

Dublin City Council

St. Anne's Court in Raheny, Dublin 5

Part 8 – Flood Risk Assessment

Reference: SAC-ARUP-ZZ-XX-RP-C-0020

C03 | 21 December 2023

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 288354-00

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Document Verification

Project title St. Anne's Court in Raheny, Dublin 5
Document title Part 8 – Flood Risk Assessment
Job number 288354-00
Document ref SAC-ARUP-ZZ-XX-RP-C-0020
File reference 4-04-03

Revision	Date	Filename	SAC-ARUP-ZZ-XX-RP-C-0020		
C01	16 August 2023	Description	Approved for Pre-planning Section 179a Circulation – Status A2		
			Prepared by	Checked by	Approved by
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C02	25 August 2023	Filename	SAC-ARUP-ZZ-XX-RP-C-0020		
		Description	Approved for Section 179A of the Planning and Development Act Circulation – Status A2		
			Prepared by	Checked by	Approved by
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C03	21 December 2023	Filename	SAC-ARUP-ZZ-XX-RP-C-0020		
		Description	Issued for Planning (S4)		
			Prepared by	Checked by	Approved by
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Issue Document Verification with Document



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Executive Summary

Arup has been commissioned by Dublin City Council to undertake a Flood Risk Assessment (FRA) as part of the Planning Application for the “Older Persons Housing” project at St. Anne’s Court in Raheny, Dublin 5. It has been undertaken in accordance with ‘The Planning System and Flood Risk Management’ guidelines for planning authorities published in November 2009, jointly by the Office of Public Works (OPW) and the then Department of Environment, Heritage and Local Government (DEHLG).

The project aims to replace the existing 61 bed-sit units on the site with 102 dwellings constructed to “Universal Design” and “Universal Design Plus” standards, as per the Dublin City Council Project Brief.

Flood risk to the site of the proposed development is very low and there is no historic record of flooding at the site. The risk of flooding in a climate change scenario will also remain low.

Surface water discharges from the proposed development will be restricted in line with Dublin County Council (DCC) Water Services requirements and various SuDS features will be incorporated as part of the development. Surface water from the proposed development will be intercepted and treated in a SuDS system comprising of blue roofs, green roofs, swales, and porous paving.

Given the absence of significant flood risk at the site and a sufficient elevation above ground level, access and egress routes are very unlikely to be compromised during flood events. The proposed development will not have any impact on floodplain storage or conveyance and will therefore not have any impact off site.

The proposed development is classified as a “Highly Vulnerable Development” as per OPW’s vulnerability classification. As the site is not within the 1000 year fluvial or tidal floodplain, it is within Flood Zone C. Therefore, a justification test for the development is not required and it is necessary only to identify mitigation measures for any residual risk.

1. Introduction and Background

1.1 Project Background

Arup has been commissioned by Dublin City Council to undertake a Flood Risk Assessment (FRA) as part of the planning application for the “Older Person Housing” project at St. Anne’s Court in Raheny, Dublin 5.

This report details the Flood Risk Assessment carried out as part of the planning application. It has been undertaken in accordance with ‘The Planning System and Flood Risk Management’ guidelines for planning authorities published in November 2009, jointly by the Office of Public Works (OPW) and the then Department of Environment, Heritage and Local Government (DEHLG) and “Circular PL 2/2014 Flooding Guidelines”.

The purpose of the FRA is to identify and quantify the risk of flooding of the proposed redevelopment and, if necessary, identify a series of measures to mitigate the risk.

1.2 Scope of Study

The scope of study includes the following:

- Review of the risk of fluvial, coastal, pluvial and groundwater flood risk;
- Review of any available site investigation data;
- Review of the proposed building layout and finished floor level; and
- Preparation of a flood risk assessment report.

1.3 Summary of Data used

In preparing this report, the following data was collated and reviewed:

- Topographical data from the site;
- Architectural and design drawings of the proposed development;
- Guidelines for Planning Authorities on ‘The Planning System and Flood Risk Management’ published in November 2009, jointly by the Office of Public Works (OPW) and the then Department of Environment, Heritage and Local Government (DEHLG);
- The Dublin City Development Plan 2022 – 2028;
- Flood history of the site from the OPW National Flood Hazard Mapping website (www.floodinfo.ie);
- Flood maps from the CFRAM Study (www.floodinfo.ie);
- Water features of the site from EPA Maps website (<https://gis.epa.ie/EPAMaps/>);
- Aerial photography and mapping from Bing Maps, Google Maps and Open Street Map.

1.4 Site Description

The site for the proposed development is located in Raheny in Dublin as indicated in Figure 1. The site is directly opposite All Saints Park to the West, the All-Saints’ Church to the North, and St. Anne’s Park to the South. It is approximately 6,200 m² in size. An aerial view of the site and its boundary is shown in Figure 2.

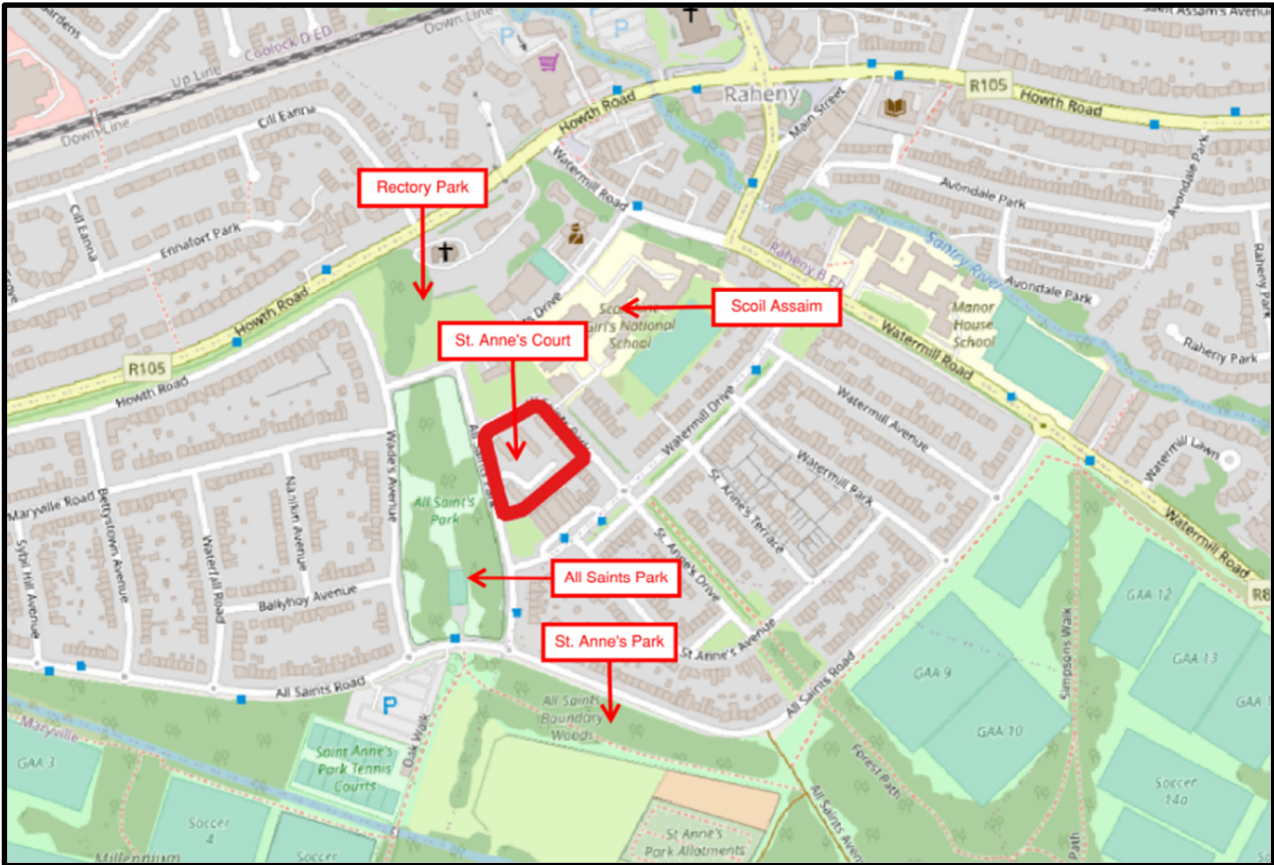


Figure 1: Site location (@ Open Street Map and contributors)



Figure 2: Aerial View of the site (@ Google Earth Pro and contributors)

The existing building on the site, St. Anne's Court, comprises of five existing two-storey residential blocks built in the 1970s, currently occupied by senior citizens. There are a total of 61 bed-sits and a community

room contained within these blocks. The site enjoys its own access and site parking and is separated from neighbouring properties by public roads.

1.5 Proposed Development

The proposed development will consist of the demolition of the existing buildings and the construction of new high quality senior citizen dwellings. The development aims to replace the existing 61 bed-sit units with 102 dwellings which will consist of 96nr - 1 bed 2 person Universal Design apartments and 6nr - 1 bed 2 person Universal Design Plus apartments

The current architectural proposal includes four new residential buildings with one block along each side of the site and access paths between each block leading to the central courtyard/landscaped area, the overall massing is four stories on all elevations. See Figure 3 for the site layout, and Figure 4 for the block naming convention.

Landscaping will form an important part of the development, with a shared community garden with both soft and hard landscaping at the centre of the development.



Figure 3: Proposed building layout (Source: Grafton Architects, received on 21/07/23)

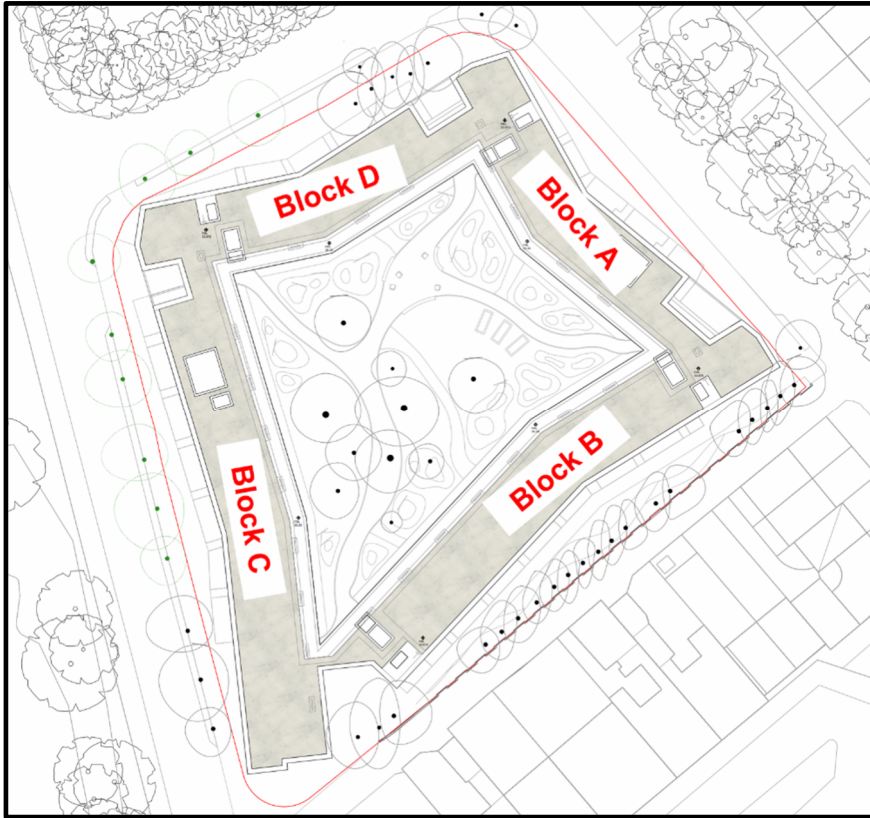


Figure 4: Block naming convention (Source: Grafton Architects, received on 21/07/23)

1.6 Existing Ground Levels

A topographical survey of the existing ground levels across the site was carried out by Apex Surveys and is presented in Figure 5. It can be seen from figure 5 that the levels vary by circa 1m across the site: from circa 20.0mOD in the South West of the site to circa 20.95mOD in the North East.

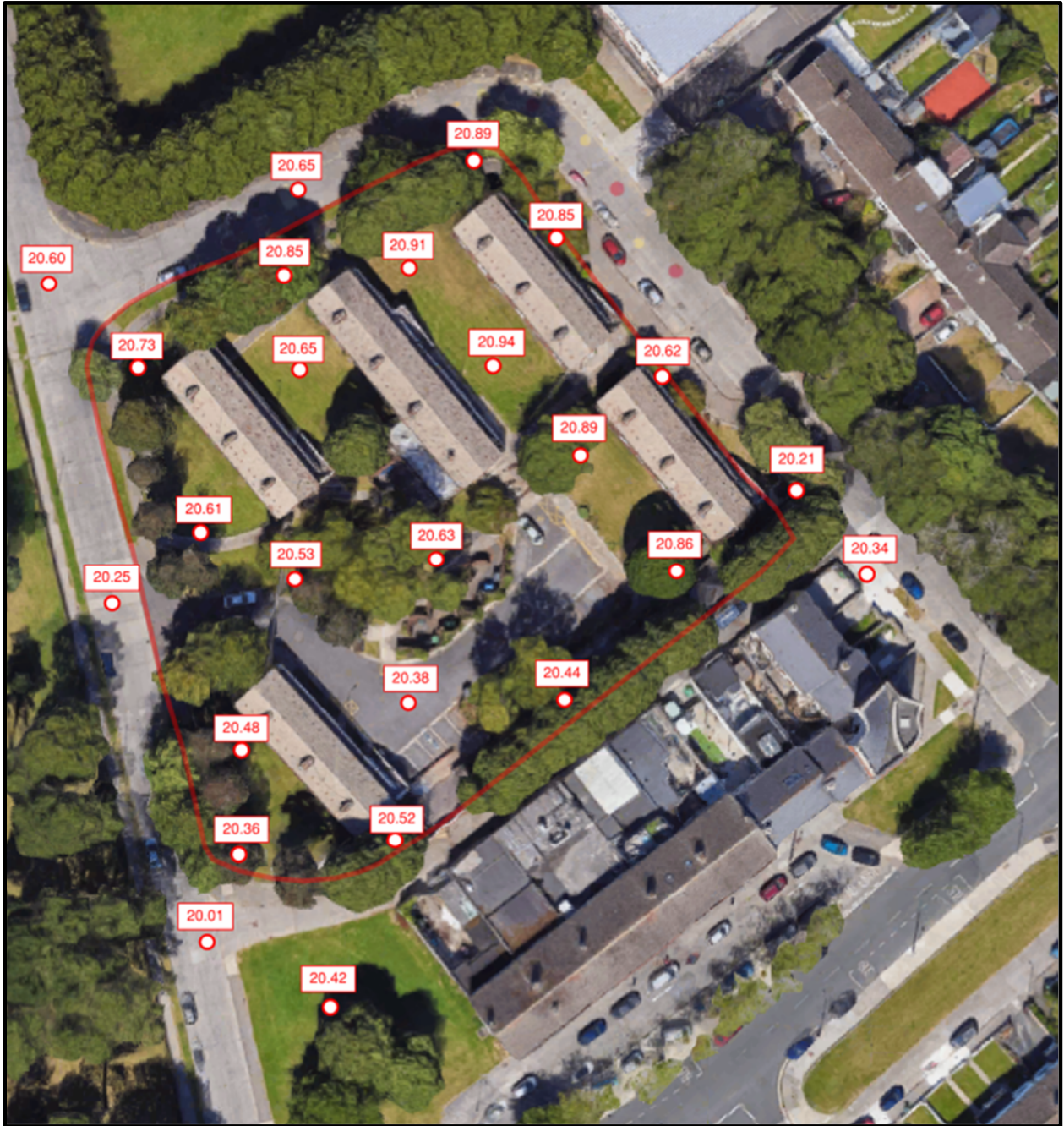


Figure 5: Existing elevation on site

2. Planning Context

2.1 The Planning System and Flood Risk Management Guidelines

The following planning policy documents are relevant to the flood risk assessment of the proposed development.

- The Planning System and Flood Risk Management Guidelines for Planning Authorities.
- Dublin City Development Plan 2022 – 2028

2.1.1 Introduction

In November 2009, the Department of Environment, Heritage and Local Government and the Office of Public works jointly published a Guidance Document for Planning Authorities entitled “the Planning System and Flood Risk Management”.

The Guidelines are issued under Section 28 of the Planning and Development Act 2000 and Planning Authorities and An Bord Pleanála are therefore required to implement these Guidelines in carrying out their functions under the Planning Acts.

The aim of the guidelines is to ensure that flood risk is neither created nor increased by inappropriate development.

The Guidelines require the Planning system to avoid development in areas at risk of flooding unless the development can be justified on wider sustainability grounds and the risk can be reduced or managed to an acceptable level.

The guidelines require the adoption of a Sequential Approach (to Flood Risk Management) of Avoidance, Reduction, Justification and Mitigation and they require the incorporation of Flood Risk Assessment into the process of making decisions on Planning Applications and Planning Appeals.

Fundamental to the guidelines is the introduction of flood risk zoning and the classifications of different types of development having regard to their vulnerability.

The management of flood risk is now a key element of any development proposal in an area of potential flood risk and should therefore be addressed as early as possible in the site master planning stage.

2.1.2 Definition of Flood Zones

Flood Zones are geographical areas within which the likelihood of flooding is in a particular range. There are three types of flood zones defined in the Guidelines as shown in Table 1:

Table 1: Definition of flood zones

Zone	Description
Flood Zone A	Probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
Flood Zone B	Probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and
Flood Zone C	Probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

2.1.3 Definition of Vulnerability Classes

Table 2 summarises the Vulnerability Classes defined in the Guidelines and provides a sample of the most common type of development applicable to each.

Table 2: Definition of vulnerability classes

Type of Vulnerability	Definition
Highly Vulnerable Development	Includes Garda, ambulance and fire stations, Healthcares, schools, residential dwellings, residential institutions, essential infrastructure, such as primary transport and utilities distribution and SEVESO and IPPC sites, etc.
Less Vulnerable Development	Includes retail, leisure, warehousing, commercial, industrial and non-residential institutions, etc.
Water Compatible Development	Includes Flood Control Infrastructure, docks, marinas, wharves, navigation facilities, water based recreation facilities, amenity open spaces and outdoor sport and recreation facilities

2.1.4 Types of Vulnerability Classes Appropriate for Each Zone

Table 3 illustrates the different types of Vulnerability Class appropriate to each Zone and indicates where a Justification Test will be required.

Table 3: Vulnerability class and zones

	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable	Justification Test	Justification Test	Appropriate
Less Vulnerable	Justification Test	Appropriate	Appropriate
Water Compatible	Appropriate	Appropriate	Appropriate

2.2 Vulnerability Classification

It is considered that the proposed development should be classified as a “Highly Vulnerable Development” as per the vulnerability classification in Table 4. As indicated in Section 0, the proposed development is not indicated as being within the 1000 year fluvial or tidal floodplain. In accordance with the OPW’s planning guidelines, the site therefore lies within Flood Zone C and a justification test for the development is not required.

Table 4: Vulnerability classification as per the planning guidelines

Vulnerability class	Land uses and types of development which include*:
Highly Vulnerable development (include essential infrastructure)	<p>Garda, ambulance and fire stations and command centres require to be operational during flooding;</p> <p>Healthcares;</p> <p>Emergency access and aggress points;</p> <p>Schools;</p> <p>Dwelling houses, student half of residence and hostels;</p> <p>Residential institutions such as residential care homes, children’s homes and social service homes;</p> <p>Caravans and mobile home parks;</p> <p>Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and</p> <p>Essential infrastructure, such as primary transport and utilities distribution including electricity generated power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SECESO sites, IPPC sites, etc.) in the event of flooding.</p>

Vulnerability class	Land uses and types of development which include*:
Less vulnerable development	<p>Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions;</p> <p>Land and buildings used for holiday or sort-let caravans and camping, subject to specific warning and evacuation plans;</p> <p>Land and buildings used for agriculture and forestry;</p> <p>Water treatment (except landfill and hazardous waste);</p> <p>Mineral working and processing; and</p> <p>Local transport and infrastructure.</p>
Water- compatible development	<p>Flood control infrastructure;</p> <p>Docks, marinas and wharves;</p> <p>Navigation facilities;</p> <p>Ship building, repair and dismantling, dockside fish processing and refrigeration and compatible activities requiring a water side location;</p> <p>Water based recreation and tourism (excluding sleeping accommodation);</p> <p>Lifeguard and coastguard stations;</p> <p>Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and</p> <p>Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).</p>

2.3 Sequential Approach

Figure 6 below illustrates the sequential approach to be adopted under the ‘Planning Systems and Flood Risk Management’ guidelines.

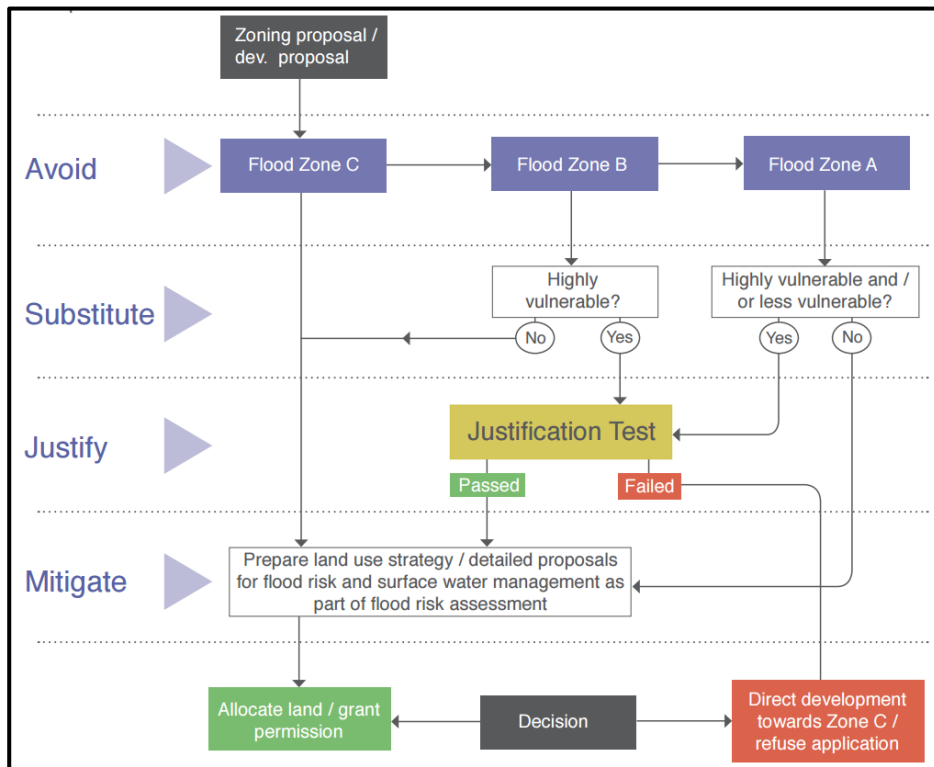


Figure 6: Sequential approach

The consequences of the sequential approach are considered later in the report.

2.4 Dublin City Development Plan (2022-2028)

2.4.1 Introduction

The Dublin City Development Plan 2022 – 2028 contains the policies and objectives to guide development and land use in Dublin City. The plan has effect from 14 December 2022 and is to be used for the determination of all planning applications from this date. The plan puts forward a vision of the future growth of the County over a six-year period and beyond.

2.4.2 Strategic Flood Risk Assessment for DCC Development Plan

To inform land-use zoning for the Dublin City Development Plan 2022-2028, a Strategic Flood Risk Assessment (SFRA) report has been developed. It aims to support the adoption of policies in relation to the zoning of lands in flood prone areas. The report was prepared in accordance with the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014).

The SFRA provides an assessment of all types of flood risk within the County and assisted DCC to make informed strategic land-use planning decisions and formulate flood risk policies. A Stage 1 Flood Risk Identification was undertaken to identify any flooding or surface water management issues related to the County that may warrant further investigation. The report outlines the primary watercourses in the county and identifies the flood risk zones as per the OPW's Planning Guidelines.

The report outlines a broad overview of the requirements for a Flood Risk Assessment which should accompany planning applications including:

- All developments, including in Flood Zone C, must consider the impacts of surface water flood risks on drainage design and demonstrate compliance with minimum required finished floor levels in line with the Greater Dublin Strategic Drainage Study, Dublin City Council's Surface Water Management Guidance and the Council's forthcoming Sustainable Drainage design and evaluation Guide and Green and Blue Roof Guide – Technical Summaries

- Flood risk from sources other than fluvial and Tidal should be reviewed, as should the impacts of climate change
- Groundwater flood risk reported in a surface water assessment and management report
- Use of the sequential approach and a justification test if necessary, as per The Planning System and Flood Risk Management Guidelines for Planning Authorities (2009)
- As well as assessing the surface water management risk for a site, all development including that in Flood Zone C, should consider residual risk factors which could influence the potential mitigation measures for a site.

It is recommended that any planning applications in flood risk areas are accompanied by a supporting appropriately detailed flood risk assessment. This is to ensure a conservative approach and that consideration is given to new development within Flood Zones where mitigation measures may still be required to ensure an appropriate level of flood protection and/or resilience. The detailed assessment should include at a minimum Stage 1 - Identification of Flood Risk. Where flood risk is identified a Stage 2 - Initial FRA will be required, and depending on the scale and nature of the risk a Stage 3, detailed FRA may be required.

The SFRA report highlights several sources of relevant flood risk information available for Dublin County including:

- Office of Public Works (OPW) Catchment Flood Risk Assessment and Management Studies (CFRAMS), which include the Dodder and Fingal East Meath Pilot studies, and the Eastern CFRAM study. The studies mapped fluvial and coastal flood risk including benefits provided by flood defences.
- The River Tolka flooding study and River Wad drainage study both analysing flood risk based on extreme flood events.
- Coastal flooding maps and extreme sea levels from the Irish Coastal Protection Strategy Study (ICPSS) and Dublin Coastal Flood Protection Project (DCFPP).
- Strategies and Actions for Flood Emergency Risk Management (SAFER) providing tide event forecasting and coastal flood maps.
- Historical flood events in Dublin from met.ie/

The SFRA identifies several areas of existing development and undeveloped lands which are at risk of flooding. The subject site at St. Anne's Court is not included as a flood risk Special Area of Interest in the report.

An extract for the Development Plan Zoning maps in the vicinity of the subject site is shown in Figure 7. It can be seen from the figure that the site falls within Zone Z1 and is marked to protect, provide and improve residential amenities.

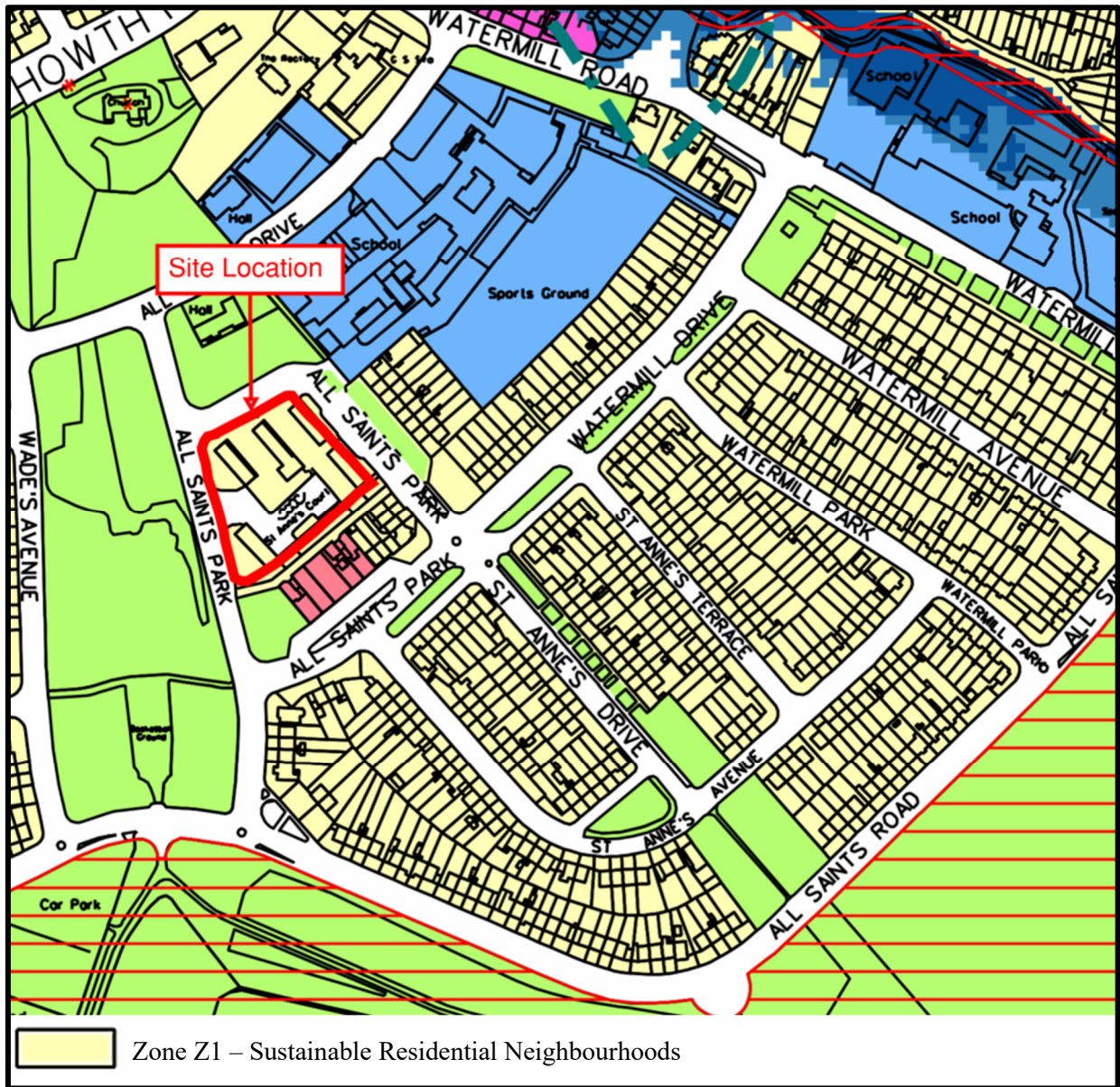


Figure 7: Development Plan 2022-2028 zoning map in the vicinity of the subject site

3. Overview of Flood Mechanisms and Historical Flooding at the Site

3.1 Flooding Mechanisms

In broad terms, the potential sources of flooding at the site can be categorised as:

- Fluvial (River) Flooding - Fluvial flooding occurs when rivers overflow their banks. The closest river to the site is the Santry River.
- Pluvial Flooding - Pluvial flooding occurs when the capacity of the local urban drainage network is exceeded during periods of intense rainfall. At these times, water can collect at low points in the topography and cause flooding.
- Groundwater Flooding - Groundwater Flooding can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the groundwater table is already high. If the groundwater level rises above ground level, it can pond at local low points and cause periods of flooding.
- Coastal Flooding - Flooding from the sea which is caused by higher than normal sea levels and/or high waves resulting in the sea overflowing onto the land.

Each of the applicable potential sources of flooding are considered in this FRA.

3.2 Historic Flooding at the Site

3.2.1 OPW National Flood Hazard Mapping Website

The OPW National Flood Hazard Mapping summarises all recorded flood events within 2.5 km of a chosen location. A map which can be seen in Figure 8 below indicates there are no recorded flood events within or in the vicinity of the site.

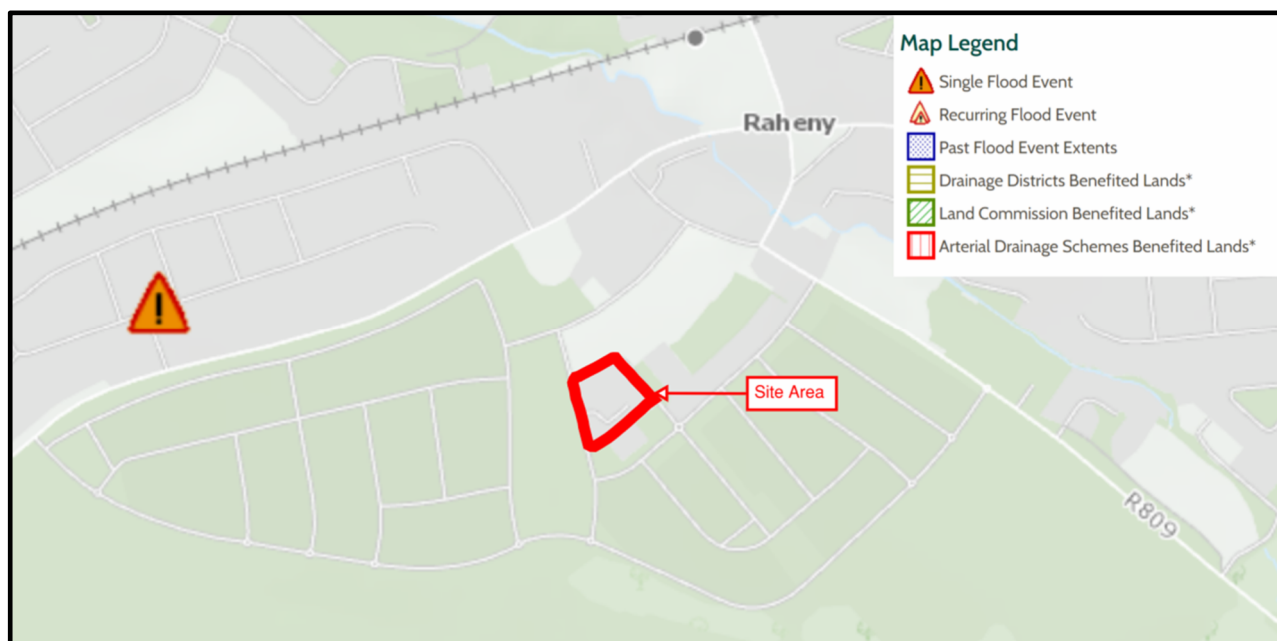


Figure 8: Past Flood Events (Source: www.floodinfo.ie)

While there is no record of past flooding on site, it is still possible however that unrecorded flooding has occurred on the site in the past.

3.3 Fluvial Flood Risk

3.3.1 Santry River

The Santry River is the nearest large watercourse to the site. An extract from the Eastern CFRAM Study is presented in Figure 9 and presents the modelled fluvial flood extents from the study for three separate return period events (the 1 in 10-, 100- and 1000-year fluvial flood events). It can be seen that the site is located well outside the flood extents and is therefore at low risk of fluvial flooding from the Santry River.

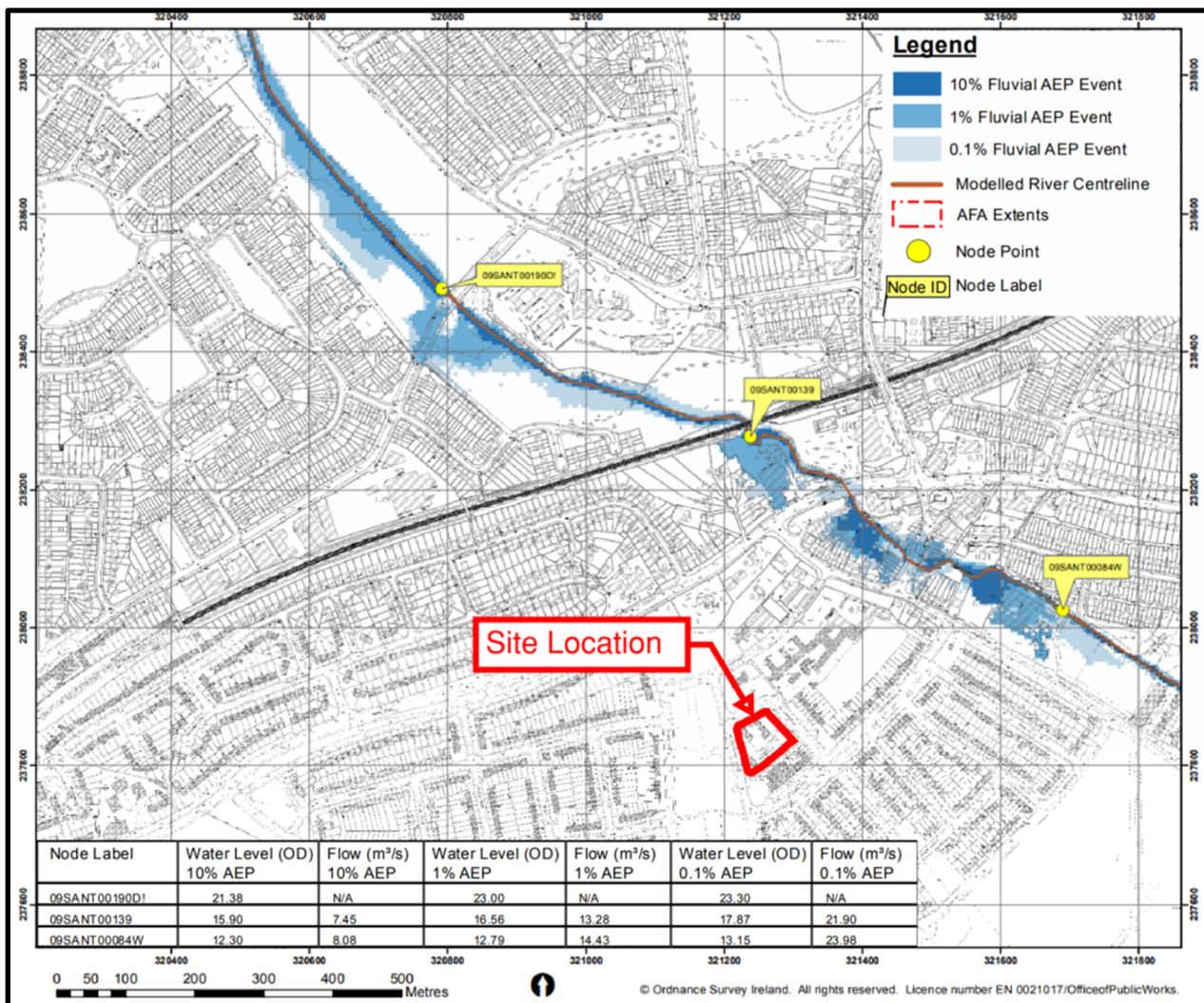


Figure 9: CFRAM flood extend mapping for the Santry River (source: www.floodinfo.ie)

3.3.2 Naniken River

The Naniken River is a minor watercourse located approximately 330m to the South of the site. The alignment and direction of flow of the river is indicated in Figure 10 below.

The existing ground level in the vicinity of the right bank of the Naniken River at the point at which it is closest to the site is circa 16mOD. The site of the proposed development is therefore circa 4m – 5m above the elevation of the right bank of the river.

Given the distance of the Naniken to the site and the very significant difference in ground elevation between both locations, it can be concluded that the site is at very low risk of fluvial flooding from the Naniken River.

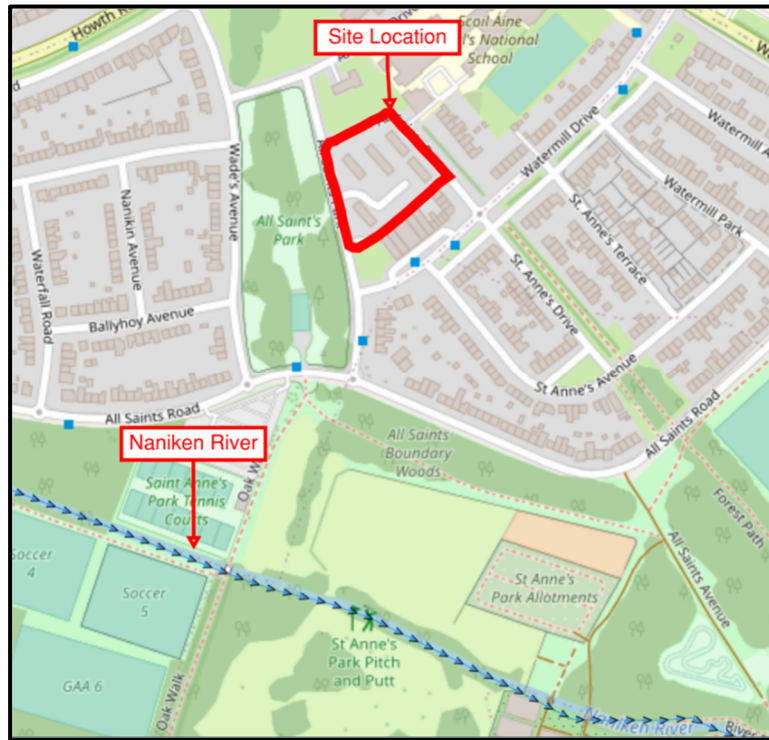


Figure 10: River Naniken Flow Direction (Source: gis.epa.ie)

3.4 Pluvial Flood Risk

Pluvial flooding occurs when extreme rainfall overwhelms drainage systems or soil infiltration capacity, causing excess rainwater to pond above ground at low points in the topography. Given the variation in the existing ground levels across the site and in its immediate vicinity, the risk of excess surface water collecting at the site is low. The risk of pluvial flooding is therefore deemed to be low.

3.5 Groundwater Flood Risk

Groundwater flooding can occur during lengthy periods of heavy rainfall, typically during later winter/early spring when the groundwater table is already high. If the groundwater level rises above surface level, it can pond at local points and cause flooding.

The risk from groundwater flooding is likely to be low. It is however recommended that ground water levels at the site are monitored during construction in order to allow a more detailed assessment of groundwater flood risk to be made.

3.6 Coastal Flood Risk

The risk of coastal flooding to the site is very remote given that the existing ground levels are greater than 16m above the design tidal level of 3mOD.

3.7 Flood risk in a climate change scenario

The impact of climate change is very unlikely to present any significant increase in the flood risk to the site. An increase in the mean sea level is irrelevant given the elevation of the site above the sea.

4. Management of Residual Flood Risk

4.1 Finished Flood Levels at the Site

Given the low flood risk at the subject site, the finished floor level (FFL) of the various buildings in the development need to be considered in the context of the existing ground levels of the site, the FFLs of the existing buildings and the low risk of surface water ingress that may occur during a design rainfall exceedance event.

For safety reasons due to the end user being senior citizens, the height difference between the finished floor level and the ground level must also be limited.

The FFL for the proposed developments varies across the site as noted below.

- The proposed FFLs for Block A range from 20.69 to 20.90 mOD. The proposed FFLs are higher than the ground levels external to the entrances of the buildings.
- The proposed FFLs for Block B ranges from 20.30 to 20.65 mOD. The proposed FFLs are higher than the ground levels external to the entrances of the buildings.
- The proposed FFLs for Block C ranges from 20.25 to 20.59 mOD. The proposed FFLs are higher than the ground levels external to the entrances of the buildings.
- The proposed FFLs for Block D ranges from 20.60 to 20.86 mOD. The proposed FFLs are higher than the ground levels external to the entrances of the buildings.

The risk of surface water ingress to the buildings is therefore low.

4.2 Access and Egress Routes

Given the absence of significant risk of flooding of the site, access and egress routes will not be compromised during flood events.

4.3 Storage and Conveyance

The proposed development will have no impact on floodplain storage and conveyance as it is outside the 1 in 100-year floodplain of the all the watercourses in the vicinity of the site.

4.4 Drainage System for the development

The Sustainable Drainage Design and Evaluation Guide 2021 (which supplements the Dublin City Development Plan 2022-2028) states the need to “*require the use of Sustainable Drainage Systems (SuDS) in all new developments, where appropriate, as set out in the Greater Dublin Strategic Drainage Study (Vol 2: New Development)/ Greater Dublin Regional Code of Practice for Drainage Works. Sustainable Drainage Systems (SuDS) should incorporate nature-based solutions and be designed in accordance with the Dublin City Council Sustainable Drainage Design and Evaluation Guide (2021) which is summarised in Appendix 12. SuDS should protect and enhance water quality through treatment at source while enhancing biodiversity and amenity.*”

Surface water will be managed in accordance with the CIRIA SuDS Manual and discharges from the proposed development will be restricted in accordance with the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharges will be retained within the various SuDS systems, sized to contain the 1 in 100-year event plus 20% for climate change.

Surface water from the proposed development will be intercepted and treated in a SuDS system comprising of blue roofs, green roofs, swales, and porous paving. The site SuDS features are represented in Figure 11- Figure 13.

It is proposed to discharge the surface water to an existing 225mm diameter surface water sewer at the south-west corner of the site on All Saints Park, which in turn discharges south into a 300mm surface water sewer.

The drainage systems will be designed in accordance with Part H of the Building Regulations, BS EN 752 Drain and Sewer Systems outside Buildings, the Greater Dublin Regional Code of Practice for Drainage Works, and Irish Water requirements.

The reader is referred to a separate Draining Planning Report accompanying this planning application for further information.



Figure 11: Planted swales and extent of this SuDS feature on site



Figure 12: Green and blue roofs and extent of these SuDS feature on site



Figure 13: Permeable paving and extent of this SuDS feature on site

4.5 Surface water runoff in a design exceedance event

The risk of water ingress to a building in a design rainfall exceedance event is deemed to be low given the variation in the existing ground levels at the site, any excess surface water will be unable to collect at the site.

Where constraints such as sloping topography exist for managing surface water ingress, interventions such as the installation of check dams and throttles can be made to maximise the storage of water at source e.g. on the porous paving system.

4.6 Maintenance Programme

The drainage system for the development will need to be maintained. This includes undertaking regular inspections of the drains and various SuDS features by ensuring that any debris which may have accumulated is removed. This will ensure that the risk of blockage of the drains is greatly reduced. The reader is referred to Section 8.1.13 of the accompanying drainage report for further details.

4.7 Sequential Approach

Under the Sequential Approach as discussed in Section 2.3 the site of the report, the proposed development is classified as a “Highly Vulnerable Development”. As the site is not within the 1000 year fluvial or tidal floodplain, it is classified as being within Flood Zone C. Therefore, a justification test for the development is not required and it is necessary only to identify mitigation measures for any residual risk as discussed in this chapter of the report.

5. Discussion

Flood risk to the site of the proposed development at St. Anne's Court is very low and there is no historic record of flooding at the site. Flood risk in a climate change scenario will also be very low.

Access and egress routes are unlikely to be compromised during flood events as the proposed development will have no impact on floodplain storage and conveyance. There is no off-site impact associated with the development as it is located outside of the floodplain.

Surface water discharges from the proposed development will be restricted in line with Dublin County Council (DCC) Water Services requirements. With the implementation of the SuDS measures discussed in this report the peak discharge from the site will be reduced by 47 l/s.

It is considered that the proposed development is classified as a "Highly Vulnerable Development" as per OPW's vulnerability classification. As the site is not within the 1000 year fluvial or tidal floodplain, it is within Flood Zone C. Therefore, a justification test for the development is not required and it is necessary only to identify mitigation measures for any residual risk.