MALONE O'REGAN
CONSULTING ENGINEERS

SOCIAL HOUSING BUNDLE 4

DEVELOPMENT AT THE STANLEY STEET DEPOT,

DUBLIN 7

DESKTOP FLOOD RISK ASSESSMENT

DUBLIN CITY COUNCIL

August 2024

Job: 23006

Contents Amendment Record

2B Richview Office Park, Clonskeagh, Dublin 14
Tel: +353-1-260 2655 Fax: +353-1-260 2660 E-mail: info@MORce.ie

MALONE O'REGAN

Title: **Social Housing Bundle 4, Development at the Stanley Street Depot, Dubin 7 / Desktop Flood Risk Assessment / Dublin City Council**

Job Number: **23006**

Prepared By: **Michelle Gaughan** **Signed:** Mgaughan

Checked By: **Douglas Weir** **Signed:**

Approved By: **Douglas Weir** **Signed:**

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
0	14.07.2023	Initial Issue	P1	KA	PB	PB
1	06.11.2023	Information	P1	KA	PB	PB
2	26.04.2024	Information	P1	KA	ND	ND
3	03.05.2024	Information	P1	KA	ND	ND
4	20.05.2024	Information	P1	KA	ND	ND
0	13.08.2024	Planning	P3	MG	ND	ND
1	29.08.2024	Planning	P3	MG	DW	DW

CONTENTS

1 INTRODUCTION

This report is prepared on behalf of Dublin City Council to accompany a Part 8 proposal. The development proposed is the construction of 167 apartments and duplex units at a site c. 1.15 ha at the former Dublin City Fire Brigade Maintenance Depot and Dublin City Council Mechanical Division, Stanley Street, Grangegorman Lower, Dublin 7. Development at the site will consist of the following:

- The demolition and site clearance of the existing buildings, sheds, warehouses and garages.
- Retention and modification of the south and east elevation of an existing structure (facing onto Grangegorman Lower) to form part of apartment Block G at the southeast corner of the site.
- Construction of 167 no. apartment and duplex units across Blocks A-K (including frontage onto Grangegorman Lower).
    - Blocks A – C consist of 71 no. apartment units (43 no. 1 bed and 28 no. 2 bed units) and ranges from 5 to 6 storeys.
    - Blocks D-G consist of 84 no. apartment units (43 no. 1 bed units, 29 no. 2 bed units and 12 no. 3 bed units) and ranges from 4 to 5 storeys.
    - Blocks H-K consist of 12 no. duplex units (6 no. 1 bed and 6 no. 3 bed units) and are 3 storeys.
- Provision of 270 long-stay and 101 short-stay bicycle parking spaces, 19 no. car parking spaces and 1 no. motorcycle parking space.
- Construction of a 277.54 sqm creche.
- Provision of 552 sqm of community, cultural and arts space located at ground floor level across Blocks B, E, F and G.
- 0.113 ha of public open space and 1350 sqm of communal open space
- Two vehicular accesses are proposed, one from Grangegorman Lower and one from Stanley Street.
- Boundary treatments, public lighting, site drainage works, internal road surfacing and footpaths, ESB meter rooms, ESB substations, stores, bin and cycle storage, plant rooms, landscaping; and
- All ancillary site services and development works above and below ground.

Figure 1-1 – Proposed Site Development

The purpose of this Desktop Flood Risk Assessment (DFRA) is to assess the potential flood risk to the proposed development site and the impact that the development as proposed may or may not have on the hydrological regime of the area. Quoted ground levels or estimated floor levels relate to Ordnance Datum (Malin) unless stated otherwise.

The flood risk assessment has been carried out in accordance with the Government's 2009 Planning System and Flood Risk Management Guidelines (hereafter referred to as the 2009 Planning Guidelines). These guidelines adopt a staged approach to the assessment of flood risk. This report describes a Stage 2 Initial Flood Risk Assessment which is defined within the 2009 Planning Guidelines as follows:

"A qualitative or semi-quantitative study to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information, to provide a qualitative appraisal of the risk of flooding to development, including the scope of possible mitigation measures, and the potential impact of development on flooding elsewhere, and to determine the need for further detailed assessment."

The study was principally focused on examining flooding risks to the proposed site from the River Liffey.

2 PROPOSED SITE DESCRIPTION

2.1 Site Description

The location of the proposed development is illustrated in Figure 1.1 below. The site is situated in the north central area of Smithfield, Dublin city centre. The site is bounded on four sides with a mix of building types and uses. To the north on Stanhope Street and Stanhope Court there is a mix of two and three storey houses. Grangegorman Lower Road bounds the east boundary. The southern boundary (Brunswick St N) is flanked by three storeys commercial premisses house in old stone building (formally the Wool Merchant). In addition, four storey residential appartement. There are historic tracks down the old Stanley Street which are to be preserved. The western boundary is bordered by a mix of two and three storey housing and commercial units, a school and industrial yard off Manor Street. Many of the buildings along the western boundary date to the Georgian period and have a basement.

The proximity of the site to natural watercourses is outlined in Figure 2-1. The total area of the proposed development site is approximately 1.15 hectares.

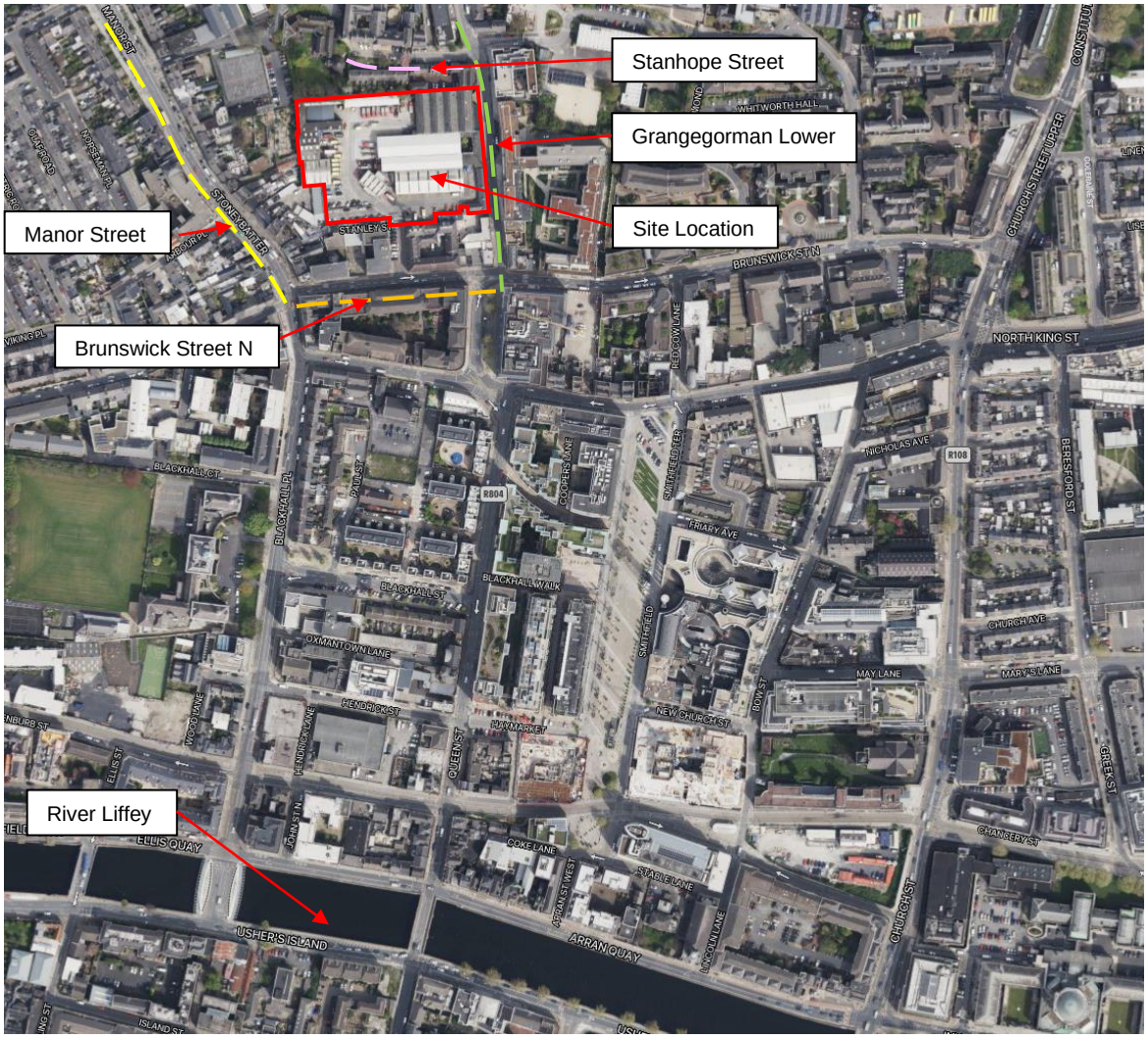


Figure 2-1 – Site Location showing the indicative Site Boundary

2.2 Surrounding Watercourse

The most significant hydrological feature in the vicinity of the site is the River Liffey which is located approximately 550m to the south of the site. At this location the River Liffey which flows to the east entering the Irish Sea at its mouth at the midpoint of Dublin Bay.

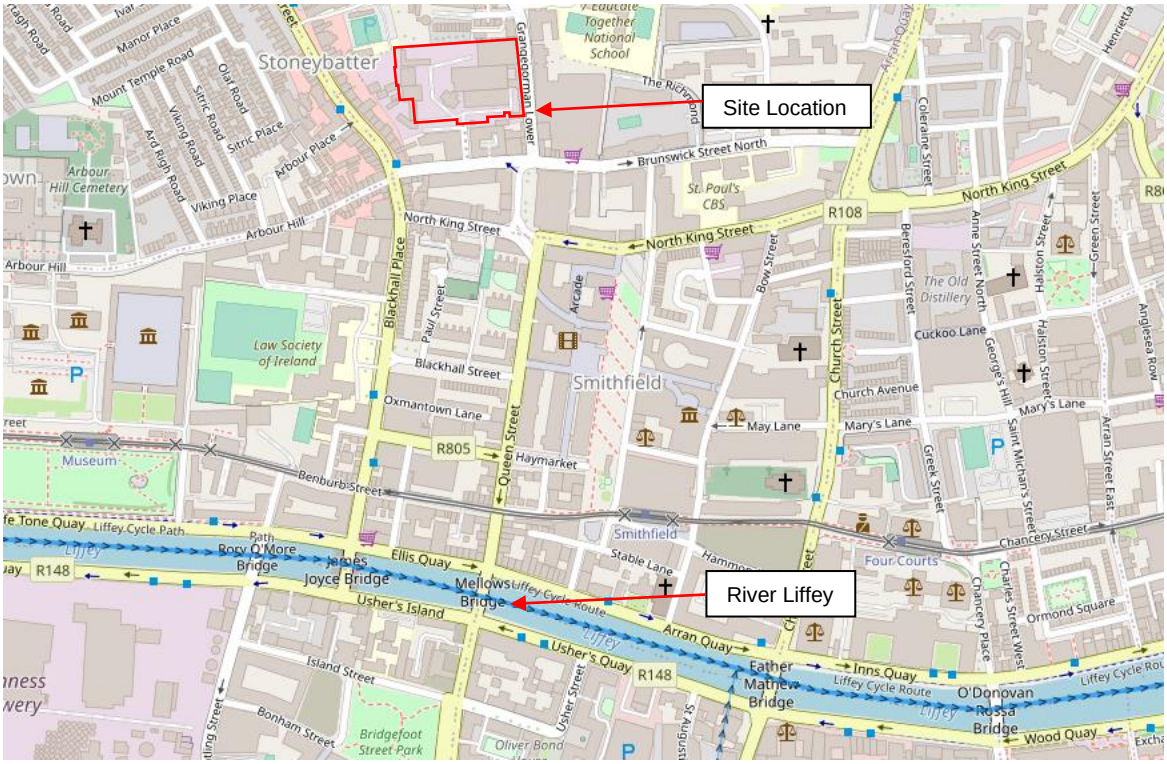


Figure 2-2 – Surrounding Watercourse (Extract from the EPA Maps)

2.3 Land Use Zone

Land use zoning map is used in order to assess which types of developments, based on vulnerability to flood risk, are appropriate for each Flood Zones.

Where developments/land uses are proposed that are considered inappropriate to the Flood Zone that may be identified in the future at project level following adoption of the Plan, then a Development Management Justification Test and site-specific Flood Risk Assessment will be required in accordance with The Planning System and Flood Risk Management Guidelines 2009 (and as updated).

Table 2-1 - Matrix of Vulnerability vs. Flood Zone (Extract from the Strategic Flood Risk Assessment of the Dublin City Development Plan 2022-2028)

Vulnerability Class	Land Use and Types of Development which include
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks;

	Dwelling houses designed, constructed or adapted for the elderly or other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable Development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure
Water compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations;
Water compatible development Contd.	Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

Refer to Flood Risk Management Guidelines 2009 and 'Strategic Flood Risk Assessment for the Dublin CDP 2022-2028' for additional detail:

- Highly vulnerable developments include houses, schools, hospitals, residential institutions, emergency services, essential infrastructure, etc.
- Less vulnerable developments include economic uses (retail, leisure, warehousing, commercial, industrial, non-residential institutions, etc.), land and buildings used for agriculture or forestry, local transport infrastructure, etc.

Land use zone map is provided in the SFRA of the Dublin CDP 2022-2028. The different land zone is illustrated in Figure 3 below and the full map is provided in Appendix A.

The proposed development is located within land zoned as *"Z5 – City Centre: To consolidate and facilitate the development of the central area, and to identify, reinforce, strengthen and protect its civic design character and dignity"*.

The lands to south, east and west are also within land zones as "*Z5 – City Centre",* and the lands to the north are within land zoned as *"Z15 – Community and social infrastructure".*

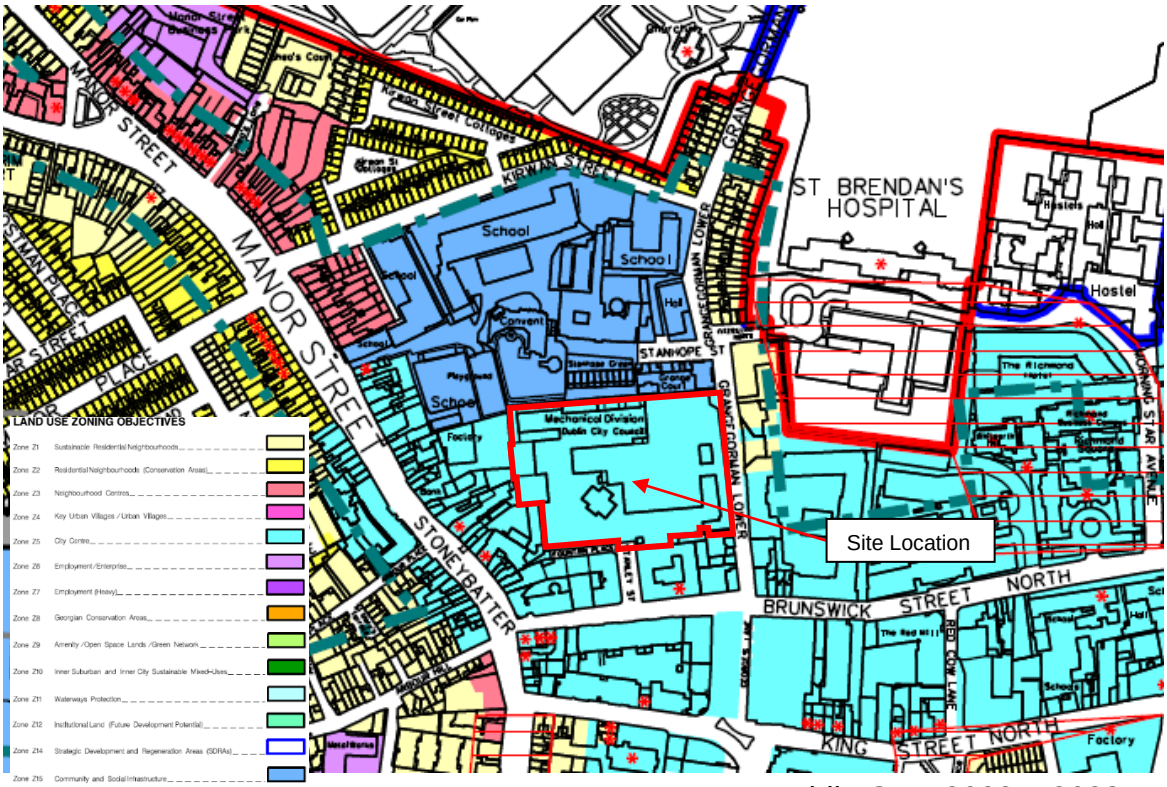


Table 2-2 Land Use Zoning Map (Extract from SFRA of the Dublin CDP 2022 – 2028)

2.4 Existing Topography Levels at Site

A topographical survey of the site has been carried out which shows that there is a gentle slope across the site. The elevation at the north-western corner of the site is approximately +13.400m. The land falls towards the level of approximately +12.000m in the south-eastern corner of the site.

3 FLUVIAL FLOOD RISK ASSESSMENT

The following sources of information were reviewed in order to identify any flood risk to the proposed development site as a result of fluvial flooding:

- The National Preliminary Flood Risk Assessment (PFRA) – Overview Report & Indicative Flood Maps
- Climate Change
- OPW Flood Records from www.floodmaps.ie
- Ordnance Survey Historic Mapping
- Strategic Flood Risk Assessment, Dublin City Development Plan 2022 – 2028

3.1 The National Preliminary Flood Risk Assessment

The National Preliminary Flood Risk Assessment (PFRA), which was carried out by the OPW in March 2012, identified Areas of Further Assessment (AFA) where further, more detailed assessment was required to determine the degree of flood risk. Flood Risk Assessment Maps were prepared by the Catchment Flood Risk Assessment and Management (CFRAM) Study which indicate the extent of flooding caused by fluvial flood events with an annual exceedance probability (AEP) of 10% (10yr event), 1% (100yr event) and 0.1% (1000yr event) in these areas. The final versions of the maps were published in May 2017.

The CFRAM maps indicating the extent of flooding caused by a fluvial flood event with an annual exceedance probability (AEP) of 10% (10yr event), 1% (100yr event) and 0.1% (1000yr event) are included in Appendix B.

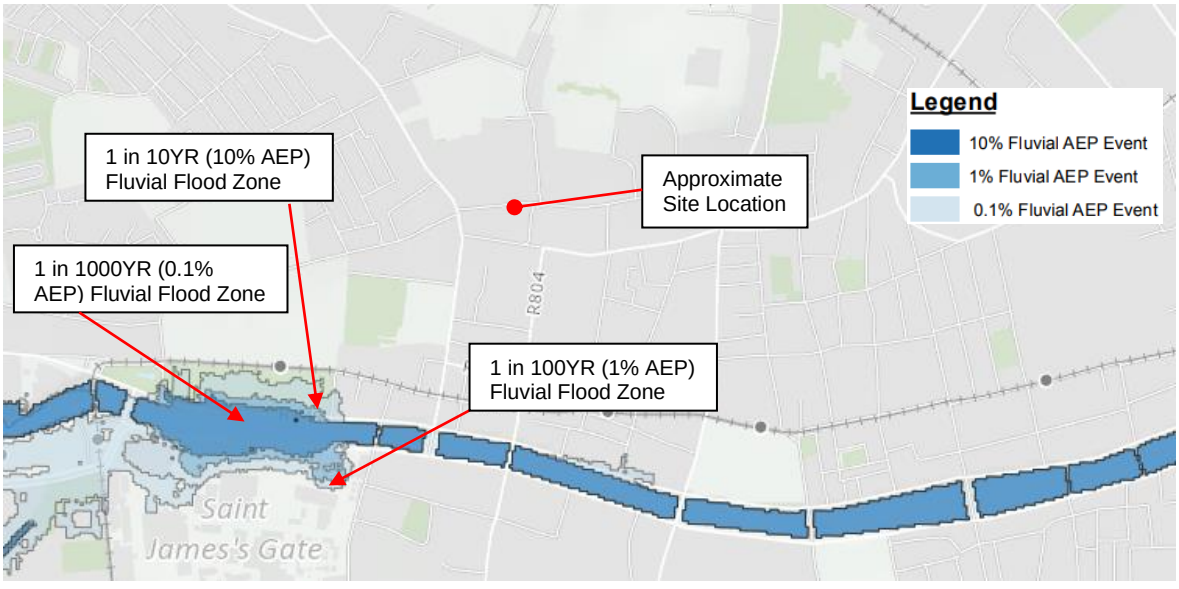


Figure 3-1 - CFRAM Fluvial Flood Extent Map (Extract from OPW)

The PFRA flood mapping indicates that the proposed development site does not fall within the predicted extreme 0.1% (1 in 1000 year) current scenario fluvial flood zone.

The CFRAMS flood map also provides information on predicted water levels for the 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) fluvial flood events at various node points along the River Liffey. The node points are listed in Table 3-1 below. The location of the node points is indicated in Figure 3-2 and on the drawings in Appendix B. Predictive extreme flood levels at this node point are applicable to utilise in the assessment of potential fluvial flood risk to the proposed development site.

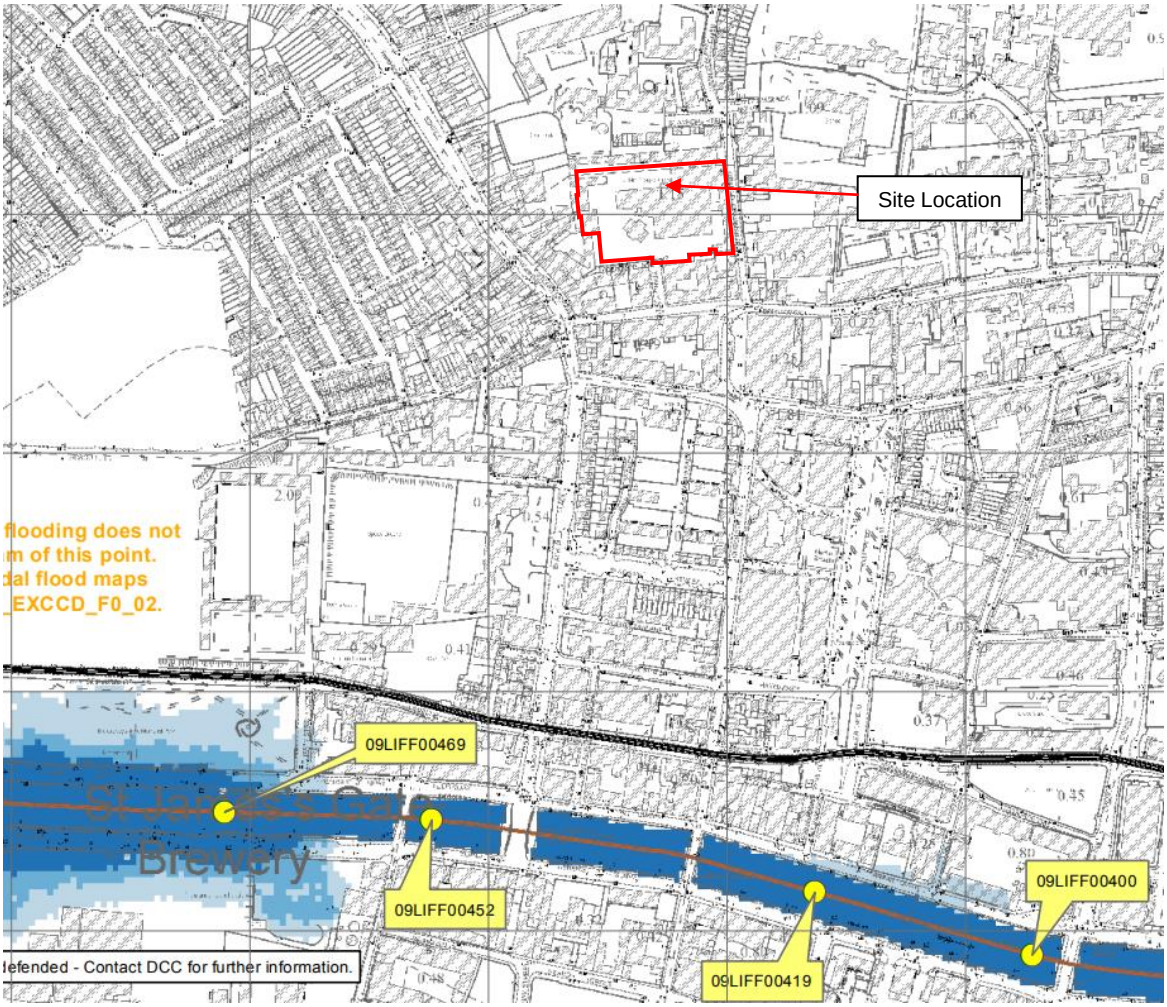


Figure 3-2– Extract from PFRA Maps (Extract from OPW)

Table 3-1 – CFRAMS Predicted Water Levels

Node Label	Water Level 10% AEP	Water Level 1% AEP	Water Level 0.1% AEP
09LIFF00469	2.75	2.99	3.36
09LIFF00452	**2.71**	**2.92**	**3.23**
09LIFF00419	2.64	2.80	3.04
09LIFF00400	2.61	2.74	2.94

The node point closest to the western boundary of the site is referenced as node point *09LIFF00452*. The 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood levels at this point are predicted as 2.92m and 3.23m respectively.

According to the SFRA of the Dublin City Development Plan 2022 – 2028 the recommended minimum finished floor level is to be:

Table 3-2 – Recommended Minimum Finished Floor Levels (Extract from the Strategic Flood Risk Assessment of the Dublin City Development Plan 2022-2028)

Scenario	Finished floor level to be based on
Fluvial, undefended	1% AEP flood + climate change (20% allowance for highly vulnerable development) + 300mm freeboard

Using the information obtained from the predicted flood level, in order to permit a sustainable development of this site and to mitigate against potential residual flood risk to the development it is recommended that the finished floor level = 2.92m with 20% + 0.3m = 3.22m.

The topography falls towards the south of the site at 11.20m and rising to 13.00m to the north. The existing buildings on the site are to be demolished and has a finished floor levels ranging from 11.80m at the southern end of the site to 13.60m towards the northern end of the site with no records of flooding on the site noted. Thus, it is proposed to place the finished floor levels for the block at the northwest end from 13.15m to 12.55m. Levels to the southeast block range from +12.100m to +13.100m. Levels to the duplex units range from +12.200m to +12.800m.

3.2 OPW Flood Records

The OPW Flood Maps Website (www.floodinfo.ie) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrences in the vicinity of the proposed development site. These records, which are summarised in Appendix C of this report, indicate 29 recorded flood events within a 2.5km radius of the proposed site.

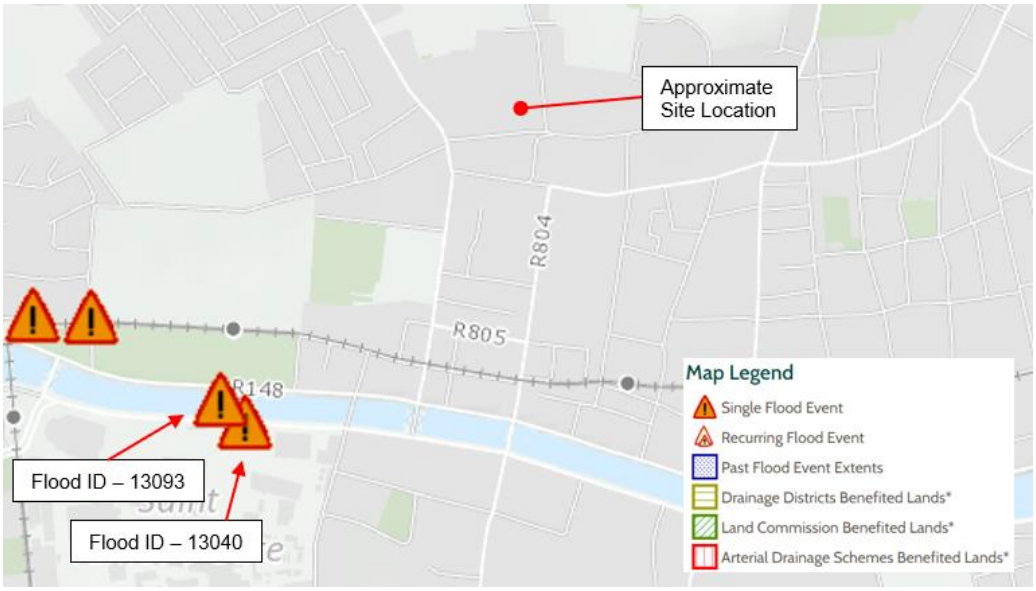


Figure 3-3 – OPW Flood Event Summary

Figure 3-3 indicates various historical flooding events within Dublin City Area, however there are no recorded recurring instances of flood events mapped within the immediate vicinity of the site.

Two flooding events associated with the Liffey catchment occurred approximately 550m southwest of the site. Flood ID – 13040 reports of a flood event that occurred on the 6th of January 2014. Flood ID – 13093 reports of a flood event that occurred on the 3rd of February 2014.

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

3.3 Ordnance Survey Historic Mapping

Historic Groundwater Flood Maps were produced by Geological Survey Ireland. The historic groundwater flood map is a national-scale flood map presenting the maximum historic observed extent of karst groundwater flooding. The map is primarily based on the winter 2015/2016 flood event, which in most areas represented the largest groundwater flood event on record. The map was produced based on the SAR imagery of the 2015/2016 event as well as any available supplementary evidence. The floods were classified by flood type differentiating between floods dominated by groundwater (GW) and floods with significant contribution of groundwater and surface water (GWSW).

The map that was viewed was the historical 6-inch map (pre-1900). Figure 3-4 illustrates the historic mapping for the area of the proposed development site. The historic 6-inch mapping does not indicate any historical or anecdotal instances of flooding within or adjacent to the boundary of the proposed development site.

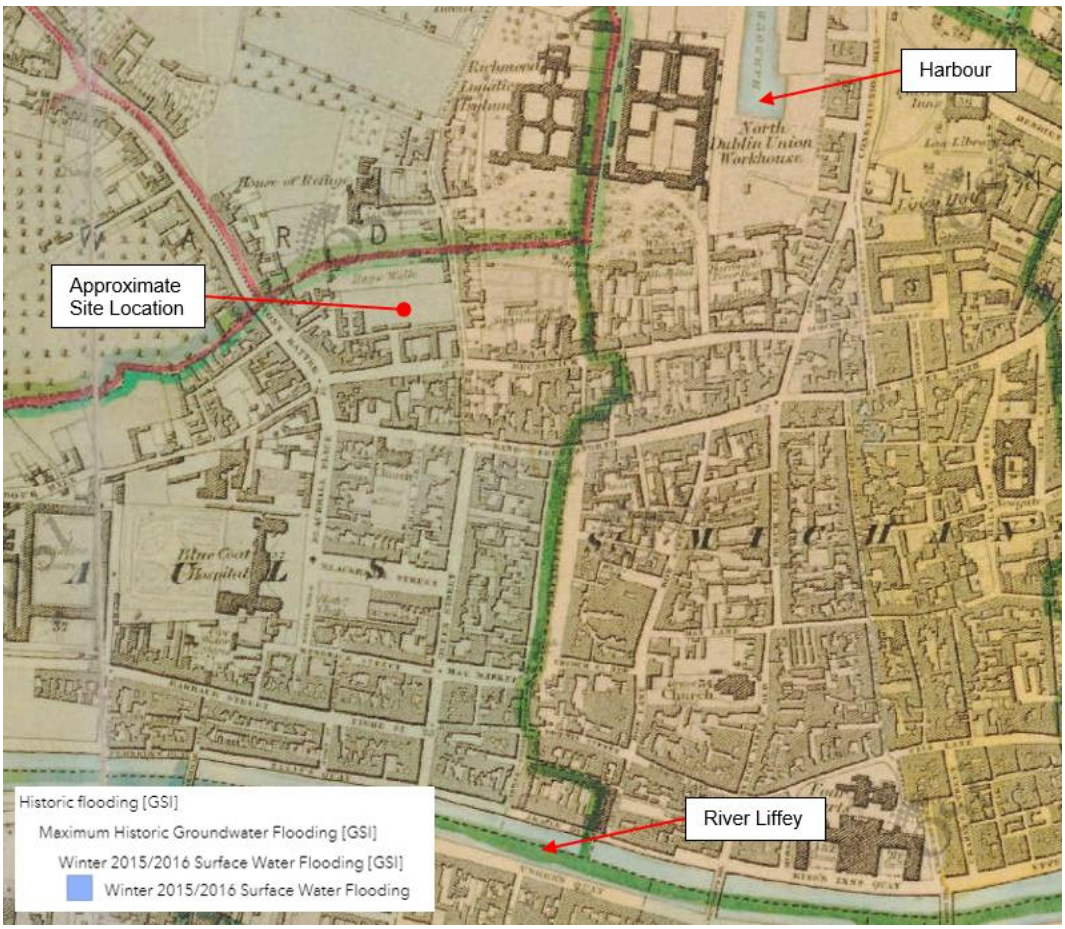


Figure 3-4– Historic 6 Inch Mapping

3.4 Strategic Flood Risk Assessment, Dublin City Development Plan 2022 – 2028

A Strategic Flood Risk Assessment (SFRA), as required by 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' (DEHLG and OPW, 2009), has been undertaken as part of the preparation of the Dublin City Development Plan 2022 2028.

3.4.1 Composite Flood Zone Map

The SFRA contains a Composite Flood Zone Map, the map is included in Appendix D and an extract is shown in Figure 3-5. It indicates that the proposed development site falls within a predictive Flood Zone C scenario.

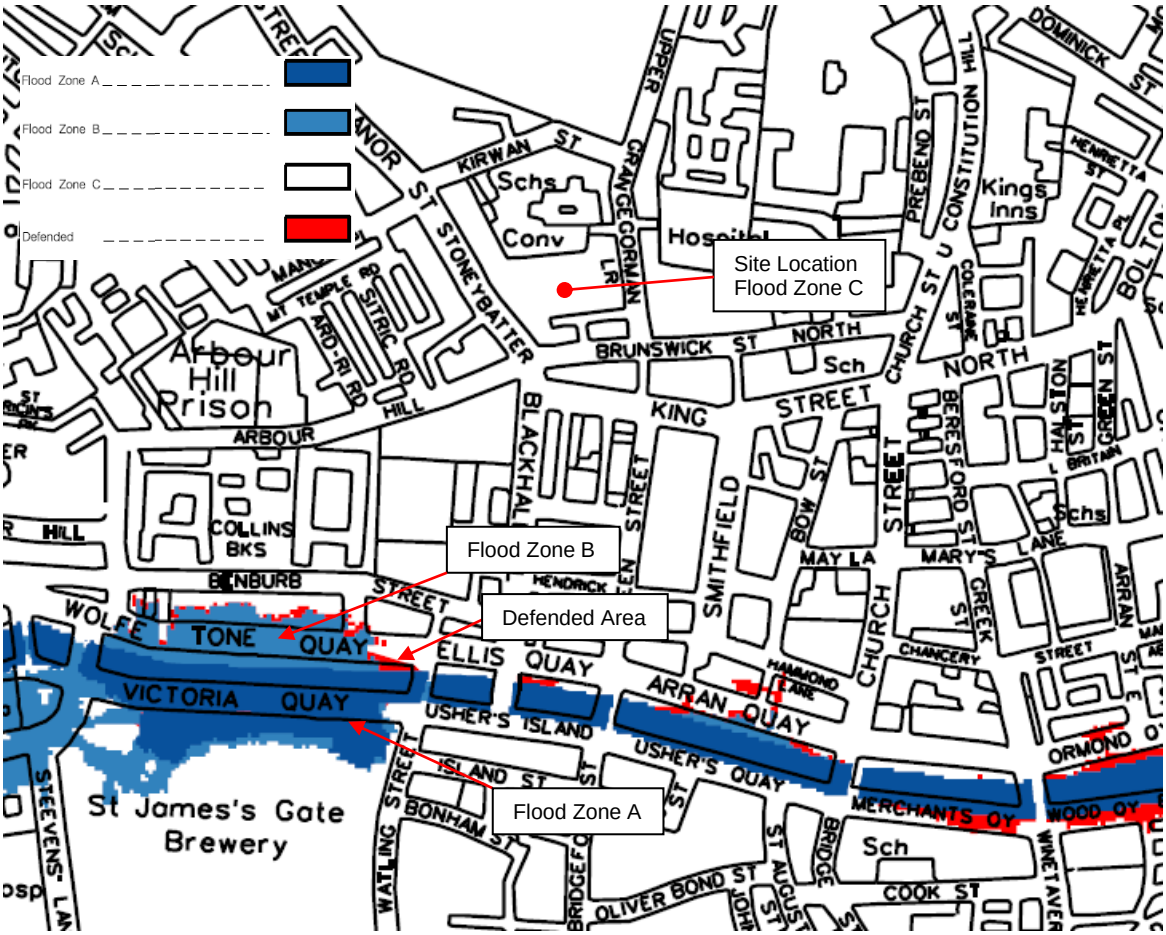


Figure 3-5 – Composite Flood Map (Extract from the SFRA of the Dublin City Development Plan 2022 – 2028)

3.4.2 Justification Test

The Guidelines direct new development primarily towards areas at low risk of flooding. The Guidelines recognise that flood risks should not be the only deciding factor in zoning for development; the Guidelines recognise that circumstances will exist where development of a site in a floodplain is desirable in order to achieve compact and sustainable development of the core of urban settlements.

In order to allow consideration of such development, the Guidelines provide a Justification Test, which establishes the criteria under which desirable development of a site in a floodplain may be warranted.

The full Justification test for the development site is provided in Appendix E. An extract from the Justification Test for is presented in Table 3-3. The development site is located within an area identified as 'Area:4. Liffey: Sean Heuston Bridge – O'Connell Bridge'.

Table 3-3 – Justification Test for Development (Extract from the SFRA of the Dublin City Development Plan 2022 – 2028)

Justification Test for Development Plans
1. Urban Settlement is targeted for growth. Yes: The subject site is within Dublin City, which is targeted for growth in the National Spatial Strategy 2002-2020, Regional Planning Guidelines for the Greater Dublin Area 2010-2022 and in the Dublin City Development Plan 2022-2028.
2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular: **i. Essential to facilitate regeneration and/ or expansion of the centre of the urban settlement.** Yes: The ongoing redevelopment of this area is essential to facilitate the regeneration, consolidation and expansion of the City Centre. Existing. development in this area is a mixture of high density and intensive commercial, industrial, employment and residential development. **ii. Comprises significant previously developed and/ or under-utilised lands.** Yes: The area is intensively developed, however there are some underutilised brownfield lands in the area. It is likely that underutilised lands will be developed within the Plan period and existing developed sites could be redeveloped. Most of the lands within Flood Zone A and B are already built up or comprise brownfield sites. **iii. Is within or adjoining the core of an established or designated urban settlement.** Yes: This area forms part of the City Centre and the City Centre Retail Core. **iv. Will be essential in achieving compact and sustainable urban growth.** Yes: The ongoing development/ redevelopment of land in the City Centre is essential to achieving compact and sustainable urban growth. **v. There are no suitable alternative lands for the particular uses or development type in areas at lower risk of flooding, within or adjoining the urban settlement.** Yes: There are no suitable alternative lands for the particular uses or development type in areas at lower risk of flooding, within or adjoining the urban settlement.
3. A flood risk assessment to an appropriate level of detail has been carried out. Yes: The current report comprises a detailed site-specific flood risk assessment for the subject site that identifies and recommends mitigation measures.
4. Conclusion: The subject area **passes** the Justification Test for Development Plans.

4 OTHER FLOOD SOURCES

4.1 Tidal Flooding

The proposed development site is located approximately 550m south of the nearest potential source of tidal flooding in the River Liffey Estuary. A review of the OPW Tidal Flood Extents Mapping was carried out and indicates that the proposed development site does not fall within a the predicted extreme 0.1% (1 in 1000-year current scenario) tidal flood event.

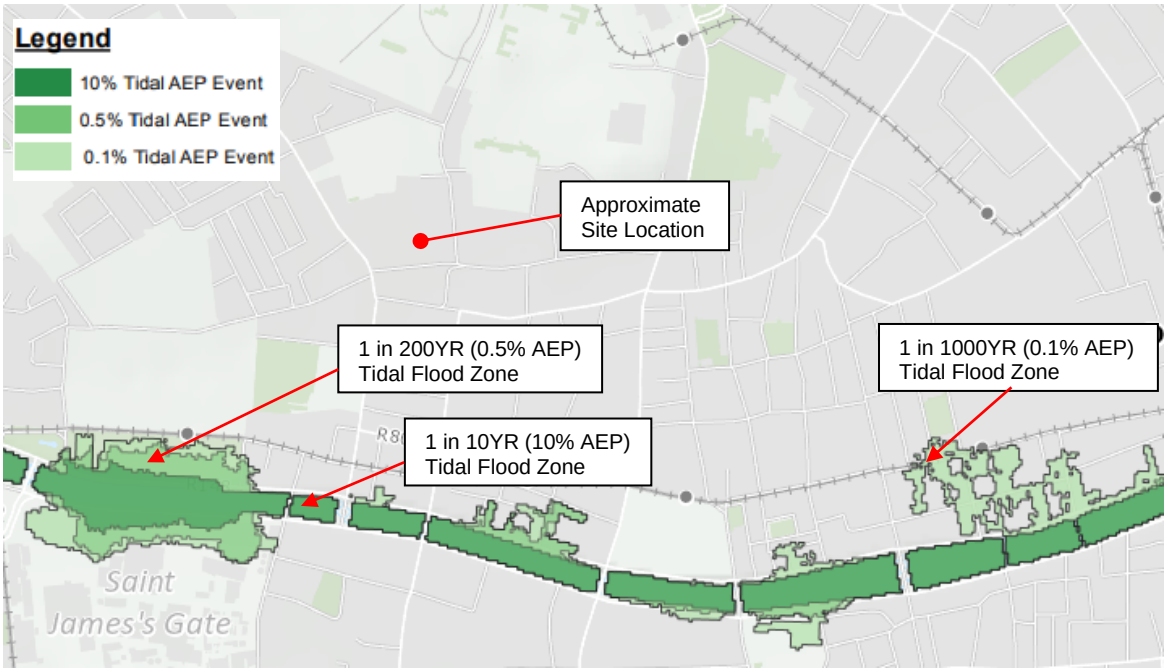


Figure 4-1 – CFRAM Tidal Flood Extent Map (Extract from OPW)

The CFRAMS flood map also provides information on predicted water levels for the 0.1% AEP (1 in 1000 year), 0.5% AEP (1 in 200 year), 10% AEP (1 in 10 year) coastal flood events at various node points along the River Liffey. The node points are listed in Table 4-1 below. The location of the node points is indicated in Figure 4-2and on the drawings in Appendix F. Predictive extreme flood levels at this node point are applicable to utilise in the assessment of potential fluvial flood risk to the proposed development site.

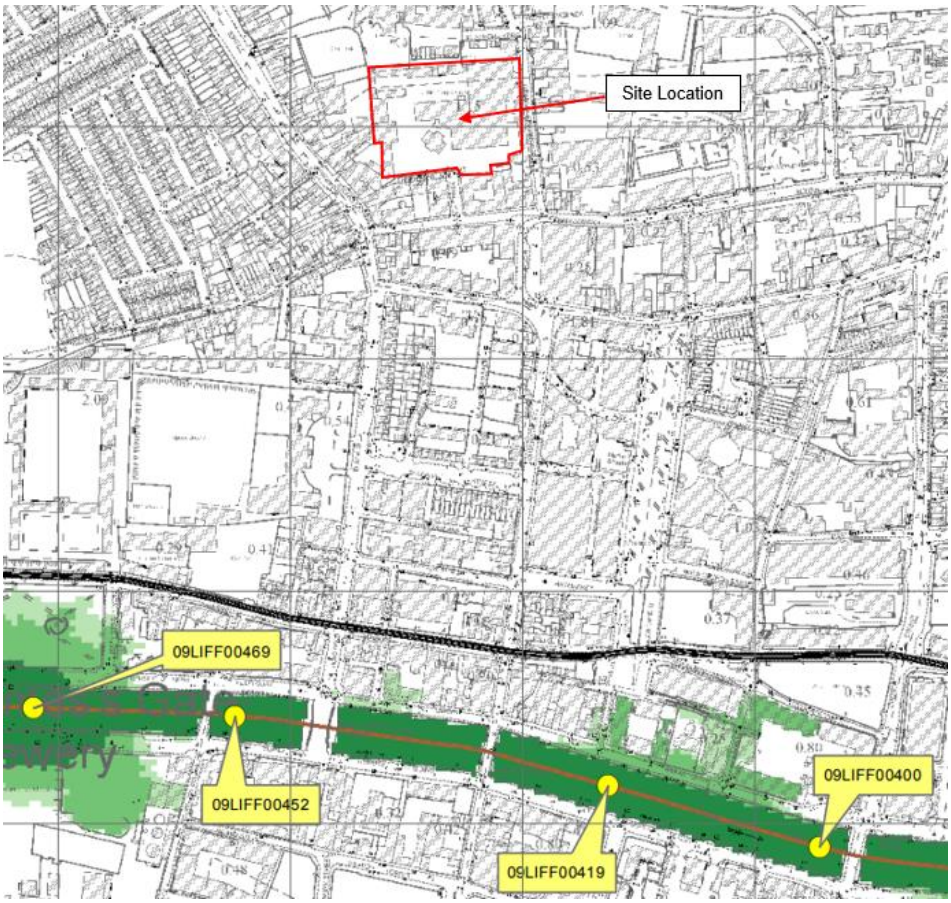


Figure 4-2 – CFRAM Tidal Flood Extent Map(Extract from OPW)

Table 4-1 - CFRAMS Predicted Water Levels

Node Label	Water Level 10% AEP	Water Level 0.5% AEP	Water Level 0.1% AEP
09LIFF00469	2.82	3.24	3.46
09LIFF00452	**2.71**	**2.92**	**3.23**
09LIFF00419	2.77	3.19	3.41
09LIFF00400	2.75	3.18	3.40

The node point closest to the western boundary of the site is referenced as node point *09LIFF00452*. The 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) flood levels at this point are predicted as 2.92m and 3.23m respectively.

According to the SFRA of the Dublin City Development Plan 2022 – 2028 the recommended minimum finished floor level is to be:

Table 4-2 - Recommended Minimum Finished Floor Levels (Extract from the Strategic Flood Risk Assessment of the Dublin City Development Plan 2022-2028)

Scenario	Finished floor level to be based on
Tidal, undefended	0.5% AEP flood + climate change (20% allowance for highly vulnerable development) + 300mm freeboard

Using the information obtained from the predicted flood level, in order to permit a sustainable development of this site and to mitigate against potential residual flood risk to the development it is recommended that the finished floor level = 2.92m with 20% + 0.3m = 3.22m.

4.2 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 Resilient City (FRC) project was carried out and indicates some pluvial flooding surrounding the site. Note, these maps are 'predictive' flood maps showing areas predicted to be inundated during a theoretical or 'design' flood event with an estimated probability of occurrence, rather than information for actual floods that have occurred in the past, which is presented on 'historical' flood maps.

The flood mapping shows small pockets of moderate pluvial flood risk present on the development site; this corresponds to minor undulations in the ground level within the undeveloped site. In developing the site, the ground levels will be re-profiled, removing these undulations.

The proposed site is currently used as a Service and Maintenance Depot by Dublin City Fire Brigade, occupied by surface car-parking and storage buildings; the site is largely hardstand and is provided with no attenuation facility or flow control mechanism. The proposed drainage system will collect surface water runoff from the site and attenuate to equivalent greenfield run-off rates; this will mitigate the potential pluvial flood risk arising from the development site.

Figure 4-3 – Pluvial Flood Extent Map (Extract from OPW)

5 SEQUENTIAL APPROACH TO PLANNING

The document "Planning Systems and Flood Risk Management: Guidelines for Planning Authorities November 2009" requires the adoption of a sequential approach to flood risk management when assessing the location for new developments. This approach is a risk-based method to guide development away from areas that have been identified through flood risk assessment as being at risk from flooding. The philosophy used in this approach is outlined in Figure 5-1.

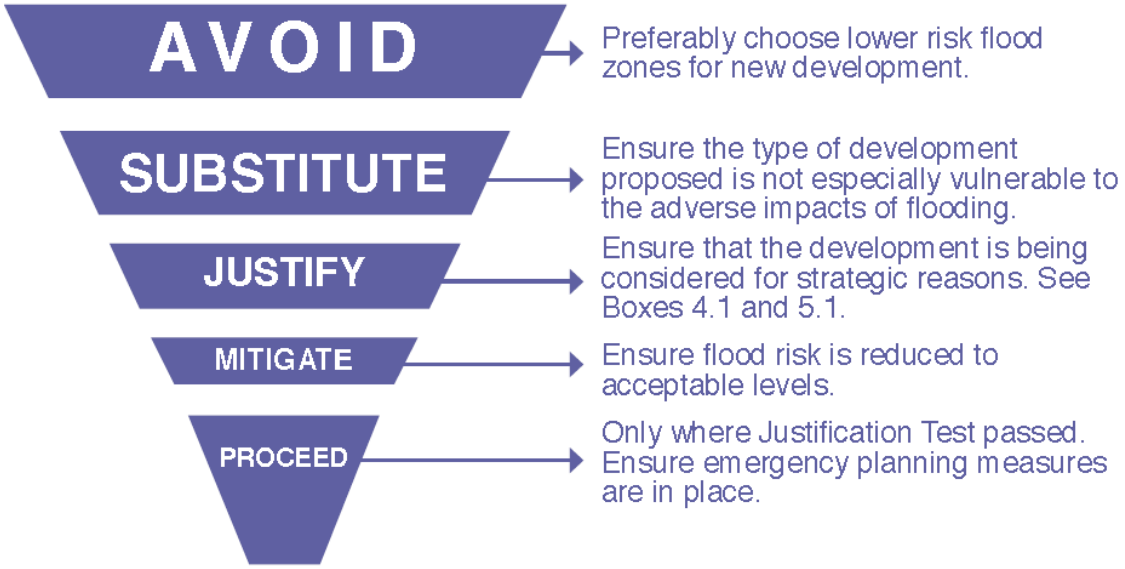


Figure 5-1 - Source: The Planning Systems and Flood Risk Management: Guidelines for Planning Authorities November 2009

The sequential approach uses mapped flood zones alongside considerations of the vulnerability of different types of development to give priority to development in zones of low flood probability.

5.1 Flood Zones

The flood zones are defined on the basis of flooding from rivers and the sea. The different flood zones recommended in the 2009 Planning Guidelines are:

Flood Zone A – Highest risk area where there is a 1% chance of flooding in any one year from rivers and a 0.5% chance of coastal flooding.

Flood Zone B – Moderate risk area where the chance of flooding in any one year is 0.1-1% for rivers and 0.1-0.5% for coastal flooding.

Flood Zone C – Low risk area with less than 0.1% chance of flooding from rivers or the sea in any given year.

As described in Section 3 and Section 4, the proposed development is outside of the area predicted to flood during a 0.1% AEP (1 in 1000year) fluvial and tidal flood event. The development is therefore located within Flood Zone C in accordance with the 2009 Planning Guidelines.

5.2 Vulnerability Class of Proposed Development

The vulnerability class of the development is dependent on the land use and type of development proposed. See Figure 5-2 for the vulnerability classes.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

Figure 5-2 - Classification of Vulnerability to Flooding for Various Development Types (Source – Table 3.1 Planning System and Flood Risk Management – Guidelines for Planning Authorities DEHLG, OPW, November 2009)

The 2009 Planning Guidelines presents a matrix of vulnerability versus flood zone to illustrate appropriate development and the requirement of justification tests. That matrix can be seen in Figure 5-3. Based on the land uses listed in Figure 5-2, the proposed residential development is classified as a highly vulnerable development. However, the development will be located in Flood Zone C and is therefore considered to be appropriate, and a Justification Test is not therefore required.

	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

Figure 5-3 - Matrix of Vulnerability vs. Flood Zone (Source – Table 3.1 Planning System and Flood Risk Management – Guidelines for Planning Authorities DEHLG, OPW, November 2009)

6 SUMMARY AND CONCLUSIONS

The analysis and flood zone delineation undertaken as part of this DFRA indicates that the proposed site is not expected to be impacted during the occurrence of a 0.1% AEP (1 in 1000 year) fluvial flood event.

The PFRA flood mapping indicates that the proposed development site does not fall within the predicted extreme 0.1% (1 in 1000 year) current scenario fluvial flood zone.

The node point closest to the western boundary of the site is referenced as node point *09LIFF00452*. The 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood levels at this point are predicted as 2.92m and 3.23m respectively.

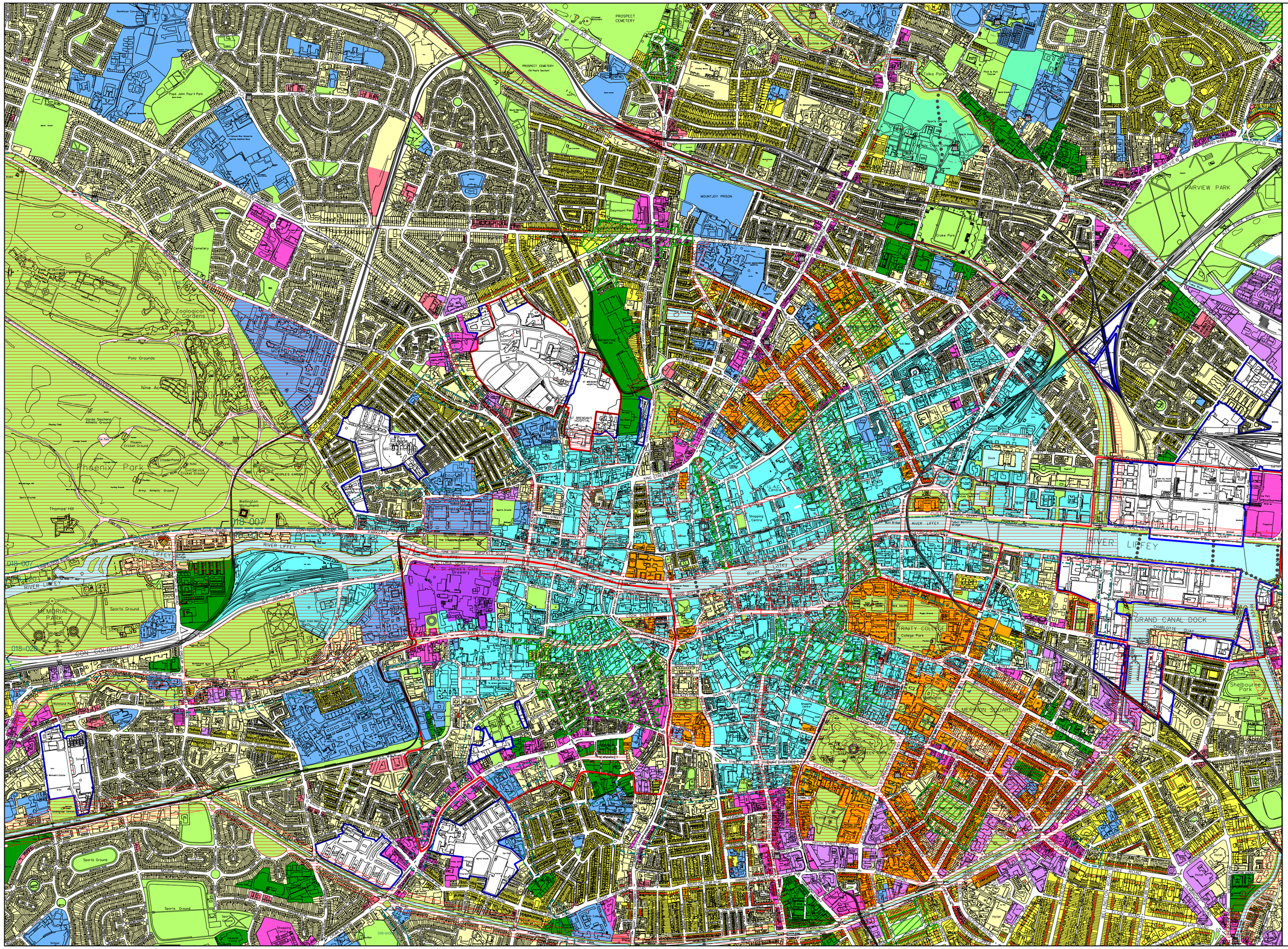
According to the SFRA of the Dublin City Development Plan 2022 – 2028, it is recommended that for a scenario of fluvial event-undefended, the minimum finished floor level is to be based on 1% AEP flood + climate change (20% allowance for highly vulnerable development) + 300mm freeboard i.e., = 2.92m with 20% + 0.3m = 3.22m.

The development site passes the Justification Test for Development Plans.

A review of the OPW Tidal Flood Extents Mapping was carried out and indicates that the proposed development site does not fall within a the predicted extreme 0.1% (1 in 1000-year current scenario) tidal flood event.

In consideration of the above assessment, analysis and recommendations, overall development of the site is not expected to result in an adverse impact to the existing hydrological regime of the area or to result in an increased flood risk elsewhere.

APPENDIX A – LAND USE ZONING MAP



Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

Dublin City Development Plan 2022-2028

DRAFT

Map E

MAP A	MAP B	MAP C
MAP D	MAP E	MAP F
MAP G	MAP H	

LAND USE ZONING OBJECTIVES[4]

- Zone Z1 Sustainable Residential Neighbourhoods
- Zone Z2 Residential Neighbourhoods (Conservation Areas)
- Zone Z3 Neighbourhood Centres
- Zone Z4 Key Urban Villages / Urban Villages
- Zone Z5 City Centre
- Zone Z6 Employment / Enterprise
- Zone Z7 Employment (Heavy)
- Zone Z8 Georgian Conservation Areas
- Zone Z9 Amenity / Open Space Lands / Green Network
- Zone Z10 Inner Suburban and Inner City Sustainable Mixed-Uses
- Zone Z11 Waterways Protection
- Zone Z12 Institutional Land (Future Development Potential)
- Zone Z14 Strategic Development and Regeneration Areas (SDRAs)
- Zone Z15 Community and Social Infrastructure

SPECIFIC OBJECTIVES

- Conservation Areas
- Architectural Conservation Areas
- Protected Structures, (RPS takes precedence) ***
- Sites of Archaeological Interest*
- Zones of Archaeological Interest*
- National Monuments*
- COMAH establishments (SEVESO establishments)
- LAP (Local Area Plan) & SDZ (Special Development Zone)
- Dublin Airport Outer Public Safety Zone

ROADS
- Roads, Street and Bridge Schemes

1. Map to be read in conjunction with the written statement
2. Roads objectives are shown diagrammatically
3. *Based on the Record of Monuments and Places (RMP). For additional information see www.archaeology.ie
4. See written statement (Chapter 14) for full zoning text

City Boundary

Scale: 0 100 200 300 400 500 metres

John O'Hara
Dublin City Planner

APPENDIX B – CFRAM FLUVIAL FLOOD EXTENTS MAP

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
09LIFF00513	2.82	149.62	3.10	205.77	3.50	275.16
09LIFF00508	2.82	149.90	3.11	205.77	3.51	275.14
09LIFF00469	2.75	153.34	2.99	207.08	3.36	276.42
09LIFF00452	2.71	154.33	2.92	208.54	3.23	276.87
09LIFF00419	2.64	156.52	2.80	210.16	3.04	278.18
09LIFF00400	2.61	158.04	2.74	211.32	2.94	279.13

313400 313600 313800 314000 314200 314400 314600 314800

235000 234800 234600 234400 234200 234000 233800

Fluvially influenced flooding does not extend downstream of this point. Please refer to tidal flood maps Figure No. E09LIF_EXCCD_F0_02.

09LIFF00508

09LIFF00513

09LIFF00469

09LIFF00452

09LIFF00419

09LIFF00400

For river Camac flood extents and depths Refer to Camac HPW maps.

Currently Undefended - Contact DCC for further information.

St James's Gate Brewery

0 50 100 200 300 400 500 Metres

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

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

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

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:
Liffey Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
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_EXFCD_F1_02

Map Series : Page 2 of 8

Drawing Scale : 1:5,000 @ A3

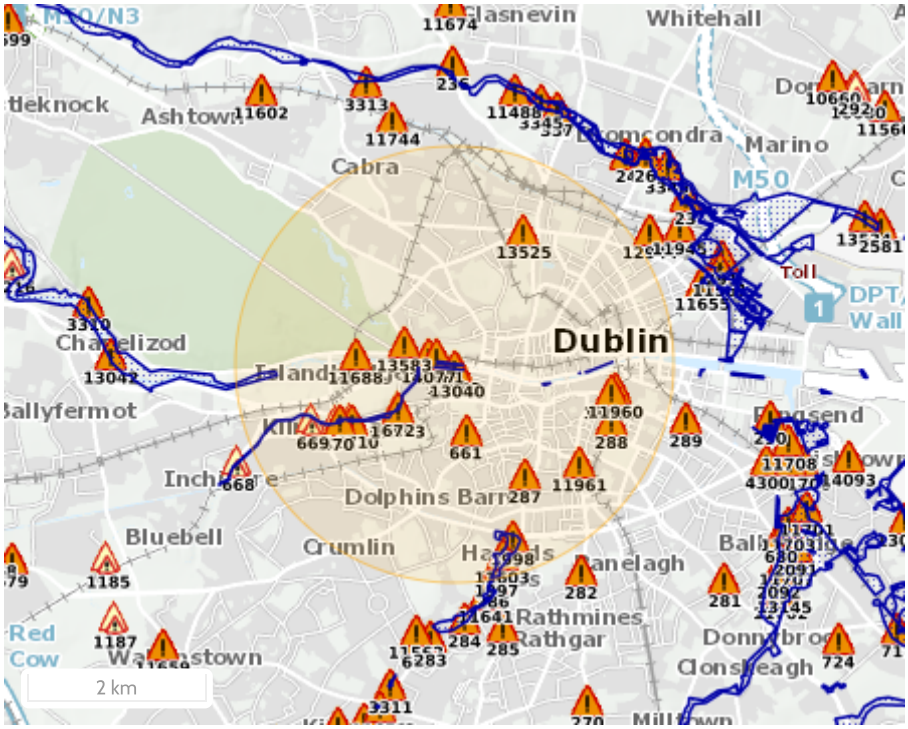
APPENDIX C – PAST FLOOD SUMMARY REPORT

Past Flood Event Local Area Summary Report

Report Produced: **26/5/2023 10:43**

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

This report has been downloaded from www.floodinfo.ie (the "**Website**"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

29 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Flooding at Trinity College, Dublin 2, 26th July 2013 (ID-11960)	25/07/2013	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
2.	Flooding on Wexford St, Dublin 2 on 26th July 2013 (ID-11961)	25/07/2013	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
3.	Flooding at Dublin City on 30/07/2019 (ID-13659)	30/07/2019	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
4.	Poddle August 1986 (ID-32)	24/08/1986	Area
	Additional Information: Reports (9) Press Archive (1)		
5.	Poddle St Claires Ave Sept 1931 (ID-1997)	02/09/1931	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
6.	Poddle Limekiln Lane Aug 1905 (ID-1998)	24/08/1905	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Flooding at Dublin City on 22/11/2017 (ID-13583) Additional Information: Reports (0) Press Archive (0)	22/11/2017	Approximate Point
8.	Poddle Limekiln Lane Sept 1931 (ID-3267) Additional Information: Reports (1) Press Archive (0)	02/09/1931	Approximate Point
9.	Camac August 1986 (ID-125) Additional Information: Reports (3) Press Archive (0)	24/08/1986	Area
10.	Liffey Lower - Dec 1954 (ID-241) Additional Information: Reports (5) Press Archive (2)	08/12/1954	Area
11.	Flooding at Dublin City on 06/01/2014 (ID-13040) Additional Information: Reports (0) Press Archive (0)	06/01/2014	Approximate Point
12.	Mount Jerome Harold's Cross June 1963 (ID-286) Additional Information: Reports (4) Press Archive (2)	10/06/1963	Exact Point
13.	Clanbrassil Street June 1963 (ID-287) Additional Information: Reports (4) Press Archive (2)	10/06/1963	Exact Point
14.	Grafton Street June 1963 (ID-288) Additional Information: Reports (4) Press Archive (2)	10/06/1963	Exact Point
15.	Poddle Tributary Marrowbone Lane Jan 1941 (ID-661) Additional Information: Reports (1) Press Archive (0)	20/01/1941	Approximate Point
16.	Camac Turvey Ave Recurring (ID-669) Additional Information: Reports (1) Press Archive (0)	n/a	Exact Point
17.	Camac Carrickfoyle Terrace Recurring (ID-670) Additional Information: Reports (1) Press Archive (0)	n/a	Exact Point
18.	Camac Kearns Place Recurring (ID-671) Additional Information: Reports (1) Press Archive (0)	n/a	Exact Point
19.	Camac Bow Bridge Recurring (ID-672) Additional Information: Reports (1) Press Archive (0)	n/a	Approximate Point
20.	Flooding at Dublin City on 14/06/2016 (ID-14077) Additional Information: Reports (0) Press Archive (0)	14/06/2016	Approximate Point
21.	Flooding at Dublin City on 15/06/2016 (ID-13525) Additional Information: Reports (0) Press Archive (0)	15/06/2016	Approximate Point
22.	Dublin City Tidal Feb 2002 (ID-456) Additional Information: Reports (45) Press Archive (27)	01/02/2002	Area
23.	Flooding at Bow Lane, Kilmainham, Dublin 8 on 24th Oct 2011 (ID-11563) Additional Information: Reports (1) Press Archive (0)	23/10/2011	Approximate Point
24.	Flooding at Harold's Cross, Dublin City on 24th Oct 2011 (ID-11603) Additional Information: Reports (1) Press Archive (0)	23/10/2011	Approximate Point

	Name (Flood_ID)	Start Date	Event Location
25.	Flooding at Kearns Place, Kilmainham, Dublin 8 on 24th Oct 2011 (ID-11620) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Approximate Point
26.	Flooding at Lady's Lane, Kilmainham, Co. Dublin on 24th Oct 2011 (ID-11622) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Approximate Point
27.	Flooding at Ashling Hotel, Parkgate Street, Dublin 8 on 24th Oct 2011 (ID-11681) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
28.	Flooding at Bridgewater Quay Apartments, Islandbridge, Dublin 8. on 24th Oct 2011 (ID-11688) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
29.	Flooding at Dublin City on 03/02/2014 (ID-13093) **Additional Information:** Reports (0) Press Archive (0)	03/02/2014	Approximate Point

APPENDIX D – DCC COMPOSITE FLOOD MAP

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

Dublin City Development Plan 2022-2028

Composite Flood Map for Dublin City Council

Note: The Composite Flood Map, and all other map extracts, illustrate Flood Zone A, B and Defended Areas (in red), where defended areas indicates lands defended to the 1% AEP fluvial and /or the 0.5% AEP tidal flood events and should therefore be considered also to be Flood Zone A.

Flood Zone A

Flood Zone B

Flood Zone C

Defended

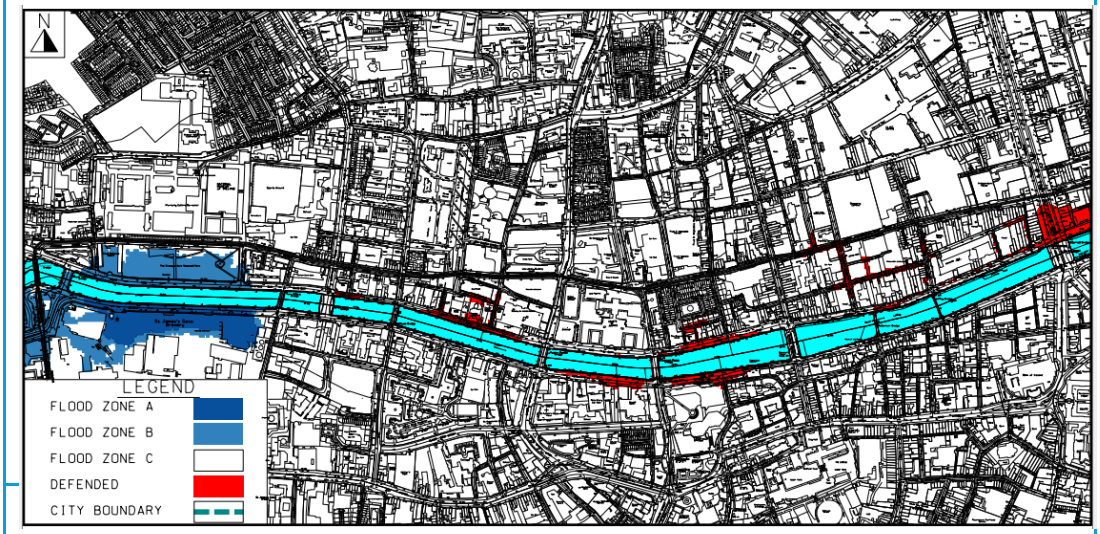
City Boundary

Refer To OPW Website – Floodinfo.ie

John O'Hara
Dublin City Planner

APPENDIX E – DCC JUSTIFCATION TEST

Area: 4. Liffey: Sean Heuston Br. - O'Connell Bridge



Council Development Plan 2022 - 2028, **Flood Map E.**

Area Description	The area comprises the City centre. The area is served by Dublin Bus / DART / Main Line Rail / Luas. The area on the south side includes Burgh Quay, Aston Quay, Crampton Quay, Wellington Quay, Essex Quay, Wood Quay, Merchants Quay, Usher's Quay, Ushers Island and Victoria Quay and areas south of these. On the north side it includes Wolfe Tone Quay, Ellis Quay, Arran Quay, Inn's Quay, Ormond Quays Upper & Lower, Bachelor's Walk and areas north of these. The area includes the City Centre retail core centred on Henry Street and Grafton Street, a number of the City's cultural quarters including around Dublin Castle, the north and south Inner City (including part of the north east Inner City), the Liberties and Guinness lands, Smithfield / Markets Area and Grangegorman Lower. Development in this area is a mixture of high density commercial and residential.
SDRAs within this Area	SDRA 7 Heuston and Environs (part of) SDRA 10 North East Inner City (part of) SDRA 13 Markets Area and Environs SDRA 15 Liberties and Newmarket Square (part of) SDRA 17 Werburgh Street
Benefitting from Defences (flood relief scheme works)	All of this area has existing Quay Walls but their design standards and capacity for flood defence is unknown. Dutch Dam defences have been incorporated into openings in the Quay Walls along the boardwalk. These are raised out of the ground to combat high tides and generally afford 750mm of flood protection.
Sensitivity to Climate Change	The River Liffey at this location is tidally influenced, and is as vulnerable to climate change as per its

Area: 4. Liffey: Sean Heuston Br. - O'Connell Bridge	
	downstream limits. Increases in river levels could have significant consequences if quay walls are overtopped more frequently.
Residual Risk	Given the unknown standard of defences, risk should be assessed based on a fully undefended scenario so no specific assessment of defence failure will be required.
Historical Flooding	The SFRA flood maps are consistent with previous flooding of this section of the Liffey Estuary. The main flood risk zones are sections of the north and south quay roads and some roadways off these as outlined on above map, Victoria Quay, sections of the Diageo site, Wolfe Tone Quay and sections of the Esplanade.
Surface Water	All surface water in this area needs to be carefully managed and provision made for significant rainfall events during high tides. A one year high tide event should be assumed during a 100-year rainfall event. Should development be permitted, best practice with regard to surface water management should be implemented across the development area, to limit surface water run-off to current values. All developments shall have regard to the Pluvial Flood Maps in their Site Specific Flood Risk Assessment, see FloodResilienCity Project**,** Volume 2 City Wide Pluvial Flood Risk Assessment at http://www.dublincity.ie/main-menu-services-water-waste-and-environment-drains-sewers-and-waste-water/flood-prevention-plans.
Commentary on Flood Risk: The flood extents indicate flow paths generally coming directly out of the tidally influenced River Liffey. Some flow routes are through quay walls and underground chambers and pipelines near quay walls. All known outlets have been flapped to reduce the tidal influence on other types of flooding. The flood maps were produced based on the OPW CFRAM Plan and checked against historic flooding in the area. Fluvial influences in the Liffey Estuary are estimated to contribute significantly to flood water levels upstream of Rory O'Moore Bridge.	
Development Options: Infill development / redevelopment proposals are likely to come forward in the City Centre Retail Core and the wider City Centre area during the lifetime of the Plan. In addition, there are a number of Strategic Development and Regeneration Areas (SDRA's) located / forming part of this area: SDRA 7 Heuston and Environs, SDRA 10 North East Inner City, SDRA 13 Markets Area and Environs, SDRA 15 Liberties and Newmarket Square, and SDRA 17 Werburgh Street. Specific development proposals	

Area: 4. Liffey: Sean Heuston Br. - O'Connell Bridge

/ opportunity sites are identified in these SDRA's - see sections 13.9, 13.12, 13.15, 13.17 and 13.19 respectively, of the Written Statement.

The main flood cell is located along Victoria Quay on the south side of the river, which is currently zoned Z7 '*To provide for the protection and creation of industrial uses and facilitate opportunities for employment creation including Port Related Activities*' and currently forms part of St. James Gate Brewery in the Development Plan.

The areas shown along Wolfe Tone Quay generally coincide with Z9 zoning which is '*To preserve, provide and improve recreational amenity, open space and ecosystem services'*. Water compatible uses will be permitted in this area or uses permissible under the Z9 objective. Uses to the south side of the River at the Guinness lands should be compatible with the Z7 zoning for the site. However, any development could reasonably be accommodated within the extents of Flood Zone C and should not need to extend into Flood Zone A or B.

Justification Test for Development Plans

1. **Part 1 of the Justification Test is covered under Section 3.2.1 in the main body of the SFRA report.**

2. **The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:**

(i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement.

Answer: Yes: The ongoing redevelopment of this area is essential to facilitate the regeneration, consolidation and expansion of the City Centre**.** Existing development in this area is a mixture of high density and intensive commercial, industrial, employment and residential development.

(ii) Comprises significant previously developed and/or under-utilised lands.

Answer: Yes: The area is intensively developed, however there are some underutilised brownfield lands in the area. It is likely that underutilised lands will be developed within the Plan period and existing developed sites could be redeveloped. Most of the lands within Flood Zone A and B are already built up or comprise brownfield sites.

(iii) Is within or adjoining the core of an established or designated urban settlement.

Area: 4. Liffey: Sean Heuston Br. - O'Connell Bridge

Answer: Yes: This area forms part of the City Centre and the City Centre Retail Core.

(iv) Will be essential in achieving compact and sustainable urban growth.

Answer: Yes: The ongoing development/ redevelopment of land in the City Centre is essential to achieving compact and sustainable urban growth.

(v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.

Answer: There are no suitable alternative lands for the particular uses or development type in areas at lower risk of flooding, within or adjoining the urban settlement. There are only limited areas idenitifed as being in Flood Zones A and B and they are considered essential to achieving a consolidated urban centre and to comply with the NPF and RSES.

3. Specific Flood Risk Assessment

- See Justification Test for Strategic Development and Regeneration Areas No's. 7 (Heuston and Environs) and 15 (Liberties and Newmarket Square) in Appendix C2 for specific recommendations in relation to those areas.
- To a large extent, the areas indicated as being within Flood Risk Areas are generally built out or are existing brownfield sites and the opportunities for future development are limited.
- The extents of Flood Zone A and B are relatively limited but there may be situations where large sites come up for redevelopment which encroach partly into the Flood Zones A or B. In such cases, the guidance on FRA should be followed, and water compatible or less vulnerable elements of the development located within Flood Zone A / B and along the river side.
- Climate change risks should be assessed and appropriately mitigated in all development.
- It is an objective of DCC in conjunction with the OPW to look at identified flood cells as above, and to look at overall flood alleviation scheme for the catchment. However, the extents of the Flood Zones are not significant enough to prevent infill development and well planned larger scale regeneration from occurring.
- Specific FRA's should be carried out for all basements and underground structures with respect to any human access. No underground offices or residential units (whether temporary or permanent) will be allowed.
- Groundwater flooding particularly during high tide should be considered in all development flood risk assessments in this area.

Area: 4. Liffey: Sean Heuston Br. - O'Connell Bridge
Conclusion: The subject area passes the Justification Test for Development Plans.

APPENDIX F – CFRAMS TIDAL FLOOD EXTENTS MAP

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 0.5% AEP	Flow (m³/s) 0.5% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF00513	2.86	112.55	3.27	115.00	3.48	116.33
09LIFF00469	2.82	N/A	3.24	N/A	3.46	N/A
09LIFF00452	2.71	118.39	2.92	121.24	3.23	123.62
09LIFF00419	2.77	N/A	3.19	N/A	3.41	N/A
09LIFF00400	2.75	N/A	3.18	N/A	3.40	N/A

Tidally influenced flooding does not extend upstream of this point. Please refer to fluvial flood maps Figure No. E09LIF_EXFCD_F0_02.

09LIFF00513

09LIFF00469

09LIFF00452

09LIFF00419

09LIFF00400

St James's Gate Brewery

313400 313600 313800 314000 314200 314400 314600 314800

235000 234800 234600 234400 234200 234000 233800

0 50 100 200 300 400 500 Metres

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

Legend

- 10% Tidal AEP Event
- 0.5% Tidal AEP Event
- 0.1% Tidal AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

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

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW

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:
Liffey Tidal Flood Extents

Map Type:	EXTENT
Source:	TIDAL
Map Area:	COASTAL
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_02

Map Series : Page 2 of 8

Drawing Scale : 1:5,000 @ A3