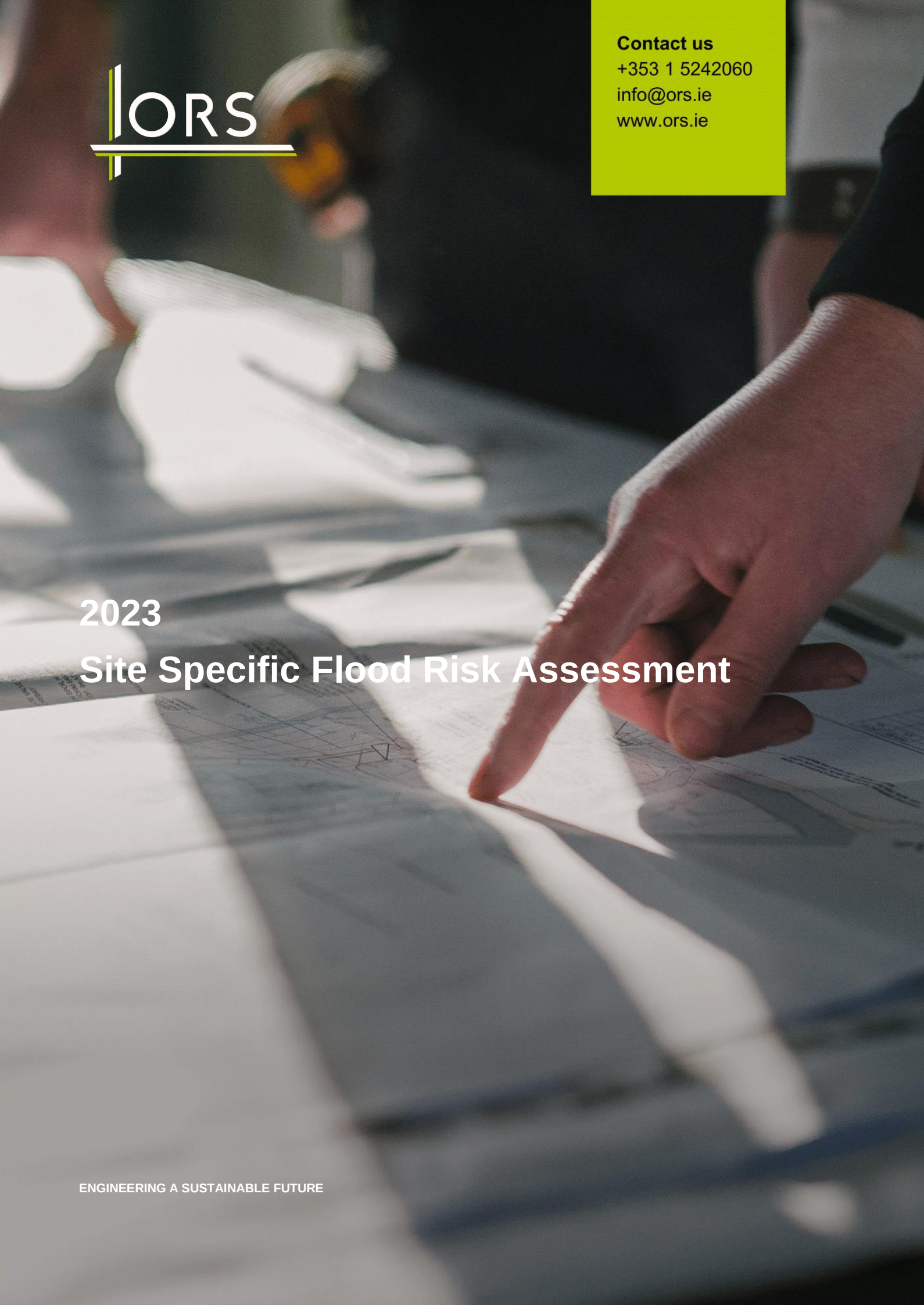

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2023
Site Specific Flood Risk Assessment

ENGINEERING A SUSTAINABLE FUTURE

Flood Risk Assessment

Proposed development at 24 Ballymount Rd Upper, Ballymount, Dublin, D24 E097.

Document Control Sheet

Client:	Starrus Eco Holdings Ltd.
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P02	**S2**	**OD**	**AK**	**JB**	**27/11/2023**

ORS

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1 Introduction

1.1 Background

ORS have been commissioned by Starrus Eco Holdings Ltd., to prepare a Site-Specific Flood Risk Assessment (SSFRA) Report to accompany a planning application for a proposed development on a site at 24 Ballymount Rd Upper, Ballymount, Dublin, D24 E097. This report has been prepared to assess the flood risk to the proposed site location and adjacent lands.

1.2 Scope of Report

This report outlines the findings of the SSFRA carried out for the proposed development and takes cognisance of the following relevant guidelines and legislation.

- Department of the Environment Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) (November 2009) Guidelines for Planning Authorities: The Planning system and Flood Risk Management Guidelines for Planning Authorities.

- The Planning and Development Act 2000.

The aforementioned guidelines introduce mechanisms for the incorporation of flood risk identification, assessment, and management into the planning process. This report has been prepared in accordance with these guidelines.

1.3 Proposed Development

The development will consist of: demolition of all existing buildings, including a c. 1,648 sq m one-storey material recovery building (max height c. 10.9 m) and a c. 612 sq m two-storey administration office building (max height c. 8.2 m); construction of a 4,710 sq m one-storey material recovery building (max height 13.3 m) (the material recovery building will inter alia include an ancillary administration reception office, canteen, WCs, and storage); and a change of use (intensification) to increase the annual waste acceptance rate from 150,000 tonnes to 350,000 tonnes per year so as to expand the facility's recycling/recovery capacity.

The development will also consist of: relocation of the facility's entrance some 25 m southeast; redirection of refuse vehicle route; relocation of weighbridges and waiting area in the path of the revised refuse vehicle route; relocation of skip storage and trailer parking to the northeast of the site; installation of an odour control unit to the rear (eastern corner) of the material recovery building (the unit will include an external flu 15.3 m in height above ground); construction of an ESB substation (max height 3.4 m); reduction in, and rearrangement of, car parking provision (from some 70 No. to 43 No. total car parking spaces, including the provision of 9 No. EV car parking spaces and 3 No. disabled car parking spaces (1 No. being a disabled and EV car parking space)); provision of 24 No. bicycle stands; a 4 m high acoustic wall located along the eastern boundary of the site; hard and soft landscaping; boundary treatments; tree removal; tree planting; interim site hoarding; lighting; site services; and all ancillary works and services necessary to facilitate construction and operation.

The current Ballymount MRF operates under an Industrial Emissions Licence issued by the EPA that authorises the acceptance of 150,000 tonnes of waste annually. It encompasses 1.18 ha. There are 2 weighbridges at the entrance, with car parking to the east and west. There are

two adjoining waste processing buildings (1,610m^2 in total) the north of the site, with an office block (612m^2) in the southwest. The office houses the staff of a number of the Beauparc group companies.

The development will see the demolition of the existing processing sheds and offices and the expansion of waste processing operations on the site into a single building. The office functions will be relocated to Beauparc's company head office in Fassaroe.

A single 4,710m^2 industrial building will be built on the site, complete with staff welfare facilities and a small site office and weighbridge. The annual waste intake will increase to 350,000 tonnes. All waste processing will be carried out inside the building. A negative air extraction and dust and odour control units will be installed. A modern fire detection and extinguishing system will be provided.

As the annual waste intake will exceed 100,000 the development is considered to be Strategic Infrastructure Development (SID) and a planning application will be made directly to An Bord Pleanála.

1.4 Proposed Site Location

The proposed development site is located at Panda Waste Processing Facility at 24 Ballymount Rd Upper, Ballymount, Dublin, D24 E097 in the administrative jurisdiction of South Dublin County Council (SDCC).

The site has a total area of approximately 1.18ha and is located on Ballymount Road Upper. The proposed site is bounded to the east and west by industrial units, to the south by Ballymount Road Upper and to the north by a greenfield area.

A topographical survey of the site was undertaken in October 2023. The site slopes gradually from southeast to northwest from approximately 64.987m OD in the southeast to 63.495m OD in the northwest. There are localised high and low points on the site. A copy of the topographical survey is included in **Appendix A**.

The proposed site location is illustrated in **Figure 1.4** below.

Figure 1.4: Proposed Site Location

1.5 Proposed Site Layout

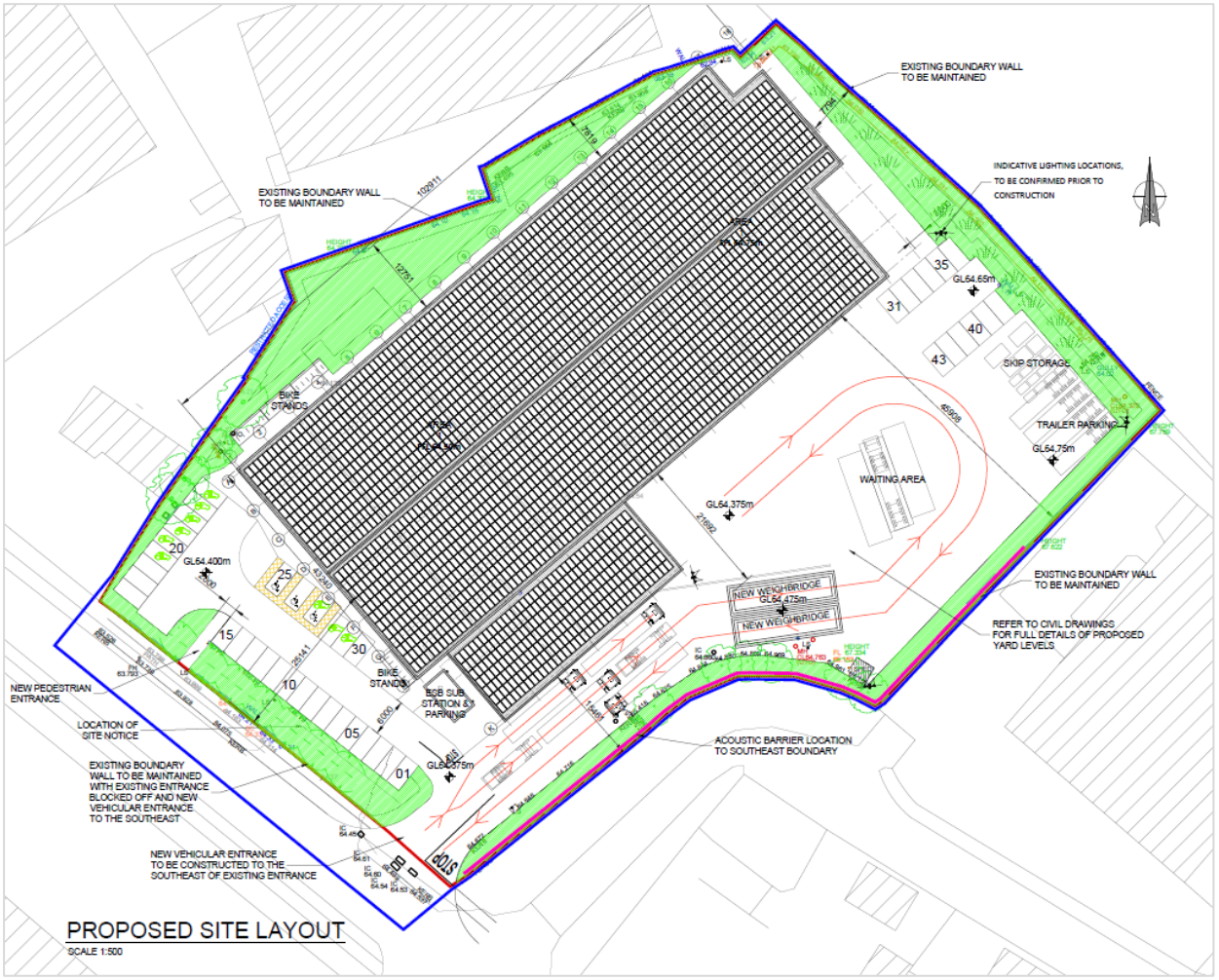


Figure 1.5: Proposed Site Layout

2 Risk Assessment Process

2.1 Definition of Flood Risk

Flood risk is an expression of the combination of the flood probability or likelihood and the magnitude of the potential consequences of the flood event. It is normally expressed in terms of the following relationship:

Flood Risk = Likelihood of flooding x Consequences of flooding

The likelihood of a flood event is dependent on the nature of the water body (Source) and the possible migratory routes from the water body (Pathways). The consequences of a flood event are dependent on the nature of people and assets impacted (Receptors). The Source – Pathway – Receptor linkage is illustrated in the Guidelines in the following graphic;

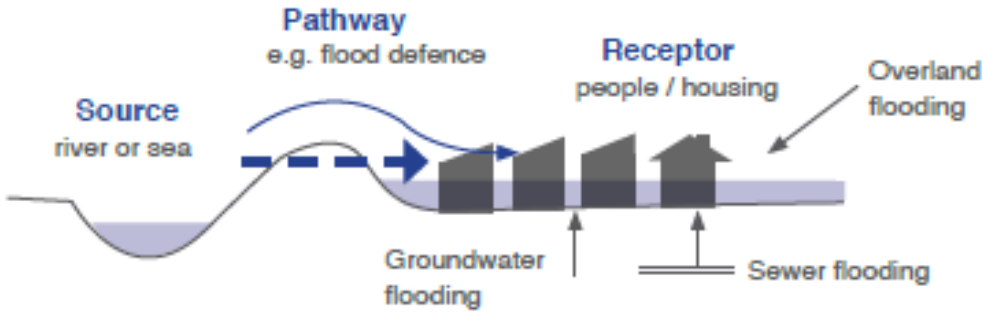


Figure 2.1 - Conceptual representation of Source - Pathway - Receptor model

The principal sources of flooding are rainfall or higher than normal sea levels. The principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains. The receptors can include people, their property, and the environment. All three elements as well as the vulnerability and exposure of receptors must be examined to determine the potential consequences.

2.2 Likelihood of Flooding

The Guidelines define the likelihood of flooding as the probability or a frequency of a flood of a given magnitude or severity occurring or being exceeded in any given year. It is generally expressed as the chance of a particular flood level being exceeded in any one year. This return period is described as the Annual Exceedance Probability (AEP). For example, a 1 in 100 or 1% flood is that which would, on average, be expected to occur once in 100 years, though it could happen at any time.

Annual Exceedance Probability is the inverse of return period as shown in **Table 2.1** below.

Table 2.1: Return period and corresponding AEP

Return Period	Annual Exceedance Probability (%)
1	100
10	10
50	2
100	1

200	0.5
1000	0.1

2.3 Flood Zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range. There are three types or levels of flood zones defined for the purposes of the Guidelines:

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);

- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and

- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

It is important to note that when determining flood zones, the presence of flood protection structures should be ignored. This is because areas protected by flood defences still carry a residual risk from overtopping or breach of defences and the fact that there is no guarantee that the defences will be maintained in perpetuity.

2.4 Objectives and Principles of the Planning Guidelines

The principal actions when considering flood risk are set out in Section 3.1 of the guidelines and are summarised below:

(1) “Flood hazard and potential risk should be determined at the earliest stage of the planning process...”
(2) “Development should preferentially be located in areas with little or no flood hazard thereby avoiding or minimising the risk....”
(3) “Development should only be permitted in areas at risk of flooding when there is no alternative, reasonable sites available...”
(4) “Where development is necessary in areas at risk of flooding an appropriate land use should be selected”
(5) A precautionary approach should be applied, where necessary, to reflect uncertainties in flooding datasets and risk assessment techniques...”
(6) “Land required for current and future flood management... should be pro-actively identified...”
(7) “Flood risk to, and arising from, new development should be managed through location, layout and design incorporating Sustainable Drainage Systems (SuDS) and compensation for any loss of floodplain...”
(8) Strategic environmental assessment (SEA) of regional planning guidelines, development plans and local area plans should include flood risk as one of the key environmental criteria...”.

2.5 Staged Approach to Flood Risk Assessment

The Guidelines recommend a staged approach to flood risk assessment that covers both the likelihood of flooding and the potential consequences. The stages of appraisal and assessment are;

- **Stage 1: Flood Risk Identification** – to identify whether there may be any flooding or surface water management issues.
- **Stage 2: Initial Flood Risk Assessment** – to confirm sources of flooding that may affect an area or proposed development, 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.
- **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.

2.6 The Sequential Approach and Justification Test

The sequential approach has been adopted to ensure that developments are directed towards land that is at low risk of flooding, this is not always possible however, as many towns and city centers are located within flood plains.

The sequential approach is to be applied throughout the planning process is outlined in the Guidelines;

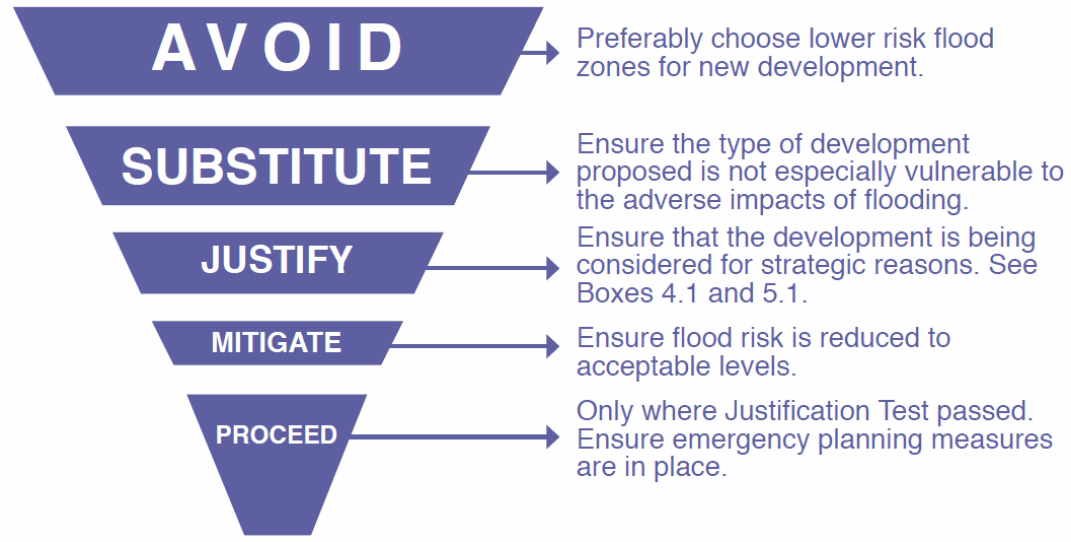


Figure 2.2 Sequential Approach (Source: The Planning System and Flood Risk Management)

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of developments that are being considered in areas of moderate or high flood risk. The test comprises the following two processes:

(1) The first is the Plan-making Justification Test and is used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding.

(2) The second is the Development Management Justification Test and is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

The types of development that would be required to meet the Justification Test are illustrated in the table below.

Table 2.6 Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test (Source: The Planning System and Flood Risk Management)

	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

3 Flood Risk Identification

3.1 General

This Flood Risk Identification includes a review of existing information and identification of any flooding or surface water management issues in the vicinity of the proposed site that may warrant further investigation.

3.1 Data Sources

The following data sources were consulted in the preparation of this report;

Table 3.2 Information Sources Consulted

Source	Comment
OPW Preliminary Flood Risk Assessment (PFRA) mapping	Fluvial, Pluvial, Costal and Groundwater flooding examined.
OPW Floodinfo.ie online mapping	Fluvial, Pluvial, Costal and Groundwater flooding and OPW flood records examined.
EPA online mapping	Review of surface and groundwater features.
GSI Teagasc subsoils mapping	GSI Teagasc subsoils map consulted to identify alluvial deposits on site that may indicate the presence of a watercourse and floodplain.
Historical mapping	OSI Geo Hive 6'' Cassini reviewed to look for areas of historic flooding.
OPW (2018) Flood Risk Management Plan for Liffey & Dublin Bay (UOM09)	Review flood risk assessment and modelled flood levels for the Liffey & Dublin Bay.
Eastern Catchment Flood Risk Assessment and Management (CFRAM) study	Identification and review of CFRAM flood mapping and modelled flood level for the catchment.
South Dublin County Development Plan 2022-2028	Review of objectives and policies in relation to flood risk management and specific flood measure for the area.
South Dublin County Development Plan 2022-2028: Strategic Flood Risk Assessment	Review recent flood maps and strategic plan for the area.
Site Drawings	Review site levels relative to estimated flood levels.

3.2 Fluvial

The Project area is covered within the Eastern CFRAM study area. The CFRAM programme

led by the OPW, provides a detailed assessment of flooding in areas identified as AFA's during the PFRA study. Catchment wide Flood Risk Management Plans were also developed as part of the programme.

The site is located within UoM 09, which is referred to as the Liffey-Dublin Bay catchment. There are numerous watercourses which are all contained within or influence the Liffey River catchment. The approximate total length of watercourses is 265 km. The principal rivers include the Liffey, the Griffeen, the Camac, the Poddle, the Dodder and the Owendoher. Other notable streams include the Tobermaclugg, the Whitechurch, the Tallaght Stream and the Robinhood Stream. All of the watercourses lie within the Hydrometric Area (HA) 09 (Liffey- Dublin Bay). The catchments of the County are highly urbanised but there is rural land in the west and south containing agriculture, forestry, and the Dublin & Wicklow Mountains.

Road levels around the perimeter of the site range from *ca.* 63.5m OD to 64.5m OD at the development entrance on Ballymount Road Upper. The site levels reaches *ca.* 64.7m OD at the centre of the site. The lowest point of the proposed development is *ca.* 63.73m OD at the southeast corner. The proposed finished floor level (FFL) is ca. 64.0m OD.

The Camac Fluvial Flood Extents map (E09CAM_EXFCD_F1_21), dated 13 November 2017, as shown in **Appendix B** was studied. It is noted that the flood map indicated a 1 in 1000-year food level of 59.43m OD at node SO09303604 (closest node to the development). The lowest point on site at the entrance to the development is ca. 63.5m OD and ca. 4.0m OD above the closest CFRAM node (SO09303604) on the flood map, the development is not situated within any flood extents, therefore the associated flood risk is considered low and is situated within Flood Zone C. The nearest area indicated as flooding in relation to the target site is an area adjacent to Merrywell Business Park which is situated *ca.* 450m northeast of the development.

The National Indicative Fluvial Maps (NIFM) have been created to identify areas where further assessment would be required if development is being considered within or adjacent to the flood extents shown on the maps. These maps are 'predictive' flood maps showing indicative areas predicted to be inundated during a theoretical fluvial flood event with an estimated probability of occurrence, rather than information for actual floods that have occurred in the past, which is presented, where available, on the 'past' flood maps. Similar to the PFRA maps, the NIFM maps refer to flood event probabilities in terms of a percentage Annual Exceedance Probability, or 'AEP'. This represents the probability of an event of this severity occurring in any given year. They are also commonly referred to in terms of a return period (e.g. the 100-year flood), although this period is not the length of time that will elapse between two such events occurring, as, although unlikely, two very severe events may occur within a short space of time NIFM fluvial flood extents – 0.1% & 1% indicate closest lands prone to flooding are located *ca.* 760m northeast of the site.

Significant flood risk was not detected within the site boundary or near to the development.

The published CFRAM flood maps are included in **Appendix B**. A Digital Terrain Map which

includes an overview of local elevations is included in **Figure 3.2.**

Figure 3.2: Local Topography

The finished ground floor level for the development is *ca*. 64.0m OD, therefore the flood risk to the development is considered to be low.

3.3 Previous Flood Risk Assessment and Predictive Flood Maps

3.3.1 Pluvial

Pluvial flooding can occur during extreme prolonged rainfall. Pluvial flooding may occur through the below pathways during extreme rainfall.

Table 3.3.2: Pluvial Flooding S-P-R Risk Assessment

	Pathway	Receptor
1	Surcharging of the proposed internal drainage systems during heavy rainfall events leading to internal flooding	Development – Buildings

2	Surcharging from the existing surrounding drainage system leading to flooding within the subject site by surcharging surface water pipes	Development – Buildings
3	Surface water discharging from the subject site to the existing drainage network leading to downstream flooding	Development – Buildings
4	Overland flooding from surrounding areas flowing onto the subject site	Development – Buildings
5	Overland flooding from the subject site flowing onto surrounding areas	Development – Buildings

The Office of Public Works' Preliminary Flood Risk Assessment indicative pluvial maps (2012) are not considered to be reliable for assessing pluvial risk. Development drainage will however be designed to SUDs standard resulting in flood mitigation and controlled surface water discharge from the development.

Pluvial flood mapping is included in **Appendix C**.

3.3.2 Preliminary Flood Risk Assessment (PFRA)

The Preliminary Flood Risk Assessment (PFRA) involved a national screening exercise, based on available and readily derivable information, to identify areas where there may be a significant risk associated with flooding (referred to as Areas for Further Assessment, or AFA's). The area surrounding the site has been included under the PFRA as an AFA and was therefore studied under CFRAM.

3.3.3 Catchment Flood Risk Assessment and Management Study (CFRAM)

The Catchment Flood Risk Assessment and Management (CFRAM) study was commissioned in each River Basin District in order to inform on Ireland's medium to long-term strategy for the reduction and management of flood risk throughout Ireland. Data collection included historic flood event and rainfall records, high resolution floodplain surveying, and detailed channel/structure surveys of selected rivers. Hydraulic models determined flood hazard (where rivers or the sea is likely to flood in extreme events) and flood risk (the resultant impact on people, the economy, and the environment).

The Office of Public Works (OPW) are responsible for the management of the CFRAM programme and are responsible for reporting, coordination, and consultation under the Floods Directive. The CFRAM programme provides a detailed assessment of flooding in areas identified as AFA's during the PFRA study. The OPW have produced a series of maps which indicate the low, medium, and high probability flood risk for areas throughout Ireland, which were assessed as part of the CFRAM program. Catchment wide Flood Risk Management Plans were also developed as part of the programme.

The Camac CFRAM study map (No. E09CAM_EXFCD_F1_21) for the area reports that the site is within Flood Zone C, indicating that the flood risk to the development in the present day scenario is considered to be low.

Maps highlighting the site location in respect to the CFRAM maps are also included in **Appendix D.**

3.3.4 CFRAM Mid-Range Future Scenario

Two scenarios can be used with respect to future modelling and climate change for the given location:

- **Mid-Range Future Scenario (MRFS):** Likely future scenario – allowances for increased flow/sea level rise.
- **High-End Future Scenario (HEFS):** Extreme future scenario - allowances for significant increased flow/sea level rise.

The allowances, in terms of numerical values for future changes to 2100 in relevant phenomena or characteristics, which should typically be used for each of these scenarios, are set out in the **Table 3.3.5**:

Table 3.3.5: Allowances in Flood Parameters for the Mid-Range and High-End Future Scenarios

	MRFS	HEFS
Extreme Rainfall Depths	+ 20%	+ 30%
Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 500 mm	+ 1000 mm
Land Movement	- 0.5 mm / year[1]	- 0.5 mm / year[1]
Urbanisation	No General Allowance – Review on Case-by Case Basis	No General Allowance – Review on Case-by Case Basis
Forestation	- 1/6 Tp[2]	- 1/3 Tp[2] + 10% SPR[3]

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)

Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

In the context of this report the medium and high range future scenarios were examined. As can be seen in **Appendix E,** the site is not impacted.

3.3.5 Tidal

Tidal Flooding is caused by elevated sea levels or overtopping by wave action. The Irish Sea is approximately 9.8km east of the subject site. The Dublin Coastal Protection Project indicated that the 2002 high tide event reached 2.95m OD Malin. The subject site is, between 63.0m and 65.0m above the highest tide recorded in the Dublin Coastal area.

As can be seen in **Appendix F** the site is not affected by Coastal Flooding.

3.3.6 National Coastal Flood Mapping 2021

A review of existing indicative coastal flooding mapping from the National Coastal Flood Mapping 2021 shows that there is no potential for coastal flooding in a mid-range future or high-end future scenario. CFRAM Coastal maps also show low risk with regard to site.

As can be seen in **Appendix F** the site is not affected by Coastal Flooding.

3.3.7 GSI Groundwater Flooding

Geological Survey Ireland (GSI) have developed Groundwater Flood Maps for the Republic of Ireland, developed as part of the 2016-2019 'GWFlood' project in collaboration with Trinity College Dublin and the Institute of Technology Carlow.

Groundwater is the water that soaks into the ground from rain and can be stored beneath the ground. Groundwater floods occur when the water stored beneath the ground rises above the land surface. The Historic Groundwater Flood Map layer on the OPW map viewer shows the observed peak flood extents caused by groundwater in Ireland.

The closest groundwater flood extents are noted *ca.* 11.0km east of the proposed site. See **Appendix G.**

3.3.8 GSI Winter 2015/2016 Surface Water Flooding

The GSI developed a Winter 2015/2016 Surface Water Flooding map which attempted to measure the surface water flood extents. There are no impacted areas reported in the vicinity of the site, however an area located ca. 800m to the west is recorded.

Map highlighting the site location in respect to the Winter 2015/2016 Surface Water Flooding maps are included in **Appendix H**.

3.3.9 OPW Historic Flooding

The OPW National Flood Hazard Mapping, www.floodinfo.ie, was examined to identify any recorded flood events within the vicinity of the proposed development site. There are no records of flooding at the proposed development on the flood hazard website.

Flooding at Walkinstown Crescent, Walkinstown, Dublin 12 (Oct 2011) flood event occurred ca. 1.35 km northeast. There was no impact to the development during this flood event.

There are two recurring instances of flooding (Robinhood Stream Walkinstown, ca. 1.2 km

northeast of the site and Camac Culvert Old Naas Road, ca. 1.7 km also northeast of the site). The development is at a higher level than both areas, directing overland flows from any drainage system failure away from the development. Due to distance and topography these events are considered low risk in relation to site.

A report on Historic Flooding in proximity to the proposed site is included in **Appendix I**.

3.3.10 National Indicative Fluvial Maps (NIFM)

The National Indicative Fluvial Maps (NIFM) have been created to identify areas where further assessment would be required if development is being considered within or adjacent to the flood extents shown on the maps. These maps are 'predictive' flood maps showing indicative areas predicted to be inundated during a theoretical fluvial flood event with an estimated probability of occurrence, rather than information for actual floods that have occurred in the past, which is presented, where available, on the 'past' flood maps.

Similar to the PFRA maps, the NIFM maps refer to flood event probabilities in terms of a percentage Annual Exceedance Probability (%), or 'AEP'. This represents the probability of an event of this severity occurring in any given year. They are also commonly referred to in terms of a return period (e.g., the 100-year flood), although this period is not the length of time that will elapse between two such events occurring, as, although unlikely, two very severe events may occur within a short space of time.

NIFM fluvial flood extents mapping indicates lands with a low (0.1%) and medium (1%) probability of flooding are located *ca.* 300m north of the site.

Maps indicating the past flood events, groundwater flood events and predicted flood events as per the NIFM maps are included in **Appendix J.**

3.3.11 OPW Drainage Maps

Local authorities are charged with a responsibility to maintain Drainage Districts. The Arterial Drainage Act, 1945 contains several provisions for the management of Drainage Districts in Part III and Part VIII of the act.

Arterial Drainage Scheme (ADS) maps of the area show that the proposed site is not located within benefitting lands.

The published Arterial Drainage Scheme (ADS) and Drainage District (DD) maps has been included in **Appendix K**.

3.3.12 Historic Maps

Historical maps are consulted to indicate areas of flooding documented previously to records being kept by the current responsible authorities. The enclosed historical map has been prepared using GeoHive, web-based access to authoritative Irish spatial data from multiple providers, including Ordnance Survey Ireland (OSi). No areas of flooding were indicated on the 6" Cassini or 25" maps. Refer to **Appendix L** for Historical Mapping.

3.4 GSI Maps

GSI Teagasc subsoil map was sourced from the EPA online map viewer, it shows the subsoil characteristics of the site of interest. The proposed development site is indicated to be predominantly made ground.

Refer to **Appendix M** for GSI soils and bedrock maps.

3.5 OPW Flood Risk Management Plan - River Basin (09) Liffey and Dublin Bay

In 2018, the Office of Public Works (OPW) carried out the Flood Risk Management Plan for River Basin (09) Liffey and Dublin Bay.

The overall objective of the Plan is to manage and reduce the potential consequences of flooding, recognising other benefits and effects across a broad range of sectors including human health, the environment, cultural heritage, and economic activity, through viable flood protection schemes and other measures informed by a sound understanding of the flood risk established through the preparation of flood maps.

The main stated objectives for Flood Risk Management Plan were as follows:

- Spatial Scope: The Plan sets out viable measures, typically flood protection schemes, proposed to manage, and reduce flood risk in the communities that were identified through the PRFA as being at potentially significant flood risk. The Plan also sets out a range of non-structural policies and measures, which are in place or under development, that contribute to the reduction and management of flood risk throughout the River Basin.
- Sources of Flood Risk: The flood protection measures that are set out in the Plan address flood risk from the sources of flooding as identified in Table ES-1 of the report in one or more communities, as these sources were determined through the PFRA to be potentially significant in these communities. The range of non-structural policies and measures set out in the Plan can contribute to the reduction and management of flood risk from all sources of flood risk.
- Level of Detail: The Plan sets out the measures that have been identified as the most appropriate at this stage of assessment. The flood protection measures set out in the Plan are to an outline design and are not at this point ready for construction. Further detailed design, including a review of costs and benefits, environmental assessment, and consultation will be required for such works before implementation.

No additional measures specific to Ballymount are proposed.

3.6 Draft South Dublin County Development Plan 2022 – 2028

The purpose of the Development Plan is to set out an overall strategy for the proper planning and sustainable development for the County.

Policy IE4: Flood Risk within the County Development Plan outlines the following Objectives:

IE4 Objective 1: To require site specific flood risk assessments to be undertaken for all new

developments within the County in accordance with The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009) and the requirements of DECLG Circular P12/2014 and the EU Floods Directive.

IE4 Objective 2: To require all developments in the County to be designed and constructed in accordance with the “Precautionary Principle” detailed in the OPW Guidelines.

IE4 Objective 3: To continue to support and co-operate with the Office of Public Works in delivering the relevant Catchment-Based Flood Risk Assessment and Management Programme.

IE4 Objective 4: To support and facilitate the delivery of flood alleviation schemes in South Dublin County, including the following schemes:

- Poddle Flood Alleviation Scheme.
- Camac Flood Alleviation Scheme.
- Whitechurch Flood Alleviation Scheme.

IE4 SLO 1: To require the preparation of a site and catchment specific Flood Risk Assessment and Mitigation Strategy, prepared by a qualified person(s), to be submitted with any proposal for development on the ‘EE’ zoned lands at Moneenalion Commons Upper, Baldonnell.

3.7 South Dublin County Development Plan 2022 – 2028 SFRA

A Strategic Flood Risk Assessment (SFRA) of the County has been carried out to support the Strategic Environmental Assessment of the County Development Plan. The assessment was carried out in accordance with the requirements of the Flood Risk Management Guidelines and the EU Water Framework Directive. The SFRA Report is a separate document to be read in parallel with this Plan.

The SFRA identifies and maps flood risk in the County and has supported a sequential approach to planning, in accordance with the recommendations of the Flood Risk Management Guidelines.

3.8 Site Survey and Drawings

A topographical survey of the site was undertaken in October 2023. The site slopes gradually from southeast to northwest from approximately 64.987m OD in the southeast to 63.495m OD in the northwest. There are localised high and low points on the site.

The Camac Fluvial Flood Extents map (E09CAM_EXFCD_F1_21), dated 13 November 2017, as shown in **Appendix B** was studied. It is noted that the flood map indicated a 1 in 1000-year flood level of 59.43m OD at node SO09303604 (closest node to the development). The lowest point on site at the entrance to the development is ca. 63.5m OD and ca. 4.0m OD above the closest CFRAM node (SO09303604) on the flood map, the development is not situated within any flood extents, therefore the associated flood risk is considered low and is situated within Flood Zone C. The nearest area indicated as flooding in relation to the target site is an area adjacent to Merrywell Business Park which is situated ca. 450m northeast of the development.

Given that the proposed site will have a minimum FFL of 63.495m AOD this allows for a freeboard of *ca*. 4.06m above the most significant modelled flood event.

The site topographical survey is included in **Appendix A** of this report.

4 Proposed Design Measures

4.1 Drainage Strategy

The proposed site will be served via below ground gravity pipework which will run below the yard and below the road alongside the development. The surface water network will be fed via an ACO channel in the yard, on-road gullies, and rainwater from the building roof via guttering and downpipes.

It is proposed to collect run-off generated from impermeable areas of the site and attenuate the runoff in SuDS measures. In developing the surface water design for the site, a range of SuDS measures were reviewed. Measures which were deemed suitable in controlling the quality and quantity of water discharged from the development include:

- Rainwater harvesting;
- Collection of excess roof rainwater and run-off from impermeable surfaces and
- attenuating this run-off prior to discharge to outfall locations;
- The use of trapped gullies throughout the development;
- Permeable paving;
- Soakaways;
- Swale behind the building;
- The use of an oil interceptor.

The excess surface water runoff will be attenuated prior to discharging to the existing 300mm diameter surface water pipe located to the southwest of the site. It is proposed to provide attenuation within a 1450m3 attenuation tank in the south-eastern side of the site. This tank has been sized to store both surface water and fire water, in the event of a fire.

The rainwater from the roof of the building will be collected and will fall by gravity. On the northwestern side of the building, it will discharge into the soakaway behind the building. The soakaway will allow runoff to infiltrate into the subsoil. On the southern side of the building, the rainwater from the roof will flow by gravity through the system of 225mm to 375mm pipes at a gradient 1:150 - 1:200 on the southeast and southwest of the building, and then to the 10,000l precast concrete rainwater harvesting tank located at the entrance to the site.

The discharge from the impermeable paving will be collected via the system of ACO channels in the yard area and gullies on the road.

Prior to the surface water discharging into the existing public drainage system, it will be flow controlled to greenfield runoff rates and will pass through a full retention oil interceptor.

The following design criteria has been incorporated into the design:

- Pipes are designed for small catchment areas as defined in GDSDS, based on the
- Modified Rational Method and a rainfall intensity of 50mm/hour onto impermeable
- surfaces.
- All surface water pipes have been designed to achieve a minimum self-cleansing
- velocity of 0.75m/s.
- Surface water pipework will be laid to a gradient no flatter than 1:500.

- The GDSDS requirements with respect to interception volume, long-term storage volume and treatment volume have been considered.
- Minimum surface water pipe size of 225mm
- Minimum depth of cover to pipework of 1.2m below roads without appropriate protection
- Maximum depth of pipework 5m
- Roughness value for surface water pipework, ks 0.6mm

4.2 Catchment and SuDS Systems

The proposed site layout has been designed to have its own storage via permeable paving, attenuation and rainwater harvesting tanks and soakaway. Each catchment will have a gravity surface water drainage network which will outfall into a dedicated SuDS area. The permeable paving, tanks and soakaway will be sized to store the runoff from a 1:100-year storm of critical duration plus a 20% climate change allowance. From the modelling carried out of the stormwater network, a minimum storage of 410m3 is required in the offline attenuation tank. A tank of size 1450m3 has been provided; this tank has been sized to store surface water and also fire water in the event of a fire. In addition to this, storage is provided in the permeable paving, soakaway, rainwater harvesting tank and swale. The attenuation storage provided is greater than the attenuation required and is therefore determined to be sufficient.

4.3 Flow Controls

The surface water collected within the site will flow into the SuDs measures and where possible will infiltrate into the subsoil or discharge to the proposed 225mm surface water network. The final manhole before the discharge shall include a flow control device to limit flows to greenfield run-off rates.

4.4 Oil Interceptors

A full retention oil Interceptor will be installed prior to discharge into the existing surface water system on Ballymount Road Upper. All surface water shall be drained from impermeable areas through precast lockable gully traps.

Please refer to ORS drawing nos. **221244-ORS-ZZ-00-DR-CE-400, 221244-ORS-ZZ-00- DR-CE-401, 221244-ORS-ZZ-00-DR-CE-420** and **221244-ORS-ZZ-00-DR-CE-421** for details of the proposed surface water drainage for the development.

5 Justification Test

5.1 Background

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of developments that are being considered in areas of moderate or high flood risk. The Strategic Flood Risk Assessment (SFRA) which was carried out as part of the preparation of the County Development Plan has highlighted the comparison of flood zones with existing or proposed zoning may reveal conflicts between flood risk areas and areas zoned for development. In such cases, the Planning Authority must subject each site to the Justification Test.

The Strategic Flood Risk Assessment (SFRA) also recommends that a Justification Test is carried out for any development proposed for lands in Flood Risk Zone A or B. The proposed development works are scheduled within a Flood Zone C as reported in the CFRAM Study, therefore the Justification test is not applied to the proposed development.

6 Conclusions

In reviewing existing information in relation to the flood risk posed to the proposed development site the following sources were consulted:

- OPW Preliminary Flood Risk Assessment (PFRA) mapping
- OPW Floodinfo.ie online mapping
- EPA online mapping
- GSI Teagasc subsoils mapping
- Historical mapping
- OPW (2018) Flood Risk Management Plan for Liffey & Dublin Bay (UOM09)
- Eastern Catchment Flood Risk Assessment and Management (CFRAM) study
- South Dublin County Development Plan 2022-2028
- South Dublin County Development Plan 2022-2028: Strategic Flood Risk Assessment
- Site Drawings

There have been no recorded historic flooding incidents within the development boundaries.

The extent of the Area of Further Assessment (AFA) covers the site location hence projected flood levels were modelled for this development location under the CFRAM program indicating that the development is positioned in Flood Zone C, therefore the flood risk associated with this development is low.

The subject site has been analysed for risks from tidal flooding from the Irish Sea, fluvial flooding, pluvial flooding, groundwater, reservoir flooding and drainage system failures due to human error or mechanical system failure. Table 5 below presents the various residual flood risks involved. As the flood risk from all sources can be mitigated, reducing the flood risk to low or very low, the proposed development is considered acceptable in terms of flood risk.

Due to all the considerations above the risk of an increased flood risk elsewhere of the development is considered to be low, as summarised in **Table 7.1**.

Table 7.1: Flood Risk Assessment Summary

Source	Pathway	Receptor	Likelihood	Consequence	Risk	Mitigation Measure	Residual Risk
Tidal	Irish Sea Coastal zone	Development	Low	High. Flooding of building and the basements	Low	None required	**Low**
Fluvial	Camac	Development	Low	Moderate. Water ingress into the building and basements	Low	None required	**Low**
Pluvial	Private and Public Drainage Network	Development	Low	High. Flooding of the building and basements	High risk of damage to the building and basement	Appropriate drainage design, over land flood routing and setting of appropriate floor levels	**Low**
Ground Water	Groundwater present in the ground seeping through basement walls and floor	Development	Low	Moderate. Ground water ingress into basement	Low	Adequately waterproofing of basement structure	**Low**
Human / Mechanical Error	Drainage network	Development	Low	Moderate. Water ingress into the building and basements	Moderate risk of damage to the building	Maintenance strategy	**Low**
Reservoir	Private and Public Drainage Network	Development	Low	Moderate. Water ingress into the building and basements	Very Low	None required	**Low**

Appendix A: Existing Topography

Site Outline Panda

OPW_3122

OPW_3122_DTM.tif

Band 1 (Gray)

84.134041

42.410732

0 100 200 m

Appendix B: CFRAM Fluvial Map

Site Outline Panda

River - High Probability

River - Medium Probability

River - Low Probability

0.1% AEP CFRAM Extent

1% AEP CFRAM Extent

10% AEP CFRAM Extent

0 250 500 m

Appendix C: Pluvial Flooding Map

Site Outline Panda

Low Probability Pluvial Extent

Medium Probability Pluvial Extent

High Probability Pluvial Extent

Google Earth Base Map

0 200 400 m

Appendix D: CFRAM Maps

Node Label	Water Level (OD) 10% AEP	Flow (m^3/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m^3/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m^3/s) 0.1% AEP
09WALK00068	46.4	0.03	46.77	0.06	46.96	0.11
09KING00063	44.52	N/A	44.97	N/A	45.15	N/A
09WALK00038	46.34	2.10	46.73	4.02	46.91	6.70
09KILN00051J	51.2	N/A	51.48	N/A	51.74	N/A
09KING00092	47.17	N/A	47.31	N/A	47.52	N/A
SO09303604	59.11	N/A	59.2	N/A	59.43	N/A
SO10302403	55.47	N/A	55.63	N/A	55.9	N/A

309200 309400 309600 309800 310000 310200 310400 310600

231400 231200 231000 230800 230600 230400

09KING00063

<10% AEP

09WALK00038

09WALK00068

09KING00092

09KILN00051J

SO09303604

SO10302403

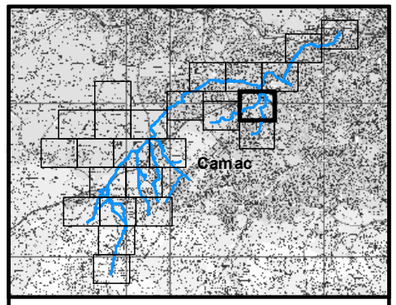
ROBINHOOD
Robinhood

FOX-and-GEESE
An Sionnach agus na Geanna

BALLYI
Baile ar

KINS
(Part of)
Baile Bh

0 50 100 200 300 400 500 Metres



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Embankment
- Wall
- Defended Area
- 1% AEP — Standard of Protection of Flood Defence
- 1% AEP — (Walls / Embankments)
- Node Point
- Node ID — Node Label

FINAL

REV:	NOTE:	DATE:
01	SOP label updated (Pg 21) Removal of Def. Area (Pg 21)	13/11/2017

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

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The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

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T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Camac Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By :	C.McG. Date : 13 November 2017
Checked By :	A.S. Date : 13 November 2017
Approved By :	S.P. Date : 13 November 2017
Drawing No. :	E09CAM_EXFCD_F1_21
Map Series :	Page 21 of 24
Drawing Scale :	1:5,000 @A3

Appendix E: Mid-Range Future Scenario and High End Future Scenario Map

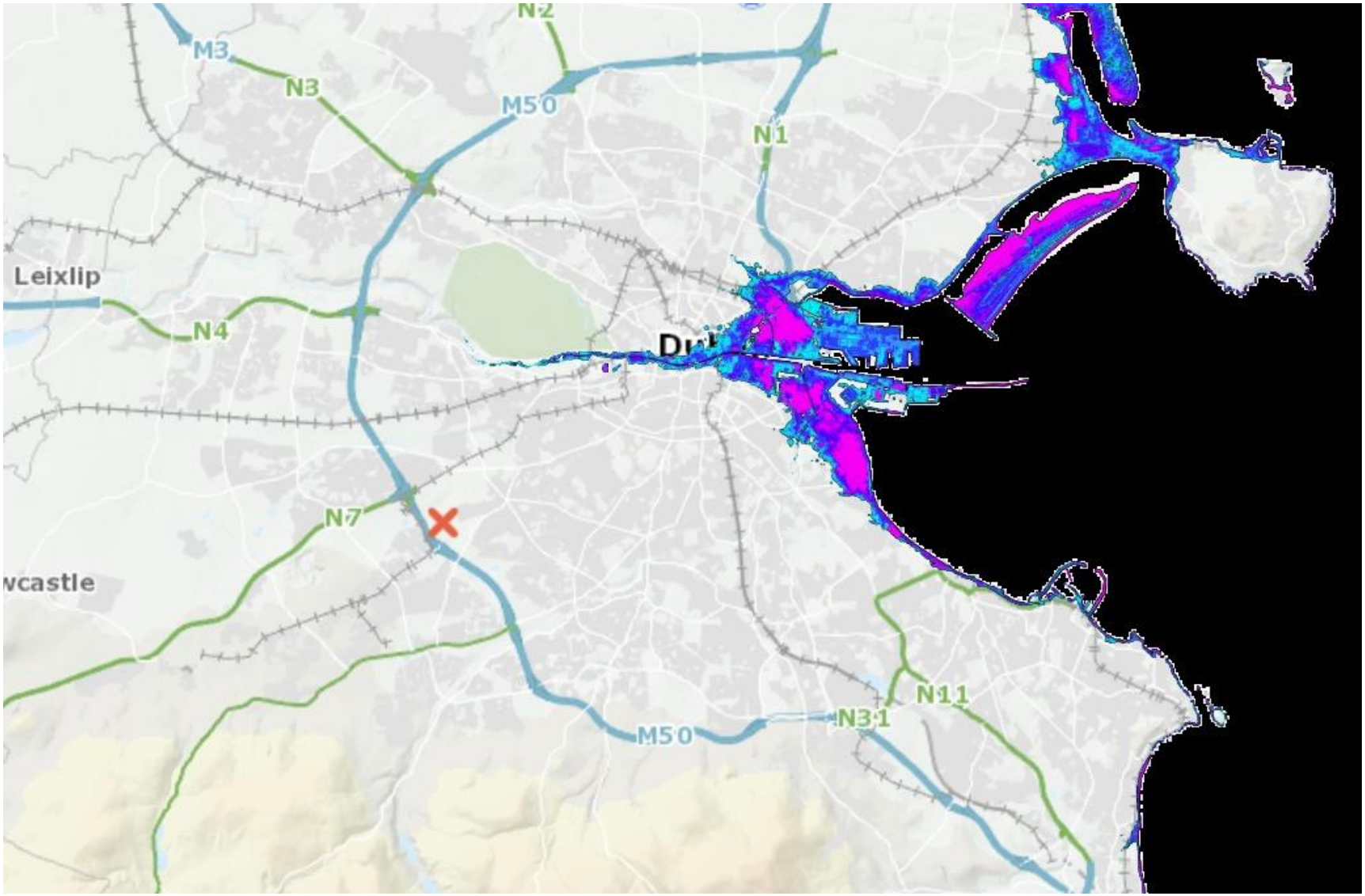
Site Outline Panda
0.1% AEP Fluvial
1% AEP Fluvial
10% AEP Fluvial
Google Earth Base Map

0 200 400 m

Site Outline Panda
0.1% AEP Fluvial
1% AEP Fluvial
10% AEP Fluvial
Google Earth Base Map

0 200 400 m

Appendix F: Coastal Flooding Map


N2
M3
N3
M50
N1
Leixlip
N4
N7
wcastle
N11
N31
M50

Appendix G: Groundwater Flooding Map

Appendix H: GSI Winter Surface Water Flooding Map

Appendix I: OPW Historic Flooding Map

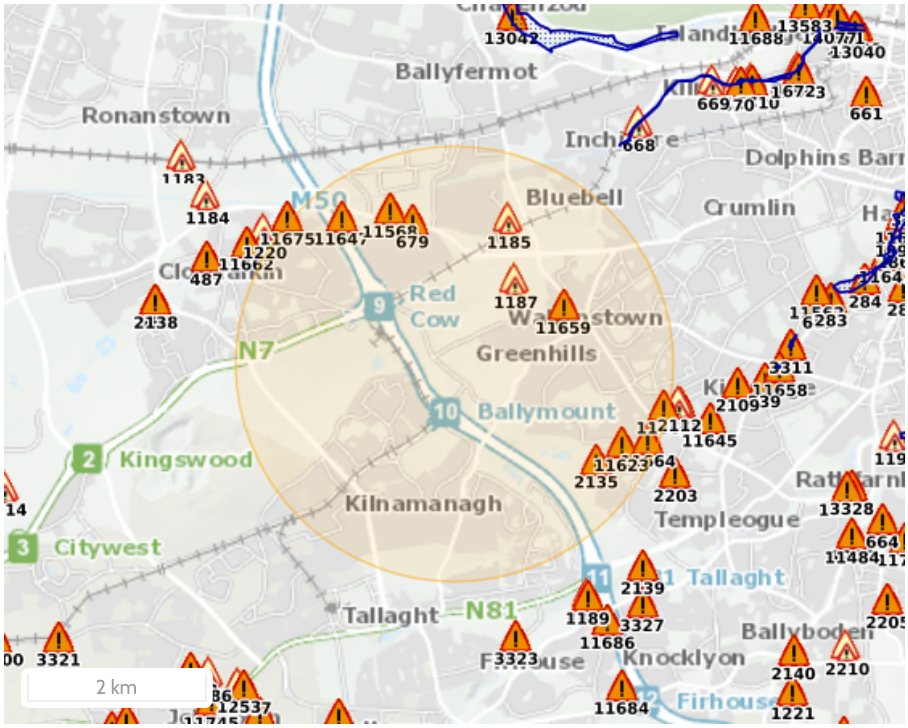
Past Flood Event Local Area Summary Report

OPW Oifig na nOibreacha Poiblí Office of Public Works

Report Produced: **26/10/2023 14:35**

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

11 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Osprey Estate Nov 1982 (ID-2135)	05/11/1982	Exact Point
	Additional Information: Reports (1) Press Archive (0)		
2.	Camac November 2000 (ID-679)	05/11/2000	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
3.	Camac Culvert Old Naas Road recurring (ID-1185)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
4.	Robinhood Stream Walkinstown Recurring (ID-1187)	n/a	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
5.	Flooding at Diageo, Nangor Road, Dublin 12 on 24th Oct 2011 (ID-11568)	23/10/2011	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
6.	Flooding at Riverview Business Centre, New Nangor Road, Dublin 12 on 24th Oct 2011 (ID-11647)	23/10/2011	Exact Point
	Additional Information: Reports (1) Press Archive (0)		

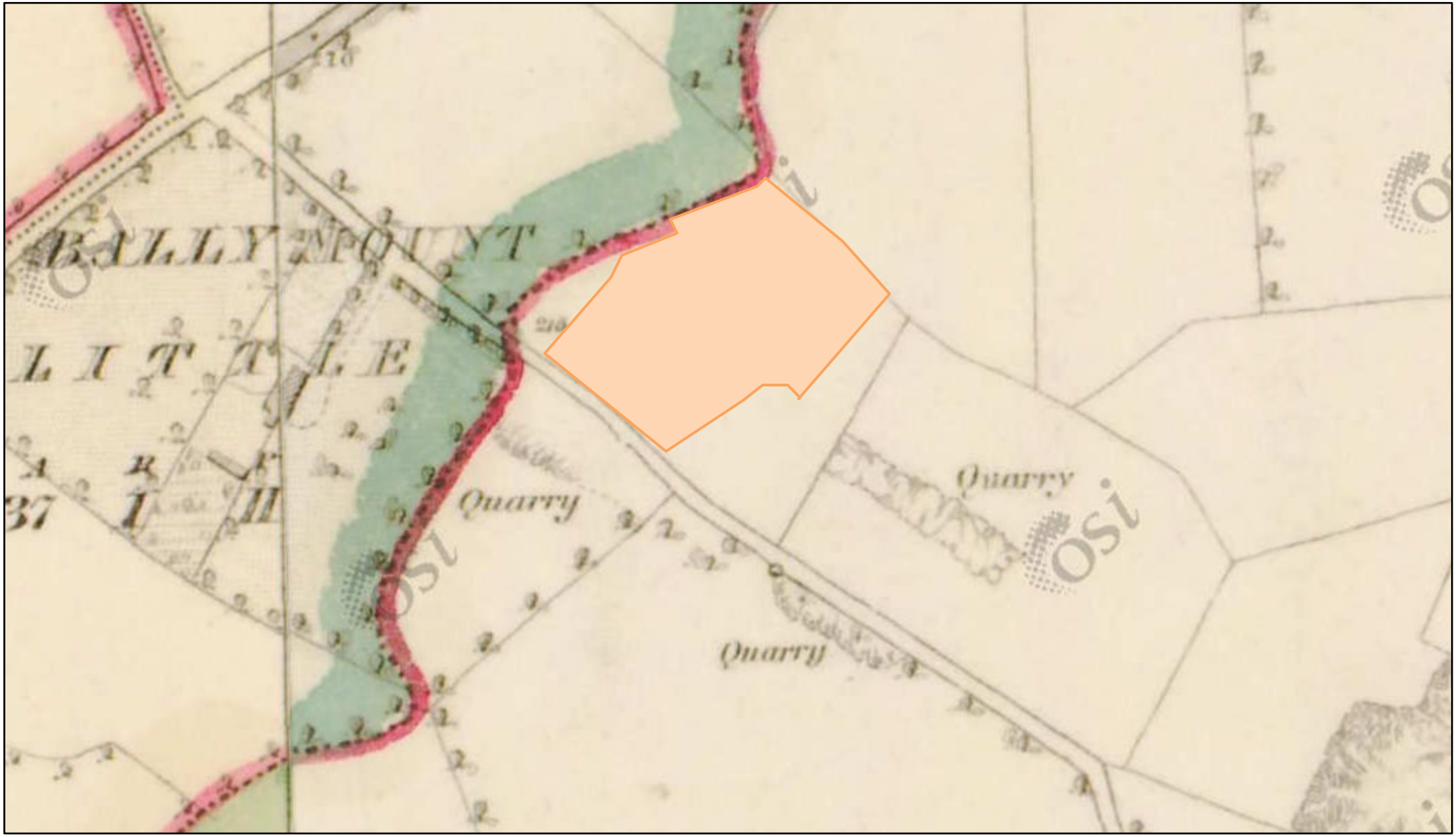
	Name (Flood_ID)	Start Date	Event Location
7.	Flooding at Limekiln Road, Ballyboden Rd, Co. Dublin on 24th Oct 2011 (ID-11623) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Approximate Point
8.	Flooding at Robinhood Industrial Estate, Clondalkin, Dublin 12 on 24th Oct 2011 (ID-11654) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
9.	Flooding at Walkinstown Crescent, Walkinstown, Dublin 12 on 24th Oct 2011 (ID-11659) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
10.	Flooding at Wellington Lane, Dublin 24 on 24th Oct 2011 (ID-11664) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
11.	Flooding at Whitehall Road, Templeogue, Dublin 6W on 24th Oct 2011 (ID-11666) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point

Appendix J: NIFM Fluvial Flood Mapping

Appendix K: OPW Drainage Maps

Appendix L: Historic Development Maps

6" Historic Map



April 19, 2023

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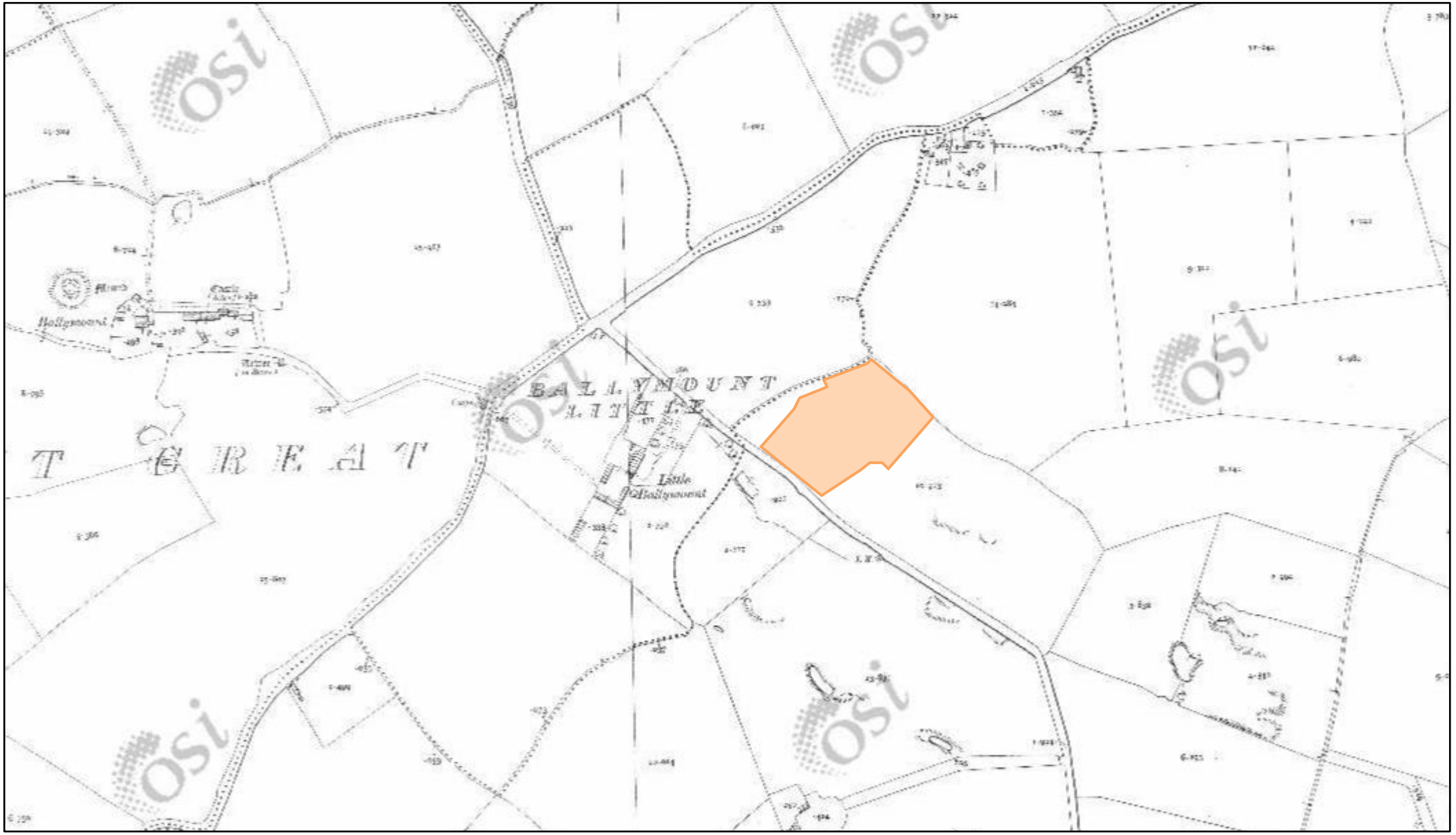
0 0.02 0.04 0.08 mi

0 0.03 0.07 0.13 km

Myplan

DHLGH

25 Inch Map



April 19, 2023

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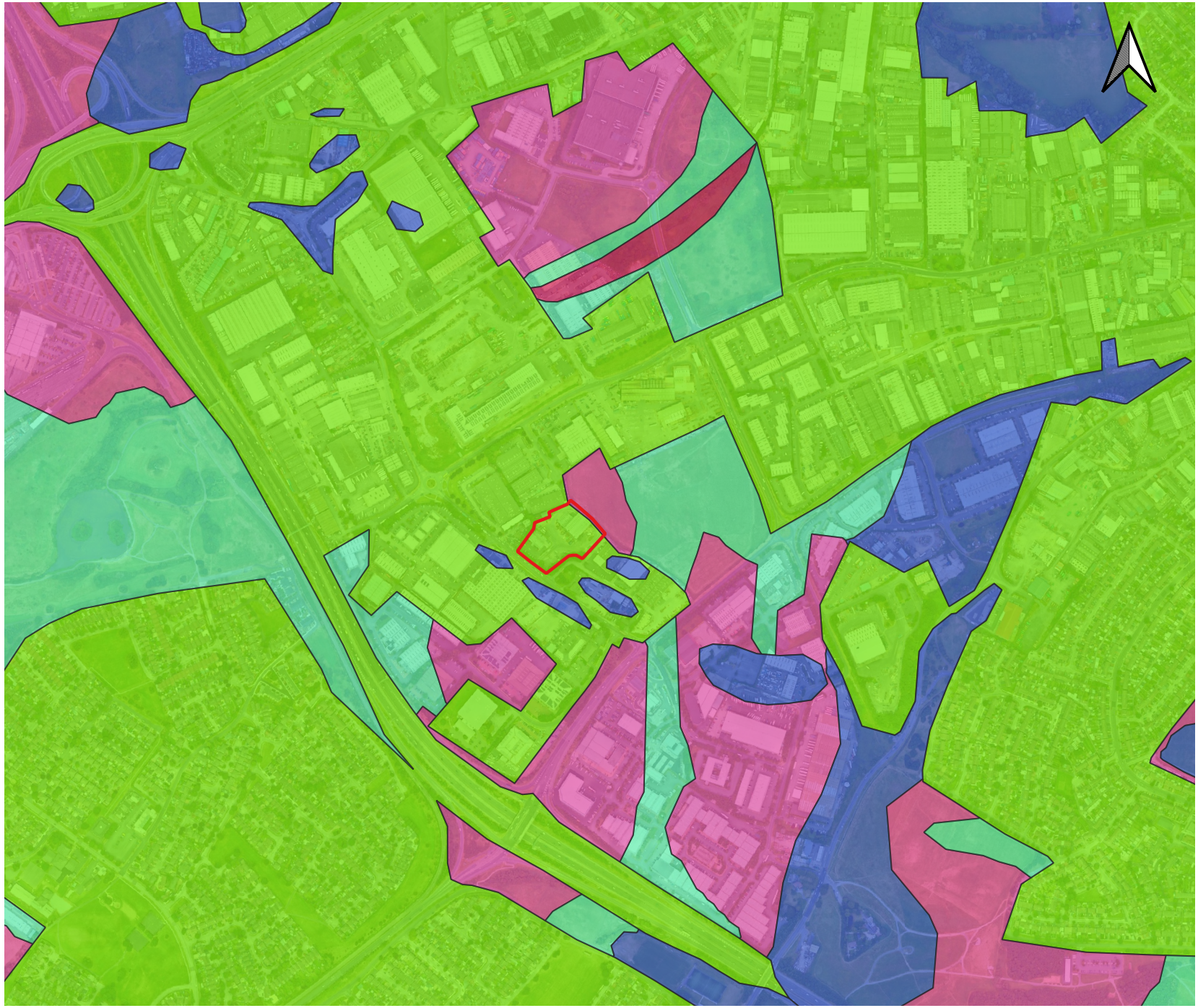
0 0.05 0.1 0.2 km

Myplan

DHLGH

Appendix M: GSI Soils and Bedrock Maps



Site Outline Panda

Soils — Soils/Data/soils_ie_f1.shp

- AlluvMIN
- BminDW
- BminPD
- BminSW
- Made

Google Satellite

0 200 400 m

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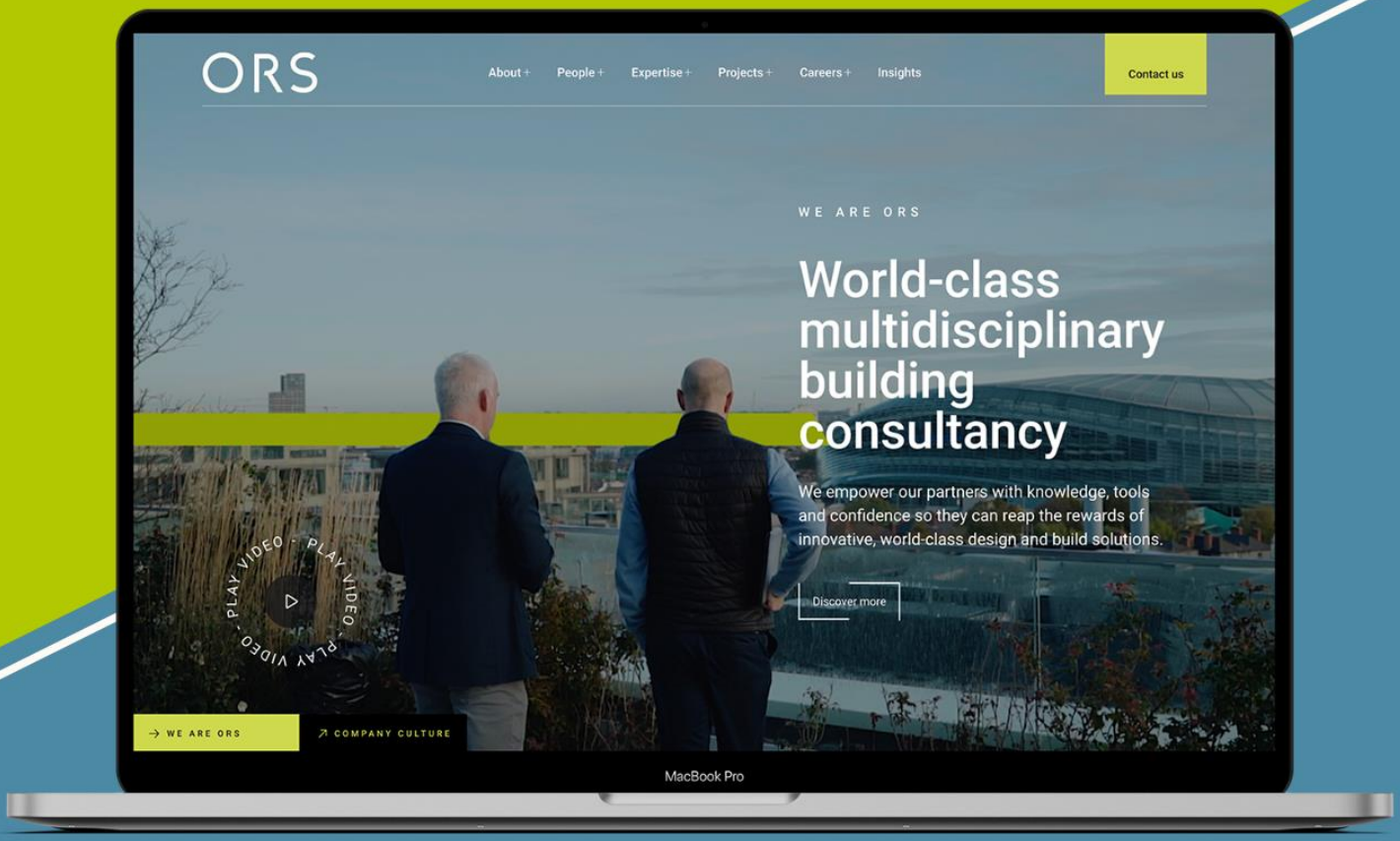

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