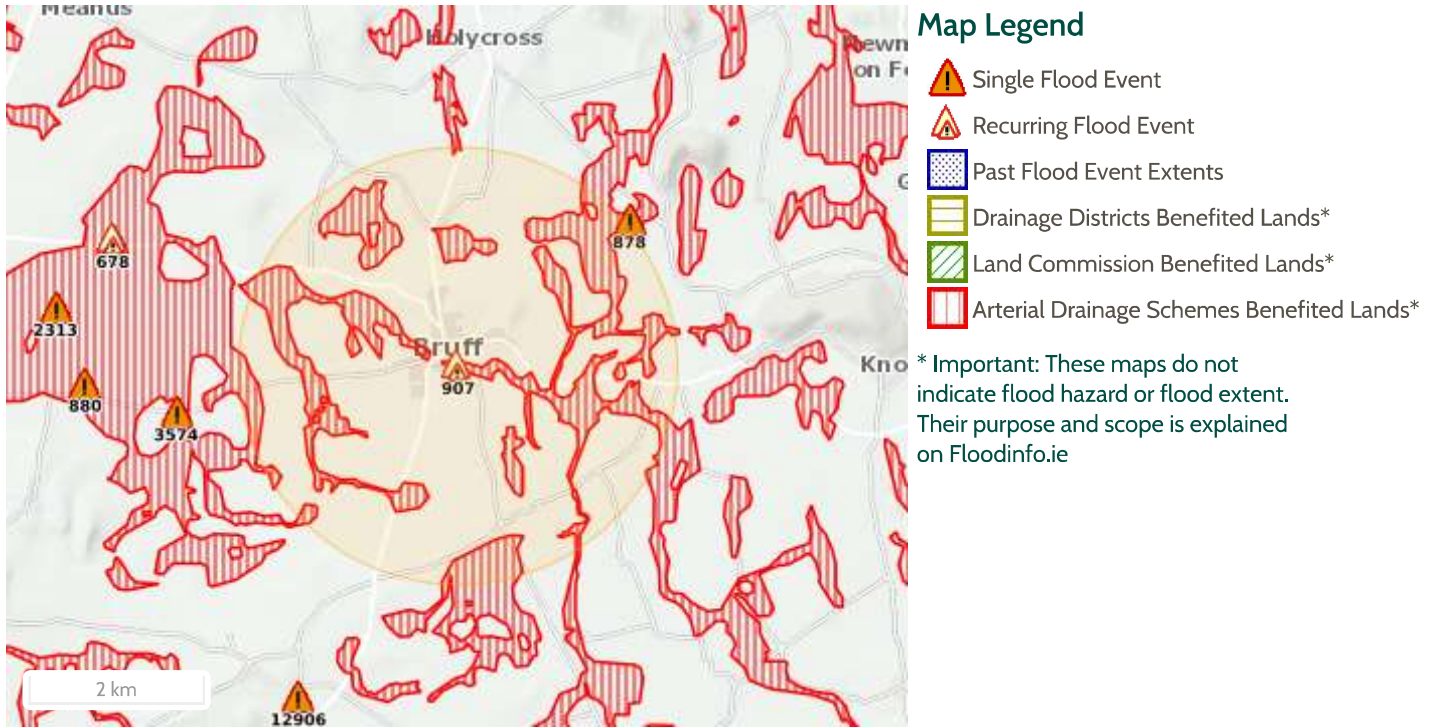
Appendix B: OPW Historic Flood Report



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This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

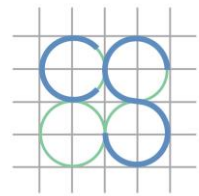
This report has been downloaded from www.floodinfo.ie (the "Website"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



1 Results

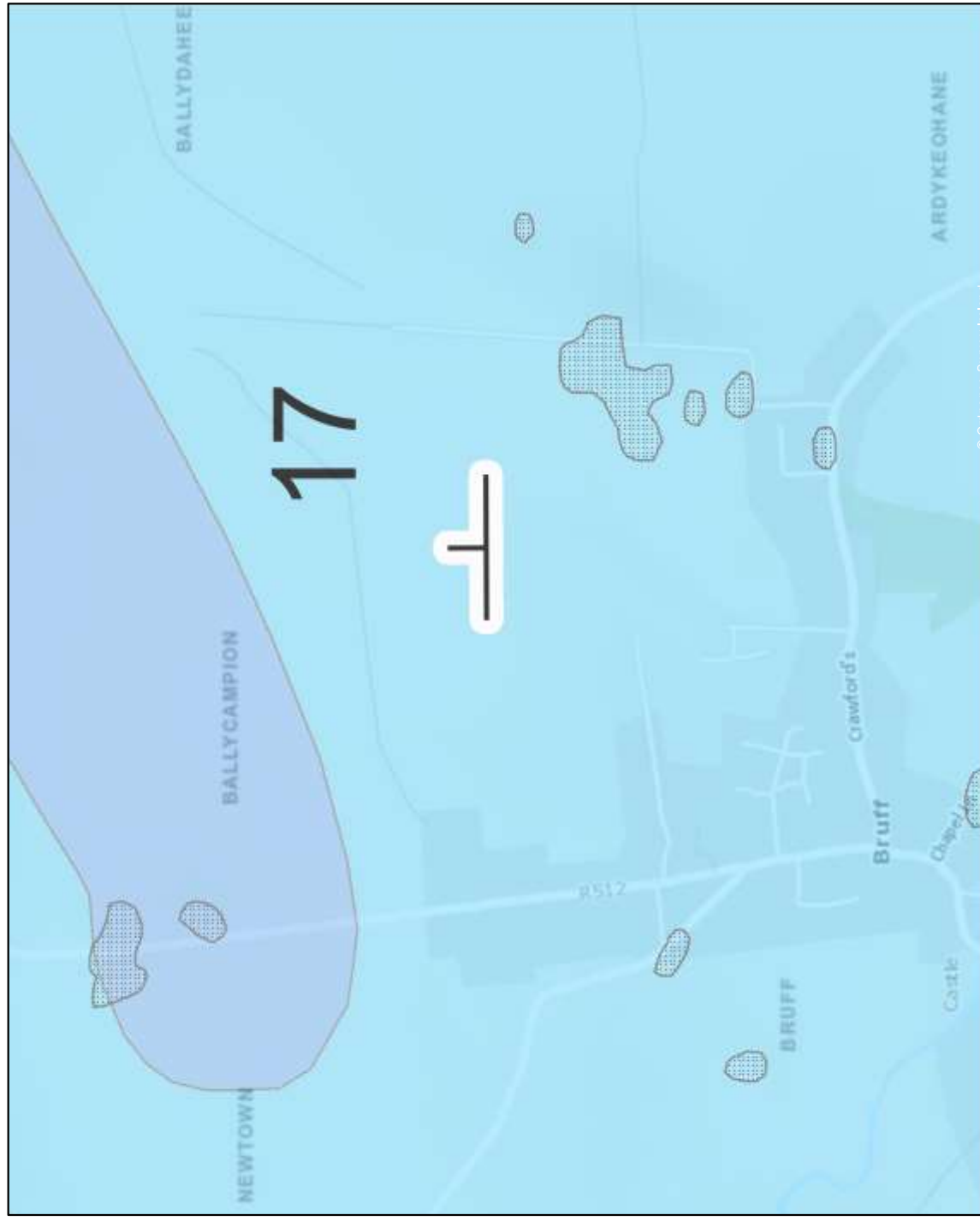
Name (Flood_ID)	Start Date	Event Location
1. Morningstar River Bruff - Limerick recurring (ID-907)	n/a	Exact Point

Additional Information: [Reports \(2\)](#) [Press Archive \(0\)](#)



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Appendix C: GSI Maps



Scale: 1:10,000

Geological Survey Ireland

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Map Centre Coordinates (ITM) 563,183 636,753
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Legend

Structural Symbols 100K ITM 2018

- Dip of bedding or main foliation, old
- GSI data First foliation parallel to bedding
- Foliation trend, Thorr and Rosses Granites
- Horizontal Bedding
- Strike and dip of bedding, right way up
- Strike and dip of bedding, way up
- unknown Strike and dip of first foliation
- Strike and dip of overturned bedding
- Strike and dip of second foliation
- Strike and dip of third foliation
- Strike and plunge of first generation fold axis
- Strike and plunge of second generation fold axis
- Strike and plunge of third generation fold axis
- Strike of vertical bedding/foliation
- Strike of vertical first foliation
- foliation <all other values >

Bedrock Outcrops 100 ITM 2018

Bedrock Linework 100k ITM 2018

- Anticlinal Axis
- Antiformal axis
- Aquifer Boundary
- Area
- Coal seam
- Dyke
- Fault

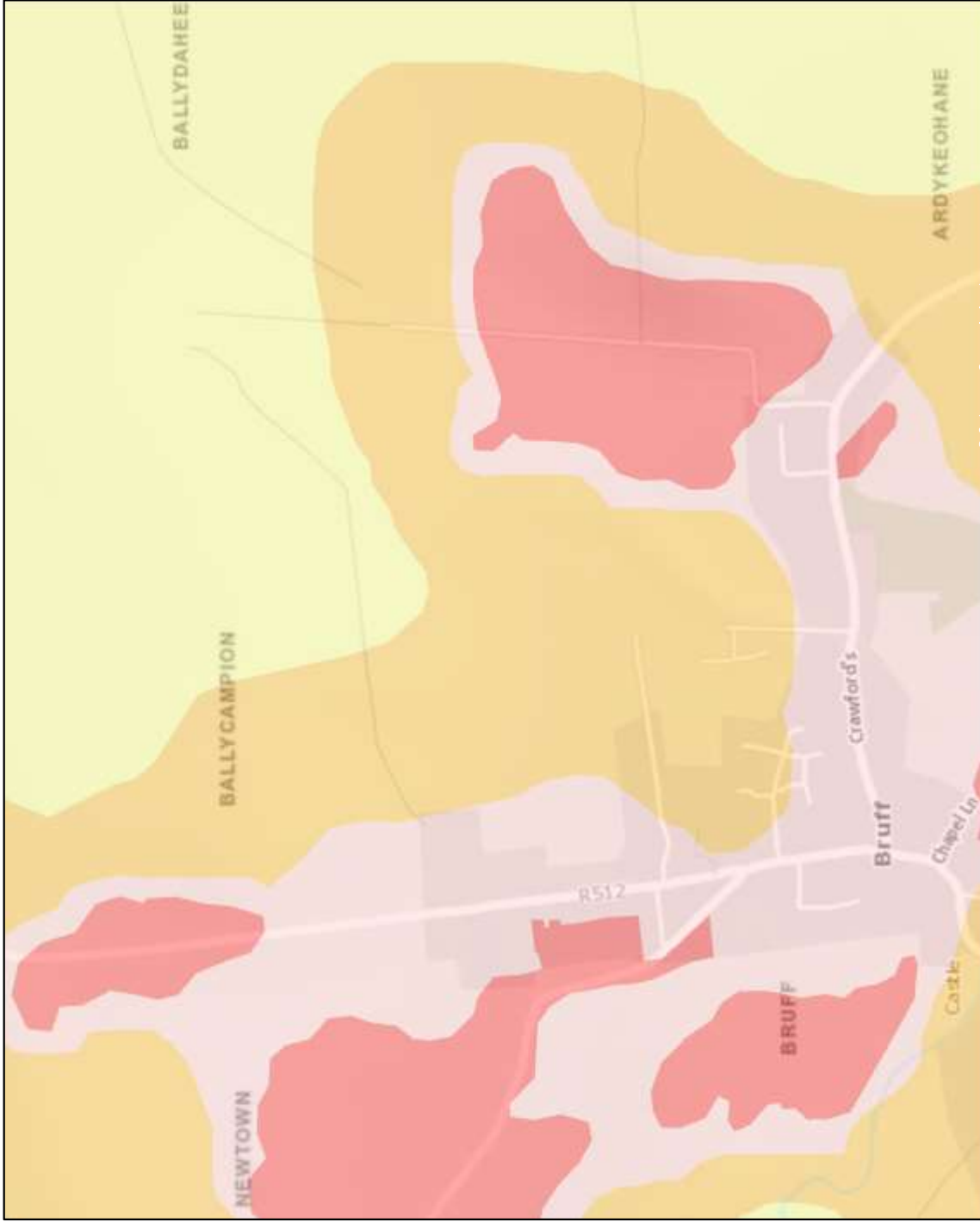
- Ghost Line
- Goniatite marine band (R1-R4)
- Lithological boundary offshore
- Metacolerite sheet, mainly sills, Paleogene/ Tertiary
- Dyke
- Synclinal Axis
- Synformal axis
- Tectonic Slide, barbs on hanging-wall
- Thin stratigraphical unit, diagrammatic Thrust, barbs on hanging-wall side
- Tuff band
- Unconformity, dots on younger side
- X-Section

GSI Groundwater Vulnerability

Legend

Groundwater Vulnerability

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

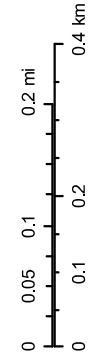


Scale: 1:10,000

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