

INFRASTRUCTURE

Project

Richmond Road SHD

Report Title

Site Specific Flood Risk Assessment

Client

Birkey Limited



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1.0 INTRODUCTION

1.1 Background

DBFL Consulting Engineers were commissioned to undertake a “Site Specific Flood Risk Assessment” (SSFRA), for a proposed planning application for a mainly residential development at Richmond Road, Dublin 3.

This SSFRA should be read in conjunction with DBFL’s Infrastructure Design Report (210027-DBFL-XX-XX-RP-C-001) and drawings for the application.

1.2 Proposed Development

Birkey Limited intend to apply to An Bord Pleanála for permission for a strategic housing development at this c. 0.61 hectare (c. 6,067 sq m) site at No. 146A and Nos. 148-148A Richmond Road, Dublin 3 (Eircodes D03 W2H1, D03 T6P0, D03 Y8R9, D03 PX27, D03 K6F7, D03 E447 and D03 HR27). The site is bounded to the north-east by Richmond Road and the Leyden’s Wholesalers & Distributor Site, to the north-west by an apartment development (Deakin Court), to the south-west by the Tolka River and to the south-east by a residential and commercial development (Distillery Lofts). Improvement works to Richmond Road are also proposed including carriageway widening and a new signal controlled pedestrian crossing facility on an area of c. 0.08 hectares (c. 762 sq m). The development site area and road works area will provide a total application site area of c. 0.69 hectares (c. 6,829 sq m).

The proposed development will principally consist of: the demolition of all existing structures on site (c. 2,346 sq m) including warehouses and 2 No. dwellings; and the construction of a part 6 No. to part 10 No. storey over basement development (with roof level telecommunications infrastructure over), comprising 1 No. café/retail unit (157 sq m) at ground floor level and 183 No. Build-to-Rent apartments (104 No. one bedroom units and 79 No. two bedroom units). The proposed development has a gross floor area of c. 16,366 sq m over a basement of c. 2,729 sq m. The proposed development has a gross floor space of c. 15,689 sq m.

The development also includes the construction of a new c. 126 No. metre long section of flood wall to the River Tolka along the site’s southern boundary. The new flood wall is positioned at the top of the existing river bank and will connect to existing constructed sections of flood wall upstream and downstream of the site. The top of the wall will be set at the required flood defence level resulting in typical wall heights of c. 1.2 to 2 metres above existing ground levels. The development will also include the repair and maintenance of the existing river wall on site adjacent to the River Tolka.

The development also provides ancillary residential amenities and facilities; 71 No. car parking spaces including 8 No. electric vehicle spaces, 4 No. mobility impaired spaces and 1 No. car share space; 5 No. motorcycle parking spaces; bicycle parking; electric scooter storage; a drop off space; the decommissioning of the existing telecommunications mast at ground level and provision of new telecommunications infrastructure at roof level including shrouds, antennas and microwave link dishes; balconies facing all directions; public and communal open space; a pedestrian/bicycle connection along the north-western boundary of the site from Richmond Road to the proposed pedestrian/bicycle route to the south-west of the site adjoining the River Tolka; roof gardens; hard and soft landscaping; boundary treatments; green roofs; ESB Substation; switchroom; comms rooms; generator; lift overruns; stores; plant; and all associated works above and below ground.

1.3 Methodology

The Planning System and Flood Risk Management Guidelines for Planning Authorities”, November 2009 and its Technical Appendices together with the recommendations in the Dublin City Council (DCC) Strategic Flood Risk Assessment (SFRA) were used as the basis for preparing the site-specific flood risk assessment. A summary of the existing and proposed Tolka River flood works is also provided.

2.0 SITE DETAILS

2.1 Site Characteristics

The subject site is located at Richmond Road, Dublin 3 and has an area of approximately 0.61ha. The current use of the site is commercial / industrial, with several warehouse buildings and a three-storey plus dormer level residential building occupying the site. The site is bounded to the north by Richmond Road, to the east by Leydens wholesalers / distributors industrial yard, to the south-east by “Distillery Lofts” apartments and office development, to the south by the Tolka River, and to the west by “Deakin Court” residential apartment development, refer to Figure 1 below for the site location map. The nearest river crossing, Distillery Road Bridge, is circa 50m downstream. There are no watercourses passing through the subject site.

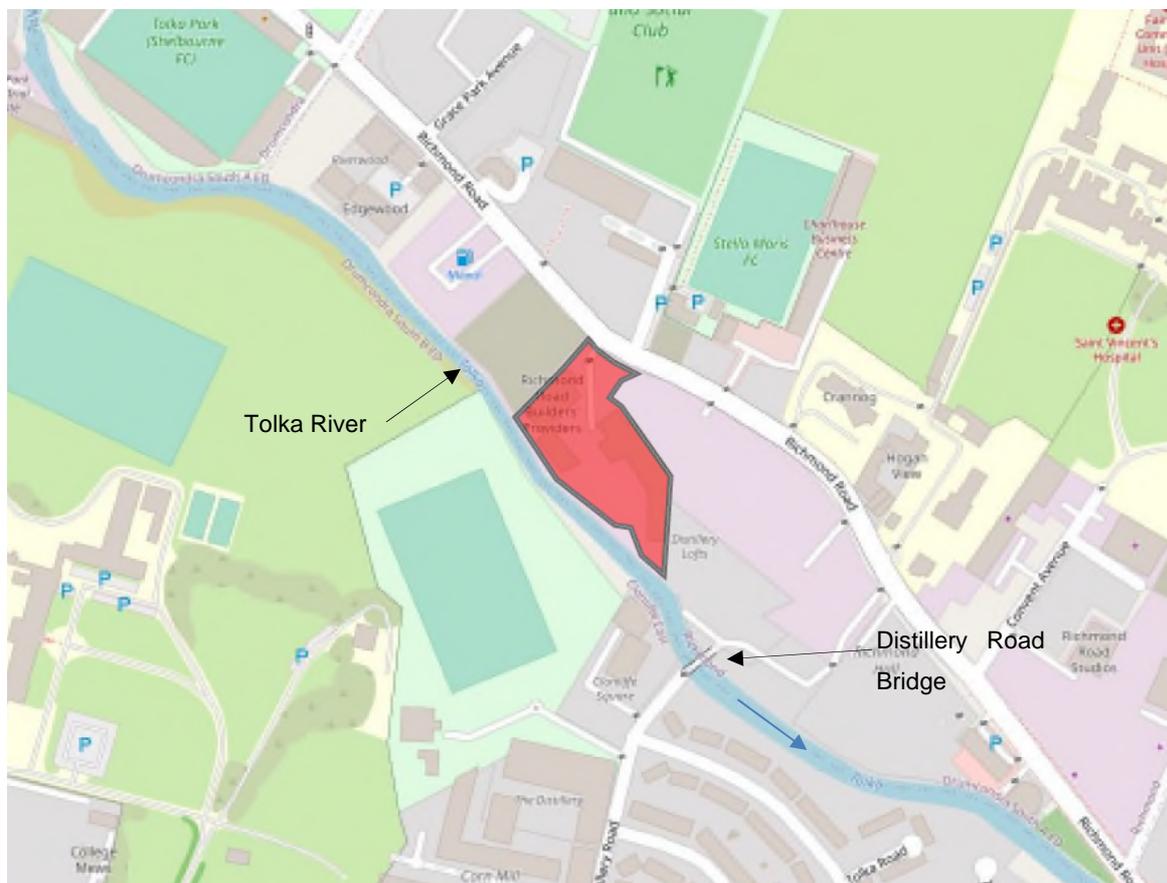


Figure 1: Indicative Site Location (source EPA Maps)

The site is generally flat, with a slight fall from Richmond Road towards the Tolka River, (average gradient 1:130). A topographical survey of the site is provided as a background to DBFL Site Services Plan drawing 210027-DBFL-CS-SP-DR-C-1001. The site is fully paved and unattenuated surface water is discharged from the site directly to the Tolka River via an existing manhole at the south east corner.

The Tolka River is immediately to the south of the site and is a major flood risk consideration for the proposed development, this is discussed further below.

3.0 TOLKA RIVER

3.1 General

The Tolka River is the second largest river to enter Dublin in terms of its length and catchment area, after the River Liffey. It rises west of Dublin in County Meath and is fed by a network of small tributaries as it flows through Batterstown, Rathbeggan, Quarryland, Piercetown, Blackbull, Dunboyne, Clonee, Mulhuddart, Blanchardstown, Finglas Bridge, Glasnevin, Drumcondra, North Strand and East Wall before entering the sea at Fairview Park approximately 1.6km downstream of the site. It is tidal at the site and up to circa 100m downstream of Drumcondra Bridge.

Past flooding of the river is well documented, with notable floods occurring in 2002, 1954, 2000, 1880, 1965, 1986 (Hurricane Charley), see table 3.1 below.

Ranking	Date	Estimated Flow at the outlet of the Tolka	Ranking	Date	Estimated Flow at the outlet of the Tolka
1	14/15th Nov 2002 ²	97m ³ /sec	11	20th September 1946 ¹	48 m ³ /sec
2	8th December 1954 ¹	85 m ³ /sec	12	23rd November 1898 ¹	45 m ³ /sec
3	6th Nov 2000 ²	76 m ³ /sec	13	12th November 1915 ¹	42 m ³ /sec
4	28th Oct 1880 ¹	71 m ³ /sec	14	3rd April 1909 ¹	37 m ³ /sec
5	Winter 1965 ²	59 m ³ /sec	15	2nd July 2009 ²	30 m ³ /sec
6	24th October 2011 ²	60 m ³ /sec	16	8th August 2008 ²	30 m ³ /sec
7	26th August 1986 ³	57 m ³ /sec	17	5th February 1946	Minor Flood
8	12th November 1901 ¹	57 m ³ /sec	18	3rd January 1948	Minor Flood
9	1st September 1931 ¹	54 m ³ /sec	19	19th December 1932	Minor Flood
10	1968 ²	49 m ³ /sec	20	17th December 1916	Minor Flood

Notes:

¹From 1955 Dublin Corporation Report on the 1954 Flood (estimate only)

²Recorded at Botanic Gardens station, The rating curve has been developed for flows up to 87 m³/sec, flows in excess of this should be treated with caution.

³Recorded at Drumcondra station

Table 3.1: Tolka River Historic Flood Events (source National Hydrology Conference 2014 – The River Tolka Flood Study 10 Years On – A Case Study on how Catchment Based Flood Risk Management Works)

3.2 River Tolka Flooding Study

Historically, the Tolka River and its immediate surrounding developments have been prone to recurrent flooding, necessitating the commission of the *River Tolka Flooding Study* in 2002 which was a catchment-based flood risk management study undertaken to comply with the Water Framework Directive. The objective of the study was to provide flood analysis of the river and its major urban and rural tributaries. A flood alleviation strategy was developed using the hydraulic model which considered climate change and possible future land developments. The study developed a floodplain management plan for the Tolka River encompassing:

- Publication and maintenance of flood risk mapping.
- An updated flood awareness and emergency planning scheme.

- Flood forecasting and flood warning arrangements including real-time rainfall and water level/flow monitoring linked to the DCC telemetry system.
- Arrangements at local level, to be put in place by the Local Authority in conjunction with Residents Associations, for local flood protection measures.
- An ongoing programme of monitoring and maintenance of the Tolka River.
- Systematic implementation of Sustainable Drainage Systems (SuDS) for new development.

3.3 November 2002 Flood Event

The most significant Tolka River flood event occurred on 15th November 2002 following two days of very heavy rainfall which resulted in extensive flooding between Drumcondra Road Bridge and the industrial areas downstream of Tolka Park. During this event, industrial and residential properties between Richmond Road industrial area and Distillery Road Bridge, were inundated with substantial flooding occurring at Clonliffe Square (directly opposite the site). The event was well documented and helped inform the Flood Study and Flood Relief Scheme.

3.4 River Tolka Flood Relief Scheme

Following the *River Tolka Flooding Study*, the *River Tolka Flood Relief Scheme* was implemented between 2002 and 2013, refer to Figure 3.1 for an extract of the Scheme extents in the site vicinity.

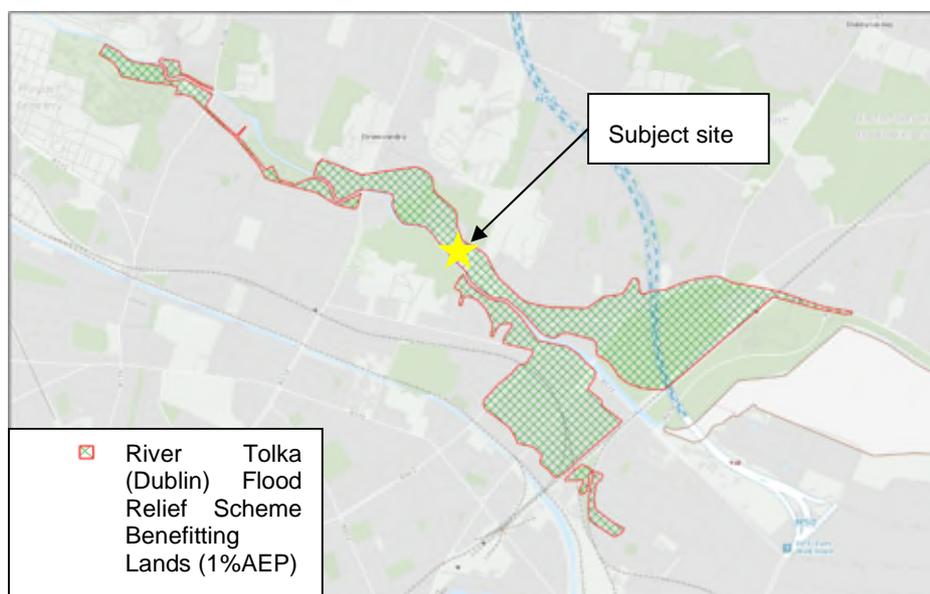


Figure 3.1: Extent of Tolka Flood Defence Works Benefitting lands (source OPW floodinfo.ie)

The scheme included approximately 11 bridge replacements / upgrades with associated road improvement, 5km of earth embankment, 4.5km of channel improvements, 2km of new flood wall, 0.5km of culvert works and weir upgrades, drainage network improvements including new flap valves at pipe outlets to the river, pipe-work diversion works and three new pumping stations.

3.5 Flood Defences

The *River Tolka Flood Relief Scheme* recommended the construction of various flood defences between Drumcondra Bridge and Fairview Park. Works in the vicinity of the site included upgrades to Distillery Bridge and Distillery Weir to address the fluvial flood risk and control out of bank flooding, refer to figure 3.2 for original scheme concept in the vicinity of the site.

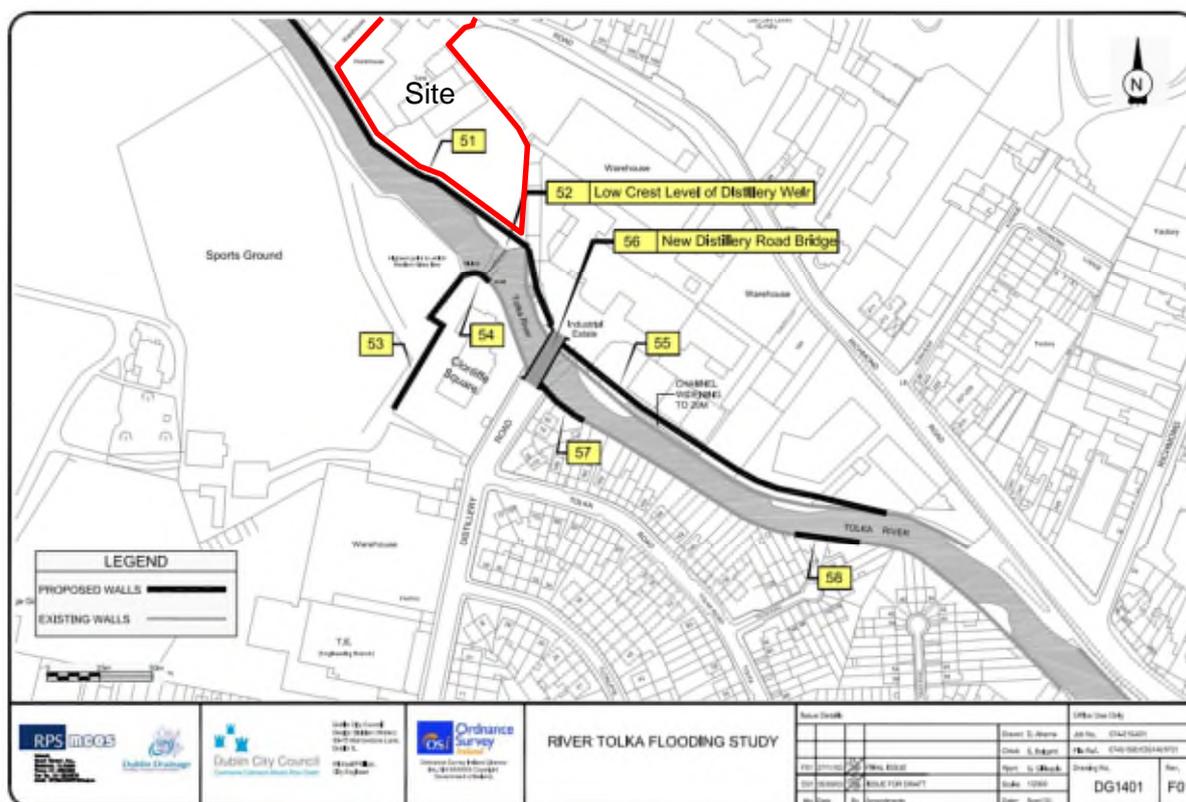


Figure 3.2: River Tolka Flooding Study – Proposed Flood Defence in vicinity of Site (source DCC – River Tolka Flooding Study)

New flood defence walls were subsequently constructed downstream of the Site at Distillery Lofts. This included a section of the new flood wall which extends approximately 24m into the site at the south-east corner, refer to figure 3.3 below. The remainder of the flood defence wall within the site was not constructed.

Immediately to the north of the site, a section of the flood defence wall was constructed as part of the Deakin Court residential development. The site is therefore one of the remaining sections to complete the Flood Defence Scheme.

3.6 Remaining Section of Flood Defence Wall

It was agreed with DCC Flood Resilience Team that the proposed development will provide the missing section of flood defence wall in the site which will link to the upstream flood wall in Deakin Court and to

the downstream constructed wall. In turn the completion of the flood defence scheme will protect the proposed development and adjacent areas.

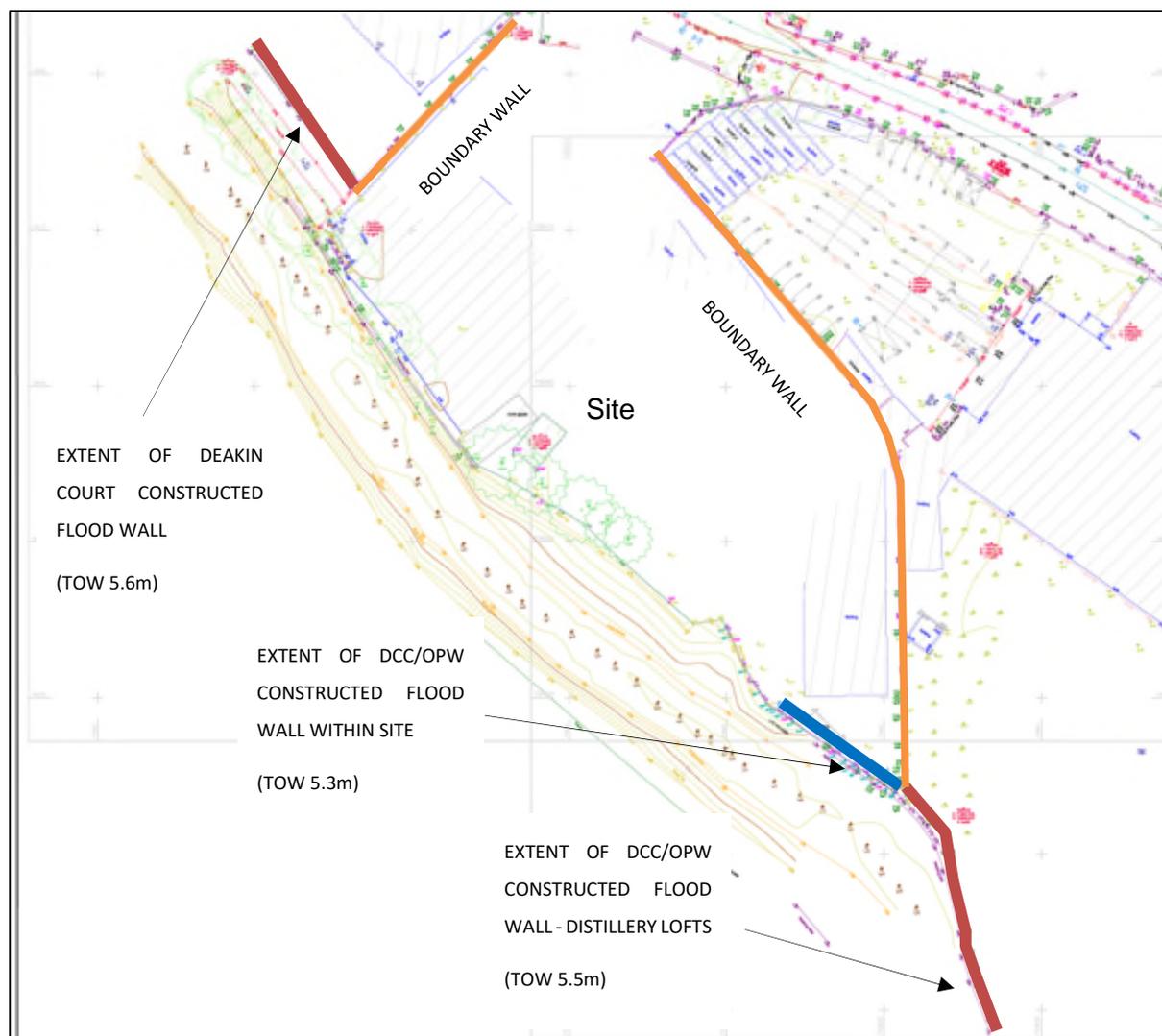


Figure 3.3: Existing Flood Defence Walls indicated on Topographical Site Survey by Murphy Surveys (Oct 2021)

3.7 River Tolka Flood Relief Scheme Flood Defence Protection Levels

Dublin City Council Flood Resilience Team confirmed that the constructed Tolka River flood defence wall at the south-east corner of the site is designed for a 1% AEP fluvial event, and a 0.5% AEP tidal event, plus 300mm freeboard.

Dublin City Council Flood Resilience Team confirmed that the new section of flood wall within the site should be designed to provide protection against the 1% AEP fluvial flood level and 0.5% AEP coastal flood level, with additional +0.3m freeboard and + 0.5m climate change for sea level rise. This is equivalent to a minimum flood defence wall level of **5.8mAOD** at the upstream site boundary and 5.1mAOD at the downstream end as indicated in Table 3.1 below.

From inspection on site and review of the topographic survey, the 24m section of existing flood wall within the site was constructed to a level of 5.33mAOD which exceeds the minimum flood defence level – as such a minimum flood defence level of **5.33mAOD** will be used at the downstream connection point.

	Max. 1% AEP Fluvial with 0.5% AEP coastal flood level (mAOD)	Additional Freeboard (m)	Additional Allowance for <u>Climate Change</u> (m)	Minimum Flood Defence Level (mAOD)	Existing Flood Defence Wall Level (mAOD)
Tolka Flood Level Upstream – Northern River extents (adjacent to Deakin Court)	5.0	+0.3	+0.5	<u>5.8</u>	5.6
Tolka Flood Level Downstream – Northern River extents (adjacent to Distillery Bridge)	4.3	300	500	5.1	<u>5.33</u>

Table 3.2: DCC Flood Resilience Team – Fluvial Flood Levels & Requested Flood Defence Levels

The coastal flood levels at the site for Current, Mid-Range Future Scenario and High-End Future Scenario are detailed in Table 3.3. All are less than the critical 1% AEP Fluvial with 0.5% AEP coastal flood level detailed in Table 3.2.

Coastal Flooding Only	Current (mAOD)	Mid-Range Future Scenario (MRFS) (mAOD)	High End Future Scenario (HEFS) (mAOD)
0.5% AEP	3.07	3.57	4.07
0.1% AEP	3.28	3.78	4.28

Table 3.3: IPCSS - Coastal Flood Levels at Site

3.8 New Flood Defence Wall Works

The development proposals include for construction of the remaining section of flood wall within the site – approximate length 120m. Sections and Elevations of the proposed flood defence works are detailed on DBFL planning drawings 210027-DBFL-XX-SP-DR-C-1020 and 210027-DBFL-XX-SP-DR-C-5006, see extracts in figure 3.4 and 3.5 below.

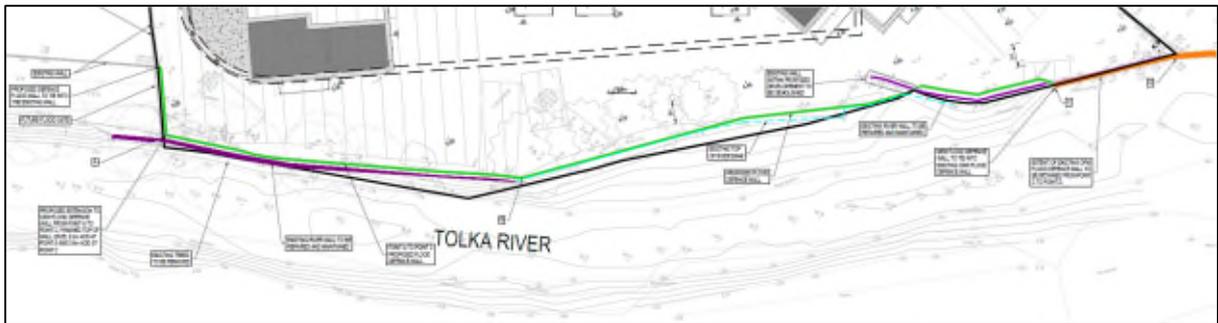


Figure 3.4 – Proposed New Flood Wall Extent within Site (shown green) (extract from Drawing 210027-DBFL-XX-SP-DR-C-1020)

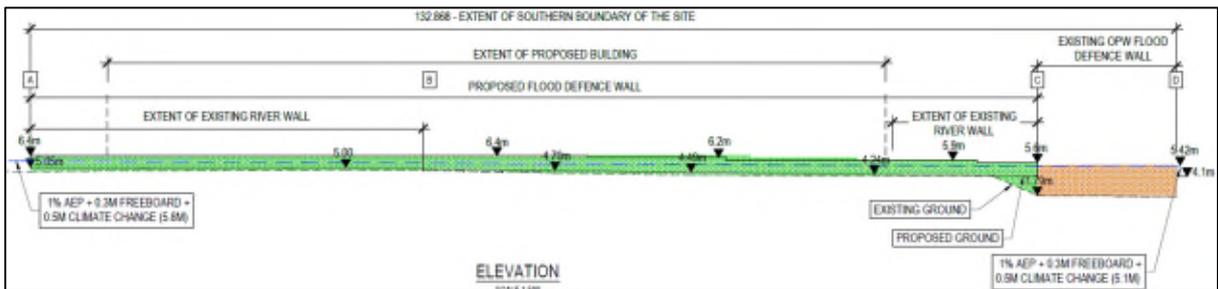


Figure 3.5 – Proposed New Flood Wall within Site (shown green) (extract from Drawing 210027-DBFL-XX-SP-DR-C-1020)

The proposed new flood wall is set back from the existing river wall to maintain the existing river profile and sections of existing river wall, see figure 3.6. Existing “river walls” will be retained and repaired where possible. Vegetation will be removed where required to provide for the various repairs. The flood wall will comprise a sheet pile with capping beam with flood wall to the required levels constructed on top.

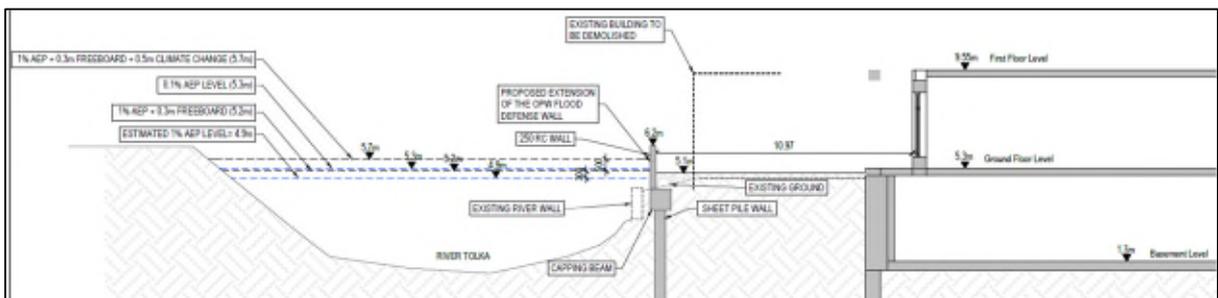


Figure 3.6 – Section of Tolka River and New Flood Wall (extract from Drawing 210027-DBFL-XX-SP-DR-C-5006)

The existing Tolka river wall along the boundary of the site is detailed in the photos below. It is noted that the river bed is stony in nature with very limited vegetation at the base of the wall / banks.



Photo 3.1 – Typical Photos of Existing Tolka River Wall at Site

4.0 PLANNING SYSTEM & FLOOD RISK MANAGEMENT GUIDELINES

4.1 Flood Risk Appraisal Stages

The typical stages of a SSFRA are:

Stage 1 Flood risk identification – identify flooding or surface water management issues.

Stage 2 Initial flood risk assessment – confirm sources of flooding that may affect a development site, extent of flood risk and mitigation measures. May involve preparing indicative flood zone maps or where hydraulic models exist the potential impact of a development on flooding elsewhere.

Stage 3 Detailed flood risk assessment – assess flood risk issues in sufficient detail and provide a quantitative appraisal of potential flood risk to a proposed development or existing land, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

4.2 Flood Zones & Vulnerability

The Guidelines define three types or levels of flood zones:

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

The Guidelines classify development into three categories.

- **Highly Vulnerable:** e.g. *dwelling*s, 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.

4.3 Sequential Approach

The Sequential Approach mechanism is the key tool used by the Guidelines for determining if the proposed development is appropriate for the site. The development proposals comprise;

- Residential = “highly vulnerable development”.
- Retail / commercial / residential amenity = “less vulnerable development”.

The Sequential Approach requires highly vulnerable development to be in Flood zone C i.e. outside the 1,000-year flood extents whereas less vulnerable development can be in located in Flood Zone B or C. When the Avoid or Substitution mechanisms cannot be applied then the Sequential Approach requires a Justification Test to be undertaken, refer to figure 3.1 and 3.2. This SSFRA details the Justification Test for the development proposals.

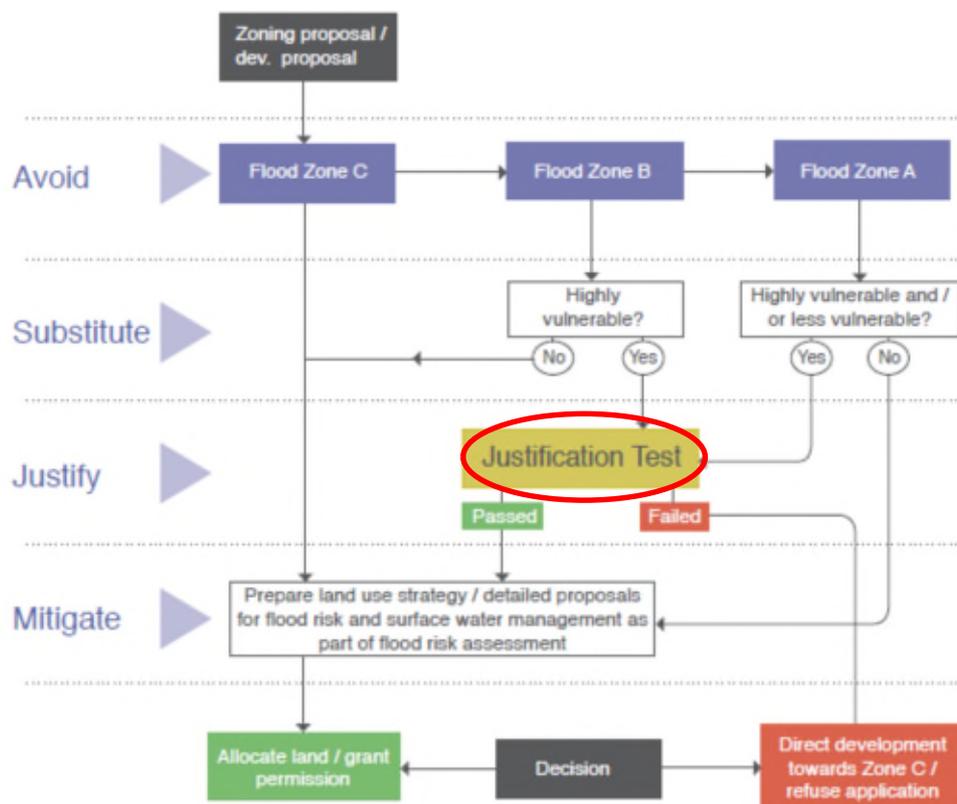


Figure 2.1 – Sequential Approach mechanism in the Planning Process (source – FRM Guidelines)

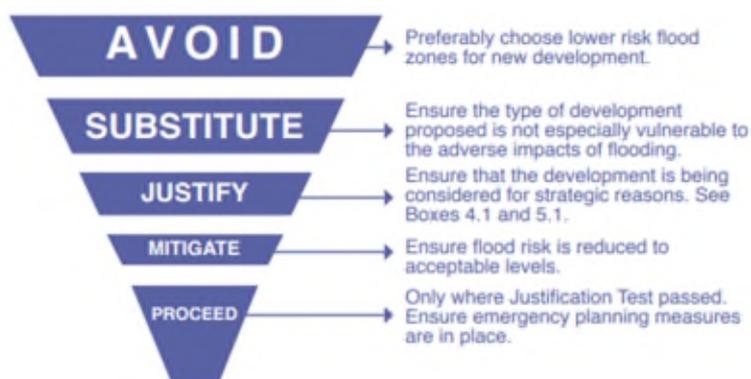


Figure 2.2 – Sequential Approach principles in the Planning Process (source – FRM Guidelines)

This SSFRA will present the following;

- Chapter 5 - Existing flood risk information & Flood mapping.
- Chapter 5 - The site's flood zone category (B & C).
- Chapter 6 - Summary of Flood Risks.
- Chapter 8 – Detailed Flood Risk Assessment & Flood Risk Design Measures.
- Chapter 7 - Justification Test for Development Management (Passed).
- Chapter 9 – Residual & Mitigation Measures.
- Chapter 10 – Conclusions.

5.0 FLOOD RISK IDENTIFICATION – STAGE 1

An initial flood risk identification stage reviewed existing available information to identify and confirm flooding sources impacting the site, refer to Table 5.1 for summary.

	Information Source	Coverage	Quality	Confidence	Identified Flood Risks	Flood Risk
Primary Data Source & Modelled Data	DCC Flood Resilience Team	Local	High	High	Flood levels for the site & Existing constructed flood defence wall level of protection provided. Minimum flood levels for new section of flood wall provided. New development can be included in DCC high tide / flood warning.	✓
	River Tolka Flood Study	Local	High	Moderate (2003)	Flood Risks are mitigated by River Tolka Flood Relief Scheme, see section 3.	✓
	OPW ECFRAM - Fluvial	Regional	-	-	Fluvial flood extent mapping is currently under review and therefore unavailable.	✓
	OPW ECFRAM - Coastal	Regional	-	-	Tidal flood extent mapping is currently under review and therefore unavailable.	✓
	Irish Coastal Protection Strategy Study (ICPSS) – Phase III	Nationwide	High	High Jan 2010	ICPSS maps indicate very minor tidal flooding on the site for the 0.1% AEP MRFS and 0.5% & 0.1% AEP HEFS flood events, flood defences in place to protect against refer to figure 5.3, 5.4 & Appendix B.	✓
	Strategic Flood Risk Assessment DCC Development Plan 2016-2022 & Draft 2022-2028	Local	High (used ECFRAM flood maps as a basis)	High	Fluvial flooding extends to part of the site from a 0.1% AEP flood event (Flood Zone B). No flooding from a 1% AEP event (Flood Zone A), refer to Figure 5.1 & Appendix A. <u>Dev. Plan Justification Test passed for site zoning by DCC, states “Flood defences incorporating 200-year tide level, plus 300mm freeboard, plus allowance for fluvial surcharge at high tide have been constructed from East Wall Road to Drumcondra Bridge. These defences provide the statutory level of protection”.</u> Pluvial Flood Hazard Map (1% AEP Event, 3 Hr Duration Model) indicates low to moderate risk of pluvial flooding to site. Refer to Figure 5.5	✓
	OPW Pluvial Flooding Risk Assessment (PFRA)	Regional	High	High	Pluvial maps (as part of the OPW Flood Resilient City), show 10%AEP flooding in vicinity of site indicating a moderate pluvial flood risk.	✓

	Information Source	Coverage	Quality	Confidence	Identified Flood Risks	Flood Risk
Secondary Data Source	Geological Survey of Ireland (GSI)	Nationwide	Moderate	Varies	Main underlying bedrock is generally marine basinal facies, dark-grey argillaceous & cherty limestone & shale which are not known for causing flood risk. The majority of quaternary sediment deposits (subsoil conditions) are 'made ground, with small corridors of alluvial deposits' along the southern boundary of the site. A review of groundwater mapping indicates low groundwater vulnerability, a locally important aquifer & moderately productive bedrock only in local zones.	X
	Walkover Survey	Local	Varies	Varies	No evidence of flooding on site. Risk from Tolka River noted. SW drainage serving development is underground.	X
	Topographic & GPR Survey	Local	High	High	Corresponds to Walkover Survey. Ground falls towards Tolka River.	X
	OPW Historic Flood Records / Floodinfo.ie	Nationwide	Varies	Varies	Several records indicate flooding of Richmond Road and industrial areas from Tolka River. Refer to section 3.1 & Appendix C.	✓
	Historic OSI Maps	Nationwide	Moderate	Low	Indicate the Tolka River was partly diverted into the site via weirs for a millrace with sluices and an island in the middle of the river. Site has now been filled and used as primarily industrial with buildings built on the same area. Refer to Figure 5.2.	✓
	Site investigation	Local	High (March 2021)	High	Ground conditions from SI: (0-0.3m) Paved surface and sub-base over; Made Ground (fill): reworked sandy gravelly clay / sandy gravel / gravelly sand fill with varying amounts of non-natural materials over; Alluvium deposits at depths; over Glacial Till: sandy gravelly clay, becoming very stiff with increasing depth. Ground water strikes at 1.3-3.5m only in some local locations	X
	EPA Maps - Existing Rivers	Nationwide	Moderate	Moderate	No Defined Watercourses within the site area – River Tolka along southern boundary	X
	Irish water / DCC Drainage Records	County	Moderate	Moderate	Nearest public drainage infrastructure is located on Richmond Road.	X

Table 5.1: Stage 1 Flood Risk Identification Summary

5.1 Flood Zones

The latest Strategic Flood Risk Assessment within the DCC Development Draft Plan 2022 – 2028 identifies the site as having fluvial Flood Zones B and C, refer to Figure 5.5. These maps are considered to be latest up to date available flood information until OPW re-publish flood maps for the area. Flood depths are shallow. Flood Zone A includes the main Tolka River channel, banks / river walls and up to existing flood wall.

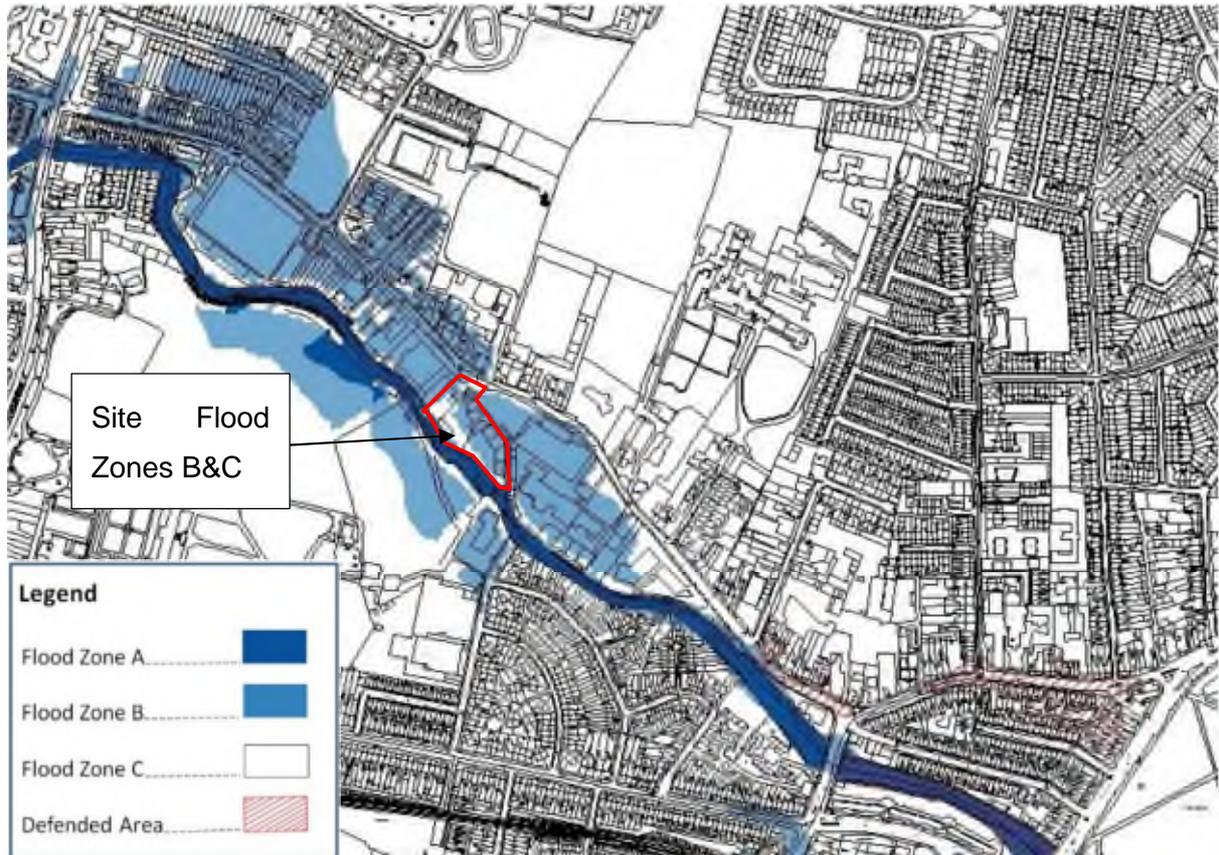


Figure 5.1: Fluvial Flood Risk Flood Zones - Extract of Dublin City Development Draft Plan 2022 – 2028) SFRA

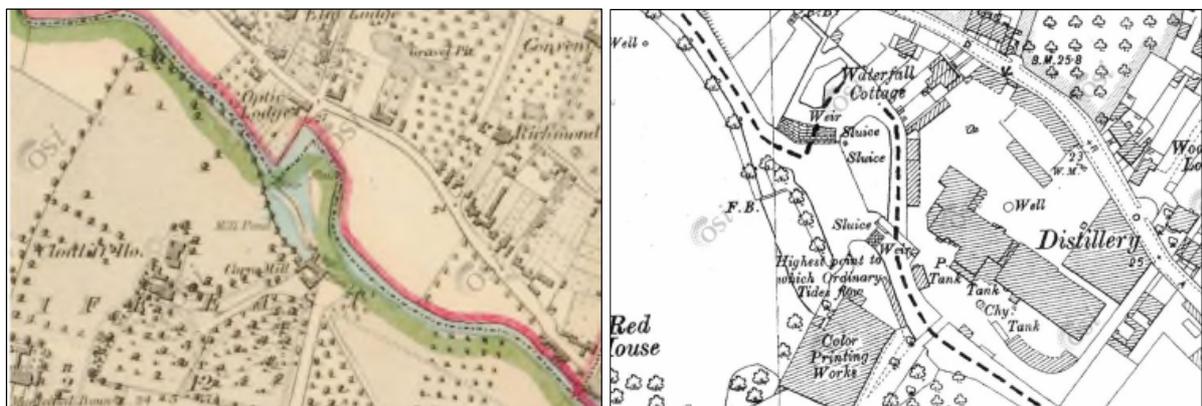


Figure 5.2: Historic 6" Colour (1829-41) & 25" B&W (1829-41) Mapping (Source OSI)

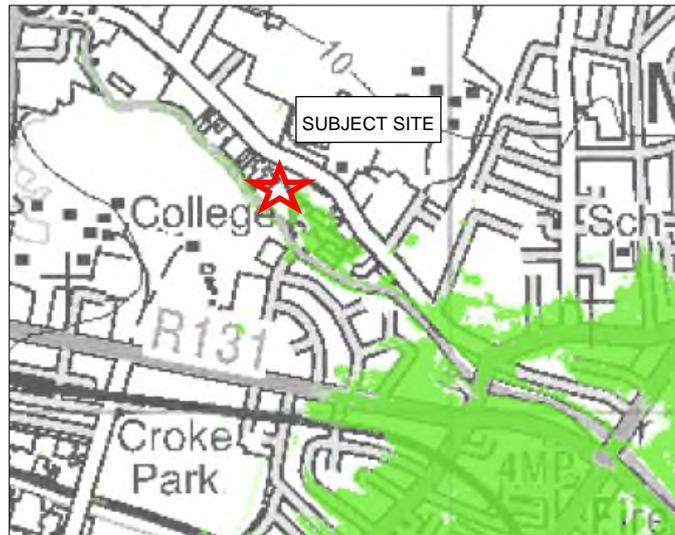


Figure 5.3: Coastal Flood Extents Map (ICPSS - PHASE III; MRFS) – (Source OPW)

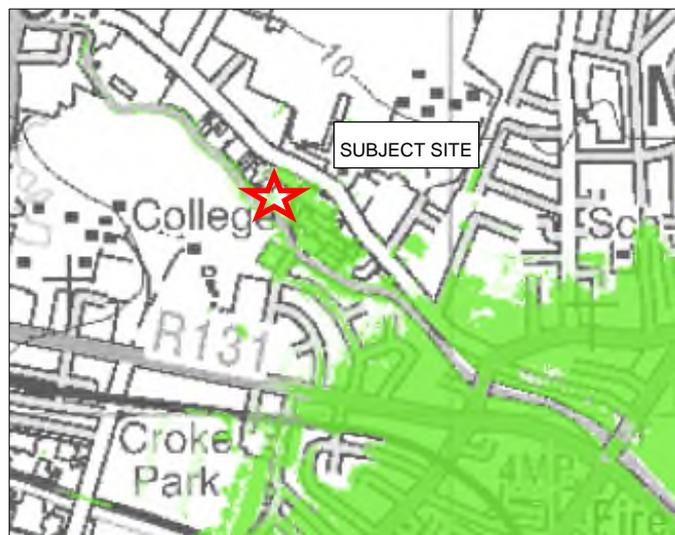


Figure 5.4: Coastal Flood Extents Map (ICPSS - PHASE III; HEFS) – (Source OPW)

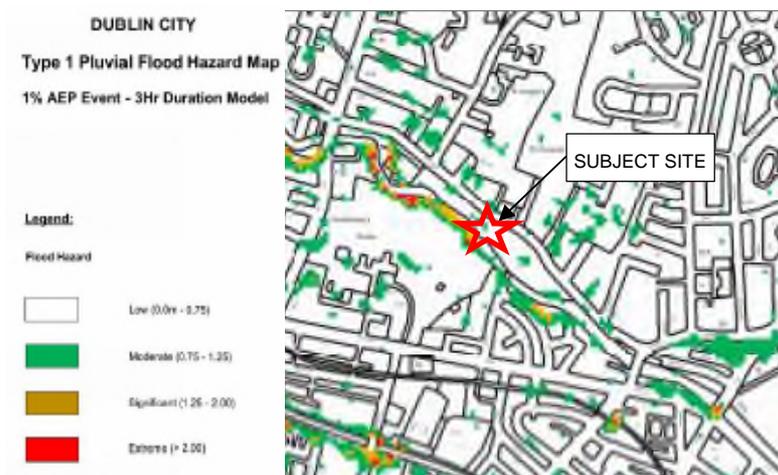


Figure 5.5: Pluvial Flood Hazard - Extract from Dublin City Development SFRA

6.0 INITIAL FLOOD RISK ASSESSMENT – STAGE 2

A source-pathway-receptor flood model summarising the initial flood risks for the site / development is detailed in table 6.1 below.

Source	Description	Pathway	Receptor	Likelihood	Consequence	Risk
F1 – Fluvial Tolka River	SFRA mapping indicates site at risk of flooding from a 0.1% AEP event, but protected for a 1% AEP event. Part of site is defended. (Remainder of flood wall to be constructed to defend site.)	Overbank from the River Tolka into the site and along Richmond Road overland flow	People and Property / proposed building & basement	Likely	High	High
F2 – Fluvial Flood Wall Breach	Part of site is already defended. Remainder of flood wall on site to be constructed to complete defence. SFRA requires assessment of defence failure.	Overbank from the River Tolka via a breach in the wall at site	People & Property / building & basement	Unlikely	High	High
C1 – Coastal Irish Sea	Site is 1.7km from coast - Tolka River is tidal at site. Existing flood defence wall protects part of site from 0.5% AEP Tidal event. Wave action not significant at site. ICPSS flood maps indicate site have a minor risk from 0.5% AEP tidal event (MRFS) and 0.5% AEP & 0.1% AEP tidal event (HRFS) at gap in current flood wall.	Overland and along Tolka River from the coast, circa 1.7km to the east.	People and Property / proposed building & basement	Likely	High	High
P1 – Pluvial SW Drains	SFRA Pluvial Flood Hazard Maps & OPW Pluvial maps indicate low to moderate risk of flooding in some areas of the site	Surcharging of development's new SW system within site	People and Property	Possible	Medium	Medium
G1 – Ground-water	GSI & SI records indicate low risk of groundwater flooding. Local groundwater identified to be addressed during construction phase and for basement design.	Rising GWL on the site	People & Property Basement	Unlikely	Low	Low
H1 – Human / Mechanical Error	New SW network incorporates flow control devices - blockage / failure of drainage network / flow control / flap valve causing surcharging.	Via drainage network, surcharging & overland	People & Ground Floor & Basement	Possible	Low	Low

Table 6.1: Source Pathway Receptor Model

7.0 DETAILED FLOOD RISK ASSESSMENT – STAGE 3

7.1 Fluvial & Coastal Flood Risk Assessment

The proposed development will complete the section of flood defence wall within the site. By completion of the flood wall the site will be protected from fluvial and coastal flooding up to the required flood defence level as advised by DCC (5.8m to 5.33m) including allowance for climate change sea level change (0.5m) and freeboard (0.3m) allowances. (Actual flood wall levels may exceed these minimum requirements in places.)

The following development design levels are relevant for the assessment – these are indicated in the typical section in figure 7.1 and detailed on DBFL drawing 210027-DBFL-XX-SP-DR-C-5006 included with the planning submission;

- Existing Site ground levels = 4.0 – 5.2m.
- Proposed Ground Floor FFL = 5.3m.
- Proposed 1st Floor FFL = 9.55m.
- Proposed Basement Level = 1.3m.
- Proposed Vent Level = 5.8m.
- Existing Richmond Road Level = 5.0m.
- Existing Deakin Court FFL = approx. 5.5m AOD.
- Tolka Bed Level = approx. 0.7m – 1.5m.
- Tolka water level (topographical survey normal non-flood conditions) = approx. 1.6m – 2.1m.
- Existing Flood Defence Level upstream (Deakin Court) = 5.6m.
- Existing Flood Defence Level downstream (SE corner of site) = 5.33m.
- Proposed Flood Defence Level = 5.33m to 5.8m.

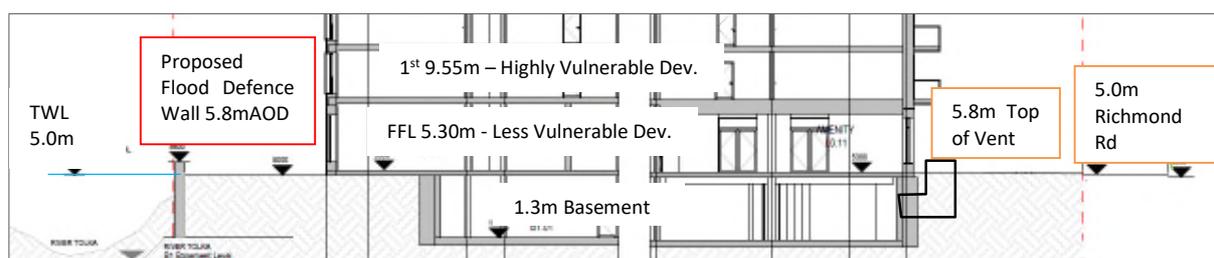


Figure 7.1: Section through Proposed Development at highest flood defence level

The development proposes “less vulnerable” development at ground floor which is compatible for the Flood Zone B classification without any flood defence works or Justification Test. Highly vulnerable residential apartments are positioned at first floor and above which is well above expected flood waters. Further flood mitigation measures incorporating appropriate flood resistance and flood resilience features will further reduce flood risk to the proposed development in particular the basement.

7.2 Assessment of Flood Zones

Based on available information and from discussions with DCC Flood Resilience Team, it is considered that the site is partially within Flood Zone “B” and has a partial “Defended” status. The Guidelines require that the presence of flood protection structures be ignored in determining flood zones because areas protected by flood defences still carry a residual risk of flooding from overtopping or breach of defences.

7.2.1 Breach of Flood Defence Wall

Flood risk may arise where the flood defence wall is breached, overtopped or the flap valve fail during a flood event. Should this occur, flood waters could flow overbank through the breach from the Tolka River and into the buffer between the flood wall and the proposed building / podium area over basement. The building is designed with a level of 5.3mAOD which provides a freeboard of 0.3m to the less vulnerable residential amenity and commercial / retail on the ground floor for the 1%AEP fluvial & 0.5%AEP. In the event of a breach, flood levels of 5mAOD around the building can be accommodated on site due to the flood mitigation and design measures proposed, these measures protect the basement from inundation and emergency egress to/from Richmond Road for the design event.

7.3 Coastal Flood Assessment

The Tolka River is tidal to circa 100m below Drumcondra bridge. The ICPSS flood extent mapping estimates coastal flood water levels for 0.5%AEP and 0.1%AEP events for various scenarios in Dublin Bay, refer to maps in **Appendix B** and flood levels in Table 2.1. The proposed finish ground floor level of 5.3mAOD is more than 1m above the estimated 0.1% AEP coastal flood level (HEFS) of 4.28mAOD and more than 1.5m above the estimated 0.1% AEP coastal (MRFS) of 3.78mAOD. With completion of the remaining section of flood wall the development will be protected for a 0.5% AEP tidal event, plus freeboard by the flood defence wall, and for a 0.1%AEP tidal event.

7.4 Pluvial Flood Risk Assessment

The pluvial flood risk to the development relating to the proposed surface water drainage network and human / mechanical error can be mitigated by designing the surface water network in accordance with the required standards and implementing mitigation measures including a proper operation and maintenance programme to reduce the risk of human or mechanical error from blockages etc. Figures 7.2 and 7.3 below indicate the existing and post development overland flow paths. In general, the development will raise site levels to provide for a new finish floor level of 5.3m which is up to 1m above existing ground levels. Existing overland flows into the site from Richmond Road will be reduced for the design event. Overland flows for flood exceedance within the site will be directed to the south-east corner by the finished development levels.

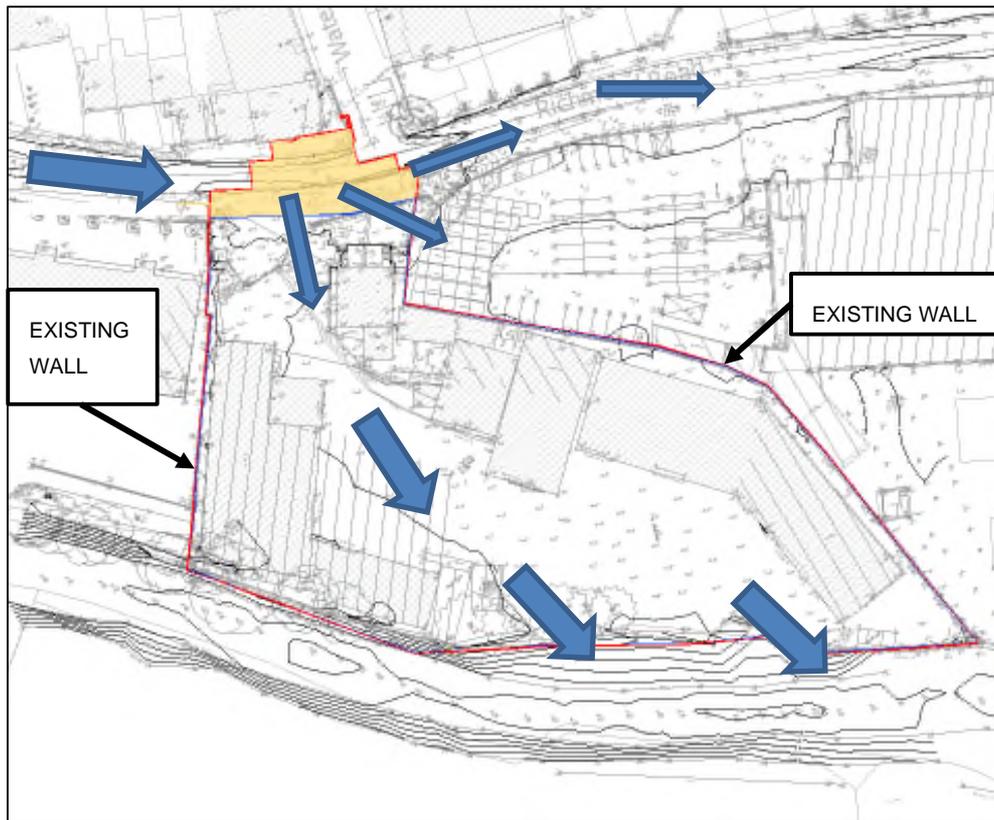


Figure 7.2: Existing Overland Flow Routes

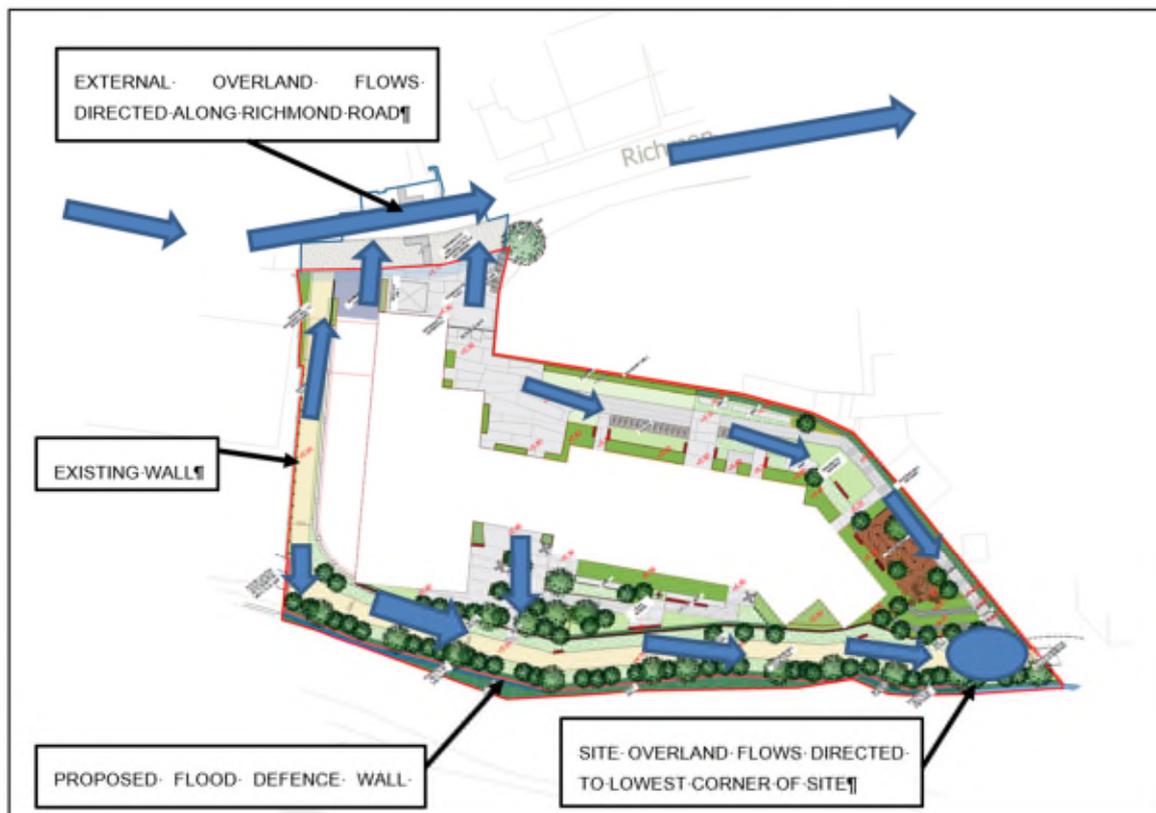


Figure 7.3: Post Development Overland Flows

7.5 Design Measures for Management of Flood Risk

The development's design has been development to address and manage flood risk as Table 9.1 below.

DEVELOPMENT DESIGN INCOPORATING FLOOD RISK MANAGEMENT MEASURES		
1	<i>Flood Defence Wall.</i>	The development will construct a section of the Tolka Flood Defence Scheme within the site connecting to the existing flood defence wall upstream at Deakin Court and downstream at the south-east corner of the site. The finished level of the wall will be above the minimum flood protection levels requested by DCC (5.8mAOD to 5.33mAOD). The flood wall is designed to include 0.3m freeboard and 0.5m for climate change.
2	<i>Surface Water Drainage & SuDS</i>	<p>A new surface water drainage system will be constructed to drain runoff from the proposed development. The drainage system is designed in accordance with the GSDSDS / DCC SW management Guidance and will included traditional and SuDS drainage features designed to CIRIA C753 SUDS Manual as part of a site wide SuDS management train, to achieve water quantity, quality, amenity and biodiversity improvements. Attenuation of surface water runoff to greenfield run-off rates with associated stormwater storage is provided for the critical 1% AEP event plus 20% climate change. The surface water drainage system is designed to surcharge during critical storm events but with no out of system / pipe flooding.</p> <p>SuDS proposals for the development include green/blue roof system. Extensive landscaping on podium areas. Hard standing areas with permeable paving or over-the-edge drainage into soft landscaping. There are no roads and only a single set-down / assessable parking spot at ground level - therefore very low risk of contaminants. A non-return / flap valve on the outflow to the River Tolka is incorporated to reduce the risk of flooding to the subject site. On-line cellular storage provides 110m³ of storage for surcharged fluvial events.</p> <p>Green infrastructure and SuDS measures represent an environmental improvement to water quality and run-off rates compared to the existing fully paved and unattenuated site.</p>
3	<i>Climate Change.</i>	Design of flood wall incorporates 0.5m climate change allowance for sea levels and 20% for fluvial events. The surface water drainage network is designed to incorporate a 20% increase in rainfall intensities for pluvial events.
4	<i>Scheme Design</i>	<p>The following design measures are incorporated into the development proposals:</p> <ul style="list-style-type: none"> • Less vulnerable development (retail, residential amenity area, lobby, bike and bin store) located at ground floor - FFL of 5.3mAOD. • Highly vulnerable residential development (apartments) located at first floor level and above, i.e. minimum FFL 9.55mAOD. • Main building access is from Richmond Road i.e. away from fluvial / coastal flood risk. • DCC SFRA states "<i>in a defended site the requirement to provide freeboard and climate change allowances on the finished floor levels can be relaxed if the defences already include the allowance</i>". The proposed FFL of 5.3m is designed to be 0.5m (climate change allowance) below the minimum upstream flood wall level of 5.8mAOD. • Basement carpark entry incorporates an elevated entry level = 5.375mAOD above FFL. • Basement carpark entry incorporates allowance for a demountable flood gate / barrier for use in extreme events. • Vents to basement elevated above ground level of 5.8mAOD. • Basement to be fully tanked to ground floor level to protect against groundwater. • Minimum 8m wide buffer provided between the building and the flood defence wall incorporates a footpath and cycle-path to improve the amenity value along the River.
4	<i>Maintenance</i>	Maintenance of the drainage system to be carried out on a regular basis in accordance with the O&M / Safety File with an annual visual assessment of flood defence wall.
5	<i>Emergency access/ egress:</i>	The scheme is designed to allow emergency vehicle access onto the podium and along the eastern and southern sides of the development.

Table 7.1: Justification Test for Development Management (Box 5.1 of Guidelines)

7.6 Impact on Adjacent Areas

Adjacent areas will not be impacted by the development compared to the existing land use. The proposed development will improve flood protection by the continuation of the OPW Tolka River flood defence wall along the boundary of the site.

7.7 Flood Risk Exceedance

For storm events greater than the 1% AEP pluvial event, the surface water drainage network could be exceeded. Overland flows for these events are directed away from doorways, basement and away from the building towards the south-east corner with the Tolka River where ponding may occur at lower ground levels within the site, refer to figure 7.3.

7.8 Application of Sequential Approach

The Guidelines are underpinned “the Sequential Approach”, the key principles are to:

- **Avoid** development in areas at risk of flooding.
- If this is not possible, consider **substituting** a land use that is less vulnerable to flooding.
- Only when both avoidance and substitution cannot take place should consideration be given to **mitigation** and **management of risks**.

The Sequential Approach as applied to the development is detailed below:

- **Avoid** development in areas at risk of flooding.

The current land use on the site is commercial / industrial.

The site is partially in Flood Zone “B”.

The site is zoned and the DCC SFRA indicates the development potential of the lands as “High density Commercial and Residential development (some infill) would be a natural extension of existing development”.

It is not considered feasible to avoid development in this zone, the next part of the sequential approach is therefore considered.

- **Substituting** with a land use that is less vulnerable to flooding.

The development proposes to substitute land use in Flood Zone “B” with less vulnerable retail, commercial and residential amenity at ground floor level. Bike and bin stores are also included at ground floor. This type of development is deemed appropriate for this flood zone / risk.

Highly vulnerable development is proposed at first floor and above with minimum floor level of 9.55mAOD, well above the anticipated flood levels.

- **Justify** with a Justification test.

Since highly vulnerable development is proposed in Flood Zone B a Justification Test must be undertaken. The development’s Justification Test is detailed in the following section 8.

8.0 JUSTIFICATION TEST

The proposed development proposes highly vulnerable residential development in an existing Flood Zone B with new flood defence works to protect the site. Since the development is not classified as “Minor Development” a “Justification Test for Development Management”, is required to satisfy the Guidelines, refer to Table 8.1.

	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 8.1: Matrix of Vulnerability versus Flood Zone to illustrate where development is appropriate for flood zone or where justification test required (Extract from Guidelines).

It is noted that the site has already passed the Justification Test for Development Plan, refer to Dublin City Development Plan 2016-2022, “Strategic Flood Risk Assessment. (It also has passed the Justification Test for Development Plan in the Dublin City Development Plan 2022-2028, “Strategic Flood Risk Assessment”.

The Development proposals have been assessed and pass the Justification Test for Development Management as detailed in Table 8.2.

JUSTIFICATION TEST for Development Management			Pass
1.0	<i>The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.</i>	<p>The zoning applied to the subject site in the Dublin City Development Plan 2016-2022, is "Z10 - to consolidate and facilitate the development of inner city and inner suburban sites for mixed-uses, with residential the predominant use in suburban locations, and office/retail/residential predominant uses in inner city areas".</p> <p>The retail / commercial / residential amenity at ground floor, with residential at first floor and above, are appropriate uses for the zoning. The proposed development completes an existing urban cell at this location in an established residential part of Dublin City. The Dublin City Development Plan is adopted, has taken account of the Guidelines, and has passed a Justification Test for Development Plans as per Box 4.1 for the zoning of the subject.</p>	Yes Pass
2.0	<i>The development has been subject to an appropriate flood risk assessment that demonstrates:</i>	The proposed development is subject to this Site Specific Flood Risk Assessment (SSFRA), in accordance with the Guidelines.	Yes Pass
2.0 (i)	<i>The development proposed will not increase flood risk elsewhere and if practicable, will reduce overall flood risk.</i>	The development will reduce flood risk to the immediate area by completing a section of Tolka flood defence wall, reducing drainage run-off rates compared to pre-existing.	Pass
2.0 (ii)	<i>The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;</i>	<p>The proposals include measures to minimise flood risk including,</p> <ul style="list-style-type: none"> Residential apartments positioned at first floor and above with less vulnerable development at ground floor. Construction of section of Tolka flood defence wall will provide protection for a 1% AEP Fluvial & 0.5% AEP Tidal event plus additional freeboard & climate change. The development proposals improve the amenity and recreational value of the Tolka River by providing a linear walk & cycleway. 	Yes Pass
2.0 (iii)	<i>The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access:</i>	<p>The following measures are proposed to minimise residual risks to the area / development:</p> <ul style="list-style-type: none"> Preparation of an evacuation plan. Inclusion in DCC's early warning system. Emergency access provided to the east and west of the building. 	Yes Pass
2.0 (iv)	<i>The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant streetscapes.</i>	<p>The proposed development is compatible with the wider planning objectives and will complete an existing urban cell at this location in an established residential part of Dublin City.</p> <p>The development improves the Richmond Road streetscape by providing a plaza area at the front of the development with café/retail unit. A linear footpath / cyclepath provided along the Tolka River improves public amenity and access in the area and retain the amenity / recreational / environmental potential of the river.</p>	Pass

Table 8.2: Justification Test for Development Management (Box 5.1 of Guidelines)

9.0 RESIDUAL RISKS & MITIGATION MEASURES

9.1 Residual Risks

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

- Fluvial flooding due to breach / overtopping of the flood defence wall or failure of the flap valve on the surface water outfall.
- Fluvial flooding from a 0.1% AEP event.
- Pluvial flooding from the drainage system related to pipe blockage.
- Pluvial flooding from the roads drainage system for storms exceeding the 1% AEP event.

9.2 Mitigation Measures

To address the residual flood risks the following mitigation measures in table 9.1 are recommended.

MITIGATION MEASURES TO BE INCORPORATED INTO DEVELOPMENT		
M1	<i>Flood Resistance / Flood Resilience Measures</i>	Development to incorporate appropriate flood resistance measures (installed to prevent floodwater from reaching or entering a property) and flood resilience measures (methods or techniques that can be carried out inside a property, to minimise damage caused by floodwater entering a property) as outlined in DCC "Property Flood Protection Guide" and "Basement Flooding Leaflet, Volume 6 – Basements" of the Greater Dublin Strategic Drainage Study and relevant CIRIA and DEFRA guidance documents.
M2	<i>Maintenance</i>	Proposed drainage system to be maintained on a regular basis to reduce the risk of blockage.
M3	<i>Exceedance</i>	In the event of pluvial storms exceeding the 1% AEP design capacity of the development's stormwater network, possible overland flow routing to be directed towards the Tolka River via suitable external finish levels with high level overflow.
M4	<i>Flood Warning and Emergency Response Plan</i>	A comprehensive and effective Flood Warning and Emergency Response Plan to be implemented for the development with recommendations for site procedures to be taken in response to flooding (forecasted or otherwise). The plan shall be kept on site and residents / site users made aware of it and all emergency evacuation procedures. The plan will be a live document and may need to be updated in response to changes to policies / strategies, refer to Appendix D.
M5	<i>DCC High Tide / Flood Warning Service</i>	The operators of the development to be registered with DCC's High Tide / Flood Warning Service so that residents can be prepared for evacuation if necessary. It is recommended that the site is registered with DCC's Warning Service. It is also noted that a new National Flood Forecasting and Warning Service is being set up by Met Eireann and the OPW. All residents and site users should be made aware of the implementation of this system when operational.
M6	<i>Level Warning</i>	A river level marking to be provided on the flood defence wall (exact details to be agreed with DCC), so that operators / residents can view and prepare for an extreme event.

Table 9.1: Justification Test for Development Management (Box 5.1 of Guidelines)

It is considered that the flood risk mitigation measures if implemented are sufficient to provide a suitable level of protection to the proposed development.

9.2.1 Flood Resistance Measures

The following flood resistance measures are implemented by the development:

- Vehicular access ramp to the basement car park has an increased crest level of 5.375m AOD
- Top of basement ramp and all building doorways at ground level to incorporate provision for fitting a flood barrier / gate to prevent ingress of surface water or flood water to a level of 1.2m above FFL.
- All windows at ground floor to be set at a level of 5.8m AOD minimum.
- The basement car park should be adequately tanked and sealed.
- Walls and floors at ground level to be tanked to level exceeding the estimated 1% AEP fluvial flood level, 0.5% AEP tidal flood level, plus 300mm freeboard plus 500mm allowance for climate change, i.e. level of 5.8m AOD.
- Non return valves or anti flood valves to be fitted to the drainage network at connection locations (foul and surface water).
- The surface water drainage system should be fitted with manhole covers capable of resisting uplift pressures from surcharging systems.
- Any pipes and / or cables that protrude through external walls at a level below 5.8m AOD should be adequately sealed to prevent groundwater ingress.
- Airbricks in external walls below the flood level should be sealed with "SMART AIRBRICKS".
- Vents to the basement car park should be raised to a minimum level of 5.8m AOD.
- Perimeter Wall to site to prevent flooding into the site from adjacent areas to a minimum level of 5.8m AOD.

9.2.2 Flood Resilience Methods

It is recommended that the following flood resilience measures are incorporated for the development:

- Where possible, important electrical appliances within buildings to be raised above ground level e.g. on shelves or plinths.
- Consider use of suitable materials at ground level which can be easily cleaned / dried should they become flooded.

10.0 CONCLUSION

The SSFRA for the proposed development at Richmond Road, Dublin 3 was undertaken in accordance with the requirements of the Planning System and Flood Risk Management Guidelines for Planning Authorities”, November 2009 and with reference to the requirements of DCC Strategic Development Plan.

The SSFRA consulted several information sources which included reference to historic flood events. The Dublin City Council Flood Resilience Team, previous Tolka Flood Study, and the Strategic Flood Risk Assessments (DCC County Development Plan (2016-2022) and Draft Development Plan (2022-2028)) were important sources that defined the existing fluvial and coastal flood risk to the site.

From analysis of the flood information, it was concluded the site was at risk of flooding from fluvial and coastal sources via the Tolka River along the south-western boundary of the site. It was confirmed that the site is mainly in defended Flood Zones B with some Flood Zone C (moderate and low risk of fluvial flooding) as defined by the Guidelines. Flood Zone A is confined to the main Tolka River channel, banks / river walls and up to existing flood wall. The site also benefits from partial protection with an existing flood defence wall at the south east corner of the site constructed as part of the Tolka River Flood Relief Scheme.

It was agreed with the DCC Flood Resilience team that the development will complete the section of Tolka River flood defence wall within the site. Completion of the flood wall within the site will provide protection to the development and reduce flood risk to adjacent areas from fluvial and coastal flooding. The required level of the flood defence was confirmed by DCC Flood Resilience team as 5.8m at the upstream end and 5.33m at the downstream end / existing flood wall tie in. These levels include additional allowance for climate change sea level change (+0.5m) and freeboard (+0.3m).

Since the ‘Avoid’ principal of the ‘Sequential Approach’ could not be applied in this instance, substitution was applied which resulted in less vulnerable development use only at ground floor (retail / commercial / residential amenity) and residential development at first floor level

A Justification Test was required for the development proposals with the following conclusions.

1. The site is zoned within the DCC Development Plan (2016-2022) and passed a Justification Test for Development Plans (Box 4.1 of the FRM Guidelines). Its land use zoning is therefore appropriate.
2. The development proposals passed a Justification Test for Development Management (Box 5.1 of the Guidelines) for both the highly vulnerable and less vulnerable development proposals.
3. Less vulnerable development proposals are appropriate within the Flood Zone B and C designations.

The development has a proposed finished building floor level of 5.3mAOD. The floor level was set with consideration of the Dublin City Council SFRA, existing Richmond Road level of 5.0mAOD and the requirement to provide level access to the building. The Dublin City Council SFRA states that “*in a*

defended site the requirement to provide freeboard and climate change allowances on the finished floor levels can be relaxed if the defences already include the allowance". The proposed finish floor level of the building therefore meets this requirement (FFL 5.3m > 0.1%AEP flood level 5.0m).

The development's design includes several design features to minimise flood risk including and mitigation measures for addressing residual flood risk, refer to section 9.2 for list. The development's stormwater design incorporating SUDS is also an improvement compared to the existing unattenuated discharge from the current development on site.

The proposed scheme will enable the site to be developed in accordance with the wider planning objectives and current zoning and will complete an existing urban cell at this established residential part of Dublin City and will transform the streetscape in this area with the introduction of the plaza and retail units onto Richmond Road.

It is concluded that as per the OPW Guidelines, the sequential approach has been applied, the proposed development has passed the necessary justification tests, the development does not increase flood risk elsewhere and the development's design incorporates measures to address flood risk.

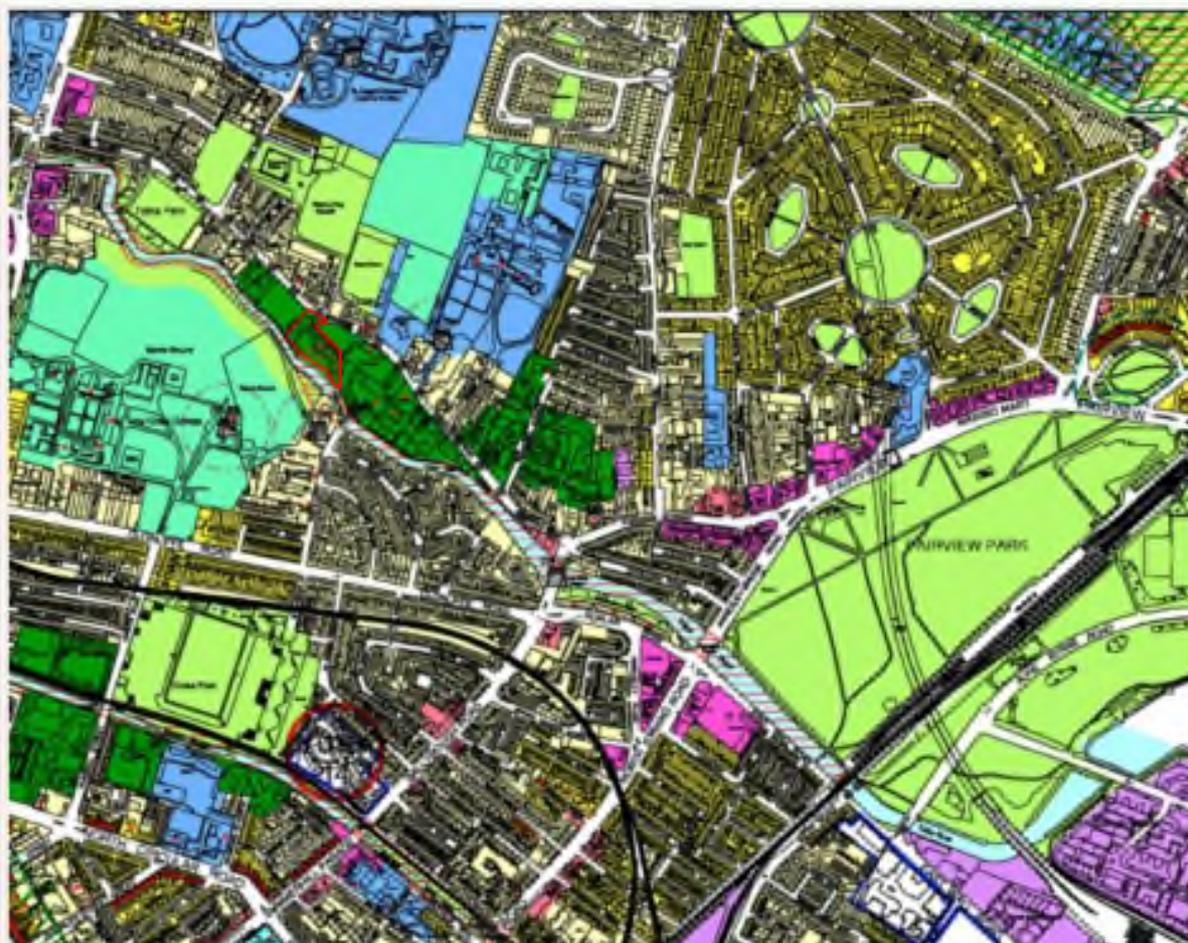
APPENDIX A

STRATEGIC FLOOD RISK ASSESSMENTS

TOLKA: DUBLIN PORT TO DRUMCONDRA BRIDGE AREA ASSESSMENT / JUSTIFICATION TESTS

EXTRACT STRATEGIC FLOOD RISK ASSESSMENTS FOR DUBLIN CITY DEVELOPMENT PLAN 2016-2022

Site: 20 Tolka: Dublin Port to Drumcondra Bridge



Dublin City Council Development Plan 2016–2022 (zoning map key at back of tables)

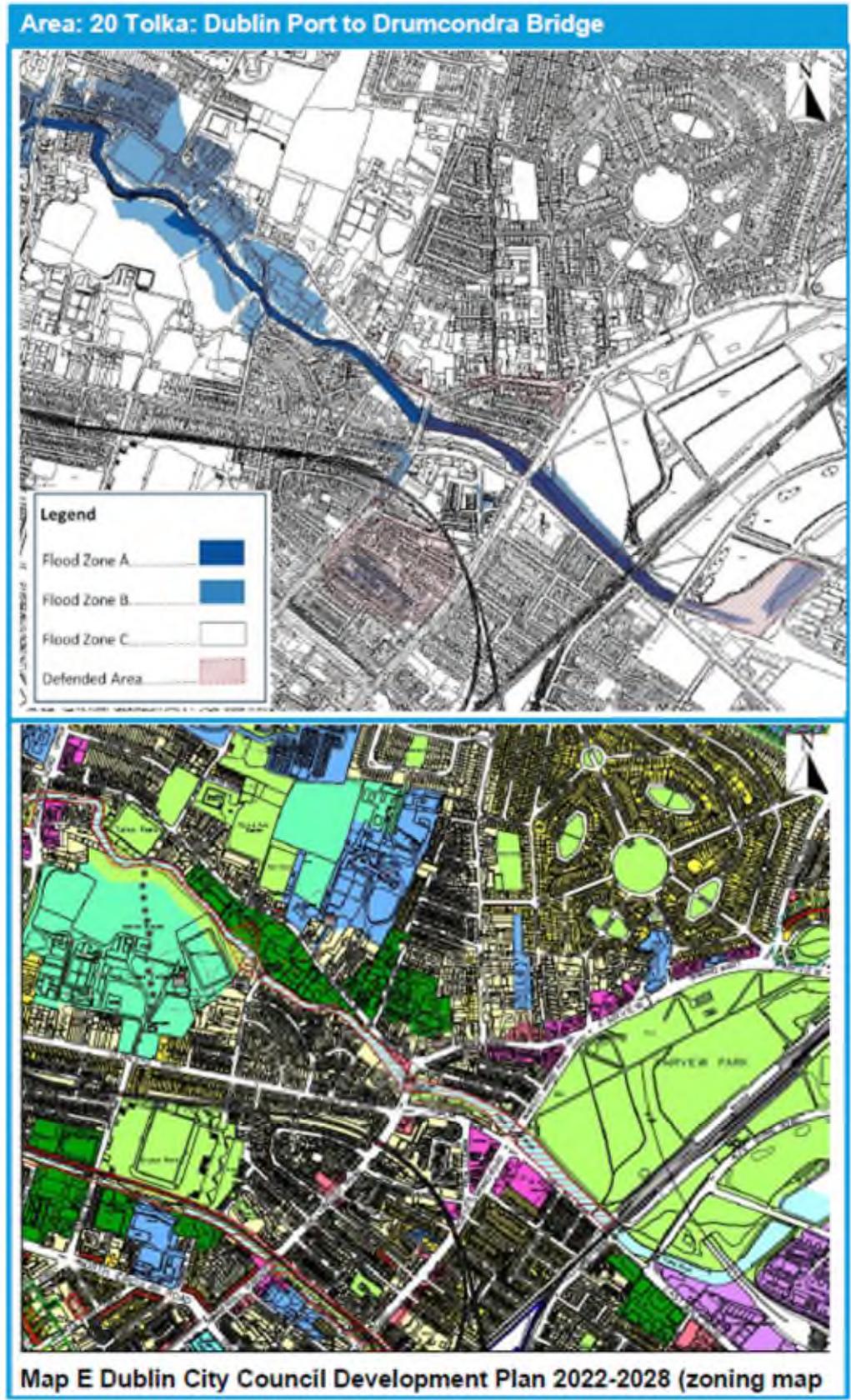
<p>Site Description</p>	<p>The area on the Tolka Estuary goes from the Dublin Port to Drumcondra Bridge. It crosses under Alfie Byrne Road, the Dublin – Belfast Railway line and Annesley Bridge. It is adjacent to East Wall Road from Alfie Byrne Road, the western end of Fairview park, Poplar Row, Cadogan Road, Luke Kelly Bridge, Orchard Road, Tolka Road, Distillery Road and Bridge. It is also adjacent to Richmond Road, Tolka Park, the Arch Bishop’s House and Cian Park. It is currently tidal to approximately 100m below Drumcondra bridge. Development in this area is a mixture of high and low density commercial and residential with infill development of both. There are a number of parks beside the Tolka River which are natural flood plains.</p>
<p>Benefitting from Defences (flood relief scheme works)</p>	<p>Flood defences incorporating 200-year tide level, plus 300mm freeboard, plus allowance for fluvial surcharge at high tide have been constructed from East Wall Road to Drumcondra Bridge. The old Distillery Bridge was removed and a new one was put in at a higher level. These defences incorporate the latest design and together with a flood gate at the pedestrian bridge on East Wall Road to Fairview Park provide the statutory level of protection.</p>
<p>Sensitivity to Climate Change</p>	<p>Significant, particularly where likely sea level rise exceeds the height of existing defences.</p>

Site: 20 Tolka: Dublin Port to Drumcondra Bridge	
Residual Risk	An appropriate assessment of residual risk of defence failure should be carried out. A structural inspection of all new defences is carried out each year.
Historical Flooding	The flood maps attached are consistent with previous flooding of this section of the River Tolka in 1954 and 2002. The highest recorded tide (3rd January 2014) was contained by the new flood defences.
Storm (surface) water	<p>All storm (surface) water in this area needs to be carefully managed and provision made for significant rainfall events during high tides. A five year high tide event should be assumed during a 100-year rainfall event. Should development be permitted, best practice with regard to storm (surface) water management should be implemented across the development area, to limit storm (surface) water runoff to current values. Separation of storm (surface) water and foul sewage flows should be carried out where possible.</p> <p>All Developments shall have regard to the Pluvial Flood Maps in their Site Specific Flood Risk Assessment, see Flood Resilient City 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</p>
<p>Commentary on Flood Risk:</p> <p>The flood extents indicate flow paths generally coming directly out of the tidal region. These can be compounded with local pluvial flooding if heavy rainfall coincides with a high tide. Wave action is not deemed significant in this section of the Tolka Estuary.</p> <p>The flood maps were produced based on the OPW CFRAM Study and checked against historic flooding in the area.</p>	
<p>Development Options:</p> <p>High density Commercial and Residential development (some infill) would be a natural extension of existing development.</p>	
<p>Justification Test for Development Plans</p>	
<p>1. Section 1 is covered elsewhere in this SFRA Justifying all of Dublin City</p>	
<p>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:</p>	
<p>(i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement</p> <p>Answer: Yes: This area is an established residential part of Dublin City. The River flows from Drumcondra Bridge through the Tolka Estuary to Dublin Port. It crosses under Alfie Byrne Road, Dublin – Belfast Railway Line and Annesley Bridge. It flows adjacent to East Wall Road from Alfie Byrne Road, the western end of Fairview Park, Poplar Row, Cadogan Road, Luke Kelly Bridge, Orchard Road, Tolka Road, Distillery Road and Bridge. It is also adjacent to Richmond Road, Tolka Park, the Arch Bishop's House and Cian Park. The area is essential for the expansion of Dublin City and comprises a mixture of high and low density Commercial and Residential with infill development of both. There are a number of parks which are natural flood plains also in this area.</p>	

Site: 20 Tolka: Dublin Port to Drumcondra Bridge

- (ii) **Comprises significant previously developed and/or under-utilised lands**
Answer: Most of the lands within Flood Zone A and B are already built up or comprise of brownfield sites. The River also flows through a number of parks which act as natural flood plains.
- (iii) **Is within or adjoining the core of an established or designated urban settlement**
Answer: Yes: The lands form part of an established suburb of the City.
- (iv) **Will be essential in achieving compact and sustainable urban growth**
Answer: Yes: (see response to (iii) above)
- (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. Areas identified as being in Flood Zones A and B are considered essential to achieving a consolidated urban centre and to comply with the NSS and RPG.
- 3. Strategic Flood Risk Assessment for Flood Zones A and B (for defended Flood Zones A and B see section 4.8)**
- Areas of open space within Flood Zones A and B must be preserved as they supplement the flood defences to provide protection.
 - Development behind flood defences should proceed in line with the general recommendations flood assessment and management in this SFRA with particular reference to section 4.8.

EXTRACT STRATEGIC FLOOD RISK ASSESSMENT (Nov 2021) FOR DRAFT DUBLIN CITY DEVELOPMENT PLAN 2022-2028



Area: 20 Tolka: Dublin Port to Drumcondra Bridge	
key at back of tables)	
Area Description	The area on the Tolka Estuary goes from East Wall to Drumcondra Bridge. It crosses under Alfie Byrne Road, the Dublin – Belfast Railway line and Annesley Bridge. It is adjacent to East Wall Road from Alfie Byrne Road, the western end of Fairview park, Poplar Row, Cadogan Road, Luke Kelly Bridge, Orchard Road, Tolka Road, Distillery Road and Bridge. It is also adjacent to Richmond Road, Tolka Park, the Arch Bishop's House and Cian Park. It is currently tidal to approximately 100m below Drumcondra Bridge. Development in this area is a mixture of high and low density commercial and residential with infill development of both. There are a number of parks beside the Tolka River which are natural flood plains.
SDRAs within this Area	Strategic Development and Regeneration Area (SDRA) 6 Docklands. Strategic Development and Regeneration Area (SDRA) 10 North East Inner City.
Benefitting from Defences (flood relief scheme works)	Flood defences incorporating 200-year tide level, plus 300mm freeboard, plus allowance for fluvial surcharge at high tide have been constructed from East Wall Road to Drumcondra Bridge. These defences incorporate the latest design and together with a flood gate at the pedestrian bridge on East Wall Road to Fairview Park provide the statutory level of protection.
Sensitivity to Climate Change	Significant, particularly where likely sea level rise exceeds the height of existing defences.
Residual Risk	An appropriate assessment of residual risk of defence failure should be carried out. A structural inspection of all new defences is carried out each year.
Historical Flooding	The flood maps attached are consistent with previous flooding of this section of the River Tolka in 1954 and 2002. The highest recorded tide (3 rd January 2014) was contained by the new flood defences. These maps are under review by the OPW.
Surface Water	All surface water in this area needs to be carefully managed and provision made for

Area: 20 Tolka: Dublin Port to Drumcondra Bridge

significant rainfall events during high tides. A five 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. Separation of surface water and foul sewage flows should be carried out where possible. Assume 2 year rainfall with the 200 year tidal flood event.

All developments shall have regard to the Pluvial Flood Maps in their Site Specific Flood Risk Assessment, see FloodResilienceCity 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 tidal region. These can be compounded with local pluvial flooding if heavy rainfall coincides with a high tide. Wave action is not deemed significant in this section of the Tolka Estuary.

The flood maps were produced based on the OPW CFRAM Plan and checked against historic flooding in the area.

Development Options:

Commercial and residential development (some infill) would be a natural extension of existing development. South of Poplar Row and East Wall Road the lands form part of the North East Inner City Strategic Development and Regeneration Area (SDRA No. 10), and also the Docklands SDRA (No. 6), see sections 13.12 and 13.8 of the Written Statement of the Development Plan.

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: This area is an established residential and mixed-use part of the inner suburbs. The River flows from Drumcondra Bridge through the Tolka Estuary to Dublin Port. It crosses under Alfie Byrne Road, Dublin – Belfast Railway Line and Annesley Bridge. It flows adjacent to East Wall Road from Alfie Byrne Road, the western end of Fairview Park, Poplar Row, Cadogan Road, Luke Kelly Bridge, Orchard Road, Tolka Road, Distillery Road and Bridge. It is also adjacent to Richmond Road, Tolka Park, the Arch Bishop's House and Cian Park. The area is essential for the expansion of Dublin City and comprises a mixture of high and low density commercial and residential with infill development of both. There are a number of parks which are natural flood plains also in this area.

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

Answer: Yes: Most of the lands within Flood Zone A and B are already built-up or comprise of brownfield sites. The River also flows through a number of parks which act as natural flood plains.

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

Answer: Yes: The lands form part of an established suburb of the City.

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

Answer: Yes: (see response to (iii) above).

(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. Areas identified as being in Flood Zones A and B are considered essential to achieving a consolidated urban centre and to comply with the NPF and RSES.

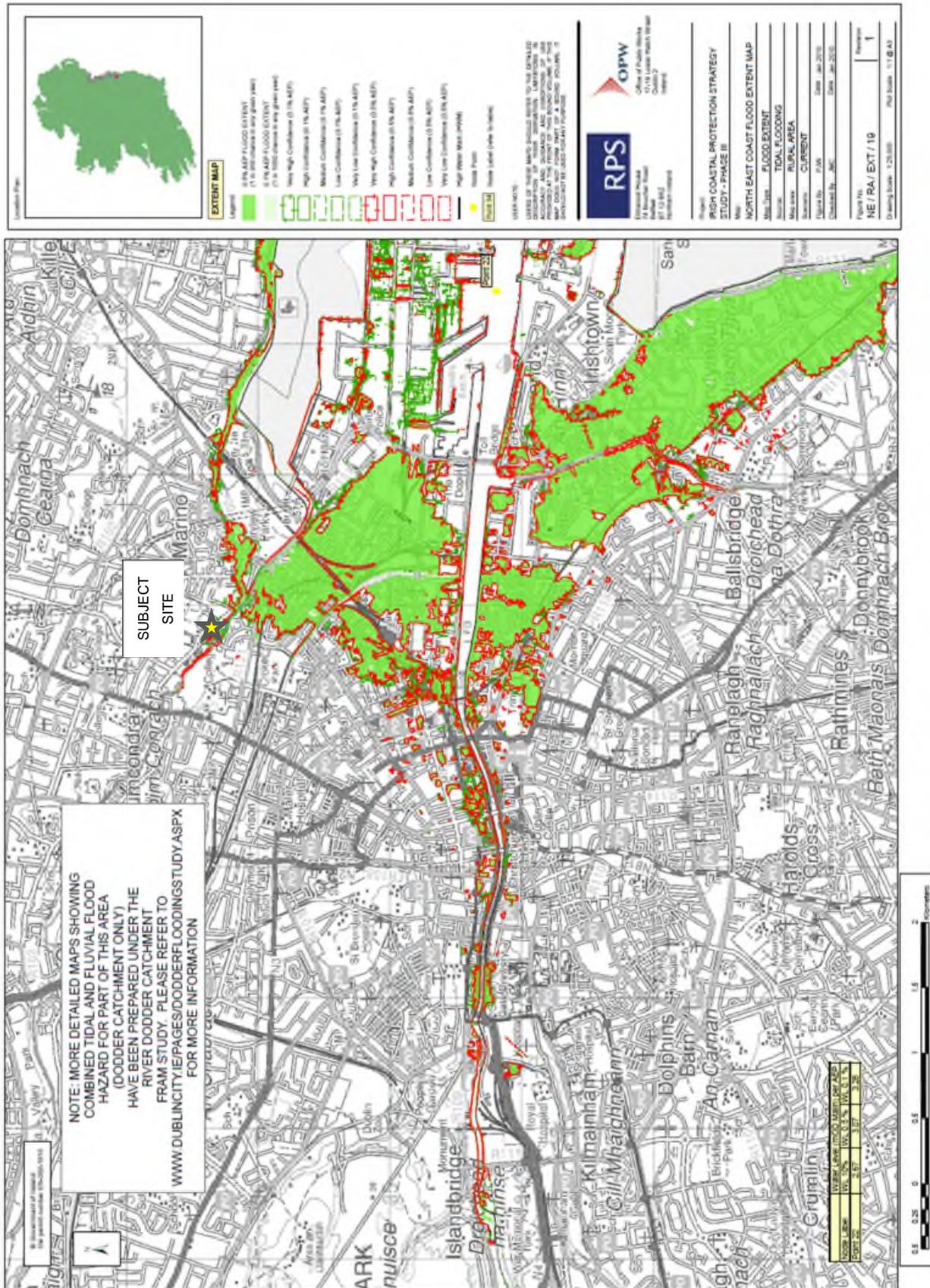
3. Specific Flood Risk Assessment

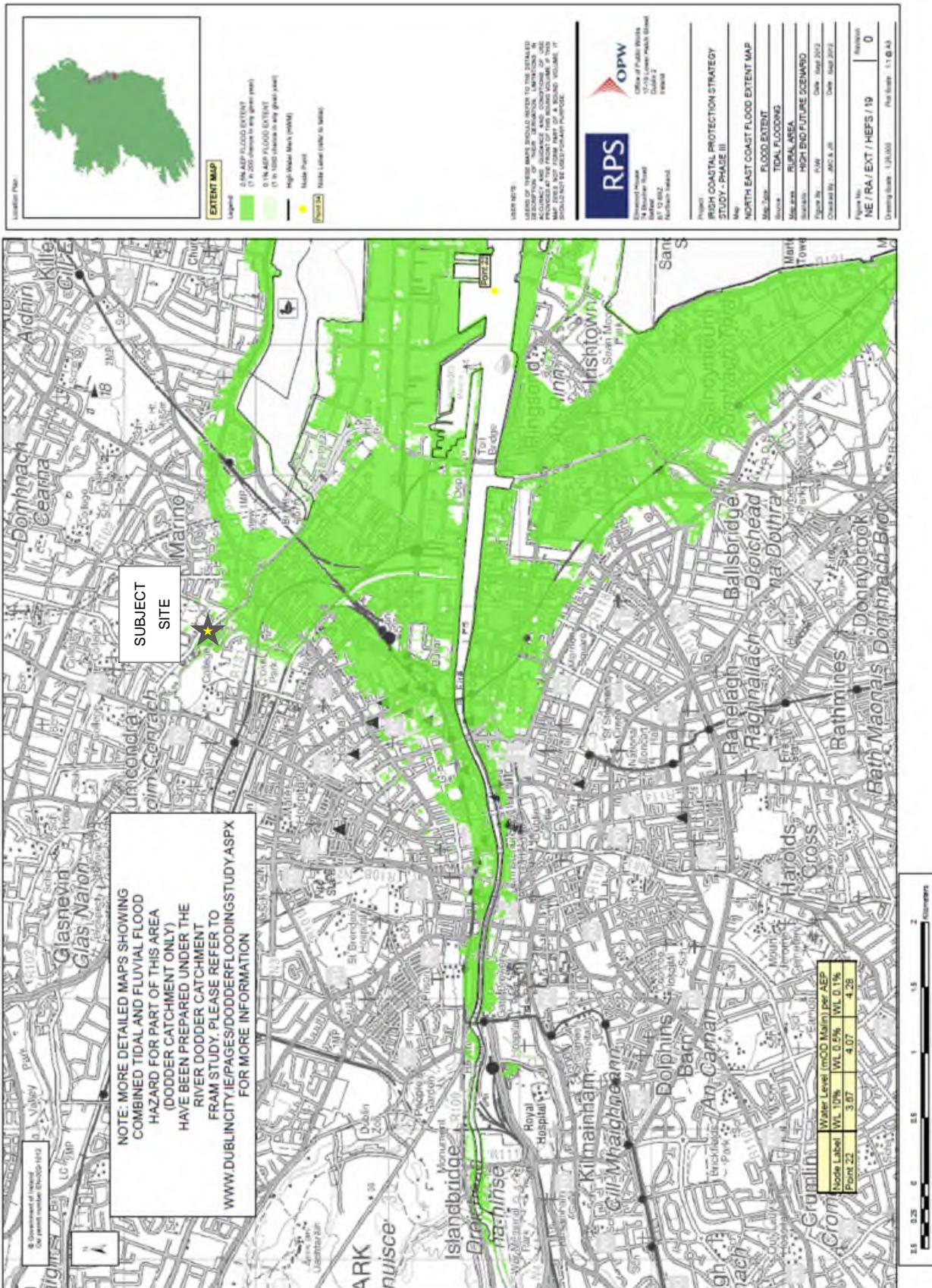
- See also Area Assessment No. 3 Liffey: O'Connell Bridge to Tom Clarke Bridge.
- See Justification Test for Strategic Development and Regeneration Area No. 6 Docklands in Appendix C2 for specific recommendations in relation to that area.
- Areas of open space within Flood Zones A and B must be preserved as they supplement the flood defences to provide protection. A flood risk assessment is underway to widen the Tolka floodplain adjacent to Tolka Park.
- Development behind flood defences should proceed in line with the general recommendations flood assessment and management in this

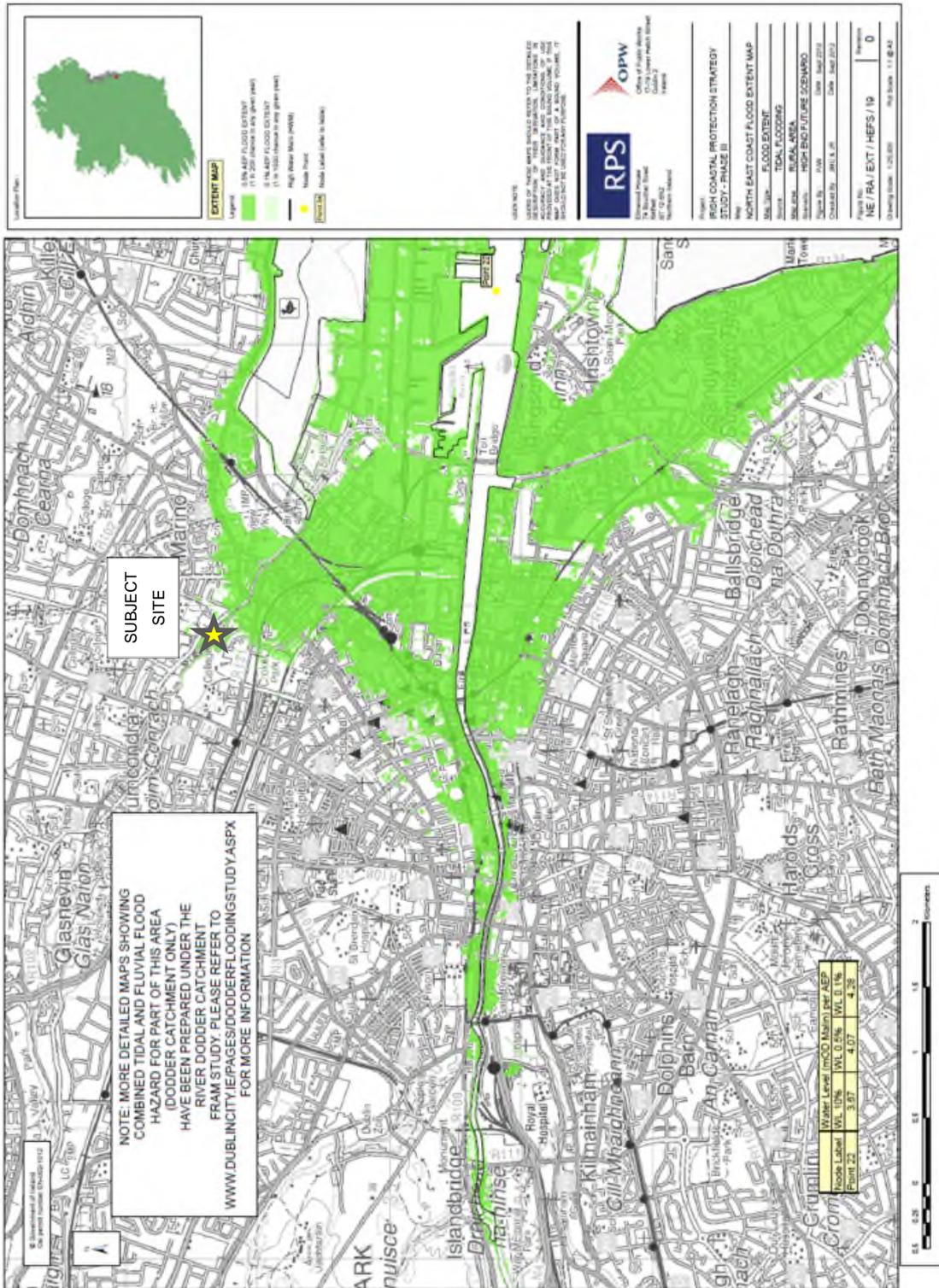
Area: 20 Tolka: Dublin Port to Drumcondra Bridge
SFRA.
Conclusion: The subject area <u>passes</u> the Justification Test for Development Plans.

APPENDIX B

IRISH COASTAL PROTECTION STRATEGY STUDY (ICPSS) FLOOD EXTENT MAPPING







APPENDIX C

OPW HISTORIC FLOOD EVENTS

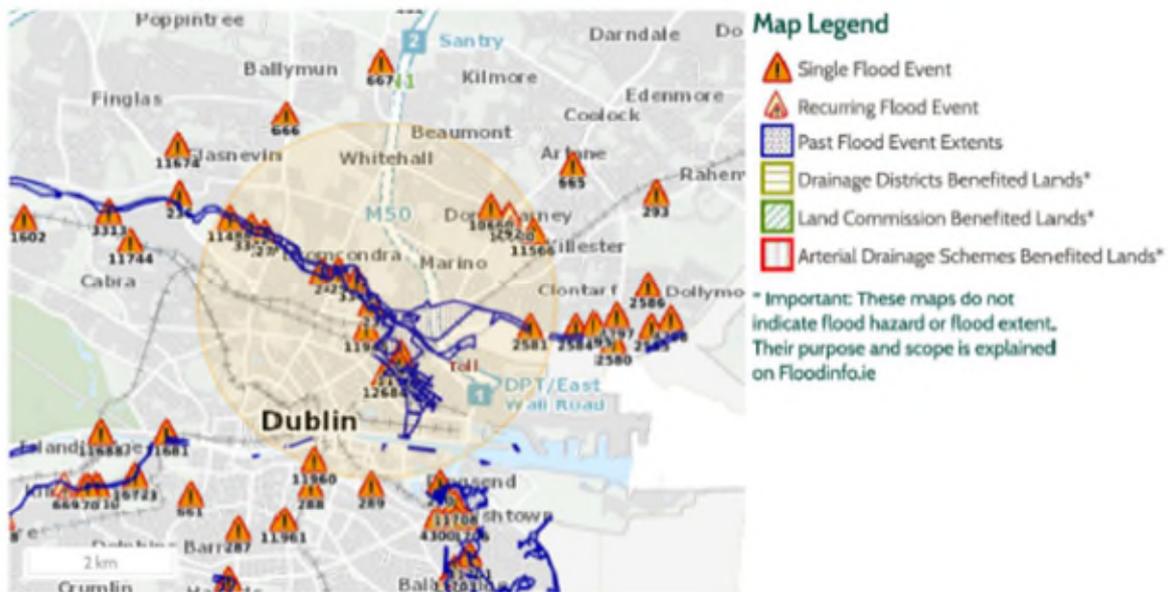
Past Flood Event Local Area Summary Report



Report Produced: 13/12/2021 12:53

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.



29 Results

Name (Flood_ID)	Start Date	Event Location
1. Flood report for Shamrock Cottages on the 24th October 2011 (ID-12684) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Approximate Point
2. Tolka November 1901 (ID-25) Additional Information: Reports (9) Press Archive (0)	12/11/1901	Approximate Point
3. Tolka September 1931 (ID-26) Additional Information: Reports (12) Press Archive (1)	03/09/1931	Approximate Point
4. Tolka Nov 1968 (ID-27) Additional Information: Reports (5) Press Archive (1)	25/11/1968	Approximate Point
5. Tolka September 1946 (ID-28) Additional Information: Reports (11) Press Archive (0)	20/09/1946	Approximate Point
6. Tolka December 1954 (ID-4) Additional Information: Reports (16) Press Archive (9)	08/12/1954	Area

Name (Flood_ID)	Start Date	Event Location
7.  Tolka October 1880 (ID-21) Additional Information: Reports (8) Press Archive (0)	28/10/1880	Approximate Point
8.  Tolka Nov 1965 (ID-23) Additional Information: Reports (9) Press Archive (2)	25/11/1965	Approximate Point
9.  Tolka Botanic Ave area August 1986 (ID-24) Additional Information: Reports (11) Press Archive (1)	25/08/1986	Approximate Point
10.  Tolka November 1898 (ID-29) Additional Information: Reports (10) Press Archive (0)	23/11/1898	Approximate Point
11.  Tolka November 1915 (ID-30) Additional Information: Reports (11) Press Archive (0)	12/11/1915	Approximate Point
12.  Tolka April 1909 (ID-31) Additional Information: Reports (5) Press Archive (0)	03/04/1909	Approximate Point
13.  Report of flooding at Jones Road, Dublin 3 on 26th July 2013 (ID-11945) Additional Information: Reports (1) Press Archive (0)	26/07/2013	Approximate Point
14.  Flooding at Trinity College, Dublin 2, 26th July 2013 (ID-11960) Additional Information: Reports (1) Press Archive (0)	26/07/2013	Approximate Point
15.  Tolka Glasnevin August 1986 (ID-3345) Additional Information: Reports (2) Press Archive (0)	25/08/1986	Approximate Point
16.  Tolka November 2002 (ID-5) Additional Information: Reports (143) Press Archive (13)	13/11/2002	Area
17.  Dublin City Tidal Feb 2002 (ID-456) Additional Information: Reports (45) Press Archive (27)	01/02/2002	Area
18.  Tolka Richmond Road Drumcondra Nov 2000 (ID-20) Additional Information: Reports (6) Press Archive (5)	05/11/2000	Approximate Point
19.  North Strand Road June 1963 (ID-291) Additional Information: Reports (4) Press Archive (2)	11/06/1963	Exact Point
20.  Donnycarney Wad June 1963 (ID-292) Additional Information: Reports (4) Press Archive (2)	11/06/1963	Exact Point
21.  Tolka Jan 2005 (ID-357) Additional Information: Reports (1) Press Archive (0)	07/01/2005	Approximate Point
22.  Clontarf Rd Seaview Avenue August 2004 (ID-2581) Additional Information: Reports (4) Press Archive (0)	23/08/2004	Exact Point
23.  Tolka Richmond Road August 1986 (ID-3346) Additional Information: Reports (4) Press Archive (0)	25/08/1986	Approximate Point

Name (Flood_ID)	Start Date	Event Location
24.  Donnycarney Dublin Recurring (ID-10680) Additional Information: Reports (4) Press Archive (0)	n/a	Approximate Point
25.  Dublin Area O2O709 (ID-10660) Additional Information: Reports (1) Press Archive (0)	02/07/2009	Approximate Point
26.  Tolka River 24th Oct 2011 Botanic Gardens (ID-11488) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Approximate Point
27.  Flooding at Bessborough Avenue, North Strand, Dublin 3 on 24th Oct 2011 (ID-11561) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Exact Point
28.  Flooding at Clanmoyle Road, Donnycarney, Dublin 5 on 24th Oct 2011 (ID-11566) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Approximate Point
29.  Flooding at Sharnrock Place, Cottages and Terrace, Dublin 3 on 24th Oct 2011 (ID-11655) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Exact Point

APPENDIX D

DEVELOPMENT FLOOD WARNING & EVACUATION PLAN

FLOOD WARNING & EVACUATION PLAN

1. General Precautions and Information

- The house is located within a defended area of the fluvial flood extents and in the scenario, there is a breach in fluvial flood defences, this plan outlines the actions required by the site users.
- The time of first inundation of the site could be fast, and with little warning due to unknown status of a breach. Although, it is likely the Local Authority will have prior warning of the increased fluvial levels and have a flood warning for the area in effect.
- Ensure all residents are aware of this plan, understand it and are fully briefed on the risk assessment, and provide basic training to any children at the site.
- The residents and site users will need to be aware that during a flood event there is likely to be a failure of the utilities.
- Ensure multiple emergency flood boxes are located within each and are accessible. This should be checked and maintained as part of a bi-annual check.
- The residents should be aware of higher risk periods e.g. high spring tides, paying particular attention to weather conditions and flood warnings during these times.
- Dublin City Council operates a flood warning procedure and residents and site users are encouraged to sign up to notification systems such as MapAlerter (www.mapalerter.com/alerts/floods) and check websites such as Meteoalarm (www.meteoalarm.eu) to ensure they are aware of any flood warnings in place for the area. These warnings are published on the Local Authorities website with more details of how to prepare for flooding available through the OPW Website, ww.flooding.ie.
- A new National Flood Forecasting & Warning Service is currently being set up and is anticipated to be fully operational in 3 years (2021). All residents and site users should be made aware of the implementation of this system when operational.
- This plan should be a live document and may need to be updated in the future as a result of local policies and strategies being changed. This Flood Plan should be amended as necessary with a log kept of any changes and reasons for change. This is included in appendix 3 and should be completed following any revisions

2. Response to Flood Alert or Flood Warnings

Once a 'Flood Alert or 'Flood Warning' has been reported, the following actions will be undertaken.

The Local Authority & Met Eireann are responsible for issuing severe flood warnings and residents and site users should listen to local media and watch other media to assess the developing situation.

Emergency Flood Boxes will be checked for contents. (See Appendix 2 for box contents).

3. Response to Severe Flood Warnings

Once a 'Severe Flood Warning' has been issued, the following actions should be taken. For Residents of the development:

1. Obtain the Emergency Flood Box.
2. Assemble all residents and visitors on the podium or in dwellings which have all been raised above the flood level.
3. Avoid evacuation wherever possible, as it will be very difficult to evacuate people from the site to an area outside the floodplain using a designated safe route. Access to the evacuation route and trafficability can be lost early in the flood because of rising floodwaters. Evacuation must be organised by the emergency services in this instance.
4. Contact the emergency services.
5. Depending on the level of flood risk and its imminence the emergency services will advise the public on the quickest and safest way off the property.

IMPORTANT: DO NOT RE-ENTER THE PROPERTY UNTIL INSTRUCTED TO DO SO BY LOCAL AUTHORITY OR THE EMERGENCY SERVICES

NO ACTIONS SHOULD BE TAKEN WHICH COMPROMISE THE SAFETY OF THE PERSONS INVOLVED

APPENDIX 1: Warning System

(Following Met Eireann's Weather Warning System)

1: STATUS YELLOW – Flood Alert

Flooding is possible. Be prepared - Is used from two hours to two days in advance of flooding.

Following Actions:

- Watch water levels
- Monitor local news and weather forecasts on radio, TV or internet.
- Make sure you have what you need to put your flood plan into action.
- Check flood kit is fully equipped.
- Alert your neighbours, particularly the elderly and less able.
- Reconsider travel plans.
- Ensure all residents in your dwelling are accounted for.

2: STATUS ORANGE – Flood Warning

Flooding is expected. Immediate action is required - Is used from half an hour to one day in advance of flooding. Following Actions:

As with Flood Alert plus;

- Move valuables and other items to safety
- Prepare flood kit.
- Prepare to turn off gas, electricity and other services.
- Be prepared for evacuation.
- Protect yourself and others that need your help.

3: STATUS RED – Severe Flood Warning

Severe flooding. Danger to life - Is used when flooding poses a significant threat to life. Following Actions: As with Flood Warning plus;

- Stay in a safe place.

- Turn off gas, electricity and water supplies if safe to do so
- Try to keep calm, and to reassure others, especially children
- Co-operate with emergency services and local authorities
- Prepare for evacuation.
- Call 999 if you are in immediate danger.

In the Event of a Breach Scenario no warning may be provided and the first sign of flooding may be water entering the site. In this situation ensure all site users are safely gathered inside the building and contact the emergency services. Follow the actions as shown on the Severe Flood Warning.

APPENDIX 2: Emergency Flood Box Contents

1. Encapsulated procedure checklist for Flood Officer with pen
2. Torch and battery back-up for mobile phone/tablet or dynamo radio
3. A first-aid kit, including a supply of any essential medication
4. Red and white hazard tape
5. A list of useful telephone numbers
6. An up to date copy of flood warning information (Met Eireann/Dublin City Council)

Procedure list is to assist in delivery of the response plan:

Priority	Action	Complete ✓
1	<ul style="list-style-type: none"> • Account for all residents and inform about flood warning 	
2	<ul style="list-style-type: none"> • Continue to monitor situation by watching/listening to media. 	
3	<ul style="list-style-type: none"> • Gather residents and visitors to podium level and above. 	
4	<ul style="list-style-type: none"> • Contact Emergency Services 	
<p>LEAVE THE PROPERTY FOLLOWING EMERGENCY SERVICES INSTRUCTIONS</p>		

