



Carmanhall Road SHD 2022

Flood Risk Assessment

August 2022

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Engineering Consultants

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This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015 and BS EN ISO 14001: 2015)

Issue	Date	Prepared by	Checked by	Approved by
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Comments

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1. Introduction

This Flood Risk Assessment (FRA) has been prepared by Waterman Moylan on behalf of Atlas GP Ltd to accompany an SHD application to An Bord Pleanála (ABP) for a residential development on a brownfield site at the junction of Carmanhall Road and Blackthorn Road, Sandyford, Dublin 18. See Figure 1.

This FRA has been carried out in accordance with the Department of Housing and Local Government (DEHLG) and the Office of Public Works (OPW) document “*The Planning Process and Flood Risk Management Guidelines for Planning Authorities*” published in November 2009. This Assessment identifies and sets out possible mitigation measures against potential risks of flooding from various sources. Sources of possible flooding include coastal, fluvial, pluvial (direct heavy rain), groundwater and human/mechanical error.

This report provides an assessment of the subject site for flood risk purposes only.

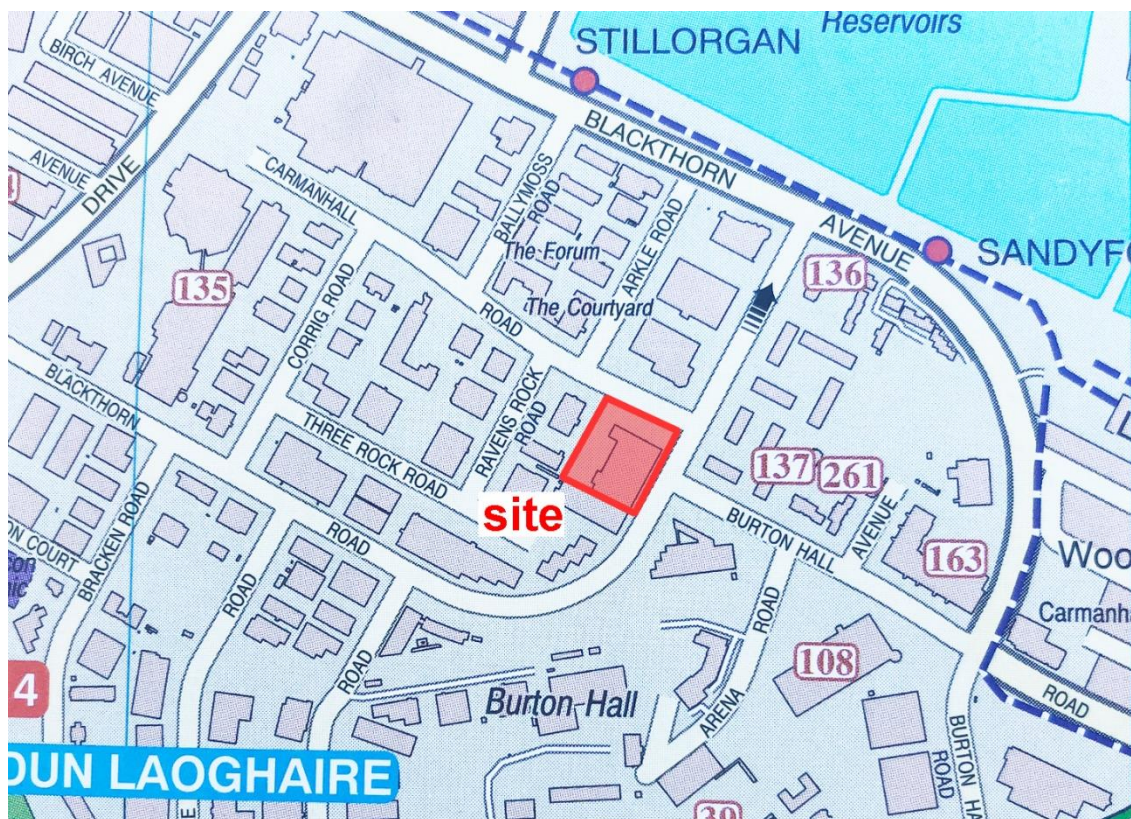


Figure 1 Location Map

2. Site Description

2.1 Site Location

The subject site is located at Sandyford in south County Dublin. The site which has an area of 0.73ha (c. 1.8 acre), with a planning red line area of 0.99 Ha, is located at the junction of Carmanhall Road and Blackthorn Road, Sandyford, Dublin 18. It was formerly occupied by Avid Technology.

The site falls from southwest to northeast ranging in level from 86.0mOD in the southwest to 84.0 mOD in the northeast.

The existing vehicular access to the site is from Carmanhall Road.

At the time of writing in August 2022, the site was vacant.

The adjoining site to the west at the junction of Carmanhall Road and Ravens Rock Road which is the location for a concurrent development was formerly occupied by Tack Packaging. It extends to 0.56 ha ((1.4 acre). See Figure 2.

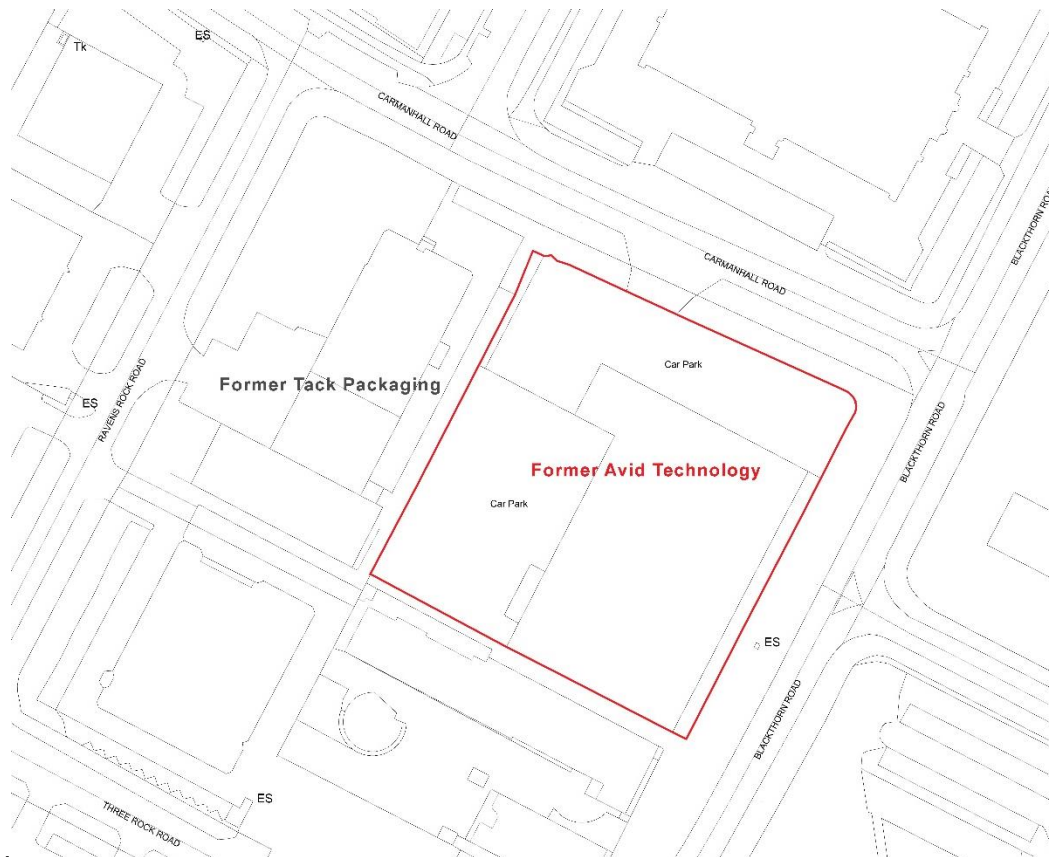


Figure 2 Existing Site Layout

2.2 Proposed Development

The proposed development consists of **334** Build to Rent residential apartment units within 4 No. apartment blocks and as follows:

- 79 No. Studio
 - 175 No. 1 bed
 - 80 No. 2 bed
-
- All residential units provided with private balconies/terraces to the north/south/east and west elevations Crèche 272 sqm.
 - Residential amenity spaces 893 sqm. (including resident's gym, business centre, multipurpose room, staff facilities, multimedia/cinema room, shared working space, concierge and games room)
 - Height ranging from 5 to 16 storeys (over basement)
 - Landscaped communal space in the central courtyard
 - Provision of a new vehicular entrance from Ravens Rock Road and egress to Carmanhall Road
 - Provision of pedestrian and cycle connections
 - 125 No. Car Parking, 6 No. Motorcycle Parking and 447 cycle spaces at ground floor/undercroft and basement car park levels
 - Plant and telecoms mitigation infrastructure at roof level

The development also includes 2 no. ESB substations, lighting, plant, storage, site drainage works and all ancillary site development works above and below ground cycle paths together with a network of watermains, foul water drains and surface water drains.

A concurrent development on the former Tack Packaging site to the west, which is the subject of a separate planning application (Reg. Ref. ABP-313338), will comprise 207 Build-to-Rent residential units and 79 car parking spaces at Lower Ground and Basement. Access will be from Ravens Rock Road and egress onto Carmanhall Road.

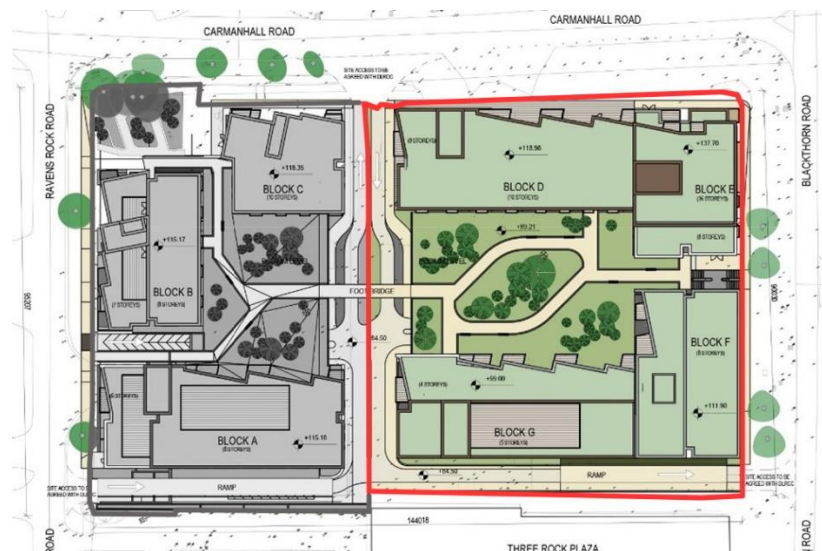


Figure 3 Proposed Site Layout

2.3 Proposed Floor Levels

The proposed levels for Blocks D, E, F and G on the former Avid Technology are:-

Table 1 Schedule of Floor Levels

Block	Basement	Lower Ground	Podium
D	81.75	84.20-85.00	89,25
E	81.75	85,00	89,25
F	81.75	85.00	89,25
G	81.75	85.00-85.95	89,25

2.4 Proposed Road and Street Levels

The proposed levels at the access and internal roads within the site are presented in Table 2.

Table 2 Proposed Road and Street Levels

Location	Function	Level
Carmanhall Road	Entrance	84.00 mOD
Site	Inner Street	84,50 m OD
Blackthorn Road	Exit	86.25 mOD

2.5 Construction Program

At the time of writing in August 2022, it is likely that construction of the proposed development could commence in 2023 for completion in 2026

3. Flood Risk

3.1 Introduction

The components to be considered in the identification and assessment of flood risk are set out in Table A1 of the DEHLG/OPW guidelines on the Planning Process and Flood Risk Management and are summarised below:

- Tidal – flooding from high sea levels.
- Fluvial – flooding from water courses.
- Pluvial – flooding from rainfall / surface water.
- Ground Water – flooding from springs / raised ground water and
- Human/mechanical error – flooding due to human or mechanical error.

Each component will be investigated from a source, pathway and receptor perspective and the likelihood of flood occurring and the possible consequences will be assessed.

The likelihood of flooding falls into three categories; low, moderate and high, as described in the OPW Guidelines and set out in Table 3.

Table 3 OPW Guidelines

Likelihood	Low	Moderate	High
Tidal	Where probability < 0.1 % chance of occurring in a year	0.5 % chance of occurring in a year > probability > 0.1 % chance of occurring in a year	Where probability > 0.5 % chance of occurring in a year
Fluvial	Where probability < 0.1 % chance of occurring in a year	1 % chance of occurring in a year > probability > 0.1 % chance of occurring in a year	Where probability > 1 % chance of occurring in a year
Pluvial	Where probability < 0.1 % chance of occurring in a year	1 % chance of occurring in a year > probability > 0.1 % chance of occurring in a year	Where probability > 1 % chance of occurring in a year

For ground water and human/mechanical error, the limits of probability are not defined and therefore professional judgment is used. However, the likelihood of flooding is still categorised as low, moderate and high for these components. The likelihood and possible consequence of each event is considered, and the risk is evaluated. Risks will be mitigated where possible and the residual risks will then be considered as part of this assessment.

This report has considered the Eastern Catchment Flood Risk Assessment & Management (CFRAM) Study and maps prepared by RPS Group Ireland for the OPW. In addition, the Strategic Flood Risk

Assessment (SFRA) prepared as part of the Dun Laoghaire Rathdown County Development Plan 2022-2028 has been considered.

3.2 Tidal – Irish Sea

Source

The subject site is located in the catchment of the Carysfort Maretimo Stream as illustrated in Figure 4. The Carysfort Maretimo Stream discharges into the Irish Sea in Blackrock where the highest tide level is 4.5 metres OD (Malin).

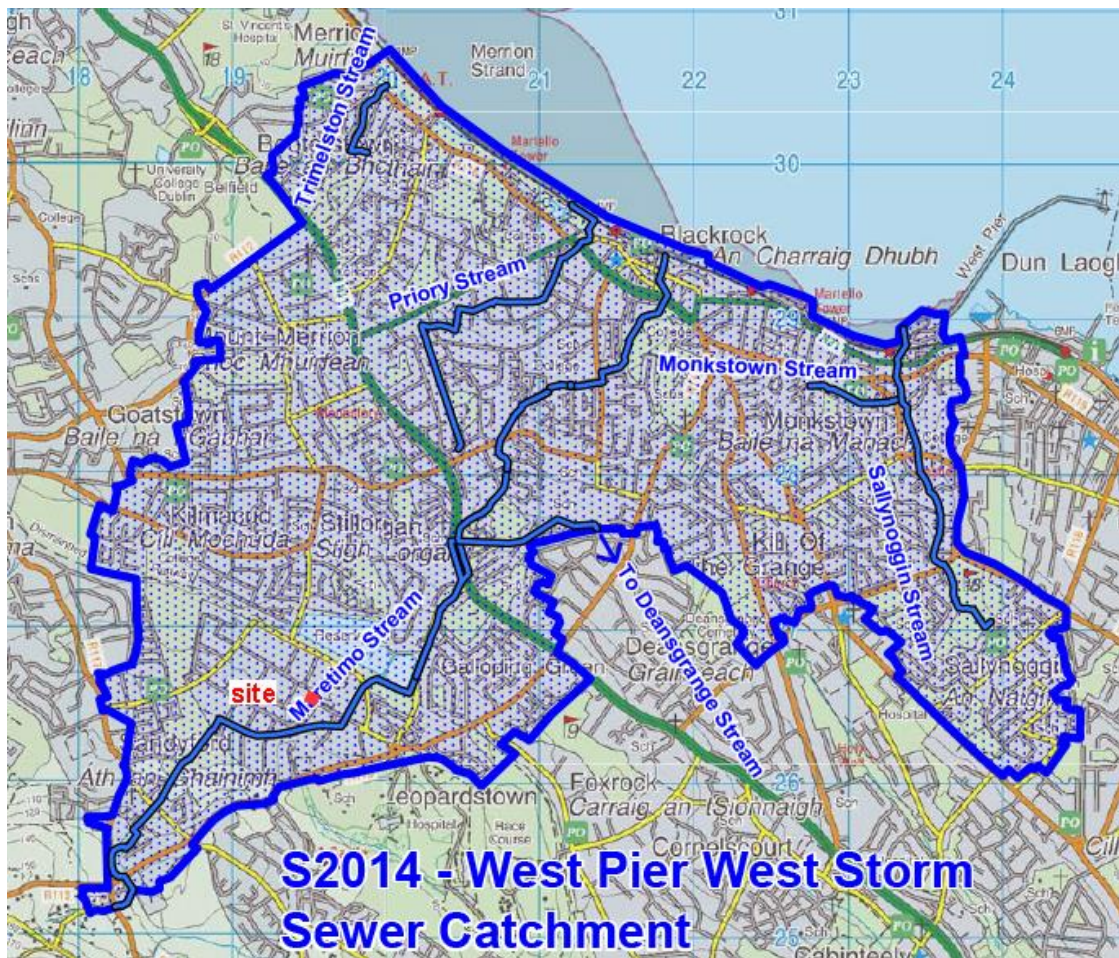


Figure 4 Extract from GSDSDS Fig.9.3.15-S2014-West-Pier-Storm-Sewer-Catchment

Receptor

The receptor is the proposed development with a ground floor level of 89.20 mOD, a lower ground floor level of 85.00 mOD and a basement level of 82.45mOD. The lowest level at which tidal water could enter the proposed development would be from Carmanhall Road at a level of 84.00 mOD and along the Inner Street which will have a minimum level of 84.5mOD. All ventilation and other openings below this level will be bunded to a minimum level of 84.5 mOD.

Pathway

The subject site is located some 4 km from the Irish Sea at in Blackrock at an elevation of 84.0 mOD (Malin) compared to a high tide level of below 5.0m OD (Malin) at Blackrock.

Given that the site is located some 4 km inland from the Irish Sea and that there is a significant difference of 79 metres in level between the subject site and high tide, there is no pathway between the source and the receptor.

Risk of Flooding

Given that the site is located inland from the Irish Sea and that there is a significant difference in level between the subject site and high tide, the risk from tidal flooding is insignificant.

Mitigation Measures

As the risk from tidal flooding is insignificant, no flood mitigation measures were required to be considered.

3.3 Fluvial

Source

The subject site is located in the catchment area of the Carysfort Maretimo Stream. The Carysfort Maretimo Stream rises to the southwest of Sandyford Village. It flows in a north easterly direction through the Sandyford Business District and Stillorgan before discharging into Dublin Bay at Blackrock at an elevation of 4.5 metres OD (Malin). See Figure 4.

Documents Consulted

The following documents including flooding reports and records were consulted by Waterman Moylan during the preparation of this Flood Risk Assessment: -

- Carysfort Maretimo Improvement Scheme, Part Planning Report, Final Issue, DLRCC, March 2008.
- Strategic Flood Risk Assessment, Appendix 13, DLR County Development Plan, 2016 – 2022
- Carysfort Maretimo Fluvial Flood Extent, Page 5 of 7, OPW, 2017.

Carysfort Maretimo Improvement Scheme 2010

The Carysfort Maretimo_Flood Relief Scheme was completed by DLRCC in 2011. The objective of the Scheme was to deliver solutions for flooding by enhancing channel capacity and dealing with other deficiencies in the stream following a number of severe flooding events during the previous decade particularly following a very localised, high intensity storm in July 2007.

As part of the Scheme, works were carried out at various locations along the stream between Brewery Road at Stillorgan Reservoir and Blackrock.

The works carried out included the following measures: -

- Provision of flood protection walls.
- Upgrading of existing trash screens and provision of new trash screens.

- Modification to existing stream structures, including weirs and chambers.
- Removal of structures acting as flow obstructions.
- Provision of additional culverts and manhole chambers.
- Stream training and channel widening.
- Culvert inlet improvement measures.
- Provision of access to trash screens for maintenance purposes.
- Stream bank protection measures.
- Removal of scrub and vegetation where these act as flow obstructions.
- Associated works such as service and utility diversions.

The listed works were carried out downstream of the subject site works were carried out at various locations along the stream between Brewery Road at Stillorgan Reservoir and Blackrock.

Strategic Flood Risk Assessment, Appendix 15, DLR Development Plan 2022 -2028

Section 6.2.13 *Carysfort Maretimo* of the Strategic Flood Risk Assessment in Appendix 15, DLR Development Plan 2022 -2028 advises that

The CFRAM Study shows flood risk along the majority of the Carysfort Maretimo River, being a combination of Flood Zone A and B and covering a range of existing land uses, including open space, residential and office and enterprise (Figure 6-6). Funding for a flood relief scheme for the Carysfort Maretimo, and including the Crinken Stream, has been secured, but the scheme will be in the second round (following Carrickmines and Deansgrange), so timelines for these works are unknown at this stage. As part of the FRS a climate change adaptation plan will be produced which will outline the process for managing flood risk into the future. This should inform future Development Plans and be an integral part of associated SFRAs.

The majority of flood risk highlighted in the Sandyford Business District (21) and surrounding area is shown to be Flood Zone B, with small pockets indicated to be Flood Zone A. Development in Flood Zones in this area has passed the Justification Test for Development Plans (Section 6.2.5), Similarly, the Justification Test for Plan Making has been passed for the Stillorgan and Blackrock District Centres. Under the MRFS climate change scenario in the CFRAM Study, there is some increase in flood extents predicted in the future. It is important that this is assessed and suitable mitigation measures provided within any site specific flood risk assessments.

Upstream of the Sandyford Business Park flooding is indicated at, but not limited to, the residential areas of Blackrock Bypass, Brookfield, Carysfort Avenue, Avondale Lawn, Carysfort Hall, Avoca Park, Grove Paddock, Stillorgan Grove, Stillorgan Road and Brewery Road, Lakelands, Coolkill, Sandyford Downs and Sandyford Village. Until the FRS has been completed, residential development within the catchment and outside the District Centres and Business District will be restricted to Minor Development as defined in Section 5.2.1. In the residential areas flood risk can be managed through a site specific FRA, which should include consideration of culvert blockage (where appropriate) and the impact this could have on flood risk at lower return periods.

There is a length of defence along the Carysfort Maretimo River which runs parallel to Rockfield Park (22) which is of recent construction and provides protection against the 1% AEP fluvial flood event. Assessment of breach impacts is not considered necessary for these defences, but the impacts of

overtopping, either through higher return period events or with the impact of climate change on river flows, should be taken into account in any site specific flood risk assessment.

The extent of flooding along the Carysfort Maretimo Stream is illustrated in Figure 5 which was reproduced from Fig 5.3.7 SFRA, Appendix 13, DLR Development Plan 2016-2022.

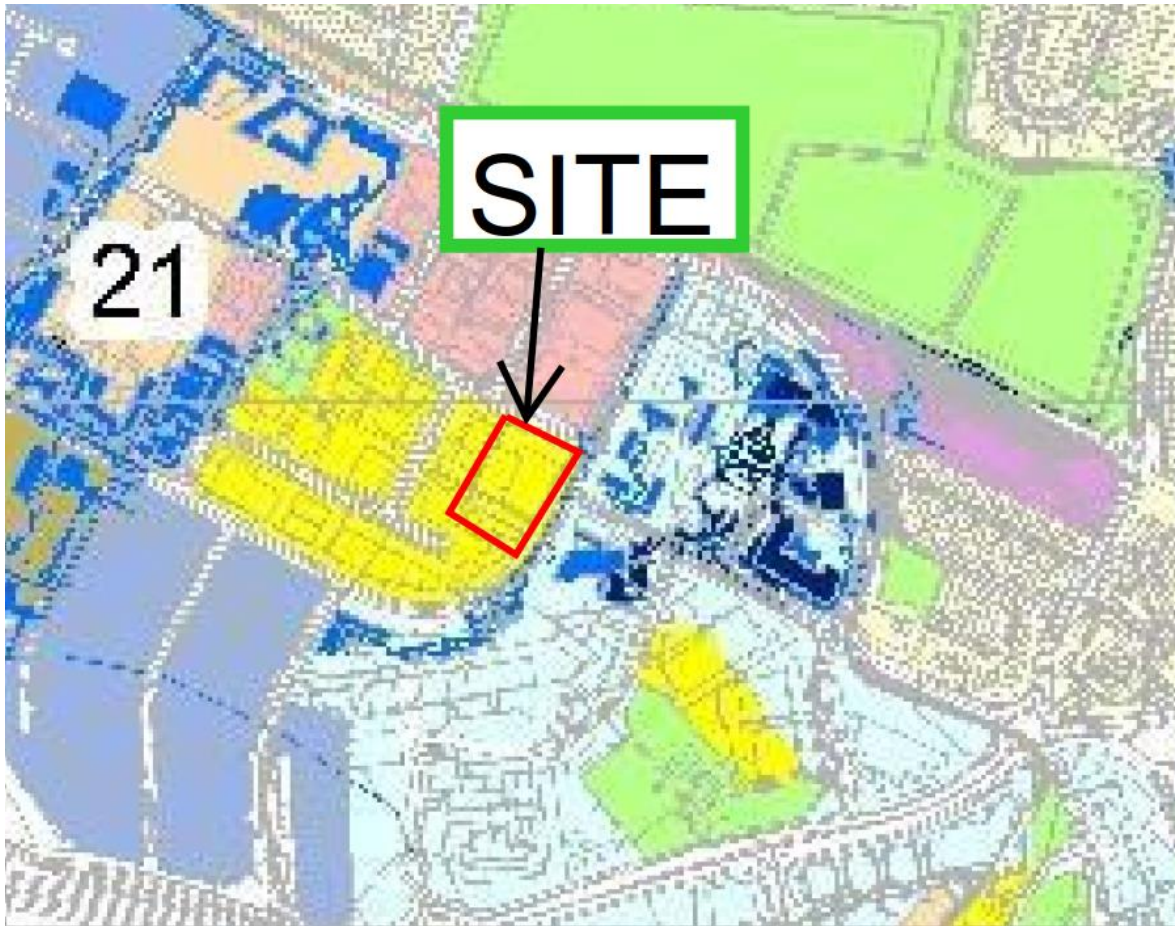


Figure 5 Carysfort Maretimo Stream

(Reproduced from Fig 6.6 SFRA, Appendix 15, DLR Development Plan 2022-2028)

Flood Extent Mapping 2017

The location of the proposed development is shown on Map 5 of the Carysfort Maretime Flood Extent Mapping published by OPW in October 2017. See Figures 6 and 7.

The predicted 1 in 1,000 water level shown on this map for the 0.1% Fluvial AEP event at Node SO 19267035 some 175 metres to the southeast of the subject site is 84.37mOD which is below the ground level at the subject site.

Due to the topography in the surrounding area, any floodwater will flow to the east and north away from the subject site.

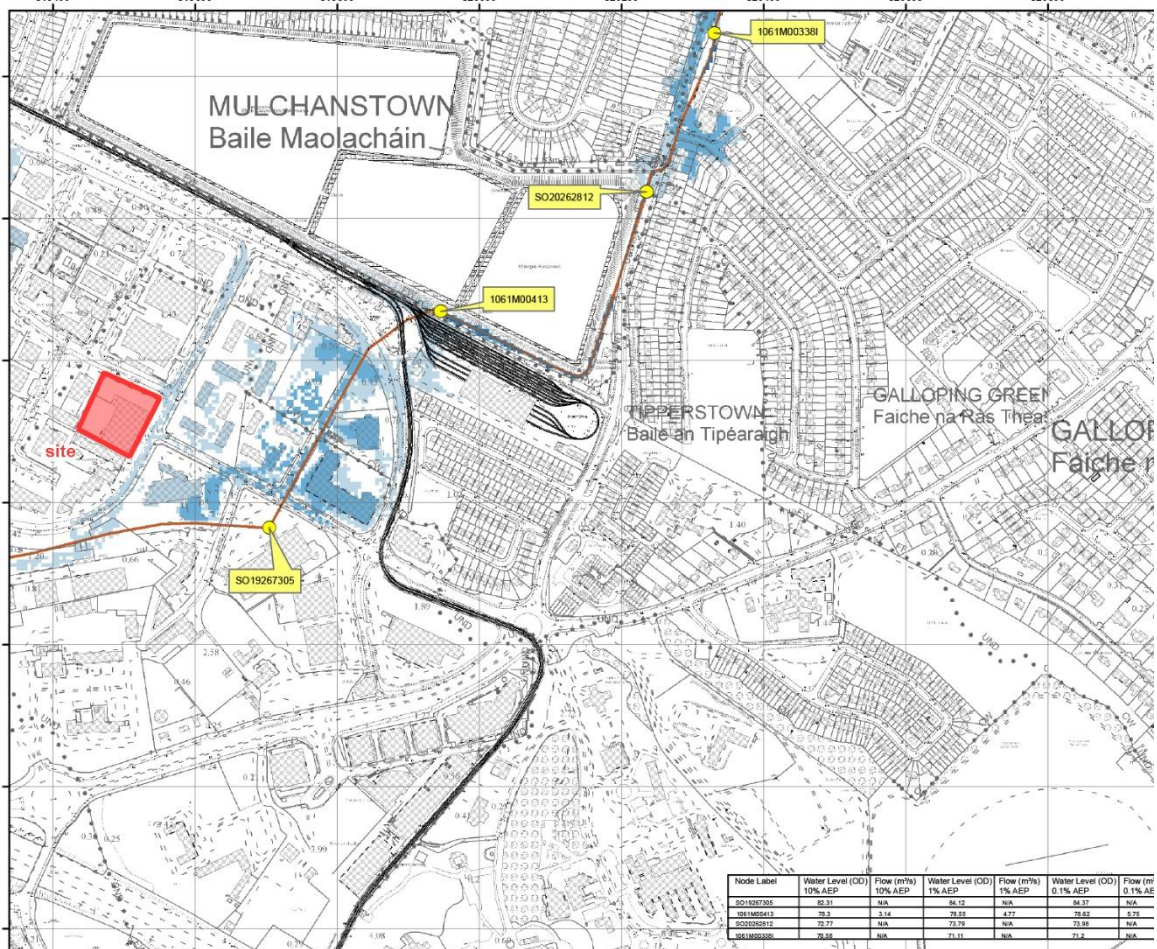


Figure 6 Carysfort Maretime Flood Map 5, OPW, 2017

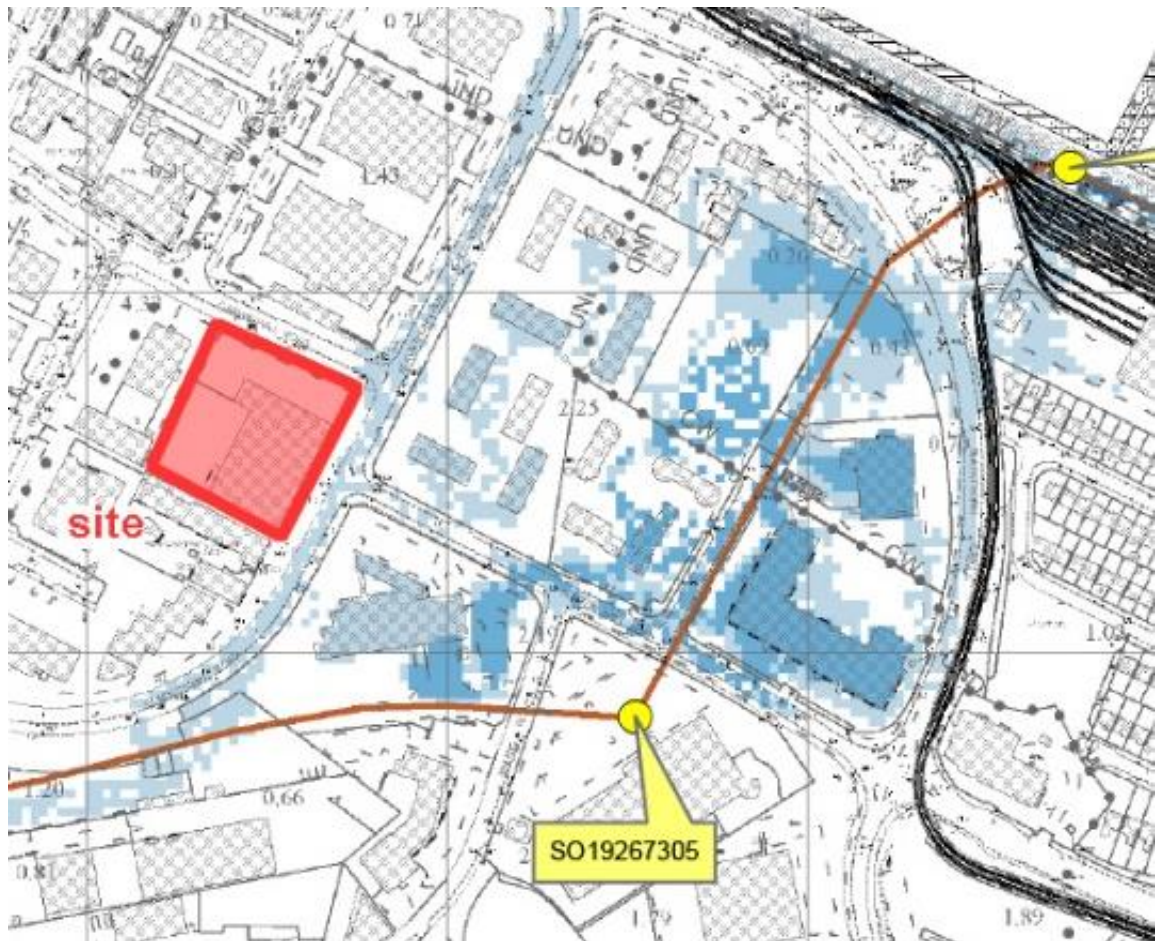


Figure 7 Extract from Carysfort Maretimo Flood Map 5, OPW, 2017

Receptor

The receptor is the proposed development with a ground floor level of 89.20 mOD, a lower ground floor level of 84.20-85.95 mOD and a basement level of 81.75mOD. The lowest level at which tidal water could enter the proposed development would be from Carmanhall Road at a level of 84.00 mOD and along the Inner Street which will have a minimum level of 84.5mOD. All ventilation and other openings below this level will be banded to a minimum level of 84.5 mOD.

Pathway

The subject site is located at an elevation of 84.2 metres OD (Malin).

Attenuated surface water drainage from the subject site will discharge into the existing public drain on Carmanhall Road with a cover level of 84.0 mOD and an invert level of 81.0 mOD.

This drain in turn discharges outfalls into the Carysfort Maretimo Stream in the area of the Luas Sandyford Depot.

The closest section of the Carysfort Stream to the proposed development is Node SO19267305 more than 200 metres to the southeast of and upstream of the subject site.

The tabulated water level predictions at Node SO19267305 are

- 0.1% AEP: 84.37 mOD
- 1% AEP: 84.12 MOD
- 10% AEP: 82.31 MOD

Given that the site is located some 200 metres away the Carysfort Maretimo Stream and that there is level difference between the subject site and the Stream, there is no pathway between the source and the receptor.

In addition, other low-lying areas located between the node and the site will store flood water as confirmed by the topographical origin of Map 6. In this way, any flood water will be prevented from reaching the site due to the topography of the area. Flood water on Blackthorn Road will in fact flow north, as the existing topography of the road falls in that direction

Risk of Flooding

Given that there is no pathway between the source and the receptor, the risk from fluvial flooding is insignificant.

In addition, the various flood maps and reports published by OPW during the past decade confirm the absence of any fluvial flooding in the area of the subject site or its immediate environs.

Mitigation Measures

As the risk from fluvial flooding is insignificant, no flood mitigation measures were required to be considered.

3.4 Pluvial

Pluvial flooding is from heavy rainfall and is often referred to as flooding from surface water. Surface water flooding can occur as a result of overland flow or ponding during periods of extreme prolonged rainfall. Flooding may occur through any of the pathways outlined in Table 4 and the risk associated with each pathway is outlined below.

Table 4 Pathways/Receptors

	Pathway	Receptor
1	Surcharging of the proposed internal drainage systems during heavy rainfall events leading to internal flooding	Proposed development – Basement and buildings
2	Surcharging from the existing surrounding drainage system leading to flooding within the subject site by surcharging surface water pipes	Proposed development – Basement and buildings

3	Surface water discharging from the subject site to the existing drainage network leading to downstream flooding	Downstream properties and roads
4	Overland flooding from surrounding areas flowing onto the subject site	Proposed development – Basement and buildings
5	Overland flooding from the subject site flowing onto surrounding areas	Downstream properties and roads

3.4.1 On-site drainage system surcharging

The proposed on-site surface water drains have been designed to accommodate flows from a 5-year return event which indicates that the internal system may surcharge during rainfall events with a return period in excess of five years. Therefore, the likelihood surcharging of the on-site drainage system is considered high over the lifetime of the building. The risk of flooding is mitigated however by providing attenuation for the development which can store water for the 1 in 100-year storm event plus a 20% allowance for climate change and therefore the residual risk is low.

3.4.2 Flooding from the existing surrounding drainage system surcharging

The existing drainage system is a separate foul and surface water drainage systems and the existing site drains to the separate foul and surface water public sewers on Carmanhall Road. The surface water drainage from the proposed development will be attenuated on site and will have a restricted outflow to the public surface water sewer, reducing the rate of run-off to the sewer and further reducing the risk of the sewer surcharging. Therefore, the likelihood of flooding due to surcharging the existing drainage network is considered low.

3.4.3 Surface water discharge from the subject site causing downstream flooding

The proposed development site is already 100% hard surfaced. The development, as designed, will increase the permeable area due to the installation of permeable paving, planters, green roofs and podium areas and swales all of which will help reduce the volume of run-off from the site during low storm events. Surface water discharging from the development will be limited by a hydro-brake with a peak discharge of 2 l/s/ha. This will reduce the effects of the development on the local drainage network further reducing the risk of downstream flooding. The likelihood of the proposed development resulting in pluvial flooding downstream of the site is therefore considered extremely low.

3.4.4 Overland flooding from surrounding areas

A map showing all flood events within close proximity of the subject site is provided below in Figure 8. No single or recurring flood events are recorded in the area of the subject site.



Figure 8 Past Flood Events

3.4.5 Overland flooding from the subject site

Positive drainage in the form of gullies and ACO drains as well as SUDS systems such as permeable paving and swales will be provided to collect and discharge rain falling on hard standing areas to the attenuation tanks. External pavement will be laid so that water will be directed away from building entrances towards the drainage gullies and channels. Building maintenance will be responsible for ensuring the gullies and channels are kept free of debris and therefore, the risk to both the development and the surrounding areas from overland flooding from the development is considered low.

3.5 Groundwater

Source

On-site groundwater is a potential source of flooding but unlikely due to the elevated location of the site.

Pathway

During periods with extreme prolonged rainfall groundwater might come to the surface and flood the proposed development.

Receptor

The receptor is the proposed development with a ground floor level of 89.25 mOD, a lower ground floor level of 84.20 mOD and a basement level of 81.75mOD. The lowest level at which tidal water could enter the proposed development would be from Carmanhall Road at a level of 84.00 mOD and along the Inner Street which will have a minimum level of 84.5mOD. All ventilation and other openings below this level will be bunded to a minimum level of 84.5 mOD.

Likelihood

The likelihood of ground water flooding for the subject site is remote as the site is located in a relatively elevated area.

Consequence

The consequence of ground water flooding would be the damage to property and loss of amenity.

Risk

For the subject site, there is a low risk of ground water flooding.

Flood Risk Management

In the event of ground water flooding on site, this water can escape from the site in a south-westerly direction.

3.6 Human / Mechanical Errors

Source

The subject site and surrounding roads are served by an existing foul water drainage system and a separate surface water drainage system.

All foul water from the sanitary fittings within the proposed development will be discharged by gravity to the foul water drainage system located under the surrounding public roads. Surface water drainage from the car parks at lower ground level will also be discharged by gravity to the foul water drainage system.

Surface water from the roofs and paved areas will be stored in an underground attenuation tank and discharged at a controlled rate to the existing surface water drainage system located under the surrounding public roads.

It is not expected that there will be any drainage pumps in the foul or surface water drainage systems at the proposed development.

Pathway

In the absence of any pumps, there is no pathway between source and receptor.

Receptor

The receptor is the proposed development with a ground floor level of 89.25 mOD, a lower ground floor level of 84.20 mOD and a basement level of 81.75mOD. The lowest level at which tidal water could enter the proposed development would be from Carmanhall Road at a level of 84.00 mOD and along the Inner Street which will have a minimum level of 84.5mOD. All ventilation and other openings below this level will be bunded to a minimum level of 84.5 mOD.

Likelihood

The likelihood of a flood occurring on the subject site due to mechanical error is remote.

Consequence

In the event of a blockage in either of the drainage systems, the consequence would be the damage to property and loss of amenity.

Risk

Although the risk of flood due to blockage of the drainage systems is low, there is a risk of a limited flood if the maintenance of the drainage systems is carried periodically and completed in accordance with good practice.

Flood Risk Management

In the event of flooding on site due to a blockage of either drainage system, the floodwaters would be contained within the car parks at lower ground level.

No flood route has been identified to date for the escape of foul or surface water from the basement at lower ground floor level.

4. Drainage Impact Assessment

APPENDIX A

From: DLR Municipal Services,
Drainage Planning,
Level 3,
County Hall.

To: DLR Planning Department
Ger Ryan, Senior Planner
Miguel Sarabia Executive Planner

Re: PAC/SHD/276/21

Site Location: Former Avid Technology International Site, Carmanhall Road, Sandyford Industrial Estate, Dublin 18
Drainage Planning report

Drainage Planning Report

As the SHD process does not provide for Further Information the applicant should be advised to consult with and reach agreement with the Drainage Planning Section of Municipal Services on surface water drainage proposals for this site in advance of the lodgment (subject to the consent of An Bord Pleanála following this stage of the process) of a planning application.

Flood Risk Assessment -Report

The site is located in Sandyford Business District and though while not located in either Flood Zone A or B a Site Specific Flood Risk Assessment has been provided, as flooding is predicted for the 0.1% AEP event on roads bounding the site, Carmenhall Road and Blackthorn Road.

1. As standard, a surcharge analysis of the surface water drainage system will be required with commentary on the significance, if any, of possible surcharges with reference to the freeboard used in the calculations. Analysis to determine the impact of a 50% blockage in the surface water drainage system has been done, however the details of the analysis have not been included in the report. The applicant shall provide the analysis and should be referenced in the Site Specific Flood Risk Assessment.

Signed: _____

Johanne Codd
Executive Engineer
Drainage Planning

Date: _____

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5. Conclusions and Recommendations

The subject site has been analysed for risks from flooding from the Irish Sea / Dublin Bay, the Carysfort Maretime Stream, the internal and external surface water network, ground water and failures of mechanical systems.

Through careful design and appropriate mitigation measures, the risks and consequences of flooding have been mitigated across the development.

The Flood Risk Assessment is summarised in Table 4 below.

Table 5 Summary of the Flood Risks from each flooding type.

Source	Pathway	Receptor	Likelihood	Consequence	Risk	Mitigation Measures	Residual Risk
Tidal	None	People, Property	Remote	None	Low	None Required	Low
Fluvial	None	People, Property	Remote	None	Low	None Required	Low
Foul Water	Drainage network	People, Property	Remote	Possible damage to property and loss of amenity	Low	None Required	Low
Surface Water	Drainage network	People, Property	Remote	Possible damage to property and loss of amenity	Low	None Required	Low
Ground Water		People, Property	Remote	Possible damage to property and loss of amenity	Low	None Required	Low
Human Error Mechanical Error	Drainage network	People, Property	Possible	Possible damage to property and loss of amenity	Low	Required	Low

UK and Ireland Office Locations

