CS CONSULTING

GROUP

DUBLIN | LONDON | LIMERICK

Site Specific Flood Risk Assessment

Kilcock West SHD2

Boycetown, Kilcock, Co. Kildare

Client: Teresa Monaghan

Job No. S037

September 2022



CS CONSULTING
GROUP

CS CONSULTING
GROUP

SITE SPECIFIC FLOOD RISK ASSESSMENT

KILCOCK WEST SHD2

BOYCETOWN, KILCOCK, CO. KILDARE

CONTENTS

1.0 INTRODUCTION _____ 1

2.0 SITE LOCATION AND PROPOSED DEVELOPMENT _____ 2

3.0 FLOOD RISK ASSESSMENT _____ 7

4.0 FLOOD RISKS & MITIGATION MEASURES _____ 9

5.0 CONCLUSIONS _____ 11

Appendix A: OPW Historical Flood Mapping

Appendix B: Kildare County Council LAP Flood Mapping

Appendix C: GSI Geological Mapping

This Report has been prepared by CS Consulting for the benefit of its Client only. The contents of this Report are shared with interested parties for information only and without any warranty or guarantee, express or implied, as to their accuracy, reliability or completeness. This Report cannot be relied on by any party other than the party who commissioned it.

File Location: Job-S037\B_Documents\C_Civil\A_CS Reports\FRA

BS 1192 FIELD	**S037-CSC-ZZ-XX-RP-C-0002-P3**

Job Ref.	Author	Reviewed By	Authorised By	Issue Date	Rev. No.
S037	GF	RFM	OS	01.09.2022	P3
S037	GF	RFM	OS	10.08.2022	P2
S037	RFM	RFM	OS	21.05.2021	P1

CS CONSULTING
GROUP

1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by Teresa Monaghan to prepare a Site Specific Flood Risk Assessment to accompany a planning application for a proposed 272-unit Strategic Housing Development (SHD) at Boycetown, Kilcock, Co. Kildare.

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

- Kildare County Development Plan 2017-2023
- Kilcock Local Area Plan 2015-2021 (November 2015)
- Regional Code of Practice For development works, Version 6.
- Greater Dublin Strategic Development Study.
- Local Authority Drainage Records.

This report 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 site of the proposed development is located on the western outskirts of Kilcock, Co. Kildare, in the operational area of Kildare County Council (KCC). The core of the development site encompasses an area of 8.75ha, while the planning application boundary extends to 11.39ha.

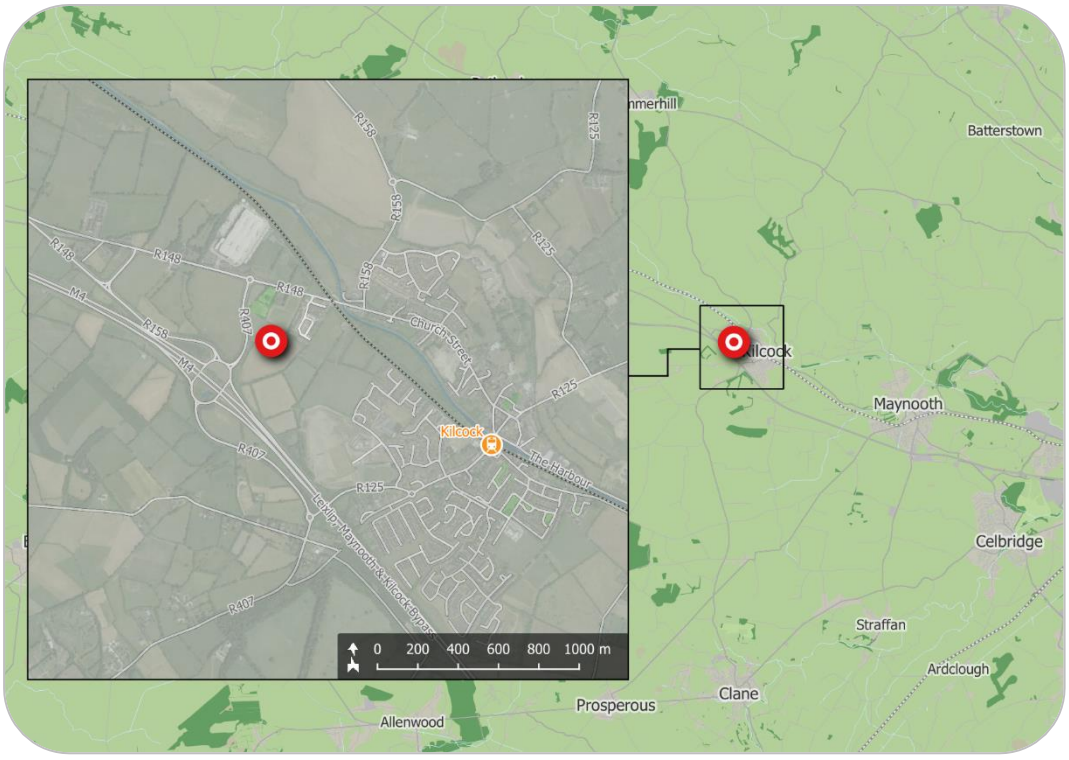


Figure 1 – Location of proposed development site
(map data and imagery: EPA, OSi, OSM Contributors, Google)

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**.

The site is located adjacent to Junction 8 on the M4 motorway. It is bounded to the north by the R148 regional road, to the west by the R158

regional road, to the north-east by the existing Boycetown Court residential development, to the east by undeveloped farmland, and to the south-east by lands on which planning permission has been granted for a Strategic housing Development (SHD).

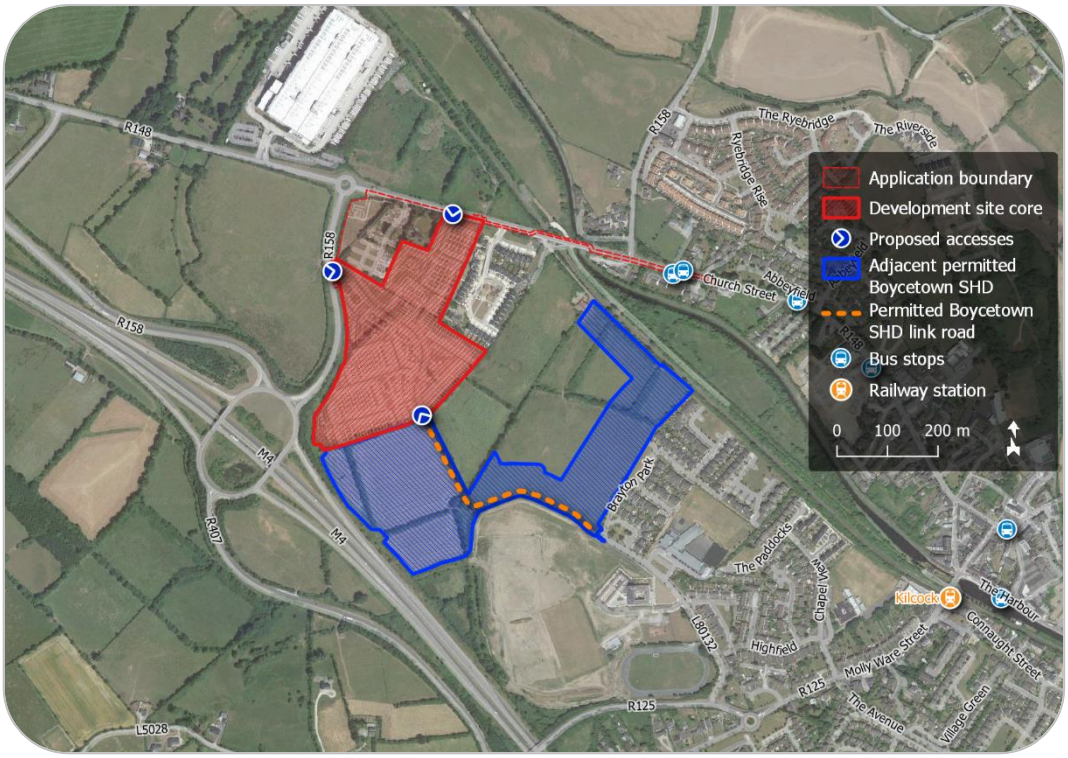


Figure 2 – Site extents and transport context
(map data and imagery: NTA, OSi, OSM Contributors, Google)

2.2 Existing Land Use

The core of the development site comprises greenfield agricultural land, an existing farm access to which is located on the R158, at its western boundary. The site rises from an elevation of 75.0m in the north to 81.0m at the middle of the site and falls to 78.0m to the south towards the M4 motorway, which runs along the site's south-western boundary. A former church (Kilbeg House, now in residential use) and the existing St. Joseph's Cemetery are located within the north-west corner of the overall

development site; these are to remain essentially unchanged by the proposed development.

2.3 Description of Proposed Development

The proposed development (30,839 sq.m GFA) will consist of the demolition of a detached, vacant cottage (gfa 69sq.m) and the construction of 272 residential units (149 no. houses, 65 apartments and 58 duplexes), childcare facility and foul pumping station along with associated ancillary works and site works.

The 149 no. dwellings consist of:

- 40 no. 4 bed 2 storey houses (House Type A1, A2, A3, A4, A5)
- 8 no. 4 bed 3 storey houses (House Type E1, E2)
- 90 no. 3 bed 2 storey houses (House Type B1, B2, B3, C1, C2)
- 11 no. 2 bed 2 storey houses (House Type D1)

The proposed apartments and duplexes are provided in 7 no. blocks (Blocks A, B, C, D, E, F, G) ranging in height from 3 to 4 storeys, with the exception of 1no. Duplex Block (Type N1), which is a 3 storey, end of terrace unit. Block A and Block B containing Rooftop terraces at 4th floor level.

The Duplex Blocks (Type J1, Type, J2, Type J3, Type J4, Type K1, Type L1, Type M1, Type N1) are all 3-storey and contain 58 units divided as follows:

- 6no. 1 bed ground floor apartment units (Units L1-A)
- 23no. 2 bed ground floor apartment units (Units J1-A, J2-A, J3-A, J4-A, K1-A, M1-A, N1-A)
- 1no. 2 bed duplex unit (two-storey unit) (Units K1-B)
- 25no. 3 bed duplex units (two-storey units) (Units J1-B, J2-B, J3-B, J4-B, L1-B)
- 3no. 4 bed duplex units (two-storey units) (Units M1-B, N1-B)

The 65 apartments are located within Blocks A, B, C and D divided as follows:

- 17no. 1 bed units (Type F1, Type F2, Type F3, Type F4, Type F5, Type F6)
- 37no. 2 bed units (Type G1, Type G2, Type G3, Type G4, Type G5-A, Type G5-B, Type G6, Type G7, Type G8)
- 11no. 3 bed units (Type H1, Type H2)

Block D also contains a childcare facility (gfa.526.2 sqm) and includes a dedicated outdoor play area (about 210 sq.m).

Ancillary works including 1 no. vehicular entrances off the R148 to the north and 1 no. vehicular entrance off the R158 to the west, a spine road which will link with the permitted spine road on the adjoining lands to the south-east under PL09.306826, internal roads, footpaths, cycle lanes, car parking (465 no. spaces), cycle storage/parking (426 no. spaces), 2 no. bus stops, bin storage, public open space, hard and soft landscaping, natural play area, play equipment, boundary treatments, public lighting, 3 no. substations (14sq.m each) and controlled pedestrian crossing on the R148.

All associated site and infrastructural works including underground wastewater pump station (a wetwell); welfare building 6.25sqm and 3m in height; 472m of 125mm OD rising main and 250m of gravity sewer along the R148; an underground emergency storage tank, capacity 230 m^3 approx.; above ground lifting gantry; valve and flowmeter chambers; a chemical dosing facility for odour control; Passive Carbon Unit; Kiosks; above ground surge vessel (<13 m^3); Landscaping, fencing and access off the R148. The proposed development includes all necessary ancillary pipework and manholes, diversion of existing utilities; new power supply and water connection for the pump station, ducting, mechanical and electrical services, plant, instrumentation, automation, controls and equipment. It also includes all associated site development works, hardstanding areas and access and site drainage. The proposed development includes works

on lands owned by Kildare County Council to facilitate access and drainage infrastructure.

3.0 FLOOD RISK ASSESSMENT

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 set out the best practice standards for flood risk assessment in Ireland.

These are summarised in **Table 2** below (Table 8.1 from Guidelines document).

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

Table 2: Summary of Level of Service – Flooding Source

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

- **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 years 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 *Planning Systems and Flood Risk Management Guidelines for Planning Authorities*, residential dwellings are classified as 'highly vulnerable developments'. The proposed development is within the **Zone C** designation.

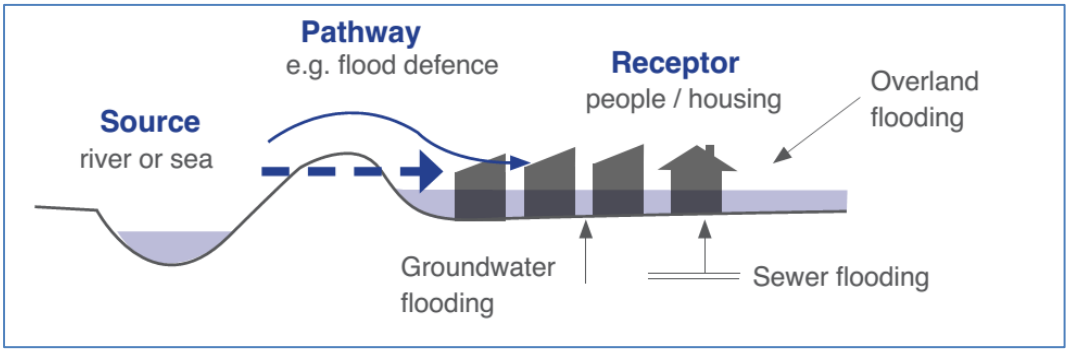


Figure 3 – Source-pathway-receptor model
(source: Flood Risk Management Guidelines)

4.0 FLOOD RISKS & MITIGATION MEASURES

4.1 Historical 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 or in the vicinity of the subject lands. See the OPW Map-report included in **Appendix A**.

4.2 Fluvial Flooding

Flood Mapping prepared for Kildare County Council as part of Kilcock LAP 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. See the LAP Flood mapping included in **Appendix B**.

4.3 Tidal Flooding

The site's location is such that it is not affected by tidal water bodies is therefore at negligible risk of tidal flooding.

4.4 Pluvial Flooding

Pluvial flooding is flooding that has originated from overland flow resulting from high intensity rain fall. Previous flood events in the area can be reviewed on the Office of Public Works web site (www.floodmaps.ie). The historical flood mapping record does not indicate flood events in the area.

4.5 Potential for Site to Contribute to Off-Site Flooding

The site is currently undeveloped and does not have any attenuation systems in place. As such, the proposed development of the site will require

attenuation to be provided. The attenuation tank will be sized for a 1-in-100-year storm event and will 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.

4.6 Existing Off-Site Drainage

It is the understanding of CS Consulting that at present there are no issues with the local drainage arrangements. The proposed development will enhance the current storm water drainage as only an attenuated flow will outfall into the system post construction.

4.7 Groundwater Flooding

According to the Geological Survey of Ireland interactive maps, the subject site is underlain with *Dinantain Limestones* The area is listed as overlaying a locally important aquifer which has bedrock which is *moderately productive only in local zones*. The groundwater vulnerability assessment of the site shows that the vulnerability of groundwater in the area is *low*. Refer to **Appendix C** for GSI mapping information.

5.0 CONCLUSIONS

The site has no history of flooding events and the predicted flood hazard maps reviewed do not indicate that the subject lands are located in a flood risk zone.

Flood mapping generated for Kildare County Council's Kilcock LAP indicates that the subject site is not located in the 1-in-1000 flood zone for pluvial or fluvial flooding.

The proposed development will include an attenuation system which will restrict the storm water flows from the site, limiting the storm water run-off to a pre-development greenfield rate. The proposed attenuation system will retain the expected storm water volumes for a 1-in-100-year extreme storm event. By restricting the discharge rate, the chances for the proposed development to flood off site land is minimised.

The geological setting for the subjects does not indicate that the potential for the site to be flooded from a groundwater source is present.

A look at the mechanisms for flooding as noted in the national flood guidelines does not indicate that the subject lands will be flooded by pluvial/fluvial of groundwater sources. As the proposed development will prevent excessive off-site storm water discharges, it will not have a detrimental effect on the surrounding lands.

Appendix A

OPW Historical Flood Mapping

CS CONSULTING
GROUP

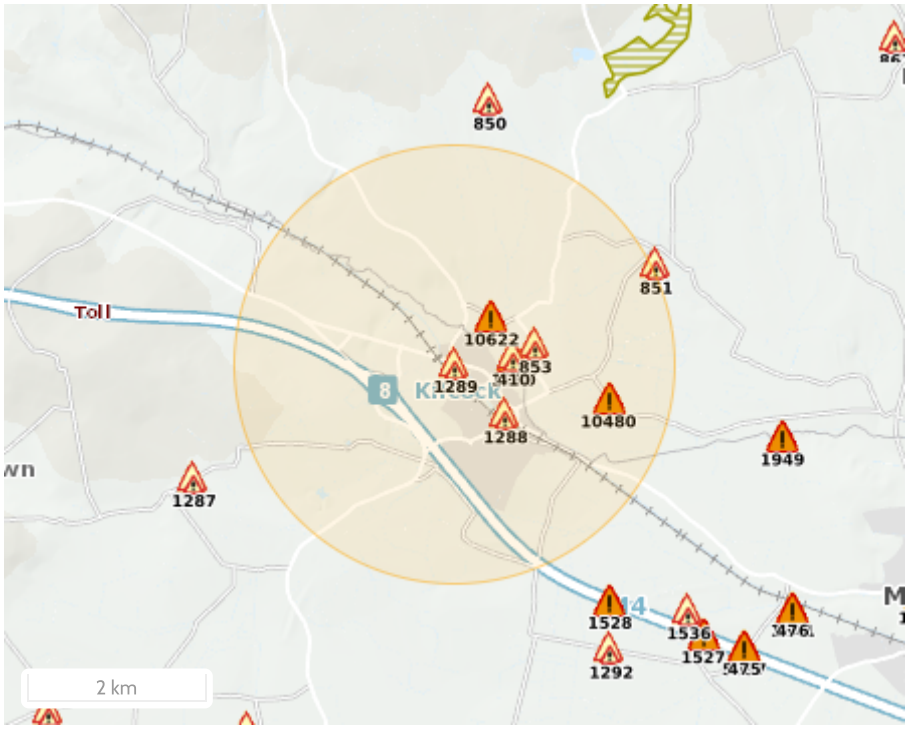
Past Flood Event Local Area Summary Report

OPW Oifig na nOibreacha Poiblí Office of Public Works

Report Produced: **12/5/2021 18:04**

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.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

7 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Ryewater Kilcock Nov 2000 (ID-410)	07/11/2000	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
2.	Ryewater Dolanstown Recurring (ID-853)	n/a	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
3.	School Street, Kilcock Recurring (ID-1288)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
4.	Kilcock Recurring (ID-1289)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
5.	Ryewater, Kilcock Recurring (ID-1290)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
6.	Ryewater Balfeaghan Bridge Kilcock 18th August 2008 (ID-10622)	16/08/2008	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		

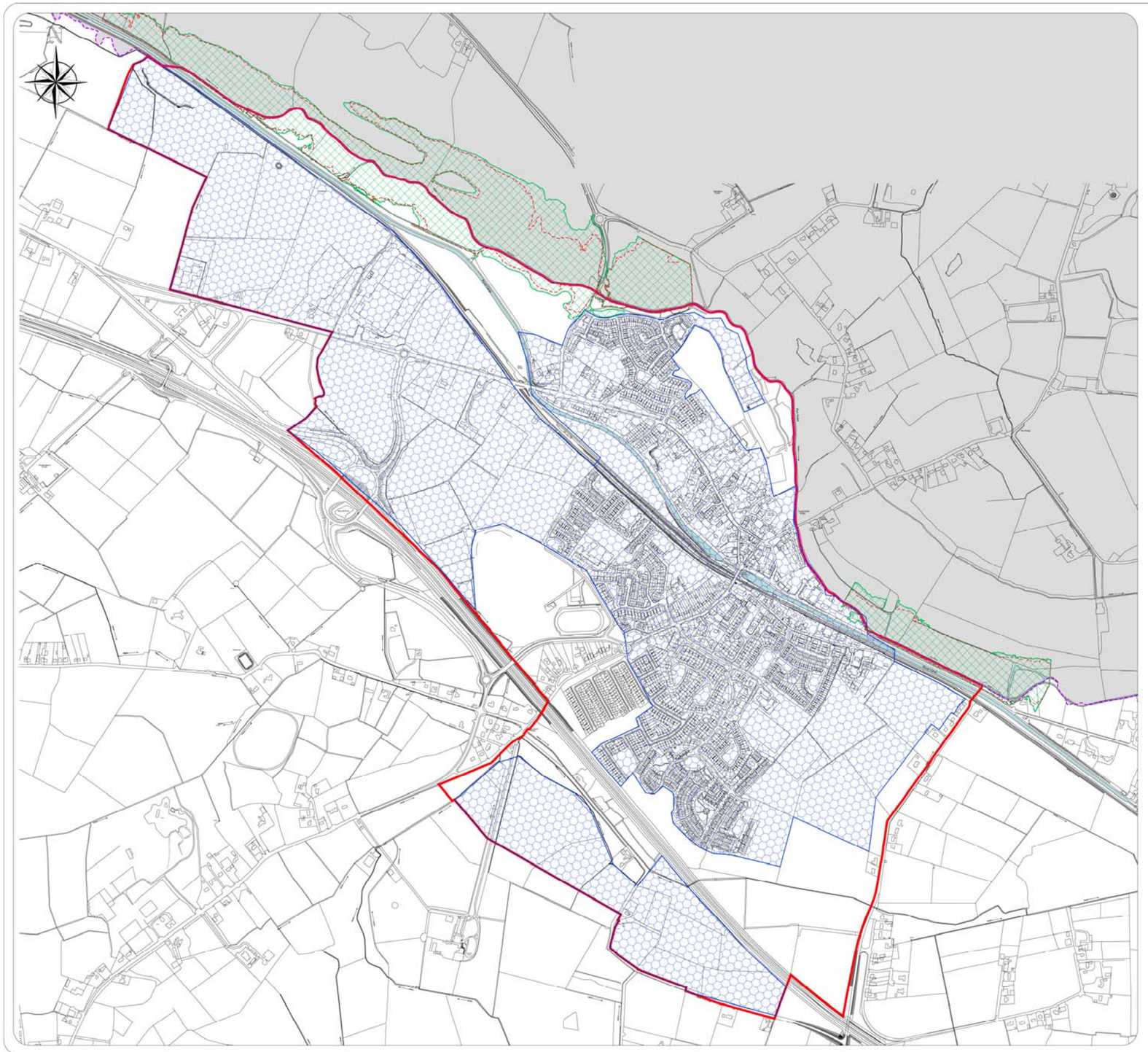
	Name (Flood_ID)	Start Date	Event Location
7.	Rye Water Newtown Prospect Kilcock 8th Jan 2005 (ID-10480)	08/01/2005	Approximate Point

Additional Information: Reports (1) Press Archive (0)

Appendix B

Kildare County Council LAP Flood Mapping

CS CONSULTING
GROUP



Kildare County Council
Planning & Economic
Development Department

Kilcock Local Area Plan
2015-2021
Adopted October 2015

Legend :

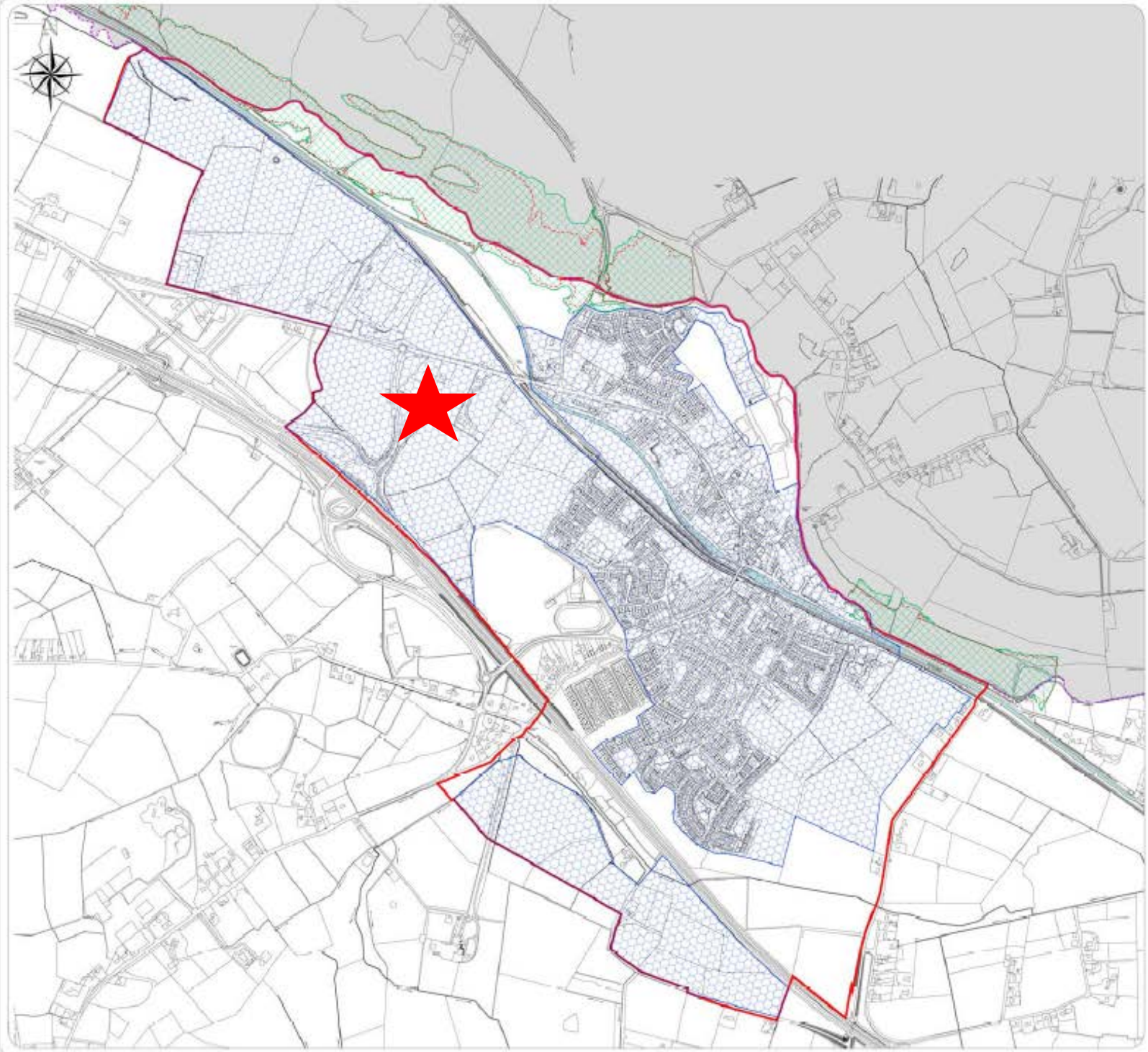
- Meath Zoning
- Development Boundary
- Kildare County Boundary
- Rivers, Canal & Lakes
- Development proposals for lands outlined thus are to be the subject of site-specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. Such development proposals shall also:
  - Indicate and quantify loss of floodplain storage arising from the development proposal;
  - Provide compensatory storage located within or adjacent to the proposed development;
  - Indicate measures to ensure that water-vulnerable elements of the development would not be flooded during the 1,000year flood;
  - Ensure that existing flow paths for flood waters will not be compromised.
- 1,000 year flood zone established by Detailed Flood Risk Assessment
- Extent of 100year flood zone established by Detailed Flood Risk Assessment

Flood Risk Map

Scale : N.T.S	Map Ref :
Date: 30th Jan 2015	Drawing No: 200/14/688
© Ordnance Survey Ireland. All rights reserved. Licence No.: 2004/07CCMA (Kildare County Council)	Drawn By: G McGrath

This drawing is to be read in conjunction with the written statement and objectives map

Map 8: Flood Risk Map



Kildare County Council
Planning & Economic
Development Department

Kilcock Local Area Plan
2015-2021
Adopted October 2015

Legend :

- Meath Zoning
- Development Boundary
- Kildare County Boundary
- Rivers, Canal & Lakes
- Development proposals for lands outlined thus are to be the subject of site-specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. Such development proposals shall also:
  - Indicate and quantify loss of floodplain storage arising from the development proposal;
  - Provide compensatory storage located within or adjacent to the proposed development;
  - Indicate measures to ensure that water-vulnerable elements of the development would not be flooded during the 1,000year flood;
  - Ensure that existing flow paths for flood waters will not be compromised.
- 1,000 year flood zone established by Detailed Flood Risk Assessment
- Extent of 100year flood zone established by Detailed Flood Risk Assessment

Flood Risk Map

Scale : N.T.S	Map Ref :
Date: 30th Jan 2015	Drawing No: 200/14/688
	Drawn By: G McGrath

© Ordnance Survey Ireland.
All rights reserved.
Licence No.: 2004/07CCMA
(Kildare County Council)

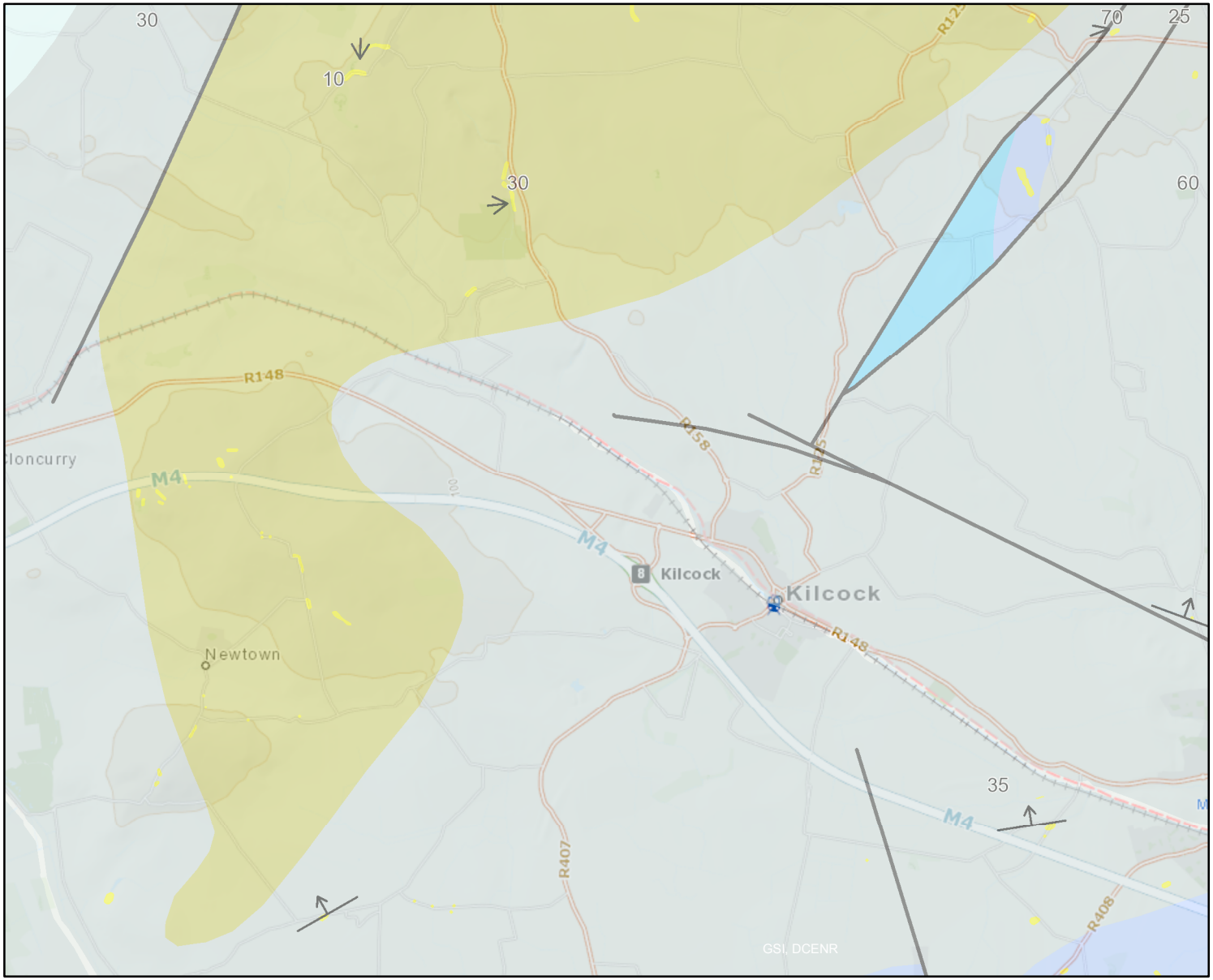
This drawing is to be read in conjunction with the written statement and objectives map

Appendix C

GSI Geological Mapping

CS CONSULTING
GROUP

Job No. S037 Geology



Legend

Structrual Symbol Labels

Bedrock Structure Symology

- Bedding or main foliation, old GSI data
- Contorted bedding or main foliation, old GSI data
- First foliation parallel to bedding
- Foliation trend, Thorr and Rosses Granite
- Horizontal Bedding
- Horizontal first generation fold axis
- Horizontal second generation fold axis
- 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 Foliation
- Strike and Dip of Second Foliation
- Strike and Dip of overturned Bedding
- 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 Shear fabric
- Strike of vertical Bedding
- Strike of vertical First Foliation

Bedrock Stratigraphy

- Boundary of Igneous Intrusion
- Dyke
- Unconformity
- Formation lines
- Boundary of dolomization
- Outer limit of metamorphic aureole
- Outer limit of higher grade aureole
- Lithological Boundary
- Shear Zone Boundary
- Ghost line
- Coal seam/Tertiary dolorite dyke
- Metadolerite sheet/....Limit of granite sheeting(Ox Mountains)
- 3Z

Bedrock Structure

- 10A0-2
- 10A1-1
- Anticline S1
- 10A2-1
- Anticline F2
- Anticline F3
- Anticline F4
- Anticline F5
- 10S0-2
- 10S1-1
- Syncline S1
- 10S2-1
- Syncline S2
- Syncline S3
- Syncline S5
- 11F1-2
- 11S1-1
- Early Slide
- 11S2-2
- 11S2-2
- 11T1-2
- 11T2-2

Outcrop

Generalised Bedrock (Rock Unit Groups)

- Basalts & other Volcanic rocks
- Permo-Triassic Sandstones
- Permo-Triassic Mudstones and Gypsum
- Westphalian Sandstones
- Westphalian Shales
- Namurian Shales
- Namurian Sandstones
- Namurian Undifferentiated
- Dinantian Shales and Limestones
- Dinantian Mixed Sandstones, Shales and Limestones
- Dinantian Sandstones
- Dinantian Pure Bedded Limestones
- Dinantian Upper Impure Limestones
- Dinantian Dolomitised Limestones
- Dinantian Pure Unbedded Limestones
- Dinantian Lower Impure Limestones
- Dinantian (early) Sandstones, Shales and Limestones
- Dinantian Mudstones and Sandstones (Cork Group)
- Devonian Kiltorcan-type Sandstones
- Devonian Old Red Sandstones
- Granites & other Igneous Intrusive rocks
- Silurian Metasediments and Volcanics
- Ordovician Metasediments
- Ordovician Volcanics
- Cambrian Metasediments
- Precambrian Quartzites, Gneisses & Schists
- Precambrian Marbles

Scale: 1:64,699

Geological Survey of Ireland

N W E S

0 0.45 0.9 1.8 mi

0 0.75 1.5 3 km

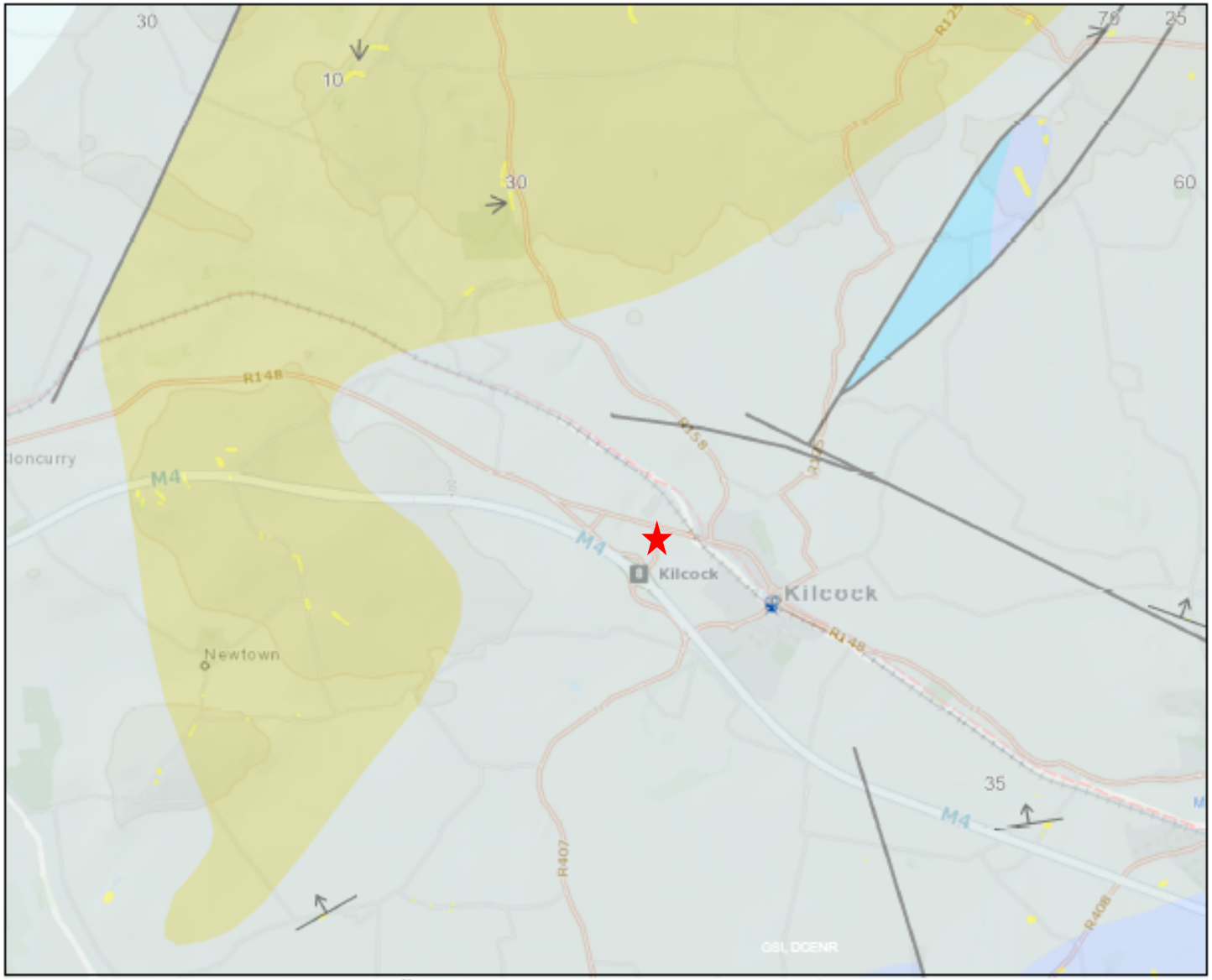
Map Centre Coordinates (ITM) 686,765 740,798

Snapshot Date: February 22, 2016

This map and its data may not be used or reproduced for commercial purposes without the prior written permission of Copyright holders.
This map is a user generated static output from an Internet mapping site and is for general reference only.
Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Ordnance Survey Ireland Licence No. EN 0047215
© Ordnance Survey Ireland/Government of Ireland
© Geological Survey Ireland/Government of Ireland
Map data © OpenStreetMap contributors

Job No. S037 Geology



Legend

Structrual Symbol Labels

Bedrock Structure Symology

- Bedding or main foliation, old GSI data
- Contorted bedding or main foliation, old GSI data
- First foliation parallel to bedding
- Foliation trend, Thorr and Rosses Granite
- Horizontal Bedding
- Horizontal first generation fold axis
- Horizontal second generation fold axis
- 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 Foliation
- Strike and Dip of Second Foliation
- Strike and Dip of overturned Bedding
- 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 Shear fabric
- Strike of vertical Bedding
- Strike of vertical First Foliation

Bedrock Stratigraphy

- Boundary of Igneous Intrusion
- Dyke
- Unconformity
- Formation lines
- Boundary of dolomization
- Outer limit of metamorphic aureole
- Outer limit of higher grade aureole
- Lithological Boundary
- Shear Zone Boundary
- Ghost line
- Coal seam/Tertiary dolerite dyke
- Metadolerite sheet/ ... Limit of granite sheeting(Ox Mountains)
- SZ

Bedrock Structure

- 1DA0-2
- 1DA1-1
- Anticline S1
- 1DA2-1
- Anticline F2
- Anticline F3
- Anticline F4
- Anticline F5
- 1DS0-2
- 1DS1-1
- Syncline S1
- 1DS2-1
- Syncline S2
- Syncline S3
- Syncline S5
- 11F1-2
- 11S1-1
- Early Slide
- 11S2-1
- 11S2-2
- 11T1-2
- 11T2-2

Outcrop

Generalised Bedrock (Rock Unit Groups)

- Basalts & other Volcanic rocks
- Permo-Triassic Sandstones
- Permo-Triassic Mudstones and Gypsum
- Westphalian Sandstones
- Westphalian Shales
- Namurian Shales
- Namurian Sandstones
- Namurian Undifferentiated
- Dinantian Shales and Limestones
- Dinantian Mixed Sandstones, Shales and Limestones
- Dinantian Sandstones
- Dinantian Pure Bedded Limestones
- Dinantian Upper Impure Limestones
- Dinantian Dolomitised Limestones
- Dinantian Pure Unbedded Limestones
- Dinantian Lower Impure Limestones
- Dinantian (early) Sandstones, Shales and Limestones
- Dinantian Mudstones and Sandstones (Cork Group)
- Devonian Kiltorcan-type Sandstones
- Devonian Old Red Sandstones
- Granites & other Igneous Intrusive rocks
- Silurian Metasediments and Volcanics
- Ordovician Metasediments
- Ordovician Volcanics
- Cambrian Metasediments
- Precambrian Quartzites, Gneisses & Schists
- Precambrian Marbles

Scale: 1:64,699

Geological Survey of Ireland

0 0.45 0.9 1.8 mi

0 0.75 1.5 3 km

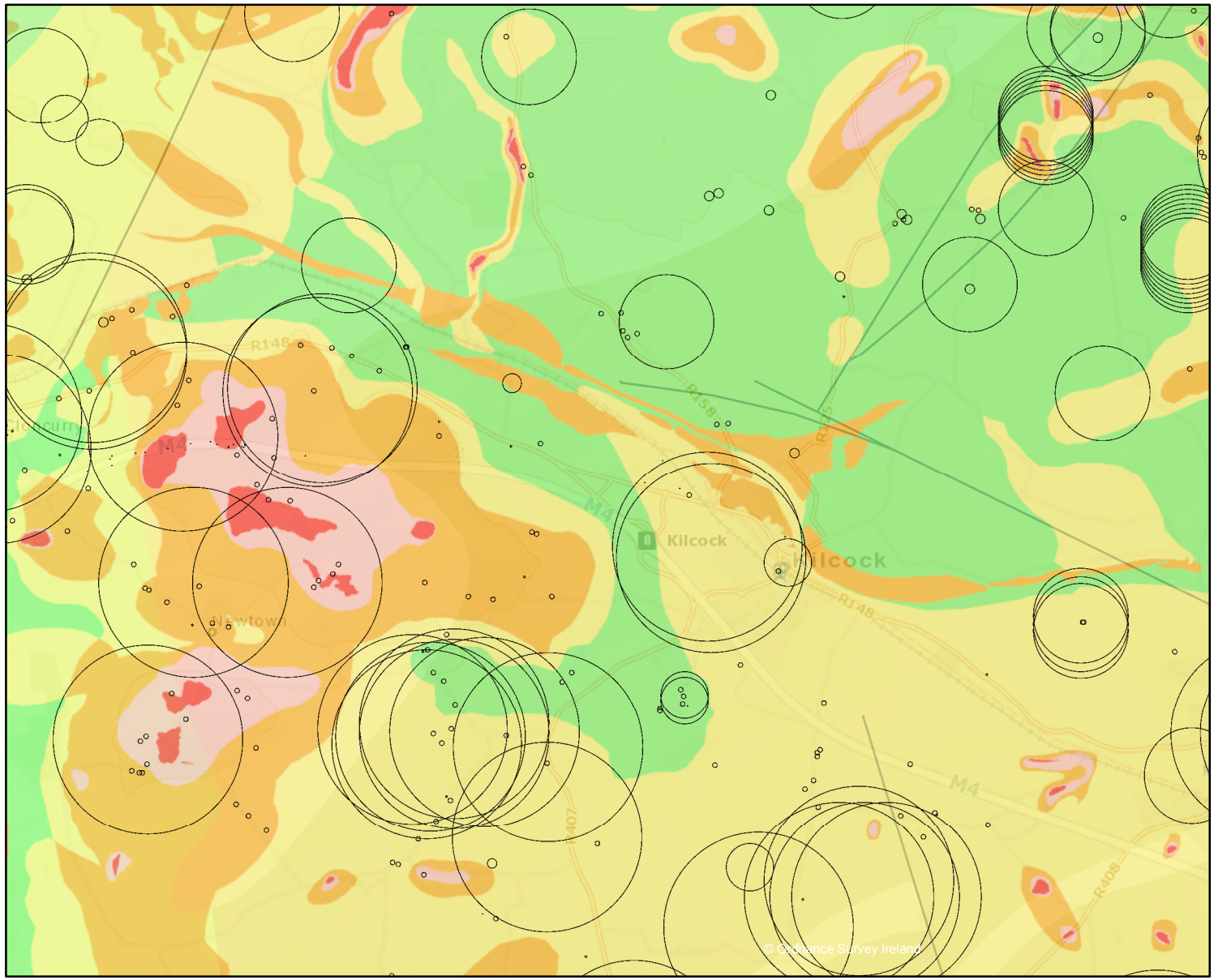
Map Centre Coordinates (ITM) 686,765 740,798

Snapshot Date: February 22, 2016

This map and its data may not be used or reproduced for commercial purposes without the prior written permission of Copyright holders.
This map is a user generated static output from an Internet mapping site and is for general reference only.
Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Ordnance Survey Ireland Licence No. EN 0047215
© Ordnance Survey Ireland/Government of Ireland
© Geological Survey Ireland/Government of Ireland
Map data © OpenStreetMap contributors

Job No. S037 Groundwater



Legend

- Groundwater Wells and Springs

Karst Landforms

- Borehole
- Cave
- Dry Valley
- Enclosed Depression
- Spring
- Superficial Solution Features
- Swallow Hole
- Turlough

- Traced Underground Connections

Groundwater Vulnerability

- X - Rock at or near surface or Karst
- E - Extreme
- H - High
- M - Moderate
- L - Low
- W - Water

- Bedrock Aquifer Faults

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
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Lake

Scale: 1:64,699

Geological Survey of Ireland

N W E S

0 0.45 0.9 1.8 mi

0 0.75 1.5 3 km

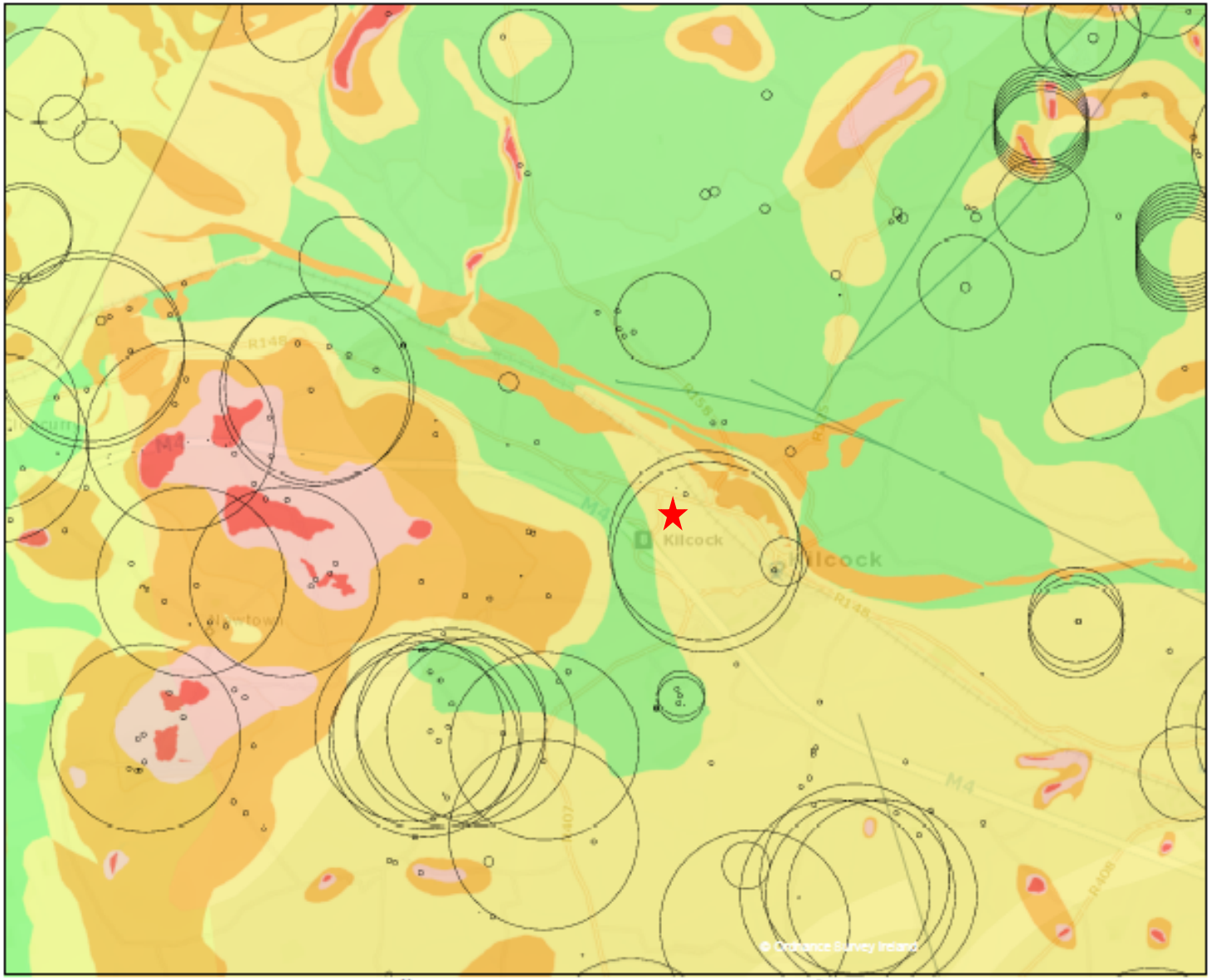
Map Centre Coordinates (ITM) 686,712 740,444

Snapshot Date: February 22, 2016

This map and its data may not be used or reproduced for commercial purposes without the prior written permission of Copyright holders.
This map is a user generated static output from an Internet mapping site and is for general reference only.
Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Ordnance Survey Ireland Licence No. EN 0047215
© Ordnance Survey Ireland/Government of Ireland
© Geological Survey Ireland/Government of Ireland
Map data © OpenStreetMap contributors

Job No. S037 Groundwater



Legend

- Groundwater Wells and Springs

Karst Landforms

- Borehole
- Cave
- Dry Valley
- Enclosed Depression
- Spring
- Superficial Solution Features
- Swallow Hole
- Turlough

- Traced Underground Connections

Groundwater Vulnerability

- X - Rock at or near surface or Karst
- E - Extreme
- H - High
- M - Moderate
- L - Low
- W - Water

- Bedrock Aquifer Faults

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
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive

- Lake

Scale: 1:64,699

Geological Survey of Ireland

0 0.45 0.9 1.8 mi

0 0.75 1.5 3 km

Map Centre Coordinates (ITM) 686,712 740,444

Snapshot Date: February 22, 2016

This map and its data may not be used or reproduced for commercial purposes without the prior written permission of Copyright holders.
This map is a user generated static output from an Internet mapping site and is for general reference only.
Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Ordnance Survey Ireland Licence No. EN 0047215
© Ordnance Survey Ireland/Government of Ireland
© Geological Survey Ireland/Government of Ireland
Map data © OpenStreetMap contributors