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DUBLIN | LONDON | LIMERICK

Site Specific Flood Risk Assessment for a Proposed Mixed-Use Development

Belgard Square East, Belgard Road and Blessington Road, Dublin 24.

Client: Ravensbrook Limited.

Job No. Q003

June 2022

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SITE SPECIFIC FLOOD RISK ASSESSMENT

PROPOSED RESIDENTIAL DEVELOPMENT, BELGARD SQUARE EAST, BELGARD ROAD AND BLESSINGTON ROAD, DUBLIN 24.

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File Location: J:\Q_JOBS\Job-Q003\B_Documents\1.0_Civil\4_Reports\FRA\Q003-CSC-ZZ-XX-RP-C-0002 FRA 20220607.docx

BS 1192 FIELD	**Q003-CSC-ZZ-XX-RP-C-0002**

Job Ref.	Author	Reviewed By	Authorised By	Issue Date	Rev. No.
Q003	FB	RFM	NB	07.06.2022	P5
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Q003	FB	NB	NB	27.10.2021	P2
Q003	FB	NB	NB	11.10.2021	P1
Q003	FB	RFM	RFM	05.10.2021	-

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1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by Ravensbrook Limited to prepare Flood Risk Assessment to accompany a planning application for a proposed mixed-use development at Belgard Square East, Belgard Road and Blessington Road, Dublin 24.

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

- South Dublin County Council Development Plan 2016–2022, (including Strategic Flood Risk Assessment)
- Draft South Dublin County Development Plan 2022-2028,
- Tallaght Town Centre Local Area Plan 2020 (including Strategic Flood Risk Assessment)
- Greater Dublin Regional Code of Practice for Works,
- Office of Public Works Flood Maps,
- Department of the Environment Flooding Guidelines,
- Planning System and Flood Risk Management, Guidelines for Planning Authorities 2009,
- Geological Survey of Ireland Maps,
- Local Authority Drainage Records.

The Flood Risk Assessment is to be read in conjunction with the engineering drawings submitted by CS Consulting and with the various additional information submitted by the other members of the design team.

2.0 SITE LOCATION

The proposed development site is located on Belgard Square East, Belgard Road and Blessington Road, Dublin 24. The site is located in the administrative jurisdiction of South Dublin County Council (SDCC) and has a total area of circa 1.26 ha.

Figure 1 – Site Location
(map data: EPA, NTA, OSM Contributors)

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 development site is bound by Belgard Square East to the west, Blessington Road to the north, Belgard Road to the east and existing commercial developments to the south.

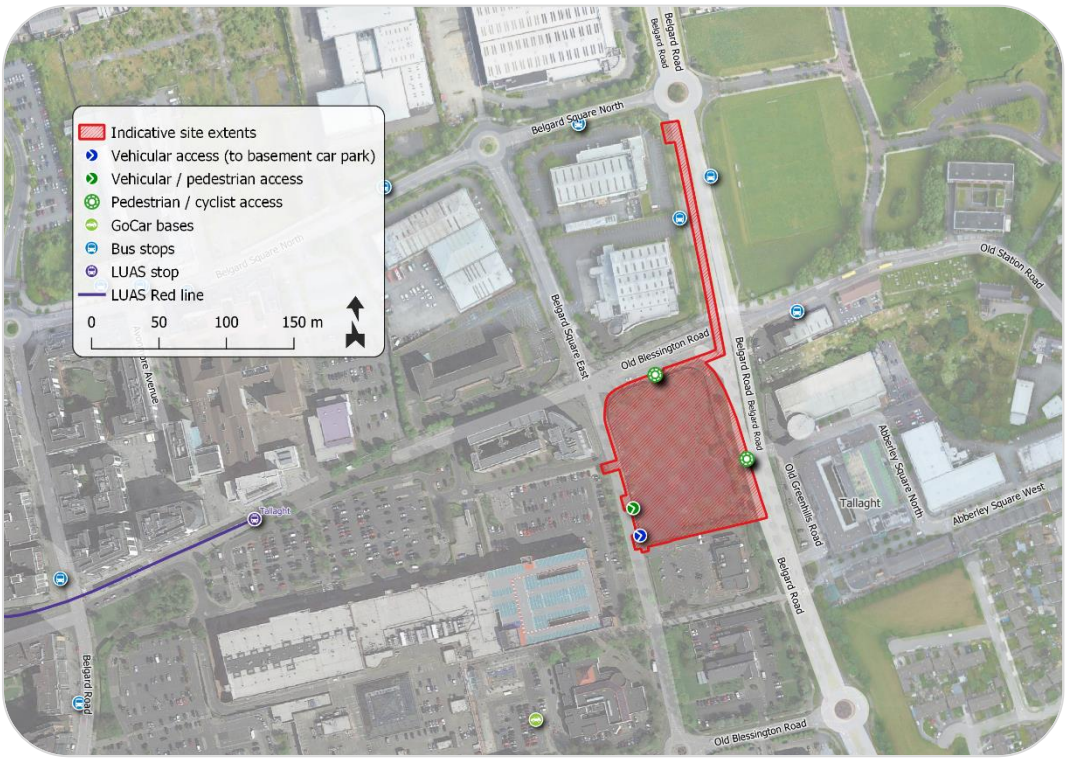

Figure 2 – Site Environs
(map data: NTA, OSM Contributors, Google)

2.1 Existing Land Use

The site is currently a brownfield site consisting primarily of hardstanding surfacing. No existing buildings are present on site. The site does not currently generate any vehicular traffic. A topographical survey has been carried out and survey information is shown on CS Consulting drawing no. Q003-CSC-ZZ-XX-DR-C-0001.

3.0 PROJECT DESCRIPTION

The proposed development will consist of the demolition of existing boundary wall and construction of:

c. 2,289 sqm of retail/commercial floor space across 10 no. units including retail, restaurant/café and Class 2 financial/professional services and office use, and a crèche (257sqm) at ground and first floor levels;

310 no. build to rent residential apartments including 99 no. one bedroom units, 203 no. 2 bedroom units and 8 no. three bedroom units within a part 6 to part 12 no. storey development across 3 blocks over partial basement;

c. 2,223 sqm of communal external amenity space provided in the form of a ground floor garden and external terraces at fifth, sixth, seventh and eighth floor levels; c. 1,026 sqm of public open space provided in the form of a central courtyard with landscaped areas at site perimeters;

c. 1,785 sqm of resident support facilities and services and amenities provided at basement, ground and first floor levels;

Vehicular access to the basement development from a new access point at Belgard Square East;

A new tertiary route will be provided in the southern part of the site linking Belgard Square East and Belgard Road;

Provision of 130 no. car parking spaces (including 8 no. club car spaces and 6 no. disabled access spaces) at basement level in addition to 5 no. set down spaces (4 no. serving creche) and 1 no. disabled access space at ground level, layby on Belgard Square East, 6 no. motorcycle spaces and a total of 763 no. bicycle parking spaces;

Provision of 4 no. Ø0.3m microwave link dishes to be mounted on 2 no. steel support pole affixed to lift shaft overrun, all enclosed in radio friendly GRP shrouds, together with associated equipment at roof level at Block B;

Provision of 3 no. ESB substations with switch rooms and plant rooms at basement level, hard and soft landscaped areas, bin and bicycle stores, public lighting, attenuation, green roof, plant at roof level, service connections and all ancillary site development works.

4.0 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.

3.1 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 1 below.

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 1 – 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. Tallaght Town Centre Local Area Plan includes a Strategic Flood Risk Assessment covering the area within the scope of the LAP. This includes the subject development site. The Strategic Flood Risk Assessment states the following in relation to the assessment of flood risk for new planning applications:

"It is recommended that an assessment of flood risk is required in support of any planning application where flood risk may be an issue and this may include sites in Flood Zone C where a small watercourse or field drain exists nearby. The

level of detail will vary depending on the risks identified and the proposed land use. As a minimum, all proposed development, including that in Flood Zone C, must consider the impact of surface water flood risks on drainage design. In addition, flood risk from sources other than fluvial and tidal should be reviewed. Within the FRA the impacts of climate change and residual risk (including culvert/structure blockage) should be considered and remodelled where necessary, using an appropriate level of detail, in the design of finished floor levels. Further information on the required content of the FRA is provided in the Planning System and Flood Risk Management Guidelines.

Any proposal that is considered acceptable in principle shall demonstrate the use of the sequential approach in terms of the site layout and design and, in satisfying the Justification Test (where required), the proposal will demonstrate that appropriate mitigation and management measures are put in place

3.2 It is a requirement of both South Dublin County Councils *Tallaght Town Centre Local Area Plan 2020,* the *Greater Dublin Strategic Drainage Study*, (DCC 2005) & the Department of the Environment, community & Local Government flooding guidelines, The *Planning System and Flood Risk Management, Guidelines for Planning Authorities,* that the predicted effects of climate change are incorporated into any proposed design. Table 2 below indicates the predicated climate change variations.

Design Category	Predicated 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

Table 2 – The predicated climate change variations (source: Planning System and Flood Risk Management, Guidelines for Planning Authorities).

3.3 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 *Planning Systems and Flood Risk Management Guidelines for Planning Authorities*, residential dwellings are classified as 'highly vulnerable developments'.

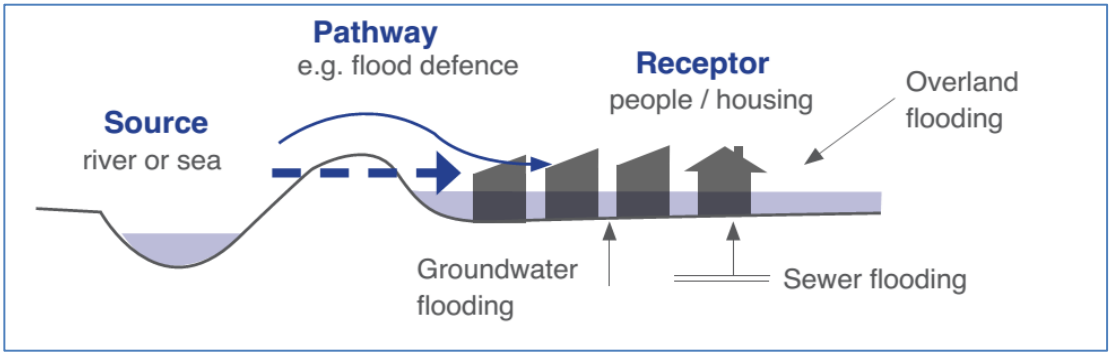

Figure 3 – Source-pathway-receptor model Site location
(Flood Risk Management Guidelines)

Section 5.5.2 of the Strategic Flood Risk Assessment carried out for Tallaght Town Centre Local Area Plan 2020 states that where a site is within Flood Zone C, but adjoining or in close proximity to Flood Zone A or B there could be a risk of flooding associated with factors such as future scenarios (climate change) or

in the event of failure of a defence (if applicable), blocking of a bridge or culvert. Risk from sources other than fluvial and coastal must also be addressed for all development in Flood Zone C. As a minimum in such a scenario, a flood risk assessment should be undertaken which will screen out possible indirect sources of flood risk and where they cannot be screened out it should present mitigation measures.

3.4 The flooding 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.

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

Table 3 – Flood Zone Vs Justification Test Matrix

As noted above the site is located within **Flood Zone C** and is not situated in close proximity to Flood Zone A or B, as such a justification test is not required. See **Appendix A.**

5.0 FLOOD RISKS & MITIGATION MEASURES

5.1 Fluvial 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 included in **Appendix B**.

Recent modelling of the River Camac and surrounding area as part of the *Eastern Catchment Flood Risk Assessment Mapping*, CFRMA, project indicates that the subject lands is deemed to be located outside of the 0.1% AEP fluvial floodplain, based on the currently available maps, see **Appendix C**. There are no flood alleviation measures in place in the immediate vicinity of the proposed development.

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

5.2 Tidal Flooding

The subject site is such that it is not affected by tidal water bodies as such the risk of tidal flooding is negligible and mitigation measures are not required.

5.3 Pluvial Flooding

Pluvial flooding is flooding which 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 does not indicate flood events in the area. As part of a review of the potential flooding the site is deemed not to be at the risk from pluvial flooding as the development storm drainage system and attenuation storage is designed to cater for a 100 year storm event in accordance with the *Greater Dublin Strategic Drainage Study*.

5.4 Potential for Site To Contribute To Off-Site Flooding.

The proposed development will provide attenuation for a 1 in 100 year storm event plus 20% (to account for climate change) for the predicated effects of climate change. The attenuation will release the storm water in a controlled manner by means of a hydrobrake limited to 2.0l/s 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. Furthermore, it is proposed to implement SuDS measures within the proposed development to intercept and treat rainfall. The proposed discharge rate for the subject development shall be 2.0l/s which is lower than the greenfield run-off rate calculated (2.2l/s). Please refer to the Engineering Services Report under separate cover within this planning application for details of proposed SuDS measures.

5.5 Existing Off-Site Drainage

There are no issues with the local drainage arrangements. Existing drainage infrastructure in the vicinity of the subject development is under the ownership of South Dublin County Council. Please refer to OPW Historical Flooding Report included within Appendix B for further details.

Figure 4 - Existing Surface Water Infrastructure (source: Geological Survey Ireland)

The subject lands will only discharge a restricted flow into the public system thereby reducing the hydraulic pressure on the public network during extreme rainfall events.

5.6 Groundwater Flooding

Following review of groundwater flooding mapping by Geological Survey of Ireland (GSI) does not indicate groundwater flooding in the vicinity of the subject development site. According to the GSI interactive maps, the subject site is underlain with *Dark limestone & shale*. 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 medium. It is not proposed to rely on infiltration for the proposed surface water strategy, instead runoff shall be attenuated within the subject development and discharged at a controlled rate into the public storm network, as such it is anticipated that the subject development shall have negligible impact on the groundwater. See **Appendix E** for GSI mapping information for background groundwater & geology data for the subject lands.

6.0 CONCLUSION

- It is noted that there is no historical flooding on site according to the OPW's historical flood maps.
- The subject development site is situated entirely within Flood Zone C.
- The subject development site has been reviewed against flooding from the following sources and no negative impacts on flooding are foreseen;
    - Pluvial flooding,
    - Fluvial flooding,
    - Tidal flooding,
    - Groundwater flooding.
- The proposed development shall improve local stormwater infrastructure capacity as a result of the proposed attenuation of rainfall and restriction of stormwater discharge rate during periods of intense rainfall.

Appendix A

SDCC Flood Maps

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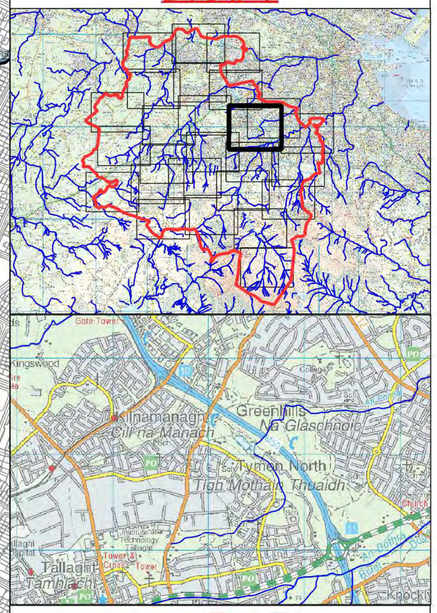
Legend

- Flood Zone A - 1% AEP Flood Extent (1 in 100 chance in any given year)
- Flood Zone B - 1% AEP Flood Extent (1 in 1000 chance in any given year)
- Defended Area
- Watercourse Centreline
- Indicative Flood Extents
- County Boundary

DRAFT



Comhairle Contae Átha Cliath Theas
South Dublin County Council

Project: Strategic Flood Risk Assessment

Title: Fluvial Flood Zone Mapping

Figure: MDW657_0010

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Issue Details

Drawn:	BT	Project No.	MDW0657
Checked:	JH	File Ref	MDW0657QG0010F02
Approved:	JH		
Scale:	1:6000 @ A1	Drawing No.	Projection
Date:	14/01/2016	10 of 26	IG

Notes
1. The viewer of this map should refer to the SFRA Report and Disclaimer

0 200 400 600 800 1000 m

Appendix B

OPW Historic Flood Maps

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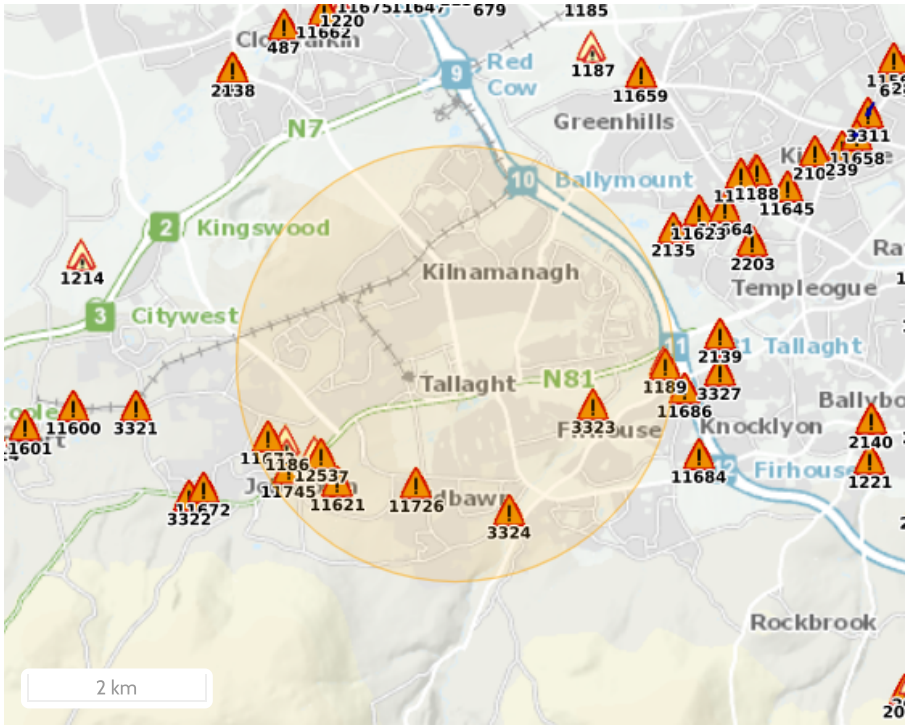
Past Flood Event Local Area Summary Report

OPW Oifig na nOibreacha Poiblí Office of Public Works

Report Produced: **11/10/2021 10:45**

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



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

11 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Killinarden Stream Jobstown recurring (ID-1186)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (1)		
2.	Dodder Mount Carmel Park recurring (ID-1189)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (1)		
3.	Killinarden Stream N81 Jobstown Recurring (ID-1253)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (1)		
4.	Dodder Avonmore Park Nov 2000 (ID-3323)	05/11/2000	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
5.	Dodder Kiltipper Road Nov 2000 (ID-3324)	05/11/2000	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
6.	Mount Carmel Park Firhouse Nov 2000 (ID-3333)	05/11/2000	Approximate Point
	Additional Information: Reports (1) Press Archive (1)		

	Name (Flood_ID)	Start Date	Event Location
7.	Flooding at Whitestown Way, Tallaght, Dublin 24 on 24th Oct 2011 (ID-11726) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point
8.	Flooding at Blessington Road, Tallaght, Dublin 24 on 1st May 2012 (ID-11745) **Additional Information:** Reports (1) Press Archive (0)	05/01/2012	Exact Point
9.	Flooding at Knockmore, Tallaght, Co. Dublin on 24th Oct 2011 (ID-11621) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Approximate Point
10.	Flooding at Tallaght Pass, N81, Dublin 24 on 24th Oct 2011 (ID-11657) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point
11.	Flooding at Bawnlea Crescent and Avenue, Tallaght, Co. Dublin on 24th Oct 2011 (ID-11673) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point

Appendix C

CFRAM Fluvial Flood Maps

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TS1_3471
TS1_3111
TS1_3165
TS1_3051
TS1_3047
TS1_3010
TS1_3320
TS1_3475
TS1_2790
TS1_2488
TS1_2590
TS1_2320
TS1_2209
TS1_2503
TS1_2092
TS1_2300
TS2_560
TS1_2115
TS1_1820
TS1_1990
TS2_360
TS2_180
TS2_0

10% Flow = 10.68 m^3/s
1% Flow = 18.846 m^3/s
0.1% Flow = 29.867 m^3/s

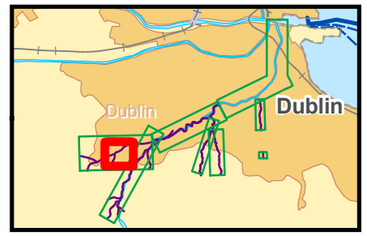
10% Flow = 13.2 m^3/s
1% Flow = 21.758 m^3/s
0.1% Flow = 35.557 m^3/s

10% Flow = 3.57 m^3/s
1% Flow = 5.9 m^3/s
0.1% Flow = 9.34 m^3/s

10% Flow = 3.58 m^3/s
1% Flow = 5.96 m^3/s
0.1% Flow = 9.71 m^3/s

	Water Level (mOD) per AEP		
Node Label	WL 10%	WL 1%	WL 0.1%
TS1-1820	98.38	98.77	99.06
TS1-1990	95.47	96.29	96.60
TS1-2092	95.20	96.09	96.35
TS1-2115	95.08	95.46	95.59
TS1-2209	95.08	95.45	95.60
TS1-2300	94.26	94.59	94.85
TS1-2320	94.23	94.57	94.82
TS1-2488	93.70	94.10	94.33
TS1-2503	93.57	93.83	94.04
TS1-2590	91.94	92.21	92.53
TS1-2790	90.39	90.65	90.98
TS1-3010	89.29	89.89	90.38
TS1-3047	89.22	89.69	90.04
TS1-3051	89.21	89.67	90.01
TS1-3111	89.19	89.65	89.99
TS1-3165	87.71	88.05	88.51
TS1-3320	87.00	87.37	87.98
TS1-3471	86.32	86.69	87.21
TS1-3475	86.27	86.62	87.13
TS2-0	98.14	98.38	98.69
TS2-180	96.75	96.94	97.14
TS2-360	95.13	95.37	95.68
TS2-560	94.33	94.74	95.00

Location Plan:



Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Defended Area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (>40m) (10% and 0.1% AEP)
- High Confidence (<20m) (1% AEP)
- Medium Confidence (<40m) (1% AEP)
- Low Confidence (>40m) (1% AEP)
- River Centreline
- Node Point
- OS_2975 Node Label (refer to table)
- Flow reporting location
- 10% Flow = 1.20 / 1% Flow = 1.56 / 0.1% Flow = 2.17 Peak flow during design flood extent

USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

Client:

Dublin City Baile Átha Cliath · South Dublin County Council · Dún Laoghaire-Rathdown County Council Comhairle Contae Dhún Laoghaire-Ráth an Dúin · OPW

Project:

DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map:

PRESENT DAY TALLAGHT STREAM

Map Type: FLOOD EXTENT
Source: FLUVIAL FLOODING
Map Area: URBAN AREA
Scenario: CURRENT

Drawn By :	A.A.B	Date :	26 November 2010
Checked By :	A.J.	Date :	26 November 2010
Approved By :	A.G.B	Date :	26 November 2010

Figure No. :

TS/EXT/UA/CURS/102

Map Series : Page 2 of 3

Drawing Scale : 1: 5,000 **Plot Scale : 1:1 @ A3**

0 0.1 0.2
Kilometers

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Appendix D

Irish Water Drainage Records

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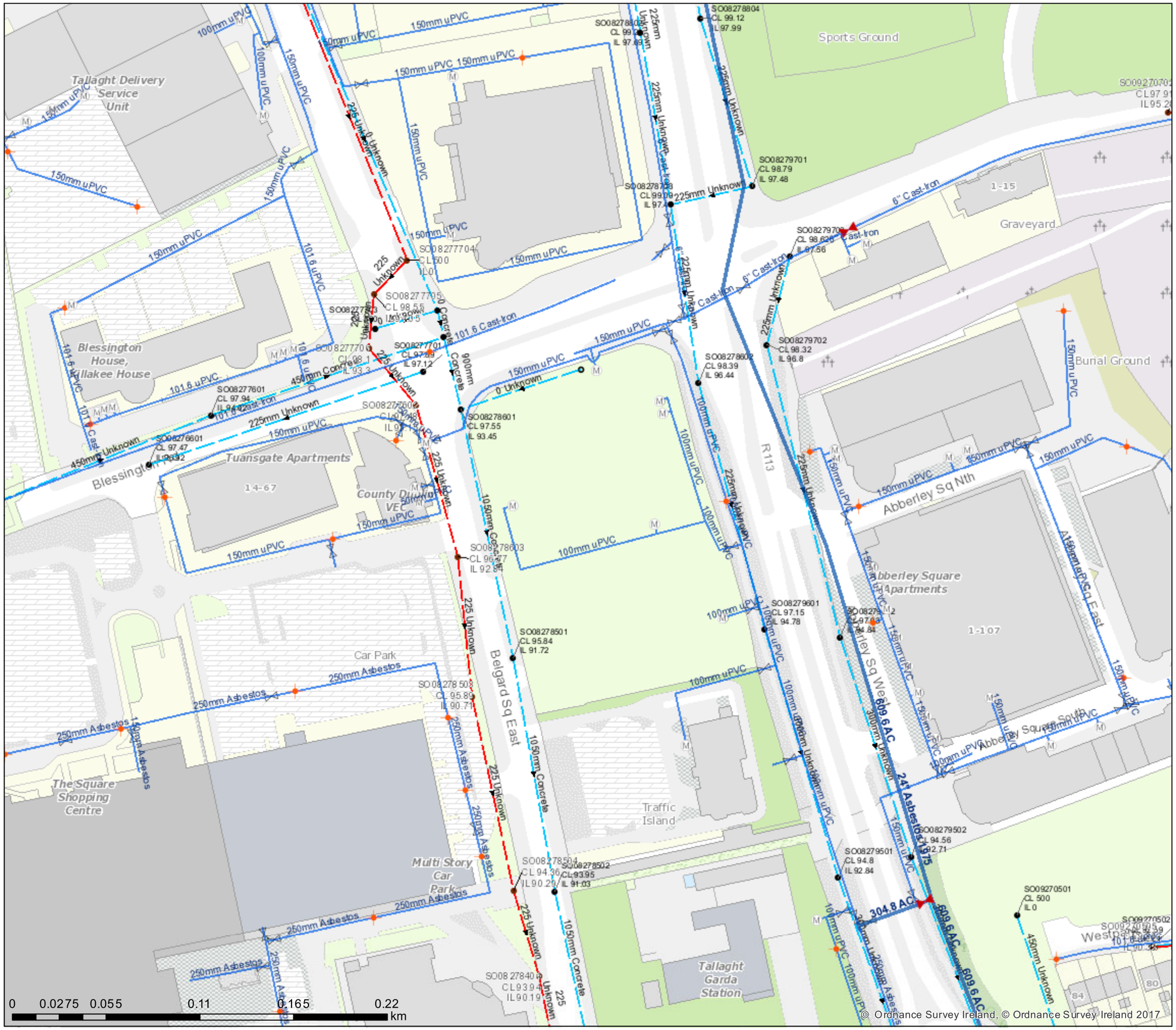
Irish Water Web Map



UISCE ÉIREANN : IRISH WATER

Print Date: 19/01/2021

Printed by:Irish Water

Water Distribution Network
- Water Treatment Plant
- Water Pump Station
- Storage Cell/Tower
- Dosing Point
- Meter Station
- Abstraction Point
- Telemetry Kiosk

Reservoir
- Potable
- Raw Water

Water Distribution Mains
- Irish Water
- Private

Trunk Water Mains
- Irish Water
- Private

Water Lateral Lines
- Irish Water
- Non IW
- Water Casings
- Water Abandoned Lines
- Boundary Meter
- Bulk/Check Meter
- Group Scheme
- Source Meter
- Waste Meter
- Unknown Meter ; Other Meter
- Non-Return
- PRV
- PSV
- Sluice Line Valve Open/Closed
- Butterfly Line Valve Open/Closed
- Sluice Boundary Valve Open/Closed
- Butterfly Boundary Valve Open/Closed
- Scour Valves
- Single Air Control Valve
- Double Air Control Valve
- Water Stop Valves
- Water Service Connections
- Water Distribution Chambers
- Water Network Junctions
- Pressure Monitoring Point
- Fire Hydrant
- Fire Hydrant/Washout

Water Fittings
- Cap
- Reducer
- Tap
- Other Fittings

Sewer Foul Combined Network
- Waste Water Treatment Plant
- Waste Water Pump station

Sewer Mains Irish Water
- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow

Sewer Mains Private
- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow
- Sewer Lateral Lines
- Sewer Casings

Sewer Manholes
- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown

Discharge Type
- Outfall
- Overflow
- Soakaway
- Standard Outlet
- Other; Unknown

Cleanout Type
- Rodding Eye
- Flushing Structure
- Other; Unknown

Sewer Inlets
- Catchpit
- Gully
- Standard
- Other; Unknown

Sewer Fittings
- Vent/Col
- Other; Unknown

Storm Water Network

Surface Water Mains
- Surface Gravity Mains
- Surface Gravity Mains Private
- Surface Water Pressurised Mains
- Surface Water Pressurised Mains Private

Inlet Type
- Gully
- Standard
- Other; Unknown

Storm Manholes
- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown
- Storm Culverts
- Storm Clean Outs
- Stormwater Chambers

Discharge Type
- Outfall
- Overflow
- Soakaway
- Other; Unknown

Gas Networks Ireland
- Transmission High Pressure Gasline
- Distribution Medium Pressure Gasline
- Distribution Low Pressure Gasline

ESB Networks

ESB HV Lines
- HV Underground
- HV Overhead
- HV Abandoned

ESB MVLV Lines
- MV Overhead Three Phase
- MV Overhead Single Phase
- LV Overhead Three Phase
- LV Overhead Single Phase
- MVLV Underground
- Abandoned

Non Service Categories
- Proposed
- Under Construction
- Out of Service
- Decommissioned

Water Non Service Assets
- Water Point Feature
- Water Pipe
- Water Structure

Waste Non Service Assets
- Waste Point Feature
- Sewer
- Waste Structure

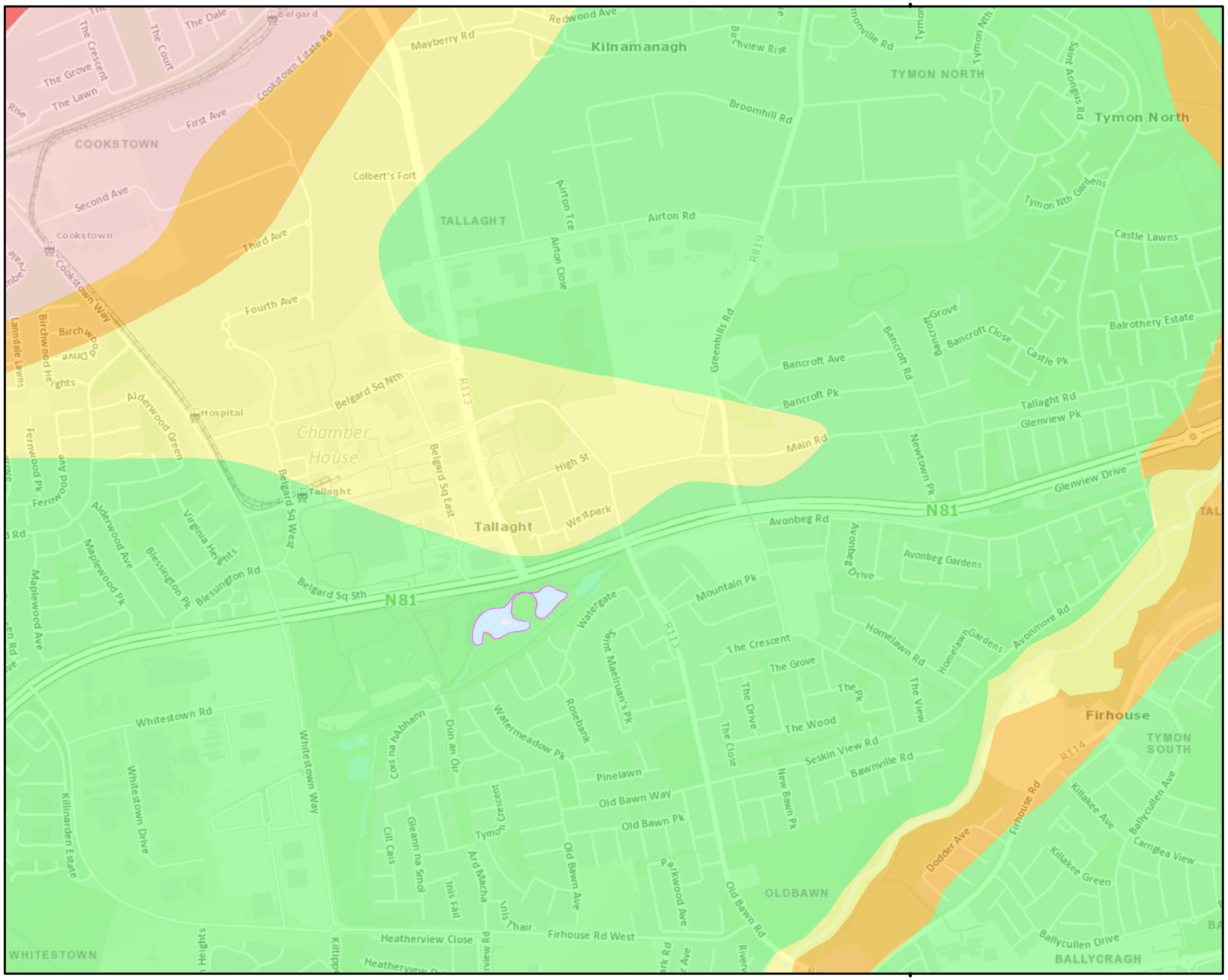
Appendix E

GSI Hydrogeology & Geological Maps

CS CONSULTING

GROUP

Groundwater Recharge



Legend

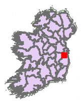
National Groundwater Vulnerability Ireland

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

Scale: 1:16,883

Geological Survey Ireland

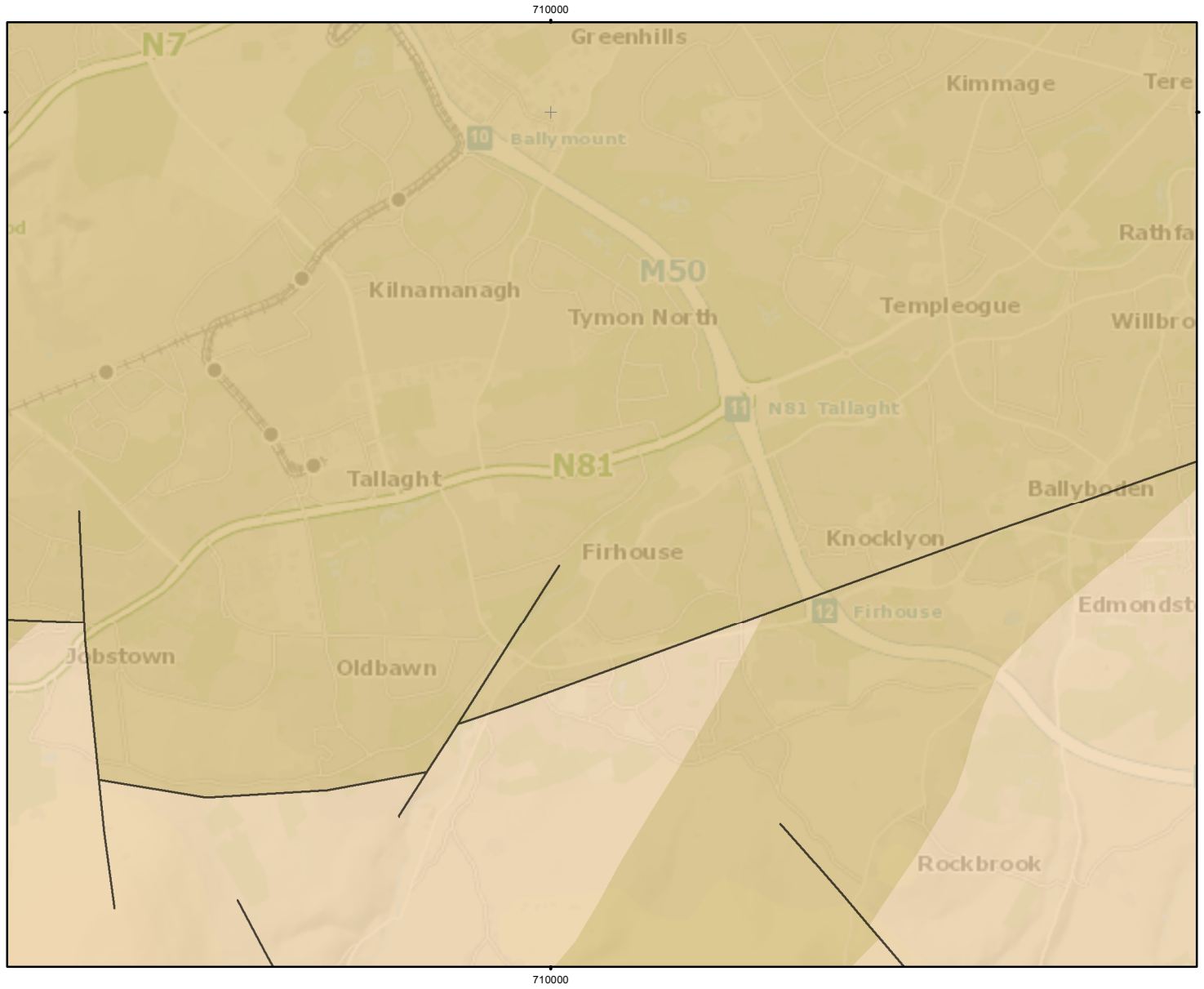
0 0.1 0.2 0.4 mi
0 0.175 0.35 0.7 km



Map Centre Coordinates (ITM) 709,209 727,595
10/11/2021, 10:57:01 AM

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

Groundwater Aquifers



Scale: 1:42,208

Geological Survey Ireland

N W E S

0 0.3 0.6 1.2 mi
0 0.5 1 2 km

Map Centre Coordinates (ITM) 710,350 727,389
10/11/2021, 12:07:53 PM

Legend

Bedrock Aquifer Faults

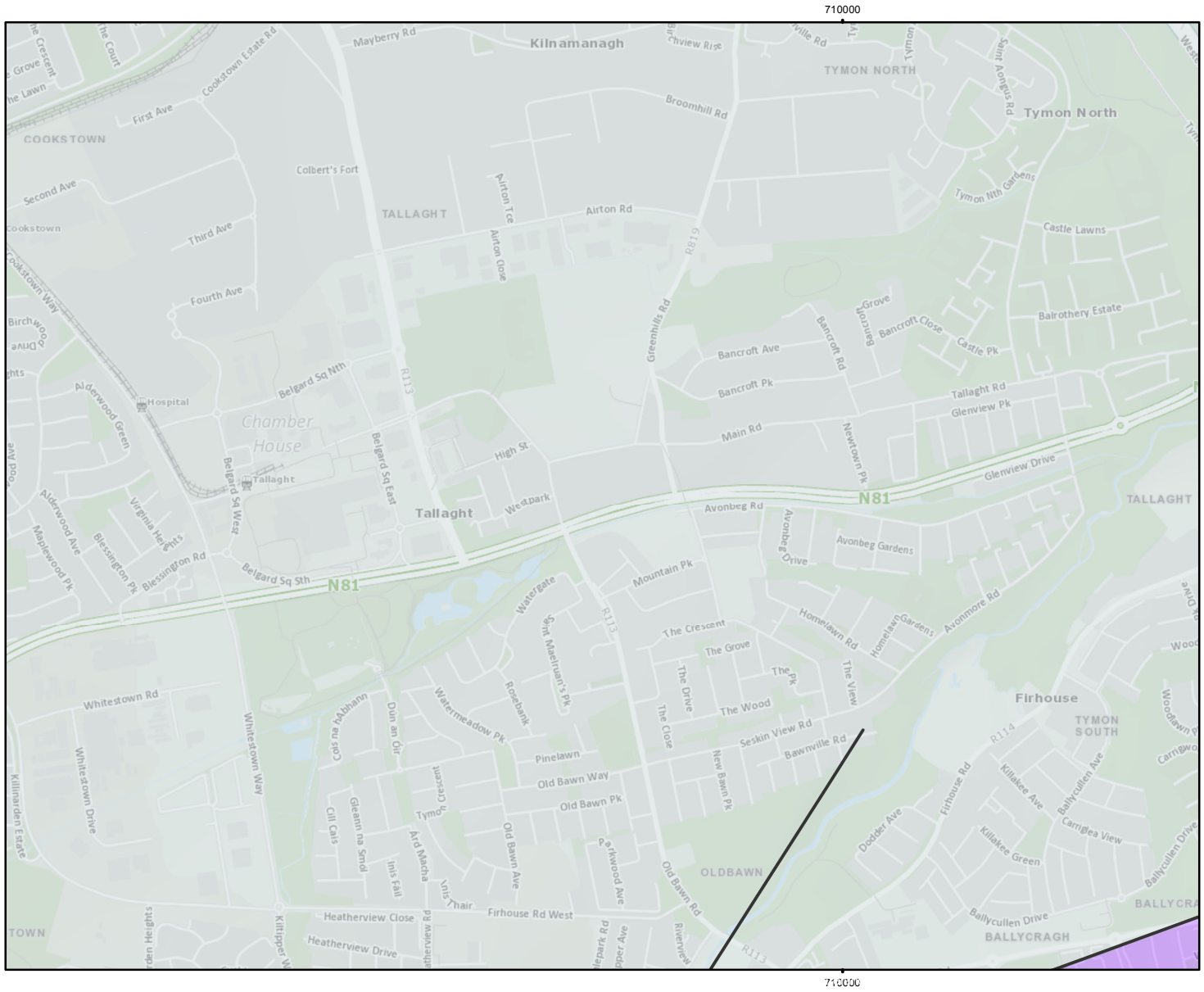
Bedrock Aquifer

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

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

Bedrock Geology



Scale: 1:16,883

Geological Survey Ireland

N W E S

0 0.1 0.2 0.4 mi
0 0.175 0.35 0.7 km

Map Centre Coordinates (ITM) 709,345 727,545
10/11/2021, 12:13:58 PM

Legend

Bedrock Linework 100k ITM 2018

- Fault

Bedrock Polygons 100k ITM 2018

- Lucan Formation
- Type 2p microcline porphyritic
- Aghfarrell Formation