

Project

SHD Development at Cooldown Commons Phase 3

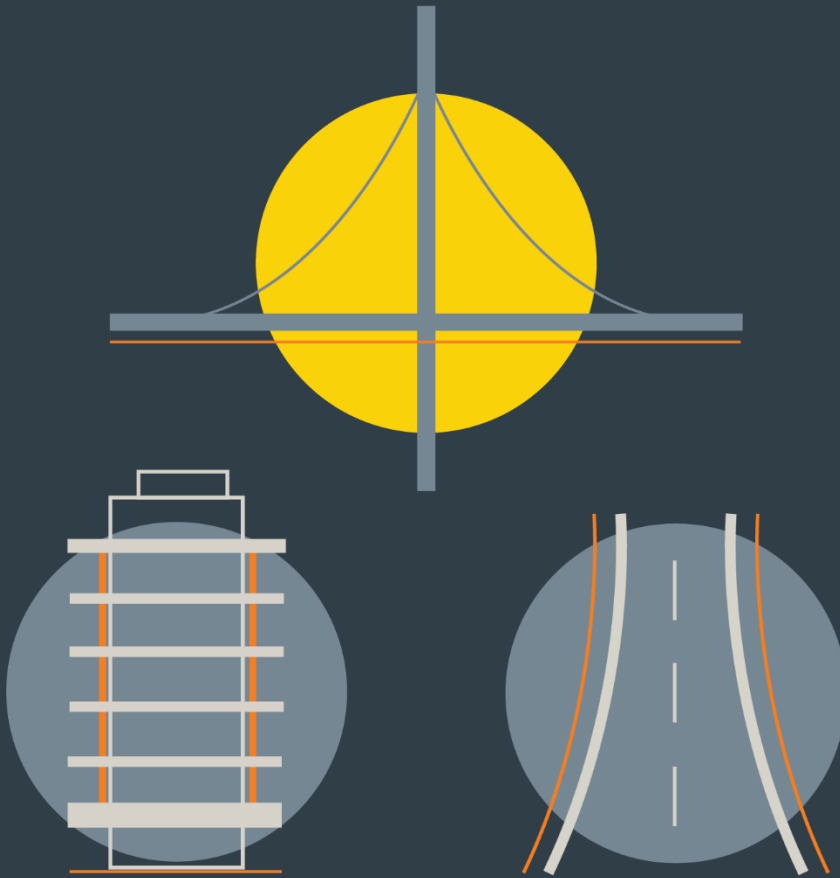
Report Title

Site Specific Flood Risk Assessment Report

Client

Cairn Homes Properties Limited

INFRASTRUCTURE



DBFL CONSULTING ENGINEERS

June 2021

Job Title: SHD Development Cooldown Commons Phase 3

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Author: Aneta Smietana

Approved by: Deirdre Walsh

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DBFL Consulting Engineers

Dublin Office

Ormond House
Ormond Quay
Dublin 7

Tel 01 4004000

Email info@dbfl.ie

Web www.dbfl.ie

Waterford Office

Suite 8b, The Atrium,
Maritana Gate, Canada
Street,
Waterford. X91W028

Tel 051 309500

Email info@dbfl.ie

Web www.dbfl.ie

Cork Office

Phoenix House
Monahan Road
Cork

Tel 021 202 4538

Email info@dbfl.ie

Web www.dbfl.ie

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APPENDIX A – EXTRACT FROM ECFRAM STUDY CAMAC FLUVIAL FLOOD EXTENTS

APPENDIX B – EXTRACT FROM SOUTH DUBLIN COUNTY COUNCIL STRATEGIC FLOOD RISK ASSESMENT 2016-2022

APPENDIX C – OPW FLOODINFO DATA

1.0 INTRODUCTION

1.1 Background

DBFL were commissioned to undertake a Site Specific Flood Risk Assessment (SSFRA), to accompany an SHD planning submission for a proposed residential development of 421 units at Cooldown Commons, Citywest, Dublin 24, refer to Figure 1 below. The subject site comprises circa 3.404ha and is within the jurisdiction of South Dublin County Council. The proposed development comprises phase 3 of a residential development, with Phases 1 & 2 under construction under ABP-302398-18.

1.2 Objectives

The objective of this report is to inform the planning authority regarding flood risk for the proposed residential development. This report assesses the lands and zoning proposals in accordance with the requirements of “*The Planning System and Flood Risk Management Guidelines for Planning Authorities*”. This report clarifies the lands flood zone category and presents information which would facilitate an informed decision of the planning application in the context of flood risk.

1.3 Development Proposals

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, residential amenity space, and open spaces along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description is provided in the statutory notices and in Chapter 3 of the EIAR.

1.4 Site Characteristics

The subject site is situated approximately 1km northwest of Saggart in the Fortunestown area of Citywest. It is bounded to the west and north by Phases 1 & 2 residential development under construction under planning reference ABP-302398-18 and by undeveloped lands with planning permission for a residential development approved under planning reference SD16A/0210. It is bounded to the east by the LUAS red line and undeveloped residentially zoned lands and the N81 and to the south by the LUAS red line and Fortunestown Stop. The N7 Naas Road is approximately 700m north of the site, with junction 3 accessed from the N82. The site falls from south to north. The Baldonnell Upper Stream forms the north eastern boundary of the site.

Refer to Figure 1 below.

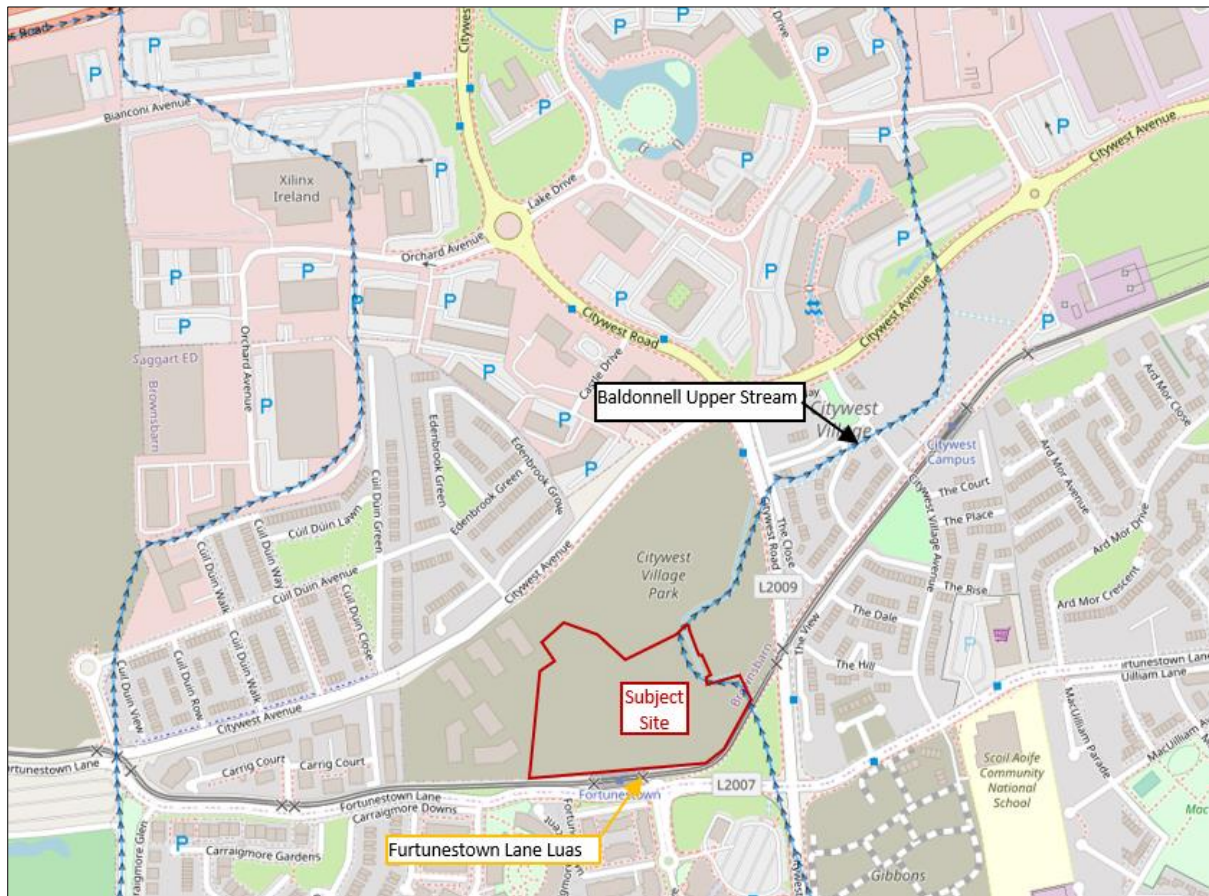


Figure 1 Location of Subject Site (EPA Maps)

1.5 Site Geology

A review of the Geological Survey of Ireland (GSI) maps indicated that the subsoil of the subject site is made up of till (Figure 2) derived from limestone and no karst features located within the site or the immediate area. The associated groundwater vulnerability, which indicates the risk to the underlying waterbody for the site is classified as low for the subject site and surrounding area.

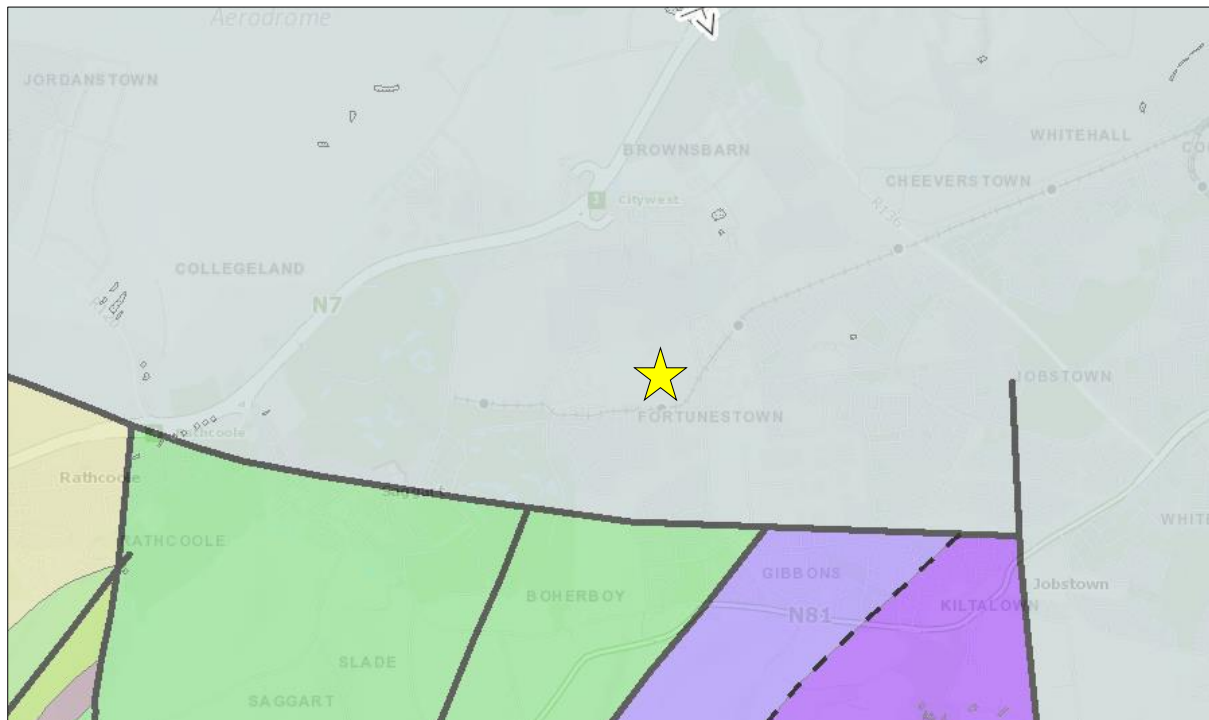


Figure 2 Geological Survey Ireland (GSI Maps)

The associated groundwater vulnerability, which indicates the risk to the underlying waterbody for the site is classified as low (Figure 3).

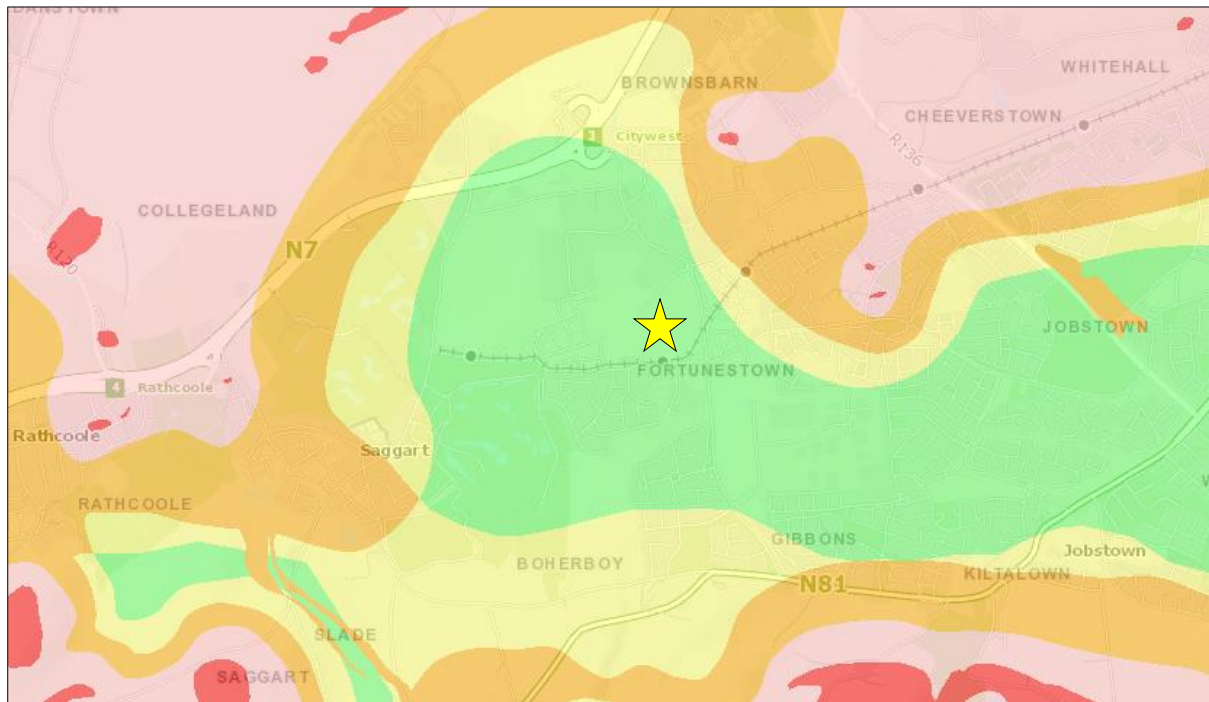


Figure 3 Groundwater Vulnerability Mapping (GSI Maps)

The EPA mapping for aquifers in the area indicates that it is a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones. (Figure 4).

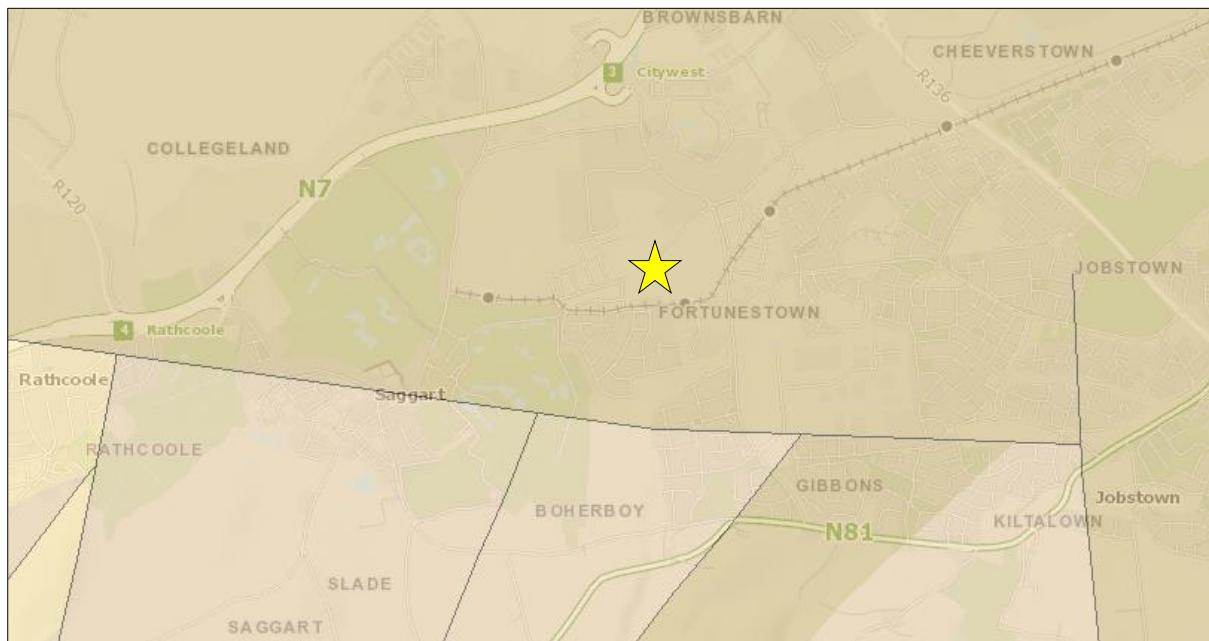


Figure 4 Aquifer Mapping (GSI Maps)

2.0 PLANNING GUIDELINES & FLOOD RISK ASSESSMENT

2.1 The Planning System and Flood Risk Management, Guidelines for Planning Authorities

The FRM Guidelines provide “mechanisms for the incorporation of flood risk identification, assessment and management into the planning process...”. They ensure a consistent approach throughout the country requiring identification of flood risk and flood risk assessment to be key considerations when preparing development plans, local area plans and planned development.

“The core objectives of The FRM Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure the requirements of EU and national law in relation to the natural environment and nature conservation are complied with for flood risk management.”

The FRM Guidelines outlines the key principles that should be adopted by regional and local authorities, developers and their agents as follows

- Avoid the risk, where possible;
- Substitute less vulnerable uses, where avoidance is not possible, and
- Mitigate and manage the risk, where avoidance and substitution are not possible.”

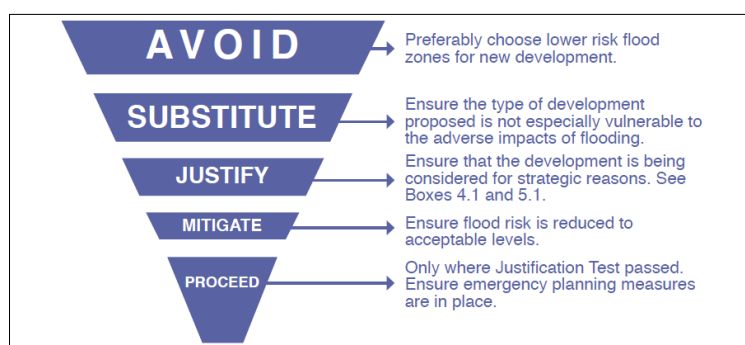


Figure 5 Sequential Approach Principles in Flood Risk Management (Extracted from FRM Guidelines)

The Sequential Approach in the Management of Flood Risk is included in Figure 5. Where the avoid and substitute principles of the sequential approach are not appropriate, then the Guidelines allow

application of a Justification Test to assess the appropriateness or otherwise, of developments under consideration in areas of moderate or high flood risk.

2.2 Flood Risk Appraisal & Assessment

2.2.1 General

The assessment of flood risk requires an understanding of where water comes from (the source), how and where it flows (the pathways) and the people and assets affected by it (the receptors). Refer to Figure 6 below.

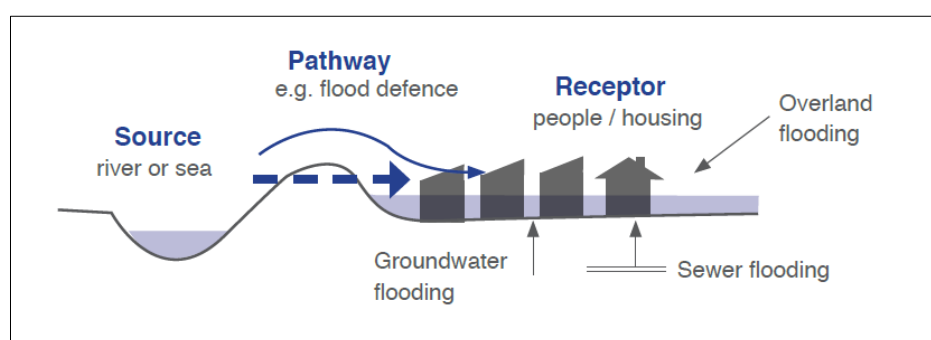


Figure 6 Source-Pathway-Receptor Model (Extracted from FRM Guidelines)

The principal sources are rainfall or higher than normal sea levels. The principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets. The receptors can include people, their property and the environment.

The Guidelines further state that “A staged approach should be adopted, carrying out only such appraisal and or assessment as is needed for the purposes of decision-making at the regional, development and local area plan levels, and also at the site-specific level. 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 related to either the area of regional planning guidelines, development plans and LAP’s or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;

Stage 2 Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or proposed development site, 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. Where hydraulic models

exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and

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.

This SSFRA includes Stages 1, 2 and 3 Flood Risk Appraisal and Assessments related to the planned development.

2.2.2 Flood Zones

The FRM Guidelines use flood zones to determine the likelihood of flooding and for flood risk management within the planning process. The three flood zones levels are:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest 1% AEP (Annual Exceedance Probability) for rivers and 0.5% AEP for coastal;
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1000 and 1% AEP or 1 in 100 for river flooding); and
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas outside zones A and B.

The FRM Guidelines categorises all types of development as either;

- Highly Vulnerable e.g. dwellings, hospitals, fire stations, essential infrastructure,
- Vulnerable e.g. retail, commercial or industrial buildings, local transport infrastructure,
- Water Compatible e.g. flood infrastructure, docks, amenity open space.

2.3 Vulnerability v Flood Zone

The FRM Guidelines states that *“a sequential approach to planning is a key tool in ensuring that development, particularly new development, is first and foremost directed towards land that is at low risk of flooding”*.

The Sequential Approach restricts development types to occur within the flood zone appropriate to their vulnerability class, as outlined below in Table 1. Alternatively, a Justification Test can be completed to justify development in higher risk areas, (refer to Figure 7 below).

	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

Table 1 Matrix of Vulnerability versus Flood Zone to illustrate where development appropriate for flood zone or where justification test required (Extract from FRM Guidelines)

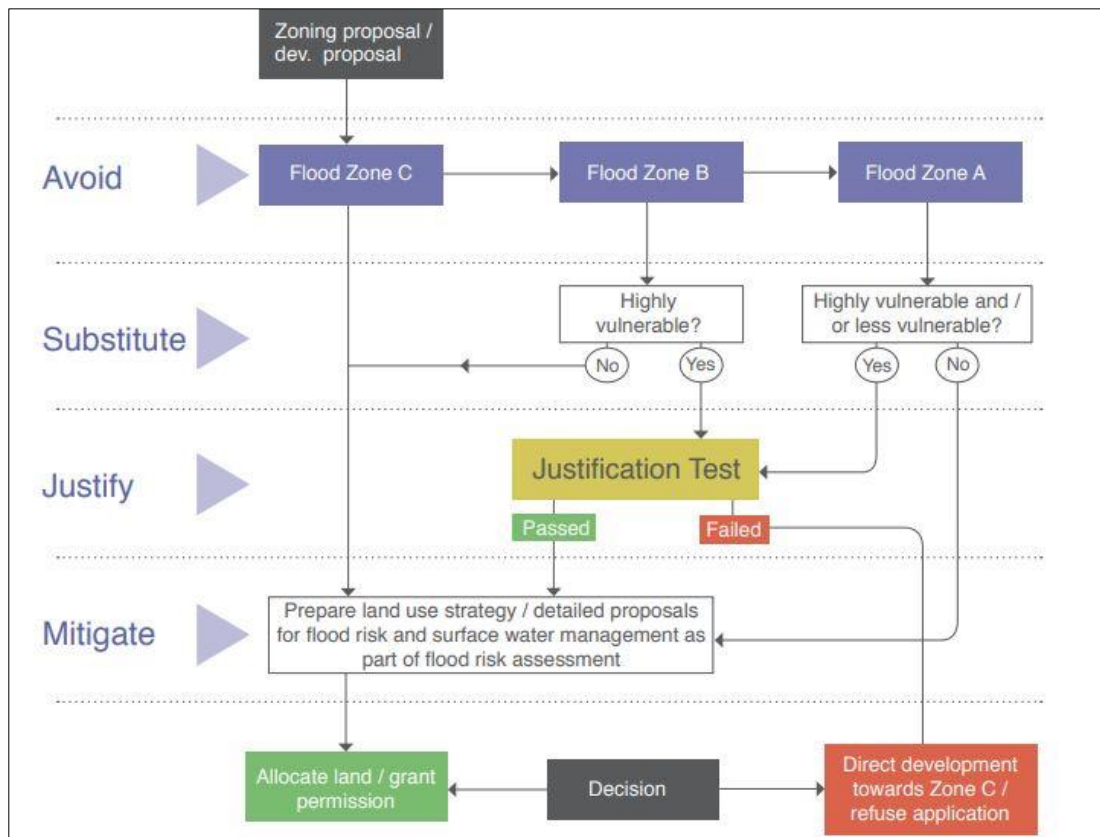


Figure 7 Sequential Approach & Justification Test Mechanism in the Planning Process (FRM Guidelines)

The proposed development is classified as a highly vulnerable development (residential and essential infrastructure) in the Guidelines. This class is appropriate to flood zone 'C'.

3.0 FLOOD RISK IDENTIFICATION

The initial flood risk identification stage uses predictive and historical information to identify and confirm whether there may be flooding or surface water management issues for the site in question which may warrant further investigation. Findings from the flood risk identification stage are outlined below:

3.1 Predictive Flood Data

3.1.1 OPW ECFRAMS Flood Extent Mapping 2017

The OPW's ECFRAM Study assessed fluvial and coastal flood risk. Flood maps indicate that fluvial flooding associated with the River Camac (and tributaries) do not impact the site. Refer to Figure 8 below and to **Appendix A** for further details.

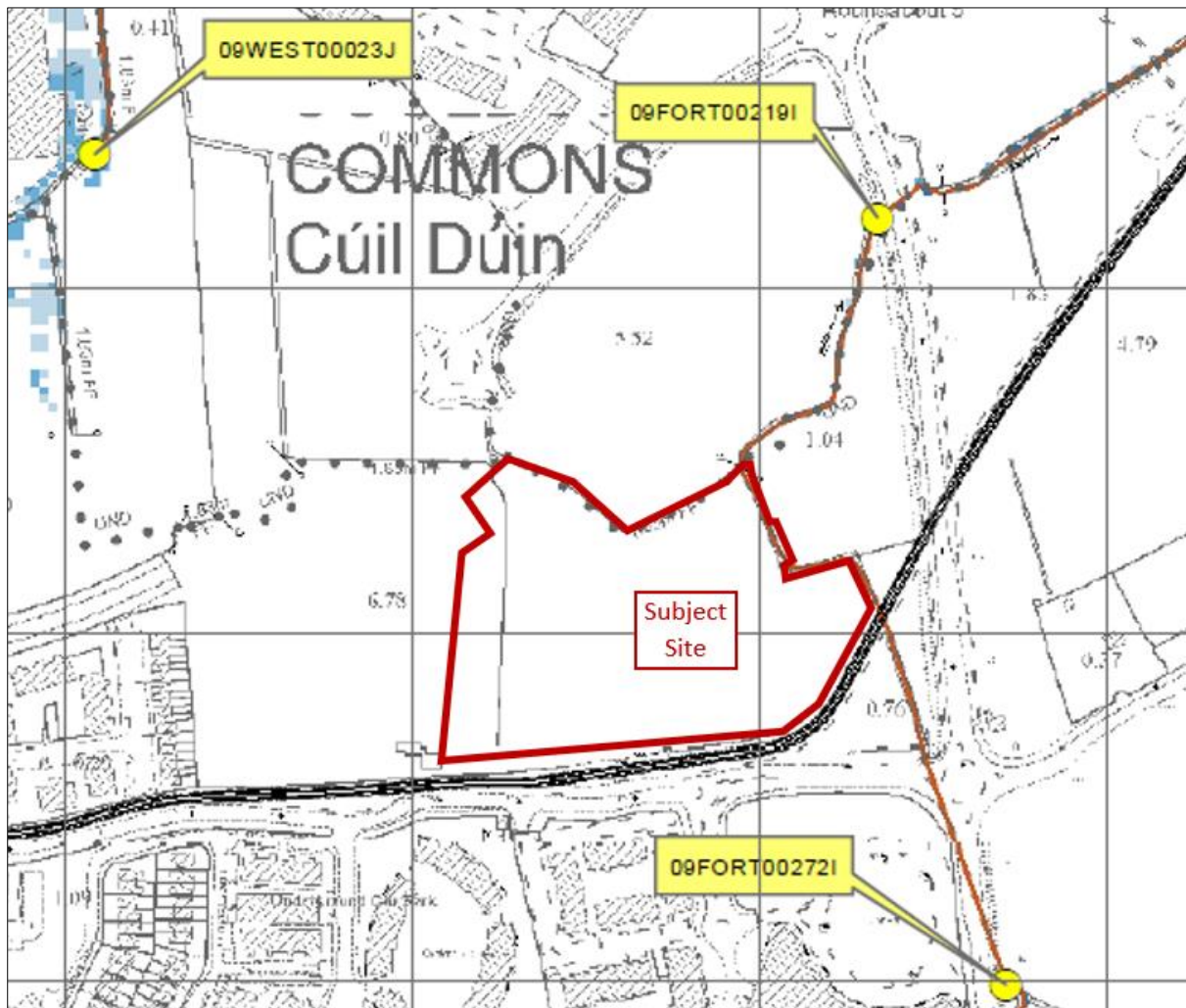


Figure 8: Extract of ECFRAM Study Camac Fluvial Flood Extents

3.1.2 County Development Plan 2016-2022 Strategic Flood Risk Assessment

No flooding identified within the site. Refer to Figure 9 below and to **Appendix B** for further details.

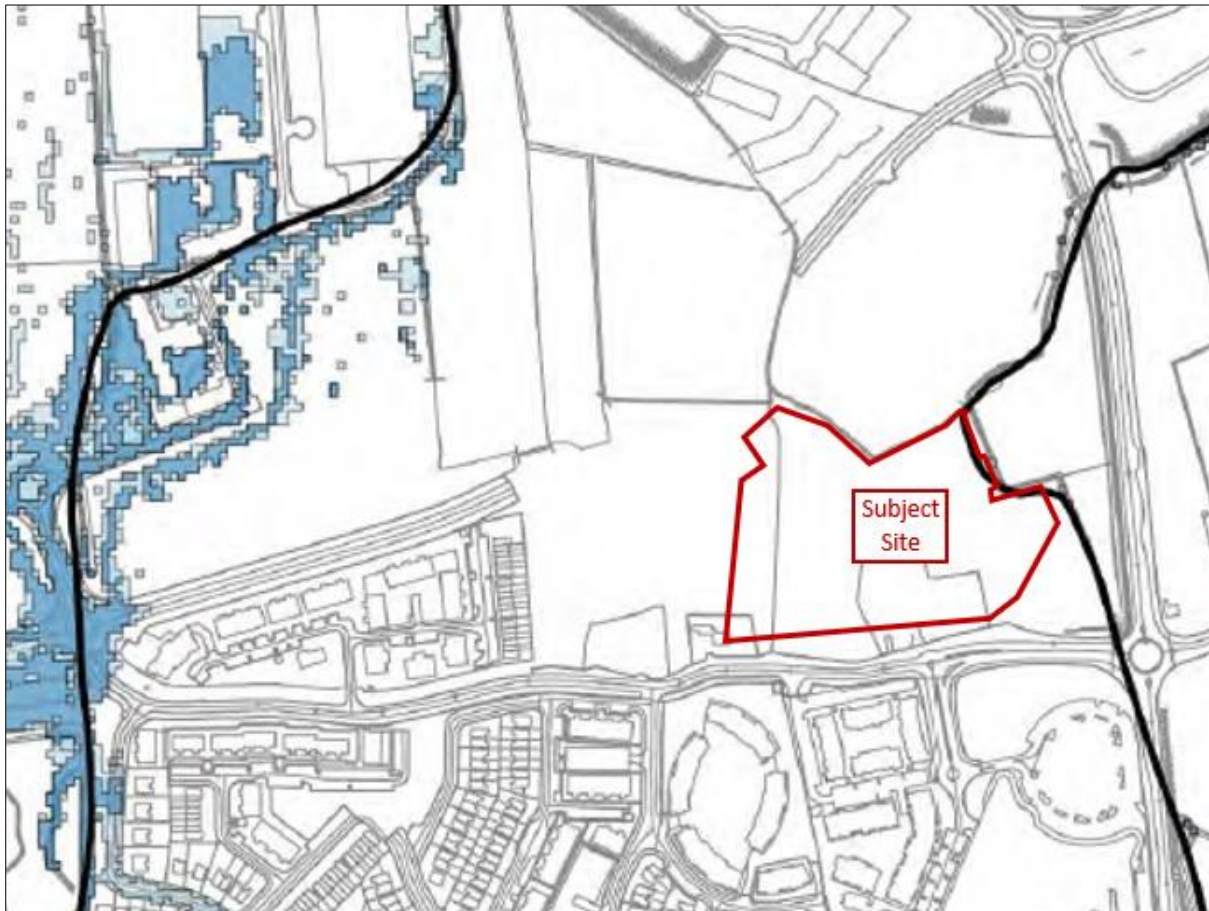


Figure 9: Extract of SDCC SFRA 2016-2022

3.2 Flood History

3.2.1 OPW Historic Flood Records & Benefitting Lands

No records of flooding on the lands. No benefitting lands indicated. Refer to report in **Appendix C**.

3.2.2 Historical and Recorded Flood Events

A search for recorded flood events near the subject site was carried out using the OPW's *floodinfo.ie* website and using a general internet search. The *floodinfo.ie* website provides information on recorded flood events nationwide.

Within the site: None

There is no historical flood event recorded within the site.

In the vicinity of the site:

A single flood event in the vicinity of the site at Fortunestown Lane. Refer to Figure 10 below. This was a single flood event recorded for the 5th / 6th of November 2000, on Fortunestown Lane to the south east of the site. Refer to Figures 10, 11 & 12. The report associated with this event notes serious flooding elsewhere in South Dublin County Council jurisdiction (Lucan) and only notes that Fortunestown Lane was closed for circa 12 hours, but no specific details are provided. There is no further information available for this single event and the location indicated is approximate only. This event is recorded outside of the site does not impact the subject site. Vehicular access to the site is from Citywest Avenue to the north and not from Fortunestown Lane.

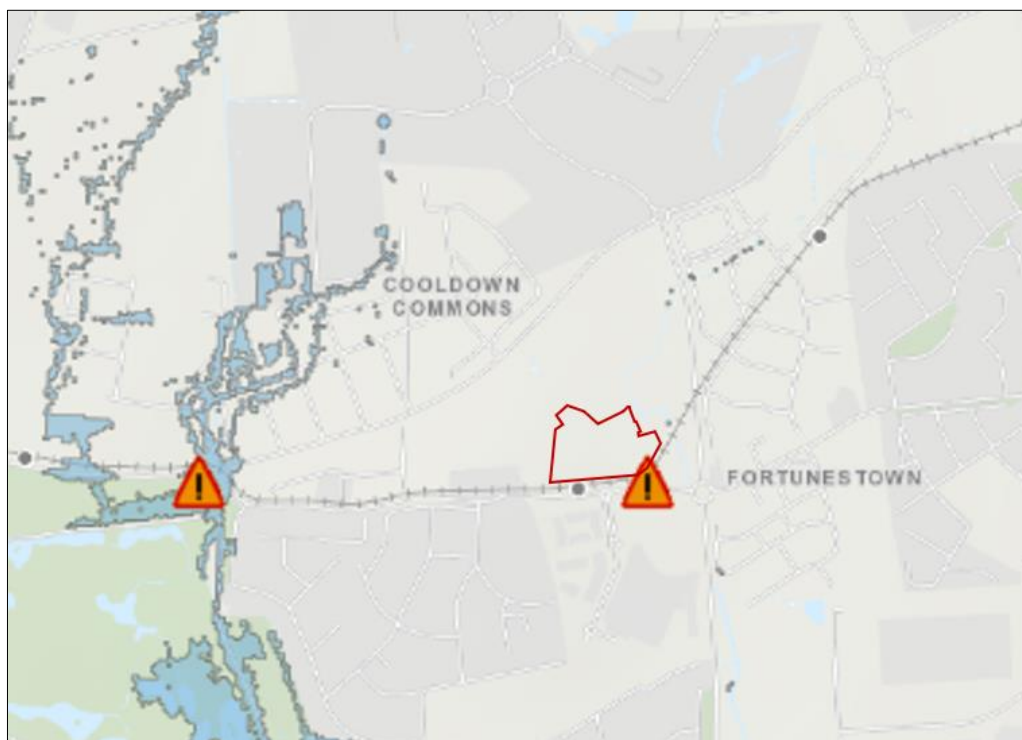


Figure 10: OPW Floodinfo Maps Showing Past Flood Events

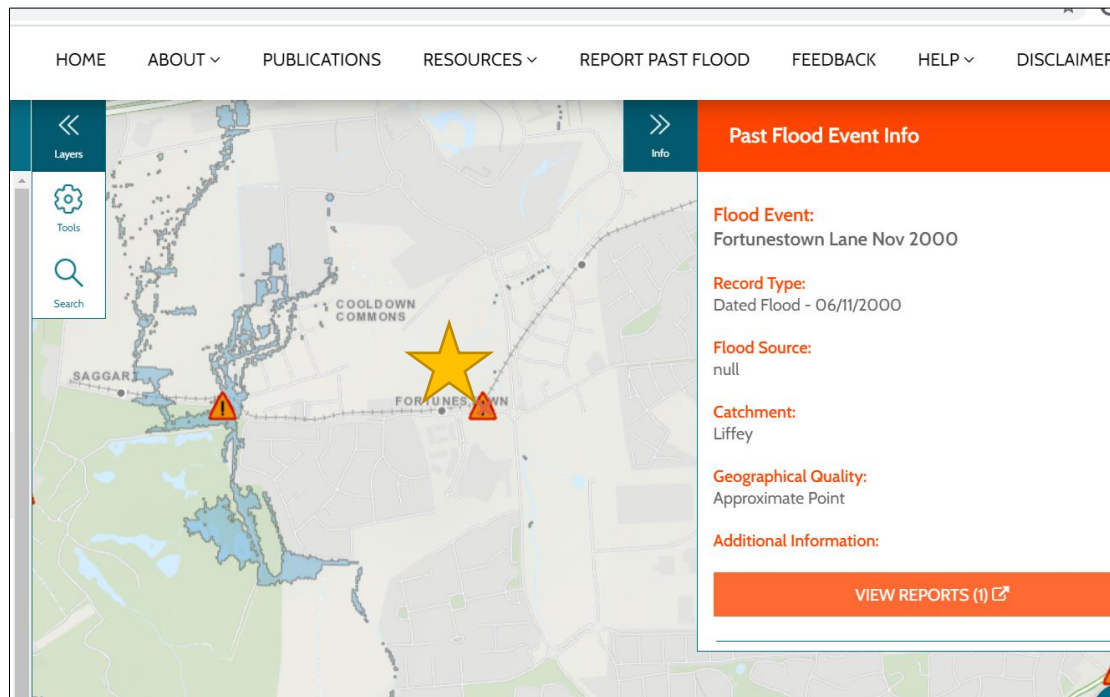


Figure 11: Extract of Floodinfo website showing historical flood event

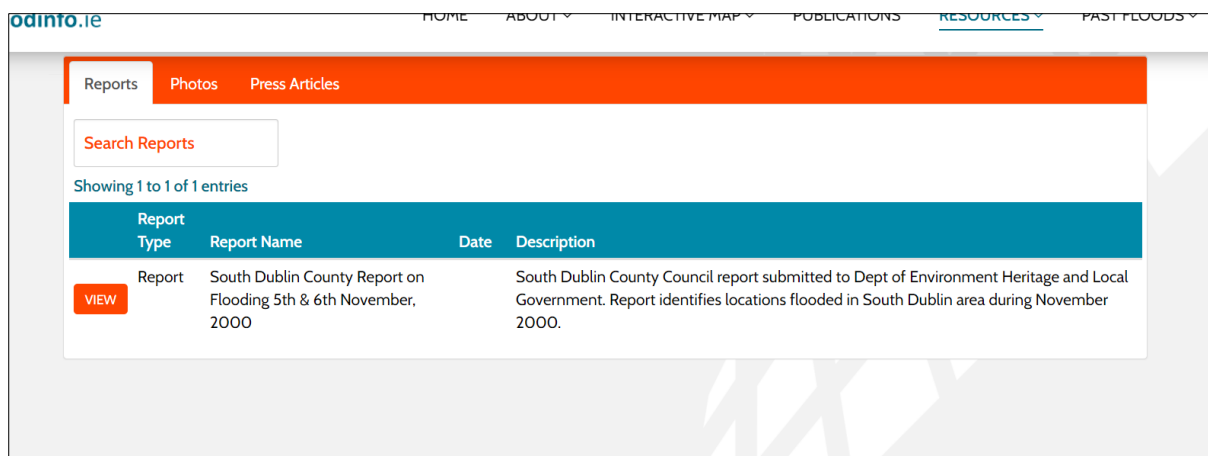


Figure 12: Extract of Floodinfo website showing historical flood event

Flooding is also identified on Fortunestown Lane circa 600m west of the site and does not impact the site. Access to the site can be maintained to the east.

Refer also to **Appendix C** for OPW Floodinfo report.

4.0 INITIAL FLOOD RISK ASSESSMENT

4.1 Sources of Flooding

4.1.1 Fluvial

Available mapping indicates that the site is not at risk of fluvial flooding and the site is within flood zone "C" as defined by the "Guidelines".

4.1.2 Pluvial

Pluvial or surface water flooding is the result of rainfall-generated flows that arise before run-off can enter a watercourse or sewer.

The proposed development may be subject to pluvial flood risk from the developments proposed surface water drainage system. The comprehensive and detailed design of the surface water system, design of road, ground levels, finished floor levels, and SuDs measures will mitigate pluvial flood risk to a site.

4.1.3 Coastal

The site is located approximately 21km west of the coast. Therefore, coastal flooding is not considered a source of flood risk to the site.

4.1.4 Groundwater

The OPW PFRA mapping does not indicate any groundwater flooding at the site or surrounding area. The GSI groundwater vulnerability for the site is classified as low. Furthermore, there are no karst features in the area which would indicate areas at risk of groundwater flooding. There is no known risk of groundwater flooding in this area, therefore groundwater should not be considered as a likely source of flood risk to the site.

4.2 Source-Pathway-Receptor Model

A source-pathway-receptor model has been produced to summarize the possible sources of floodwater, the receptors and the pathways by which floodwater could reach the receptors.

Table 2 Source- Pathway- Receptor- Analysis

Source		Pathway	Receptor	Likelihood	Consequence	Risk
Tidal	T1	Tidal flooding from coast, circa 18km away.	Entire Site	Remote	Medium	Low
Fluvial	F1	From the Baldonnell Upper Stream to the east	Residents (people), dwellings, apartments, vehicles, roads;	Low	Medium	Low
Surface Water Drainage (Pluvial)	P1	Flooding from the surcharging of the development's drainage systems	People and property (of the proposed development)	Possible	Medium	Medium
Groundwater Flooding	G1	Rising GWL on the site	People and property (of the proposed development)	Remote	Medium	Low
Human or Mechanical Error (Pluvial)	H1	New drainage network blocks	People and Property	Possible	Medium	Medium

The above table indicates that there is a moderate risk of pluvial flooding on site from the potential surcharging and blockage of the new drainage network.

4.3 Stage 2 – Initial Flood Risk Assessment

Flood risks identified during Stage 1 – Flood Risk Identification, are outlined in Table 2 (Source Pathway Receptor Analysis) and noted below. These risks are assessed further in this section of the SSFRA.

- Low risk of tidal flooding;

- Low risk of fluvial flooding;

- Medium risk of pluvial flooding (surface water and human / mechanical error) ;

- Low risk of groundwater flooding;

- Medium risk of flooding due to mechanical or human error;

The information sources identified in Section 3 are considered adequate for the purpose of an Initial Flood Risk Assessment for the site and no further technical studies are proposed.

4.3.1 Initial Fluvial Flood Risk Assessment

The Source-Pathway-Receptor model identified a low risk of fluvial flooding.

The Final ECFRAM Camac Fluvial Flood Extents map identifies the extents of the predicated 1% AEP and 0.1% AEP fluvial flood events associated with the Baldonnell Upper Stream which forms the eastern boundary of the site. The maps indicate that there is no fluvial flooding in the vicinity of the site, with no out of bank or out of channel flooding indicated.

The closest modelled node to the site is located on the Baldonnell Upper stream to the north east of the site (Node 09FORT002191), approximately 150m north east of the site.

The location of this node is shown on ECFRAM Drawing E09CAM_EXFCD_F1_07 (Appendix A) and in Figure 13 below.

- Node 09FORT002191, 10% AEP fluvial flood level +107.3mAOD
- Node 09FORT002191, 1% AEP fluvial flood level +107.37mAOD
- Node09FORT002191, 0.1% AEP fluvial flood level +107.47mAOD
- Lowest Proposed FFL +111.970m

The lowest proposed FFL (111.97m) is significantly higher than the predicted flood levels at the above node. The lowest FFL is also 1m above the adjacent top of bank level for the Baldonnell Upper Stream and as noted previously, there is no out of channel flooding associated with the stream.

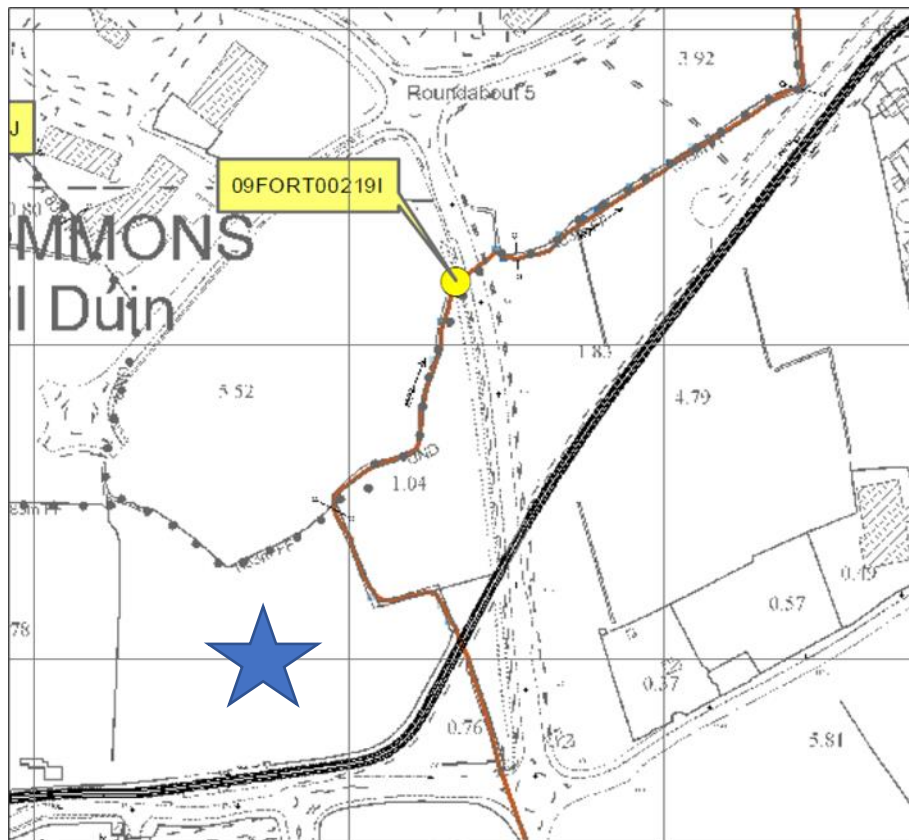


Figure 13 Extract of Final ECFRAMS Camac Fluvial Flood Extents

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
09VERS00167J	111.46	N/A	111.53	N/A	111.64	N/A
09VERS00113	102.63	N/A	102.8	N/A	103.01	N/A
09WEST00023J	107.08	N/A	107.16	N/A	107.42	N/A
09WEST00000I	106.71	0.05	106.91	0.11	107.22	0.23
09FORT00272I	112.87	N/A	112.9	N/A	112.94	N/A
09FORT00219I	107.3	N/A	107.37	N/A	107.47	N/A
09FORT00176X	102.33	N/A	102.36	N/A	102.4	N/A

Figure 14 Extract of Final ECFRAMS Camac Fluvial Flood Extents

4.3.2 Initial Pluvial Flood Risk Assessment

The Source-Pathway-Receptor model identified a medium risk of pluvial flooding relating to the proposed surface water drainage network and human / mechanical error. This risk can be mitigated by

designing the surface water network in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) including attenuation of the 1% AEP storm event and implementation of SuDS methodologies.

Proper operation and maintenance of the drainage system should also be implemented to reduce the risk of human or mechanical error causing pluvial flood risk from blockages, fuel / oil interceptor operation problems etc.

4.3.3 Initial Groundwater Flood Risk Assessment

No groundwater wells, springs or marsh areas are located within the site (based on review of information available on the GSI and OSI websites and a walkover survey of the site).

Therefore, the risk of groundwater flooding occurring at the site is considered negligible.

4.3.4 Initial Tidal Flood Risk Assessment

The site is circa 18km to the east and the site is therefore not at risk of flooding from the coast.

4.3.5 Flood Zone Category

On completion of Stage 2 – Initial Flood Risk Assessment, the site is considered to be located in Flood Zone C as defined by the requirements of “The Planning System and Flood Risk Management, Guidelines for Planning Authorities” and its Technical Appendices. The proposed development is therefore considered appropriate as it is located in a Flood Zone C area.

5.0 MANAGEMENT OF FLOOD RISK AND FLOOD RISK MITIGATION

Flood risk to the proposed development will be managed using different strategies as outlined below.

5.1 Drainage Design

5.1.1 Surface Water Drainage & SuDS

A new surface water drainage system will be constructed to accommodate surface water runoff from the proposed development. The drainage system will be designed in accordance with the recommendations of the GDSDS (Greater Dublin Strategic Drainage Study) and EN752 and will include traditional drainage features and SuDS features, including the attenuation of surface water runoff and storage of runoff from a 1% AEP event.

The surface water drainage network is designed for a 50%AEP (1 in 2-year return period) storm event and is “flood checked” for a 1%AEP (1 in 100-year return period) event, i.e. it is designed to accommodate runoff from a 1%AEP rainfall event under surcharged conditions. The surface water drainage system was modelled using the ‘NETWORK module of ‘Microdrainage’, for a range of storms with return periods of 1 in 30 and 1 in 100 years (1% AEP). For a 1% AEP event, while the surface water drainage system surcharges there is no ‘out of system / pipe’ flooding.

Surface water runoff from the proposed development is managed using both traditional drainage (i.e. a standard gully and pipe-work collection system) and Sustainable Urban Drainage Systems (SuDS) where appropriate.

SuDS features proposed for the development include a swales, tree pits, intensive green roof (podium), extensive green roofs, permeable paving above ground detention basin and underground storage in the form of Stormtech.

5.1.2 Surface Water Attenuation & Storage

Surface water runoff from the development is attenuated to “Greenfield Runoff”, Q_{bar} with runoff exceeding this allowable outflow rate stored on site for up to a 1% AEP (Annual Exceedance Probability). Circa 1,350m³ of storage is provided to accommodate runoff from a 1% AEP event for the subject site.

Surface water storage is provided in 'Stormtech' underground storage units and an above ground detention basin. In accordance with the recommendations of the GSDSDS, a minimum 500mm buffer is provided between the top water level in the storage system and the lowest floor level within the catchment.

To manage surface water runoff from the development, it is proposed to separate the development into two surface water catchments ("A" & "B") corresponding to each surface water outfall.

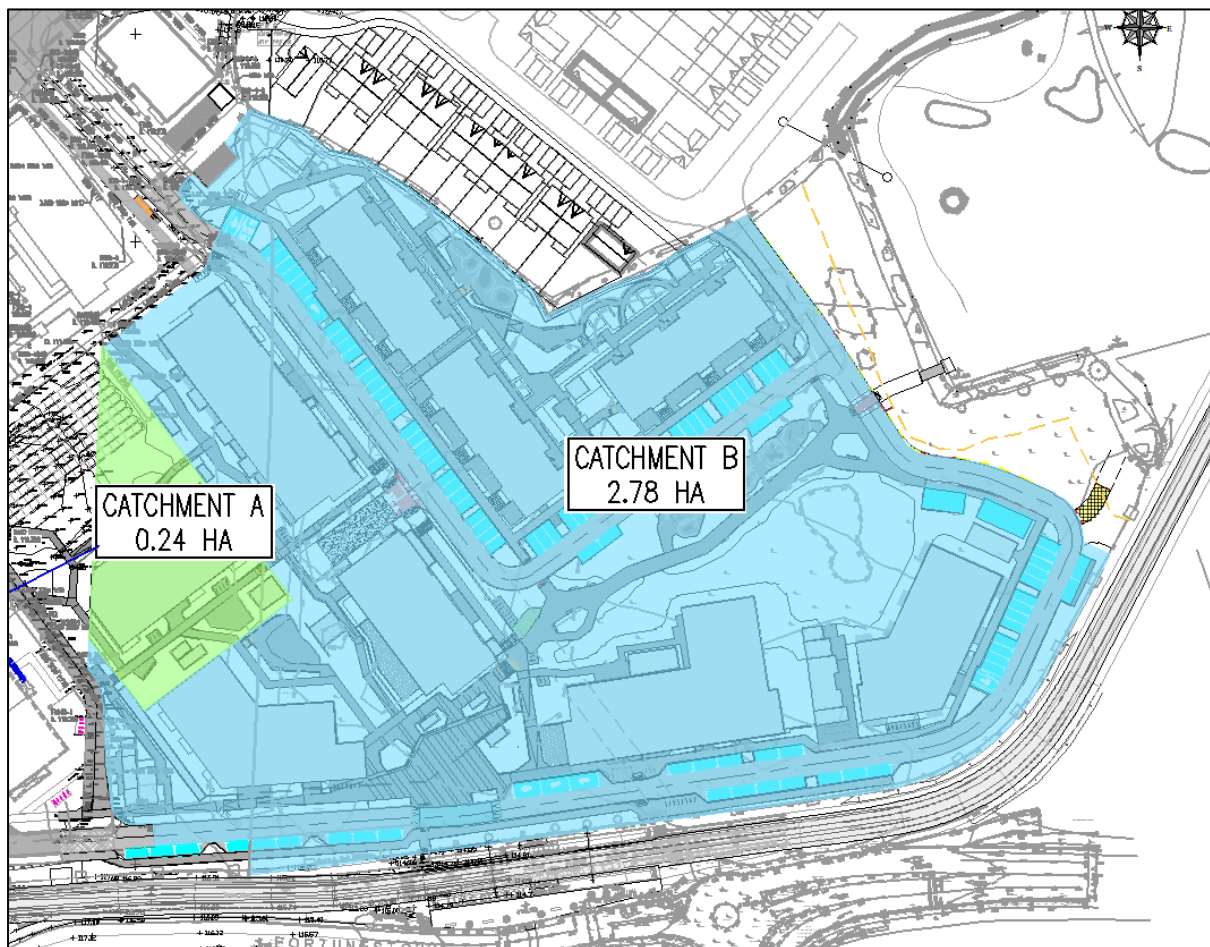


Figure 15: Surface Water Catchments for Subject Site

Unattenuated surface water runoff from Catchment "A" discharges to the surface water drainage system in Phase 2 and is stored in the surface water attenuation system for Phase 2 (which is designed to accommodate surface water runoff from a portion of the subject site).

Refer to DBFL *Infrastructure Design Report* for further details of surface water management.

Attenuated surface water runoff from Catchment “B” discharges to the Baldonnell Upper Stream along the eastern boundary. Catchment B excludes the riparian buffer and open space immediately adjacent to the stream as this is not positively drained.

5.1.3 Riparian Corridor

The eastern boundary is formed by the Baldonnell Upper Stream. A significant portion of open space is proposed in the immediate vicinity of the channel with a riparian strip of varying widths proposed (minimum 12m and increasing to circa 24m and 29m in places). This is excess of the minimum of 10m requested by South Dublin County Council.

5.1.4 Flood Exceedance

For storms greater than the 1%AEP pluvial event, the development’s drainage network design may be exceeded and overland flow may occur. Refer to Figure 16 below with overland flow directed towards open space areas and away from buildings.

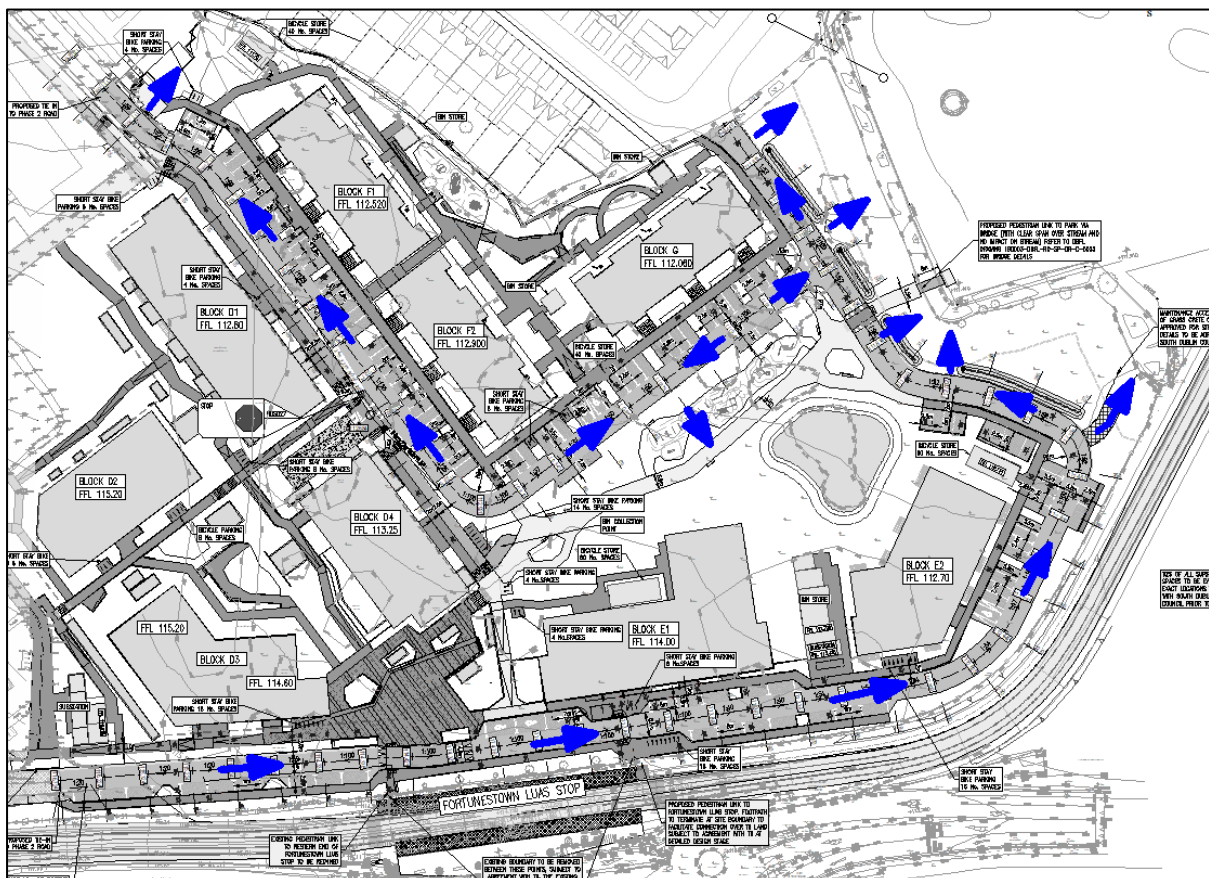


Figure 16: Flood Exceedance Map

5.2 Climate Change

The potential impact of climate change has been allowed for in the design of the surface water drainage network and storage system, with an allowance for a 10% increase in rainfall intensities.

5.3 Foul Drainage

A new foul drainage system will be constructed to collect flows from the proposed development.

5.4 Maintenance

The proposed drainage system to be maintained on a regular basis by South Dublin County Council to reduce the risk of a blockage. Maintenance of SuDS features should also be carried out in accordance with the recommendations of "The SuDS Manual" (CIRIA).

Drop kerbs are proposed at to facilitate maintenance access to the Baldonnell Upper Stream. Refer to DBFL Proposed Site Services Plan 190003-DBFL-CS-SP-DR-C-1001.

5.5 Impact on Adjacent Areas

The proposed development would not result in increased risk of flooding upstream or downstream of the site as the surface water runoff from the development is attenuated to greenfield runoff, Q_{bar} in accordance with the recommendations of the GSDSDS.

It should be noted that there would not be any displaced surface water associated with the development, as surface water runoff exceeding the surface water allowable runoff rate will be retained on site.

Also, taking into consideration the management of surface water runoff from extant permissions and from the subject site, all of which limit surface water runoff to greenfield runoff (Q_{bar}), the development of the site would not increase flood risk elsewhere.

5.6 Access and Egress During Flood Events

The proposed development (including essential infrastructure such as roads), is in flood zone 'C'. Where the capacity of the drainage system is exceeded for storm events exceeding a 1%AEP event, there would not be surface ponding of stormwater within the site as water would runoff towards open space areas, as demonstrated in the overland flow map in Figure 16.

There are two vehicular access points to the development, via Phase 2 development onto Citywest Avenue to the north. There is also potential for a third vehicle access point via lands to the north west (granted planning permission under SD16A/0210).

Vehicular access to the site is located in Flood Zone "C" and therefore, the site can be maintained during storm events.

Access from the basement car park under apartment blocks 'D1', 'D2', 'D3' and 'D4' would be maintained as the entrance is flood protected, with a flood defence ramp proposed at the top of the ramp to the basement car park as. This would direct water back onto the main access road and away from the basement.

5.7 Residual Risks

Remaining residual flood risks, following the detailed assessment include the following;

1. Pluvial flooding from the drainage system related to a pipe blockage or from flood exceedance.
2. Pluvial flooding from the development's drainage system for storms exceeding the design capacity.

Mitigation measures to address residual flood risks are as follows:

1.0 Pluvial flooding from the drainage system related to a pipe blockage or from flood exceedance:

- **Mitigating Measure M1:** The proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage.
- **Mitigating Measure M2:** Overland flow routes for pluvial events should not be built on or become blocked off. Overland flow routes should be designed to direct to grassed areas and away from dwellings.

2.0 Pluvial flooding from the development's drainage system for storms exceeding the design capacity:

Mitigating Measure M3:

- The drainage network is designed in accordance with the recommendations of the GDSDS and provides attenuated outlets and associated storage up to the 1% AEP (1 in 100-year return

period event). The drainage network for the site has been designed to ensure that it can accommodate the 1% AEP Storm event with no out of system flooding.

- **Mitigating Measure M4:** Overland flow routes for pluvial events should not be built on or become blocked off. Overland flow routes should be designed to direct to grassed areas and away from dwellings.

- **Mitigating Measure M5:** At detailed design stage, the location of all dropped kerbs to be fully reviewed to ensure all overland flow paths are not impeded.
-
- **Mitigating Measure M6:** Maintain the riparian strip adjoining the stream.
-

3.0 Risk of flooding of the basement car park under blocks 'D1', 'D2', 'D3' and 'D4' due to runoff from a storm exceeding a 1%AEP via overland flow from the adjacent access road to the basement ram:

Mitigating Measure M7: A flood defence ramp is included at the top of the ramp to the basement car park.

Mitigating Measure M8: All incidental flows from the basements shall be pumped on a duty and standby basis. These pumps will drain the basement areas only and no groundwater would be pumped i.e. the basement is to be sealed structure.

Effectiveness of mitigation measures:

It is considered that the flood risk mitigation measures once fully implemented are sufficient to provide a suitable level of protection to the proposed development. A regularly maintained drainage system will ensure that it remains effective and in good working order should a large pluvial storm occur.

6.0 CONCLUSION

We consider that the proposed development, can be delivered on the site in the context of flood risk to same and that the implementation of mitigation measures, as outlined in this report, can be accommodated by the site's detailed design and the surface water drainage design.

The OPW document "The Planning System and Flood Risk Management Guidelines (November 2009)" requires that the proposed development be compatible with flood risk for the site. In accordance with these guidelines, the subject site is located within Flood Zone 'C'. Flood Zone "C" lands are suitable for all types of land use, including residential developments which are classified as "highly vulnerable" in the "Guidelines". Therefore, the proposed development is suitable for the subject site and the Planning Guidelines Sequential Approach is passed.

The proposed development layout was assessed and it was concluded that it can be delivered on the Site in the context of flood risk to same and that the implementation of the proposed mitigation measures, by the developments detailed design will address the remaining residual risks.

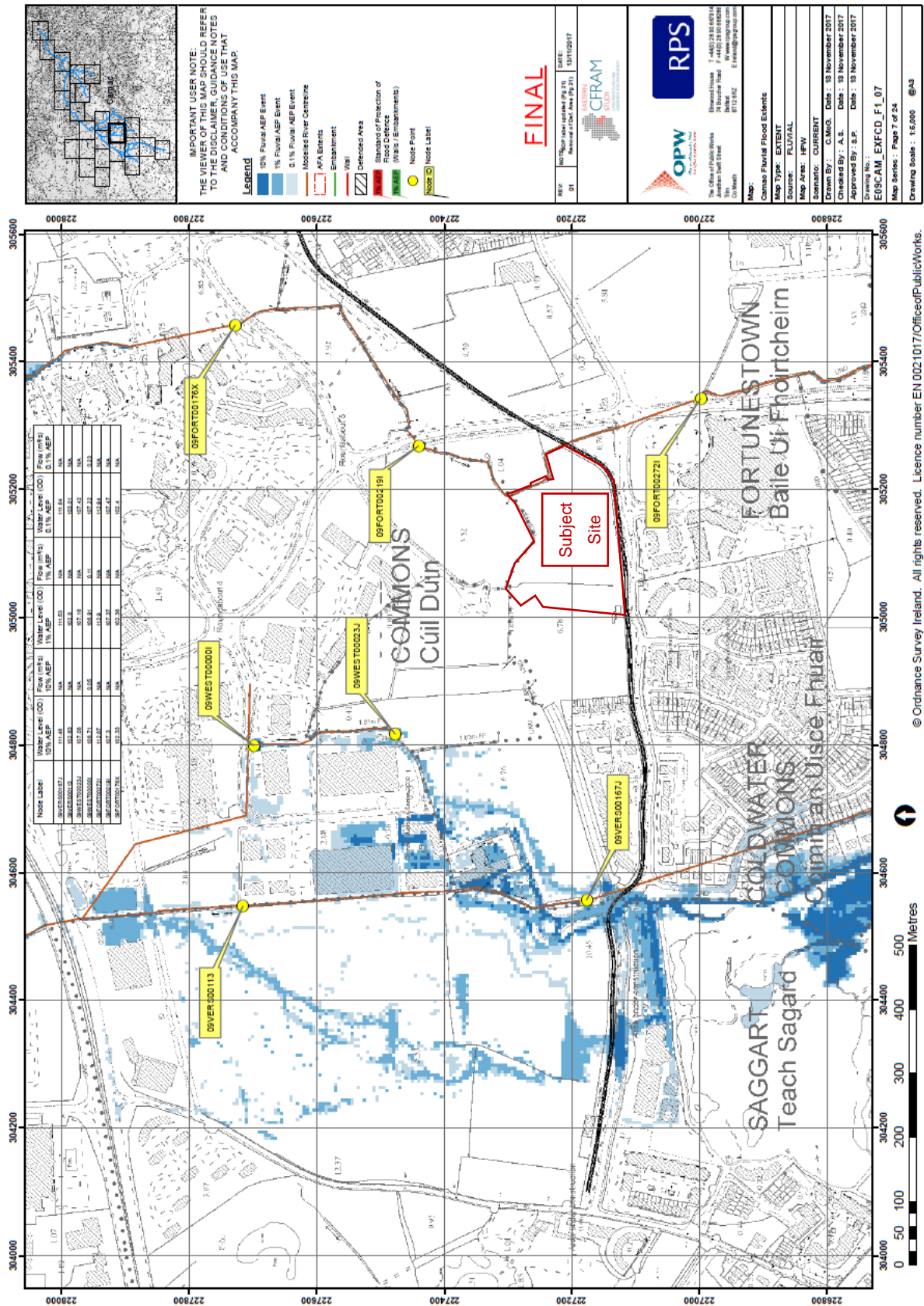
Taking into consideration the management of surface water runoff from extant neighbouring permissions their discharge rates are all limited to greenfield runoff and they would not increase flood risk elsewhere. The developments surface water runoff will be limited to Q_{bar} (greenfield runoff rate). Therefore, the development complies with the requirements of the GDSDS and does not increase the risk of flooding elsewhere and does not result in displaced waters.

It is concluded that the development meets the requirements of The FRA Guidelines and that the proposed development is appropriate to this flood zoning and a justification test is not required.

It is concluded that the development meets the requirements of The FRA Guidelines and that the proposed development is appropriate to this flood zoning and a justification test is not required.

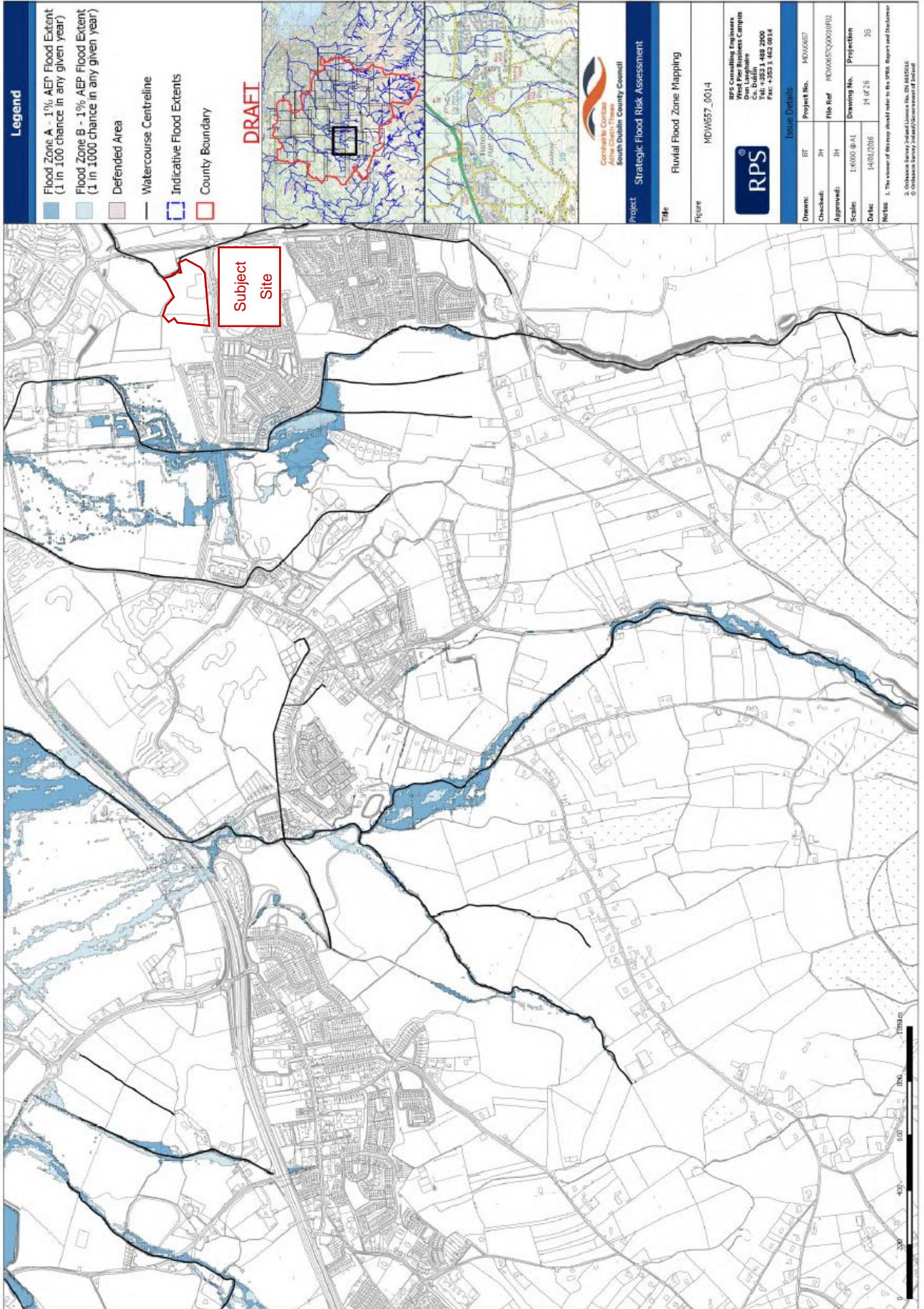
APPENDIX A

EXTRACT FROM ECFRAM STUDY CAMAC FLUVIAL FLOOD EXTENTS

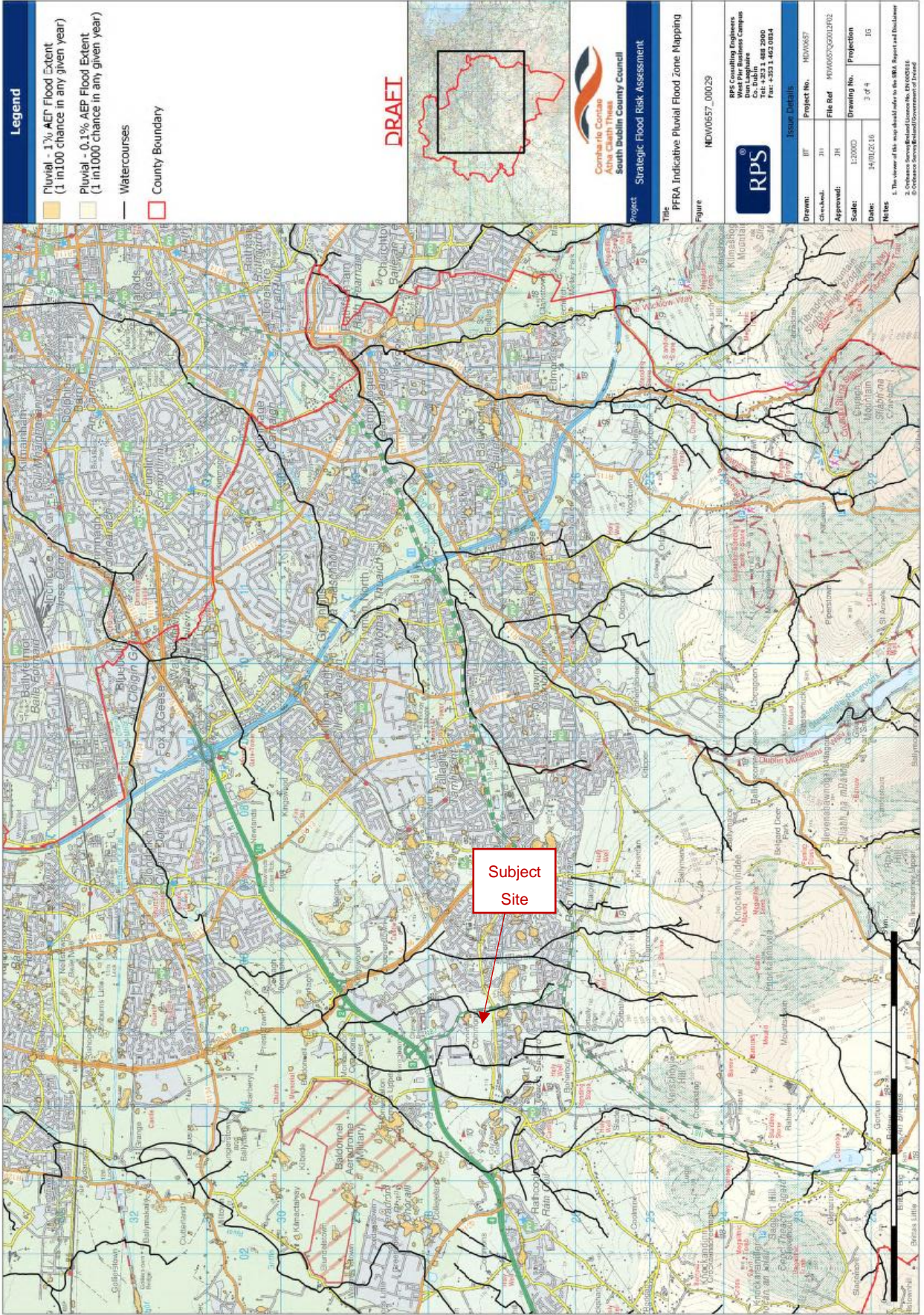


APPENDIX B

EXTRACT FROM SOUTH DUBLIN COUNTY COUNCIL STRATEGIC FLOOD RISK ASSESMENT 2016-2022



Site Specific Flood Risk Assessment
 SHD Development at Cooldown Commons Phase 3



APPENDIX C

OPW FLOOD INFO REPORT

Summary Local Area Report

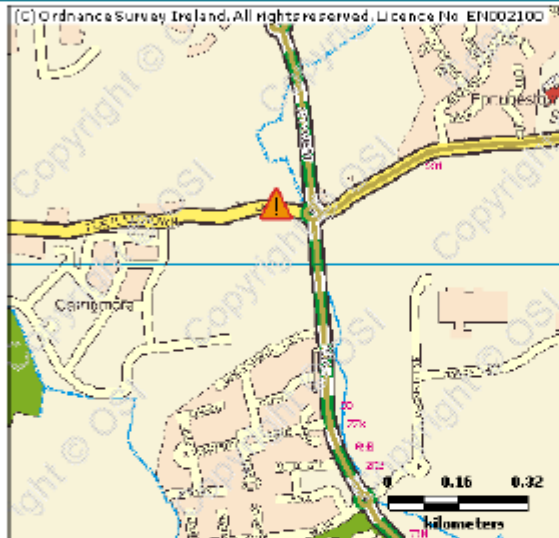
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Dublin

NGR: O 052 269

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Scale 1:13,247

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. Their purpose and scope is explained in the Glossary.

14 Results

	1. Flooding at Mill Road, Saggart, Co. Dublin on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	2. Flooding at Garter Lane, Saggart, Co. Dublin on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	3. Flooding at Knockmore, Tallaght, Co. Dublin on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	4. Flooding at Fortunestown Lane, Citywest, 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. Flooding at Tallaght Pass, N81, Dublin 24 on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2

Additional Information: Reports (1) More Mapped Information		
	6. Flooding at Blessington Road, Tallaght, Dublin 24 on 1st May 2012 County: Dublin	Start Date: 05/Jan/2012 Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information		
	7. Flooding at Avoca Road, Saggart on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information		
	8. Flooding at Belfry Drive/De Selby Park, Dublin 24 on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information		
	9. Flooding at Bawnlea Crescent and Avenue, Tallaght, Co. Dublin on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information		
	10. Fortunestown Lane Nov 2000 County: Dublin	Start Date: 06/Nov/2000 Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	11. Jobstown N81 Nov 2000 County: Dublin	Start Date: 05/Nov/2000 Flood Quality Code:3
Additional Information: Reports (1) Press Archive (2) More Mapped Information		
	12. Baldonnell Barneys Lane Recurring County: Dublin	Start Date: Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information		
	13. Killinarden Stream Jobstown recurring County: Dublin	Start Date: Flood Quality Code:4
Additional Information: Reports (1) Press Archive (1) More Mapped Information		
	14. Killinarden Stream N81 Jobstown Recurring County: Dublin	Start Date: Flood Quality Code:4
Additional Information: Reports (1) Press Archive (1) More Mapped Information		

Report Produced: 11-May-2018 11:09

**SOUTH DUBLIN COUNTY COUNCIL
COMHAIRLE CHONTAE ATHA CLIATH THEAS**

Bosca 4122
Lar an Bhaile, Tamhlacht
Baile Atha Cliath 24

Telefon: 01-4149000
Facs: 01-4149101

ENVIRONMENTAL
SERVICES DEPARTMENT
P.O. Box 4122
Town Centre, Tallagh
Dublin 24

Telephone: 01-4149000
Fax: 01-4149101

South Dublin County Report on Flooding 5th & 6th November, 2000

Rainfall

- Rainfall varied across the County from the 76mm recorded at Baldonnell to 137mm recorded at Bohamabreena for the period 9.00a.m. Sunday to 9.00a.m. Monday.

Geography of South Dublin

- South Dublin County Council Administrative Area is divided into 3 main catchment areas, drained respectively by the Griffeen, Camac and Dodder Rivers.
- The most serious flooding events occurred in the Griffeen Catchment area. Drainage works carried out post '93, Camac Phase 1, effectively served to protect the Camac Catchment from serious flooding and thus protected urban areas downstream of Corkagh Park, in particular Clondalkin.

Some flooding occurred in the Dodder Catchment at Dodder Park Road and Lower Dodder Road, also the Tallagh Stream, a tributary of the Dodder.

To the west of the Griffeen Catchment some flooding occurred in areas that ultimately drain to the Liffey via a series of watercourses and small streams flowing northwards through Kildare in the Newcastle/Hazelhatch area.

Details of flooding

- Serious flooding occurred in the Griffeen Catchment particularly in 2 areas.

To the north at its confluence with the Liffey, the Griffeen river caused considerable flooding in the old village of Lucan.

The second area affected by serious flooding was in the Griffeen Valley just to the north of the Dublin Cork Railway line in the new housing areas of Old Forge and Grange Manor estates.

Chronology & Response

- South Dublin County Council received its first emergency call at 12.30p.m. on 5.11.00.

Consequent on this call and following inspections by Supervisory personnel, Drainage Department work crews were mobilised at 2.00p.m. on the 5.11.00. Work crews from the Council's Roads, Cleansing and Housing sections subsequently joined in the emergency works. These squads remained on duty from 2.00p.m. 5.11.00 to 3.00a.m. on 6.11.00 and from 8.00a.m. on 6.11.00 to 1.00a.m. on 7.11.00 to deal with the various problems arising.

On Sunday evening and Sunday night, squads were engaged in the cleaning of river and culvert screens to facilitate flows, filling, distribution of sandbags to protect vulnerable areas and freeing blockages throughout the system caused by debris.

During this period excavations were carried out to lower the bank of the Camac at Corkagh Park to allow the pitches to serve as attenuation ponds.

- Early on Monday morning (6.11.00) at approximately 4.00a.m., the Griffeen broke its banks at the northern extremity of Griffeen Valley Park (north of the N4) and flooded Lucan Village.

Between 4.00a.m. and 7.00a.m. on Monday the Griffeen also flooded the estates of Old Forge and Grange Manor in the South Lucan Area.

This flooding persisted throughout Monday and the Griffeen was only returned to its channel at approximately 8.00p.m. on Monday night.

Emergency Plan

- The extent of the storm and the flooding caused local emergency plans to be put into operation. There were considered adequate to deal with the situation which developed. It was not considered necessary to declare a major emergency in South Dublin due to the very specific and confined areas affected.

Road Closures

The only national route closed was the national secondary road N81 at Jobstown (11.00p.m. 5.11.00 – 4.00p.m. 6.11.00).

Regional and Local Roads closed included:

Adamstown Road at Lucan Village (4.00a.m. 6.11.2000 – 9.11.2000)

Lucan Ballowen Road (9.00a.m. – 4.00p.m. 6.11.2000)

New Link Road at Grange Manor (8.00a.m. – 8.00p.m. 6.11.2000)

Adamstown Road Flooded but passable.

Alymer Road (4.00a.m. – 8.00p.m. 6.11.2000)

Lucan Peamount (Polly Hops) (4.00a.m. – 8.00p.m. 6.11.2000)

College Lane (8.00a.m. – 8.00p.m. 6.11.00 – passable)

Hatch road flooded – passable

Belgard Road flooded – passable

Fortunestown Lane (8.00a.m. – 8.00p.m.)

Barnhill Road (Weirview Cottages) 4.00a.m. 6.11.2000 – 9.11.2000

Properties Flooded

Residential

12 houses at Avonmore Park (Nos. 7 – 18)

4 No. houses, Kiltipper Road, Tallaght (individually named)

25 No. houses, Old Forge Estate, Lucan

18 No. houses, Grange Manor Park/Drive, Lucan

House beside 'Griffeen Valley Nursing Home', Arthur Griffith Park, Lucan

House to rear of 'Courtneys Pub', Lucan Village

2 No. Bungalows Newcastle Village

2 No. Bungalows beside Newcastle Treatment Works

2 No. Houses, Knocklyon Avenue, Firhouse

3 No. Houses, Edmonstown Road (individually named)

15 No. Houses, Woodview Cottages, Rathfarnham

1 house beside Chemsolve on Edmonstown Road

'Homeville' opposite Mount Carmel Park, Firhouse 3 Houses at Hazelhatch

Total number of residential properties known to be flooded: 90.

Commercial

'Virtus Ltd' Haydens Lane, Lucan

All the following in Lucan Village:

Centra Supermarket
Village Oriental Food Stores
Spice Inn Chinese Fast
Creative Flowers
Irish Permanent
O'Neills Pub
Kennys Pub
Courtneys Pub
Bank of Ireland
Pat Toolan Bookmaker
Carrolls Butchers

Also:

Jobstown Inn, Jobstown, Tallaght
'Johns Takeaway' Walkinstown Roundabout
'Motorworld' Robinhood Industrial Estate and adjoining premises
Chemserve on Edmondstown Road
'Eurometals' Mill Road, Saggart

Total number of commercial known to be flooded: 17.

The above are the premises which have come to the attention of this South Dublin County Council to date.

Evacuations

- No large-scale evacuations were required. However in a number of limited cases South Dublin County Council personnel helped to evacuate houses, a particular example being an expectant mother in the Old Forge estate.
- These evacuations were from Private Residential houses.
- No alternative accommodation was either requested or provided.
- We do not consider that anyone is still evacuated due to the flooding.

General

- No water treatment works were affected due to the flooding.
- Certain sewerage systems were affected by the flooding:
 - (a) The treatment Plant at Newcastle was submerged, preventing its operations for 24 hours.
 - (b) The Lucan Low Level Pumping Station on the Adamstown Road was flooded. As a result the pump motors were burnt out and need to be replaced. Alternative pumping arrangements will be in place by 10.11.00.