# CLONBURRIS CANAL EXTENSION

## Flood Risk Assessment Report

MDC0709
Flood Risk Assessment
RPS-00-XX-RP-Z-RP0004
A1 C01
March 14th 2022

rpsgroup.com

## Document status

| Version | Purpose of document | Authored by | Reviewed by | Approved by | Review date |
|---|---|---|---|---|---|
| S3 P01 | Draft | JOS/BT | BC | CW | February 2022 |
| A1 C01 | Planning Submission | JOS/BT | BC | CW | 14th March 2022 |



**Prepared by:**

**RPS**

**Prepared for:**

**South Dublin County Council**

Dublin | Cork | Galway | Sligo
rpsgroup.com

RPS Group Limited, registered in Ireland No. 91911
RPS Consulting Engineers Limited, registered in Ireland No. 161581
RPS Planning & Environment Limited, registered in Ireland No. 160191
RPS Engineering Services Limited, registered in Ireland No. 99795
The Registered office of each of the above companies is West Pier Business Campus, Dun Laoghaire, Co. Dublin, A96 N6T7

# Contents



## Figures



## Tables

# EXECUTIVE SUMMARY

A Flood Risk Assessment (FRA) was carried out to support the South Dublin County Council (SDCC) Part 8 Planning Application for a Proposed Development known as the Clonburris Canal Extension. The site of the Proposed Development is located on land adjoining the Bawnogue Road and Ashwood Drive in Clondalkin/ Clonburris just south of the Grand Canal, and west of the Fonthill Road (the R113). The site is on SDCC owned lands. The Clonburris Canal Extension Development forms part of the Clonburris Strategic Development Zone (SDZ) Planning Scheme.

A review of available flood risk information indicated that the Proposed Development is not at risk from fluvial flooding but is potentially at risk from pluvial flooding. A surface water drainage assessment was carried out for the development site and has been designed in accordance with the requirements from the Greater Dublin Region Regional Code of Practice and the Greater Dublin Strategic Drainage Study (GSDS) Volume 2. The surface water drainage assessment also followed the recommendations from the Clonburris Strategic Development Zone Draft Planning Scheme, Surface Water Strategy. Therefore the potential risk from pluvial flooding is deemed to be low with the proposed mitigation measures in place for the development.

# 1 INTRODUCTION

RPS have been appointed by SDCC as multidisciplinary consultants for the design and consenting of the Clonburris Canal Extension. The Proposed Development is located at on lands adjoining the Bawnogue Road and Ashwood drive in Clondalkin/ Clonburris just south of the Grand Canal, and west of the Fonthill road (the R113), on SDCC owned lands.

The Flood Risk Assessment (FRA) was carried out to inform the design process and to be submitted as part of a Planning Application for the Proposed Development. This FRA was completed in accordance with “The Planning System and Flood Risk Management – Guidelines for Planning Authorities” (DOEHLG, 2009).

# 2 DESCRIPTION OF DEVELOPMENT

## 2.1 Introduction

This chapter provides a description of the Proposed Development and contains information on the existing site, the proposed site layout and other relevant features, in order to establish the characteristics for the purposes of the FRA.

## 2.2 Site Description

The site is located on undeveloped greenfield lands adjoining the Bawnogue Road, north of residential properties on Ashwood Road and Ashwood Drive, south of the Grand Canal, and west of the Fonthill Road (the R113), Co. Dublin. The site is shown in **Figure 2-1**. The site extends to approximately 3.25 hectares and will form Phase 02 of the development of SDCC lands within the approved SDZ at Clonburris shown in it's entirety in **Figure 2-2**.

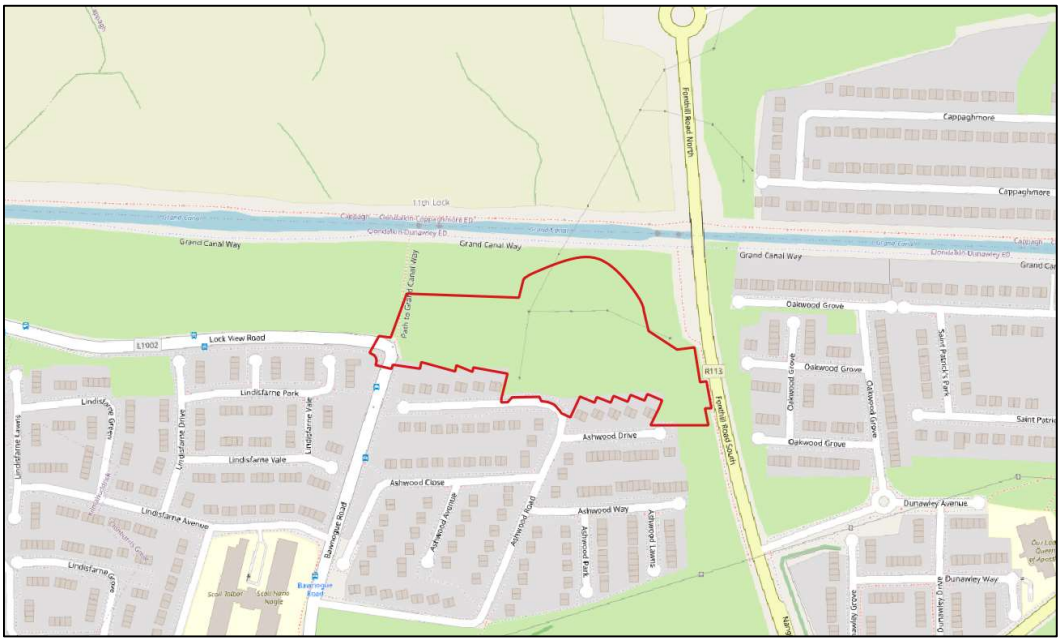


**Figure 2-1:Site of Proposed Development**

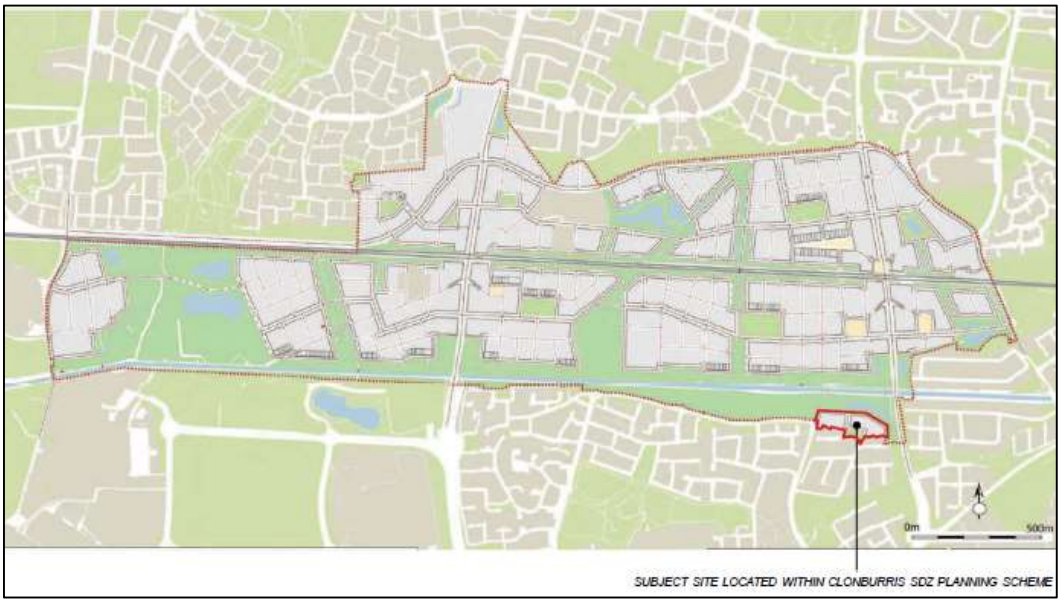


**Figure 2-2: Location of Clonburris Canal Extension within the Clonburris SDZ Planning Scheme**

## 2.3 Existing topography

The land slopes in a north easterly direction towards the 10th Lock of the Grand Canal. The site is relatively flat with average gradient of approximately 1 in 115 across the site. The ground levels vary from 62.5mOD to 59.5mOD. The topography of the site and a cross section through the site is shown are shown in **Figure 2-3**.

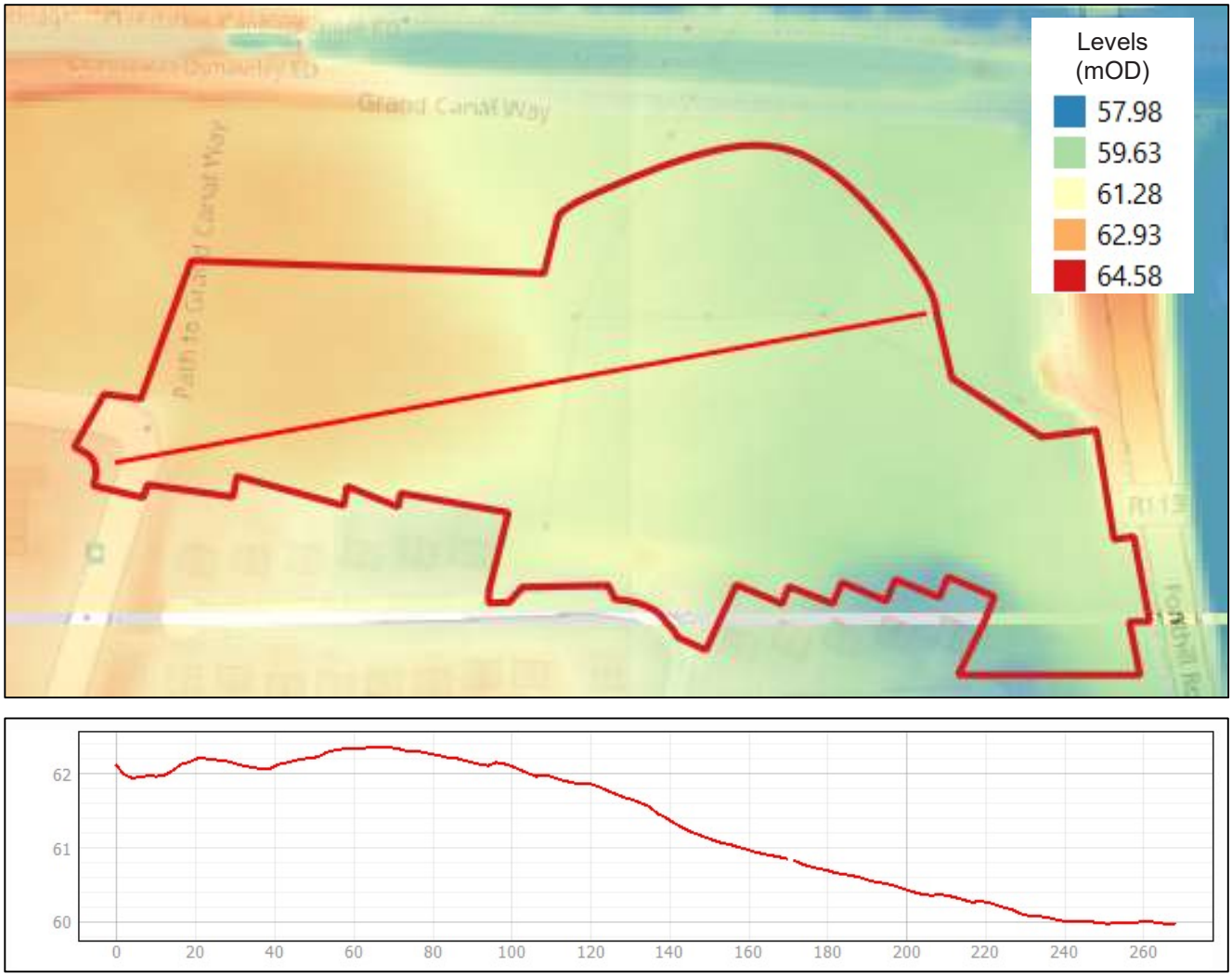


**Figure 2-3: Topography Profile across the existing site**

## 2.4 Local Hydrology

The Proposed Development is located in Hydrometric Area 09 - Liffey and Dublin Bay and the River Camac catchment, as shown in **Figure 2-4**. There are no significant watercourses within or adjacent to the development site boundary. The runoff from urban areas in the immediate vicinity drain to a surface water network that flows south towards the River Camac along the Fonthill Road, as shown in **Figure 2-5**. The Grand Canal is located to the north of the development site, however there is no hydrological connectivity between the canal and Proposed Development.

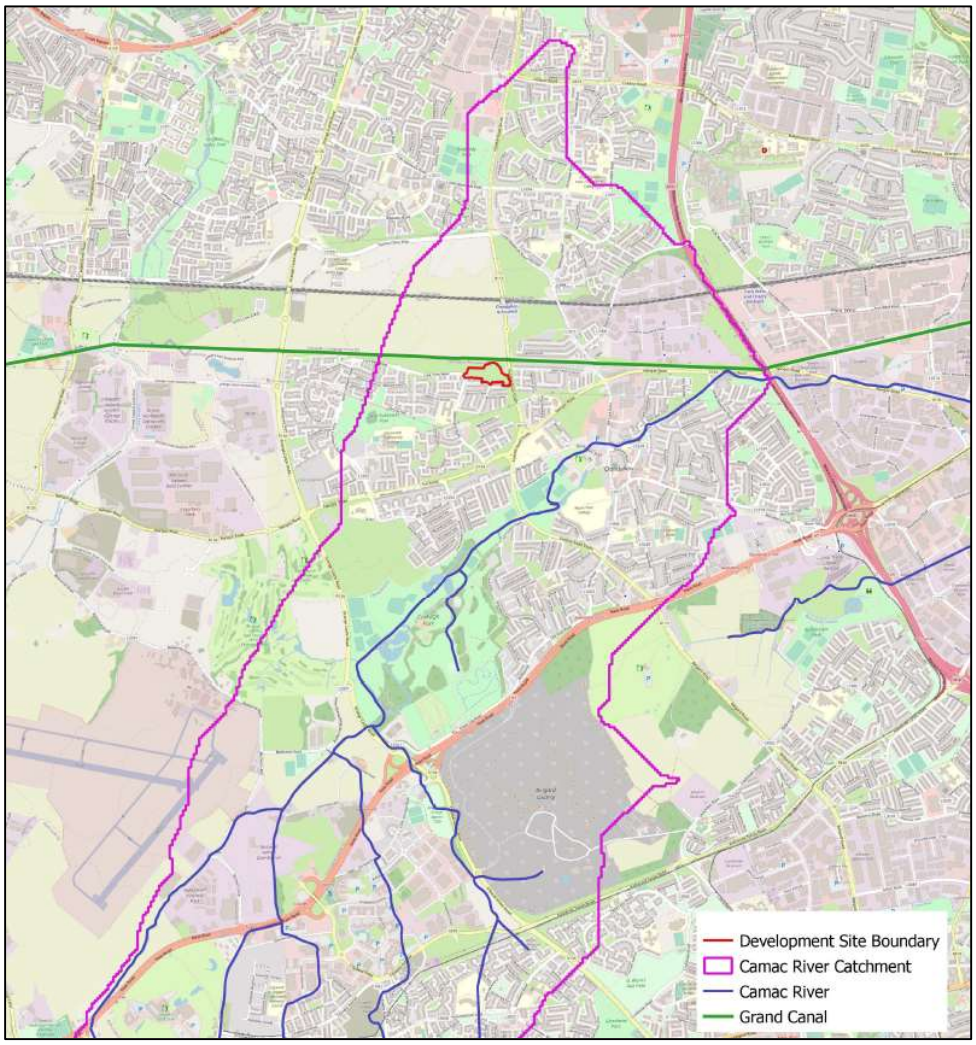


**Figure 2-4: Development site located within the Camac River Catchment**

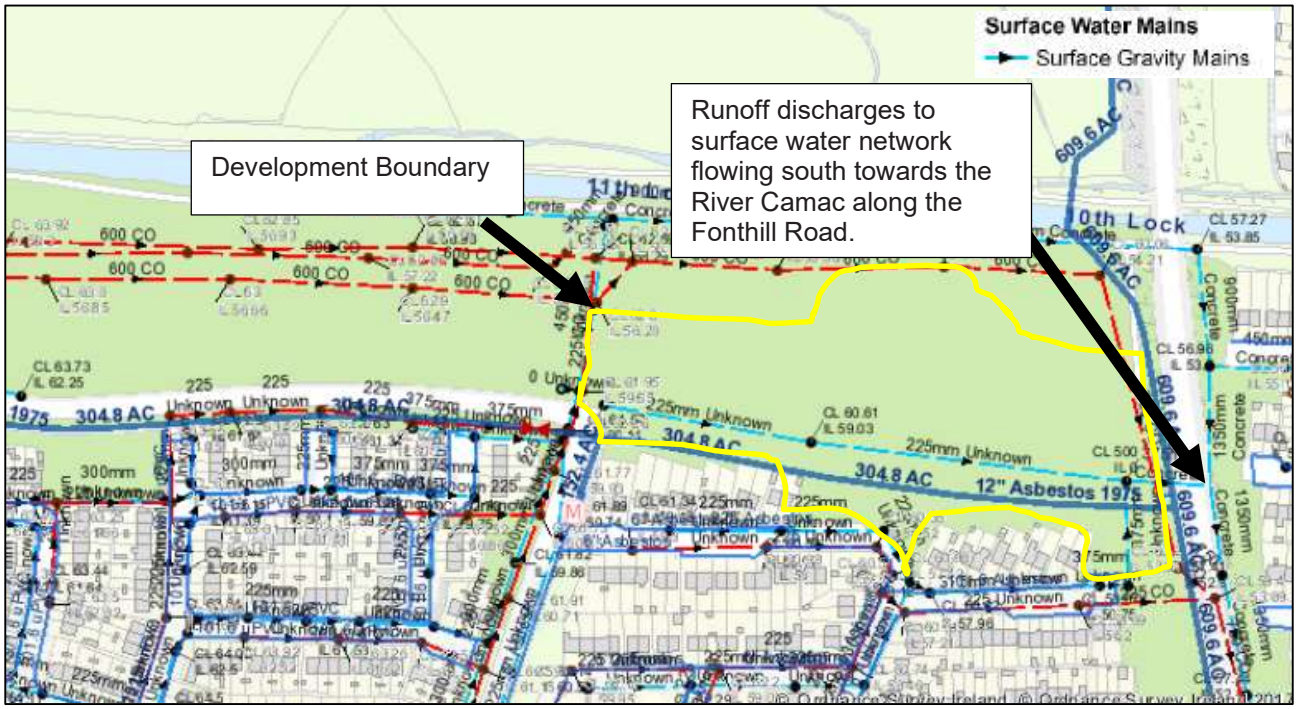


**Figure 2-5: Local Surface Water Drainage Network**

## 2.5 Proposed Development - Clonburris Canal Extension

The Proposed Development consists of the construction of 118 no. residential units comprising a combination of the following:

- three-bed houses
- four-bed houses
- Affordable Duplex units; consisting of both two-beds (Ground Floor units) and three-beds (2 storey units)
- Social Duplex units; consisting of both two-beds (Ground Floor units) and three-beds (2 storey units)
- Affordable Triplex units; consisting of two-beds (Ground Floor units) and one-bed units + study (First and Second Floor)
- Affordable Triplex units; consisting of both two-beds (Ground Floor units) and one-bed units (First and Second Floor)
- 4 Storey Apartment building; consisting of 19 No. Apartments (15 No. one-beds and 4 No. two-beds)

Layout of the Proposed Development is shown in shown in **Figure 2-6.**


**Figure 2-6: Layout of Proposed Development.**

# 3 STAGE 1 - FLOOD RISK IDENTIFICATION

## 3.1 Overview

The purpose of this section is to establish the level of flood risk for the Proposed Development and to collate and assess existing current and historical information and data which may indicate the level and/or extent of any flood risk. The following sections detail information and data collated as part of the Stage 1 Flood Risk Identification carried out for the Proposed Development.

## 3.2 Source-pathway-receptor model

In the first instance, an identification and assessment of the probability, magnitude, response of pathways and consequences of a flood event for the Proposed Development were appraised using flood risk guidance matrixes from the Flood Guidance Statement User Guide (FFC, 2020). This analysis was aimed at identifying high risk elements as summarised in **Table 3.1** below.

**Table 3.1: Possible flood mechanisms.**

| Source | Pathway | Likelihood (remote, possible, likely) | Consequences (low, medium, high) | Risk (low, medium, high) | Comment/ Reason |
|---|---|---|---|---|---|
| Fluvial | Increased river levels overtopping riverbanks | Remote | High | Low | The site is not located adjacent to any significant watercourses and is not identified as being at risk from fluvial flooding. |
| Coastal | Increased river levels overtopping existing riverbanks | Remote | High | Low | The site is located inland and outside the coastal zone. |
| Pluvial | Overland Flow from Elevated Lands or Water logging | Unlikely | High | Medium | The Office of Public Works (OPW) Preliminary Flood Risk Assessment (PFRA) pluvial flooding mapping did not identify any extents within the main boundary of the site. However, there is pluvial flooding located nearby on a low spot along the Bawnogue Road. The surrounding topography slopes north easterly towards the 10$^{th}$ Lock of the Grand Canal. The subsoil is identified as having moderate drainage. |
| Blockage | Increased river level overtopping existing riverbanks | Remote | High | Low | There are no culverts or bridges in the immediate vicinity of the site which could be cause of flooding due to blockages. |
| Groundwater | Rising Ground Water Level | Remote | High | Low | There are no records of groundwater flooding in the area. Geological Survey of Ireland (GSI) also did not highlight this area in its predictive groundwater flooding mapping. |
| Human or Mechanical Error | Attenuation or Pipework failure | Remote | High | Low | The appropriate design of the proposed surface water drainage and regular maintenance should avoid any issues of this nature. |

The primary source of flood risk to the Proposed Development may be attributed to pluvial flooding. However, this is unlikely given appropriate site drainage system design.

## 3.3 Flood risk & flood studies information

Relevant information was reviewed and collated from the following sources:

- SDCC (2016) South Dublin County Council Development Plan 2016-2022, Strategic Flood Risk Assessment. South Dublin County Council;
- SDCC (2017) Clonburris Strategic Development Zone Draft Planning Scheme, Strategic Flood Risk Assessment. South Dublin County Council;
- SDCC (2017) Clonburris Strategic Development Zone Draft Planning Scheme, Surface Water Strategy. South Dublin County Council;
- SDCC (2021) Draft South Dublin County Development Plan 2022 - 2028 Strategic Flood Risk Assessment, South Dublin County Council;
- OPW (2018) Flood Risk Management Plan – River Basin 9. Office of Public Works;
- OPW (2016) Eastern CFRAM Study Hydrometric Area 9 – Hydrology Report. Office of Public Works; and
- OPW (2016) Eastern CFRAM Study Hydrometric Area 9 – Hydraulics Report. Office of Public Works.

## 3.4 Flooding history

The area for development has no recorded history of flooding incidents. **Figure 3-1** below shows a snapshot from the OPW website[1] highlighting showing no flooding incidents in the area.

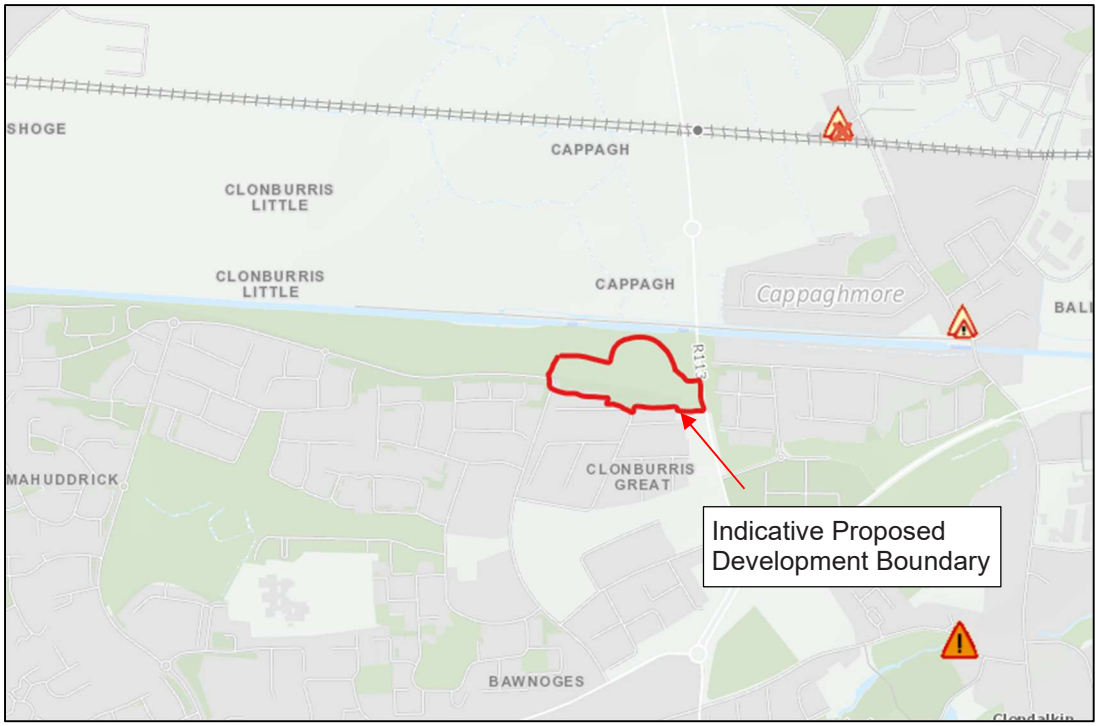


**Figure 3-1: Historical flooding in Clonburris[1].**

[1] Source: www.floodinfo.ie

## 3.5 Fluvial Flooding

Review of all available flood risk information, refer to **Section 3.3**, did not identify any fluvial flood risk. **Figure 3-2** shows a snapshot from the OPW website[2] highlighting the flood extents (inclusive of climate change) from the River Camac. It can be seen that the Proposed Development is located outside the predicted flood extents.

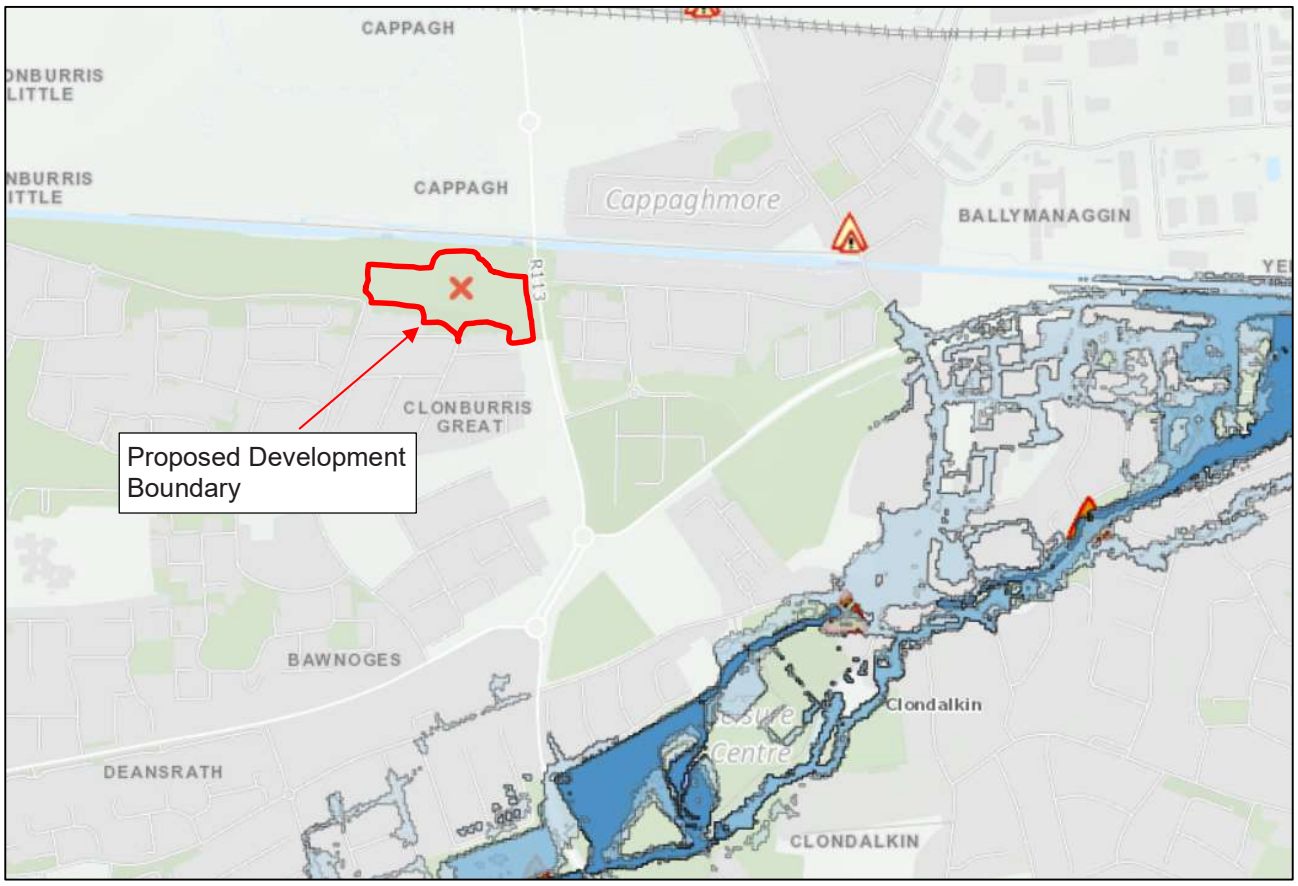


**Figure 3-2 Flooding extents from the River Camac**

## 3.6 Grand Canal

The Grand Canal north of the development is an unlikely source of flooding. The section of the canal within the SDZ has:

- 2 no. lock gates;
- a lock gate cottage; and
- an overflow system which takes water from the west of the 11th lock, runs parallel to the north of the canal and re-enters the main waterbody to the east of the 9th lock. This system ensures that the canal does not overflow to the surrounding land and thus flooding is unlikely to the Proposed Development.

## 3.7 Flood Risk Management Guidelines

The Proposed Development is located outside the flood zones identified in the SDCC (2016) South Dublin County Council Development Plan 2016-2022 and the Draft South Dublin County Development Plan 2022 - 2028 Strategic Flood Risk Assessment. Therefore a Justification Test is not required for the proposed

[2] Source: www.floodinfo.ie

residential development and it is in compliance with DOEHLG (2009) Flood Risk Management Planning Guidelines.

## 3.8 Conclusion of Stage 1

Records of historical flooding, the flood extent mapping generated for the Camac River and other records outlined in the preceding sections indicate that the Proposed Development is at very low risk of flooding. The proposed development is in compliance with the DOEHLG (2009) Flood Risk Management Planning Guidelines and a Justification Test is not required. However, there is minor risk from pluvial flooding, and the FRA was progressed to **STAGE 2 – INITIAL FLOOD RISK ASSESSMENT** to assess the proposed surface water management measures to mitigate the pluvial risk.

# 4 STAGE 2 – INITIAL FLOOD RISK ASSESSMENT

## 4.1 Sources of flood risk

The purpose of the Initial FRA was to:

- appraise the availability and adequacy of the identified flood risk information;
- to qualitatively appraise the flood risk posed to the site and potential impacts on flood risk elsewhere; and
- to recommend possible mitigation measures to reduce the risk to acceptable level.

In consideration of the above assessment, the primary flood risk to the Proposed Development was attributed to pluvial flooding.

There are no recorded incidents of pluvial flooding for the proposed site. As discussed in **Section 2.3**, the site itself slopes north easterly towards the 10th lock of the Grand Canal. The soil, subsoils and geology of the site have been determined from the GSI online Spatial Data and Resources (GSI, 2021) and the Environmental Protection Agency (EPA) online map viewer (EPA, 2021). The GSI online spatial data viewer shows that the soil underlying the site is described as limestone till and has moderate drainage. Surface water infrastructure record drawings, as shown in **Figure 2-5,** show the local area is served by gravity surface pipes that drain southwards to the River Camac.

There is potential for some waterlogging and potential pluvial flooding in the area if inadequate surface water infrastructure is installed for the Proposed Development. The following section outlines the proposed surface water management measures for the site to mitigate against pluvial flood risk.

## 4.2 Proposed Surface Water Infrastructure

### 4.2.1 Background

A Surface Water Management Plan (SWMP) was produced by DBFL Consulting Engineers to identify a strategy and suite of measures which provide robust, effective and economic measures for the management of surface water quality and quantity in the entire SDZ. The Proposed Development is identified as within Sub-Catchment 7 within the SWMP. The SWMP identified a surface water strategy for the Sub-Catchment 7 and it is proposed that this strategy will be followed as part of the surface water proposal for the Proposed Development.

### 4.2.2 Surface Water Drainage – Network Design Requirements

The surface water generated by the Proposed Development will be collected by roof rainwater pipes and by gullies in the hardstanding areas. The collected run-off will be connected to a new surface water gravity sewer system, provided as part of the Proposed Development. The surface water will flow by gravity towards the proposed attenuation pond, located in the northern section of the development lands.

Surface water infrastructure is to be constructed in accordance with the Greater Dublin Region (GDR) Regional Code of Practice. This includes all pipelines and manholes. The following has been incorporated in the surface water drainage design:

- Gravity foul sewers will have adequate gradient to maintain self-cleansing conditions. A minimum self-cleansing velocity of 1.0 m/s will be designed for (pipe full conditions);
- Access points are provided at the following locations: changes in pipe direction, gradient, material and/or diameter; at the head of all sewers; junction of two or more pipes; and prior to outfall; and
- Gully and rainwater downpipe connections will be minimum 150 mm Ø. They shall be laid to a gradient of no flatter than 1:80.

As per the requirements of IS EN 752:2017, the hydraulic capacity of the pipes is calculated in accordance with IS EN 16933-2:2017. The peak flow rate within the surface water infrastructure on the site is calculated as per Cl.8.2.2.2 of IS EN 16933-2:2017.

The network will ultimately discharge to the existing public surface water network located in the Oakwood residential estate to the east of the proposed development, on the eastern side of the Fonthill Road.

### 4.2.3 Surface Water Drainage - Attenuation Strategy

An objective of the SWMP is that the development must incorporate SuDs measures. The development shall comply with guidance as set out in the Greater Dublin Strategic Drainage Study (GDSDS), Volume 2.

To comply with the requirement to restrict the outflow rate from the site to a discharge rate equivalent to the greenfield rate of run-off, it is necessary to provide attenuation storage on site. Due to the nature and use of the site, long term storage is not considered.

It is proposed to provide an attenuation pond on site to allow for the restricting of the run-off from the developed site to match a value equivalent to the greenfield rate of run-off. It is proposed to provide the pond in the form of a detention basin. The detention basin will provide the necessary attenuation volume but will also provide some degree of treatment and infiltration.

A discharge throttle or flow control device will be installed on the outlet manhole (last manhole) from the site, downstream of the attenuation pond. This will limit the discharge rate of QBAR for all extreme events (Return period of 1:100-year event). It is worth noting that, as per 6.3.3.1 of the GDSDS, flows much below 10 l/s are rarely achievable due to the operational requirements of the flow control device, i.e. a very small orifice require which will have major maintenance issues.

As per sub-criterion 4.3 of Table 6.3 of the GDSDS, a maximum discharge rate of QBAR or 2 l/s/ha, whichever is the greater, will be applied to the outfall from the site.

As part of the SWMP, an assessment on the attenuation requirements for the Sub-Catchment 7 lands was undertaken. However, the attenuation requirements have been rationalised, based on the most up to date Proposed Development layout.

As part of the proposed application design, the following calculated values have been noted to apply:

- Total Site Area = 3.2405 hectares
- Total Green Area = 1.1862 hectares
- Pond Area = 0.2399 hectares
- Total Impermeable Area = 1.8144 hectares

Based on the above information, a revised assessment of the site attenuation requirements has been undertaken:

- Qbar = 10.5 l/s
- Q30 = 22.0 l/s
- Q100 = 27.8 l/s
- Storage Type = Pond
- Storage Volume Required (100 Years) = 943$m^3$.
- Storage Volume Provided = 1,250$m^3$.

From the design calculation, it has been determined that a volume of 943$m^3$ is required to allow for sufficient storage to attenuate the outflow from the pond to a maximum of 27.8 l/s during a 1.0% AEP storm event. However, in order to maintain a level of consistency with the SWMP design, it is proposed that an attenuation pond of volume 1,250$m^3$ will be provided. This will have a maximum allowable discharge rate of 27.8 l/s during a 1% AEP event (100-year storm). The pond has been designed to match the levels as shown in the Attenuation Area 9 design, as included in the SWMP. Attenuation Area 9 has been designed in the SWMP as a retention pond, which is to have a permanent 0.6m depth of water in it, to function as an amenity. The pond has been designed with an invert level of 57.5m. Allowing for a permanent storage depth of 0.6m results in a permanent water level of 58.1m. A total storage depth allowance of 1.0m has been provided. This results in a maximum water level in the pond during a 1% AEP event of 59.1m.

The detention basin will be constructed in accordance with the GDSDS and as per the guidance as set out in the CIRIA SuDS Manual 2015.

Design calculations for the estimation of greenfield run-off and attenuation storage volumes are included in the Engineering Services Report (MDC0709-RPS-00-XX-RP-Z-RP0002) accompanying the planning application.

Other SuDS measures are proposed to be incorporated in the development. These are listed below:

- A Class 1 by-pass petrol/oil interceptor will be installed to fully treat all flows generated by rainfall rates up to 5mm/hr (99% of all rainfall events) prior to discharging into the attenuation pond;
- Low water usage appliances, to restrict/reduce potable water demand;
- Use of permeable paving for private driveways and parking bays;
- Installation of domestic rainwater butts to downpipes to encourage rainwater re-use.

The proposed surface water layout is shown in **Figure 4-1**.

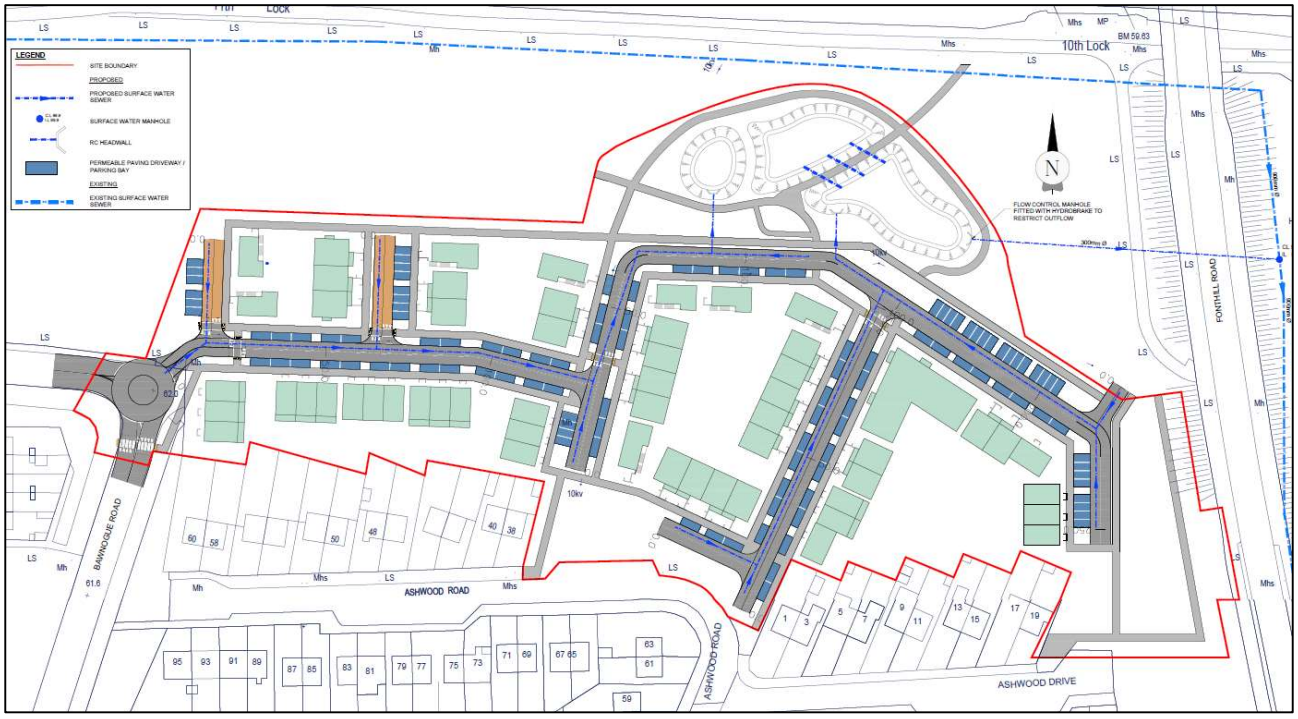


**Figure 4-1: Proposed Surface Water Layout**

## 4.3 Conclusion of Stage 2

The Proposed Development was identified to have medium pluvial risk due to the potential from flooding due it's requirement for a designed surface water management system. However, the proposed surface management system has been designed in accordance with the requirements from the Greater Dublin Region Regional Code of Practice and the GDSDS Volume 2 along with the recommendations from the Clonburris Strategic Development Zone Draft Planning Scheme, Surface Water Strategy. Therefore, the potential risk from pluvial flooding is deemed to be low, with the proposed mitigation measures in place for the development. It is deemed that the FRA does not need to proceed to a Stage 3 Detailed FRA assessment.

# 5 CONCLUSION AND RECOMMENDATIONS

A FRA was carried out in accordance with The Planning System and Flood Risk Management – Guidelines for Planning Authorities" (DOEHLG, 2009) to support the SDCC Part 8 Planning Application for the Proposed Development known as the Clonburris Canal Extension. The Proposed Development consists of the construction of 118 no. residential units.

A review of the available flood risk information indicated that the Proposed Development is at very low risk of flooding. The proposed development is in compliance with the DOEHLG (2009) Flood Risk Management Planning Guidelines and a Justification Test is not required.

The Proposed Development was identified to have potential pluvial risk however the proposed surface management system has been designed in accordance with the requirements from the Greater Dublin Region Regional Code of Practice and the GDSDS Volume 2 along with the recommendations from the Clonburris Strategic Development Zone Draft Planning Scheme, Surface Water Strategy. Therefore the potential risk from pluvial flooding is deemed to be low with the proposed mitigation measures in place for the development.

# 6 REFERENCES

CIRA (2015) The SuDS Manual C753. Construction Industry Research and Information Association

DOEHLG (2009) The Planning System and Flood Risk Management Guidelines for Planning Authorities. Department of the Environment, Heritage and Local Government.

Dublin Drainage Consultancy (2005) Greater Dublin Strategic Drainage Study. Final Strategy Report.

European Commission (EC) (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report. (Directive 2011/92/EU as amended by 2014/52/EU), European Union.

EPA (2021) Environmental Protection Agency: Web Mapping Services. Available online at: https://gis.epa.ie/EPAMaps/.

FFC (2020) Flood Guidance Statement User Guide January 2020. Flood Forecasting Centre (A working partnership between Environment Agency (UK) and MET Office (UK)).

Greater Dublin Region (GDR) (2008) Regional Code of Practice for Drainage Works

GSI (2021) Geological Survey Ireland: Spatial Resources. Available online at: https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228.

OPW (2018) Flood Risk Management Plan – River Basin 9. Office of Public Works;

OPW (2016) Eastern CFRAM Study Hydrometric Area 9 – Hydrology Report. Office of Public Works;

OPW (2016) Eastern CFRAM Study Hydrometric Area 9 – Hydraulics Report. Office of Public Works.

SDCC (2016) South Dublin County Council Development Plan 2016-2022, Strategic Flood Risk Assessment. South Dublin County Council;

SDCC (2017) Clonburris Strategic Development Zone Draft Planning Scheme, Strategic Flood Risk Assessment. South Dublin County Council;

SDCC (2017) Clonburris Strategic Development Zone Draft Planning Scheme, Surface Water Strategy. South Dublin County Council;

SDCC (2021) Draft South Dublin County Development Plan 2022 - 2028 Strategic Flood Risk Assessment, South Dublin County Council;