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Site Specific Flood Risk Assessment Report

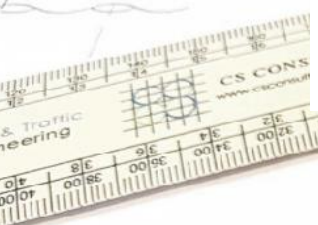
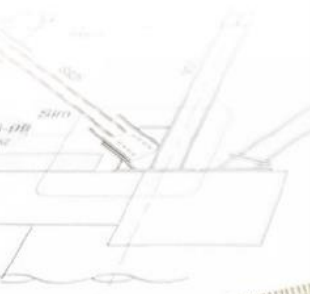
Park West SHD

Park West Avenue and Park West Road, Park West, Dublin 12

Client: Greenseed Limited

Job No. H085

December 2021



SITE SPECIFIC FLOOD RISK ASSESSMENT REPORT

PARK WEST SHD, PARK WEST AVENUE AND PARK WEST ROAD, PARK WEST, DUBLIN 12

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Appendix A: OPW Flood Maps

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File Location: Job-H085\B_Documents\C_Civil\A_CS Reports\SSFRA

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

Job Ref.	Author	Reviewed By	Authorised By	Issue Date	Rev. No.
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H085	AB	NB	OS	16.12.2020	P1

1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by Greenseed Ltd, to prepare a Site Specific Flood Risk Assessment (SSFRA) Report to accompany a planning application for a proposed Strategic Housing Development (SHD) on a site at Park West Avenue and Park West Road, Park West, Dublin 12. This report outlines the findings of the SSFRA carried out for the proposed development.

This SSRA report is to be read in conjunction with the Engineering Services Report and drawings submitted by CS Consulting and relevant additional information submitted by others, as part of the Planning Submission.

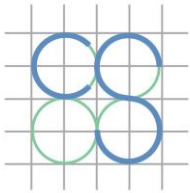
1.1 Scope of This Report

This report outlines the findings of the SSFRA carried out for the proposed residential development, and takes cognisance of the following relevant guidelines and policies:

- Department of the Environment Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) Guidelines for Planning November 2009 on '*The Planning system and Flood Risk Management Guidelines for Planning Authorities*'.
- The Planning and Development Act 2000.

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

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



The OPW and DEHLG's publication also outline a Sequential Approach for determining whether a particular development is appropriate for a specified location in terms of flood risk. The categorisation of the subject site in terms of the OPW and DEHLG's sequential approach is further outlined in Section 4.1 of this report.

2.0 SITE LOCATION

The proposed development is located 500m east of the Motorway M50, between junction 7 and 9. The site is bounded to the north by a railway line, to the east by an industrial estate and O'Casey Avenue, to the south by Park West Road and to the West by Park West Avenue.

The site has a total area of approximately 9.4ha and is in the administrative jurisdiction of Dublin City Council (DCC).

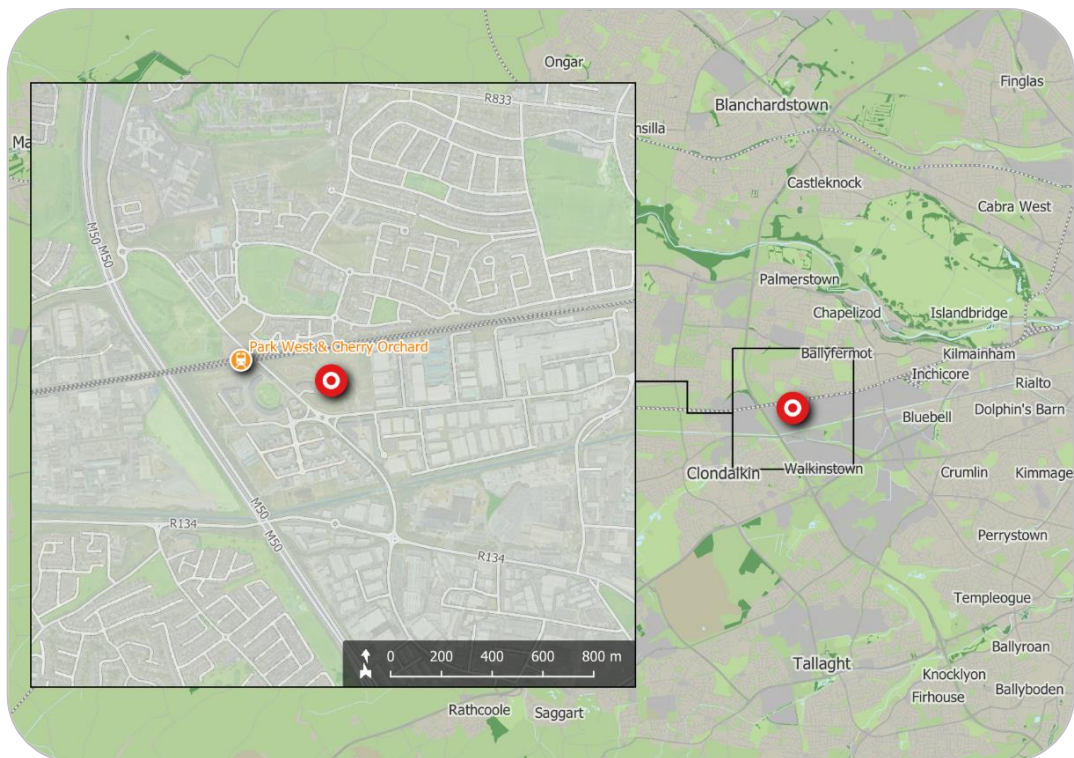


Figure 1 – Location of proposed development site
(map data and imagery: EPA, OSi, OSM Contributors, Google)

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

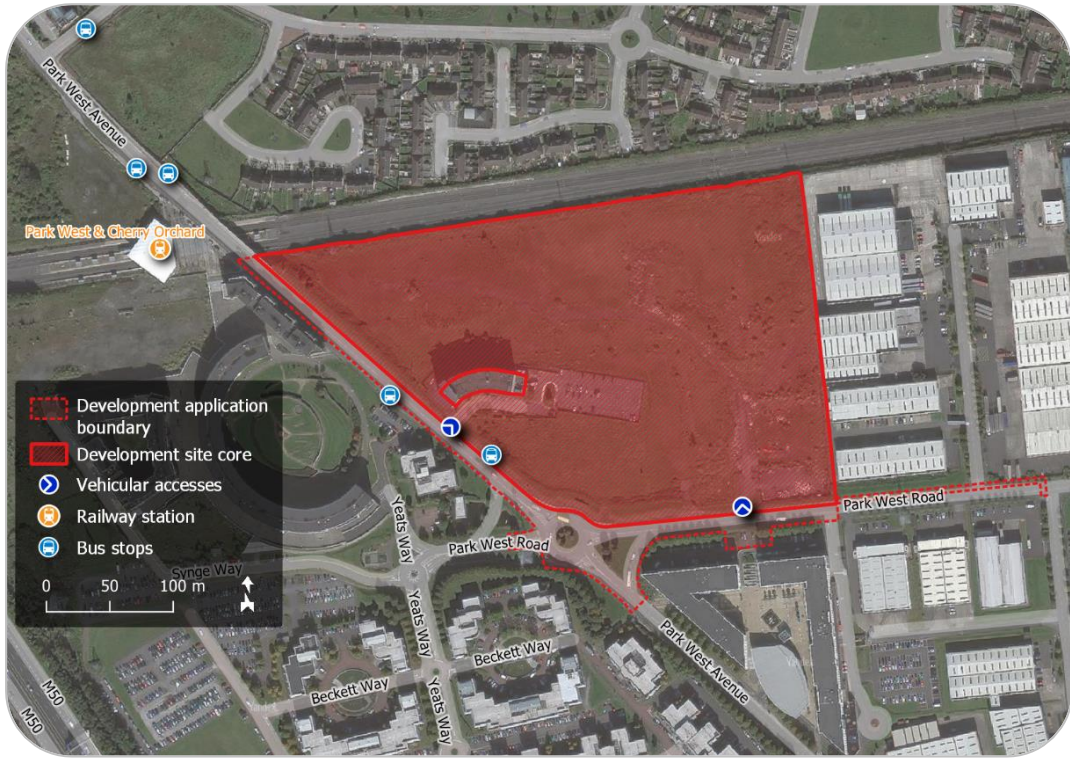
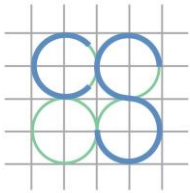


Figure 2 – Site extents
(map data and imagery: NTA, OSi, OSM Contributors, Yandex)

3.0 STAGE 1 – FLOOD RISK IDENTIFICATION

Stage 1 identifies whether there are any flooding or surface water management issues at the subject site location. It also identifies whether a flood risk assessment is required. This involves review of desk study information available as outlined in the following headings.

Table 1 Summary of possible sources of flood water and Risks at the site

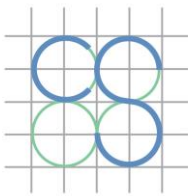
Source	Pathway	Receptor	Likelihood	Consequence	Risk
Tidal Note	Overtop Breach	Property	Very remote	High	Low
Fluvial Note	Overtop Breach	Property	Very Remote	High	Low
Groundwater	Rising groundwater levels	Property	Very remote	Medium	Low
Pluvial Surface water	Overflow / Blockage	Property	Possible	Medium	Medium

3.1 Historical Flooding

A review of the OPW Historical Flood Maps online was carried out and indicates a past flooding event reported in the vicinity of the subject site.

The flooding event was in October 2011 and the source of flooding was the Camac River. The river flooded adjacent Business Centre on the New Nangor Road, approximately 700m south of the subject site location. Data collected from the OPW website confirms a flood depth equivalent to 100mm was recorded at the Business Centre car park.

A second site was also flooded during the same flood event. The site at Yellow Meadow Apartments off Nangor Road, approximately 800m south west of the subject site location, flooded. Data collected from the OPW website confirms a flood depth equivalent to 300mm was recorded in basements of the apartment blocks.



There are no records of past flooding at the subject site location in recent history.

Based on available and recorded information as outlined above, the subject site is considered not to have been subject to flooding in recent history.

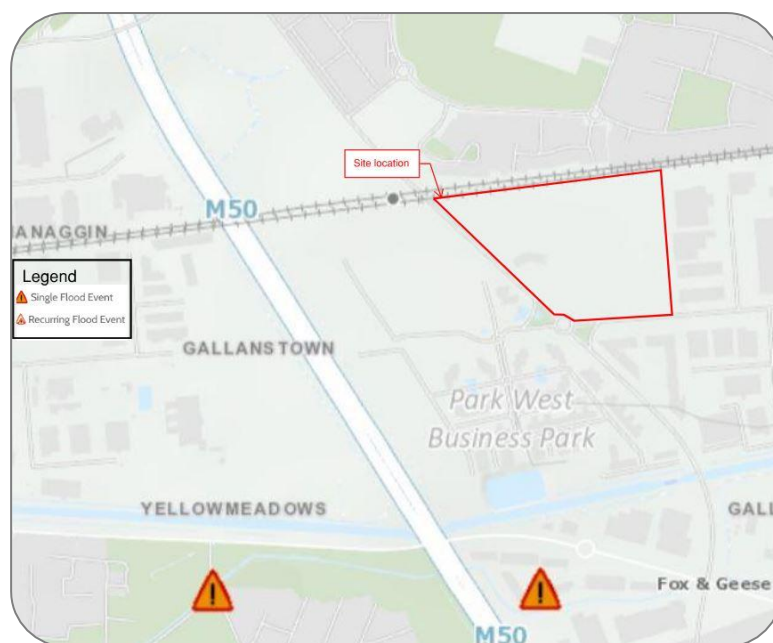


Figure 3 - Recorded Past Flood Events (Source: OPW – www.floodinfo.ie)

3.2 Coastal Flooding

Coastal flooding occurs when sea levels along the coast or in estuaries exceed neighbouring land levels or overcome coastal defences where these exist. A review of the River Liffey Tidal Flood Extents Mapping was carried out and indicates no coastal flooding at the subject site for the following flood event probabilities:

- 10% Tidal AEP (Annual Exceedance Probabilities) or 1 in 10 year return period.
- 0.5% Tidal AEP or 1 in 200 year return period.

- 0.1% Tidal AEP or 1 in 1000 year return period.

The OPW tidal flood extents map near the subject site area is included in **Appendix A** for further information. The nearest flood location to the site based on the River Liffey Tidal Flood Extents map is approximately 3.95km north east of the site and therefore has no bearing on the development site (See Figure 4 below).

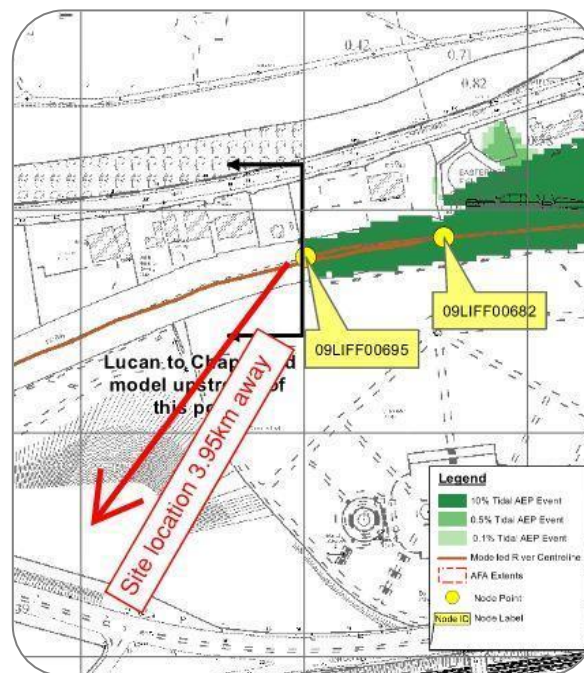


Figure 4 - River Liffey Tidal Flood Extents (Source: OPW Eastern CFRAM Study)

3.3 Fluvial Flooding

Fluvial flooding occurs when rivers and streams break their banks and water flows out onto the adjacent low-lying areas. The Camac River runs south of the subject site location, approximately 700m away. The Camac River has a history of flooding. DCC and the OPW are working on flood relief measures to alleviate this risk.

Notwithstanding the above, a review of the Camac River Fluvial Flood Extents Mapping was carried out and indicates no fluvial flooding at the subject site for the following flood event probabilities (See Figure 5 below for extract of Camac River Fluvial Flood Extents Map):

- 10% Fluvial AEP or 1 in 10 year return period.
- 0.5% Fluvial AEP or 1 in 200 year return period.
- 0.1% Fluvial AEP or 1 in 1000 year return period.

Therefore, the risk of fluvial flooding is considered low as the subject site lies outside the 0.1% AEP. The OPW fluvial flood extents map near the subject site area is included in **Appendix A** for further information.

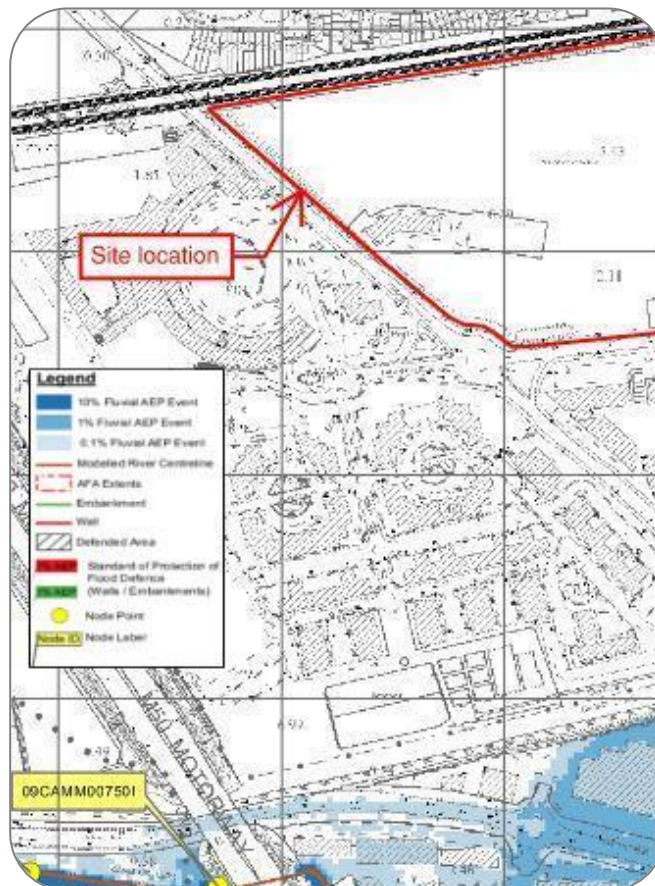


Figure 5 - Camac River Fluvial Flood Extents
(Source: OPW Eastern CFRAM Study)

Other surface water bodies in the vicinity are the Grand Canal located approximately 500m south of the subject site. The Grand Canal flows in an easterly direction and into the River Liffey. The Grand Canal is a manmade waterway channel and water levels in the canal is regulated via series of locks. Therefore, the risk of flooding may arise when locks malfunction or from vandalism. However, in such event, the canal shall drain towards the River Liffey and away from the subject site. Therefore, the risk of flooding from the Grand Canal is considered low.

3.4 Groundwater Flooding

Groundwater flooding occurs when the level of water stored in the ground rises as a result of prolonged rainfall, to meet the ground surface and flows out over. Site investigations including ground water monitoring shall be commissioned to provide information on the water table at the site location.

A desk study of planning applications in the vicinity was carried out and it indicates ground water at a metre below ground levels. This information shall be checked and validated when we obtain the results from the ground water monitoring investigation.

A review of the groundwater vulnerability data from the Geological Survey Ireland (GSI) website was also carried out and the model indicates high vulnerability. The map identifies how susceptible areas are to groundwater contamination by human activities. Infiltration tests shall be carried out on site to determine subsoil permeability. Measures shall be taken to prevent groundwater pollution.

Therefore, the risk of flooding due to ground water ingress to the proposed development is under review.



Figure 6 - Groundwater Vulnerability
(Source: GSI Data Viewer Map)

3.5 Pluvial Flooding

Pluvial flooding occurs when the amount of rainfall exceeds the capacity of urban surface water drainage systems or the ground to absorb it. A review of the available literature including the DCC Flood Resilience City (FRC) project was carried out and indicates risk of pluvial flooding at the subject site. Note, these maps are 'predictive' flood maps showing areas predicted to be inundated during a theoretical or 'design' flood event. It is an estimated probability of occurrence, rather than information for actual floods that have occurred in the past, which is presented on 'historic' flood maps, see Section 3.1.

Based on the pluvial flood extent map, the subject is site is at risk of flooding for the 1% AEP or the 1 in 100 year return period, 3 hour duration.

Notwithstanding the above, surface water runoff from the proposed development, internal access shall be attenuated prior to discharge into the receiving system. Discharge rates shall be restricted to DCC Drainage Division's requirements. The proposed SuDS measures shall reduce the risk of flooding downstream of the subject site, by restricting peak runoff rate and reducing the volume of runoff leaving the site. The proposed surface system shall be designed to cater for the 1 in 100 year plus 20% for climate change, in line with DCC Drainage Division guidelines.

Therefore, the risk of pluvial flooding is considered low due to the proposed resilient measures in place.

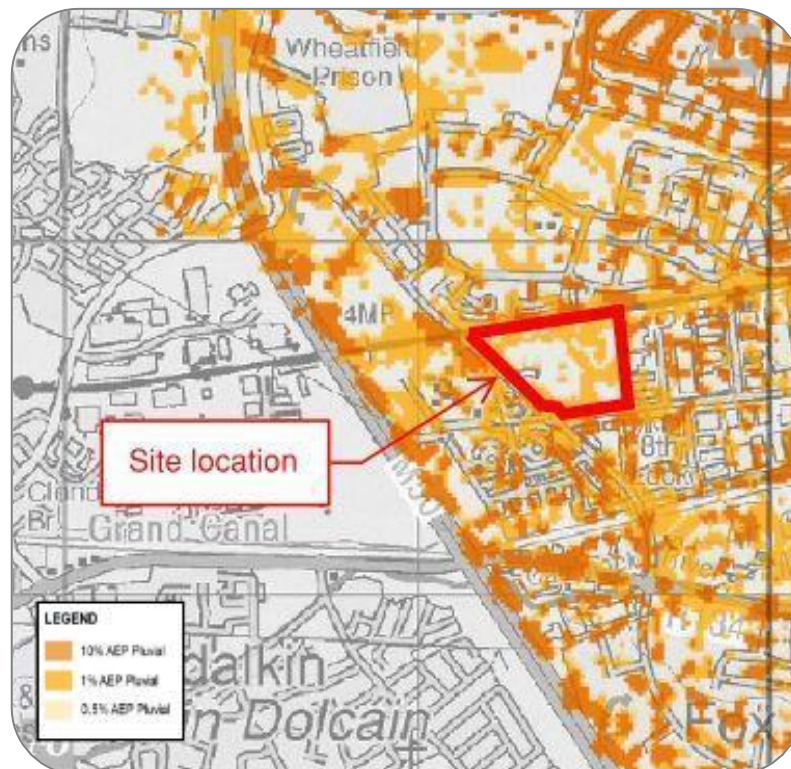


Figure 7 – 3-hour Rainfall Flood Extent Map
(Source: OPW- Dublin Pluvial Study)



3.6 Climate Change

All new developments are required to take climate change into consideration when assessing the flood risk of a site. When designing for extreme rainfall events an allowance of 20% additional flow should be taken. The system is designed for storms up to and including the 1 in 100 year storm and 20% extra for climate change. Hence the development can be considered to be climate change resilient. Refer to the Engineering Services report for further details on hydraulic analysis for the proposed development.

4.0 STAGE 2 – INITIAL FLOOD RISK ASSESSMENT

The purpose of an initial flood risk assessment is to examine flood risk issues highlighted as part of Stage 1 Flood Risk Identification.

Based on available recorded information as outlined in Stage 1, the site is considered not been subject to flooding in recent history.

The risk of tidal flooding is considered low as the subject site lies outside the 0.1% AEP.

The risk of fluvial flooding is considered low due the site located outside the 0.1% AEP fluvial.

The risk of flooding due to ground water ingress to the proposed development is under review.

The risk of pluvial flooding is considered low, due to proposed measures for the development.

4.1 Sequential Approach

The sequential approach used in this assessment follows the guidelines from The Planning System and Flood Risk Management Guidelines for Planning Authorities, 2009, see Figure 8 for a graphical representation.

As outlined in the OPW and DEHLG publication, new developments are divided into three categories which are as follows:

- Highly Vulnerable Development (i.e. power stations, residential)
- Less Vulnerable Development (i.e. retail, leisure)
- Water-compatible Development (i.e. car parking, recreational space)

The proposed residential development comes under the heading of Highly Vulnerable Development.

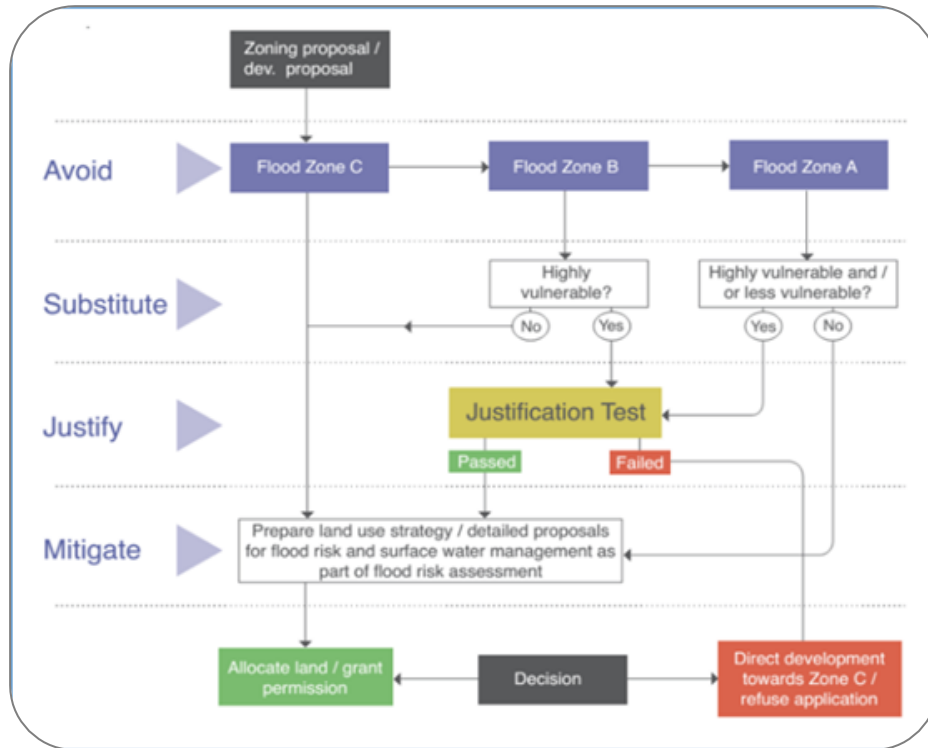
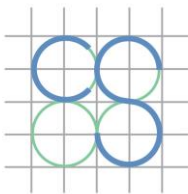


Figure 8 Sequential Approach

(Source: Guidelines for Planning Authorities, 2009)

Geographical areas are similarly divided into three categories, based on their risk of river and tidal flooding. The three categories are as follows:

- 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).
- 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 i.e. all areas which are not within zone A or B).

Based on the flood risk identification in Stage 1, the proposed development falls in Flood Zone C. Hence, the proposed development is deemed 'Appropriate' in accordance with the guidelines of the OPW's publication.

Therefore, no 'Justification Test' and / or Stage 3 Detailed Flood Risk Assessment is required. The sequential approach shown in Figure 8 recommends mitigation measures for residual risks.

Table 2 Matrix of vulnerability versus flood zone (Source: Guidelines for Planning Authorities, 2009)

	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



5.0 RESIDUAL FLOOD RISK MANAGEMENT

During extreme rainfall events and where the proposed drainage system is blocked, due to lack of maintenance, there is a chance that localised ponding shall occur. However, as internal finished floor levels are set at a minimum of 150mm above highest external surface levels in the vicinity, any runoff or ponding shall be retained on the access road and footpaths. This measure during the unlikely event is considered appropriate for the nature of the development.

6.0 CONCLUSION

This report outlines the findings of the SSFRA carried out for the proposed mixed use development at Park West Avenue & Park West Road, Park West, Dublin 12. This SSFRA was carried out in accordance with the DEHLG guidelines for Planning 2009 and The Planning and Development Act 2000.

Based on available recorded information as outlined in Stage 1, the site is considered not been subject to flooding in recent history.

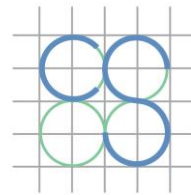
The risk of tidal flooding is considered low as the subject site lies outside the 0.1% AEP.

The risk of fluvial flooding is considered low due the site located outside the 0.1% AEP fluvial.

The risk of flooding due to ground water ingress to the proposed development is under review.

The risk of pluvial flooding is considered low, due to proposed measures for the development.

Based on the flood risk identification in Stage 1, the proposed development falls in Flood Zone C. Hence, the proposed development is deemed 'Appropriate' in accordance with the guidelines of the OPW's publication.

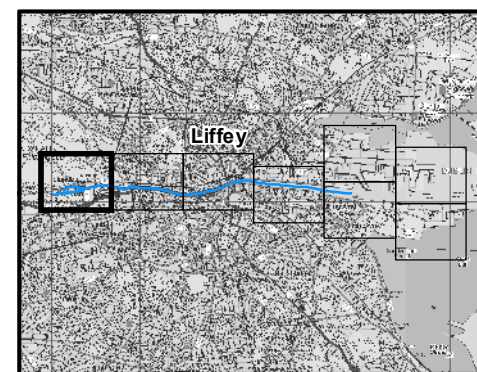


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Appendix A

OPW Flood Maps

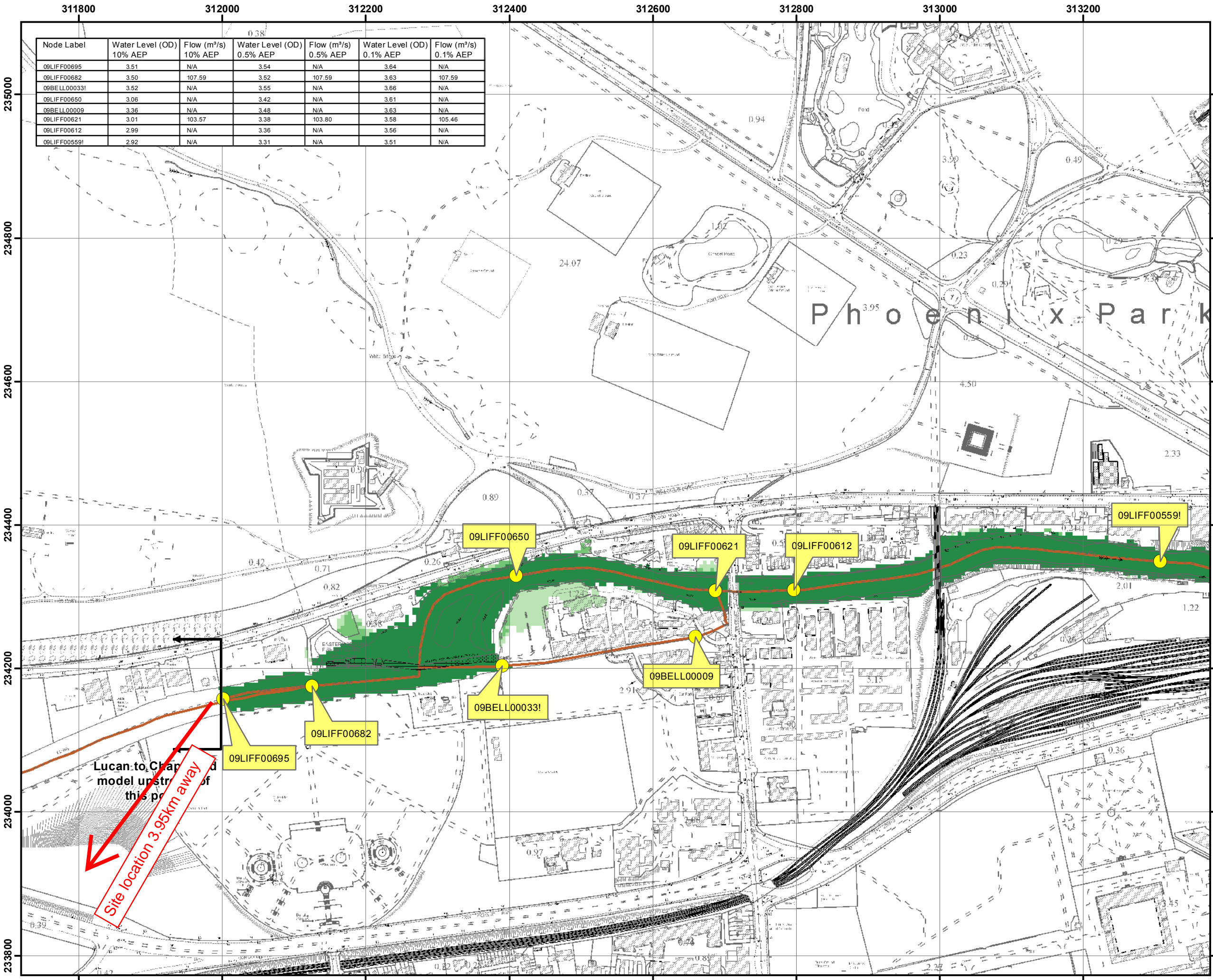
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09BELL00033!	3.52	N/A	3.55	N/A	3.66	N/A		
09LIFF00650	3.06	N/A	3.42	N/A	3.61	N/A		
09BELL00009	3.36	N/A	3.48	N/A	3.63	N/A		
09LIFF00621	3.01	103.57	3.38	103.80	3.58	105.46		
09LIFF00612	2.99	N/A	3.36	N/A	3.56	N/A		
09LIFF00559!	2.92	N/A	3.31	N/A	3.51	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% Tidal AEP Event
- 0.5% Tidal AEP Event
- 0.1% Tidal AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label



Lucan to Chap model upstream of this point
Site location 3.95km away

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extents.	05/12/16



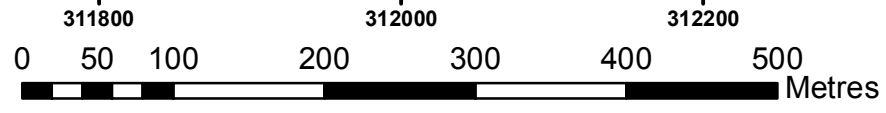
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Jonathan Swift Street
Trim
Co Meath

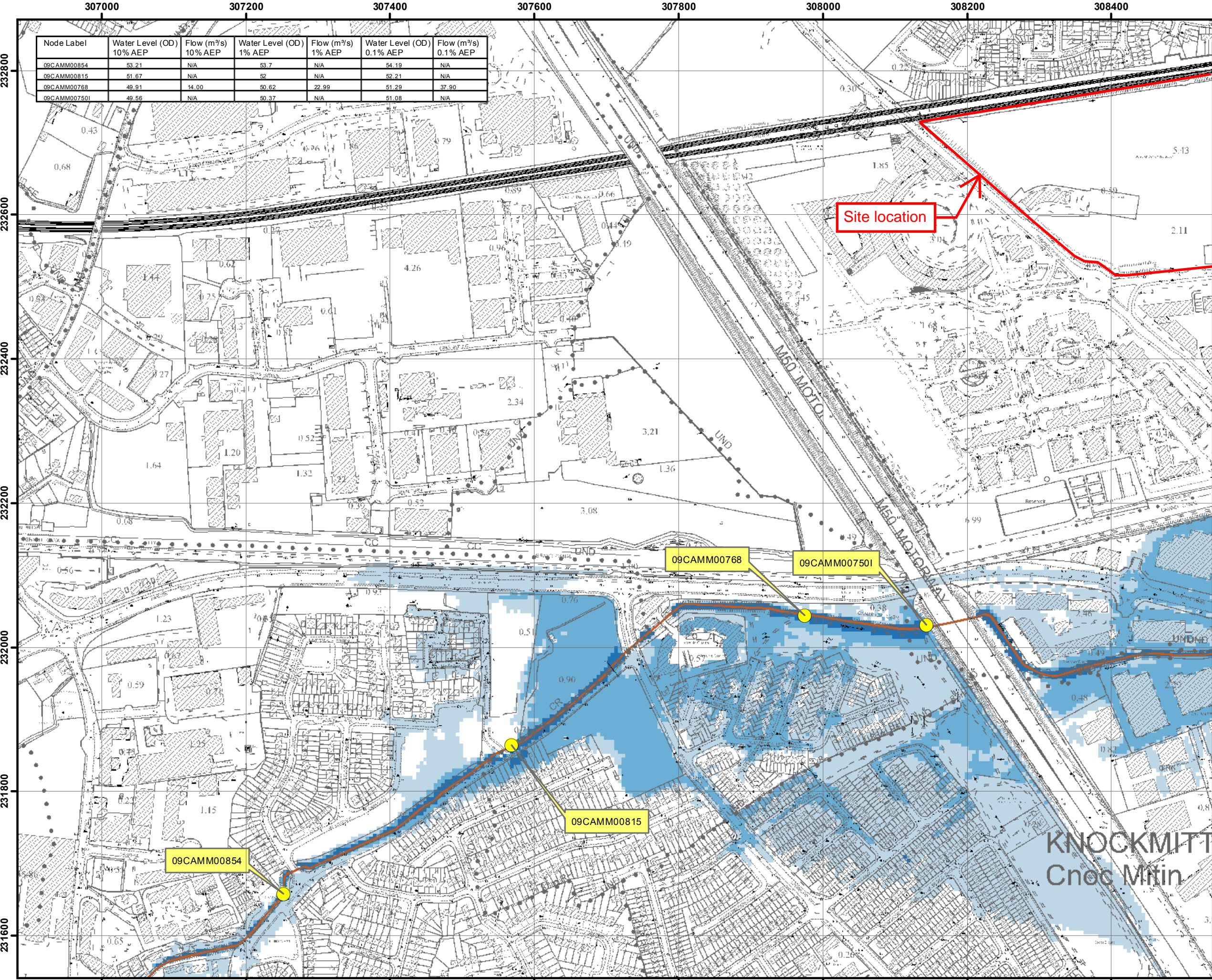
Elmwood House
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W www.rpsgroup.com
E ireland@rpsgroup.com

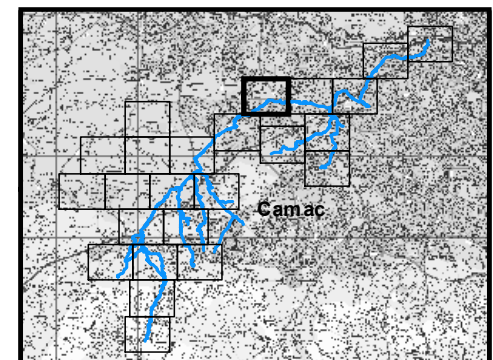
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Scenario:	CURRENT
Drawn By:	C.C. Date : 9 May 2017
Checked By:	A.S. Date : 9 May 2017
Approved By:	S.P. Date : 9 May 2017

Drawing No :
E09LIF_EXCCD_F1_01
Map Series : Page 1 of 8
Drawing Scale : 1:5,000 @ A3





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
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09Camm00815	51.67	N/A	52	N/A	52.21	N/A
09Camm00768	49.91	14.00	50.62	22.99	51.29	37.90
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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 (Walls / Embankments)
 - 0.1% AEP Standard of Protection of Flood Defence (Walls / Embankments)
 - Node Point
 - Node ID Node Label

FINAL

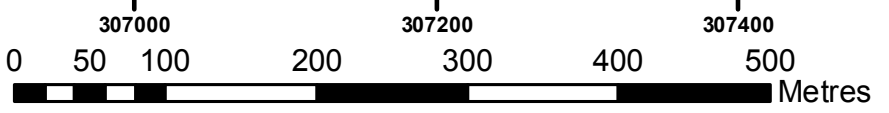
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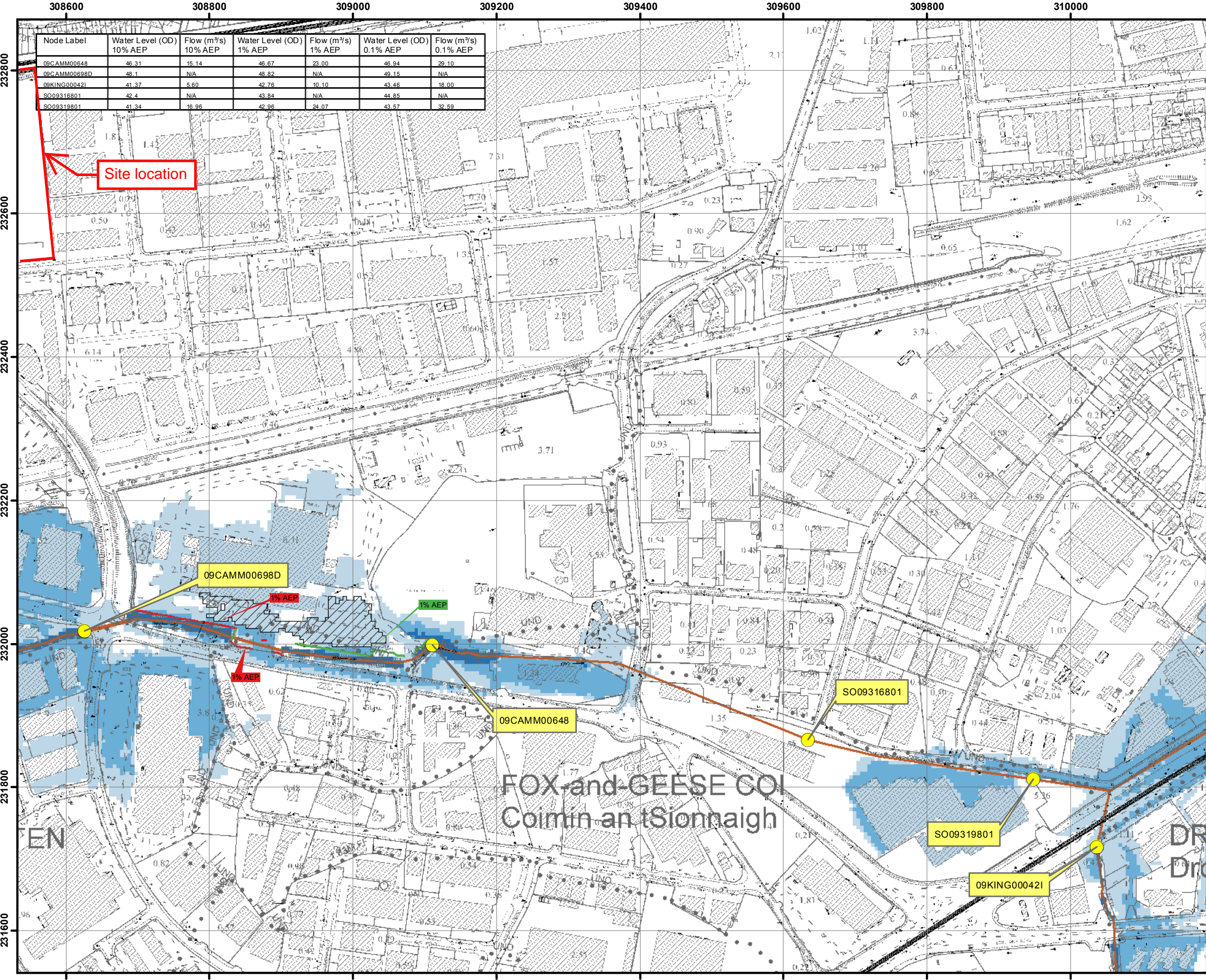


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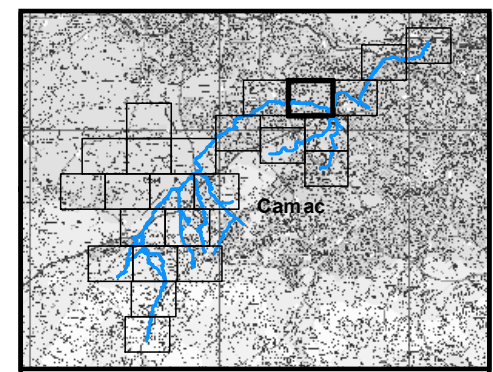
Elmwood House
74 Boucher Road
Belfast
BT12 6RZ
E ireland@rpsgroup.com

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Scenario: CURRENT	
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Checked By: A.S.	Date: 13 November 2017
Approved By: S.P.	Date: 13 November 2017
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Map Series: Page 17 of 24	
Drawing Scale: 1:5,000 @A3	





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
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09Camm00698D	48.1	N/A	48.82	N/A	49.15	N/A
09King000421	41.37	5.60	42.76	10.10	43.46	18.00
SO09316801	42.4	N/A	43.84	N/A	44.85	N/A
SO09319801	41.34	16.96	42.96	24.07	43.57	32.59



IMPORTANT USER NOTE:
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- 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 (Walls / Embankments)
 - 0.1% AEP Standard of Protection of Flood Defence (Walls / Embankments)
 - Node Point
 - Node ID Node Label

FINAL

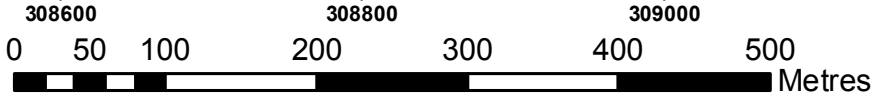
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Elmwood House
74 Boucher Road
Belfast
BT12 6RZ
Eireland@rpsgroup.com

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
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Map Series: Page 18 of 24	
Drawing Scale: 1:5,000 @A3	



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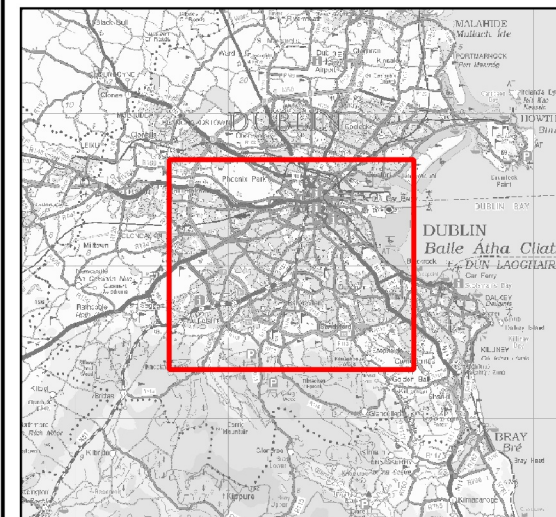
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


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Location Plan:



LEGEND

-  10% AEP Pluvial
-  1% AEP Pluvial
-  0.5% AEP Pluvial

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Jonathan Swift Street
Trim
Co. Meath



Dublin City Council
Civic Offices
Wood Quay
Dublin 8

Project:
DUBLIN PLUVIAL STUDY (FloodResilienCity)

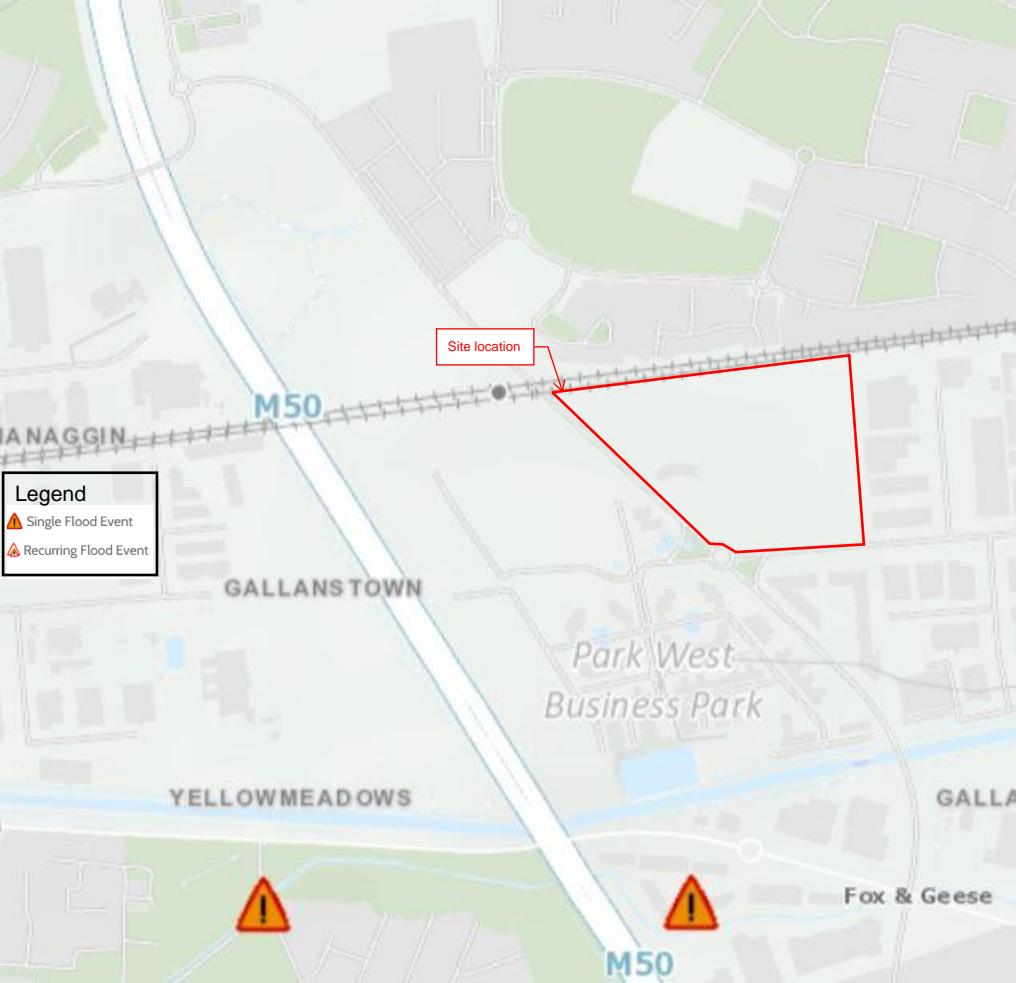
Map: **DUBLIN CITY - PLUVIAL FLOOD EXTENT MAP**

Map Type:	EXTENT - 180min Rainfall
Source:	PLUVIAL
Map Area:	URBAN
Scenario:	CURRENT

Drawn by:	IH	Date:	Aug - 2016
Checked by:	MC	Date:	Aug - 2016
Approved by:	JM	Date:	Aug - 2016

Map No.:
E09DCC_EXPDC_F0_03

Revision: F0
Map Scale: 1:50,000 Plot Scale: 1:1 @ A3



Site location

M50

GA NAGGIN

Legend

▲ Single Flood Event

▲ Recurring Flood Event

GALLANSTOWN

Park West
Business Park

YELLOWMEADOWS

GALLA

Fox & Geese

M50

