The Donore Project

Part 10 Planning Application
Flood Risk Assessment

The Land Development Agency

STG-AEC-S1b-00-00-RE-C-0000002_Flood_Risk_Assessment

28 November 2022

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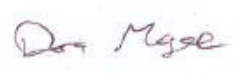			
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1. Introduction

In accordance with Section 175 of the Planning and Development Act 2000 (as amended) The Land Development Agency, on behalf of Dublin City Council, gives notice of its intention to make an application for approval to An Bord Pleanála for a seven year permission in relation to a proposed residential development at this site located on the former St. Teresa's Gardens, Donore Avenue, Dublin 8. The site is bound by Donore Avenue to the north-east, Margaret Kennedy Road to the north-west, The Coombe Women & Infants University Hospital to the west, the former Bailey Gibson factory buildings to the south-west, and the former Player Wills factory to the south-east. The development will consist of the construction of a residential scheme of 543 no. apartments on an overall site of 3.26 ha.

This report contains a Stage 1 & 2 Flood Risk Assessment which identify and assess flood risk respectively. Mitigation measures are discussed thereafter.

This Site-Specific Flood Risk Assessment (SSFRA) has been carried out in accordance with "The Planning System and Flood Risk Management" Guidelines, 2009 and Policy SI15 of the Dublin City Development Plan 2022-2028. The proposed development was designed to accommodate sustainable drainage and effectively manage surface water flood risk, in accordance with Policy SI21 & Policy SI22 of the Development Plan.

The proposed development is hereafter referred to as the 'Donore Project'. The site is owned by Dublin City Council (DCC).

Figure 1.1: Site Location

The current site is part of the overall Strategic Development & Regeneration Area (SDRA) 11 in the 2022-2028 Dublin City Development Plan). This site lies at the centre of the SDRA lands and will be developed to provide 543 new homes.

The development (GFA of c. 53,227 sqm) contains the following mix of apartments: 225 No. 1 bedroom apartments (36 no. 1-person & 189 no. 2-person), 274 No. 2 bedroom apartments (including 52 No. 2 bed 3 person apartments and 222 No. 2 bed 4 person apartments), 44 No. 3 bedroom 5-person apartments, together with retail/café unit (168 sq.m.), mobility hub (52 sq.m.) and 952 sq.m. of community, artist workspace, arts and cultural space, including a creche, set out in 4 No. blocks.

The breakdown of each block will contain the following apartments:

- Block DCC1 comprises 111 No. apartments in a block of 6-7 storeys;
- Block DCC 3 comprises 247 No. apartments in a block of 6-15 storeys;
- Block DCC5 comprises 132 No. apartments in a block of 2-7 storeys;
- Block DCC6 comprises 53 No. apartments in a block of 7 storeys;

The proposed development will also provide for public open space of 3,408 sqm, communal amenity space of 4,417 sqm and an outdoor play space associated with the creche. Provision of private open space in the form of balconies or terraces is provided to all individual apartments.

The proposed development will provide 906 no. residential bicycle parking spaces which are located within secure bicycle stores. 5% of these are over-sized spaces which are for large bicycles, cargo bicycles and other non-standard bicycles. In addition, 138 spaces for visitors are distributed throughout the site.

A total of 79 no. car parking spaces are provided at undercroft level. Six of these are mobility impaired spaces (2 in each of DCC1, DCC3 & DCC5). 50% of standard spaces will be EV fitted. Up to 30 of the spaces will be reserved for car sharing (resident use only). A further 15 no. on-street spaces are proposed consisting of:

- 1 no. accessible bay (between DCC5 & DCC6)
- 1 no. short stay bay (between DCC5 & DCC6)
- 1 no. crèche set-down/ loading bay (between DCC5 & DCC6)
- 1 no. set-down / loading bay (northern side of DCC5)
- 1 no. set-down/loading bay (northern side of DCC 3)
- 10 no. short stay spaces (north-east of DCC1)

In addition, 4 no. motorcycle spaces are also to be provided.

Vehicular, pedestrian and cyclist access routes are provided from a new entrance to the north-west from Margaret Kennedy Road. Provision for further vehicular, pedestrian and cyclist access points have been made to facilitate connections to the planned residential schemes on the Bailey Gibson & Player Wills sites for which there are extant permissions (Ref. No.'s ABP-307221-20 & ABP-308917-20).

The development will also provide for all associated ancillary site development infrastructure including site clearance & demolition of boundary wall along Margaret Kennedy Road and playing pitch on eastern side of site and associated fencing/lighting, the construction of foundations, ESB substations, switch room, water tank rooms, storage room, meter room, sprinkler tank room, comms room, bin storage, bicycle stores, green roofs, hard and soft landscaping, play equipment, boundary walls, attenuation area and all associated works and infrastructure to facilitate the development including connection to foul and surface water drainage and water supply.

Refer to Figure 1.2 for the proposed site layout. The proposed development consists of the construction of 543 no. residential units, distributed over 4 no. proposed apartment blocks (DCC1, DCC3. DCC5 and DCC6). Table 1.1 summarises the current schedule of accommodation, per block.

Figure 1.2: Extract from drawing STG-MW-S1b-00-RF-DR-A-1100002 – Site Layout Plan Proposed

Table 1.1: Proposed Residential Units

Phase	Number of Proposed Units
DCC1	111
DCC3	247
DCC5	132
DCC6	53
Total	543

Source: <Metropolitan Workshop>

2. The Planning System and Flood Risk Management Guidelines

This Stage 1 & 2 Flood Risk Assessment (FRA) has been prepared in line with the requirements of "The Planning System & Flood Risk Management Guidelines for Planning Authorities" (The Guidelines) as published in November 2009, and the particular requirements of a site-specific Flood Risk Assessment as outlined in Appendix 6A of the Technical Appendices to those Guidelines.

In September 2008 "The Planning System and Flood Risk Management" Guidelines (The Guidelines) were published by the Department of the Environment, Heritage and Local Government in Draft format. In November 2009, the adopted version of the document was published.

The Flood Risk Management Guidelines give guidance on flood risk and development. The Guidelines recommend a precautionary approach when considering flood risk management in the planning system. The core principle of The Guidelines is to adopt a risk based sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding.

The objective of a Site-Specific Flood Risk Assessment (SSFRA) is to assess all types of flood risk to a development. The assessment should investigate potential sources of flood risk and include for the effects of climate change. The assessment is required to examine the impact of the development and the effectiveness of flood mitigation and management procedures proposed. It should also present the residual risks that remain after those measures are put in place.

As set out in the Flood Risk Management Guidelines, the assessment of flood risk *"requires an understanding of where the water comes from (i.e. the source), how and where it flows (i.e. the pathways) and the people and assets affected by it (i.e. the receptors)".*

This approach is based on the identification of flood zones for river and coastal flooding. "Flood Zones" are geographical areas used to identify areas at various levels of flood risk. It should be noted that these do not consider the presence of flood defences, as risks remain of overtopping and breach of the defences. There are three flood zones defined:

Zone A (high probability of flooding) is for lands where the probability of flooding is greatest (greater than 1% or the 1 in 100 for river flooding and 0.5% or 1 in 200 for coastal flooding).

Zone B (moderate probability of flooding) refers to lands where the probability of flooding is moderate (between 0.1% or 1 in 1,000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1,000 and 0.5% or 1 in 200 for coastal flooding).

Zone C (low probability of flooding) refers to lands where the probability of flooding is low (less than 0.1% or 1 in 1,000 for both river and coastal flooding).

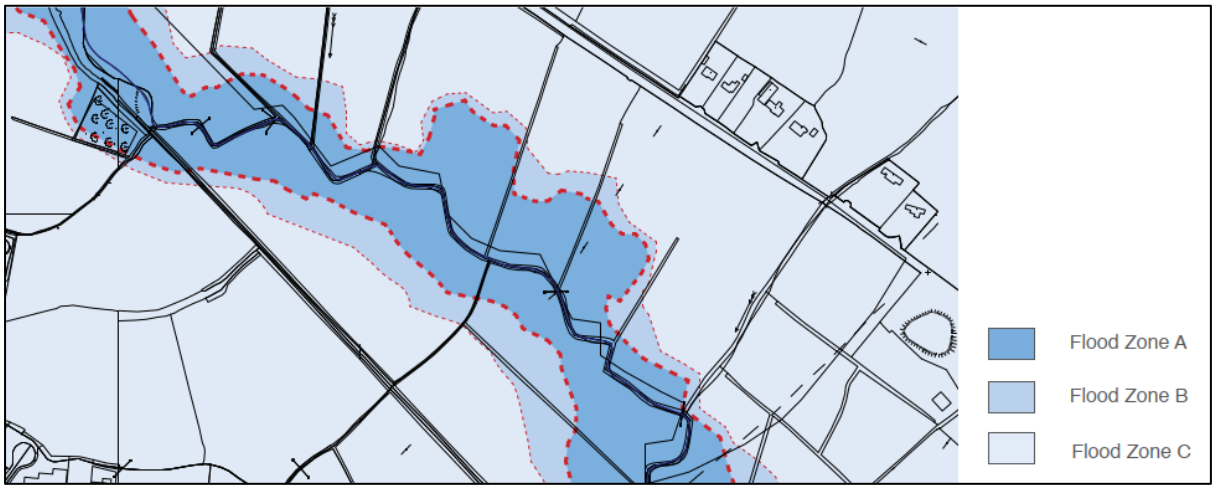


Figure 2.1: Indicative Flood Zone Map (Extract from The Guidelines)

Once a flood zone has been identified, The Guidelines set out the different types of development appropriate to each zone. Exceptions to the restriction of development due to potential flood risks are provided for using the **Justification Test**, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. This recognises that there will be a need for future development in existing towns and urban centres that lie within flood risk zones, and that the avoidance of all future development in these areas would be unsustainable. The current Dublin City Development Plan (2016-2022) and new Dublin City Development Plan (2022-2028) Strategic Flood Risk Assessments (SFRAs) have been carried out in accordance with the Flood Risk Management Guidelines.

The Guidelines set out a staged approach to assessment. The stages of assessment are:

Flood Risk Identification (Stage 1) - Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment.

Initial Flood Risk Assessment (Stage 2) - Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measures.

Detailed Flood Risk Assessment (Stage 3) - Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

3. Flood Risk Identification (Stage 1 FRA)

As part of the overall exercise to establish the potential flood risk to the development site, AECOM carried out a review of available and recorded information with regard to flooding in the area. The following sources were consulted as part of the review:

- Historic Flood Records
- GSI (Geological Survey Ireland) Groundwater Flooding Probability Maps
- Greater Dublin Strategic Drainage Study (GDSDS) Flooding Maps
- OPW PRFA Mapping & CFRAM Predictive Mapping
- Dublin City Development Plan 2016-2022: Strategic Food Risk Assessment (SFRA)
- Dublin City Development Plan 2022-2028: Strategic Food Risk Assessment (SFRA)

3.1 Historical Flood Records

The Office of Public Works (OPW) collates available reports of flooding from all sources (e.g. fluvial, pluvial, coastal, etc.) on a nationwide basis and provide mapping for the historical flooding events in specific areas. Figure 3.1 is an extract from the historical flooding report, showing the area in the vicinity of the development site and notes no reported instances of flooding within or around the frontage of the development site. Please refer to Appendix A for the OPW Past Flood Summary Report.

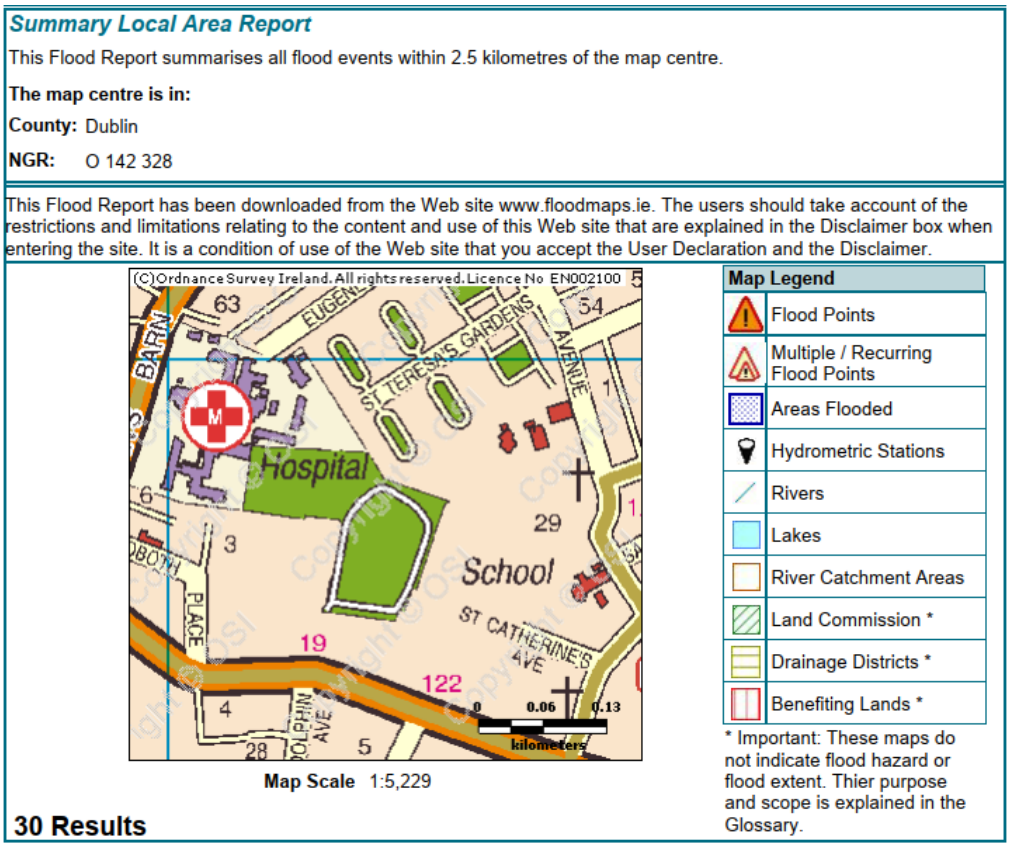


Figure 3.1: Historic Flood Events in the Vicinity of the Subject Site

3.2 GSI (Geological Survey Ireland) Groundwater Flooding Probability Maps

GSI Groundwater Flood Probability Maps are available on floodinfo.ie and show the probabilistic flood extent of groundwater flooding in limestone regions.

No groundwater flooding is shown to be predicted anywhere in Co. Dublin.

3.3 Greater Dublin Strategic Drainage Study (GDSDS) Flooding Maps

The Greater Dublin Strategic Drainage Study (GDSDS) provides significant information regarding the existing surface water and foul water infrastructure within the subject site. Performance Maps give flooding predictions and cataloguing existing hydraulic deficiencies in the network area. Refer to Figure 3.2.

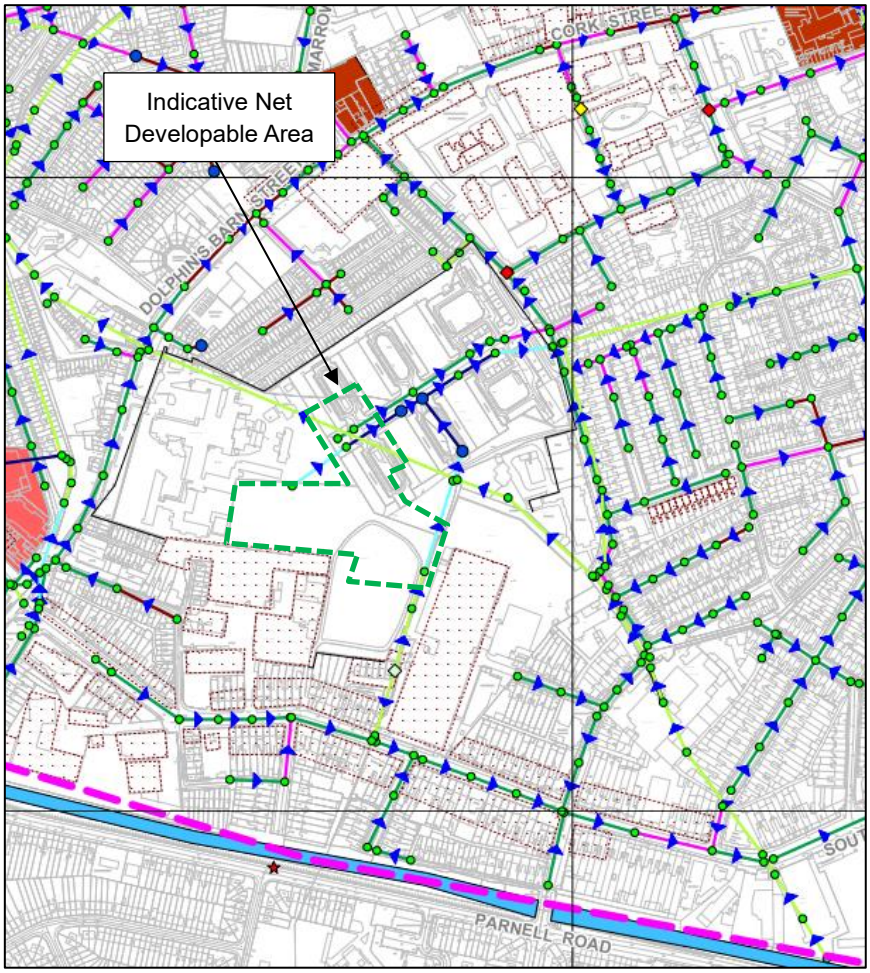


Figure 3.2: Extract from the GDSDS Existing Hydraulic Performance Map 2013

The colouring coding is as follows:

- **Brown Line** – Foul/Combined sewer flooding for the 30 year event or less,
- **Magenta Line** – Foul/Combined sewer surcharging for the 1 or 2 year event,
- **Dark Green Line** – Foul/Combined sewer does not surcharge/flood,
- **Green Dot** – Modelled Manhole does not flood for the 5 year event,
- **Light Green Line** – Surface Water does not surcharge/flood,
- **Light Blue Line** – Surface Water surcharging for the 1 or 2 year event,
- **Dark Blue Line** – Surface Water flooding for the 30 year event or less.

The sewer shown in light green, traversing the site, is noted to be obsolete (refer to Section *4.2 Existing Surface Water Drainage*, of the STG-AEC-S1b-00-00-RE-C-0000001_Infrastructure_Report enclosed with this application for further information) and will be removed as part of the overall future developments within the SDRA.

The existing surface water sewer shown in Dark Blue is running within a small portion of the subject site which receives flows from The Coombe Women & Infants University Hospital to the west. The extent of this line within the development will be diverted.

It should be noted that there are construction works underway within The Coombe Women & Infants University Hospital lands (on the western boundary of The Donore Project site) for a proposed new building which includes

attenuation proposals. It is therefore acknowledged that the flood risk of this sewer will be reduced as the proposed drainage upgrades, with associated attenuation, will also reduce the volume of stormwater entering the sewer. For further details on the diversion proposal please refer to the relevant section (Proposed Surface Water Drainage Diversions) of the Infrastructure Report (STG-AEC-S1b-00-00-RE-C-0000001_Infrastructure_Report).

In order to avoid further possible flooding events, the proposed drainage network in the area will be designed to minimise the risk of flooding occurring on site.

3.4 OPW CFRAM Flood Risk Mapping

The CFRAM (Catchment Flood Risk Assessment and Management) programme is a national programme which produced a series of Preliminary Flood Risk Assessment (PFRA) which cover the entire county. This assessment was carried out based on readily available information to identify areas where there may be a significant risk of flooding.

The PFRA was undertaken by:

- Reviewing records of floods that have happened in the past;
- Undertaking analysis to determine which areas might flood in the future, and what the impacts might be; and
- Consulting with Local Authorities and other Government departments and agencies.

The objective of the PFRA was to identify areas where the risk associated with flooding might be significant. These areas, which are referred to as ‘Areas for Further Assessment’ or AFAs, are where a more detailed assessment was then undertaken to more accurately assess the extent and degree of flood risk.

The CFRAM predictive flood risk mapping was based on the output of hydraulic modelling carried out as part of the study. The hydraulic model predicts the water levels for three fluvial flood events at given nodes. Based on the predicted water levels at these nodes, fluvial flood extents associated with the 10% AEP event, 1% AEP event (Flood Zone A), and the 0.1% AEP event (Flood Zone B) are mapped.

The Eastern CFRAM study provides predictive flooding within areas of further assessment from Fluvial and Coastal/Tidal sources. Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent lands, whereas, coastal flooding is the result of sea levels which are higher than normal and result in sea water overflowing onto the land. Coastal flooding can also be influenced by high tide level, storm surges and wave action.

The CFRAM mapping available for the area surrounding the development indicates that the site is within a predicted fluvial flooding area. The subject site is located approx. 1.2 km from the predicted coastal flood extent. Refer to Figure 3.3 and Figure 3.4.

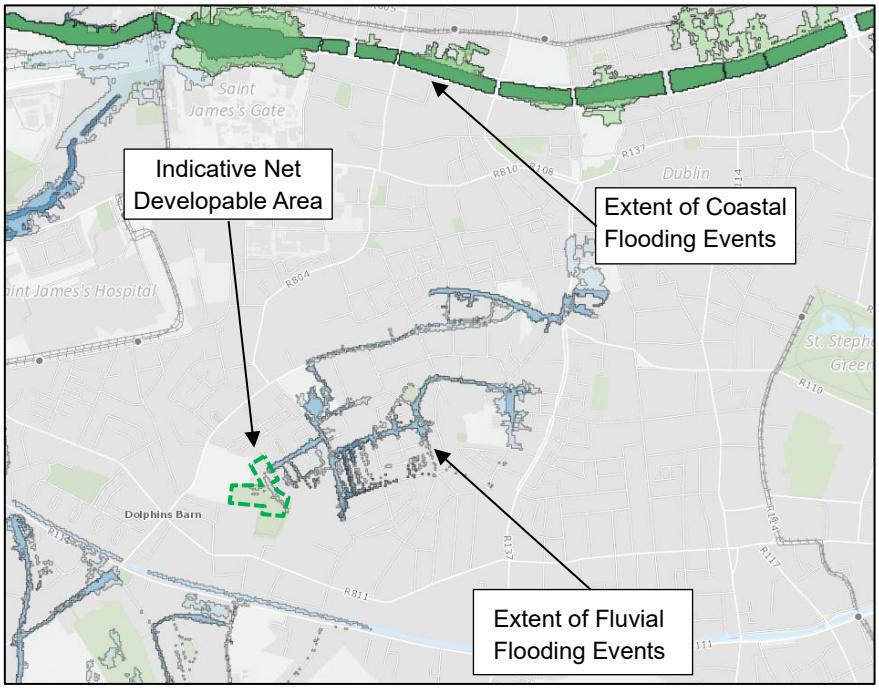


Figure 3.3: Fluvial Flood Zones at The Donore Project site, as defined by the CFRAM Mapping (www.floodinfo.ie)

3.4.1 CFRAM Mapping – Poddle River Fluvial Flooding

The Poddle River, located east of the proposed site, is the closest river to the proposed site, and the most likely source of possible fluvial flooding. The CFRAM mapping for the Poddle River near the site, illustrates the location of the closest fluvial model node to the development site (ref. No. SO14324909).

This map was published as part of the Eastern CFRAM project on the 11th August 2016. It should be noted that the previous apartment blocks have been demolished, and the access road has partly been removed. Given these changes, the 2016 mapping is not fully representative, as ground levels have changed since the date of publish. An analysis of flood levels and the latest ground has been undertaken, refer to Section 4.1.1 of this report.

An extract from the Eastern CFRAM map Drawing No. E09POD_EXFCD_F0_05 is illustrated in Figure 3.4. Refer to Appendix B for these CFRAM flood extent and flood depth maps.

On the outdated CFRAM mapping, fluvial flooding is predicted on the subject site, for the 1:100 year flood event (a minimal flood extent area, with 0 - 0.25 m flood depth predicted) and for the 1:1000 year event (a larger flood extent area with a 0 - 0.25 m flood depth predicted). Based on this mapping, approx. 90% of the site is located within Flood Zone C, 10% within Flood Zone B and <1% situated within Flood Zone A. Given a portion of the site is in Flood Zone A/B, it would be prudent to carry out a Justification Test, refer to Section 5.3.

However, given the topography has changed since this study, an analysis of flood levels and topography was carried out, refer to Section 4.1.1.

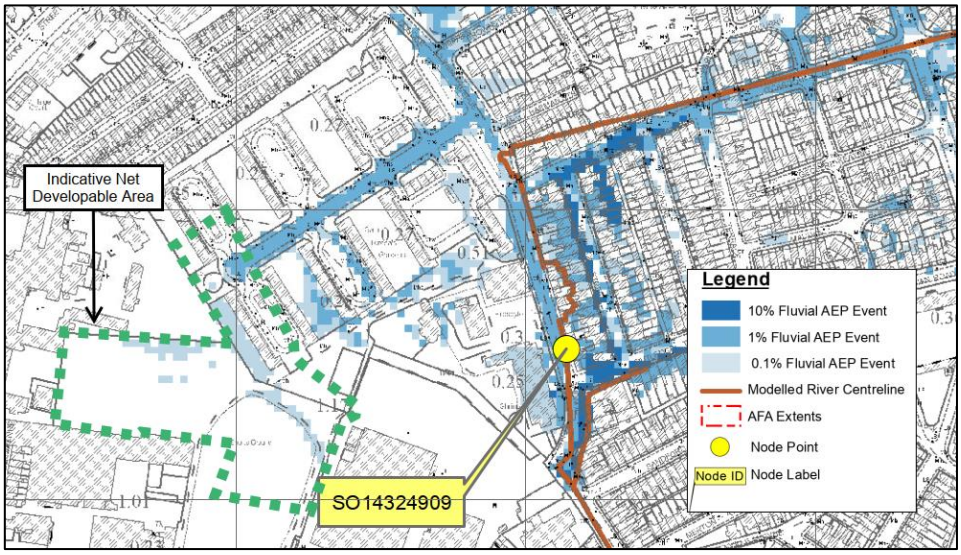


Figure 3.4: Extract from CFRAM Fluvial Flood Extents

3.4.2 CFRAM Mapping – Pluvial Flooding

As part of the CFRAM study, predictive pluvial flood maps were produced for Dublin City. Pluvial flooding is rainfall generated flooding, which arises during or after intense rainfall events which produce overland flows and ponding.

3.5 DCC Development Plan 2016-2022 Strategic Flood Risk Assessment

The Strategic Flood Risk Assessment (SFRA), published as part of the DCC Development Plan 2016-2022 is largely based on the CFRAM mapping and hence shows the same information. The subject site is within Site 13: Poddle – Inside Canal of the justification test tables in Appendix 3 of the DCC SFRA. Refer to Figure 3.5.

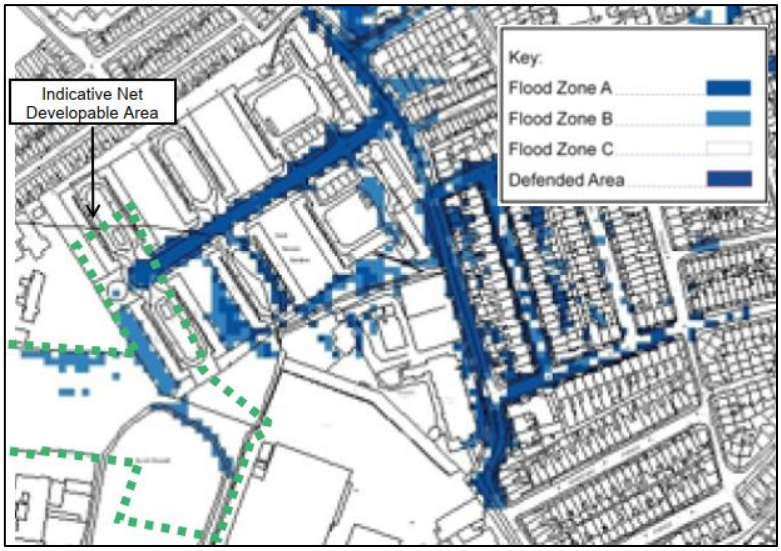


Figure 3.5: Site 13: Poddle – Inside Canal, from DCC Development Plan 2016-2022 SFRA

3.6 DCC Development Plan 2022-2028 Strategic Flood Risk Assessment

The Strategic Flood Risk Assessment (SFRA), published as part of the DCC Development Plan 2022-2028, includes SDRA Screening & Justification Tests for each SDRA. The subject site is within SDRA 11 of the 2022-2028 Development Plan and the Flood Zones for the SDRA (refer to Figure 3.6) show a larger Flood Zone B extent than the previous SFRA (2016-2022).

A study is ongoing for the River Poddle Flood Alleviation Scheme (flood levels are not available at the time of writing), and this may be part of the reason the larger Flood Zone areas are shown. The impact on the subject site appears to source from Donore Avenue, similar to the CFRAM mapping predictions, albeit a larger Flood Zone. As noted previously in Section 3.4.1, the CFRAM mapping appears to be based on topography which has changed since the CFRAM study, therefore, an analysis of flood levels and topography was carried out, refer to Section

4.1.1. This analysis concludes that the topography has changed following demolition of the previous St. Teresa's Gardens flats and the fluvial floods extent would also differ as a result.

Furthermore, it appears the flood extent shown in the SFRA is incorrect, relative to the OS (Ordnance Survey) Mapping, when comparing topographical levels. In addition to levels, it appears the flooding is mistakenly shown approx. 50 m southeast relative to the OS Mapping when comparing with the CFRAM mapping and the previous SFRA. (And as expected, the flood extents should generally be within roadways).

The Justification Test for SDRA 11 in the SFRA concludes SDRA 11 passes the Justification Test for Development Plans and notes '*The Poddle Flood Alleviation Scheme proposes to adapt portions of the drainage network to reduce flood risk in this area. Although this will be beneficial, the scheme is not required to allow development of the site.*'

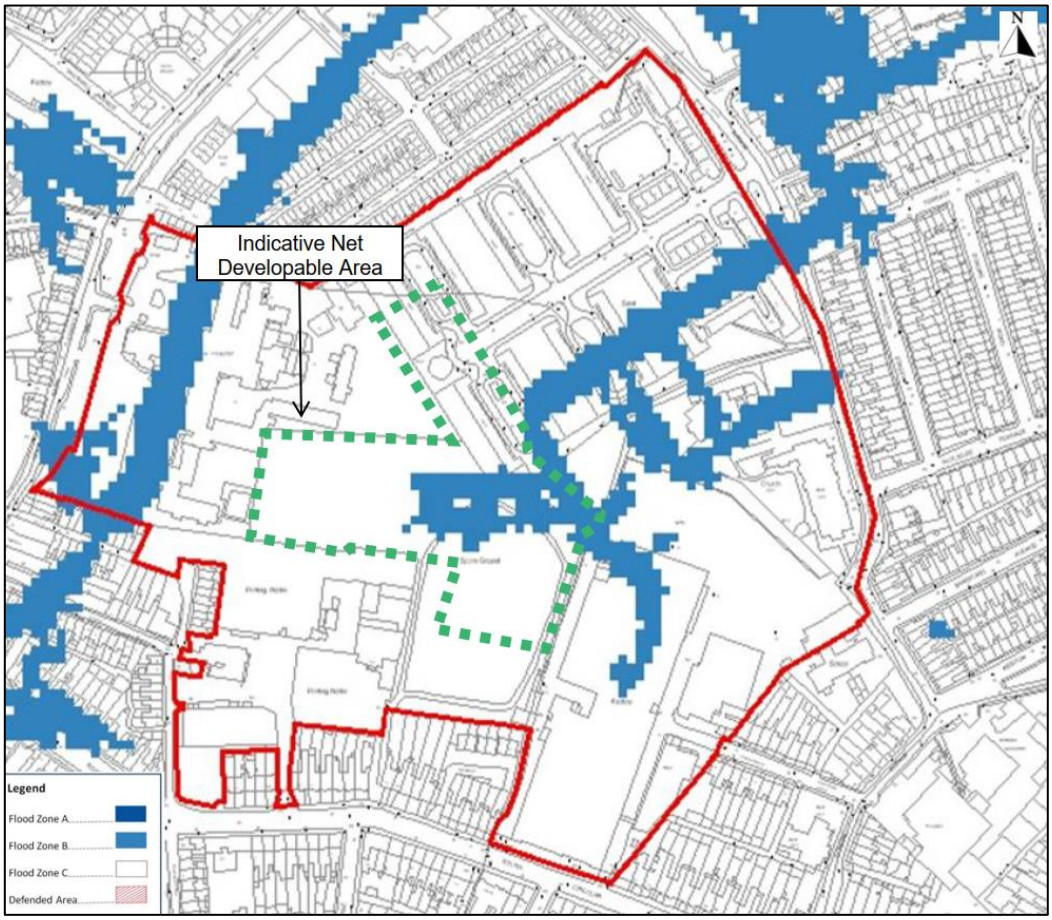


Figure 3.6: Flood Zones at SDRA 11 (DCC Development Plan 2022-2028 SFRA)

4. Initial Flood Risk Assessment (Stage 2)

4.1 Potential Sources of Flooding

Based on the review of the historical data and existing flood studies reviewed in the Stage 1 Flood Risk Identification, the potential sources of flooding at the proposed development site are the following;

- Fluvial;
- Coastal Flooding;
- Pluvial/Surface Water Flooding;
- Groundwater Flooding; and
- Flooding from Sewers.

4.1.1 Fluvial Flooding

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out on to the adjacent floodplain. Mapping published in 2016 as part of the OPW CFRAM Study is used to evaluate the fluvial flood risk to the proposed development. Based on this mapping, the majority of the site area is located within Flood Zone B and C, with approx. 50-100 m^2 situated within Flood Zone A.

Table 4.1 includes the fluvial flood water levels for various Annual Exceedance Probabilities (AEP) at Node SO14324909 on the Poddle River.

Table 4.1: Predictive Fluvial Flood Water Levels in the Vicinity of the Site

Node	10% AEP Water level (m OD)	1% AEP Water Level (m OD)	0.1% AEP Water Level (m OD)
SO14324909	18.27	18.37	18.49

Source: floodmaps.ie

However, it is noted that this CFRAM mapping was carried out based on the topographical information available at the time of the study, which included the previous residential development on the site. The existing buildings have been demolished recently and a topographical survey carried out by Murphy Geospatial in June 2021. The survey shows the levels are higher than the predicted water levels in the table above, suggesting a regrading of the site following the demolition works. Refer to the Topographical Survey drawing appended to the Infrastructure Report.

The CFRAM mapping shows the original 12 apartment blocks of the St. Teresa's Gardens flats, however, 10 of these blocks have been demolished and only 2 blocks remain. Ground levels at the locations of the demolished flats are higher than the ground levels surrounding the remaining flats, as shown in the topographical survey (appended to STG-AEC-S1b-00-00-RE-C-0000001_Infrastructure_Report). In summary;

- Existing road levels on Donore Avenue range from 17.8 – 18.2 m,
- Existing levels on the access road from Donore Avenue to the flats range from 17.72 to 18.07 m,
- Existing road levels surrounding the remaining blocks of flats range from 17.99 – 18. 4 m,
- Existing levels at the fenced boundary between the greenfield and the remaining flats range from 18.03 – 18.5 m.
- Approximately 25 m west of the boundary fence (towards the subject site), the levels reach 19 m

Therefore, the CFRAM mapping flood extent is no longer representative as flood water would not pond at the area of the demolished flats. The likely flood routes would be along Donore Avenue and Brown Street. Levels on Brown Street are lower than levels on Margaret Kennedy Road, which also has a raised table which would block flood water, meaning flood water is likely to flow onto Brown Street, which wouldn't effect the proposed development. Furthermore, Cameron Street (a minor road off Margaret Kennedy Road), would also be a flood route if flood waters gathered on Margaret Kennedy Road, i.e., it is unlikely that flood water would approach the proposed development.

Based on the flood model's nearest node to the site, which predicts a flood level of 18.49 m for the 1 in 1000 year event, the proposed buildings are at minimal risk of flooding, given the lowest proposed Finished Floor Level is 19.1 m.

4.1.2 Coastal Flooding

Coastal flooding is the result of sea levels which are higher than normal and result in sea water overflowing onto the land. It can also be influenced by high tide level, storm surges and wave action.

As shown in Figure 3.3, tidal flooding is not predicted to affect the subject site.

4.1.3 Pluvial Flooding

Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high intensity rainfall. Flood risk from pluvial sources exists in all areas. Refer to Section 5.4 for mitigation measures regarding pluvial flooding.

4.1.4 Groundwater Flooding

Groundwater is the water that soaks into the ground from rain and can be stored beneath the ground. Groundwater floods occur when the water stored beneath the ground rises above the land surface. There is no evidence of groundwater flooding in the vicinity of the subject site on floodinfo.ie.

4.1.5 Flooding from Sewers

As shown in Figure 3.2: Extract from the GDSDS Existing Hydraulic Performance Map 2013Figure 3.2 (Section 3.3), there are 2 sewers which are noted to surcharge from the 1 or 2 year event. Both of these sewers are being diverted; one sewer is being diverted into the proposed network, which has been modelled and no flooding occurs for 100 year events with a 20% climate change allowance, and the other sewer is being diverted and as noted in Section 3.3 includes attenuation located within The Coombe Women & Infants University Hospital, which will reduce maximum flows draining to the sewer.

The proposed surface water connection is to the surface water sewer in Ebenezer Terrace which was not recorded to flood in the GDSDS performance study. DCC will advise at detailed design stage if a non-return valve is recommended to reduce flood risk to the proposed site and its environs, from this sewer.

The proposed wastewater connection is to the combined sewer in Donore Avenue and was not recorded to flood in the GDSDS performance study. The former St. Teresa's Gardens flats were in operation at the time of the study and have since been demolished with wastewater connections removed/capped, and similarly for surface water connections to the combined sewer. Irish Water have issued Confirmation of Feasibility for connection to this sewer without upgrade works.

4.2 Climate Change

The CFRAM map outputs, discussed in Section 3.4, 3.4.1 and 4.1, are a 'present day scenario' as allowances for climate change are not included.

Advice on the expected impacts of climate change and the allowances to provide for future flood risk management in Ireland is given in the "OPW Assessment of Potential Future Scenarios, Flood Risk Management Draft Guidance", 2009. Two climate change scenarios are considered, the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS).

The MRFS is intended to represent a 'likely' future scenario based on the wide range of future predictions available. The HEFS represents a more 'conservative' future scenario at the upper boundaries of future projections. Based on these two scenarios, the OPW recommended allowances for climate change are given in Table 4.2.

Table 4.2: Recommended allowances for climate change

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+20%	+30%
Peak Flood Flows	+20%	+30%
Mean Sea Level Rise	+500 mm	+1000 mm
Land Movement	-0.5 mm/year *	-0.5 mm/year *
Forestation	- 1/6 Tp**	-1/3 Tp** + 10% SPR***

Notes:

* Applicable to the southern part of the country (Dublin – Galway and south of this).

** Reduce the time to peak (Tp) by a third; this allows for potential accelerated run-off that may arise as a result of drainage of afforested land.

*** Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

4.2.1 Fluvial Flooding Future Scenarios

The modelled future scenarios (MRFS & HEFS), available on floodinfo.ie, reveal increases in predicted fluvial floodplain extents for the different return period scenarios. Refer to the figures below for the current scenario, MRFS and HEFS for fluvial flooding.

As aforementioned, it should be noted the land use of the site has changed, therefore the 2016 mapping is no longer representative as ground levels have changed since the date of publish.

The 10% AEP flood extent involves large increases through the scenarios. The 0.1% AEP flood extent within the subject site is minorly increased; the majority of the site remains as Flood Zone C (approx. 85%), with approx. 15% of the site within Flood Zone B and <1% of the site within Flood Zone A.

However, as described, the flood routes are likely via Donore Avenue and Brown Street, due to the altered topography.

Figure 4.1: Current Scenario - Fluvial Flooding

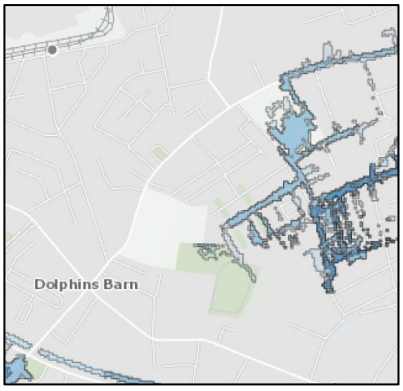


Figure 4.2: MRFS Fluvial Flooding

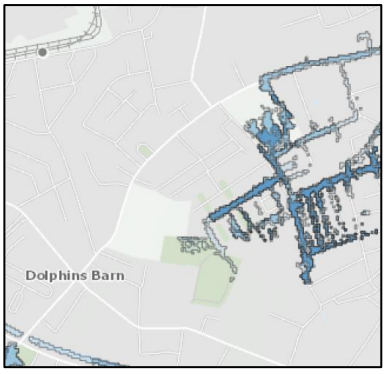


Figure 4.3: HEFS Fluvial Flooding

4.2.2 Coastal Flooding Future Scenarios

Figure 4.4 shows the High-End Future Scenario (1 m mean sea level rises). As shown in the figure, the site is not predicted to be impacted by coastal flooding when climate change is considered.

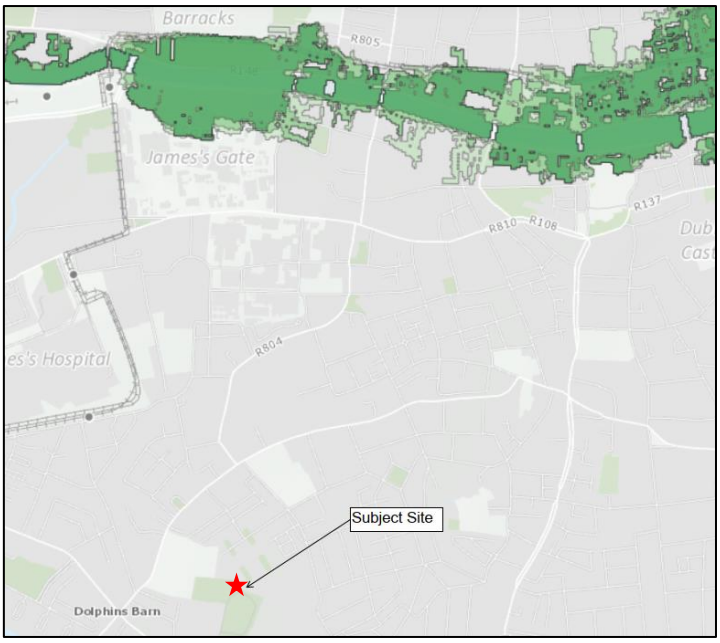


Figure 4.4: HEFS Coastal Flooding

5. Flood Risk Management

Chapter 3 of the Planning System and Flood Risk Management Guidelines (DEHLG/ OPW, 2009) describes the key principles of a risk based sequential approach to managing flood risk. The sequential approach is aimed at directing development toward land that is at low risk of flooding. Figure 5.1 is extracted from The Guidelines and illustrates the sequence in which a site must be assessed from a flood risk standpoint. Specifically, the order in which the planning authority must be satisfied from a flood risk perspective is to *Avoid* (locate in an area that is not prone to flooding), then *Substitute* (if in a flood risk zone, then substitute the type of development), *Justify* (if substitution does not reduce flood risk sufficiently, then perform Justification Test) and *Mitigate*. This section discusses the sequential approach recommended in The Guidelines with regard to the proposed development.

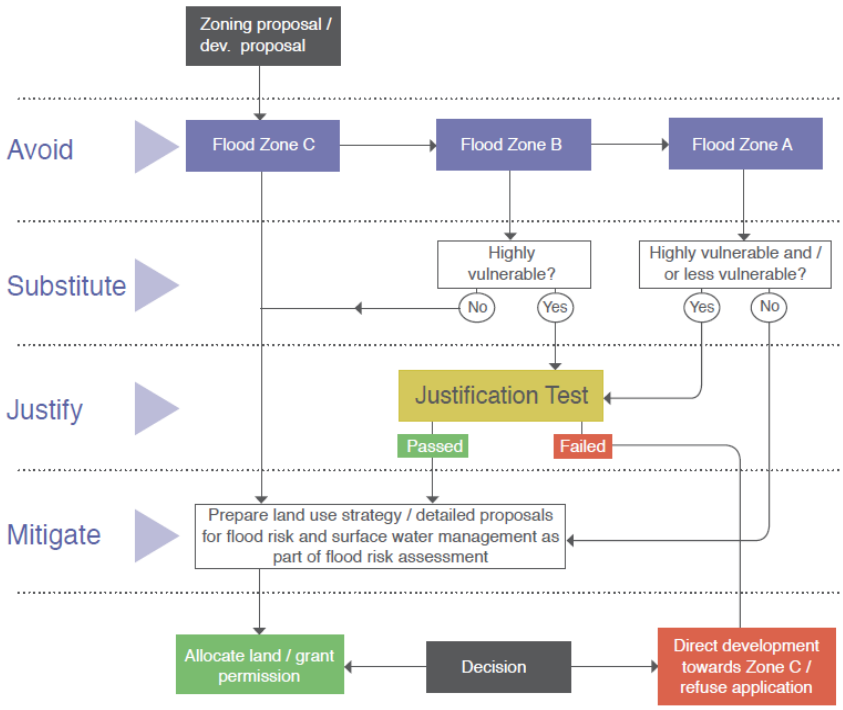


Figure 5.1: Sequential Approach Mechanism in the Planning Process

5.1 Sequential Approach

The first stage of the sequential approach is to avoid development in areas at risk of flooding. Flood Zones associated with river and coastal flooding are identified as Flood Zones A, B and C (refer to Section 2 for definitions). The planning implications for each of the flood zones include:

Flood Zone A – High probability of flooding: most types of development would be considered inappropriate in this zone. Development in this zone should be avoided or only considered in exceptional circumstances, such as in city and town centres where the Justification Test has been applied. Water compatible development such as docks or marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation would be considered appropriate in this zone.

Flood Zone B – Moderate probability of flooding: highly vulnerable development would generally be considered inappropriate in this zone, unless the requirements of the Justification Test can be met. Less vulnerable development and water compatible development would be considered appropriate in this zone. In general, less vulnerable development should only be considered in this zone if adequate lands or sites are not available within Flood Zone C and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to and from the development can or will be adequately managed.

Flood Zone C – Low probability of flooding: Development in this zone is considered appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

The second stage of the sequential approach is to substitute the type of development to one less vulnerable to flooding.

5.2 Vulnerability

Table 3.1 of The Planning System and Flood Risk Management Guidelines for Planning Authorities, 2009, provides a classification of vulnerability of different types of development. Figure 5.2 is taken from The Guidelines (Table 3.1) and sets out the Vulnerability Classifications of different types of land uses. Figure 5.3 (Table 3.2 of The Guidelines) describes the vulnerability of developments relative to the identified Flood Zone and when the requirements of the Justification Test must be satisfied.

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	

Table 3.1 Classification of vulnerability of different types of development

Figure 5.2: Classification of Vulnerability (Table 3.1 taken from The Guidelines)

	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 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

Figure 5.3: Matrix of Vulnerability (Table 3.2 taken from The Guidelines)

The proposed land use for the proposed development is largely residential, which falls within the 'Highly Vulnerable Development' classification, as shown in Figure 5.2.

Based on the review carried out of the CFRAM mapping, which is noted to include outdated topographical information, the site is partially within Flood Zone A & B (<1% and approx. 10% of the site area, respectively). Therefore, as recommended in the matrix above, a Justification Test should be carried out for the 'Highly Vulnerable Development'.

5.3 Justification Test

As outlined in Section 3.4.1, 10% of the site is within Flood Zone B and <1% situated within Flood Zone A. Given a portion of the site is in Flood Zone A/B, it would be prudent to carry out a Justification Test.

The Justification Test is in place as it is recognised that established towns and cities are currently at risk of flooding and development must take place to meet the growing requirements of these urban centres. As part of the Development Plan review process, DCC have carried justification tests as part of the SFRA, using mapped flood zones to review the need for development of areas at high or moderate risk of flooding and which would generally be inappropriate. The land use zoning objective has been retained, DCC are satisfied that it has clearly demonstrated that the designation for development has satisfied the Justification Test for Development Plans.

The Development Management Justification Test is used at planning application stage and is intended to develop land at moderate or high risk of flooding. In order for the planning authority to consider an application for a proposed development in an area where a Justification Test is required, the following criteria must be satisfied. Refer to Figure 5.4 which is taken from The Planning System and Flood Risk Management Guidelines for Planning Authorities.

Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. 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.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
   - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
   - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
   - (iii) 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; and
   - (iv) 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 and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Figure 5.4: Development Management Justification Test (The Guidelines, 2009)

5.3.1 Justification Test – Part 1

Part 1 of the Justification Test requires the proposed land use to be in accordance with their assigned zoning. The subject site is within the SDRA 11 (Strategic Development & Regeneration Area) in the 2022-2028 Development Plan, the land use of which 'will primarily support residential uses' therefore the proposed development is deemed suitable on these lands by DCC.

5.3.2 Justification Test – Part 2 (i)

Part 2 (i) of the Justification Test requires that the development will not increase flood risk elsewhere.

It is proposed to raise ground levels of the proposed site to allow the site drain by gravity to the existing drainage networks. As described in Section 4.1.1, the site is not within a floodplain and therefore development of the site will not increase flood risk elsewhere.

The runoff generated within the site boundary will be attenuated within the proposed drainage network and discharged to the existing public sewer at a restricted rate, as per the recommendations set out in the Greater Dublin Strategic Drainage Study.

A flood exceedance route, shown in drawing STG-AEC-S1b-00-00-DR-C-0000510, shows flow paths for exceedance events. Roads and footpaths create potential to produce exceedance flows, however, this potential is reduced by the proposed ground level SuDS measures; swales, bioretention, tree pits and porous asphalt. Runoff is directed towards these measures where feasible. The road levels on the site contain multiple low points, which will allow water to pond, rather than directing excess flows off the site. Therefore, the potential for runoff to leave the site has been minimised as far as possible.

5.3.3 Justification Test – Part 2 (ii)

Part 2 (ii) of the Justification Test requires that the development includes measures to minimise flood risk to people property, the economy and the environment.

The lowest proposed building with associated undercroft car park is proposed at a level 19.1 m, 610 mm above the highest predicted fluvial flood level of 18.49 m. The floor level of this building is 19.1 m and the highest water level in the drainage network in the near vicinity to this building is less than 18.2, for the 1 in 100 year event including 20% climate change.

Flood risk has been reduced to properties by providing footpath crossfalls away from the building. In one location, where levels are constrained due to Part M access, it is necessary to have approx. 10 m of footpath falling towards the private amenity space/terrace outside the building. The terrace itself falls away from the building, therefore, the ground level at this point is achieved at 40 mm lower than the building, offering some protection. A slot drain is proposed along the private amenity space (the low point) to collect runoff from the footpath. Tree pits are also proposed at this location which include inlets for runoff. Runoff from higher areas draining to this location is reduced via kerb drains at the roadsides and another slot drain higher in the catchment.

The drainage network has been designed in accordance with the GDSDS (Greater Dublin Strategic Drainage Study) and the Greater Dublin Regional Code of Practice for Drainage Works, to ensure the proposed development will mitigate flood risk. Refer to Section 5.4 for further details and other possible mitigation measures.

5.3.4 Justification Test – Part 2 (iii)

Part 2 (iii) of the Justification Test requires that the development considers residual flood risk and future risk management.

Recommendations are included in Section 5.4 (Mitigation Measures), such as evacuation plans and raising electrical equipment. A drainage maintenance checklist is provided within the Infrastructure Report (ref: STG-AEC-S1b-00-00-RE-C-0000001_Infrastructure_Report, maintenance should be carried out on the drainage network every 6 months or after large rainfall events.

5.3.5 Justification Test – Part 2 (iv)

Part 2 (iv) of the Justification Test requires that the development is "compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant active streetscapes".

Please refer to the associated architectural and planning report for the associated amenity and urban design benefits of the proposed development.

5.4 Mitigation Measures

Fluvial Flooding

Due to the proximity of the site to a floodplain, it is proposed to apply a 610 mm freeboard from the flood water level (refer to Table 4.1, the 0.1% AEP water level is 18.49 mOD). Therefore, the lowest proposed Finished Floor Level (FFL) is 19.1 m.

Further measures which are recommended;

- Raising electrical equipment above the finished floor level where possible, or protection against water ingress into the equipment. If this cannot be achieved, then additional measures should be considered to ensure electrical supplies will be maintained in the event of a flood and that the assets will be protected from damage.
- Evacuation Plans directing residents, staff, customers etc. to exit the building areas of higher ground.

The retail & commercial units, which are considered 'less vulnerable' developments, are proposed at ground floor level, while the 'Highly Vulnerable' residential units are proposed at higher floors. A creche which is classified as 'Highly Vulnerable' is proposed at ground and first floor level.

Pluvial Flooding

Overland flow routes are shown in drawing STG-AEC-S1b-00-00-DR-C-0000510_FloodExceedanceRoute. Overland flows are directed to SuDS measures where possible. The road levels on the site contain multiple low points, which will allow water to pond, rather than directing excess flows off the site, thereby reducing risk to proposed and existing properties.

The proposed development includes a separate surface water drainage network to collect run-off generated within the site. This system will collect rainfall generated run-off within the site and convey flows through the proposed network.

The site's runoff will be restricted to runoff rates similar to the greenfield rate (QBAR) by providing a Hydrobrake flow control system (or similar approved) and attenuation tank. The proposed attenuation storage will be designed using a 1 in 100-year return period rainfall event, with a 20% increase in rainfall depths to allow for the impact of climate change on rainfall. Run-off in excess of greenfield run-off rates will be attenuated in the attenuation tank.

A series of SuDS systems will provide a "Management Train" (Interception and Treatment) on site and maintenance should be carried out on the drainage network every 6 months or after large rainfall events. Refer to the Infrastructure Report for further details (ref: STG-AEC-S1b-00-00-RE-C-0000001_Infrastructure_Report).

6. Conclusion

The mixed-use development is proposed on a SDRA (Strategic Development & Regeneration Area) and comprises of 'Less Vulnerable' retail and commercial units at ground floor, a creche ('Highly Vulnerable') at ground floor (and first floor) and residential units ('Highly Vulnerable') at higher floors.

Based on the available CFRAM mapping published in 2016, which is based on outdated and no longer relevant topography, approx. 90% of the site is located within Flood Zone C, 10% within Flood Zone B and <1% situated within Flood Zone A. However, by assessing the current topographical information, it is apparent that the flood routes are now different to what was modelled as part of CFRAM, and the site would not receive flood waters given the topography following the demolition of the St. Teresa's Gardens flats. This, coupled with the zoning for the subject site, results in the subject site passing the Justification Test.

Nevertheless, it is noted that the water level for the fluvial node SO14324909 from the CFRAM flooding model is 18.49m OD, for which it would be prudent to set all FFL's within the site to minimum 19.00 to allow a 500 mm freeboard above the 0.1% AEP (1 in 1000-year return period) storm event. The lowest proposed FFL is 19.1 m.

There are no recorded incidents of previous flooding on the site.

Sewers identified to be surcharging as part of the GDSDS (Greater Dublin Strategic Drainage Study) will be diverted and a new proposed surface water network including a 20% climate change allowance will be constructed, minimising the risk of flooding occurring on site and reducing the volume of runoff entering the sewers predicted to flood.

The proposed ground level SuDS measures (swales, raingardens, tree pits and porous asphalt) and low areas of the site will minimise exceedance runoff leaving the site before entering the drainage system (overland flows). Green roofs and permeable roof paving are proposed at roof level, which will delay runoff entering the drainage network, which is beneficial for 'flash' events.

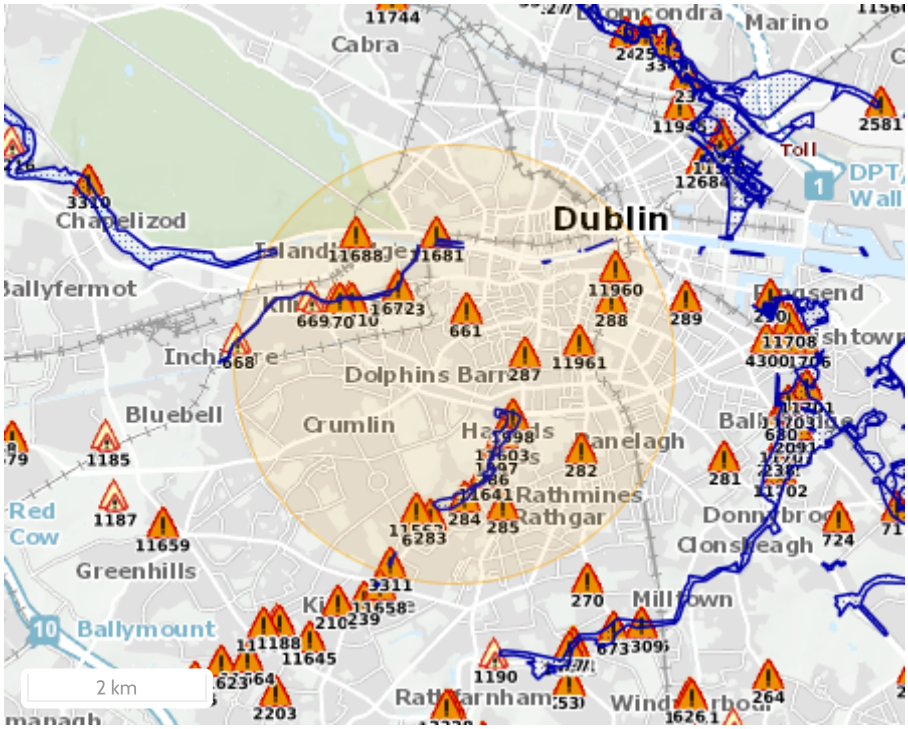
Appendix A – OPW Past Flood Summary Report

Past Flood Event Local Area Summary Report

OPW Oifig na nOibreacha Poiblí Office of Public Works

Report Produced: **4/10/2021 14:41**

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



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

33 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Flooding at Trinity College, Dublin 2, 26th July 2013 (ID-11960) **Additional Information:** Reports (1) Press Archive (0)	26/07/2013	Approximate Point
2.	Flooding on Wexford St, Dublin 2 on 26th July 2013 (ID-11961) **Additional Information:** Reports (1) Press Archive (0)	26/07/2013	Approximate Point
3.	Poddle August 1986 (ID-32) **Additional Information:** Reports (9) Press Archive (1)	25/08/1986	Area
4.	Dublin City Tidal Feb 2002 (ID-456) **Additional Information:** Reports (45) Press Archive (27)	01/02/2002	Area
5.	Rathmines Lower June 1963 (ID-282) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
6.	Kimmage June 1963 (ID-283) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point

	Name (Flood_ID)	Start Date	Event Location
7.	Kimmage Mount Argus June 1963 (ID-284) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
8.	Harold's Cross June 1963 (ID-285) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
9.	Mount Jerome Harold's Cross June 1963 (ID-286) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
10.	Clanbrassil Street June 1963 (ID-287) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
11.	Grafton Street June 1963 (ID-288) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
12.	Camac Turvey Ave Recurring (ID-669) **Additional Information:** Reports (1) Press Archive (0)	n/a	Exact Point
13.	Poddle Tributary Marrowbone Lane Jan 1941 (ID-661) **Additional Information:** Reports (1) Press Archive (0)	21/01/1941	Approximate Point
14.	Poddle Harold's Cross undated 1940's (ID-662) **Additional Information:** Reports (1) Press Archive (0)	n/a	Exact Point
15.	Poddle Larkfield Mills Undated 1940s (ID-663) **Additional Information:** Reports (1) Press Archive (0)	n/a	Approximate Point
16.	Camac Goldenbridge Recurring (ID-668) **Additional Information:** Reports (1) Press Archive (0)	n/a	Approximate 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.	Poddle St Claires Ave Sept 1931 (ID-1997) **Additional Information:** Reports (1) Press Archive (0)	03/09/1931	Approximate Point
21.	Poddle Limekiln Lane Aug 1905 (ID-1998) **Additional Information:** Reports (1) Press Archive (0)	24/08/1905	Approximate Point
22.	Poddle Limekiln Lane Sept 1931 (ID-3267) **Additional Information:** Reports (1) Press Archive (0)	03/09/1931	Approximate Point
23.	Poddle Park Nov 2000 (ID-3311) **Additional Information:** Reports (1) Press Archive (0)	05/11/2000	Approximate Point
24.	Liffey Lower - Dec 1954 (ID-241) **Additional Information:** Reports (5) Press Archive (2)	08/12/1954	Area

	Name (Flood_ID)	Start Date	Event Location
25.	Camac August 1986 (ID-125) **Additional Information:** Reports (3) Press Archive (0)	25/08/1986	Area
26.	Flooding at Blarney Park, Crumlin, Dublin 12 on 24th Oct 2011 (ID-11562) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Approximate Point
27.	Flooding at Bow Lane, Kilmainham, Dublin 8 on 24th Oct 2011 (ID-11563) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Approximate Point
28.	Flooding at Harold's Cross, Dublin City on 24th Oct 2011 (ID-11603) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Approximate Point
29.	Flooding at Kearns Place, Kilmainham, Dublin 8 on 24th Oct 2011 (ID-11620) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Approximate Point
30.	Flooding at Lady's Lane, Kilmainham, Co. Dublin on 24th Oct 2011 (ID-11622) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Approximate Point
31.	Flooding at Mount Argus Road and Kimmage Road Lower on 24th Oct 2011 (ID-11641) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point
32.	Flooding at Ashling Hotel, Parkgate Street, Dublin 8 on 24th Oct 2011 (ID-11681) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point
33.	Flooding at Bridgewater Quay Apartments, Islandbridge, Dublin 8. on 24th Oct 2011 (ID-11688) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point

Appendix B – CFRAM Maps

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
09PODD00226I	24.72	2.69	25.13	4.59	25.51	6.69
SO14326409	12.9	2.32	13.13	5.88	13.33	9.88
SO14325501	19.63	1.56	19.72	1.68	19.91	1.8
SO14324909	18.27	1.59	18.37	1.63	18.49	1.66
SO14337104	15.42	1.74	15.44	1.78	15.47	1.82

313400 313600 313800 314000 314200 314400 314600 314800 315000

233000 232800 232600 232400 232200 232000

Indicative Net Developable Area

SO14337104

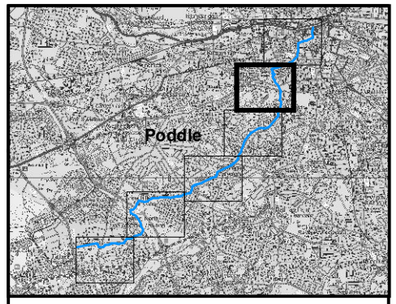
SO14324909

SO14325501

SO14326409

09PODD00226I

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:

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW Oifig na nOibreacha Poiblí The Office of Public Works

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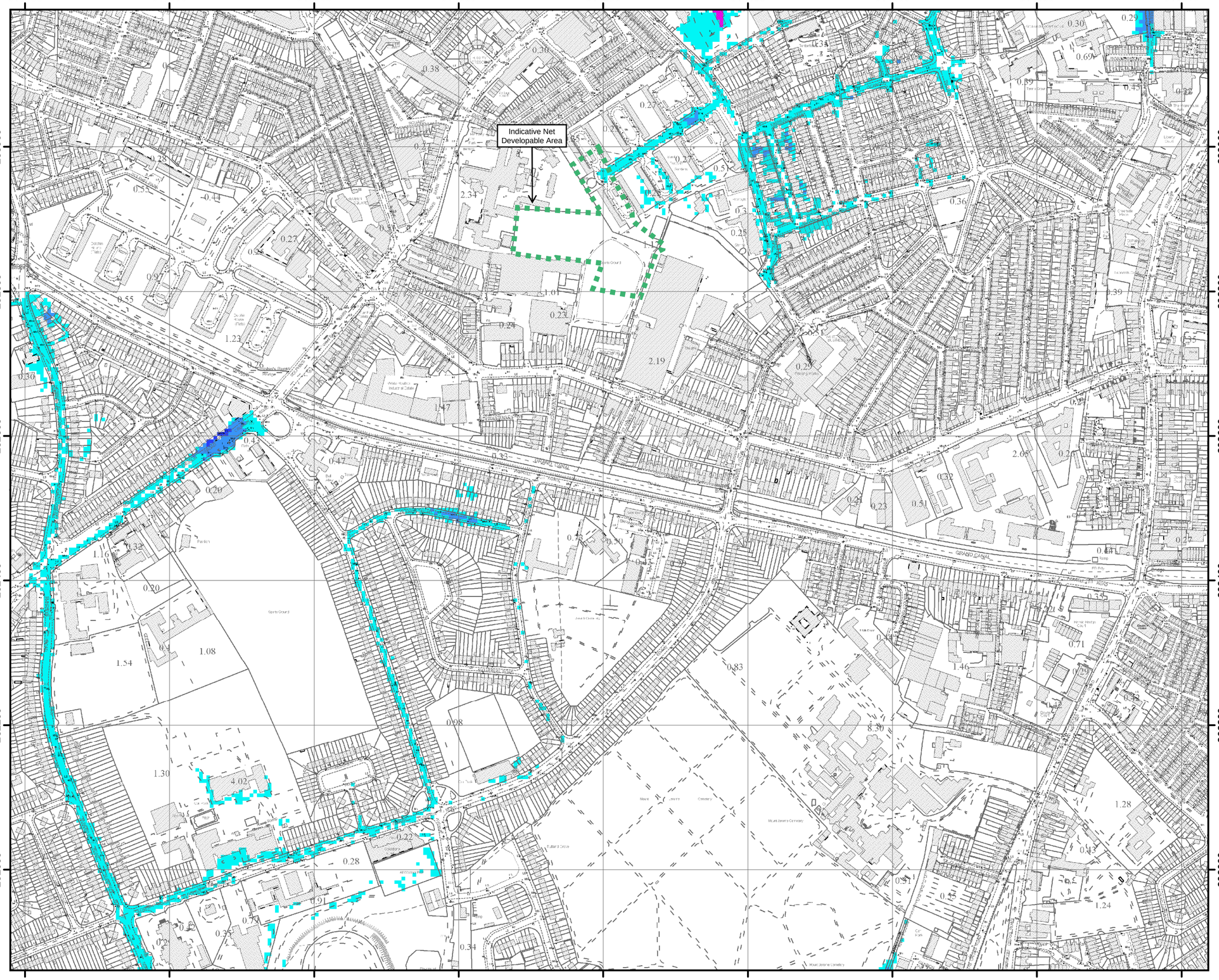
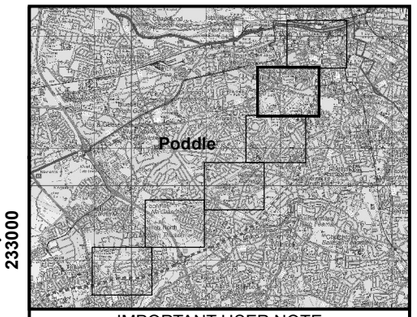
Map:
Poddle River Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : F.M.C.	Date : 11 August 2016
Checked By : A.S.	Date : 11 August 2016
Approved By : S.P.	Date : 11 August 2016
Drawing No. : E09POD_EXFCD_F0_05	
Map Series : Page 5 of 6	
Drawing Scale : 1:5,000 @A3	





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

Legend

1% Fluvial AEP Flood Depth

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

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

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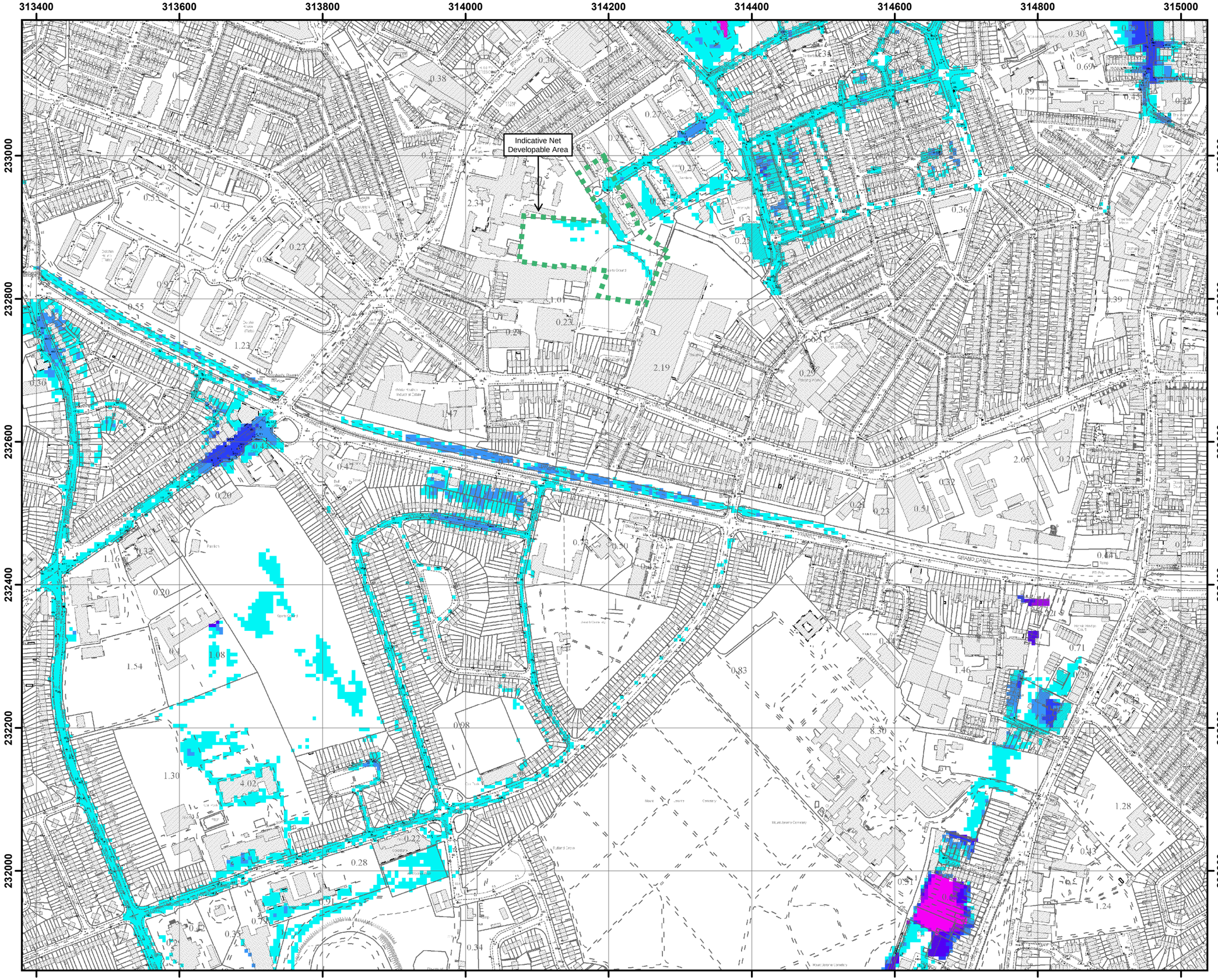
Map:
Poddle River Fluvial Flood Depths

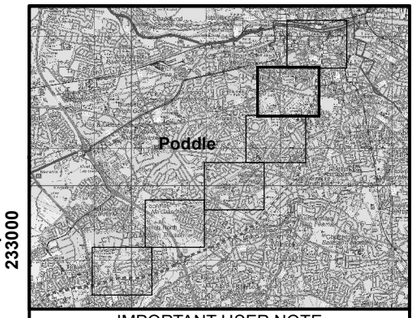
Map Type:	**DEPTH**	
Source:	**FLUVIAL**	
Map Area:	**HPW**	
Scenario:	**CURRENT**	
Drawn By :	**F.M.C.**	**Date : 20 October 2016**
Checked By :	**A.S.**	**Date : 20 October 2016**
Approved By :	**S.P.**	**Date : 20 October 2016**

Drawing No. :
E09POD_DPFCD010_F0_05

Map Series : Page 5 of 6

Drawing Scale : 1:5,000 @ A3





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

Legend

0.1% Fluvial AEP Flood Depth

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

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

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Map:
Poddle River Fluvial Flood Depths

Map Type:	**DEPTH**	
Source:	**FLUVIAL**	
Map Area:	**HPW**	
Scenario:	**CURRENT**	
Drawn By :	**F.M.C.**	**Date : 20 October 2016**
Checked By :	**A.S.**	**Date : 20 October 2016**
Approved By :	**S.P.**	**Date : 20 October 2016**

Drawing No. :
E09POD_DPFCD001_F0_05

Map Series : Page 5 of 6

Drawing Scale : 1:5,000 @ A3

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