BARRETT MAHONY
CONSULTING ENGINEERS
CIVIL & STRUCTURAL

SITE SPECIFIC FLOOD RISK ASSESSMENT
REPORT FOR PLANNING

STRATEGIC HOUSING DEVELOPMENT AT ST. JOSEPH'S HOUSE AND ADJOINING PROPERTIES, LEOPARDSTOWN

Contact Information

Barrett Mahony Consulting Engineers Ltd
52-54 Lower Sandwith Street, Dublin 2
D02 WR26

Telephone: 01 677 3200
Email: bmce@bmce.ie

www.bmce.ie

BM BARRETT MAHONY CONSULTING ENGINEERS CIVIL & STRUCTURAL

Document Information

Project
STRATEGIC HOUSING DEVELOPMENT AT ST. JOSEPH'S HOUSE AND ADJOINING PROPERTIES,
LEOPARDSTOWN

Project No.
19.236

Document Title
Site Specific Flood Risk Assessment Report For Planning

Document No.
19.236-FR-01

Document History

Issue	Date	Description	Orig.	PE	Issue Check
PL1	12/05/2020	DRAFT ISSUED FOR PLANNING	PR	PS	JC
PL2	15/06/2020	ISSUED FOR PLANNING	PR	PS	JC
PL3	06/05/2021	DRAFT FOR SW AUDIT	PS	PS	JC
PL4	20/09/2021	FOR PLANNING SUBMISSION	PS	PS	JC
PL5	22/09/2021	FOR PLANNING SUBMISSION	PS	PS	JC

TABLE OF CONTENTS

APPENDICES

APPENDIX I - PREVIOUS COMPLIANCE INFORMATION

APPENDIX II - OPW FLOOD MAP REPORT FOR THE SITE

APPENDIX III - CFRAMS FLOOD MAPPING (Tidal Flood Depth and Extents)

APPENDIX IV - SURFACE WATER OVERLAND FLOW PLAN

1.0 INTRODUCTION

1.1 General Description

Barrett Mahony Consulting Engineers Ltd. have been commissioned by Homeland Silverpines Limited to prepare a Flood Risk Assessment Report on the proposed site Leopardstown Road, Dublin 18 as part of the Planning Application.

Figure 1.1 – Site Location

Figure 1.2 – Aerial View

The development will consist of a new residential and mixed use scheme to include apartments, residential amenity space, a café and a childcare facility as follows:

- The demolition of 10 no. properties and associated outbuildings at 'Madona House' (single storey), 'Woodleigh' (2 storeys), 'Cloonagh' (2 storeys), 'Souk El Raab (2 storeys), 'Wellbrook' (2 storeys), 'Calador' (2 storeys), 'Alhambra' (2 storeys), 'Dalwhinnie' (2 storeys), 'Annaghkeen' (1-2 storeys) and 'The Crossing' (single storey) (combined demolition approx. 2,291.3 sq m GFA)
- The refurbishment, separation and material change of use of Saint Joseph's House (a Protected Structure, RPS No. 1548) from residential care facility to residential use and a childcare facility; and the construction of a new build element to provide for an overall total of 463 no. residential units, residential amenity space and a café as follows:
    - Block A (5 storeys) comprising 49 no. apartments (13 no. 1 bed units, 33 no. 2 bed units and 3 no. 3 bed units);
    - Block B (4 - 7 storeys) comprising 88 no. apartments (28 no. 1 bed units, 57 no. 2 bed units and 3 no. 3 bed units);
    - Block C (5 - 7 storeys) comprising 115 no. apartments (26 no. studio units, 26 no. 1 bed units and 57 no. 2 bed units and 6 no. 3 bed units);
    - Block D (5 - 10 storeys) comprising 157 no. apartments (36 no. studio unit, 40 no. 1 bed units and 81 no. 2 bed units), residential amenity areas of approx. 636 sq m and a café of approx. 49 sq m;
    - Block E (St. Joseph's House) (2 storeys) comprising 9 no. apartments (8 no. 2 bed units and 1 no. 3 bed units) and a childcare facility of 282 sq m with associated outdoor play areas of approx. 130 sq m;
    - Block F (3 - 6 storeys) comprising 45 no. apartments (23 no. studio units, 10 no. 1 bed units; and 12 no. 2 bed units);
- Open Space (approx. 9,885 sq m)
- 259 no. car parking spaces (232 no. at basement level and 27 no. at surface level)
- 968 no. bicycle spaces (816 no. at basement level and 152 no. at surface level)
- 10 no. motorcycle spaces (all at basement level)
- Vehicular Access
- Basement Areas
- Substations and Switch Rooms
- All associated site development works

Planning permission was granted for a residential development consisting of 122 no. units by An Bord Pleanala on 28th August 2017 (Ref: PL 06D.249248) on part of the planning application site, refer to figure 1.4.

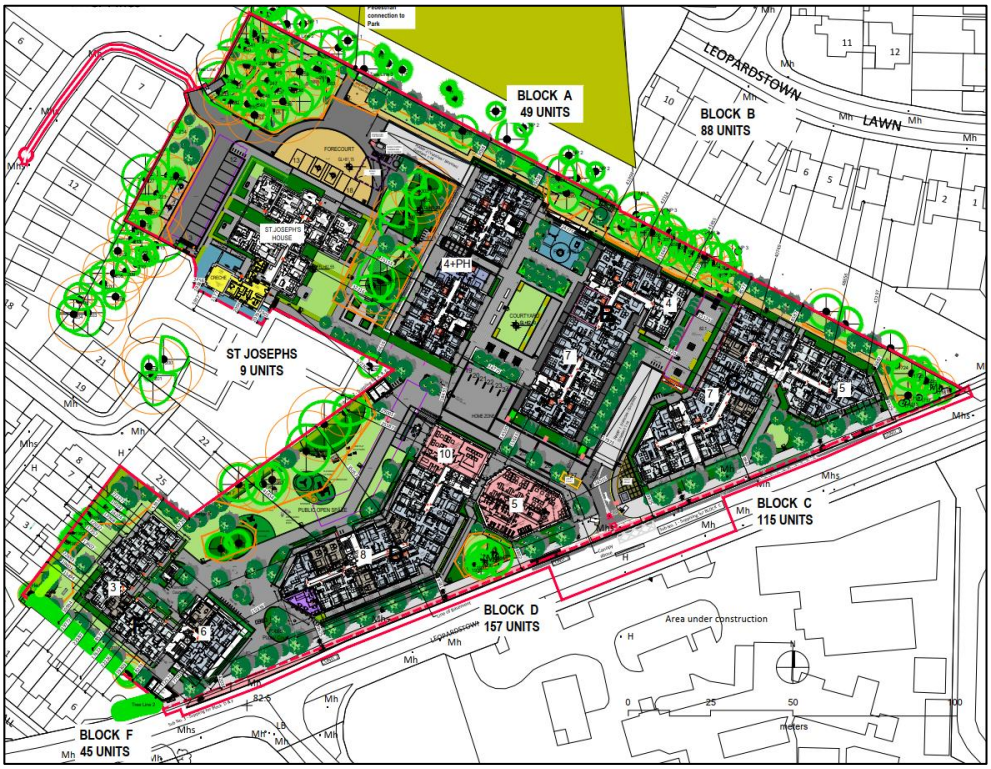


Figure 1.3 – Proposed Development

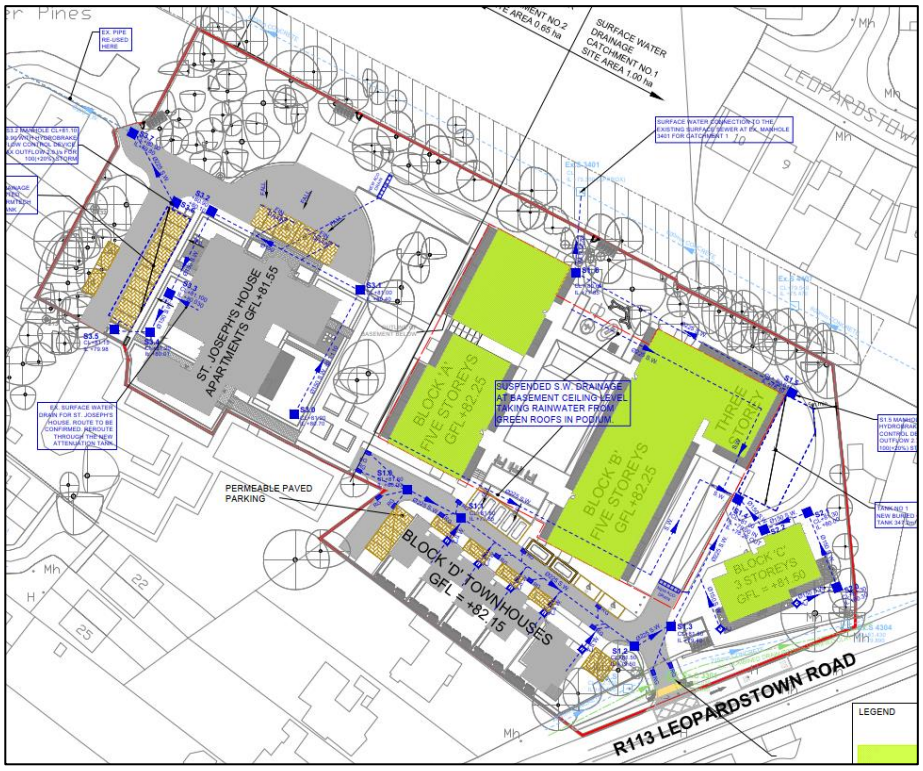


Figure 1.4 – Phase 1 (permitted scheme) drainage layout Scope of this Report

The flood risks associated with the proposed development are addressed in this report and are based on existing available information at the time of writing the report. This report should be read in conjunction with the drawings listed below submitted with the planning application.

Refer also to the Civil Infrastructure Report which also takes part of this planning application.

- BPR-BMD-00-00-DR-C-1000 – Buried Foul & Surface Water Drainage Layout
- BPR-BMD-00-B1-DR-C-1001 – Basement Drainage Layout
- BPR-BMD-00-00-DR-C-1005 – Schematic SuDS Plan Layout
- BPR-BMD-00-00-DR-C-1006 – Catchments and Positively Drained Areas
- BPR-BMD-00-00-DR-C-1007 – Soakaway Flow Routing Plan under the Basement
- BPR-BMD-00-00-DR-C-1010 – Road Layout
- BPR-BMD-00-00-DR-C-1015 – Surface Water Overland Flow Routes
- BPR-BMD-00-00-DR-C-1020 – Buried Watermain Layout
- BPR-BMD-00-00-DR-C-1050 – Swept Path Analysis – Fire Tender Access
- BPR-BMD-00-00-DR-C-1051 – Swept Path Analysis – Refuse Vehicle
- BPR-BMD-00-00-DR-C-1060 – Sightlines at Leopardstown Road Junction
- BPR-BMD-00-XX-DR-C-1100 – Surface Water Longitudinal Drainage Sections
- BPR-BMD-00-XX-DR-C-1101 – Foul Water Longitudinal Drainage Sections
- BPR-BMD-00-00-DR-C-1200 – Surface Water Drainage Details
- BPR-BMD-00-B1-DR-C-1202 – Basement Drainage Details
- BPR-BMD-00-ZZ-DR-C-1205 – SuDS Details Sheet 1 of 4
- BPR-BMD-00-ZZ-DR-C-1206 – SuDS Details Sheet 2 of 4
- BPR-BMD-00-ZZ-DR-C-1207 – SuDS Details Sheet 3 of 4
- BPR-BMD-00-ZZ-DR-C-1208 – SuDS Details Typical Green Roof Details Sheet 4 of 4
- BPR-BMD-00-ZZ-DR-C-1209 – Wastewater Pumping Station Plan
- BPR-BMD-00-ZZ-DR-C-1209A – Wastewater Pumping Details Sheet 1 of 2
- BPR-BMD-00-ZZ-DR-C-1209B – Wastewater Pumping Details Sheet 2 of 2
- BPR-BMD-00-ZZ-DR-C-1209C – Suction Tanker Vehicle Tracking Study
- BPR-BMD-00-00-DR-C-1210 – Road and Paving Details
- BPR-BMD-00-ZZ-DR-S-1080 – Foundation Sections Location Plan
- BPR-BMD-00-ZZ-DR-S-1081 – Foundation Sections Sheet 1 of 3
- BPR-BMD-00-ZZ-DR-S-1082 – Foundation Sections Sheet 2 of 3
- BPR-BMD-00-ZZ-DR-S-1083 – Foundation Sections Sheet 3 of 3

1.2 Local Authority Correspondence

Planning permission was granted in 2017 for a previous planning application with register reference D17A/0337 and decision order number P/1342/17. Refer to Appendix I for further information about that development.

There was a request from DLRCoCo relating to flood risk, that prior to commencement of development mitigation measures against the risk of flooding shall be agreed with the planning authority including measures to address egress of occupancy from the building in the case of flooding of surrounding land. This request formed Condition 9 of PL06D.249248 grant of planning as follows:

Water supply and drainage arrangements including the attenuation and disposal of surface water shall comply with the requirements of the planning authority for such works and services. In addition prior to commencement of development mitigation measures against the risk of flooding shall be agreed with the planning authority including measures to address egress of occupancy from the building in the case of flooding of surrounding land.

In May 2019 BMCE responded on behalf of Homeland Silverpines Ltd. stating that:

The only possible source of significant flooding to the subject site is from a burst in the 14 inch

or 33 inch trunk watermains which run along together through the adjacent public park along the northeast boundary to the site. These are located 6 metres out approximately from the site boundary line. There is no significant risk to the site from flooding from a burst in these watermains for the reasons outlined below:

1. The ground level in the public park, along the watermain route, is 500 to 900mm below the general level of the subject site & between 900 & 2300mm below the proposed floor levels in the development. The park falls away from the site towards the northeast (towards the sea). Escaping water will travel northwards. Any leaking water is therefore very unlikely to enter the site.

2. The top of the two ramps to the basement car park area at +81.25 and +82.10 respectively, which is significantly above the public park level of between +79.90 & +80.40. The top of ramp level is set 100mm above the adjacent ground level to eliminate the risk of any overland flow of water entering the car park. The risk of any water from a burst main entering the basement is therefore deemed to be negligible.

This letter has been included in Appendix I for further information.

1.2.1 Pre-Application Consultation 2

The PAC2 meeting was held on the MS Teams platform on 29th September 2020, and some concern was raised by the DLRCC drainage engineer in relation to the proposed foul connection which would flow into the system serving Leopardstown Lawn downstream, which is a known area of foul surcharge and flooding during storm events.

RPS were engaged by our client to investigate this historical flooding. They modelled the system and prepared a report which outlined solutions. A solution was agreed with IW whereby wastewater from the site would be discharged into the Sandyford sewer system instead of the Leopardstown system to eliminate the risk of flooding.

2.0 SITE FLOOD RISK ASSESSMENT

2.1 Introduction

This flood risk assessment (FRA) aims to identify, quantify, and communicate to decisionmakers and other stakeholders the risk of flooding to land, property, and people to the subject site or from the subject site. The purpose is to provide enough information to determine whether approving the application for the proposed development is appropriate.

This flood risk assessment (FRA) was undertaken for this site to:

- Identify whether and the degree to which flood risk is an issue.
- Develop appropriate flood risk mitigation and management measures for the development.

The flood risk assessment outlined below is carried out in accordance with the OPW publication "The Planning System and Flood Risk Assessment Guidelines for Planning Authorities".

The stages involved in the assessment of flood risk are listed in these publications as follows:

- Stage 1: Flood Risk Identification
- Stage 2: Initial Flood Risk Assessment
- Stage 3: Detailed Flood Risk Assessment

The OPW publication also outlines a Sequential Approach for determining whether a development is appropriate for a specified location in terms of flood risk. The categorization of the subject site in terms of the OPW's sequential approach is further outlined in section 1.2 below.

2.2 Stage 1: Flood Risk Identification

Stage 1 identifies whether there are any flooding or surface water management issues related to the site, i.e. it identifies whether a flood risk assessment is required.

The existing Water Treatment Plant in Mulchanstown is 300 meters away from the site and the seashore coastline at Blackrock is approximately 3.3 kilometres to the North-East of the site and does not pose a risk due to the distance and intervening topography.

An 800 diameter watermain carrying water from Vartry reservoir to Stillorgan reservoir passes along the eastern boundary of the site.

There are no watercourses in the vicinity of the site

2.2.1 OPW Hazard Map

The first source considered is the OPW Flood Hazard Mapping service. The OPW Map (National Flood Hazard Mapping Service) presented in Appendix II shows one past flood incident recorded on the site or the adjacent area to the site back in 1980, due to the pipe

size which wasn't considered adequate, and the general flooding in that area was a road levels problem.

2.2.2 Pluvial Flooding

All rain falling on the site will be collected in the new surface water drainage system and diverted back to the public surface water sewer networks in Silverpines and Leopardstown Road. Surface water on site will pass through a SuDS treatment train and flow rates will be attenuated before discharge. The system has been designed without flooding for a 100 year storm in accordance with GDSDS requirements. Therefore, the risk of pluvial flooding within the site is negligible. In the event of a system blockage, there is considerable rainwater storage available given the extensive coverage of the site with SuDS measures. Any overland flow will be southwards along paved or green areas between buildings towards the Leopardstown Road, or into the park to the south passing between St. Josephs' House and Block A. Please refer to BM drawing "*BPR-BMD-00-00-DR-C-1015 – Surface Water Overland Flow Routes"* contained in Appendix IV.

2.2.3 Fluvial Flooding

The fluvial flooding maps do not show any flood risk in the vicinity of the site due to river or sea flooding. i.e. the site is in Flood Zone C. Further information can be found in Appendix III.

2.2.4 Flood Zones

The sequential approach defines the flood zones as detailed below:

- *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.

The proposed development is located in Flood Zone C.

2.2.5 Vulnerability Class

The sequential approach describes the vulnerability classes as follows:

- Highly vulnerable development – hospitals, schools, houses, student halls of residence etc.;
- Less vulnerable development – retail, commercial, industrial, agriculture etc.;
- Water compatible development – docks, marinas, amenity open space etc.

The development is a residential development which is classed as 'Highly Vulnerable'.

2.2.6 Development Classification

The matrix of vulnerability as per "The Planning System and Flood Risk Management – Guidelines for Planning Authorities" is reproduced in Table 1.1 below.

Table 2.1 – Matrix of Vulnerability

	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

This development is therefore deemed appropriate and so no further flood assessment is required. However, to account for the proximity of the development to the existing watermains, a detailed Flood Risk Assessment has been undertaken, as set out below.

2.3 Stage 2: Initial Flood Risk Assessment

The initial flood risk assessment should ensure that all relevant flood risk issues are assessed in relation to the decisions to be made and potential conflicts between flood risk and development are addressed. It should assess the adequacy of existing information and any flood defences.

2.3.1 Examination of potential flooding sources that can affect the site

The possible sources of flood water are assessed in the table below using the "**Source – Pathway – Receptor Model"**.

Table 2.2 – The Possible Sources of Flood Water

Source	Pathway	Receptor	Likelihood	Consequence	Risk	Notes
Tidal Note	Overtop Breach	People Property	Unlikely	High	Low	1
Fluvial Note	Overtop Breach	People Property	Unlikely	High	Low	
Pluvial Surface Water	Overflow / Blockage	People Property	Possible	High	Medium	2
Groundwater	Rising Groundwater Levels	People Property	Possible	Low	Medium	3

Note 1: The site development is 3300 metres from the sea at Blackrock.
Note 2: There is an 825mm diameter watermain along the northern boundary of the site.
Note 3: The new basement will be waterproofed against groundwater ingress.

2.3.2 Appraisal of the availability and adequacy of existing information and flood zone maps

2.3.2.1 Tidal/Fluvial Flooding

Information is available on possible flooding of the area surrounding the site in the Eastern CFRAM Study by the OPW. The study is a requirement of the EU 'Floods' Directive (2007/60/EC). The PFRA (Preliminary Flood Risk Assessment) map is also available and considers flood risk arising from any major source of flooding, including natural sources such as river, sea, groundwater and rainfall as well as infrastructural sources such as urban drainage systems, reservoirs, water supply systems ESB and Waterways Ireland Infrastructure. The tidal flood risk is not assessed in this study, as the nearest seashore coastline is 3.3km away from the site.

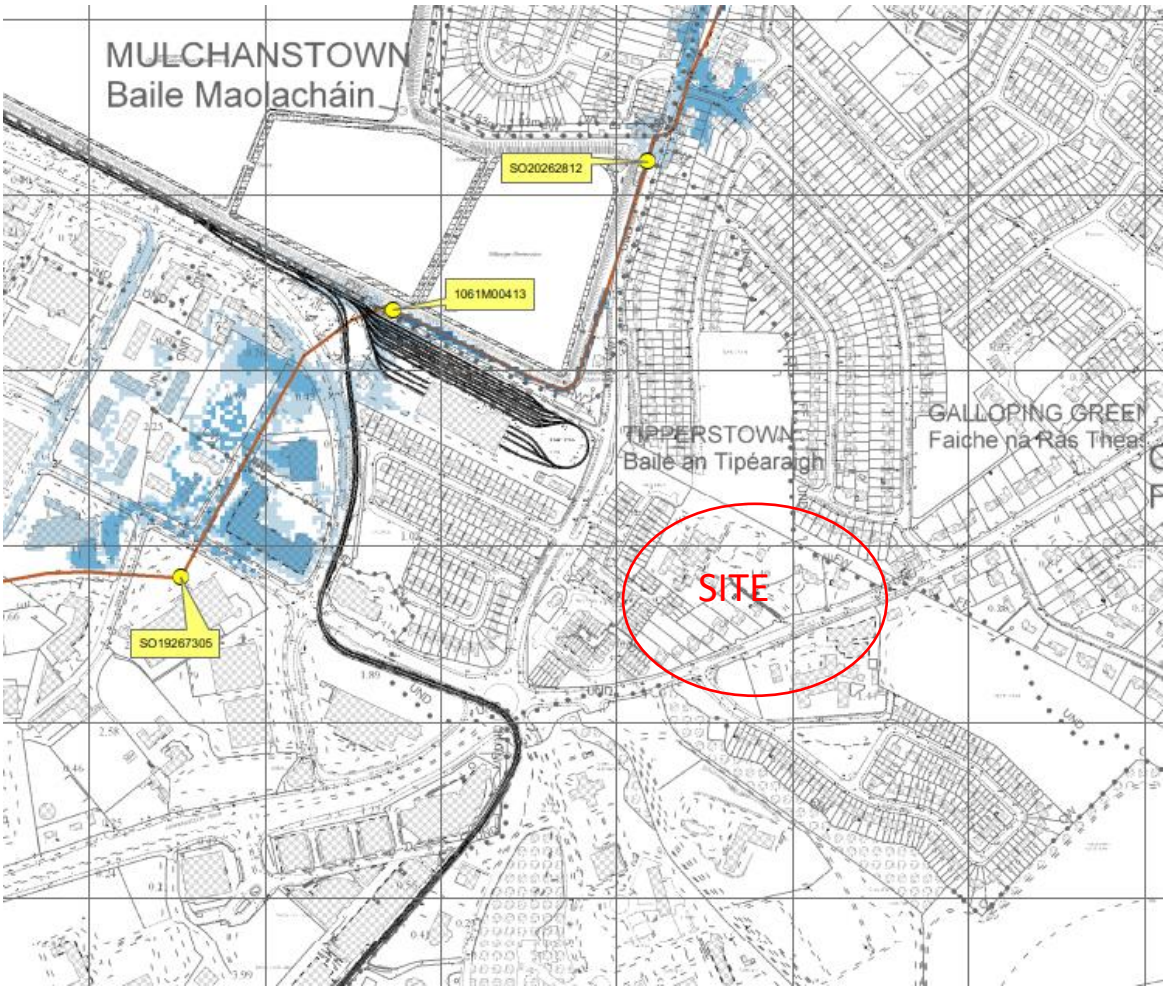


Figure 2.1 – Extent Fluvial Map

The relevant maps are contained in Appendix III and show that the site is located outside of the Flood Risk Areas.

2.3.3 Determination of what technical studies are appropriate

Given the comprehensive nature of the existing information available regarding flooding, it is not considered necessary to carry out any further analysis of fluvial or tidal flooding.

2.3.4 Description of what residual risks will be assessed and how they might be mitigated and potential impacts of development on flooding elsewhere

The site is in an area where there is no possibility of flooding due to tidal/fluvial sources.

However, due to the proximity of the site to existing watermains, the unlikely event of a burst connection has been considered below in the design. Flooding of the sewer network surrounding the site is also considered.

The proposed provision of an attenuation tank on site is given further consideration below.

2.3.4.1 Pluvial Flooding

The unlikely event of a complete blockage of the surface water drainage system on site will lead to overland flow in the site from the point of blockage. Figure 1.2 below shows the flow routes.

These routes are onto the surrounding public roads and not into third party lands, refer to Appendix IV. Extract below.

Figure 2.2 – Overland Flow Routes

2.4 Stage 3: Detailed Flood Risk Assessment

Although the proposed development is classified as appropriate and there is no need for Justification Test, some aspects of the Flood Risk Management Guidelines have been revised to add more value into the comments explained above.

A detailed flood risk assessment involves the estimation of the level of flooding on the site and the performance of the development under these conditions so that a “fit for purpose” development can be delivered. Once the likely maximum flood level has been estimated, the design should develop so that the ground floor level is above this level.

Residual flood risk may remain in other areas that for operational reasons have to be below the maximum flood level (street access, bin stores, etc.) and these areas will have to incorporate flood resilient design features and flood risk management procedures so that the risk is mitigated in so far as possible.

2.4.1 Assessment for Flood Risk due to Potential Blockage of the surface water drainage system on site.

These methods ensure that the runoff response to rainfall will not be increased with respect to the pre-development condition and ensure flood risk to the relevant catchment is not increased.

In the unlikely event of a full blockage of the surface water system before or during a storm event then water will build up in the pipe system and discharge back into the ground level SuDS devices – permeable paved & porous surfaced areas & soft landscaping. Given the building levels & ground levels on site, any residential overland flow will occur in the site towards Silverpines as shown in the Figure 2.2 above (Appendix IV).

2.4.2 Site Drainage System Maximum Flood Levels & Basement Car Park

There are no significant flood risks to the site from pluvial or tidal sources. The system has been designed to ensure that the runoff response to rainfall will not be increased with respect to the pre-development condition and ensure flood risk to the relevant catchment is not increased.

Two new buried attenuation tanks beneath green areas will be provided on site to attenuate surface water run-off. The tanks are designed to fully attenuate flows from the 1 in 100year + 20% Climate Change storm events. Discharge from the tanks will be controlled on a catchment basis by Hydrobrake flow control devices installed downstream of each tank. Surface water from the southern sub-catchment on site drains to a soakaway. There is an emergency high overflow from the soakaway into the SW drainage system & out directly to the Silver Pines sewer in the event of a blockage.

As is demonstrated in the detailed Microdrainage simulation output for the worst-case scenario 1:100yr + 20% climate change storm events, the overall surface water drainage design ensures that the network does not flood during the 1 in 100yr + 20% climate change storm events. This demonstrates the design is in accordance with the GDSDS Criterion 3 (See 19.236-IR-01), and demonstrates that the risk of flooding due to fluvial events is considered to be very low.

With regard the effect of the proposed development on flooding of surrounding sites, it is also noted, that the surface water discharge from the site does not exceed the greenfield

run-off rate of QBAR. Therefore, as the discharge from the site matches QBAR, there is no effect on the surrounding lands.

As noted in section 1.2, the risk of a burst watermain is small due to the site levels and this risk has been addressed in the design of the car park ramps top levels. In addition, the basement design will be tanked, and the concrete structure will be designed to resist water pressure.

2.4.3 Ground Floor Levels

The water source feeding the Stillorgan Reservoir which is the closest watercourse to the proposed site is shown on OPW CFRAMS Maps (Appendix III), shows the water level in the 10% Fluvial Annual Exceedance Probability (AEP) Event (node 1061M00413) which a maximum water level of +78.3mOD, whereas the proposed FFL has been set at +80.00mOD as the lowest.

The only possible source of significant flooding to the subject site is from a burst in the 14 inch or 33 inch trunk watermains which run along together through the adjacent public park along the northeast boundary to the site. These are located 6 metres out approximately from the site boundary line. The risk of any water from a burst main entering the basement is therefore deemed to be negligible for the reasons outlined below:

1. The ground level in the Leopardstown Lawn public park, along the watermain route, is 500 to 900mm below the general level of the subject site & between 900 & 2300mm below the proposed floor levels in the development. The park falls away from the site towards the northeast (towards the sea). Escaping water will travel northwards away from the site. Any leaking water is therefore very unlikely to enter the site.

2. The top of the two ramps to the basement car park area at +81.25 and +82.10 respectively, which is significantly above the public park level of between +79.90 & +80.40. The top of ramp level is set 100mm above the adjacent ground level to eliminate the risk of any overland flow of water entering the car park. The basement to be surrounded in a waterproof concrete structure to be protected against groundwater ingress.

This shows no flood risk for the proposed development.

2.4.4 Public Sewer Network

There is no history of flooding in the surrounding Surface Water sewer network, and given the level of attenuation to greenfield runoff rates, which reduces the net discharge to the sewer in comparison with current rates, it is deemed negligible risk that the development will cause flooding to the SW network.

As stated in Section 1.2.1, RPS were engaged by our client to investigate this historical flooding. They modelled the system and prepared a report which outlined solutions. A solution was agreed with IW whereby wastewater from the site would be discharged into

the Sandyford sewer system instead of the Leopardstown system to eliminate the risk of flooding.

3.0 CONCLUSION

The flood risk assessment has been carried out in accordance with the OPW publication "The Planning System and Flood Risk Assessment Guidelines for Planning Authorities".

There is no significant risk of flooding on the proposed development site or no significant increased flooding risk to surrounding areas from the development. Therefore, the development is deemed acceptable from a flood risk assessment perspective.

BARRETT **MAHONY**
CONSULTING ENGINEERS
CIVIL & STRUCTURAL

APPENDIX 1

PREVIOUS COMPLIANCE INFORMATION

BARRETT MAHONY
CONSULTING ENGINEERS
CIVIL & STRUCTURAL

Dublin | London | Sofia
Sandwith House,
52-54 Lower Sandwith Street,
Dublin 2, D02 WR26, Ireland

Phone +353 1 6773200
Email bmce@bmce.ie
www.bmce.ie

Administrative Officer,
Planning Department,
Dun Laoghaire Rathdown County Council,
County Hall, Maine Road
Dun Laoghaire, Co.Dublin
30th May 2019

Re: Compliance with Condition 9 PL06D.249248 (DLRCC Reg. Ref. D17A/0337) – Annaghkeen, Leopardstown Road, Dublin 18.

Dear Sir or Madam,

We are acting as consulting civil & structural engineers for the above development. On behalf of our client, we have set out below a response to Condition 9. This condition is as follows:

Water supply and drainage arrangements including the attenuation and disposal of surface water shall comply with the requirements of the planning authority for such works and services. In addition prior to commencement of development mitigation measures against the risk of flooding shall be agreed with the planning authority including measures to address egress of occupancy from the building in the case of flooding of surrounding land.

Response: The only possible source of significant flooding to the subject site is from a burst in the 14 inch or 33 inch trunk watermains which run along together through the adjacent public park along the northeast boundary to the site. These are located 6 metres out approximately from the site boundary line. There is no significant risk to the site from flooding from a burst in these watermains for the reasons outlined below:

1. The ground level in the public park, along the watermain route, is 500 to 900mm below the general level of the subject site & between 900 & 2300mm below the proposed floor levels in the development. The park falls away from the site towards the northeast (towards the sea). Escaping water will travel northwards. Any leaking water is therefore very unlikely to enter the site.
2. The top of the two ramps to the basement car park are at +81.25 and +82.10 respectively, which is significantly above the public park level of between +79.90 & +80.40. The top of ramp level is set 100mm above the adjacent ground level to eliminate the risk of any overland flow of water entering the car park. The risk of any water from a burst main entering the basement is therefore deemed to be negligible.

The two points above are explained diagrammatically in Figure 1 attached to this letter. We trust that this is satisfactory but please do not hesitate to contact us if you have any queries.

Yours sincerely,

John Considine

John Considine
Chartered Engineer & Director of Barrett Mahony Consulting Engineers

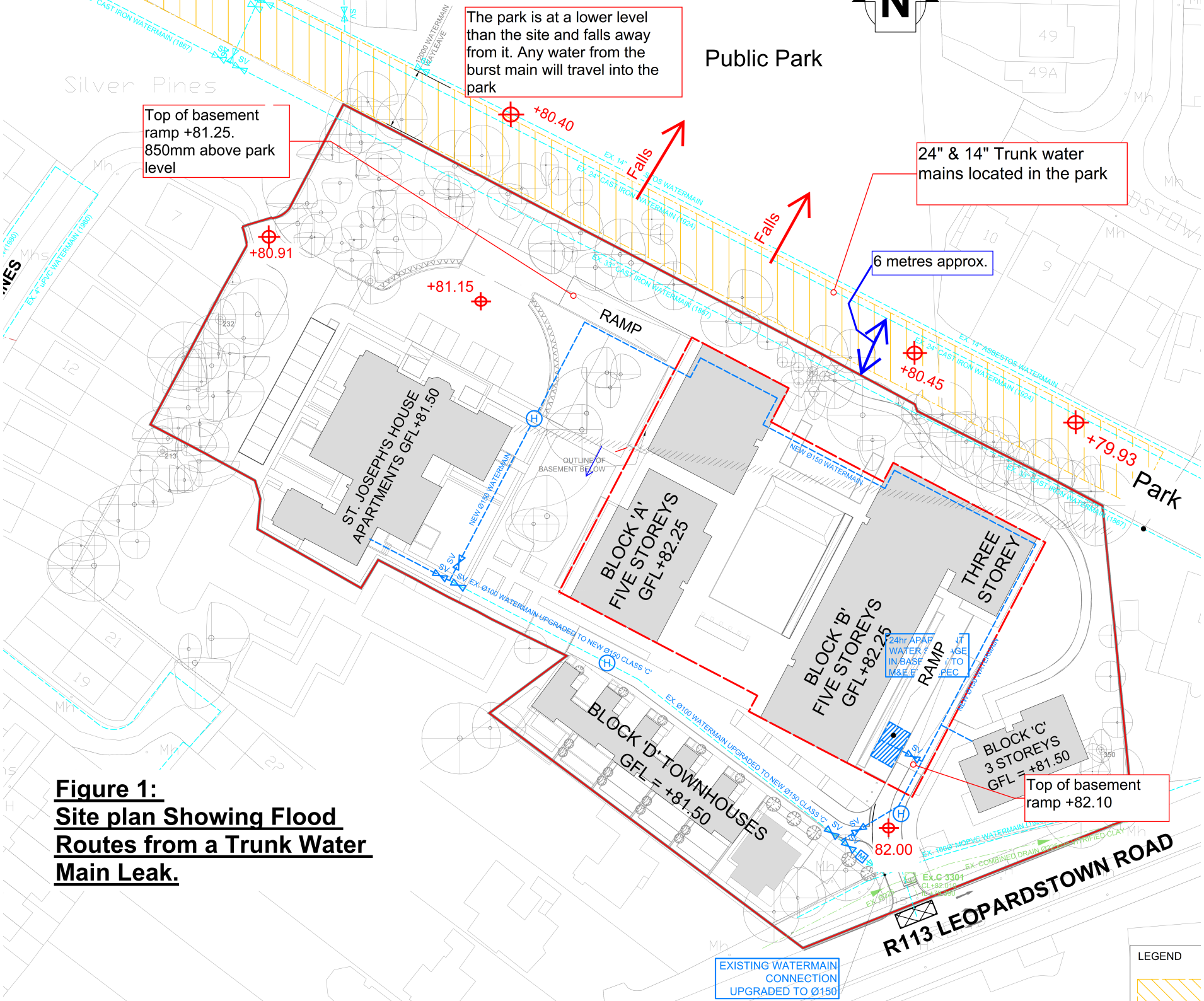


Figure 1:
Site plan Showing Flood Routes from a Trunk Water Main Leak.

BARRETT **MAHONY**
CONSULTING ENGINEERS
CIVIL & STRUCTURAL

APPENDIX 2

OPW FLOOD MAP REPORT

OPW National Flood Hazard Mapping

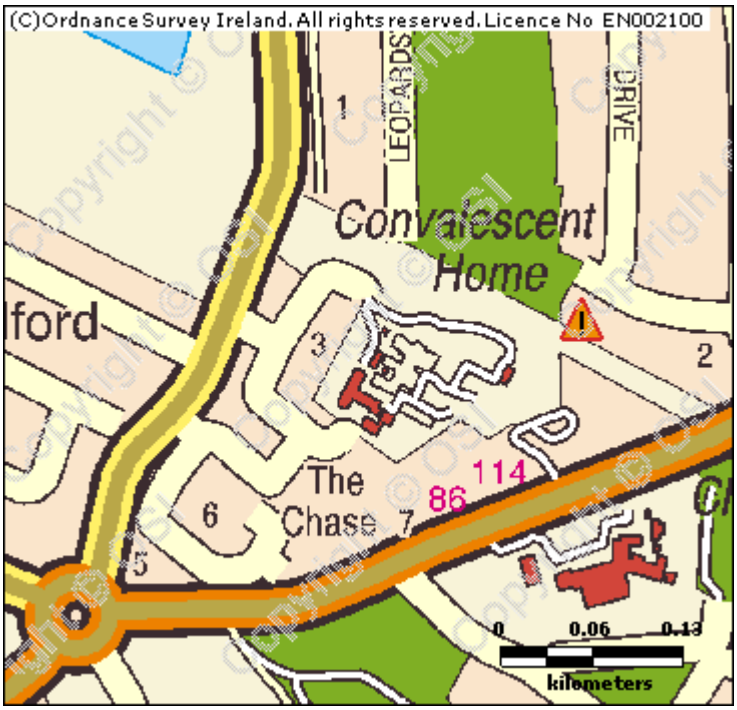
Summary Local Area Report

This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Dublin

NGR: O 202 264



Map Scale 1:5,229

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Thier purpose and scope is explained in the Glossary.

23 Results

1. Flooding at Avoca Park, Blackrock, Co. Dublin on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information

2. Flooding at Orpen Dale, Stillorgan, Co. Dublin on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information

3. Flooding at Dale Drive, Stillorgan, Co. Dublin on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:3
Additional Information: Reports (2) More Mapped Information

4. Flooding at Deansgrange Village, Deansgrange, Co. Dublin on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

5. Stillorgan Hill Nov 2002
County: Dublin
Start Date: 10/Nov/2002
Flood Quality Code:4

Additional Information: Reports (4) More Mapped Information

---

6. Carysfort May 1993
County: Dublin
Start Date: 26/May/1993
Flood Quality Code:2

Additional Information: Photos (6) More Mapped Information

---

7. Ramore Leopardstown Road May and June 1993
County: Dublin
Start Date: 01/May/1993
Flood Quality Code:3

Additional Information: Reports (2) More Mapped Information

---

8. School House Lane Sandyford Nov 1982
County: Dublin
Start Date: 26/Nov/1982
Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

---

9. Torquay Road Foxrock Nov 1982
County: Dublin
Start Date: 05/Nov/1982
Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

---

10. Sandyford Church Jan 1980
County: Dublin
Start Date: 21/Jan/1980
Flood Quality Code:4

Additional Information: Reports (1) More Mapped Information

---

11. Lakelands Close Stillorgan Jan 1980
County: Dublin
Start Date: 21/Jan/1980
Flood Quality Code:4

Additional Information: Reports (1) More Mapped Information

---

12. Brighton Terrace Jan 1980
County: Dublin
Start Date: 01/Jan/1980
Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

---

13. Leopardstown Road Dec 1979
County: Dublin
Start Date: 14/Dec/1979
Flood Quality Code:4

Additional Information: Reports (1) More Mapped Information

---

14. Brighton Cottages Dec 1978
County: Dublin
Start Date: 26/Dec/1978
Flood Quality Code:3

Additional Information: Reports (2) More Mapped Information

---

15. Carysfort Avondale Lawn Recurring
County: Dublin
Start Date:
Flood Quality Code:3

Additional Information: Reports (7) More Mapped Information

---

16. Brighton Cottages Foxrock Recurring
County: Dublin
Start Date:
Flood Quality Code:3

Additional Information: Reports (7) More Mapped Information

---

17. Carysfort MaretimoStillorgan Gr Orpen Gr Recurring
County: Dublin
Start Date:
Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

---

18. Torquay Road Recurring
County: Dublin
Start Date:
Flood Quality Code:3

Additional Information: Reports (4) More Mapped Information

19. Carysfort Maretimo Stream StillorganPark Recurring
Start Date:
County: Dublin
Flood Quality Code: 3
Additional Information: Reports (1) More Mapped Information

20. Brewery Road Recurring
Start Date:
County: Dublin
Flood Quality Code: 4
Additional Information: Reports (3) More Mapped Information

21. Ballyogan Stream Lambs Cross Recurring
Start Date:
County: Dublin
Flood Quality Code: 4
Additional Information: Reports (1) More Mapped Information

22. Carrickmines River Sandyford Hall Recurring
Start Date:
County: Dublin
Flood Quality Code: 4
Additional Information: Reports (1) More Mapped Information

23. Kilgobbin Road Recurring
Start Date:
County: Dublin
Flood Quality Code: 4
Additional Information: Reports (2) More Mapped Information

Flooding Incidents, January 1980.

The following incidents in Area 12 relate to 21.1.80 only :—

Brighton Terrace. The 12" dia. foul sewer backed up and overflowed affecting, in particular, shop. The house drains which overflowed entered a store beside the shop. Damage was averted by Drainage Maintenance Section pumping into the Surface Water Drain, which unlike Dec 1978 gave no trouble. The backing up of the sewer was as a result of the surface water from the roads gullys drained into the foul system.
as asked Roads Department to make alternative arrangements for oad Drainage. (LB/NB 29.1.80)

41, South Park. Because of e main sewer backing up, the house rain A.J.S overflowed flooding he garden. Work commenced on 3.2.80 on the relaying of a section f 12" dia. sewer in Meddowvale .B.S. grounds to eliminate a

estriction in this line.
22-33 Marian Park, Blackrock. Flood-
ng from blocked roads gullys.
Wattuille Park. Road flooding.
Stradbrook Hall Lodge.
lain sewer backing up house drains
ee also items 6 & 7 and copy of
tter A/CACE to
A.S.O. Sanitary Services
flooding in No 14, Wynberg Park
C.A.C.E.) and
mplaint from No 15.
14, Wynberg Pk.
28, Wynberg Park } Gardens
th cases from sewer backing up
ouse drain A.J.S.
There is probably serious infiltrat-
on through the joints and possibly
reaks in the main sewer which
s earthenware laid in 1909. As
ell as this roof water is drained
n at Stradbrook Hall, and at No
4 Wynberg Park from a surface
ater contained drain serving 6 No
ouses, and the roads gulley out-
ide No 14 also drains into the
sewer.

. Seafield, off Corbawn Lane. Last
ause en Shankill Main Sewer had
e garden flooded from the main
oding up through the house drain
.J.'s. The Storm Overflow have had
en closed off because McInerney
ad been abusing the system in the
djacent development. The 12" dia.
iversionary sewer in Corbawn Lane
hould have catered for the total
low from New Vale but some of
his sewage was still coming down
he 9" dia. line in Corbawn Lane.
his flow has now been totally div-
rted into the 21" dia. sewer at Sham
anagh Park.
. South Park/Clonkeen Road. There
as extensive flooding of the road
n this area. The original stream
nder the Clonkeen Road was piped
n a 12" dia. pipe presumably by the
oads Dept. This is grossly inad-
quate as the S.W. drain in South
ark is 18" dia. We would presume it
s up to Roads to upsize this drain.
f not, we would have to make provi-
ions to relay in a pipe of adequate

apacity.
Coolevin, Ballybrack. Complaints
ave received from

concerning gardens flooded
a depth of 7". This flooding was
om the drainage of a Parks area,
enetrating into back gardens.
arks Dept. should be asked to provide
nd drainage in this area with dis-
harge to a suitable water course or
urface Drain. Flooded Sat. 9.2.80.
P.S. Rahahine. This house is at the
ack of a field belonging to the Church
Ireland, Church Road, Ballybrack.
his field drains to a ditch behind
e house and is piped through an
r the dyke about 2'-0" high, and
ence into the Surface Drain to the
ear of the house.

Area 11 -
Flooding on the 19th. December
ffected -
eopardstown Road. There is no
rainage across the road for the
ater accumulating behind the wall

/ the Legionnaires of Christ grounds
b that it runs down for a consid-
rable distance as far as Leopards-
wn Avenue where Roads Dept. have
id a 6" dia. pipe recently to relieve
looding in this area. This pipe size
e do not consider adequate, but the
eneral flooding here is a Roads
)ept. problem.
Brewery Road The screen at Esso
as temporarily partially blocked with
me flow across the entrance along
he side of the road and back into
e stream on the other side.
inden Road. Roads Dept. problem
akelands. Some flooding into
ardens until screen could be cleared
ulvey Park. Roads Dept (Maintenance)
nnected gulley into main S.W. drain
) avert flooding here.
llen Park. See below.

Flooding on January 21st & 31st.
curred in the following areas:—
akelands. Flooding in back gard-
ns of Nos 54 & 56. There is gen-
rally some lodgement of water in

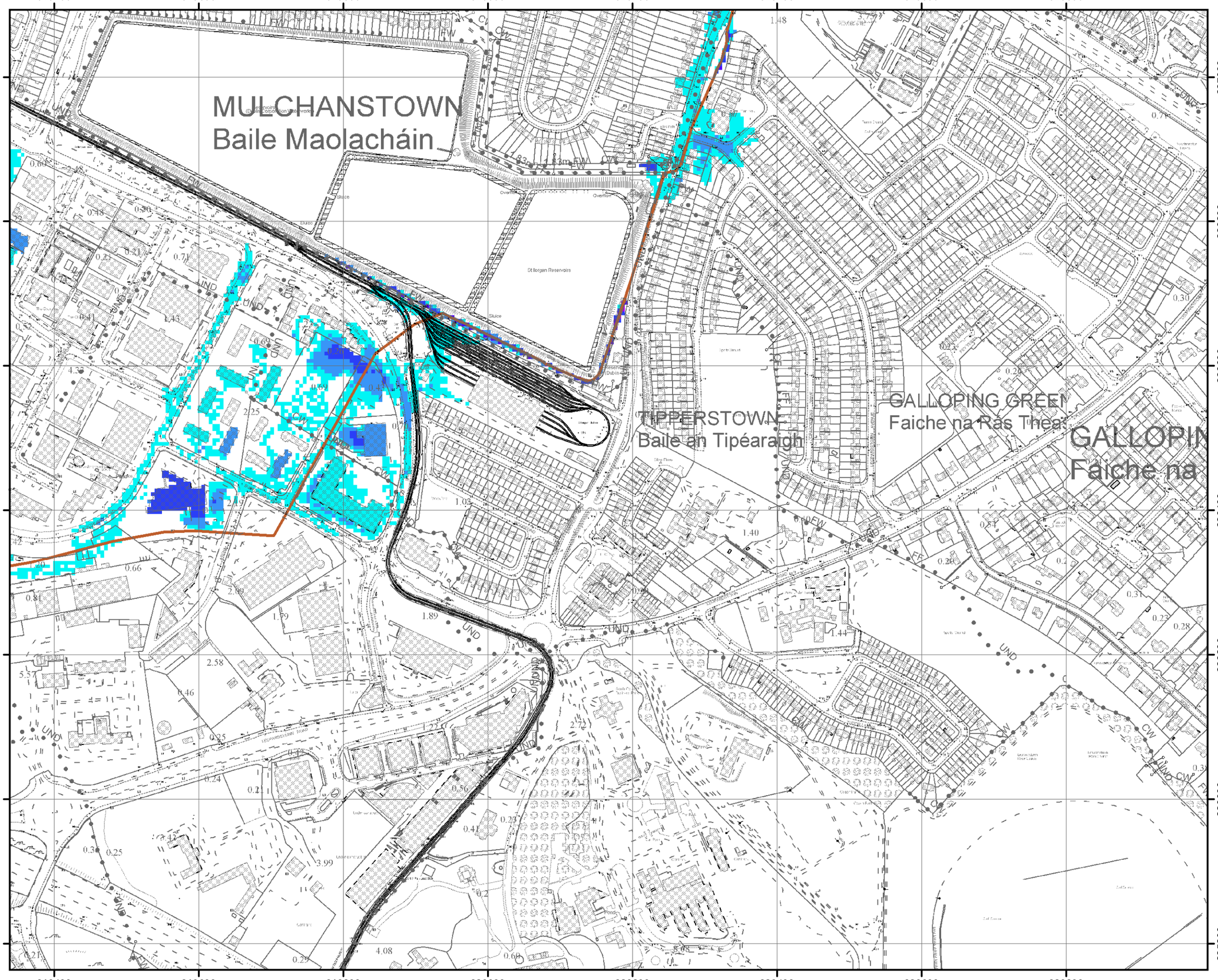
hese back gardens from temporarily
locking of the screen. The stretch
f stream 103 lin. metres was sched-
led to be piped under a Minor Works
cheme, 1980 but this work may be
liminated in the general cutback.
he problem at Lakeland is aggravat-
d since, upstream, has develop-
ed portion of the Industrial Estate
hich is already piped into the
tream and is conditioned to pipe
e section of stream within his
rea in the Industrial Estate.
Brewery Road. Temporary by passing
f screen, across Esso entrance
Priory Avenue/Avoca Avenue/Linden
oad. There are no gulleys in the
rea to drain surface water off the
oad. Most of the responsibility
ould lie with Dun Laoghaire Borough
ut a small section is under the D.C.C.
inden Road (outside convalescent
ome). Problem with block roads gulley.
oads Dept. have attended to problem
Glen Park (F.X. Woods/Farrell Homes
evelopment) The builder
has erected a boundary

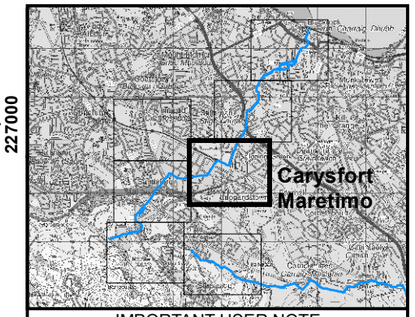
all on the estate almost parallel to
e contours on a reasonably steep
radient and have interfered with the
atural drainage of the ground so that
ie accumulated water is eventually
iverted into No. 71 Allen Park
nd the adjoining house as well as
ausing water-logging in all the gard-
ns along Merville Road. A Land
rain at the rear of this block wall
raining into a surface water drain
ould remedy this situation. (B. Control)
ommy Luccan, Bracken Brae, Sandyford
ewage backed up through manhole
main in back garden. Sandyford
illage is on a combined surface/foul
ystem. We are also investigating
he situation in Merrion Estate (N.B.A
or D.C.C. which is about to be taken
n charge.
Sandyford Church. Flooding (of a
erious enough nature) caused by
builder blocking a stream with
n accumulation of blocks, pipes,
anks & scaffolding and causing
verflow into the church. The builders
ame is

BARRETT **MAHONY**
CONSULTING ENGINEERS
CIVIL & STRUCTURAL

APPENDIX 3

CFRAMS FLOOD MAPPING





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

Legend

0.1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents

FINAL

REV:	NOTE:	DATE:
01	Amendment to Label.	08/12/16

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

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

Map:
Carysfort Maretimo Fluvial Flood Depths

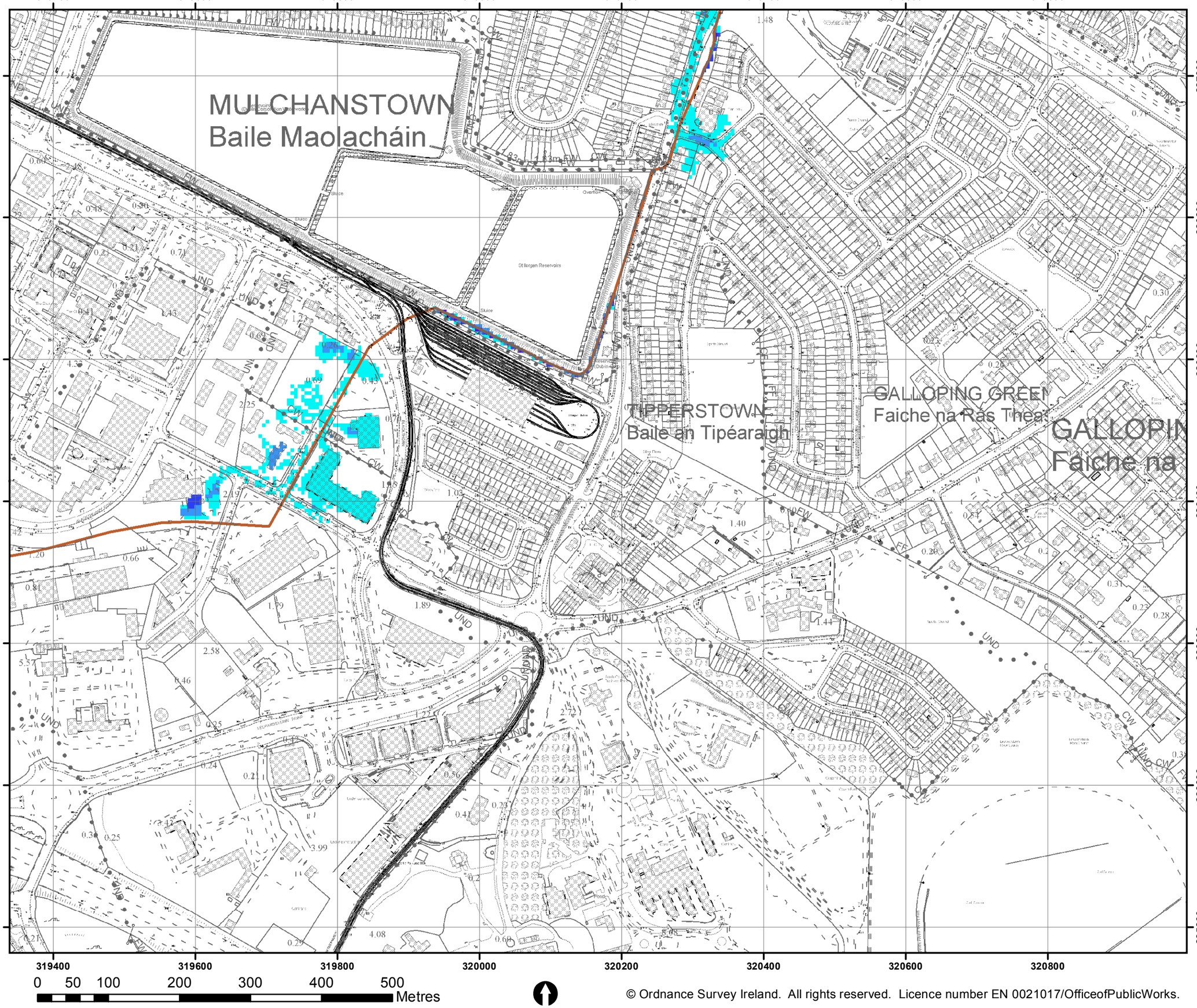
Map Type:	DEPTH	
Source:	FLUVIAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn By :	C.McG.	Date : 27 October 2017
Checked By :	A.S.	Date : 27 October 2017
Approved By :	G.G	Date : 27 October 2017

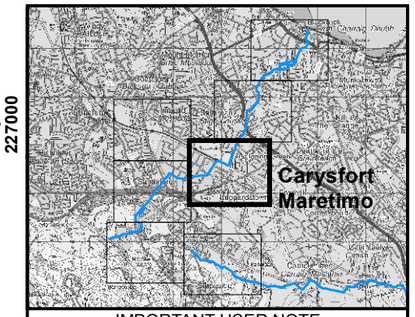
Drawing No. :
E09CAR_DPFCD001_F2_05

Map Series : **Page 5 of 7**

Drawing Scale : 1:5,000 @A3

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

1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents

FINAL

REV:	NOTE:	DATE:
01	Amendment to Label.	08/12/16

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

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

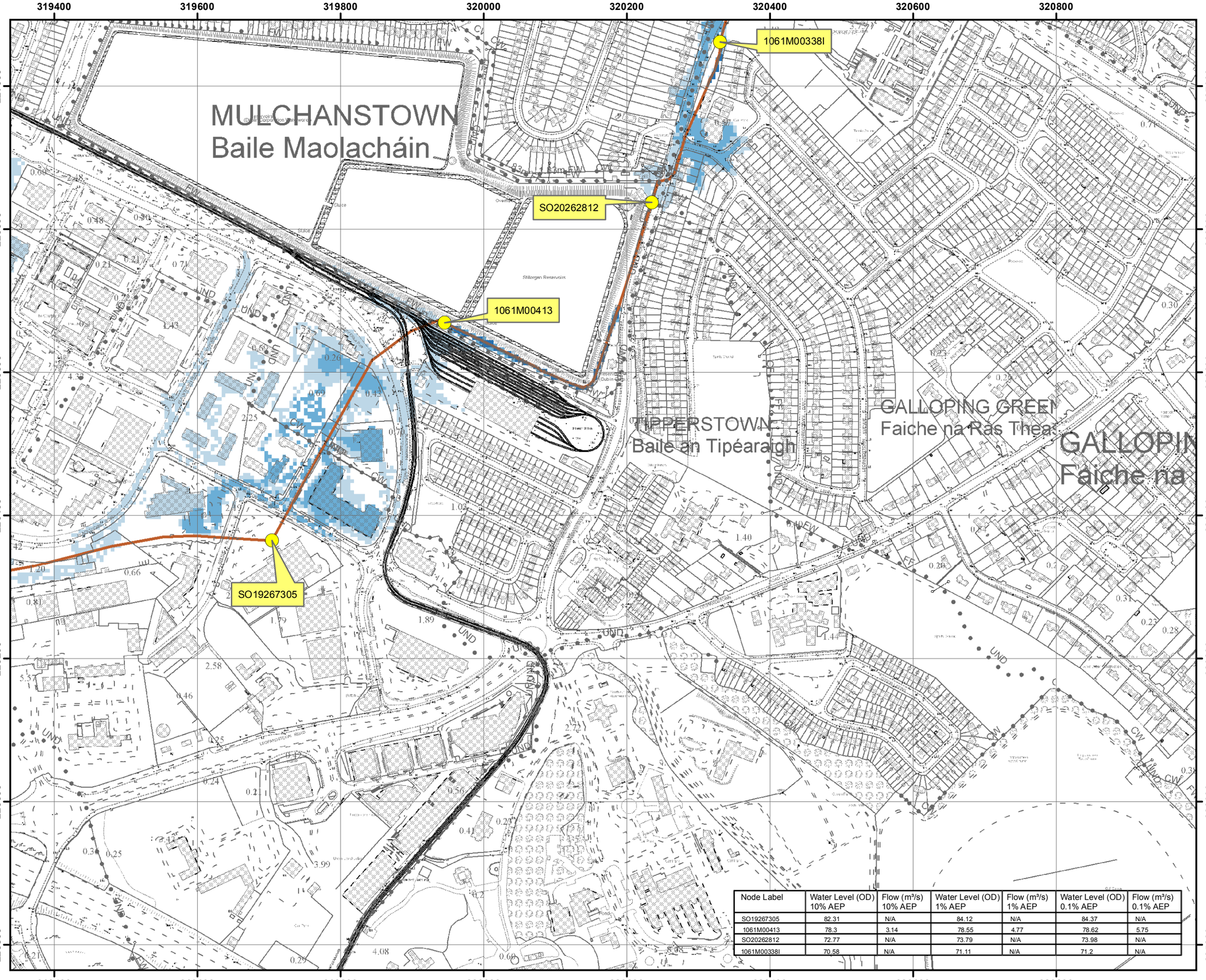
Map:
Carysfort Maretimo Fluvial Flood Depths

Map Type:	DEPTH	
Source:	FLUVIAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn By :	C.McG.	Date : 27 October 2017
Checked By :	A.S.	Date : 27 October 2017
Approved By :	G.G	Date : 27 October 2017

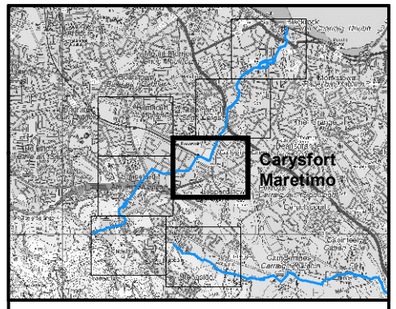
Drawing No. :
E09CAR_DPFCD010_F2_05

Map Series : **Page 5 of 7**

Drawing Scale : 1:5,000 @A3



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
SO19267305	82.31	N/A	84.12	N/A	84.37	N/A
1061M00413	78.3	3.14	78.55	4.77	78.62	5.75
SO20262812	72.77	N/A	73.79	N/A	73.98	N/A
1061M00338I	70.58	N/A	71.11	N/A	71.2	N/A



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 / 1% AEP — Standard of Protection of Flood Defence (Walls / Embankments)
- Node Point
- Node ID — Node Label

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

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

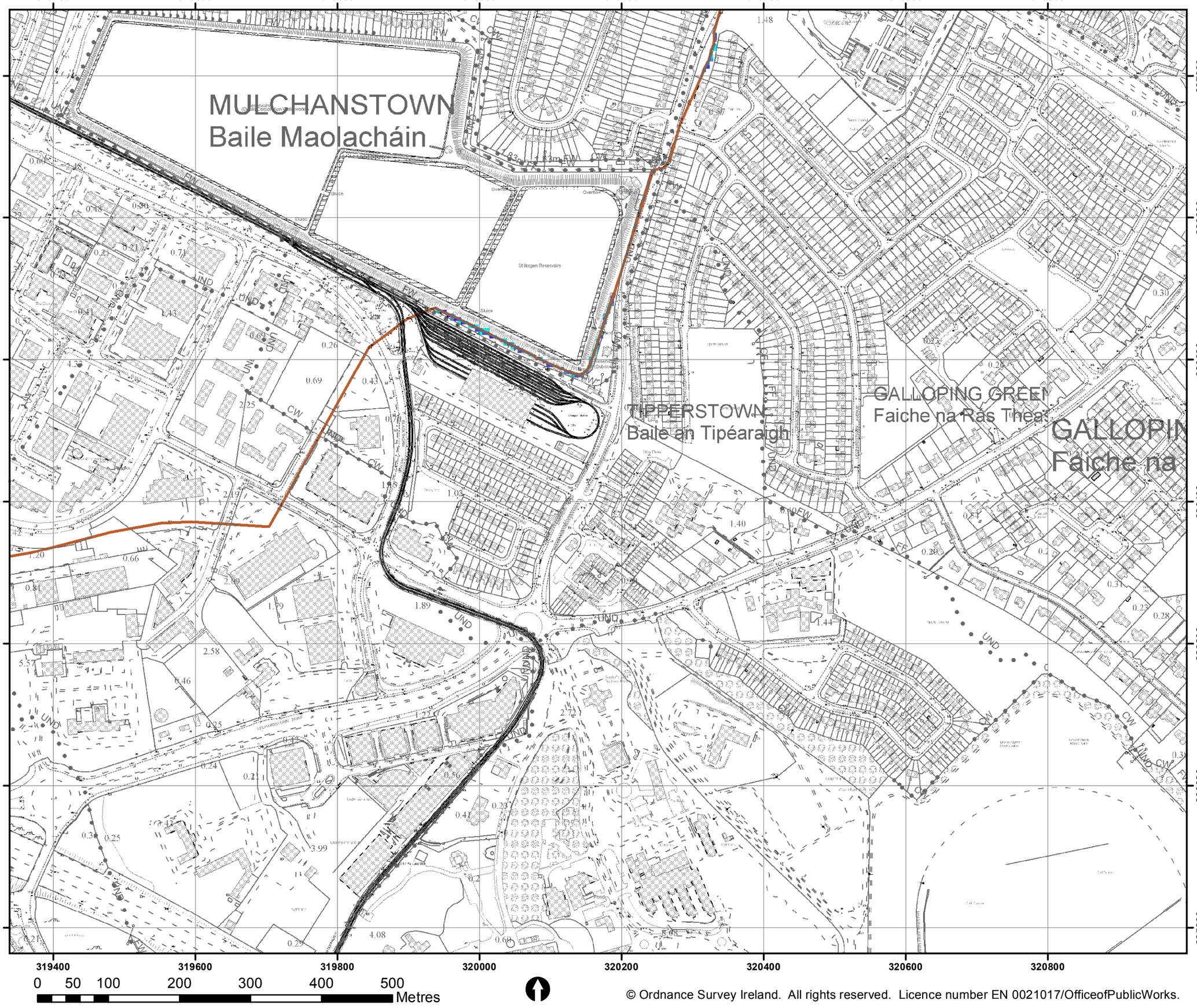
Map: Carysfort Maretimo Fluvial Flood Extents

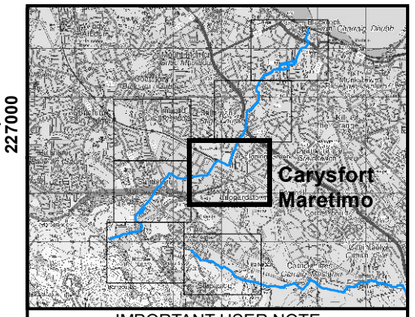
Map Type:	EXTENT		
Source:	FLUVIAL		
Map Area:	HPW		
Scenario:	CURRENT		
Drawn By :	C.C.	**Date :**	27 October 2017
Checked By :	A.S.	**Date :**	27 October 2017
Approved By :	S.P.	**Date :**	27 October 2017

Drawing No. : E09CAR_EXFCD_F2_05

Map Series : Page 5 of 7

Drawing Scale : 1:5,000 @ A3





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 Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents

FINAL

REV:	NOTE:	DATE:
01	Amendment to Label.	08/12/16

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

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

Map:
Carysfort Maretimo Fluvial Flood Depths

Map Type:	DEPTH	
Source:	FLUVIAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn By :	C.McG.	Date : 27 October 2017
Checked By :	A.S.	Date : 27 October 2017
Approved By :	G.G	Date : 27 October 2017

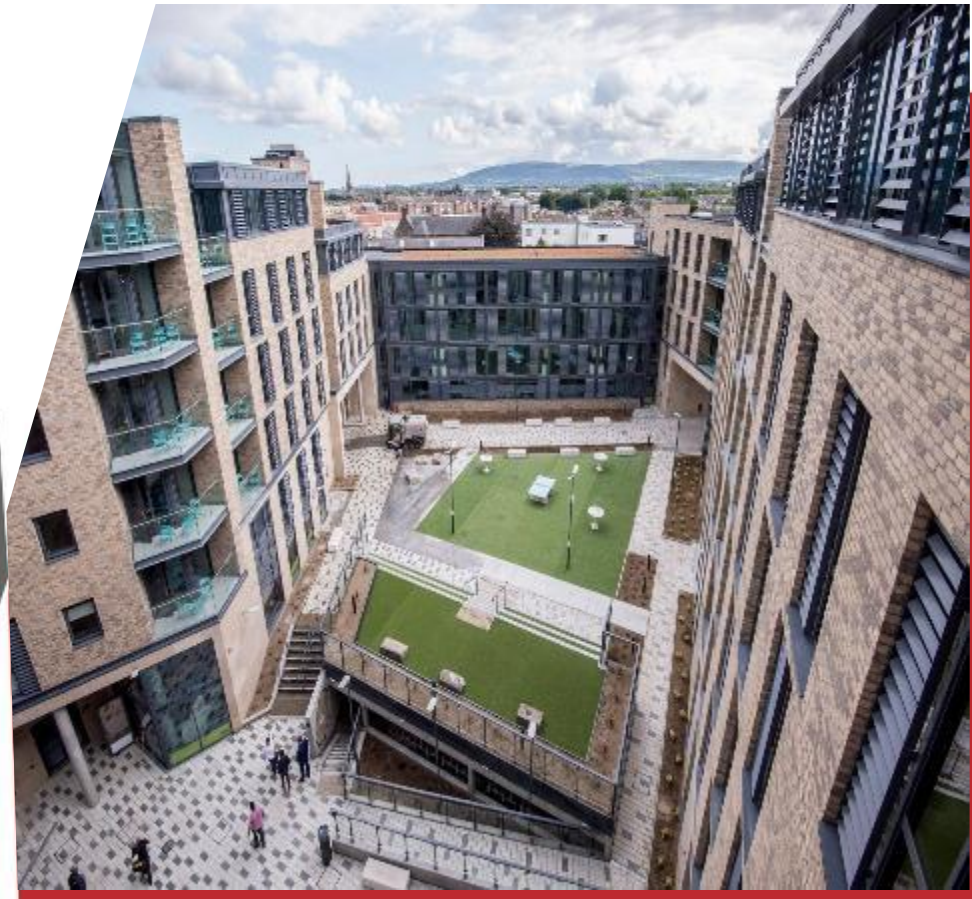
Drawing No. :
E09CAR_DPFCD100_F2_05

Map Series : **Page 5 of 7**

Drawing Scale : 1:5,000 @A3

0 50 100 200 300 400 500 Metres

BARRETT MAHONY
CONSULTING ENGINEERS
CIVIL & STRUCTURAL



APPENDIX 4

OVERLAND FLOOD ROUTE

Baile an Tipearaigh

Silver Pines

PARK

LEOPARDSTOWN LAWN

LEOPARDSTOWN ROAD

SILVER PINES

SILVER PINES

Sheils Houses

SIR IVOR MALL

Area under construction

Children's Home

Gate 4

TOP OF BASEMENT RAMP SET 100mm ABOVE ADJACENT GROUND LEVEL TO AVOID BACKFLOW DOWN THE RAMP.

+80.500

+81.150

+82.000

+82.300

+82.500

+82.050

TOP OF BASEMENT RAMP SET 100mm ABOVE ADJACENT GROUND LEVEL TO AVOID BACKFLOW DOWN THE RAMP.

ST. JOSEPH'S HOUSE BLOCK E FFL +81.55 9 UNITS

BLOCK A FFL +82.25 49 UNITS

BLOCK B FFL +82.25 88 UNITS

BLOCK C FFL +81.50 115 UNITS

BLOCK D FFL +82.650 157 UNITS

BLOCK F FFL +83.150 45 UNITS

82.5

83.1

SURFACE WATER OVERLAND FLOW ROUTES

SCALE @ A1: 1:500
SCALE @ A3: 1:1000

*** NOTE:**
THIS ROUTE APPLIES IN THE UNLIKELY EVENT OF A FULL SCALE BLOCKAGE OR BLOCKAGES IN THE SURFACE WATER DRAINAGE SYSTEM

NOTES

1. THIS DRAWING IS TO BE READ IN CO-JUNCTION WITH ALL ENGINEERS & ARCHITECT'S DRAWINGS.FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED. WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT - 'ASK'.
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.

ISSUE	DATE	DESCRIPTION	DRN.	CHKD
PL4	20.09.21	ISSUED FOR PLANNING	WK	SH / BM
			PR	P.E. / P.D.

DRAWING STAGE
PLANNING

BARRETT MAHONY
Dublin Office:
Sandwith House, 52-54 Lower Sandwith Street, Dublin 2, Ireland.
Tel: (01) 677 3200 Fax: (01) 677 3164
London Office:
12 Mill Street, London SE1 2AY, United Kingdom
Tel: (0044) 20 3750 3530
Consulting Engineers, Civ . Structural . Project Managemnt.E-mail: bmce@bmce.ie Web:: www.bmce.ie

CLIENT
HOMELAND SILVERPINES LTD.

PROJECT TITLE	BM PROJECT No.
SHD AT ST.JOSEPH'S HOUSE AND ADJOINING PROPERTIES	**19.236**

MODEL REFERENCE	MODEL REV.	SUITABILITY

DRAWING TITLE
SURFACE WATER OVERLAND FLOW ROUTES

DRAWING No.	ISSUE
BPR-BMD-00-00-DR-C-1015	**PL4**