CHAPTER 7

HYDROLOGY

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A Trinity Consultants Company

7.0 HYDROLOGY

7.1 INTRODUCTION

7.1 This chapter assesses and evaluates the potential impacts of the development on the hydrological aspects of the site and surrounding area. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

7.2 METHODOLOGY

7.2.1 Criteria for rating of effects

7.2 This chapter evaluates the effects, if any, which the proposed development will have on Hydrology as defined in the Environmental Protection Agency (EPA) 'Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022). In addition, the document entitled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009) is referenced where the methodology for assessment of impact is appropriate.

7.3 The rating of potential environmental effects on the hydrological environment is based on the standard EIAR impact predictions table included in Chapter 1 which takes account of the quality, significance, duration and type of effect characteristic identified (in accordance with impact assessment criteria provided in the Draft EPA Guidelines (2022) publication).

7.4 The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

7.5 The TII criteria for rating the magnitude and significance of impacts and the importance of hydrological attributes at the site during the EIA stage are also relevant in assessing the impact and are presented in Tables 1-3 in Appendix 7.1.

7.6 The principal attributes (and effects) to be assessed include the following:

- River and stream water quality in the vicinity of the site (where available);
- Surface watercourses near the site and potential impact on surface water quality arising from proposed development related works including any discharge of surface water run-off;
- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any); and
- Surface water features within the area of the site.

7.2.2 Sources of Information

7.7 Desk-based hydrological information in the vicinity of the site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Environmental Protection Agency (EPA) – website mapping and database information. Envision water quality monitoring data for watercourses in the area;
- River Basin Management Plan for Ireland 2018-2021.
- Third Cycle Draft River Basin Management Plan 2022-2027 – Consultation Report
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW));
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie)
- Dublin City Council (2005), Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council; and
- 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, 2001);
- National Parks and Wildlife Services (NPWS) – Protected Site Register.

7.8 Site specific data was derived from the following sources:

- Site Specific Flood Risk Assessment Omni Plaza SHD EirEng Consulting Engineers (August 2022);
- Engineering Planning Report. Omni Plaza SHD. EirEng Consulting Engineers (August 2022);
- Resource & Waste Management Plan (RWMP) Omni Plaza SHD EirEng Consulting Engineers (August 2022)
- Operational Waste Management Plan (OWMP) Omni Plaza SHD EirEng Consulting Engineers (August 2022);
- Various design site plans and drawings; and
- Consultation with site engineers.

7.3 RECEIVING ENVIRONMENT

7.9 The site is located to the north west corner of the Omni Park Shopping Centre, Santry and at Santry Hall Industrial Estate, Swords Road, Dublin 9 D09FX31 and D09HC84. The site is bounded on the north by an existing industrial estate, on the west by residential houses, and on the south and east by the Omni Park Shopping Centre development. The site falls from the east (c. 59.5m AOD) to west (c. 56.6m AOD).

7.3.1 Hydrology

7.10 The subject site is located within the former Eastern River Basin District (ERBD, now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD The subject site is located in the Eastern River Basin District (ERBD) and the River Tolka WMU (Water Management Unit).

7.11 According to the EPA maps (EPA maps, https://gis.epa.ie/EPAMaps/ accessed on 16-08-2021), the proposed development site mainly lies within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) and the Tolka River sub-catchment, although a minor part belongs to the Mayne River sub-catchment (refer to Figure 7.1 below). There are no open watercourses at the site or in the immediate vicinity of the site. The nearest watercourse to the site is the Santry River which resides c. 1 Km to the north of the site (refer to Figure 6.1 below) although the site lies within the Tolka River sub-catchment; the Tolka River is located c.2.5 Km to the south. The Dublin Bay coastal waterbody is the nearest water receptor and is located c. 9 Km southeast of the proposed development.

Figure 7.1 *Hydrological Environment (EPA, 2022)*

7.12 A review of the historical mapping records provided within the GeoHive website and bibliography consulted indicates that historical watercourses used to flow in the vicinity of the site (Naniken and Wad rivers; refer to Figure 7.2 below); however, these streams are currently culverted and therefore the subject site has no hydrological connection to them.

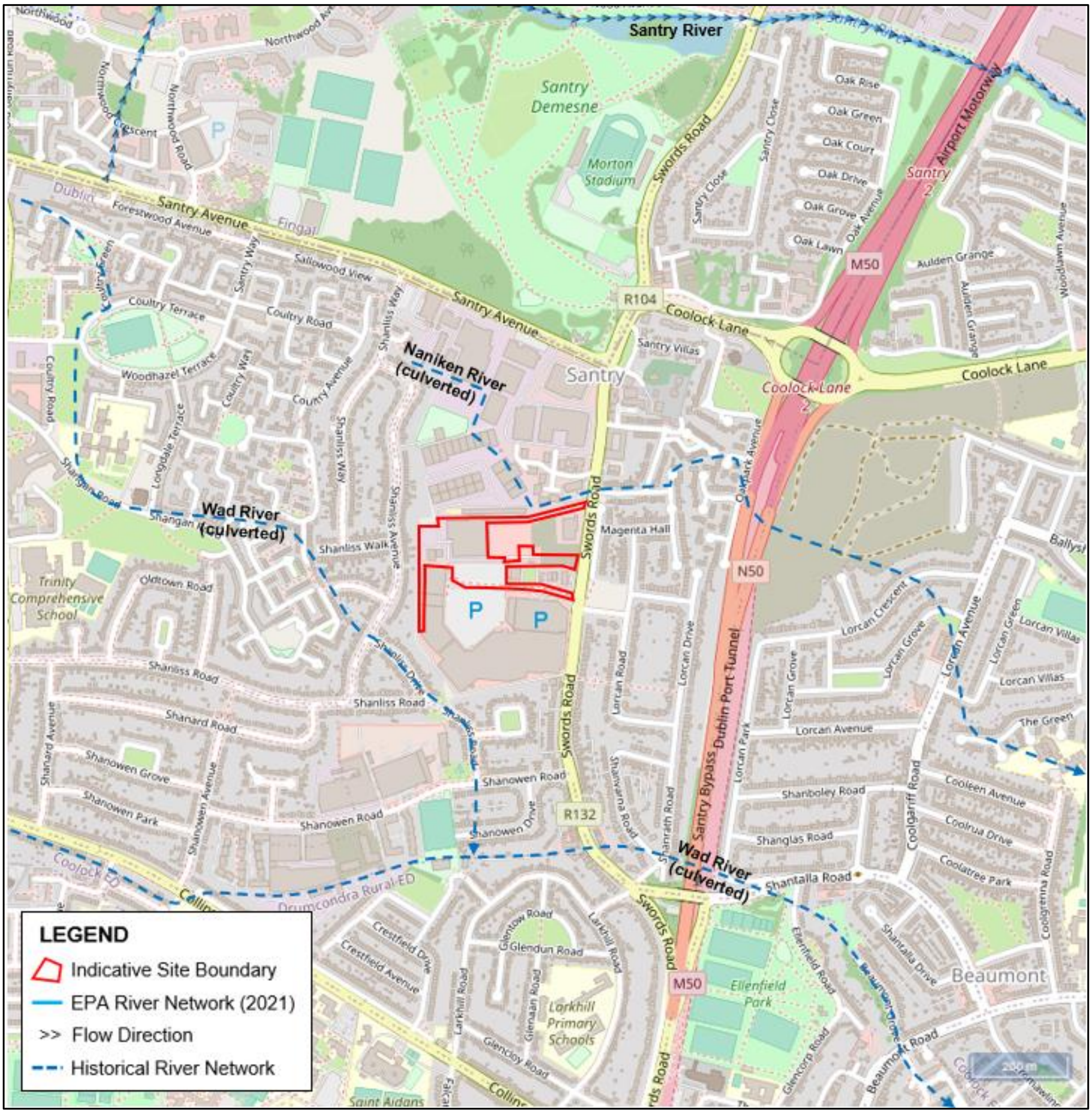

Figure 7.2 *Site Location and Historical Rivers (EPA 2022, The Rivers of Dublin, Sweeney, 2017)*

7.13 The existing commercial units are currently drained via gravity into 2 no. private surface water drainage networks which connect into other private surface water networks within the site. The private sewer network flows east where it connects into a public surface water sewer located within Swords Road which ultimately drains to the Irish Sea via the Santry River.

7.14 The existing private surface water networks and their connections to the private surface water network will be decommissioned

7.3.2 Surface Water Quality

7.15 The proposed development is located within the former ERBD (now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD). It is situated in

Hydrometric Area No. 09 of the Irish River Network and is located within the Liffey and Dublin Bay Catchment.

7.16 The Water Framework Directive (WFD) Directive 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of ‘Good Status’ in water bodies that are of lesser status at present and retaining ‘Good Status’ or better where such status exists at present.

7.17 The WFD requires ‘Good Water Status’ for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. ‘Good status’ means both ‘Good Ecological Status’ and ‘Good Chemical Status’. In 2009 the ERBD River Basin Management Plan (RBMP) 2009-2015 was published. In the ERBD RBMP, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g., water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015 and include a programme of measures to address and alleviate these pressures by 2015. This was the first River Basin Management planning cycle (2010-2015). The second cycle river basin management plan for Ireland was carried out during 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD). The third cycle (2022-2027) is currently being undertaken.

7.18 The primary aim of the plan is that Water bodies identified as being ‘At Risk’ of not achieving their environmental objectives need to have targeted measures implemented to achieve objectives under this Plan. 190 Areas for Action were identified across the 5 Local Authority regions. Within these 190 areas, a total of 726 water bodies were selected for initial actions during this RBMP cycle. There are 832 water bodies identified as being ‘At Risk’ of not achieving their environmental objectives under this Plan that have not been included in the Areas for Action. For most of these water bodies, targeted actions will be undertaken in the third cycle RBMP from 2022-2027. The draft third cycle RBMP has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the proposed development.

7.19 The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003);
- European Communities (Drinking Water) Regulations 2014 (S.I. 122 of 2014);
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended SI No. 77 of 2019)
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 S.I. No. 366 of 2016);
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010); and
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011)
- Statutory Instrument (SI) No. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988
- Local Government (Water Pollution) Acts 1977-1990
- SI No. 258 of 1988 Water Quality Standards for Phosphorus Regulations 1998

- ‘Br N of Killeek’ (EPA Code: RS08W010300): located in the Ward River c. 1.2km downstream from its join with the Huntstown Stream. The most recent status recorded by the EPA (2017) is classified as *Q4/Good*.
- ‘Coolatrath Br’ (EPA Code: RS08W010070): located in the Ward River c. 3.3km upstream of the Huntstown Stream. The most recent status recorded by the EPA (2017) is classified as *Q3-4/Moderate*.

7.20 The Water Framework Directive (WFD) Directive 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of ‘Good Status’ in water bodies that are of lesser status at present and retaining ‘Good Status’ or better where such status exists at present. The WFD requires ‘Good Water Status’ for all European waters to be achieved through a system of river basin management planning and extensive monitoring. ‘Good status’ means both ‘good ecological status’ and ‘good chemical status’.

7.21 The Tolka River belongs to the Tolka_060 WFD surface water body in its section closest to the development site. The EPA currently classifies this water body with ‘*Moderate*’ status and is ‘*At risk of not achieving good status*’. According to EPA records, this water body has good acidification and nutrient conditions; however, it has performed poorly in terms of saturated dissolved oxygen.

7.22 The Santry river belongs to the Santry_010 WFD surface water body in its section closest to the development site. The EPA currently classifies this water body as having ‘*Poor*’ status and is also ‘*At risk of not achieving good status*’. This ‘Poor’ status is related to its biological and invertebrate status or potential; all the remaining conditions (oxygenation, acidification and nutrients) have a current ‘Moderate’ or ‘High’ status.

7.3.2.1 Surface Water Quality Results

7.23 Q Values are used to express the biological water quality by the EPA, based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. Q1 indicates a seriously polluted water body, Q5 indicates unpolluted water of high quality.

7.24 Q Values for the Tolka and Santry River are shown in Table 7.1 below and the descriptions of each of the Q Ratings are shown in Table 7.2.

7.25 Refer to Figure 7.3 below for locations of these EPA quality monitoring points in the context of the site. The Q values obtained suggest that both watercourses are currently presenting a ‘Moderately Polluted’ pollution status.

Table 7.1 *EPA Biological Q Ratings for the Santry and Tolka Rivers*

RIVER	Station No.	Location	Biological Quality Ratings (Q Values)											
			1990	1991	1994	1996	1998	2002	2005	2007	2010	2013	2016	2019
Santry	RS09S010300	Clonshaugh Rd Bridge	1	2	1	2	1-2	2	2-3	2-3	3	3	3	2-3
Tolka	RS09T011100	Violet Hill Drive Finglas	1	1	2-3	3	2-3	2-3	2	3	3	3	3	3

Table 7.2 *EPA Biological Q Ratings*

Quality Ratings	Quality Class	Pollution Status	Condition
Q5, Q4-5, Q4	Class A	Unpolluted	Satisfactory
Q3-4	Class B	Slightly Polluted	Unsatisfactory
Q3, Q2-3	Class C	Moderately Polluted	Unsatisfactory
Q2, Q1-2, Q1	Class D	Seriously Polluted	Unsatisfactory

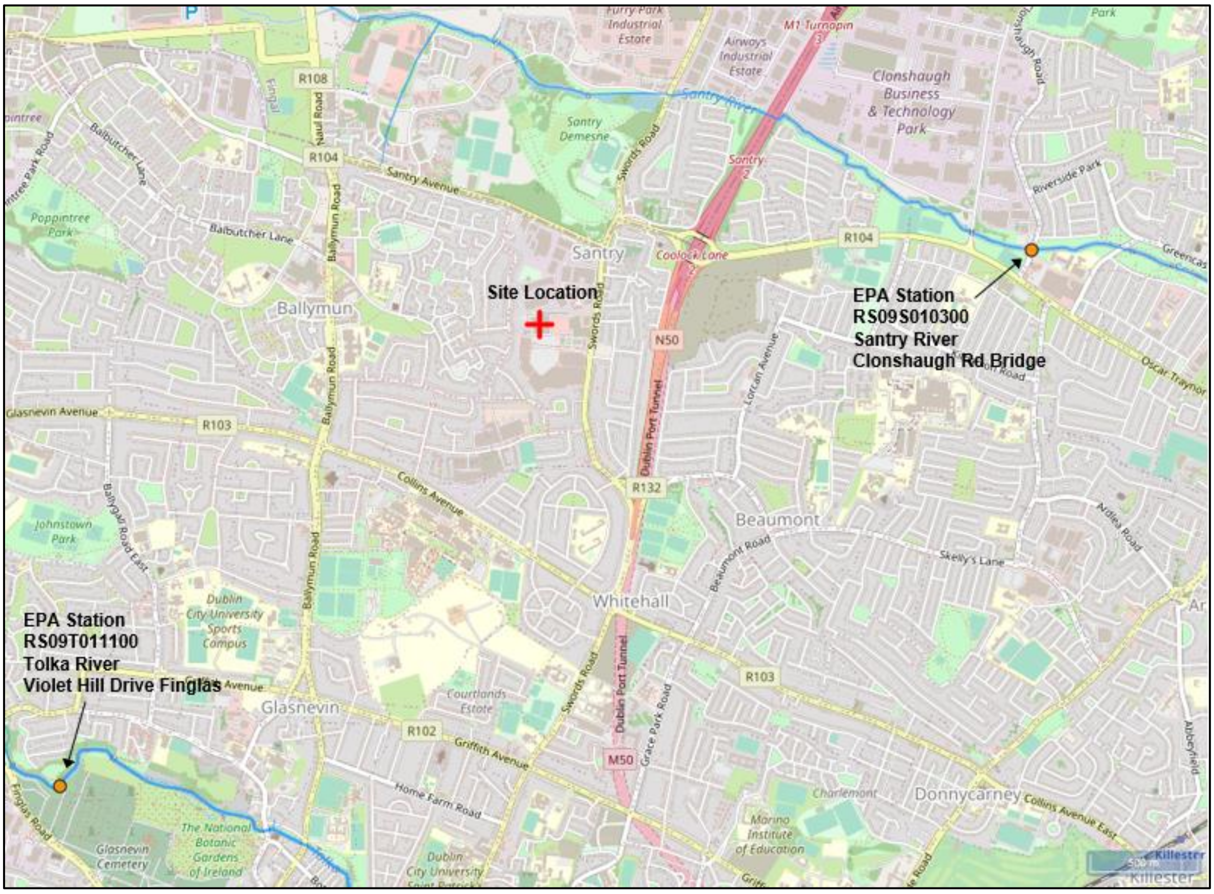

Figure 7.3 *EPA Surface Water Quality Stations (Source: EPA, 2022)*

7.3.3 Flood Risk

7.26 With reference to the Flood Risk Assessment carried out by EirEng (2022), there is no risk of flooding affecting the site from fluvial or coastal sources, since the site lies within Flood Zone C (i.e., where the probability of flooding from rivers is less than 0.1% or 1 in 1000). This Flood Risk Assessment is included as Appendix 7.2.

7.27 However, the site is considered to be a risk of pluvial flooding based on the aforementioned risk assessment. Design measures including localised ramping at ground floor entrance doorways to provide a threshold, overland flow routes directed away from the buildings and a surface water drainage network including attenuation storage designed to best practice guidelines, are considered to be sufficient measures to provide protection to the development from the potential pluvial flooding risk.

7.28 As the site will be positively drained, with the proposed SUDS measures (refer to Section 7.4 below) reducing the outflow from the site a greenfield rate, and as the existing overland flow routes are within the Omni Park Shopping Centre development falling away from the site, the proposed development will have no measurable increase on the flood risk to neighbouring lands.

7.29 As a result of the analysis, the design and mitigation measures for the proposed development is considered to be in line with the core principles of the Planning Guidelines and Objective outlined in the Dublin City Development Plan 2016-2022 and 2022-2028 (Draft) .

7.30 Under the Planning Guidelines the site is therefore considered suitable for development of commercial and residential land uses.

7.3.4 Areas of Conservation

7.31 According to the NPWS (2021) on-line database there are no protected conservation areas on or in the vicinity of the subject site. The closest European listed sites are as follows;

- Santry Demesne (site code 00178) pNHA – circa 350 m to the north of the subject site;
- The Royal Canal (site code 002103) pNHA – circa 3.6 km to the south of the site;
- South Dublin Bay and River Tolka Estuary SPA (site code 004024) and North Dublin Bay pNHA (site code 000206) – circa 3.8 km to the southeast of the site

7.32 The site would have an indirect hydrological connection with the North Dublin Bay SAC/pNHA and North Bull Island SPA through the local drainage network (refer to Section 7.4.2 below).

7.33 Figure 7.4 below presents the location of these protected areas in the context of the subject site.

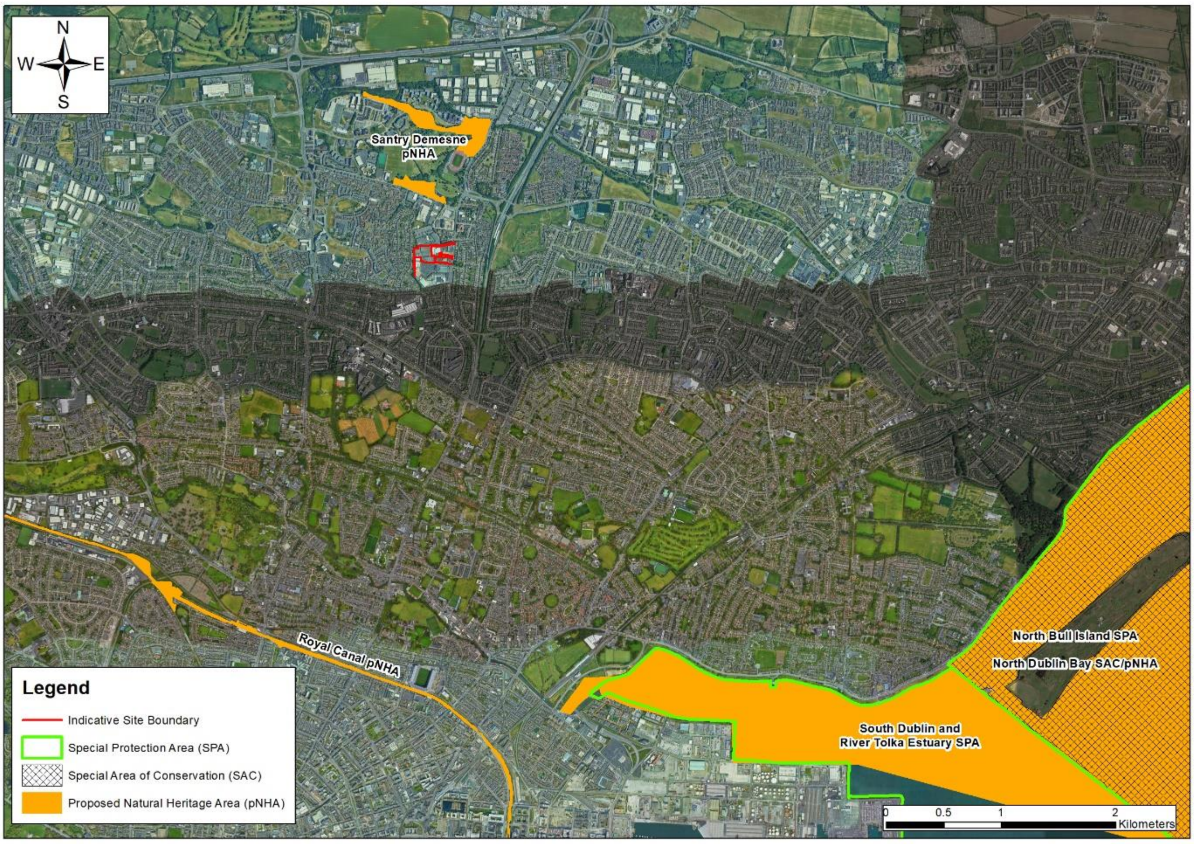

Figure 7.4 *Natura Sites in the Context of the Subject Site (Source: NPWS, 2022)*

7.3.5 Rating of Importance of Hydrological Attributes

7.34 Based on the TII methodology (2009) (See Appendix 7.1) the importance of the hydrological features at this site is rated as '**Low importance**' based on the assessment that the attribute has a low quality significance or value on a local scale.

7.35 Although there would be an indirect hydrological connection between the site and Dublin Bay protected sites (SAC, SPA, NHA), this is considered imperceptible due to the significant distance from the site (South Dublin Bay and River Tolka Estuary SPA and North Dublin Bay pNHA are c.3.8 km).

7.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

7.36 Permission for a 7 year duration is sought by Serendale Limited for a Strategic Housing Development which comprises the demolition of the existing industrial / warehouse buildings northwest of Omni Park Shopping Centre, Santry, Dublin 9 and the construction of 457 no. apartments across 4 no. blocks, ranging in height from 4-12 storeys (over basement). The proposal includes 2 no. retail/café/restaurant units, 1 no. community building, 1 no. childcare facility, 1no. residential amenity space and 5 no. ESB substations.

7.37 The development also provides for a basement carpark of 213 no. spaces and 7 no. motorcycle spaces with 7 no. creche drop-off parking spaces and 6 no. carshare parking spaces located in newly reconfigured surface carpark. The proposal provides for 768 no. bicycle parking spaces.

7.38 The proposal includes the provision of a new public open space plaza, with consequential revisions to existing commercial car parking areas, to integrate the proposals with the wider District Centre.

7.39 The proposal includes the provision of pedestrian and cycle connections and improvements through Omni Park Shopping Centre, including a plaza and cycle/pedestrian link substantially in the form permitted as part of the Omni Living Strategic Housing Development (Ref. ABP-307011-20).

7.40 Access to the proposed 213 no. basement car parking spaces is via the existing Omni Park Shopping Centre. A secondary servicing and emergency access is via the existing service road to the rear of existing retail premises at Omni Park Shopping Centre and accessed from the Swords Road.

7.41 The development provides for all associated and ancillary site development, demolition and clearance works, hoarding during construction, revisions to car parking within the Omni Park Shopping Centre, soft and hard landscaping, public realm works, public lighting and signage, ancillary spaces, plant including photovoltaic panels, water infrastructure, utilities and services.

7.42 The proposed development is described in further detail in Chapter 2 (Description of the Proposed Development). The details of the development in terms of the hydrological environment are presented below.

7.4.1 Construction Phase

7.43 The key civil engineering works which will have a potential impact on the water and hydrological environment during construction of the proposed development are summarised below.

- Excavations are required for foundations, buildings and associated services included within the development.
- Possible discharge of collected rainwater/ dewatering during excavation works and groundworks (the extent of which is dependent on the time of year development works are carried out); and
- Construction activities will necessitate storage of cement and concrete materials, temporary oils, and fuels on site. Small localised accidental releases of contaminating substances including hydrocarbons have the potential to occur from construction traffic and vehicles operating on site.

7.44 For the initial phases of demolition any surface waters arising on site will drain via the existing surface water drainage network until such time as demolition works progress to below ground in which case the existing private surface water networks and their connections to the private surface water network will be decommissioned.

7.45 Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, 20 m buffer zone between machinery and watercourses/ stormwater sewer, refuelling of machinery off site) and hydrocarbon interceptors. These specific measures will provide protection to the receiving soil and water environments during the construction phase.

7.46 Until such time as the new proposed surface water drainage system is installed minor accumulation of surface water will infiltrate to ground within the site. During construction however larger volumes of surface water run-off into excavations/earthworks cannot be prevented entirely and are largely a function of prevailing weather conditions. Any standing surface waters will be treated using a silt-buster or similar to remove suspended solids prior to being piped to foul sewer.

7.47 As construction progresses surface water run-off from the proposed development will be collected in a new slung surface water drainage network which will connect to an existing 750mm public surface water sewer located in the loading area to the west of Omni Shopping Centre. This public water service sewer discharges to the culverted River Wad and ultimately into the Irish Sea at Fairview park.

7.4.2 Operational Phase

7.4.2.1 Surface Water Management:

7.48 Surface water run-off from the proposed development will be collected in a new slung surface water drainage network in the basement which will connect to a new external surface water drainage network within the site and fall by gravity to an underground attenuation system located in the private open space located on the western boundary of the development. The outfall from the attenuation system will be limited to a flow rate of 2 l/s/ha.

7.49 It is proposed to connect the surface water outfall to an existing 750mm public surface water sewer located in the loading area to the west of OMNI Shopping Centre. This 750mm public surface water sewer in turn discharges to a culverted section of the River Wad approximately 550m south of the proposed development. The River Wad eventually discharges into the North Dublin Bay at Clontarf c. 3.8 Km to the southeast of the subject site.

7.50 The proposed surface water drainage network and attenuation system have been designed using WinDes Micro-drainage software in accordance with the "Greater Dublin Strategic Drainage Study (GDSDS)"

7.51 In accordance with best practice and Dublin City Council's requirements for SHDs a two stage SUDS treatment approach has been incorporated on site.

7.52 As part of the first stage of runoff treatment a significant section of the available roof and podium area will be covered with blue/green roofs and podium attenuation systems. All surface water runoff from the roof areas will ultimately be collected by slung drainage pipe runs located underneath each building which will connect into the proposed external surface water drainage network.

7.53 At ground level in areas of podium slab that overlay the basement extents, it is proposed to drain the podium via a Permavoid podium attenuation system. Both the proposed green roof system and the permavoid podium will provide attenuation for the 1 in 100 year event plus 20% climate change.

7.54 In other areas at ground level it is proposed to use permeable reinforced grass and permeable paving where feasible in the landscaping and paving areas located outside the footprint of the basement.

7.55 The existing carpark to the south of the development drainage is not being altered during the works. The trapped gullies in the carpark are regularly maintained by the management company of OMNI Shopping Centre as part of the overall maintenance strategy of the surface water drainage network.

7.56 As part of the second stage of runoff treatment, all surface water runoff collected by the external surface water drainage network will pass through an attenuation tank. The tank will be located under the private open space located along the western boundary of the development and will provide approximately 440m^3 of attenuation storage. Discharge from the tank will be restricted to 2 l/s/ha via a Hydrobrake flow control device, or similar approved, located in the outlet manhole of the attenuation tank.

7.57 The remaining SUDS features such as the permeable paving, permeable reinforced grass and extensive landscaping will also provide further interception storage.

7.58 Refer to the Engineering Planning Report undertaken by EirENg (2022) for further details. This report has been included in the present planning documents.

7.4.2.2 Foul Water

7.59 The existing commercial units are drained via gravity into private foul water drainage networks which connect into a public combined sewer located on Swords Road. The existing private foul water networks and the connection to the public foul sewer on Swords Road will remain as part of the foul design.

7.60 Foul water flows from the development will be collected in a new slung foul drainage network located in the basement which will connect to a new external foul water drainage network within the site. The foul water outfall will connect into a private foul water sewer located within the site and then will discharge to a public foul sewer on Swords Road.

7.61 As mentioned previously the basement car parking surface water drainage network will drain through an oil/petrol interceptor before being pumped to ground level and discharging to a stand-off manhole before connecting into the foul drainage network as the requirements of the GDSDS.

7.62 An Irish Water Pre-Connection Application has been submitted and a Confirmation of Feasibility letter has been received from Irish Water (EirEng, 2022).

7.63 Refer to the Engineering Planning Report undertaken by EirEng (2022) for further details. This report has been included in the present planning documents.

7.4.2.3 Water Supply

7.64 The existing commercial units are served by private watermain branches which connect into a private water main within the site. The existing private watermains will be removed as part of the proposed works and the connection will be made into the existing public watermain on Swords Road.

7.65 It is proposed to connect into the existing cast iron public watermain located in Swords Road. It is proposed to provide a new 225mm MDPE spur off the public watermain to serve the new development. A bulk water meter as per Irish Water requirements will also be installed. A total of 7 new fire hydrants will be located around the development.

7.66 An Irish Water Pre-Connection Application has been submitted and a Confirmation of Feasibility letter has been received from Irish Water.

7.67 Refer to the Engineering Planning Report undertaken by EirENg (2022) for further details. This report has been included in the present planning documents.

7.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

7.68 An analysis of the potential impacts of the proposed development on the hydrological environment during the construction and operation is outlined below. Due to the inter-relationship between soils, geology and hydrogeology and surface water the following impacts discussed will be considered applicable to both Chapter 6 and 7 of the EIAR. Remediation and mitigation measures included in the design of this project to address these potential impacts are presented in Section 7.6 below.

7.69 The site would have indirect hydrological connections with the North Dublin Bay SAC/pNHA and North Bull Island SPA through the local drainage networks (via both the Santry River and the River Wad). Given the potential loading and the distance from source to the Natura sites (over 3.8 Km downstream) and associated dilution factor, this risk would be imperceptible as any accidental discharge of potential contaminant would be attenuated, diluted and dispersed below statutory guidelines (i.e., S.I. European Communities Environmental Objectives Regulations, 2009 [S.I. No. 272 of 2009 as amended by SI No. 77 of 2019]). Even in the absence of best practices measures or mitigation measures outlined in Section 7.6 below, there will be no direct or indirect impacts on the conservation objectives of the North Dublin Bay SAC/pNHA and North Bull Island SPA.

7.5.1 Construction Phase

7.5.1.1 Increased Sediments Loading in Run-off

7.70 Surface water runoff during the construction phase may contain increased silt levels or become polluted from construction activities. Runoff containing large amounts of silt can cause damage to surface water systems and receiving watercourses. Silt water can arise from dewatering excavations, exposed ground, stockpiles and access roads.

7.71 During the construction phase at this site there is potential for an increase in run-off due to the compaction of soils. This will reduce the infiltration capacity and increase the rate and volume of direct surface run-off. The potential impact of this is a possible increase in surface water run-off and sediment loading which could potentially impact local drainage. Site investigations classified the subsoils as mostly 'inert' (Chapter 6).

7.5.1.2 Accidental Spills and Leaks

7.72 As with all construction projects there is potential for water (rainfall and/or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant short-term risk to groundwater quality for the duration of the construction if contaminated water is allowed percolate to the aquifer.

7.73 During construction of the development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

7.74 Machinery activities on site during the construction phase may result in contamination of runoff/surface water. Potential impacts could arise from accidental spillage of fuels, oils, paints etc. which could impact surface water if allowed to infiltrate to runoff to surface water systems and/or receiving watercourses. However, implementation of the mitigation measures detailed below will ensure that this does not occur.

7.75 Concreting operations carried out near surface water drainage points during construction activities could lead to discharges to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora. However, employment of the mitigation measures highlighted below will ensure that any impact will be mitigated.

7.5.2 Operational Phase

7.76 There are no discharges to any open water courses included in the design. The surface water network has been designed to provide sufficient capacity to contain and convey all surface water runoff associated with the 1 in 100 year event to the attenuation basins without any overland flooding including an additional allowance of 20% in rainfall intensities due to climate change. Discharge flow will be restricted to the greenfield equivalent runoff for the catchment area.

7.77 The development will be fully serviced with separate foul and stormwater public sewers which will have adequate capacity for the facility and discharge limits as required by Irish Water licencing requirements. Discharge from the site to the public foul sewer will be sewage and grey water only due to the nature of the proposed development. The foul discharge from the site will join the public sewer and will be treated at the Irish Water Ringsend Wastewater Treatment Plant (WWTP) prior to subsequent discharge to Dublin Bay. This WWTP is required to operate under an EPA licence and meet environmental legislative requirements as set out its licence.

7.78 The proposed development site includes car parking area at the site. Leakage of petrol/ diesel fuel may occur from these areas; run-off may contain a worst-case scenario of 70 litres for example. However, in the event of an accidental leakage of oil from the parking areas, this will be intercepted by the drainage infrastructure proposed and any releases to drainage will be mitigated through hydrocarbon interceptors.

7.79 There will not be any increase in hardstanding as a result of the development of the facilities as the subject site is currently 100% hardstanding. There would in fact be a decrease in hardstanding as a result of the proposed roof areas, plazas and footways.

7.6 REMEDIAL AND MITIGATION MEASURES

7.80 The design has taken account of the potential impacts of the development on the hydrology environment local to the area where construction is taking place and containment of contaminant sources during operation. Measures have been incorporated in the design to mitigate the potential effects on the hydrology. These are described below.

7.81 The site is drained by the public stormwater network. These networks ultimately flow in a easterly direction towards the North Dublin Bay which hosts Natura Sites (SPA/SAC/pNHA) and is located c. 3.8 km to the east of the site. Thus, the site would have an indirect hydrological connection with the Dublin Bay through the local drainage networks.

7.82 As stated above, no impacts are expected on North Dublin Bay SAC/pNHA and North Bull Island SPA, given the potential loading and the distance from source to the Natura sites. The potential risk is considered to be imperceptible as potential contaminant would be attenuated, diluted and dispersed below statutory guidelines (i.e., S.I. European Communities Environmental Objectives Regulations, 2009 [S.I. No. 272 of 2009 as amended by SI No. 77 of 2019]).

7.83 Due to the inter-relationship between soils, geology, hydrogeology and hydrology, the following mitigation measures discussed will be considered applicable. Waste Management is also considered as an interaction in some sections.

7.6.1 Construction Phase

7.84 In order to reduce impacts on the hydrological environment, a number of mitigation measures will be adopted as part of the construction works on site.

7.85 During the construction phase, mitigation measures are incorporated into the project specific Construction Environmental Management Plan (CEMP) and a Resource and Waste Management Plan (RWMP). These specific measures will provide protection to the receiving soil and water environment during the construction phase. The CEMP and RWMP provide for work practices that are industry best practice measures that will be applied during the construction phase, and they are in no way included to avoid or reduce potential harmful effects (if any) to European Sites (if any), which is a matter that is subject to separate assessment.

7.6.1.1 Construction Environment Management Plan and Resource and Waste Management Plan

7.86 An Outline Construction Environmental Management Plan (CEMP) and a Resource and Waste Management Plan (RWMP) have been prepared by AWN and EirEng, respectively for the proposed development and is included with the planning documentation. In advance of work starting on site, the works Contractor will prepare a detailed CEMP. The detailed CEMP will set out the overarching vision of how the construction of the proposed development will be managed in a safe and organised manner by the Contractor. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent planning conditions relevant to the proposed development.

7.87 As a minimum, the CEMP will be formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532) Construction Industry Research and Information Association;
- CIRIA (2002) Control of water pollution from construction sites: guidance for consultants and contractors (SPI56) Construction Industry Research and Information Association
- CIRIA (2005), *Environmental Good Practice on Site* (C650); Construction Industry Research and Information Association
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;

- CIRIA 697, The SUDS Manual, 2007; and
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

7.6.1.2 Surface Water Run-Off

7.88 As there is potential for run-off to enter current stormwater systems and indirectly discharge to a watercourse, mitigations will be put in place to manage run-off during the construction phase.

7.89 Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.

7.90 Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, 20 m buffer zone between machinery and watercourses/ stormwater sewer, refuelling of machinery off site) and hydrocarbon interceptors.

7.91 Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction. It is estimated that the inflow rate of groundwater will be low and limited to localised perched water. It is therefore proposed that the water be discharged via the existing stormwater sewer network. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the sewer. The use of slit traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no silt or contaminated water permitted to discharge to the sewer. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry. Due to the very low permeability of the Dublin Boulder Clay and the relative shallow nature for excavations, infiltration to the underlying aquifer is not anticipated.

7.92 Run-off water containing silt will be contained on site via settlement tanks and treated to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks/ponds).

7.93 The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection. This will prevent any potential negative impact on the stormwater drainage and the material will be stored away from any surface water drains. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust. Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to remove any potential impact.

7.94 Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site and the suitable distance of topsoil piles from surface water drains will be maintained.

7.6.1.3 Fuel and Chemical Handling

7.95 To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

7.96 Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

7.97 Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

7.98 In the case of drummed fuel or other chemical which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

7.99 Emergency response procedures will be outlined in the detailed CEMP. All personnel working on the site will be suitably trained in the implementation of the procedures.

7.6.1.4 Soil Removal and Compaction

7.100 Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment. The material will be stored away from any surface water drains (see Surface Water Run-off section above). Movement of material will be minimised to reduce degradation of soil structure and generation of dust.

7.101 All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

7.102 Site investigations carried out at the site in 2019 (Refer to Chapter 6) found no residual contamination on site (with the exception of some punctual exceedances of the 'inert' WAC for some parameters). Nonetheless, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

7.6.2 Operational Phase

Storm Water & Foul Sewer Drainage

7.103 The proposed development will provide a significant improvement to the local drainage catchment as it is proposed to provide full attenuation in compliance with the requirements of the Greater Dublin Strategic Drainage Study. A number of measures will be put in place to minimise the likelihood of any spills entering the water environment to include the design of the car park with hydrocarbon interceptors. In the event of an accidental leakage of oil from the parking areas, this will be intercepted by the drainage infrastructure proposed.

7.104 It is proposed to ultimately discharge surface water from the proposed development, post attenuation and outflow restrictions into the existing local drainage.

7.7 RESIDUAL IMPACTS OF THE PROPOSED DEVELOPMENT

7.7.1 Construction Phase

7.105 The implementation of mitigation measures outlined above (Section 7.6) will ensure that the predicted impacts on the hydrological environment do not occur during the construction phase and that the residual impact will be ***short-term-imperceptible-neutral****.* Following the TII criteria (refer to Appendix 7.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***. There will be no change in the WFD status of any surface waterbody as a result of the proposed development.

7.7.2 Operational Phase

7.106 The implementation of mitigation measures highlighted above (Section 7.6) will ensure that the predicted impacts on the hydrological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-*****neutral**. Following the TII criteria (refer to Appendix 7.1) for rating the magnitude and significance of impacts on the hydrological related attributes, the magnitude of impact is considered ***negligible***. There will be no change in the WFD status of any surface waterbody as a result of the proposed development.

7.7.3 Cumulative Impact

7.107 Section 2.10 of Chapter 2 provides a description of relevant cumulative developments within the area which have the potential to produce environmental impacts during their operational and/or construction phases which, when combined with the predicted impacts for this proposed development may give rise to overall cumulative impacts.

7.108 As has been identified in the receiving environment section all cumulative developments that are already built and in operation contribute to the characterisation of the baseline environment. As such any further environmental impacts that the proposed development may have in addition to these already constructed and operational cumulative developments has been assessed in the preceding sections of this chapter.

7.109 In considering construction related impacts upon hydrology the following cumulative developments are deemed relevant; Omni Living, Santry Place (Blocks D, E and F), and Santry Avenue.

7.110 With respect to operational impacts the following cumulative developments are deemed relevant; Omni Living, Santry Place (Blocks A, B, C, D, E and F), Santry Avenue and Swiss Cottages.

7.7.3.1 Construction Phase

7.111 Contractors for the Proposed Development will be contractually required to operate in compliance with the CEMP and RWMP which includes the mitigation measures outlined in this EIA report. The other developments abovementioned will also have to incorporate SuDS measures to protect water quality and WFD status in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019). As a result, there will be minimal cumulative potential for change in the natural hydrological regime. The cumulative impact is considered to be neutral and imperceptible.

7.7.3.2 Operational Phase

7.112 All the operational cumulative developments are required to manage discharges in accordance with S.I 272/2009 and 77/2019 amendments. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the WFD Surface Waterbody Status. The operation of the proposed development is concluded to have a long-term, imperceptible significance with a neutral impact on surface water quality.

7.8 MONITORING OR REINSTATEMENT

7.8.1 Construction Phase

7.113 During construction phase the following monitoring measures will be considered:

- Regular inspection of surface water run-off and sediments controls e.g. silt traps will be carried during the construction phase.
- Soil sampling to confirm disposal options for excavated soils in order to avoid contaminated run-off.
- Regular inspection of construction/mitigation measures will be undertaken e.g. concrete pouring, refuelling etc.

7.8.2 Operational Phase

7.114 Maintenance of the surface water drainage system, including hydrocarbon interceptors, and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to surface water.

APPENDIX 7.1

CRITERIA FOR RATING THE MAGNITUDE AND SIGNIFICANCE OF IMPACTS AT EIA STAGE NATIONAL ROADS AUTHORITY (NRA-TII, 2009)

Table 1 Criteria for Rating Site Attributes – Estimation of Importance of Hydrological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale	Salmon fishery. Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes. Quality Class C (Biotic Index Q3, Q2- 3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1). Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

Table 2 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss or extensive change to a waterbody or water dependent habitat. Increase in predicted peak flood level >100mm. Extensive loss of fishery. Calculated risk of serious pollution incident >2% annually. Extensive reduction in amenity value.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm. Partial loss of fishery. Calculated risk of serious pollution incident >1% annually. Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm. Minor loss of fishery. Calculated risk of serious pollution incident >0.5% annually. Slight reduction in amenity value.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Calculated risk of serious pollution incident <0.5% annually.
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm. Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually.
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm. Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually.
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm

Table 3 Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

APPENDIX 7.2

SITE SPECIFIC FLOOD RISK ASSESSMENT (EIRENG, 2021)

201121

Residential Development, Lands Northwest of Omni Park Shopping Centre, Swords Road, Santry, Dublin 9

Site Specific Flood Risk Assessment

2 Rogans Court
Patrick Street, Dun Laoghaire
County Dublin, Ireland
Email: info@eireng.ie
www.eireng.com

Directors: T. Sheehan, J. Lamb
Registered in Ireland
Company Registration No. 501522
Tel: +353 (1) 6638957

Document Control:

Revision	Status	Date	Prepared	Checked	Approved
A	DRAFT	20/08/21	TB	ED	JL

Table of Contents:

1.0 Introduction

This report forms part of a Planning Application for a proposed Strategic Housing Development (SHD) scheme located at Lands Northwest of Omni Park Shopping Centre, Swords Road, Santry, Dublin 9.

This report provides an assessment of the subject site for the fluvial, coastal, pluvial, groundwater and public sewer flood risk for the proposed development.

The layout of the proposed development is detailed in the series of planning drawings by JFA architects submitted with this application.

This report should be read in conjunction with EirEng Consulting Engineers drawings.

2.0 Site Layout and Location

2.1 Site Location

The location of the proposed development is identified in red in Figure 1 below.

Figure 1 - Subject Site Location

The existing site is located in Santry, Dublin. The site is bounded on the north by an existing industrial estate, on the west by residential houses, and on the south and east by the Omni Park Shopping Centre development.

The proposed development will consist of the demolition of all existing buildings on site and the construction of a mixed-use development comprised mainly of residential apartments with commercial and amenity spaces located at ground floor. An underground basement will provide car parking as well as plant rooms and lifts to service the development.

User access to the site will be via a new ramp into the underground car park from the Omni Park Shopping Centre development.

Fire tender access to the site will be via the existing private industrial road located directly east of the site, which connects to the Swords Road.

3.0 Site Geology

Geological Survey Ireland was consulted to determine the geological conditions of the site and the surrounding area.

The sub-soil on the site is identified as "Made Ground" which would be typical for an urban environment. The underlying bedrock on the site is identified as dark limestone and shale and part of the Lucan Formation. The formation comprises of dark-grey to black, fine-grained, micritic limestones with interbedded dark-grey calcar.

The groundwater vulnerability for the site is classified as low and no karst features are identified within the surrounding area.

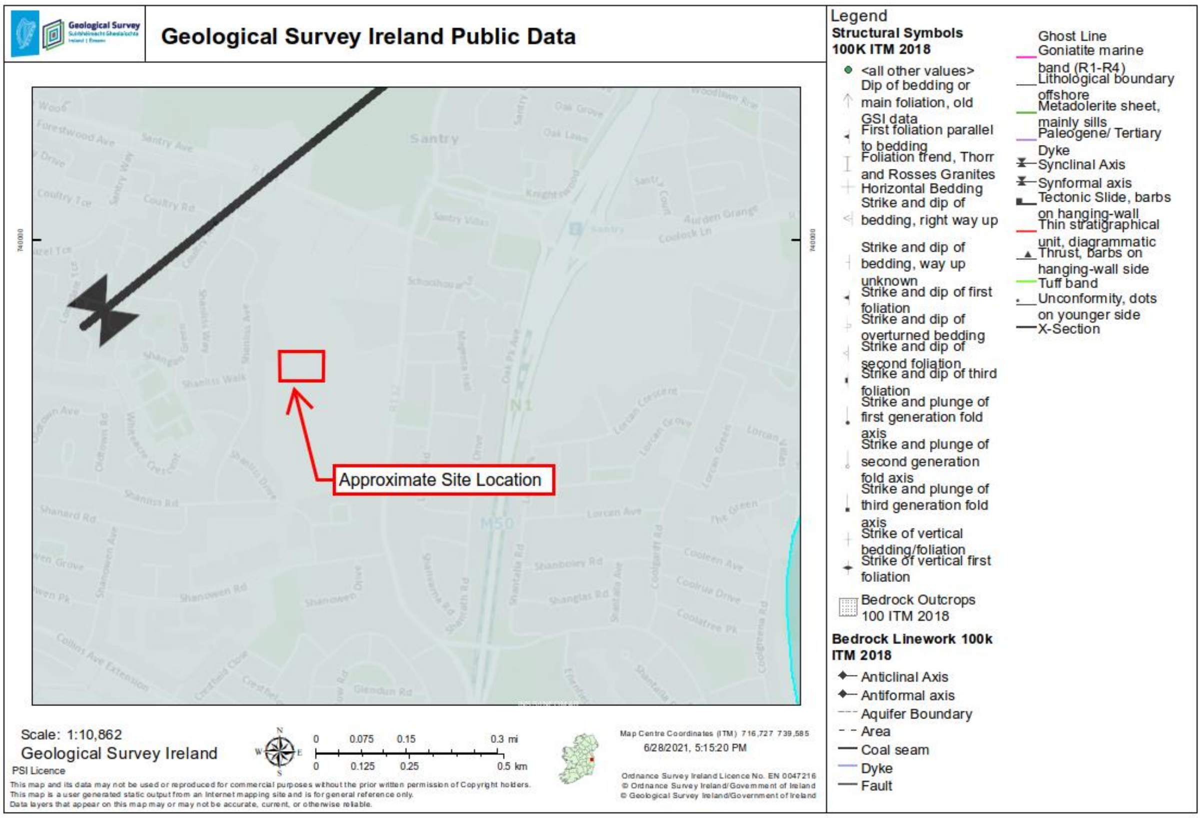

Figure 2 - Local Geological Conditions

4.0 Flood Risk Identification

An assessment of flood risk for the site has been undertaken in accordance with the 2009 DEHLG/OPW Guidelines on Flood Risk Management.

The objectives are to:

- Identify potential sources of flood risk
- Confirm the level of flood risk and identify key hydraulic features
- Assess the impact the proposed development has on flood risk
- Develop appropriate flood risk mitigation and management measures which will allow for the long-term development of the site.

The relevant components to be considered in the identification and assessment of flood risk are as per Table A1 of the 2009 DEHLG/OPW Guidelines:

- Coastal – flooding from high sea levels
- Fluvial – flooding from water courses
- Pluvial – flooding from rainfall / surface water
- Ground Water – flooding from springs / raised ground water
- Public Sewer – flooding from public sewers

Each component will be investigated and an assessment of the likelihood of a flood occurring will be undertaken as well as the possible consequences of a flood event.

4.1 Available Flood Studies and Information

The area surrounding the site has been subject to several indicative flood mapping and modelling studies. The studies examined as part of this flood risk assessment are detailed below:

- Historical Flooding – Floodinfo.ie
- Catchment Flood Risk Assessment and Management Study (CFRAM) (2016)
- Dublin City Development Plan 2016-2022 PFRA (2016)
- FloodResilienCity Project (2012)
- FloodResilienCity Interim Report October 2011 (2012)
- OPW Preliminary Flood Risk Assessment (2011)
- GDSDS Sewer Flood Maps (2005)

4.2 Historical Flooding (floodmaps.ie)

Floodinfo.ie (formerly floodmaps.ie) was consulted to identify historical flooding events within the vicinity of the site. A flood event identification node is located adjacent to the site but relates to a flood event of the River Wad in 1965. This event occurred approximately 550m south of the site at the point where the river is culverted underneath the Swords Road.

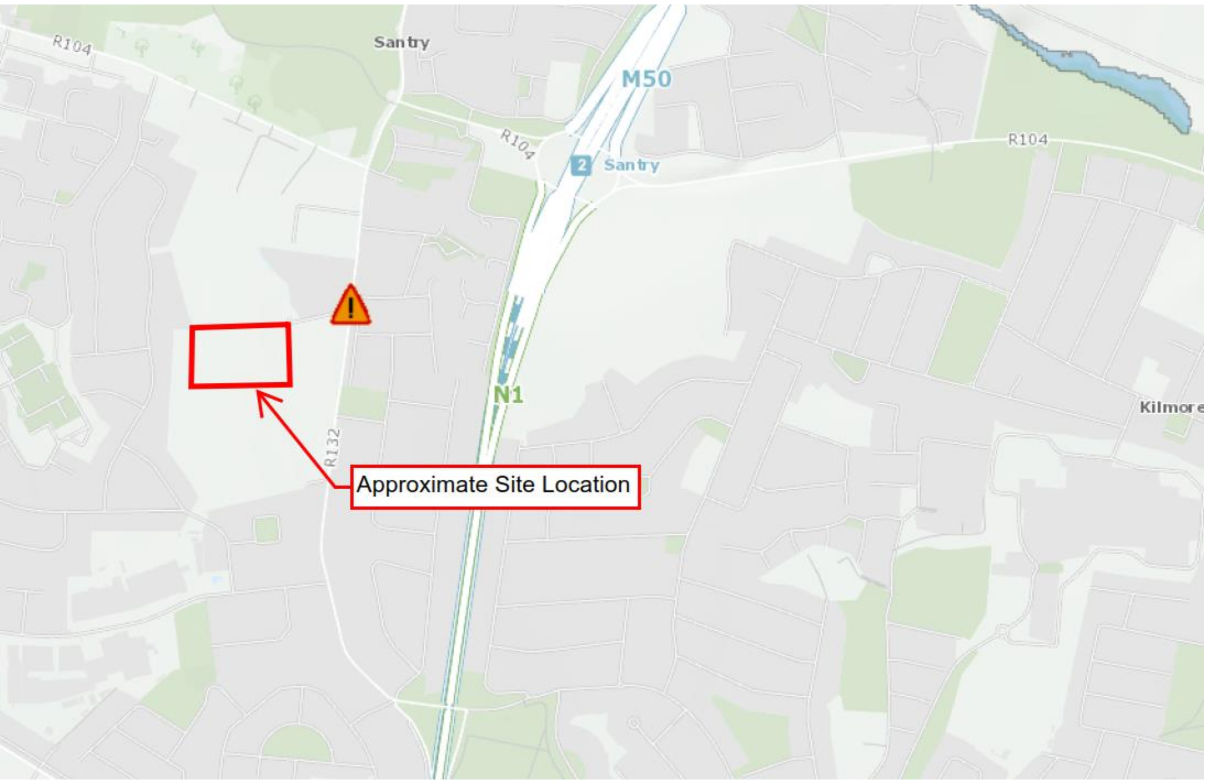

Figure 3 Floodmaps.ie Record Flood Events

The historical flood report is included in Appendix A.

4.3 Catchment Flood Risk Assessment and Management Study (CFRAM) (2016)

The National CFRAM study involved detailed hydraulic modelling of river bodies and coastal areas and is the most detailed flood mapping undertaken in the Dublin region. The project commenced in June 2011 with final flood maps issued during 2016.

The CFRAM flood maps do not cover the area of the site and as such do not identify any flood risk for the site. The nearest available map is located approximately 1km from the site, where limited fluvial and no coastal flooding is indicated.

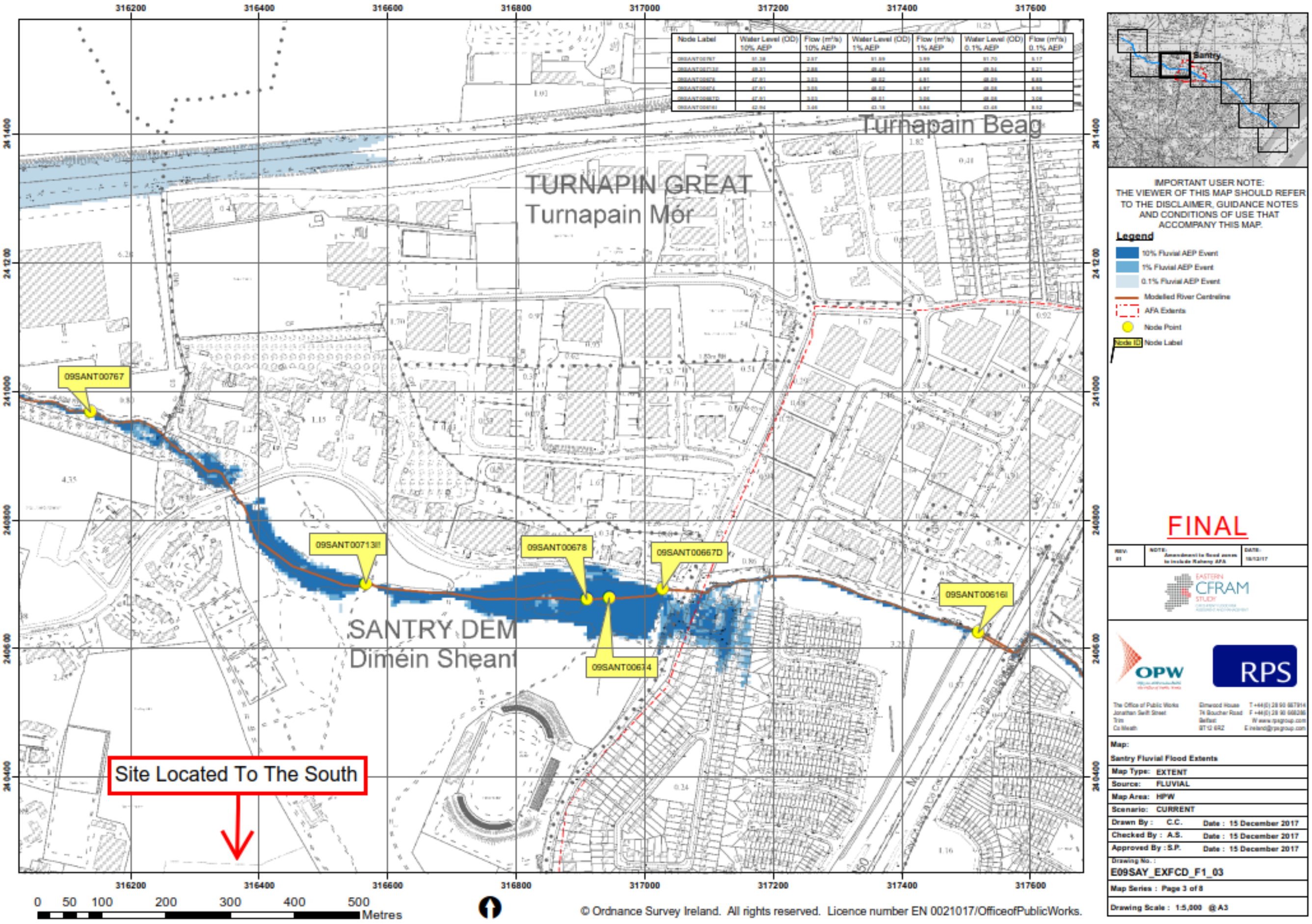

Figure 4 Santry CFRAMS Flood Mapping (2016)

4.4 Dublin City Development Plan 2016-2022 Strategic Flood Risk Assessment (2016)

The Dublin City Development Plan 2016-2022 Strategic Flood Risk Assessment (SFRA) was prepared to provide an area-wide assessment of all types of significant flood risk to inform strategic land use planning decisions. As part of the SFRA a number of predictive flood maps as well as historical flooding information was analysed to create a composite flood map.

The SFRA flood maps do not cover the area of the site and as such do not identify any flood risk for the site. The nearest available map is located approximately 1km from the site where limited fluvial and no coastal flooding, pluvial or groundwater flooding is indicated.

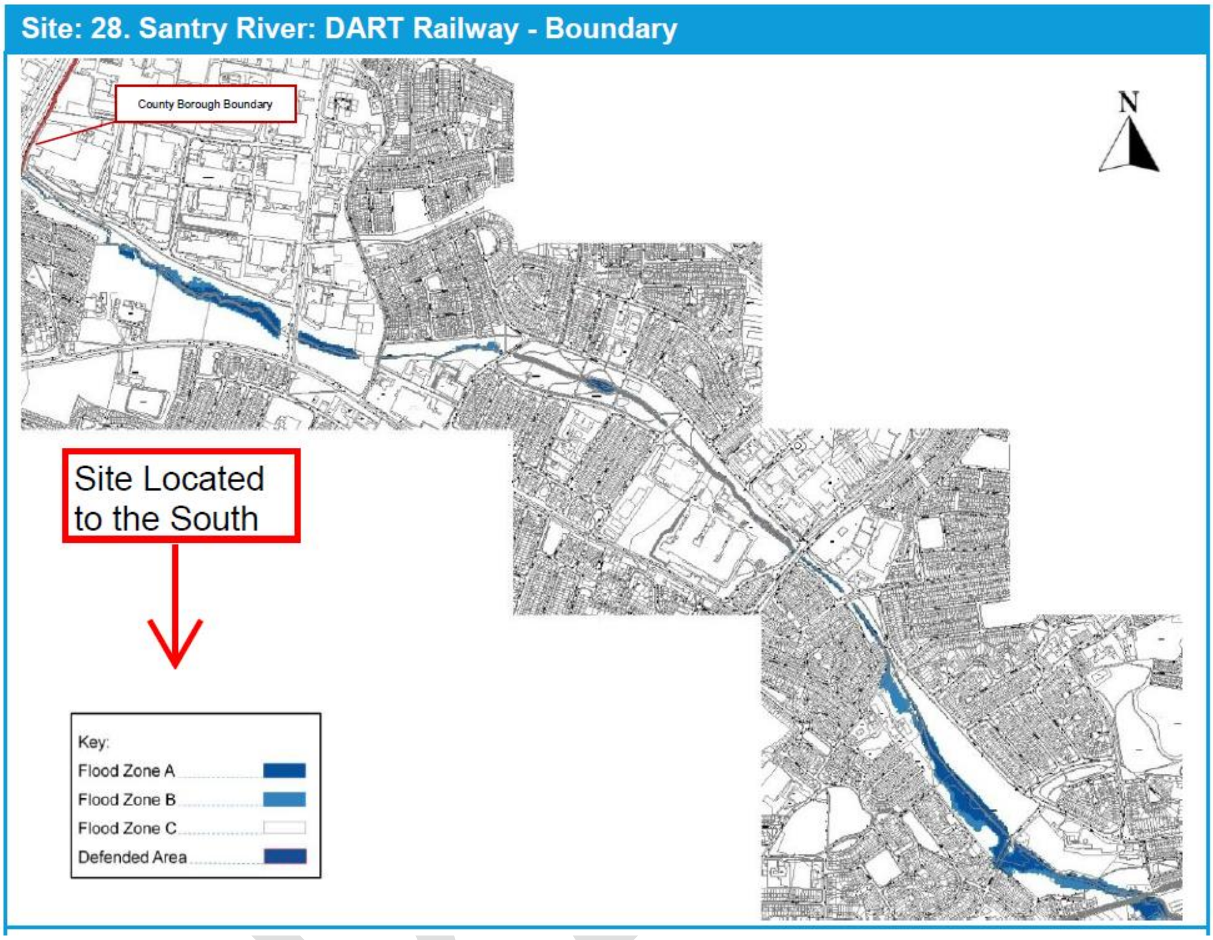

Figure 5 Dublin City Development Plan 2016-2022 PFRA (2016)

4.5 FloodResilienCity Project (2012)

As part of a European wide programme, Dublin city was included in a collaboration with other EU authorities to share knowledge and experience in relation to flood risk.

The main output of the project was a citywide pluvial flood risk map which was developed from a detailed hydraulic model based on the 180mm (1% AEP) event.

As can be seen in Figure 6 below a portion of the site is identified as having a risk of pluvial flooding.

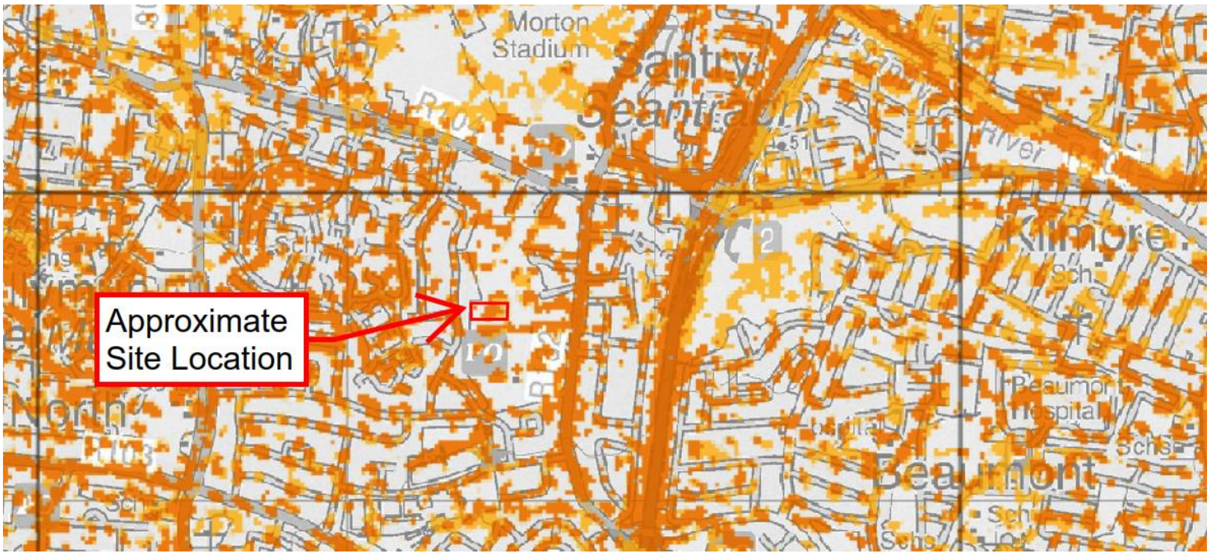

Figure 6 FloodResilienCity Pluvial Flood Maps (2012)

4.6 FloodResilienCity Interim Review October 2011 (2012)

Following on from the FloodResilienCity study a report was commissioned to analyse the fluvial and pluvial flooding events which occurred across Dublin city due to an extreme rainfall event on the 23rd and 24th October 2011. These extreme rainfall events have been estimated to be between a 1 in 50 and 1 in 100 year event across the majority of Dublin.

As part of the report a series of detailed maps identifying areas that flooded and their cause was created. As can be seen in Figure 7 below there was no pluvial or fluvial flooding recorded on or adjacent to the site during the October 2011 event.

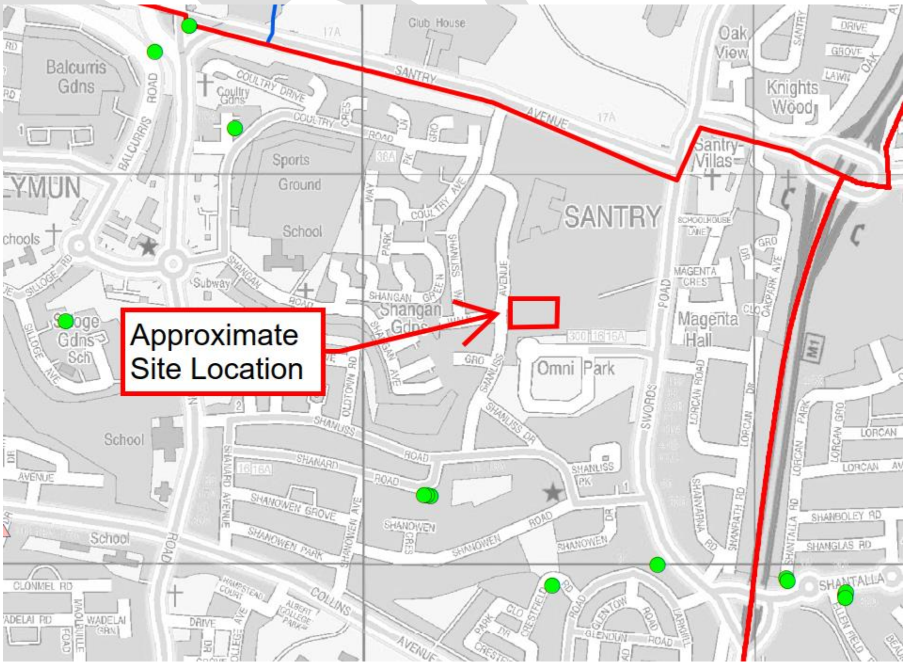

Figure 7 FloodResilientCity Interim Review October 2011 (2012)

4.7 OPW Preliminary Flood Risk Assessment (2011)

The OPW Preliminary Flood Risk Assessment (PRFA) was a national screening study which identified areas that may be at a significant risk associated with flooding. As such it was not a detailed assessment of flood risk but rather an indicative study with the majority of the fluvial and coastal information contained within the report since being superseded by the national CFRAM study.

However, the PFRA also contains useful pluvial and groundwater flooding information which was reviewed as part of this FRA. As can be seen in Figure 8 below there is no pluvial or groundwater flooding identified on or adjacent to the proposed site.

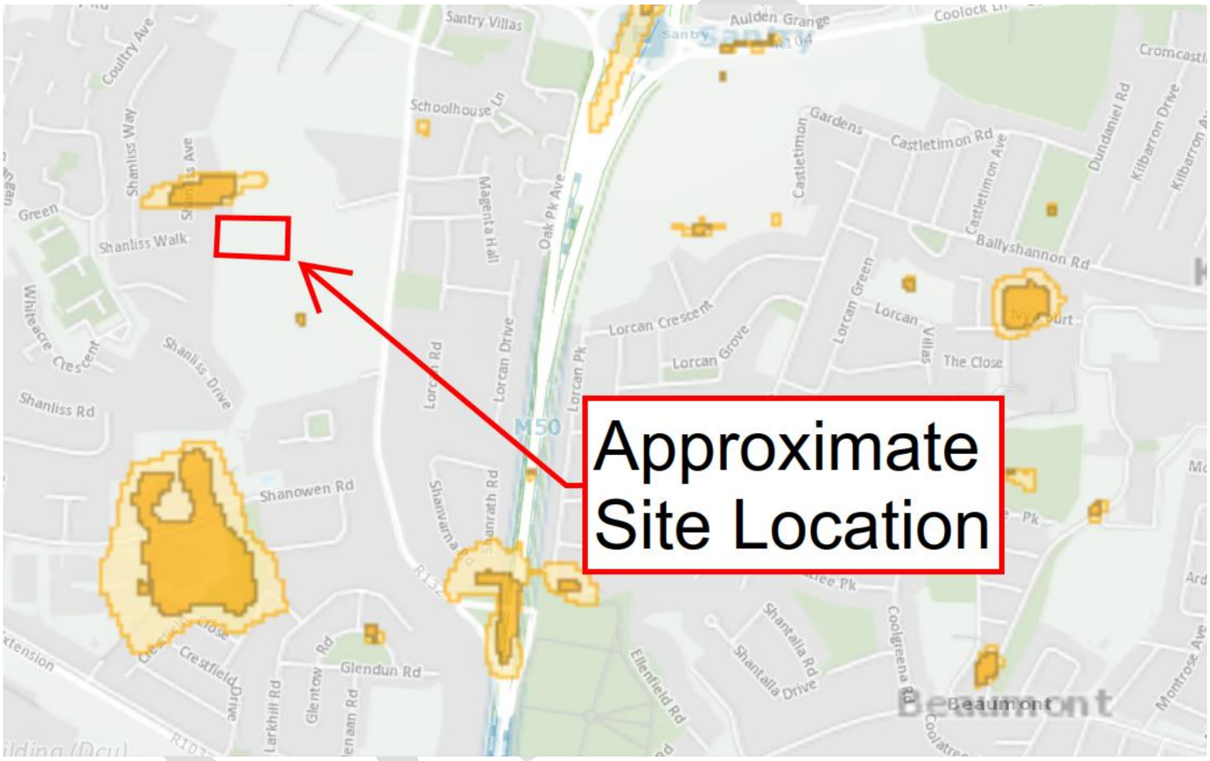

Figure 8 OPW PFRA (2011)

4.8 GDSDS Mapping (2005)

The Greater Dublin Strategic Drainage Strategy (GDSDS) was completed in 2005 and involved the mapping and modelling of major sewer lines in the greater Dublin area. From the recommendations of the report policies were implemented to ensure a consistent approach to drainage infrastructure, planning, design, construction and operation. As part of the study maps were produced for the future 2031 scenario showing sewer lines at risk of surcharging and flooding.

As can be seen in Figure 9 below the public surface water sewers located in the Swords Road adjacent to the site were not modelled as part of the study. The nearest public surface water sewers identified on the GDSDS flood maps are located in the adjacent Magenta Hall housing estate and approximately 200m south of the site in the Swords Road. Both public surface water sewers are identified as flooding less than $5m^3$ volume for the 5 year return period event, while the downstream 225mm sewer is identified as flooding for a 30 year return period or less.

Record drainage mapping information is included in Appendix B.

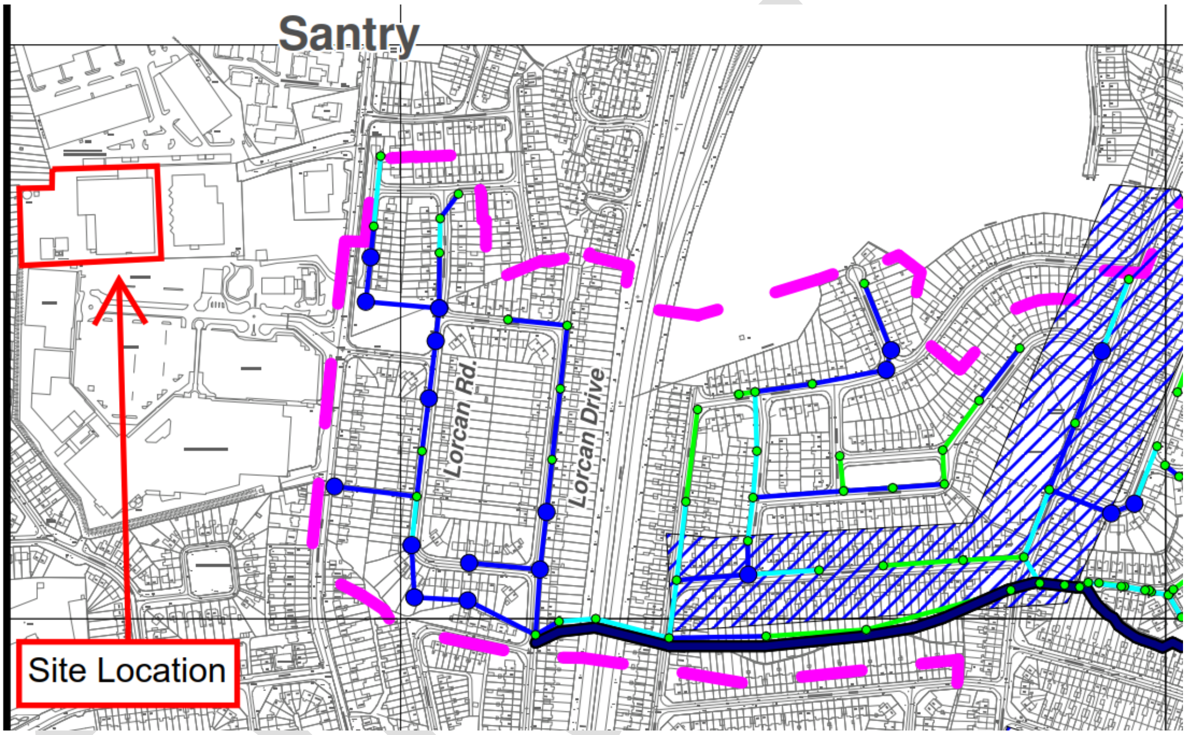

Figure 9 GDSDS Sewer Flooding Maps (2005)

5.0 Flood Risk Assessment and Mitigation Measures

5.1 Coastal

As detailed previously the national CFRAM study did not identify any coastal flood risk for the site. The nearest available map is approximately 1km from the site and identifies no coastal flooding.

Floodinfo.ie was also checked to identify any past coastal flooding events within the vicinity of the site and none were found.

Based on the above information and given that the Irish Sea lies approximately 6km from the subject site, and the site level is 56m above sea level the site is considered to be at low risk of coastal flooding.

5.2 Fluvial

The Santry River lies approximately 1km north of the site and the River Wad lies approximately 550m south of the site.

As detailed previously the national CFRAM study did not identify any fluvial flood risk for the site. The nearest available map is approximately 1km from the site and identifies limited fluvial flooding from the Santry River.

As the Santry River is a significant distance from the site and as the site is approximately 10m higher than the Santry River, it is not considered to pose a flood risk to the site.

Floodinfo.ie was also checked to identify any past fluvial flooding events within the vicinity of the site. A flood event identification node was found to be located adjacent to the site which related to an event that occurred in 1965 from the River Wad.

The event occurred approximately 550m south of the site at the point where the river is culverted underneath the Swords Road. As the event occurred a significant distance from the site and as the site is approximately 10m higher than the River Wad, it is not considered to pose a flood risk to the site.

As detailed previously the Dublin City Development Plan SFRA flood maps did not identify any flood risk for the site. The nearest available map is approximately 1km from the site and identifies limited fluvial flooding.

The FloodResilienCity Interim Review October 2011 mapping did not identify any fluvial flooding on the site.

Based on the above information the site is considered to be at low risk of fluvial flooding.

5.3 Pluvial

Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter a watercourse or sewer. It is usually associated with high intensity rainfall and typically occurs in the summer months.

As detailed previously the FloodResilienCity pluvial flood maps have identified a portion of the site at risk of pluvial flooding.

It is worth noting that the modelling for the pluvial flood map was based on a relatively broadscale digital terrain model which did not include small scale (less than $2m^2$) features, walls or other barriers to flow and is intended to indicate the potential for pluvial risk.

The FloodResilienCity Interim Review October 2011 mapping did not identify any pluvial flooding on the site.

Floodinfo.ie was also checked to identify any past coastal flooding events within the vicinity of the site and none were found. There is also no anecdotal evidence of any historic pluvial flooding within the site.

Based on the above information, and primarily on the FloodResilienCity flood maps, the site is considered to be at risk of pluvial flooding.

5.4 Groundwater

As detailed previously the OPW PRFA flood maps do not identify any groundwater flood risk for the site.

The GSI groundwater vulnerability classification for the site is low and there are no karst features located in the area surrounding the site.

Floodinfo.ie was also checked to identify any past coastal flooding events within the vicinity of the site and none were found.

Based on the above information the site is considered to be at low risk of groundwater flooding.

5.5 Public Sewer

As detailed previously GDSDS sewer flood mapping for the area does not cover the public surface water sewer located in the Swords Road adjacent to the site.

The nearest public surface water sewers identified on the GDSDS flood maps are located in the adjacent Magenta Hall housing estate and approximately 200m south of the site in the Swords Road. Both public surface water sewers are identified as flooding less than 5m^3 volume for the 5 year return period event, while the downstream 225mm sewer is identified as flooding for a 30 year return period or less.

The public surface water sewer in the Swords Road mapped as part of the GDSDS is located approximately 200m south of the site and at a ground level approximately 4m lower than the subject site.

Given the height difference between the existing public surface water sewers and the proposed development, and the overland flow paths leading away from the site, the site is considered to be at low risk of public sewer flooding.

5.6 Flood Risk Summary

Based on the information detailed above the site is considered to be at low risk of flooding from coastal, fluvial, groundwater and public sewer sources.

The site is considered to be at risk of flooding from pluvial sources.

In accordance with the Department of Environment, Heritage and Local Government and the Office of Public Work's jointly published Guidance Document for Planning Authorities - The Planning System and Flood Risk Management – the site is located within Flood Zone C and no justification test is required.

As such the proposed development for the site is appropriate for the level of flood risk subject to mitigation measures being implemented to account for the pluvial flooding risk. The proposed mitigations measures are detailed in the following section.

5.7 Proposed Flood Mitigations Measures

As detailed previously the site is considered to be at risk of pluvial flooding based on the FloodResilienCity pluvial flooding maps. The following section details flood risk management strategies which will be implemented to mitigate the risk of pluvial flooding for the proposed development.

Localised ramping (in accordance with Building Regulations Part M) will provide a threshold of at least 50mm at the entrance to all ground floor doorways to provide passive protection during extreme rainfall events.

Overland flow routes will also be incorporated into the development with any overland flows directed towards the central landscaping areas located between each apartment block and with a flow pathway provided through the external hardstanding areas of the site. A sketch detailing the overland flow routes, including existing overland flow routes, is included in Appendix C.

A surface water drainage system with SUDS features will be incorporated into the development to positively drain the entire site and to manage surface water run-off from the site. Significant blue and green sedum roof extents as well as podium attenuation, planting and landscaping at surface level will capture the first flush of intense rainfall events. All surface water flows will be conveyed to a storm water attenuation tank. The attenuation tank is designed to accommodate the 1 in 100 year flood event plus an additional 20% for climate change. The outflow from the attenuation tank will be limited to 2 l/s/ha. A maintenance schedule will be established by the management company for the development to ensure the surface water drainage network undergoes regular maintenance. The surface water drainage network will also be inspected after extreme weather events to check for damage and blockages. The proposed surface water drainage network and SUDS features are detailed on EirEng drawing 201121-Cxxx included in Appendix D.

Access to the development is to be provided from a new basement ramp located on the southern boundary on the site connecting into the existing Omni Park Shopping Centre development. A localised shallow ramp at the connection point into the existing Omni Centre development will provide a passive threshold of 100mm to protect the basement from potential overland flow routes in the vicinity.

The combination of localised ramping at ground floor entrance doorways to provide a threshold, overland flow routes directed away from the buildings and a surface water drainage network including attenuation storage designed to best practice guidelines is considered to be sufficient mitigation measures to provide protection to the development from the potential pluvial flooding risk.

6.0 Conclusion

Having reviewed the available information the site is considered to be at low risk of coastal and fluvial flooding and therefore in accordance with the Department of Environment, Heritage and Local Government and the Office of Public Work's jointly published Guidance Document for Planning Authorities - The Planning System and Flood Risk Management – is located within Flood Zone C.

The site is also considered to be at low risk of ground water and public sewer flooding.

The site is considered to be a risk of pluvial flooding based on the FloodResilienCity mapping. Several mitigation measures including localised ramping at ground floor entrance doorways to provide a threshold, overland flow routes directed away from the buildings and a surface water drainage network including attenuation storage designed to best practice guidelines is considered to be sufficient mitigation measures to provide protection to the development from the potential pluvial flooding risk.

As the site will be positively drained, with the proposed SUDS measures reducing the outflow from the site to 2 l/s/ha, and as the existing overland flow routes are within the Omni Park Shopping Centre development falling away from the site, the proposed development will have no measurable increase on the flood risk to neighbouring lands.

As a result of the analysis, design and mitigation measures the proposed development is considered to be in line with the core principles of the Planning Guidelines and Objective outlined in the Dublin City Development Plan 2016-2022.

Under the Planning Guidelines the site is therefore considered suitable for development of commercial and residential land uses.

Appendix A – Floodinfo.ie Historical Flooding Report

CITY ENGINEER'S DEPARTMENT.

24th April, 1958.

Report to: City Engineer.

Re: Wad River.

Enclosures: Design Criteria, Design Sheets, Drainage Areas
6" Plan S.M.D. 638. 12" Plan S.M.D. 639.
Longitudinal Section S.M.D. 640.

The attached 6" Plan S.M.D. 638 shows the catchment of the Wad River which has an approximate area of 1824 acres. The catchment is bounded on the North by the Santry and Nanniken catchments, on the West by the Finglas and in the South by the Claremont and Tolka River catchments.

The peak run-offs shown on the design sheets have been calculated by the Lloyd-Davies method. The catchment area of approximately 3 sq. miles comes within the limiting 5 sq. miles size recommended by Rouse for treatment by the Lloyd-Davies method (see Design Criteria). Furthermore the usual objection to this method on account of the retardations due to storage in the watercourse do not have any serious effect on the accuracy of the calculations as the catchment is highly developed. The major portion of the catchment within the City boundary is zoned for housing and the agricultural land in the upper reaches, outside the City, could possibly be developed in the future.

The time of concentration for various points in the river have been calculated on the assumption that the entire river upstream has been culverted. An impervious factor of 30% (fully developed area, on the partially separate system) has been used throughout to determine the peak run offs. This factor is considered safe both for present and future conditions of development in the catchment area. The attached report recommends that a 40% factor should be adopted when calculating peak run off from open agricultural land. The run off produced however, by this factor is accommodated in part by the considerable flood storage usually available in open ditches and streams and the velocity of flow in the main watercourse is lower than that which results from proper culverting.

Since 584 acres of the catchment upstream of the Wad Bridge on Ballymun Road is at present mainly composed of farmland a check was made on the peak run-off by using the open stream Kirpich formula with an impervious factor of 40%. The calculated peak run off amounts to 12 cumins per acre. This rate agrees with the result got from the Lloyd-Davies calculation for culverting, using a 30% factor. Hence the effect of building up an area and culverting the stream reduces the time of peak but this is compensated for by a reduction in the impervious factor from 40% to 30%.

Rainfall intensities have been derived from Ministry of Health curves. Pipe culvert sizes have been calculated from the Crimp & Bruges formula and box culverts using the Chezy formula with a constant C = 100 and considering invert, sides and roof as wetted perimeter.

The available gradients shown on the longitudinal section S.M.D. 640 have been taken along the course of the existing river except between points E and F where the proposed culvert is shown crossing Ballymun Road and following the line of the proposed Collins Avenue Extension.

The river is culverted at the following points:

(i) Alongside Ballymun Road - short length of 36" dia. concrete pipes.

(ii) Wad Bridge, Ballymun Road - 3'9" x 4'6" high stone arch.

(iii) Albert Agricultural College to Swords Road 4'0" x 3'6" concrete box culvert.

(iv) Swords Road to Beaumont Road 4'0" x 4'0" concrete box culvert.

(v) Under Beaumont Road 6'5" x 4'2" stone arch.

(vi) Malahide Road to Clontarf Golf Club. 4'0" x 4'0" concrete box culvert and 48" dia.concrete pipes.

(vii) Under G.N.R. 5' x 2'6" stone arch.

(viii) Under Howth Road twin 36"diam.concrete pipes, 4'6" x 6'0" and 5' x 12' high stone arches.

(ix) Under Clontarf Road twin 4' x 3'6" high box culvert.

Provision has been made in the North Dublin Drainage Scheme for culverting this river from the storm water overflow in the Clontarf Golf Club to Clontarf Road.

The culvert sizes and gradients indicated for various sections of the river should not be finally fixed until such time as a detail survey of the road, house and drain levels in the surrounding area is carefully made. This survey is of particular importance between Doyle's Bridge on Beaumont Road and Malahide Road. The River between these points provides considerable flood storage during storms and the adjacent low lying Celtic Park area suffers from occasional flooding.

Any culverting proposal for the river should make provision for the construction of suitable wing walls and a properly designed grid at the inlet. Serious blockages have taken place at River grids in the past. Finally, measures should be adopted to connect up all surface water drains and ground water which flows to the existing river and as constructed details of these connections should be recorded and produced on a large scale drawing.

SEN.ENGINEER I/C SEWERS AND MAIN DRAINAGE DEPARTMENT

Encls.
AS/MD

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Ext

SEWERS AND MAIN DRAINAGE DEPARTMENT

22nd November, 1955.

REPORT TO/
CITY ENGINEER

re: Drainage of Ballymun Road

Arising out of flooding of Ballymun Road on the 8/12/1954 and, to a minor extent, on subsequent occasions, a surface water drainage examination of the area has been carried out. The original flooding of 1954 was due to (1) chokage of the Wad bridge at point B, which caused the Wad River to flow down Ballymun Road with subsequent flooding at C on the Claremont Stream, and (2) insufficient capacity of the surface water drainage system of Ballymun Road itself. Remedial proposals in respect of these items are set out below. The attached plan, to scale 12" = 1 mile, elaborates the points made.

(1) Wad Bridge

The catchment area draining to Wad Bridge at B is 626 acres, mainly composed of grasslands, for which a capacity of 6,260 cumins being 10 cumins per acre should be provided. This would keep it generally uniform with the downstream culvert capacities which are known to behave adequately. At present the Wad is piped from A to B in a 36-in. pipe of capacity 2,500 cumins. This pipe was choked but has now been cleaned and a grid placed at A. Wad Bridge itself (B) is a large culvert 3'9" wide by 4'8" high (arched) but is obstructed by a gas main and E.S.B. cables. The watermain in this road was carried under the culvert. The obstruction by the gas main is only minor, but the E.S.B. cables diminish the area of flow to 3'9" wide by 1'10" high. It has been found possible to deepen the culvert so as to give an area of flow of 3'9" by 2'8" high under the cables; this gives a capacity approximating to 6,000 cumins. As a temporary expedient this is adequate but due to the probability of silting-up would not be satisfactory as a permanent arrangement. It is proposed therefore that when plans are made in respect of the Collins Avenue Extension, in which I understand Messrs. Wates are interested, the Wad should be culverted along the line AD, thus by-passing the tortuous course ABCD. The section BCD would require to be piped in a small size. The proposed realignment would be obstructed by a watermain, a gas main and two lines of E.S.B. oil filled cables at A; these will require alteration, and it will be noted from the attached letter of the 24/9/1955 from the E.S.B. that the latter are prepared to undertake the cable alterations free of cost to the Corporation. They also offer a contribution of £20 towards cleaning of the culvert which is reasonable, having regard to the fact that the cables were carried through the culvert, to the best of my knowledge, with the approval of Dublin County Council, the responsible local authority previous to 1953. It is recommended that the E.S.B. proposals as set out in theirs of the 24/9/1955 be accepted and that they be informed to that effect.

The Gas Company, by letter of the 3/10/1955, have indicated their willingness to alter their main in the culvert when required; they should be requested to transfer this offer to cover alterations at A when the Collins Avenue Extension becomes more real.

In addition to the above, at the lowest road point between A and B, three 9-inch outlets have been made from the road channel through the east bank of Ballymun Road to permit copious road drainage to the Wad River downstream of the culvert at B.

over/ ....

To/ (2) 22.11.1955
City Engineer

(2) Ballymun Road

The surface water drainage of Ballymun Road is non-uniform, consisting, in part, of a stone built drain equal in capacity to a 12-inch pipe, and for the remainder of a 9-inch pipe. There are insufficient manholes and gullies, the drainage of the east channel between B and F consists only of gripes cut into the roadside ditch. The drainage area involved is estimated at 59 acres to the point G and pipe sizes of 15" - 18" would be required to deal with this as the present system is inadequate. Due to the fall southwards to the Claremont at G, surplus drainage accumulates at G with resultant flooding; temporary provision for this will be made by installing a number of arterial gullies.

The Special Works Department have at present road improvement proposals in respect of Ballymun Road before them. Provision for adequate drainage of the road should be included in the scheme prepared; this has been indicated verbally to who appears in agreement. The area of 59 acres to be provided for is shown coloured "orange" on attached plan.

At the point G, the road valley at the Claremont Stream, there are seven gullies which are readily choked with leaves. It is proposed therefore as a safeguard to lift four of these gullies and replace them with arterial gullies, three of which can be sited to give direct access to the Claremont Stream. This will give vastly improved outlet capacity and provide drainage less liable to chokage. This work can be carried out by this department to the Paving Department's order, who have verbally agreed with the proposal.

To summarise the points made above:-

(a) The E.S.B. and Gas Company proposals should be agreed to as set out above;

(b) Provision in the Collins Avenue Extension should be made for straightening the Wad River;

(c) The Ballymun Road improvement scheme being prepared by Special Works Department should provide an adequate road drainage system;

(d) The Paving Department should be instructed to issue an order to this department to install four arterial gullies at the Claremont Stream at Ballymun Road.

JHC/CG ....

Encl: A/SENIOR ENGINEER I/C SEWERS
AND MAIN DRAINAGE DEPARTMENT

NB: It will be necessary to provide in the S.W. drainage of Ballymun Rd sufficient capacity to take overflow from the "feeder" Sewer to NDDS. at ~~Claremont~~ Griffith Ave

9/3/60

CITY ENGINEER'S DEPARTMENT

JHR/MJ

29th January, 1965.

Report to City Engineer.

Re: Council Question No.29.

wishes "to ask the City Manager to state the cause of the recent flooding at Santry, and if he could indicate what remedial measures he proposes to prevent flooding recurring at this point. Further to state if the gullies were in working order in the neighbourhood, and if there is any provision to compensate persons who have suffered losses by flooding."

The cause of the flooding was due to the partial chokage of the protecting grids at the south east corner of Buckley's Sports Field in the Albert College Grounds. Upstream of these grids, the Wad River is in open cut and runs along adjacent to the rear of a number of industrial sites. Hedges cut at the rear of these industrial sites, together with factory refuse, large tins, plastic bags, etc. were embedded in the grid, and caused the chokage. While it is probable that the grids were clear prior to the flood, as they are cleared by our routemen at least once a fortnight, and more frequently in inclement weather, the flood water would carry debris from the open banks of the river down to the grids in a very short time. As this river is in private lands, the Corporation have not control of the catchment.

The cause of the flooding on the roadway at Santry arose because the water, being unable to enter the culvert, re-routed itself overground and flowed to the lowest part on the roadway and was impounded there. The gullies on the roadway could be expected to deal with road drainage, and were overpowered by this excess flow. There are seven gullies in the vicinity of the hollow, and it is probable that some of these choked during the flood as considerable silt and papers would be carried to them.

These gullies were cleaned on the following dates, the 7th, 8th, 14th, 17th, 18th and 20th December, 1964.

Following this flooding, it is proposed to alter the layout of the gullies in the roadway so that similar type of flooding would be carried by the gullies more swiftly. In view of the development at Ballymun Housing Project, and the consequent increase in run-off from the upper catchment, it will be necessary to carry out major improvements to the culverting of the Wad River by diversion of the upper reaches to either the Tolka River or to the Claremont Stream. This investigation will be put in hands within the next six months, and should be completed within two years.

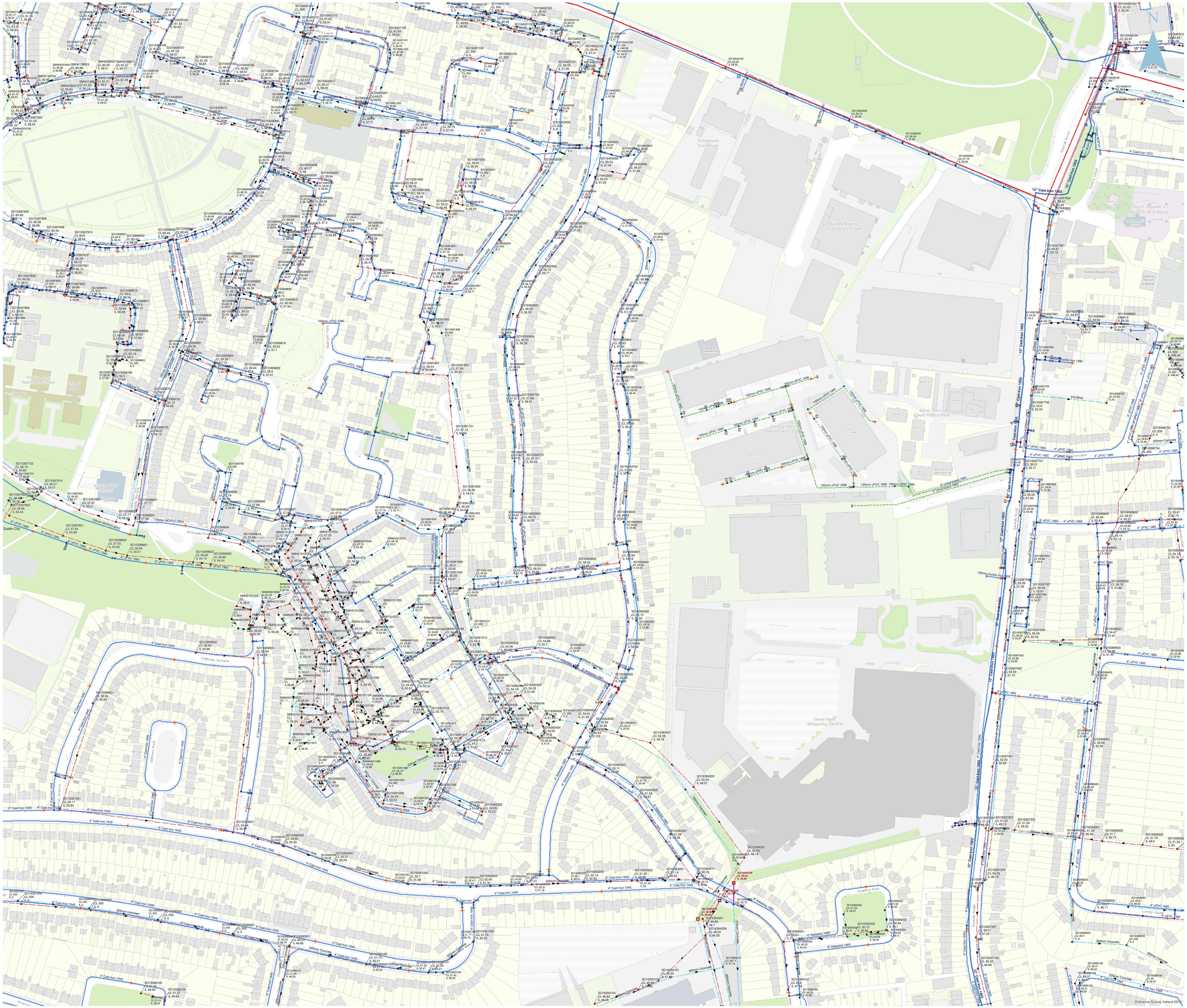
There is no provision for compensation for those who suffered losses by flooding.

Flooding on 20th Jan. '65.

Vico Lounge – Swords Rd. ÷ Carpet damaged. (243 Swords Rd. Santry)
{Lowet Bar} 20 Houses in neighbourhood, ÷ gardens + ground floor flooded. (18" water)
÷ ground floor flooded.
Collins Av. Ext. ÷ 10 garden flooded.
Cloghran 200 yds Belfast Rd., flooded by 2' water. (Santry River)
Merrion Gates ÷ Tide caused road flooding
Churchtown
Milltown
Dundrum
Ballybrack
} flooding caused traffic diversions.
~~[illegible]~~
Naas Rd. at Messrs. Volkswagen. floods made road impassable to light traffic for several hrs. (Camac River).
Whitechurch – Rathfarnham ÷ road flooding caused by overflowing of Dodder tributary.
Blackhall St., one house flooded.

Above summary taken from "Irish Independent" 21st Jan. '65.

Appendix B – Record Drainage Mapping



UISCE ÉIREANN : IRISH WATER

Legend

- Boundary Meter
- Bulk Meter
- Unknown Meter ; Other Meter
- Non-Return
- Sluice Valve Open
- Sluice Valve Closed
- Sluice Valve Open
- Sluice Valve Closed
- Double Air Control Valve

Water Hydrants

Hydrant Function

- Fire Hydrant
- Water Pump Stations
- Water Kiosk
- Cap
- Other Fittings
- Tap

Water Distribution Mains

Owned By

- Irish Water
- Private
- Irish Water
- Irish Water

Sewer Manholes

Manhole Type

- Standard
- Other; Unknown
- Waste Water Pump station

Sewer Inlets

Inlet Type

- Catchpit
- Sewer Chambers
- Gravity - Foul
- Gravity - Overflow
- Pumping - Foul
- Surface Gravity Mains

Storm Manholes

Manhole Type

- Standard
- Catchpit
- Other; Unknown

Storm Discharge Points

Discharge Type

- Overflow

Storm Inlets

Inlet Type

- Gully

1:1,250 at A0

Last edited: 07/05/2021

Metres

0 12.5 25 50

2. Whilst every care has been taken in its compilation, Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water.
Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions.This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out.
Service connection pipes are not generally shown but their presence should be anticipated.

Appendix C – Overland Flow Routes

Appendix D – Proposed Surface Water Drainage Network