BARRETT MAHONY
CIVIL & STRUCTURAL
CONSULTING ENGINEERS

Site Specific Flood Risk Assessment

Project: 20.170

Dundrum Central Development

DOCUMENT CONTROL

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1. INTRODUCTION

1.1 PROJECT DESCRIPTION

A Part 10 Planning Application to An Bord Pleanála is to be made for a development on lands at the former Central Mental Hospital, Dundrum Road, Dundrum, Dublin 14, a site of circa.9.7 ha. Tom Phillips + Associates, Town Planning Consultants, is instructed by Dún Laoghaire Rathdown County Council (referred to from hereon as the 'Applicant'), in partnership with The Land Development Agency (LDA), to submit this Part 10 Application to An Bord Pleanála. This application, taken on jointly by the LDA & DLRCC, forms part of DLRCC's goals under their 2022-2028 Development Plan.

Barrett Mahony Consulting Engineers (BMCE) are the civil and structural design engineers for the project and have been commissioned to prepare a Site Specific Flood Risk Assessment as part of planning application package.

Figure 1.1 – Site Location (note: the red line boundary shown here is approximate only)

Project Description:

The development will consist of the construction of a residential scheme of 934 no. dwellings on an overall site of c. 9.7 ha.

The development will consist of the demolition of existing structures associated with the existing use (3,677 sq m), including:

- Single storey former swimming pool / sports hall and admissions unit (2,750 sq m);
- Two storey redbrick building (305 sq m);
- Single storey ancillary and temporary structures including portacabins (618sq m);

- Removal of existing internal sub-divisions/ fencing, including removal of security fence at Dundrum Road entrance;
- Demolition of section of porch and glazed screens at Gate Lodge building (4 sq m);
- Removal of walls adjacent to Main Hospital Building;
- Alterations and removal of section of wall to Walled Garden.

The development will also consist of alterations and partial demolition of the perimeter wall, including:

- Alterations and removal of section of perimeter wall adjacent to Rosemount Green (south);
- Formation of a new opening in perimeter wall at Annaville Grove to provide a pedestrian and cyclist access;
- Alterations and removal of sections of wall adjacent to Dundrum Road (including removal of existing gates and entrance canopy), including reduction in height of section, widening of existing vehicular access, and provision of a new vehicle, cyclist and pedestrian access;
- Alterations and removal of section of perimeter wall adjacent to Mulvey Park to provide a pedestrian and cyclist access.

The development with a total gross floor area of c. 94,058 sq m (c. 93,980 sq m excluding retained existing buildings), will consist of 934 no. residential units comprising:

- 926 no. apartments (consisting of 342 no. one bedroom units; 98 no. two bedroom (3 person) units; 352 no. two bedroom (4 person) units; and 134 no. three bedroom units) arranged in 9 blocks (Blocks 02-10) ranging between 2 and 8 storeys in height (with a lower ground floor to Blocks 02 and Block 10 and Basements in Blocks 03 and 04), together with private balconies and private terraces and communal amenity open space provision (including courtyards) and ancillary residential facilities, including an 130 sq m internal residential amenity area at the Ground Floor Level of Block 3;
- 6 no. three bedroom duplex apartments located at Block 02, together with private balconies and terraces.
- 2 no. 5 bedroom assisted living units and private rear gardens located at Block 02.

The development will also consist of 4,380 sq m of non-residential uses, comprising:

- Change of use and renovation of existing single storey Gate Lodge building (former reception/staff area) to provide a café unit (78 sq m);
- 1 no. restaurant unit (266 sq m) located at ground floor level at Block 03;
- 3 no. retail units (1,160 sq m) located at ground floor level at Blocks 03 and 07;
- 1 no. medical unit (288 sq m) located at ground floor level at Block 02;
- A new childcare facility (716 sq m) and associated outdoor play area located at lower ground and ground floor level at Block 10;
- A management suite (123 sq m) located at ground floor level at Block 10; and
- A new community centre facility, including a multi-purpose hall, changing rooms, meeting rooms, storage and associated facilities (1,749 sq m) located at ground and first floor level at Block 06.

Vehicular access to the site will be from a new signalised access off Dundrum Road to the south of the existing access and the existing access of Dundrum Road will be retained for emergency vehicle, pedestrian and cyclist access only. The development will also consist of the provision of public open space and related play areas; hard and soft landscaping including internal roads, cycle and pedestrian routes, active travel routes for cyclists and pedestrians, pathways and boundary treatments, street furniture, wetland features, part-basement, car parking (524 no. spaces in total, including car sharing and accessible spaces); motorcycle parking; electric vehicle charging points; bicycle parking (long and short stay spaces including stands); ESB substations, piped infrastructural services and connections (including connection into existing surface water sewer in St. Columbanus Road); ducting; plant (including external plant for Air Source Heat Pumps and associated internal heating plantrooms); waste management provision; SuDS measures (including green roofs, blue

roofs, bio-retention areas); attenuation tanks; sustainability measures (including solar panels); signage; public lighting; any making good works to perimeter wall and all site development and excavation works above and below ground.

Please note that the subject site is in the immediate setting and curtilage of a number of protected structures, namely the 'Asylum' (RPS No. 2072), the 'Catholic Chapel' (RPS No. 2071) and the 'Hospital Building' (RPS No. 2073).

Construction of the development involves the following principal elements:

- Demolition of the existing buildings, excluding structures to be retained.
- Removal of sections of the perimeter wall.
- Site strip. Earthworks associated with the construction of the buildings and roads in the development.
- Construction of new buildings – apartments, the community facility & ancillary buildings.
- Construction of roads, footpaths & hard/soft landscaping.
- Buried site services installation. New foul pumping stations. Connection to public services.
- Works to the Dundrum Road along the site boundary, including modifying the existing site entrance and construction a new road entrance.

1.2 Purpose of the Report

This report has been prepared as part of the Part 10 Planning Application for the Dundrum Central development. The purpose of this report is to identify and analyse the flood risk on the subject site and surrounding areas due to the proposed development.

There is also an Infrastructure Report and civil engineering drawings accompanying this planning application, which should be read in conjunction with this report.

1.3 Previously Granted SHD

An SHD Planning Application was lodged with An Bord Pleanála in 2022. This application was for 977 no. units and ancillary facilities. Planning was granted by the Bord, ABP reference ABP-313176-22, subject to a number of conditions.

The overall site layout and layout of the residential blocks for the new Part 10 application is very similar to the layout submitted as part of the SHD. Ground floor levels are generally unchanged.

The buried foul drainage, surface water drainage and watermain layout are similar to those proposed for the SHD scheme. The SuDS layout is also very similar to that prepared for the SHD application.

Fig 1.2 Site layout plan

1.4 DLRCC Drainage Report to the Bord on the Previous SHD Planning Application

Extract below in italics from the DLR Drainage Planning Report submitted to the Bord on the 25.04.22.

Site Specific Flood Risk Assessment

Based on the information contained in the Site Specific Flood Risk Assessment (SSFRA) submitted by the applicant, the conclusions contained therein are accepted and thus the proposed development is considered to be in accordance with Appendix 16 (Strategic Flood Risk Assessment) of the Dun Laoghaire-Rathdown County Development Plan 2022-2028 subject to the following proposed conditions:

11. Prior to the commencement of development, the applicant shall submit to the Planning Authority for its written agreement proposals for landscaped bunding, or similar agreed measure, around the wastewater pumping station to prevent ingress of excessive overland flows into the tank and to contain any overflow from the tank in emergencies. The applicant shall also confirm who will be responsible for the maintenance and emergency response for the wastewater pumping station.

NOTE: Details of the wastewater pumping station are contained in the following BM drawings included in the Part 10 planning package:

- DCD-BMD-00-00-DR-C-11220 Foul Water Lifting Station Details Sheet 1 of 2

- DCD-BMD-00-00-DR-C-11221 Foul Water Lifting Station Details Sheet 2 of 2

The ground level of the station compound is raised 150mm above the surrounding site area to protect against the risk of flooding due to overland flows into it. The pumping station will be taken-in-charge by Uisce Éireann. Maintenance & any emergency response will be by UE.

1.5 Flood Risk Management Policy & Guidelines

1.5.1 EU Floods Directive

The European Directive 2007/60/EC on the assessment and management of flood risk aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU.

1.5.2 National Flood Policy

Recent policy is based on the Report of the Flood Policy Review Group, OPW, 2004. The adopted policy was accompanied by recommendations, including the following:

- Focus on managing flood risk, rather than relying only on flood protection measures aimed at reducing flooding;
- Take a catchment-based approach to assess and manage risks within the whole-catchment context; and
- Be proactive in assessing and managing flood risks, including the preparation of flood maps and flood risk management plans.

1.5.3 National CFRAM Programme

The national Catchment Flood Risk Assessment and Management (CFRAM) programme commenced in Ireland in 2011. The CFRAM Programme is intended to deliver on core components of the National Flood Policy, adopted in 2004, and on the requirements of the EU Floods Directive. The Programme is being implemented through CFRAM studies that have been undertaken for each of the river basin districts in Ireland.

The OPW is the lead agency for flood risk management in Ireland and is the principal agency involved in the preparation of CFRAM Studies.

1.5.4 Flood Risk Management Guidelines

1.5.4.1 The OPW Guidelines

In 2009, the OPW and the then Department of the Environment and Local Government (DEHLG) published Guidelines on flood risk management for planning authorities entitled 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities'.

1.5.4.2 Principles of Flood Risk Management

Development in areas that have the highest flood risk should be avoided and/or only considered in exceptional circumstances (through a prescribed Justification Test) if adequate land or sites are not available in areas that have lower flood risk. Only water-compatible development would typically be considered appropriate in these areas.

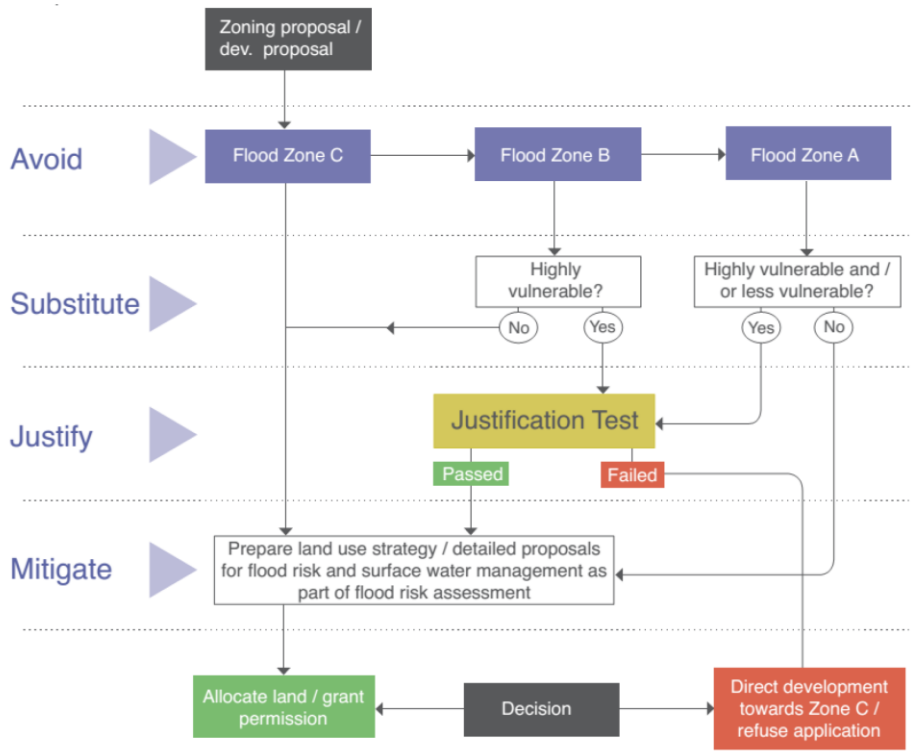


Figure 1.3 Sequential Approach from The Planning System and Flood Risk Management Guidelines for Planning Authorities, 2009

1.5.4.3 Stages of a Flood Risk Assessment

The Flood Risk Management Guidelines recommend a staged approach to flood risk assessment that covers both the likelihood of flooding and the potential consequences. The stages of appraisal and assessment are as follows:

- Stage 1 Flood risk identification – to identify whether there may be any flooding or surface water management issues related to the site.
- Stage 2 Initial flood risk assessment – to confirm sources of flooding that may affect the site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing flood zone maps.
- Stage 3 Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to the proposed development on the site, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

1.5.4.4 Flood Zones

Flood risk = Likelihood of flooding x Consequences of flooding.

Likelihood of flooding is normally defined as the percentage probability of a flood of a given magnitude or severity occurring or being exceeded in any given year. For example, a 1% Annual Exceedance Probability (AEP) indicates the severity of a flood that is expected to be exceeded on average once in 100 years, i.e. it has a 1 in 100 (1%) chance of occurring in any one year.

Consequences of flooding depend on the hazards associated with the flooding (e.g., depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of people, property and the environment potentially affected by a flood (e.g. the age profile of the

population, the type of development and the presence and reliability of mitigation measures).

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three types of flood zones defined for the purposes of the Flood Guidelines:

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest - greater than 1% Annual Exceedance Probability AEP (=1 in 100 probability in a given year) for river flooding or 0.5% AEP (1 in 200) for coastal flooding
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate - between 0.1% AEP (=1 in 1000 probability in given year) and 1% AEP (1 in 100) for river flooding and between 0.1% AEP (1 in 1000) year and 0.5% AEP (1 in 200) for coastal flooding); and
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low - less than 0.1% AEP (1 in 1000 probability in a given year).

1.5.4.5 Flood Risk Vulnerability

Details given in the tables below are abstracted from the OPW Guidelines.

Table 1-1: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test (abstracted from the OPW Guidelines).

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 1-2: Classification of Vulnerability of different types of development abstracted from the OPW Guidelines

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

1.5.4.6 Climate Change

The OPW guidance recommended two climate change scenarios are considered - the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). The allowances are applied to the 1% AEP fluvial or 0.5% AEP tidal levels. Refer to Table 1.3 below.

Table 1-3 Climate Change Allowances by Vulnerability and Flood Source

Development vulnerability	Fluvial climate change allowance (increase in flows)	Tidal climate change allowance (increase in sea level)	Storm water / surface water
Less vulnerable	20%	0.5m (MRFS)	20% increase in rainfall
Highly vulnerable	20%	0.5m (MRFS)	
Critical or extremely vulnerable (e.g. hospitals, major sub-stations, blue light services)	30%	1.0m (HEFS)	30% increase in rainfall

2. SITE TOPOGRAPHY

A detailed topographical survey of the existing site has been prepared. There is considerable variation in ground levels across the site. In broad terms the main part of the site slopes down gradually from the southwest corner towards the northeast corner, from +45.21m OD down to +38.76m OD. The western portion of the site slopes down towards the Dundrum Road entrance at +38.44m OD. These low points are the furthest locations from the high topography in the south corner at a distance of 410m and 430m away respectively. Figure 1 shows typical spot levels across the site.

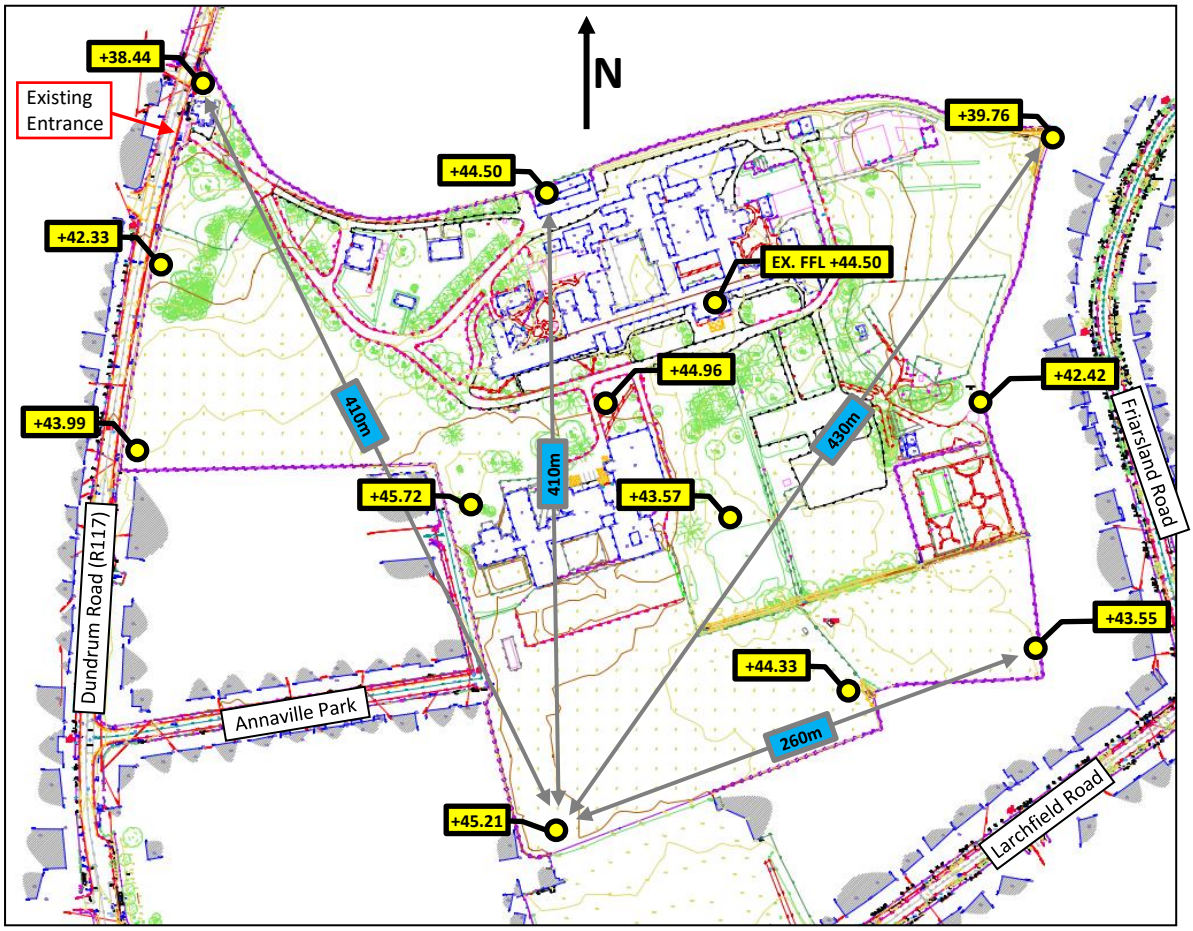


Fig 2.1 Summary of the Existing Site Topography Superimposed on the Topographical Survey Drawing. (Ordnance Datum Levels).

The proposed site levels typically follow the existing site topography. The building levels will typically be set 150mm above ground level around the building.

3. SITE SPECIFIC FLOOD RISK ASSESSMENT

3.1 INTRODUCTION

The flood risk assessment outlined below is carried out in accordance with the OPW publication "The Planning System and Flood Risk Assessment Guidelines for Planning Authorities". Refer to Section 1.5.4.2 of this report for details of the sequential approach used to determine whether or not a particular development is appropriate for a specified location in terms of flood risk.

3.2 STAGE 1: FLOOD RISK IDENTIFICATION

Stage 1 identifies whether there are any flooding or surface water management issues related to the site, i.e. it identifies whether a flood risk assessment is required.

3.2.1 Flood Maps

Flood prediction drawings prepared by RPS Consulting for the OPW are contained in Appendix 2. These were prepared as part of the Dodder Catchment Flood Risk Assessment and Management Study. The drawings in Appendix 2 are for the River Slang, which runs south to north towards the River Dodder near the east of the site, below the level of the site. These do not show flooding on the site for various return periods.

An extract from the Dún Laoghaire-Rathdown County Council (DLRCC) Flood Hazard Maps, Map 1 is shown in Figure 3.1 below. This shows the flood zone along the River Slang, outside of the site.

Pluvial and coastal flood maps are not available for the subject site. Good map information is available on fluvial flooding. These maps indicate that there is no flood risk on the subject site.

There is also further information contained in Appendix 13 of the DLRCC County Development Plan 2022-2028 which has been allowed for in this report.

3.2.2 Fluvial Flooding

The site divides into two natural catchments based on the site topograpghy and direction of falls as shown in Figure 3.2.

Natural Catchment 1 – River Slang catchment:
The western site boundary is 50m approx. from the River Slang, which runs towards the River Dodder 1km away. The fluvial flood depth of the river in a 0.1% AEP event adjacent to the site, shown in Figure 3.3, is below the level of the subject site and, therefore, the site is not considered to be at risk from River Slang flooding. The green field surface water runoff from the western portion of the site drains into the River Slang (see Natural Catchment Area 1 in Figure 3.2).

Natural Catchment 2 – Open channel drainage ditch:
A drainage ditch flows through the site towards the eastern boundary where it exits through a grated opening in the wall at location 'B1' in Figure 3.2. The ditch is typically 600mm wide at the base with steeply sloping sides. It is between 600mm & 1000mm deep along it's length. It originates in the centre of the site at a discharge point from site land drainage. A buried surface water sewer enters the site from Rosemount Green and also connects to the channel. The drainage ditch then runs northwards along the outside of the boundary wall and connects to a surface water sewer near the northeast corner of the site. There is also an opening at location 'B2' close to this sewer connection, which is the low point of this eastern catchment and takes local land drainage from the

adjacent fields through another grated opening in the wall. The bulk of the site as shown in Figure 3.2 drains naturally towards this ditch and there is no evidence of flooding associated with this drainage ditch or further downstream. The new surface water drainage system has been designed to control the site run-off, see section 3.2.3 for more information.

There are no reports of flooding in this ditch in the past. A flow measurement survey was carried out on the drainage ditch flow at location 'B1' between the 25th Feb & the 13th May 2021. The max depth recorded in the ditch was 140mm.

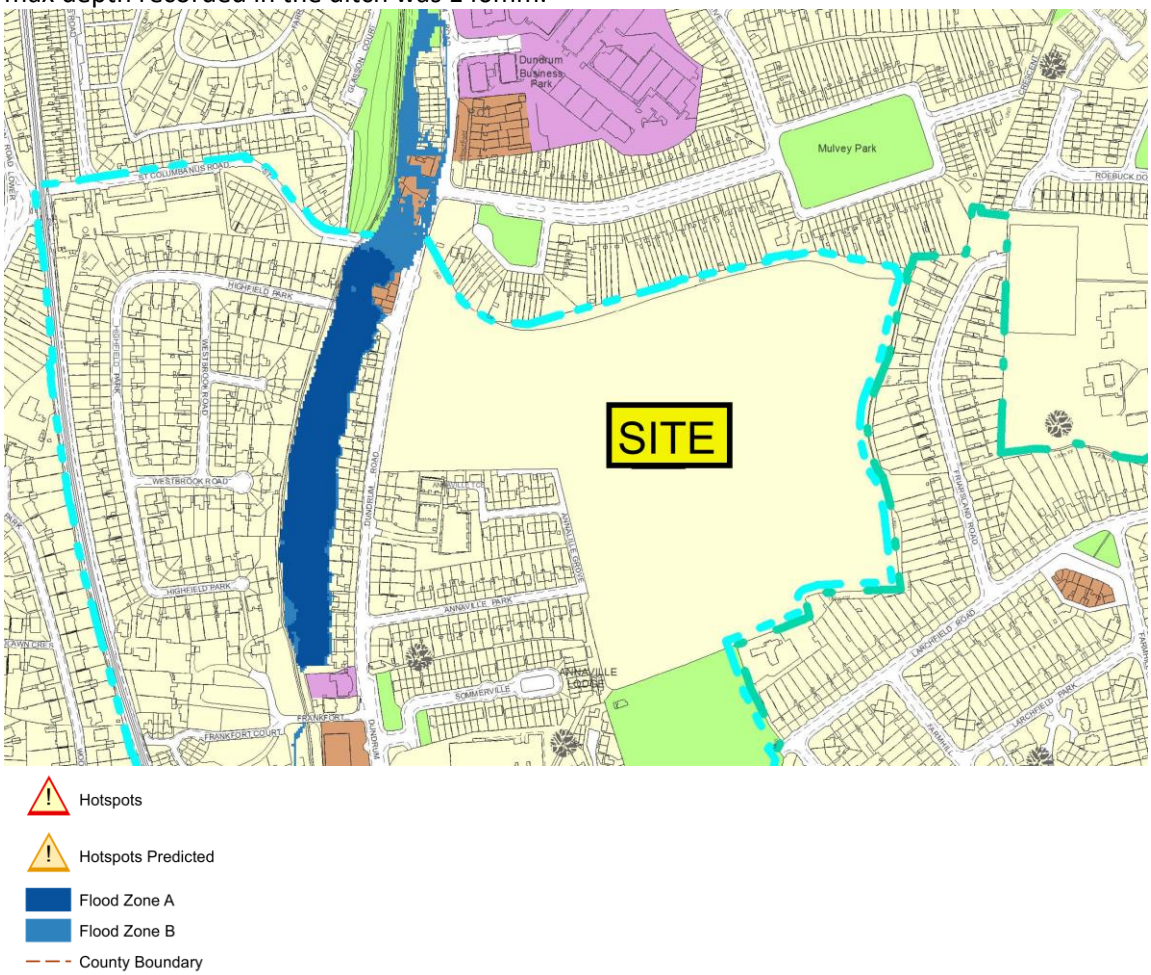


Fig 3.1 Extract from DLRCC Flood Zone Map 1. The site lies outside of the River Slang flood zones which are west of the Dundrum Road.

Fig 3.2. Aerial View of the Approximate Natural Catchment Areas of the Existing Site. Catchment 2 is in the unshaded area.

Photos of the grated wall opening for drainage at Locations B2 (left) and B1 (right)

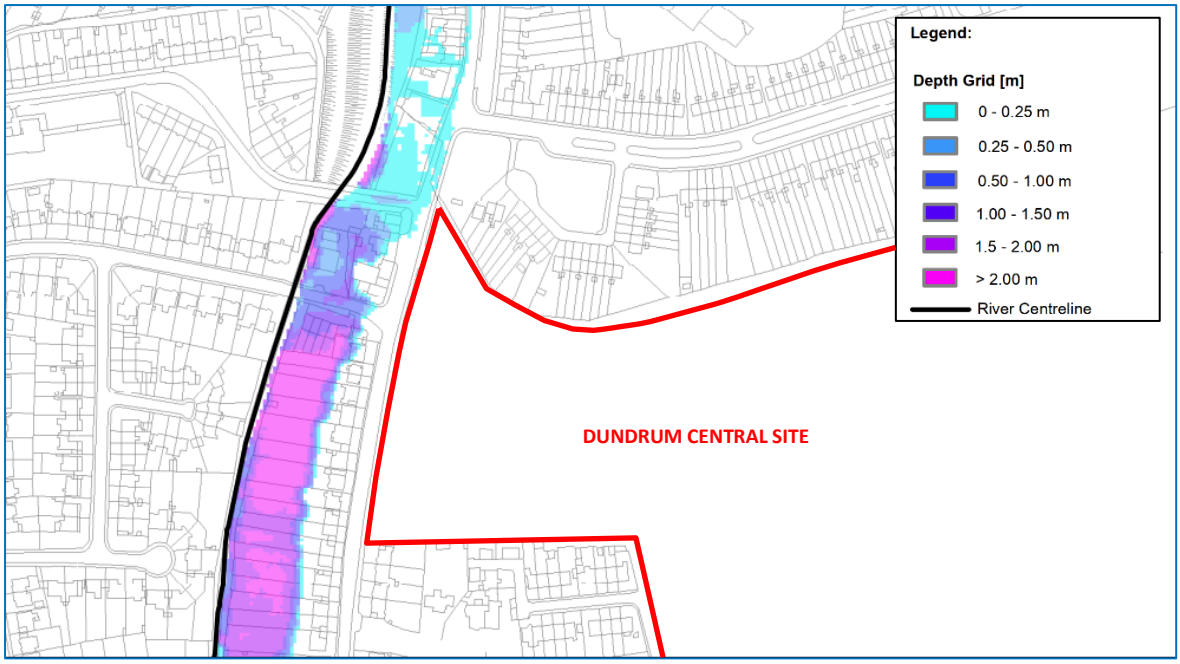


Fig 3.3 Extract from OPW Flood Risk Map for 0.1% Fluvial Flood Event for the River Slang (1 in 100 year) Dundrum Central Site is Delineated in Red.

3.2.3 Pluvial Flooding

The existing combined drainage system on site will be decommissioned and removed. All rain falling on the drained areas of the new development will be collected in the new surface water drainage system to prevent any excess surface entering the River Slang or the drainage ditch which runs thought the site. The system is designed without flooding for a 100year storm +20%climate change in accordance with GDSDS requirements. Therefore, the risk of pluvial flooding within the site is small.

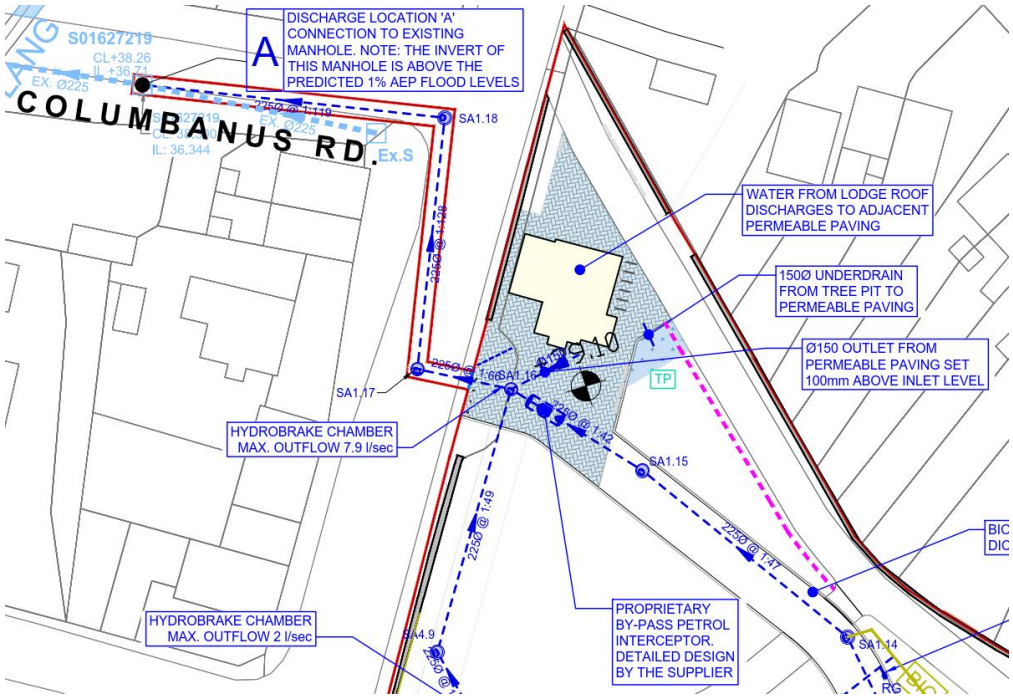


Fig 3.4. Proposed SW Connection Point in the northwest of the site to the existing Surface Water Sewer Manhole adjacent to the River Slang extracted from BM drawing no. C-11020

Proposed Drainage Catchment Strategy:

The site divides into three surface water drainage catchments (Catchment A, B and C) as shown in Figure 3.5. Catchment A area follows the Natural Catchments 1 area in Figure 3.2 as closely as possible, while Catchments B and C combined follows Natural Catchment 2 area as closely as possible. The proposed surface water system will discharge to the public SW network at three locations.

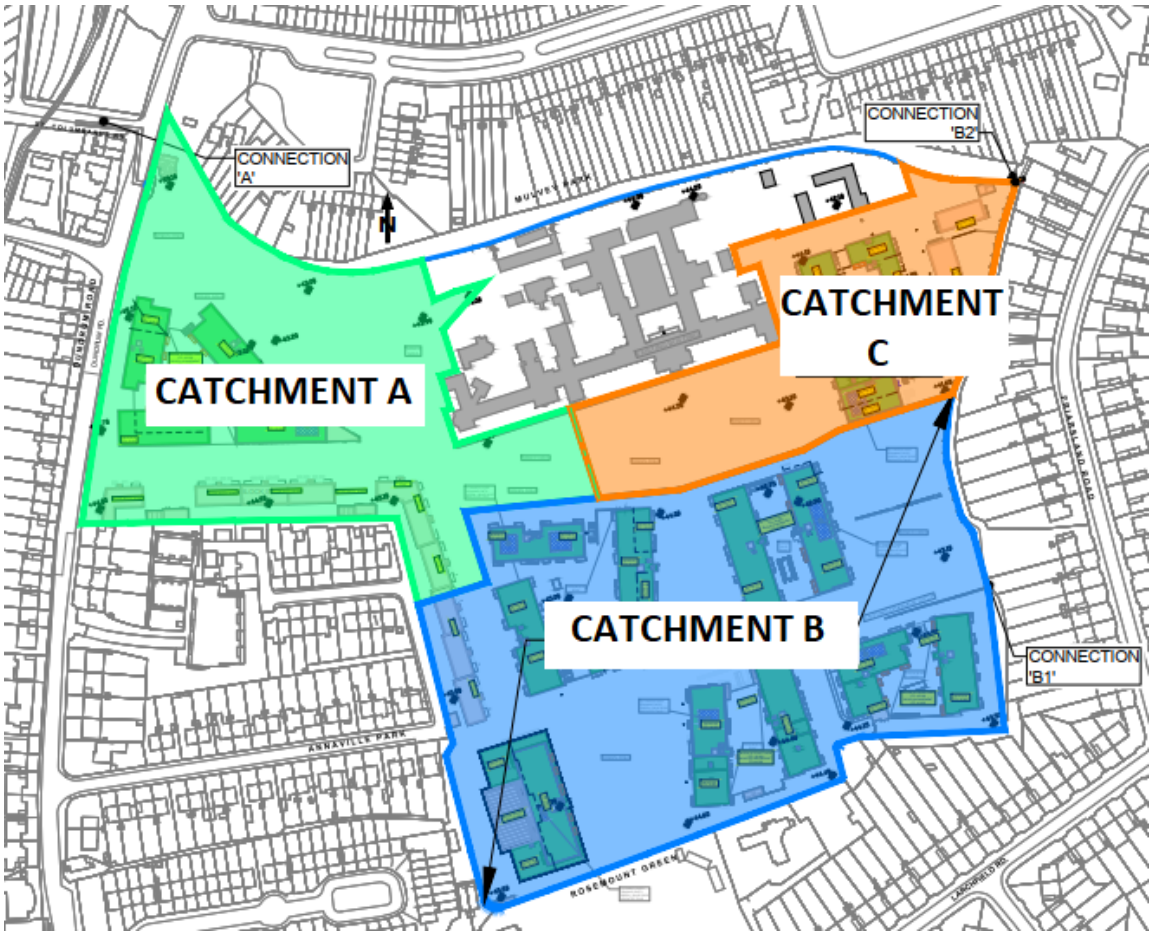


Fig 3.5 Dundrum Central Site. Proposed Surface Water Catchment Areas

Catchment 'A' draining into the River Slang:

This discharges into a manhole on a 225mm SW sewer which connects to the River Slang on St. Columbanus Road. The 1% predicted flood level in the Slang at this location +36.43 which is below the invert of the manhole i.e. will not flood the incoming connecting drain from the site . See Figure 3.4 above and drawing DCD-BMD-00-00-C-11020 (Buried Surface Water Drainage Layout) for more information.

The greenfield run-off rate Qbar for Catchment Area A (see Figure 3.5) is calculated in the BM Infrastructure Report accompanying this planning application. SW drainage flow from the proposed development is controlled and attenuated so as to not exceed Qbar values.

Catchments 'B' & 'C' draining into the eastern side open channel drainage ditch:

The majority of the rainfall falling on the site will be discharged into the drainage ditch running across the site and along the eastern boundary (Catchments B and C). B connects to the ditch inside the site close to location 'B1' in Figure 3.2. Catchment C connects at location 'B2'. The SW discharge rate for the drained areas of Catchment B and C for a 100 year storm + 20% cc is less than the Qbar for this area as set out in the BM Infrastructure Report. This has been achieved by using a combination of SuDS measures such as: bioretention areas, a detention basin, tree pits, permeable

paving, blue and green roofs and attenuation tanks, and limiting the discharge flow using Hydro brake flow controls. Therefore, the proposed development will result in a decrease of SW discharging into the drainage ditch compared to the existing situation.

Detailed design of the Surface Water System for flooding:
The GDSDS requires that no flooding should occur on site for storms up to and including the 1 in 30-year event. The pipe network and the attenuation storage volumes should, therefore, be checked for such storms to ensure that no site flooding occurs although partial surcharging of the system is allowed if it does not threaten to flood.
For the 1 in 100-year event, the pipe network can fully surcharge and cause site flooding, but the top water level due to any such flooding must be at least 500mm below any vulnerable internal floor levels, and the flood waters should be contained within the site. In addition, the top water level in any attenuation device during the 100-year storm must be at least 500mm below any vulnerable internal floor levels.

Surface water drains have been oversized to ensure the following:

- The system does not surcharge for the 1-year event
- The system surcharges but does not flood for the 30-year event.
- The system surcharges but does not flood for the 100-year event.

Detailed modelling of the surface water sewer network has been carried out using Causeway Flow software to confirm the above criteria is adequately met. The outputs are appended to the Barrett Mahony Infrastructure report prepared for this planning application..

Basements or under croft car parks are covered by podium slabs and do not receive direct rainfall. There will be limited outflow from these areas (rainfall coming off cars & rainwater coming in through car park vents). They are drained by a separate system that outfalls to a petrol interceptor buried below the ground floor slab. From there, the car park drainage is pumped to the nearest foul water manhole, in accordance with DLR requirements, and is not at risk of any backflow from the surface water system during storm conditions. GDSDS Criterion 3 is therefore complied with.

Exiting Buildings & Roads on Site
There are a number of existing buildings & roads on the subject site which are to be demolished/removed to make way for the proposed development. Currently rainwater on the existing buildings and hardstanding areas discharges to a combined drainage system in the site which discharges to the combined sewer on the Dundrum Road. This sewer discharges to a pumping station north of the site adjacent to the River Dodder. The proposed new drainage system will eliminate rainwater flows into the combined sewer and will therefore reduce the risk of overflows into the River Dodder. Foul Drainage flows into the sewer will be at a controlled rate also via a pumping station to the reduce the risk of overflows.

Summary:
The total maximum allowable discharge for the drained areas of the proposed development is which is less than the natural catchment Qbar for the overall site. Therefore, the site is not increasing the flood risk to adjoining or downstream areas.

Note: The redline of the site encompasses a small part of the Dundrum Road for works in connection with the new junction. This area will continue to drain into the existing surface water drainage system on the Dundrum Road i.e. it is not part of the site system.

Detailed information on the surface water drainage system & all associated calculations can be found in the Infrastructure Report and in the drawings accompanying this application.

3.2.4 Groundwater

Groundwater was recorded in 13 no. boreholes and 12 no. trial pits during the site investigation. This is likely to be groundwater perched on top of the impermeable clays which cover the site beneath a thin layer of topsoil & made ground. Basements and half-basements in the proposed development will be waterproofed externally with an outer tanking to prevent groundwater ingress.

3.2.5 Coastal Flooding

The site is 2.8km at its shortest distance to the sea at Sandymount Strand - there is no risk from coastal flooding to the proposed development.

3.3 Flood Risk Classification of the Development

3.3.1 Flood Zones

Geographical areas are similarly divided into three categories, based on their risk of river and tidal flooding as defined in Section 1.5.4.4 – Flood Zones A, B or C.

The subject site is in **Flood Zone C**, as there is no indication of any part of the site being within an area where the probability of flooding from rivers or the sea is greater than 1 in 1000.

3.3.2 Vulnerability Class

As outlined in the OPW publication, new developments are divided into three categories which are defined in Section 1.5.4.5. The proposed development is classed as a Highly Vulnerable Development due to the presence of residential units across the site.

3.3.3 Development Classification

The matrix below, which is an extract from the OPW document, states whether a particular development is deemed 'Appropriate' for a geographical location. The site in question is deemed Appropriate.

Table 6.1: Matrix of vulnerability versus flood zone

	Flood Zone A	**Flood Zone B**	**Flood Zone C**
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water compatible development	Appropriate	Appropriate	Appropriate

3.4 Stage 2: Initial Flood Risk Assessment

The initial flood risk assessment should ensure that all relevant flood risk issues are assessed in relation to the decisions to be made and potential conflicts between flood risk and development are addressed. It should assess the adequacy of existing information and any flood defences.

3.4.1 Examination of potential flooding sources that can affect the site.

The possible sources of flood water are assessed in the table below using the "**Source – Pathway – Receptor Model"**.

Table 6.2: The possible sources of flood water

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Tidal Note	Overtop Breach	People Property	Very Unlikely	High	Negligible
Fluvial Note	Overtop Breach	People Property	Unlikely	High	Low
Pluvial Surface water	Overflow / Blockage	People Property	Possible	Moderate	Low
Groundwater	Rising groundwater levels	People Property	Unlikely (Note 1)	Low	Low

Note 1: All basements and half-basements on site will be fully waterproofed.

3.4.2 Appraisal of the availability and adequacy of existing information and flood zone maps

3.4.2.1 Tidal/Fluvial

Good data is available on possible flooding of the surrounding area to the site in the CFRAM Study by the OPW. The relevant maps are contained in Appendix 2 and Fig 3.3 map extract. These show that the site is located outside of any area at risk of tidal or fluvial flooding.

3.4.3 Determination of what technical studies are appropriate

Given the comprehensive nature of the existing information available regarding flooding, it is not considered necessary to carry out any further analysis of fluvial / tidal flooding or of the sewer network serving the area. The proposed development will help to alleviate some local pluvial flooding and reduce site runoff towards the Dundrum Road and the River Slang which is susceptible to fluvial flooding.

3.4.4 Description of what residual risks will be assessed and how they might be mitigated.

3.4.4.1 Pluvial Flooding & Overland Flows

The unlikely event of a serious blockage of the surface water drainage system on site will lead to overland flow in the site from the point of blockage. The site slopes downhill and rainwater on impermeable surfaces from any surcharging manhole will be channelled along kerbed edges to break outs in the kerb and into existing attenuation tanks or other SuDS features as shown on Barrett Mahony drg no. C1025. An extract from this is shown below in Figure 8. Overland flows are therefore contained within the site in a controlled manner without risk to the residential buildings on site.

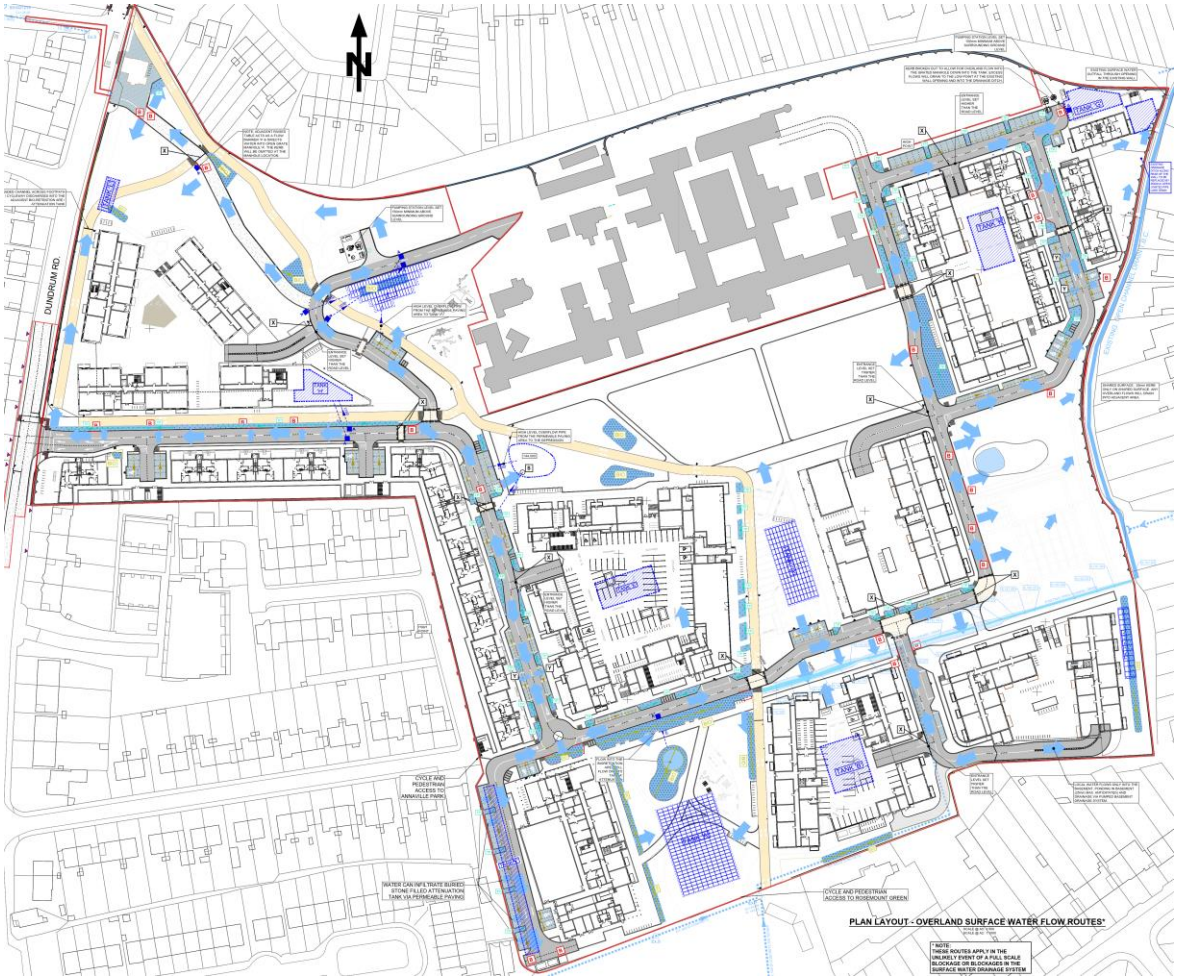


Fig 3.6 Controlled overland Flow Routes in the event of a Surface Water drainage blockage extracted from BM drawing no. C-11025

3.4.4.2 Fluvial Flooding

There is fluvial flooding to the Dundrum Road in a 0.1% AEP event, and to Highfield Road (opposite the main entrance to the subject site for a 10% AEP event. It is proposed to install new road gullies at the site entrance to prevent any uncontrolled surface water entering Dundrum Road, and subsequently the River Slang. Both the River Slang and Dundrum Road are below the levels in the subject site, and therefore the site is not at risk from any localised River Slang flooding on the Dundrum Road.

3.4.4.3 Flood Risk Mitigation Measures on site

House floor levels and apartment floor levels are set 150mm above the surrounding ground level to minimise flood risk as per standard practice. The proposed wastewater pumping stations will be raised 150mm above the surrounding ground level to minimise flood risk. All basements and half-basements on site will be waterproofed. The top of basement, half-basements will be set 100mm above the surrounding ground levels to avoid backflow of surface water down the ramps.

4. CONCLUSION

The flood risk assessment has been carried out in accordance with the OPW publication “The Planning System and Flood Risk Assessment Guidelines for Planning Authorities”. An assessment

has been carried out. The developed site is shown not to be at a significant risk from flooding and shown not to create a significant risk to adjoining areas or downstream. In summary:

1. River Slang: The site lies outside the predicted 0.1% AEP (1 in a 1000 year) extent of flooding on this river.
2. Surface Water Drainage:
    a. The system is designed for a 100yr storm + 20% climate change without flooding.
    b. The surface water drainage from the site to the surface water sewer network will discharge at rates no greater than the existing greenfield runoff rates thereby not increasing the risk of flooding to adjoining areas or downstream from the site.
    c. Overland flow routes of rainwater in the event of a significant & unlikely blockage of the surface water drainage system, have been considered. Overland flows are contained within the site in a controlled manner without risk to the residential buildings on site.
3. Standard mitigation measures will apply on site. House and apartment floor levels are set 150mm above the surrounding ground level, as are the level of the wastewater pumping stations, to minimise flood risk. All basements on site will be waterproofed. The top of basement car park entrance ramps will be set 100mm above the surrounding ground levels to avoid backflow of surface water down the ramps.

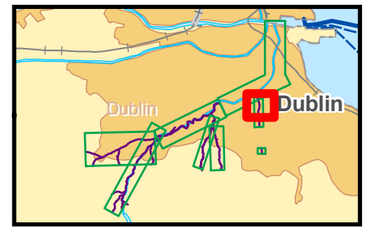
Therefore, the development is deemed acceptable & appropriate from a flood risk assessment perspective

Appendix 1

OPW Flood Maps

N

Location Plan:



Legend:

Depth Grid [m]

- 0 - 0.25 m
- 0.25 - 0.50 m
- 0.50 - 1.00 m
- 1.00 - 1.50 m
- 1.5 - 2.00 m
- > 2.00 m
- River Centreline

USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

Client:

Dublin City Baile Átha Cliath | South Dublin County Council | Dún Laoghaire-Rathdown County Council Comhairle Contae Dhún Laoghaire-Ráth an Dúin | OPW

Project:

DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map:

DUNDRUM SLANG

Map Type:	DEPTH
Return Period:	10% AEP EVENT
Source:	FLUVIAL FLOODING
Map Area:	URBAN AREA
Scenario:	CURRENT

Drawn By :	A.A.B	Date :	2 December 2010
Checked By :	A.J	Date :	2 December 2010
Approved By :	A.G.B	Date :	2 December 2010

Figure No. :

DSS/EXT/UA/DEP/10/105G

Map Series : Page 1 of 1

Drawing Scale : 1: 5,000 Plot Scale : 1:1 @ A3

0 0.1 0.2
Kilometers

RPS Consulting Engineers
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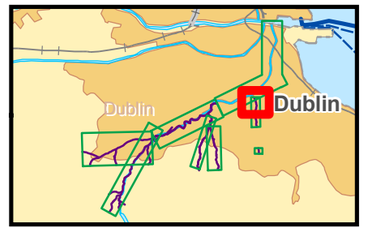
74 BOUCHER ROAD
BELFAST BT12 6RZ
TEL : 028 9066 7914
FAX : 028 9066 8286
www.rpsgroup.com/Ireland

N

Location Plan:



Legend:

Depth Grid [m]

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- 0.25 - 0.50 m
- 0.50 - 1.00 m
- 1.00 - 1.50 m
- 1.5 - 2.00 m
- > 2.00 m
- River Centreline

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Client:

Dublin City Baile Átha Cliath | South Dublin County Council | Dún Laoghaire-Rathdown County Council Comhairle Contae Dhún Laoghaire-Ráth an Dúin | OPW

Project:

DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map:

DUNDRUM SLANG

Map Type:	DEPTH
Return Period:	1% AEP EVENT
Source:	FLUVIAL FLOODING
Map Area:	URBAN AREA
Scenario:	CURRENT

Drawn By :	A.A.B	Date :	26 November 2010
Checked By :	A.J.	Date :	26 November 2010
Approved By :	A.G.B	Date :	26 November 2010

Figure No. :

DSS/EXT/UA/DEP/100/105D

Map Series : Page 3 of 3

Drawing Scale : 1: 5,000 Plot Scale : 1:1 @ A3

0 0.1 0.2
Kilometers

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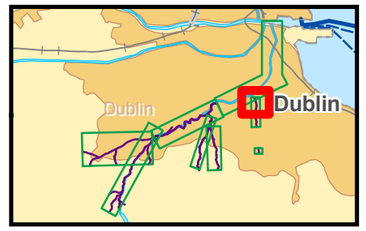
Location Plan:



Legend:

Depth Grid [m]

- 0 - 0.25 m
- 0.25 - 0.50 m
- 0.50 - 1.00 m
- 1.00 - 1.50 m
- 1.5 - 2.00 m
- > 2.00 m
- River Centreline

USER NOTE:

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Client:

Dublin City Baile Átha Cliath | South Dublin County Council | Dún Laoghaire-Rathdown County Council Comhairle Contae Dhún Laoghaire-Ráth an Dúin | OPW

Project:

DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map:

DUNDRUM SLANG

Map Type:	DEPTH
Return Period:	0.1% AEP EVENT
Source:	FLUVIAL FLOODING
Map Area:	URBAN AREA
Scenario:	CURRENT

Drawn By :	A.A.B	Date :	26 November 2010
Checked By :	A.J.	Date :	26 November 2010
Approved By :	A.G.B	Date :	26 November 2010

Figure No. :

DSS/EXT/UA/DEP/1000/105A

Map Series : Page 3 of 3

Drawing Scale : 1: 5,000 Plot Scale : 1:1 @ A3

0 0.1 0.2
Kilometers

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DSS1_4435

10% Flow = 11.546 m^3/s
1% Flow = 27.713 m^3/s
0.1% Flow = 51.208 m^3/s

DSS1_4240

DSS1_4085

DSS1_4053

DSS1_3920

DSS1_3803

DSS1_3785

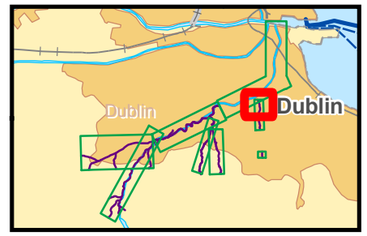
DSS1_3738

DSS1_3720

DSS1_3620

Node Label	Water Level (mOD) per AEP		
	WL 10%	WL 1%	WL 0.1%
DSS1-3620	37.53	37.67	38.09
DSS1-3720	36.88	37.41	38.19
DSS1-3738	36.71	37.22	38.09
DSS1-3785	35.24	36.25	37.85
DSS1-3803	34.75	35.50	35.84
DSS1-3920	33.22	33.80	34.36
DSS1-4053	31.51	32.06	33.39
DSS1-4085	29.83	30.65	31.18
DSS1-4240	26.66	27.50	28.34
DSS1-4435	24.93	26.16	27.63

Location Plan:



Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Defended Area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (>40m) (10% and 0.1% AEP)
- High Confidence (<20m) (1% AEP)
- Medium Confidence (<40m) (1% AEP)
- Low Confidence (>40m) (1% AEP)
- River Centreline
- Node Point
- OS_2975 — Node Label (refer to table)
- Flow reporting location
- 10% Flow = 1.20, 1% Flow = 1.56, 0.1% Flow = 2.17 — Peak flow during design flood extent

USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

Client:

Dublin City Baile Átha Cliath · South Dublin County Council · Dún Laoghaire-Rathdown County Council Comhairle Contae Dhún Laoghaire-Ráth an Dúin · OPW

Project:

DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map:

PRESENT DAY DUNDRUM SLANG

Map Type: FLOOD EXTENT

Source: FLUVIAL FLOODING

Map Area: URBAN AREA

Scenario: CURRENT

Drawn By : A.A.B **Date :** 26 November 2010

Checked By : A.J. **Date :** 26 November 2010

Approved By : A.G.B **Date :** 26 November 2010

DSS/EXT/UA/CURS/105

Map Series : Page 3 of 3

Drawing Scale : 1: 5,000 **Plot Scale : 1:1 @ A3**

0 0.1 0.2
Kilometers

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Appendix 2

Proposed Surface water Overland Flow Routes

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS & ARCHITECT'S DRAWINGS.FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED. WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT - ASK'.
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.

CIVIL LEGEND

- 1.2x1.2mx2.0m DEEP MANHOLE WITH FULL OPEN GRATING TO ALLOW FOR OVERLAND FLOW. PROVIDE 1.2m LONG KERB BREAKOUT IF THE MANHOLE IS LOCATED OFF THE ROAD EDGE — A
- DENOTES 1.5m LONG BREAK IN KERB TO ALLOW FOR OVERLAND FLOW FROM A ROAD INTO AN ADJOINING SOFT LANDSCAPED AREA — B
- 2m DIAMETER x 2m DEEP STONE FILLED SOAKAWAY — S
- BIO-RETENTION AREA — BIO
- TREE PIT — TP
- RAISED CROSSING ACTS AS A BARRIER TO OVERLAND FLOW — X
- LOCAL COLLECTION OF WATER IN THE ROAD CONSTRAINED BY THE KERBS. INFILTRATION THROUGH PERMEABLE PAVING. — Y
- BURIED ATTENUATION TANK

DUNDRUM RD.

EXISTING OPEN CHANNEL DRAINAGE DITCH

GRADED CHANNEL ACROSS FOOTPATH / CYCLEWAY DISCHARGES INTO THE ADJACENT BIO-RETENTION ARE / ATTENUATION TANK

NOTE: ADJACENT RAISED TABLE ACTS AS A FLOW BARRIER 'X' & DIRECTS WATER INTO OPEN GRATE MANHOLE 'A'. THE KERB WILL BE OMITTED AT THE MANHOLE LOCATION.

PUMPING STATION LEVEL SET 150mm MINIMUM ABOVE SURROUNDING GROUND LEVEL

HIGH LEVEL OVERFLOW PIPE FROM THE PERMEABLE PAVING AREA TO TANK 'H'

ENTRANCE LEVEL SET HIGHER THAN THE ROAD LEVEL

TANK 'H'

HIGH LEVEL OVERFLOW PIPE FROM THE PERMEABLE PAVING AREA TO THE DEPRESSION

+44.000

TANK 'G'

KERB BROKEN OUT TO ALLOW FOR OVERLAND FLOW INTO THE GRATED MANHOLE DOWN INTO THE TANK. EXCESS FLOWS WILL DRAIN TO THE LOW POINT AT THE EXISTING WALL OPENING AND INTO THE DRAINAGE DITCH

EXISTING SURFACE WATER OUTFALL THROUGH OPENING IN THE EXISTING WALL

HIGH POINT

EXISTING DRAINAGE DITCH ALONG REAR OF SITE TO BE REPLACED BY Ø300mm OPEN JOINTED PIPE LAND DRAIN

TANK 'I'

SHARED SURFACE. 25mm KERB ONLY ON SHARED SURFACE. ANY OVERLAND FLOWS WILL DRAIN INTO ADJACENT AREA.

TANK 'C'

TANK 'B'

FLOW INTO THE BIORETENTION ARE WILL FLOW ON TO TANK ATTENUA

CYCLE AND PEDESTRIAN ACCESS TO ANNAVILLE PARK

WATER CAN INFILTRATE BURIED STONE FILLED ATTENUATION TANK VIA PERMEABLE PAVING

CYCLE AND PEDESTRIAN ACCESS TO ROSEMOUNT GREEN

LOCAL WATER FLOWS ONLY INTO THE BASEMENT. PONDING IN BASEMENT (25mm MAX. ANTICIPATED) AND DRAINAGE VIA PUMPED BASEMENT DRAINAGE SYSTEM.

ENTRANCE LEVEL SET HIGHER THAN THE ROAD LEVEL

PLAN LAYOUT - OVERLAND SURFACE WATER FLOW ROUTES*

SCALE @ A0: 1:500
SCALE @ A2: 1:1000

*** NOTE:**
THESE ROUTES APPLY IN THE UNLIKELY EVENT OF A FULL SCALE BLOCKAGE OR BLOCKAGES IN THE SURFACE WATER DRAINAGE SYSTEM

ISSUE	DATE	DESCRIPTION	BY
P5	16.09.24	ISSUED FOR PLANNING	WK
P4	05.09.24	ISSUED FOR COMMENT	WK
P3	19.08.24	SURFACE WATER AUDIT ISSUE	WK
P2	10.07.24	ISSUED TO LDA FOR COMMENT	WK
P1	06.06.24	ISSUED FOR COMMENT	WK

Project Engineer: POD | Project Director: JPC

BM STAGE: **PLANNING**

BM BARRETT MAHONY
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London Office: 5th Floor, Mill House, 8 Mill Street, London SE1 2BA, United Kingdom Tel: (0044) 20 3750 3530
Consulting Engineers, Civil . Structural . Project Management.E-mail: bmce@bmce.ie Web: www.bmce.ie

APPLICANT: **DÚN LAOGHAIRE-RATHDOWN COUNTY COUNCIL**

AGENT: **LAND DEVELOPMENT AGENCY**

PROJECT TITLE: **PROPOSED PART 10 RESIDENTIAL DEVELOPMENT, DUNDRUM CENTRAL DEVELOPMENT, DUNDRUM ROAD, DUBLIN 14.**

BM PROJECT No.: **20.170**

CODES: REFERENCE | SUITABILITY | REVISION

DRAWING TITLE: **SURFACE WATER OVERLAND FLOW ROUTES**

DRAWING REFERENCE: **DCD-BMD-00-00-DR-C-11025** | STATUS | REVISION: **P5**

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