MHL & ASSOCIATES LTD.

For: **Longview Estates Limited**

Proposed Residential Development,
N7 Longview, Ballyvolane, Cork.

Flood Risk Assessment

June 2026

MHL & Associates Ltd.
Consulting Engineers

MHL & ASSOCIATES LTD.

Document Control Sheet

Client	Longview Estates Limited
Project Title	Proposed Residential Development
Project Location	N7 Longview, Ballyvolane, Cork
Document Title	Flood Risk Assessment
Document No.	24083HD-MHL-Longview N7-FRA

Rev	Status	Author	Reviewed By	Approved By	Date
00	Internal Draft	A. Ozkan	S.Moriarty	K. Manley	05/12/2025
01	Draft Issue	A. Ozkan	S. Moriarty	K. Manley	10/12/2025
02	Draft Issue	A. Ozkan	S. Moriarty	K. Manley	10/12/2025
03	Client Issue	A. Ozkan	S. Moriarty	K. Manley	17/06/2026

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1 INTRODUCTION

This FRA has been prepared on behalf of the applicant to accompany a Large-Scale Residential Development (LRD) application for Neighbourhood 7 of the Longview area at Ballyvolane, Cork.

The report is to accompany a Drainage Impact Assessment on the property prepared by MHL Consulting Engineers which considers the overall drainage strategy and the manner in which the site interacts with the existing network.

1.1 Design Details

The site is located at elevated location and does not flood.

The risk of downstream flooding has been raised during the consideration of other planning applications; with respect to run off creating additional loadings.

This will not occur in this instance.

It is proposed to attenuate the scheme using 3 no. tanks, providing sufficient capacity (m3) which is greater than the storage requirement for the 100-year return period plus 20% climate change.

Regarding limiting outflow from the storm network, hydro-brake (or similar approved) flow control devices are to be fitted at the outlet of each attenuation tank.

The GDSDS recommends that the design of the drainage network be assessed using events with a range of different durations to determine the critical event for each period analysed as follows:

- 1 in 30-year return period events were used to ensure no flooding occurs within the site.

- 1 in 100-year return period events were used to ensure that attenuation tanks were sufficiently sized with no flooding occurring. Areas were risk of localised overland flooding present to be managed within the development.

It should be noted that climate change has been accounted in the design. The GDSDS recommends a factor of 20%, which has been incorporated into the design.

The layout of the proposed storm water network is shown in the Proposed Stormwater Sewer layout plans.

In summary, the proposed development will connect to the existing permitted and constructed surface water network and be constrained so that the established discharge rates are not exceeded; and remain less than greenfield.

There is therefore no material change (increase) to the discharge volume at the Ballyhooley Rd discharge point when the new proposed development is added.

Additionally, the runoff volume previously generated from the 7.62 ha development lands will be decreased as the area is catered for by the proposed stormwater network. This means there will be a decrease in the absolute volume of discharge that would have occurred from the development lands.

As per section 16 of the GDRCoP and, compliance with all 4 Criteria is summarised as follows:

Criterion 1 (River Water Quality Protection):

Interception provided by way of:
• Surface water runoff to conveyancing swales which will have partial infiltration.

• Surface water runoff to attenuation tanks which will be equipped with silt chambers and hydrocarbon interceptors.

Criterion 2 (Stream Regime Protection):

Discharge rate restricted to QBAR for all storm events up to and including the 1 in 100-year storm event.

Criterion 3 (Level of service (flooding) for the site):

A review of the Office of Public Works (OPW) Flood Maps website indicates that there are no records of flooding incidents at the site of the proposed development.

Two past flood events, one from January 1988 and one from June 2012, are reported to have occurred south of the site along Ballyhooly road and the Kempton Park area respectively. The report on the 1988 flood indicates that a partial blockage on the Glen Stream north of Mervue Lawn was the cause. The report on the 2012 flood event notes that pluvial flooding occurred in the Kempton Park, Meelick Park, and Park Court housing estates with residents noting that the culvert under the R614 Regional Road and the number of drains within the housing estates were blocked by flood debris.

• No Site Flooding.
• No internal property flooding.
• All FFLs are a minimum of 500mm above adjacent on-site attenuation tanks/infiltration swales.
• Run-off from green areas during high intensity storm events can be catered for in on-site attenuation tanks.

Criterion 4 (River Flood Protection):

Maximum discharge rate of QBAR for all attenuated storage is proposed which is considerably less than the 30-year and 100-year greenfield run-off rates. No reduction in terms of run-off has been allowed for in the sizing of attenuation tanks because of proposed Suds measures.

For the operational phase of the scheme the provision of Suds interception measures will ensure that the first 5mm of rainfall is prevented from discharging from the site. It is often the case that the initial run-off from roads and hard pavement areas has a concentration of pollutants. This first-flush is being addressed on site thus ensuring the quality of the receiving waters is not impacted.

The storm water management proposals for the site have been informed by the relevant standards and comply with best practice in terms of Suds (Sustainable Urban Drainage Design). By providing the measures as outlined, the impact of the proposed development on the Hydrological area has been minimised and results in a reduction in the existing greenfield runoff rate for the site

Abbreviations

AEP Annual Exceedance Probability
AFA Area for Further Assessment
CFRAM Catchment Flood Risk Assessment and Management
DoHELG Department of the Environment, Heritage and Local Government DTM Digital Terrain Model
FB Freeboard
FFL Finish Floor Levels
FRA Flood Risk Assessment
FSR Flood Studies Report
GSI Geological Survey of Ireland
LiDAR Light Detection and Ranging
NIFM National Indicative Fluvial Mapping
OPW Office of Public Works
PFRA Preliminary Flood Risk Assessment
RR Rainfall-Runoff
RMS Root Mean Square
SAAR Standard Average Annual Rainfall (mm) SFRA Strategic Flood Risk Assessment
SuDS Sustainable Urban Drainage System
WL Water Level

2 BACKGROUND

Under the Planning System and Flood Risk Management Guidelines for Planning Authorities (DoEHLG & OPW, 2009), the proposed development must undergo a Flood Risk Assessment (FRA) where;

1. Action

Increases in flood risk as a result of new development may be caused: Upstream by restricting the capacity and conveyance function of the watercourse and floodplain system;

1. Response

The proposal will connect to the existing permitted and constructed surface water network and be constrained so that the established discharge rates are not exceeded; and remain less than greenfield.

There is therefore no material change (increase) to the discharge volume at the Ballyhooley Rd discharge point and a decrease in the absolute volume of discharge that would have occurred as the 7.62 Ha greenfield site is now developed and attenuated to better than greenfield discharges.

2. Action

or Downstream by decreasing the volume available for flood storage on the floodplain, altering flow routes on the floodplain or by changes to the channel which can increase the flow discharged to downstream locations;

2. Response

Not applicable

3. Action

and by increasing run-off due to changes in land management and introducing surfaces with reduced permeability, such as roads, roofs and car parks

3. Response

The proposal will connect to the existing permitted and constructed surface water network and be constrained so that the established discharge rates are not exceeded; and remain less than greenfield runoff rates.

There is therefore no material change (increase) to the discharge volume at the Ballyhooley Rd discharge point and a decrease in the absolute volume of discharge that would have occurred as the 7.62 Ha greenfield site is now developed and attenuated to better than greenfield discharges

2.1 Terms of Reference

MHL Consulting Engineers was appointed to prepare a Flood Risk Assessment (FRA) having regard to the above controlled run off scenario for an elevated site to illustrate / review findings of other recent FRA's locally that have identified / considered Flood Risk where there are measures put in place to control flows / discharges to watercourses.

2.2 Flood Risk Assessment Aims and Objectives

This study is being completed to inform the future development of the site as it relates to flood risk. It aims to identify, quantify and communicate to Planning Authority officials and other stakeholders the risk of flooding to land, property and people and the measures that would be recommended to manage the risk.

The objectives of this FRA are to:

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

Recommendations for development have been provided in the context of the 2009 OPW / DECLG planning guidance, "The Planning System and Flood Risk Management". A review of the likely effects of climate change, and the long-term impacts this may have on any development has also been undertaken.

For general information on flooding, the definition of flood risk, flood zones and other terms see 'Understanding Flood Risk' in Appendix A.

3 SITE DESCRIPTION

This section describes the proposed development site located off the Ballyhooley Road, Ballyvolane, Co. Cork; it has no watercourses. The site is located at the top of a hill and is proposed to discharge surface water via an existing network of drains established by the Longview Estates scheme. This has a permitted, controlled discharge and the flows from this proposal are attenuated and designed to keep the final discharge to the same rate.

3.1 Site Location

The site is located within the fringe of the northern suburbs of Cork City and is approximately 7.62 ha.

Houses and housing estates dominate the landscape to the east and west while agricultural lands lie to the south and east. The Cork Inner Northern Distributor Road is to pass to the south of the site, between this scheme and the Arderrow Scheme to the south, and the lands immediately west of the site will be park land that will be taken by the City Council in due course for amenity uses.

The River Bride (Cork City) is approximately 2.0km to the south west and a tributary of the Bride, the Glennamought, is approximately 1.5km to the northwest. A small stream is also present along the Ballyhooly Road which and continues towards the city until it discharges into the Bride River.

Figure 3.1 shows the site location and nearby watercourses.

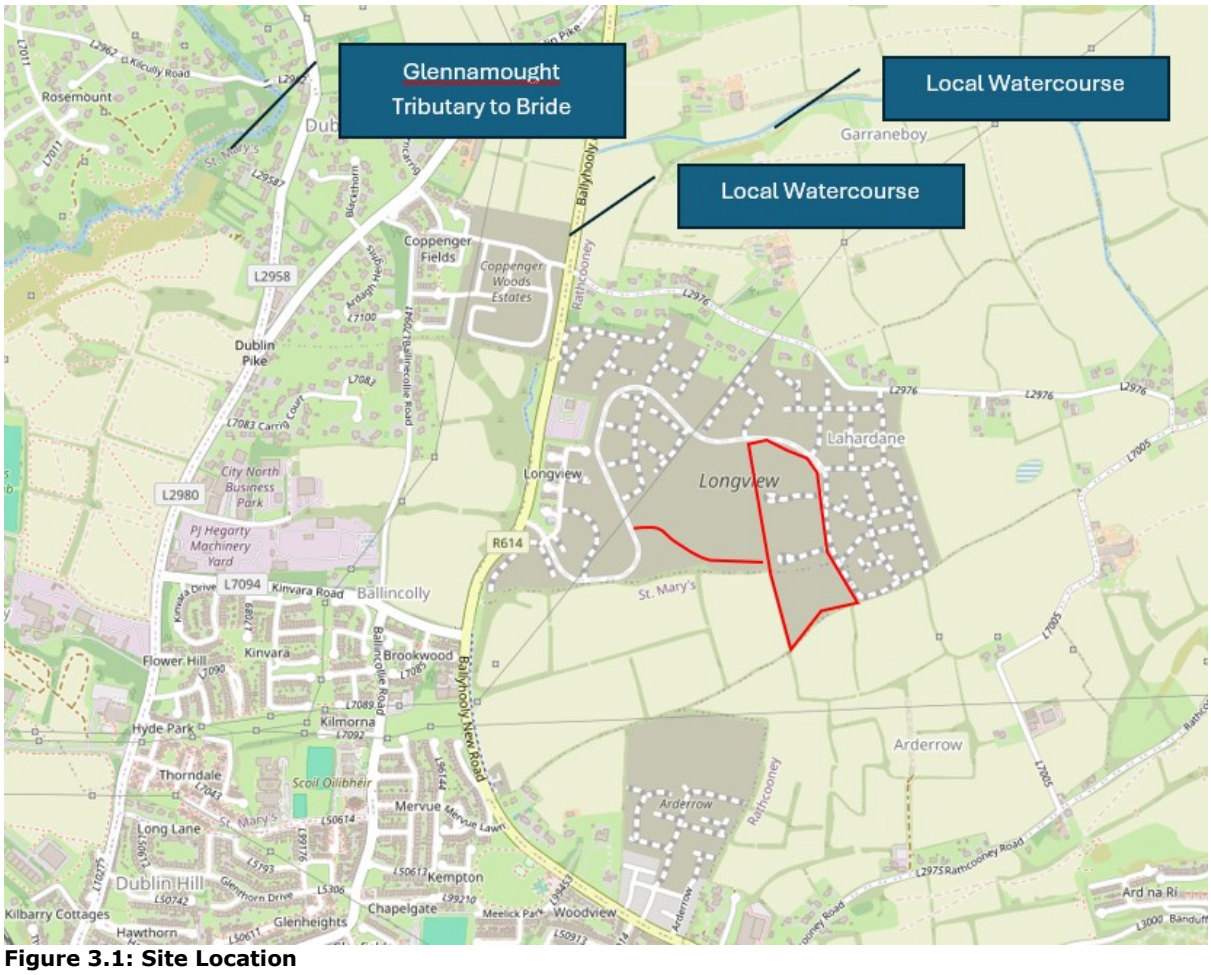


Figure 3.1: Site Location

3.2 Watercourses

There are no primary or secondary watercourses within or near the site.

3.3 Site Topography

The surrounding landscape slopes westwards towards the River Bride (Cork City), which is approximately 2.0km to the south west of the proposed development site. The site is located on the eastern side of a valley that is formed either side of the Ballyhooley Rd.

3.4 Site Geology

The Geological Survey of Ireland (GSI) groundwater and geological data viewer of the site and local area were reviewed. The subsoil within the site consists of till derived chiefly from sandstone. No alluvium type soils were noted along the site stream. The presence of alluvium could indicate historic flooding; however, no alluvium deposits are recorded (see Figure 1.2).

The underlying bedrock is classified as purple mudstone and sandstone. There are no karst features located within the site or surrounding area.

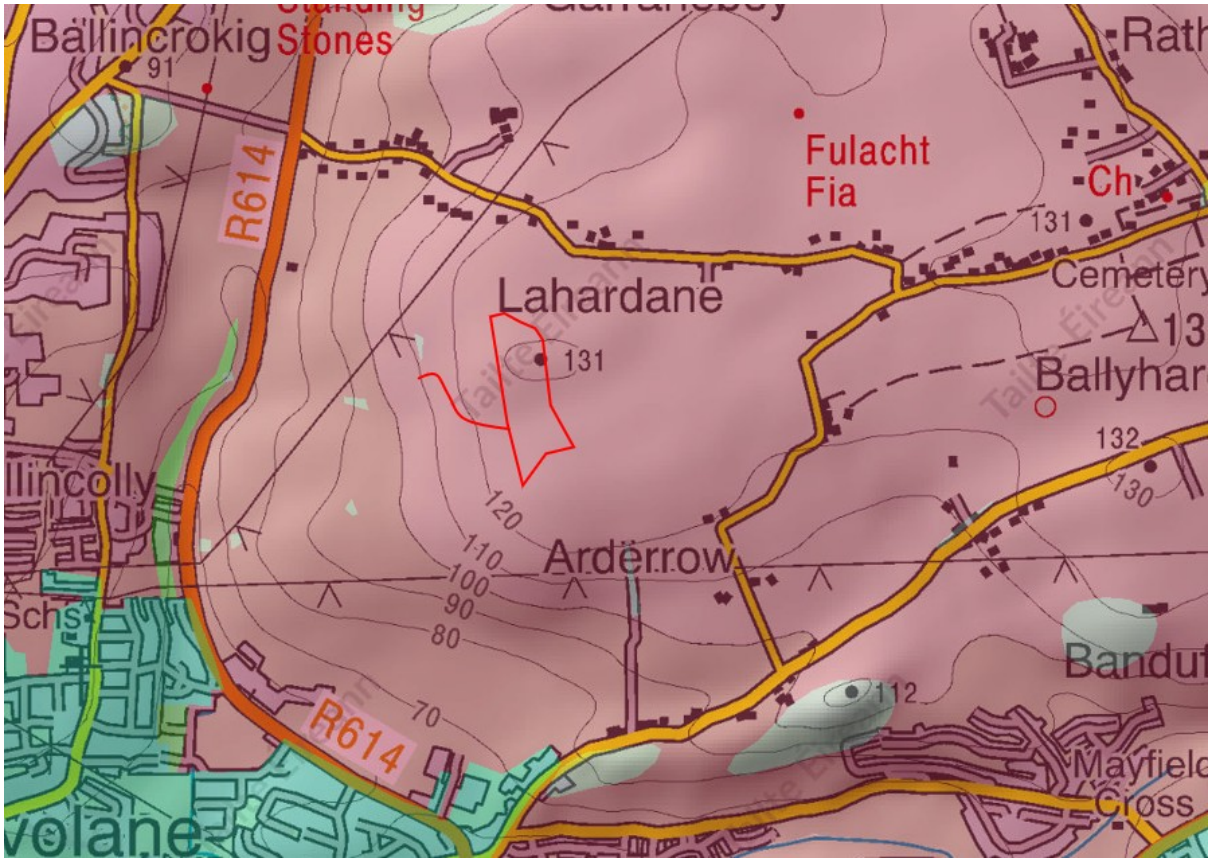


Figure 3.2: Subsoil Map (source: GSI)

4 FLOOD RISK IDENTIFICATION

An assessment of the potential for and scale of flood risk at the site is conducted using historical and predictive information. This identifies any sources of potential flood risk to the site and reviews historic flood information. The findings from the flood risk identification stage of the assessment are provided in the following sections.

Further detail on the Planning Guidelines and technical concepts are provided in Appendix A.

4.1 Flood History

A number of sources of flood information have been reviewed to establish any recorded flood history at, or near the site. This includes the OPWs national flood information portal, www.floodinfo.ie, and general internet searches.

a) Floodinfo.ie

The OPW host a national flood hazard mapping website, www.floodmaps.ie, which highlights areas at risk of flooding through the collection of recorded data and observed flood events. See Figure 4.1 for historic flood events in the area.

A review of Figure 4.1 does not show any instances of flooding at the site from the watercourse present.

There are two recorded flood events within 1km of the site.

- Flood ID - 12867:

An estimated 50mm of rain fell overnight in Cork City on 28/06/2012 causing many rivers to burst their banks. Among the affected areas was Ballyvolane. There is no other specific information provided for this flood point.

- Flood ID - 4744:

Complaints of flooding received on 12/01/1988 relating to blocked gullies.

- Flooding at Mervue Lawn and Meelick Park - Storm Babet 18/10/2023

Due to heavy rains during Storm Babet, overtopping of the stream and inundation of stormwater networks resulted in severe flooding of Ballyhooly road particularly at the entrances to Mervue Lawn and Meelick Park.

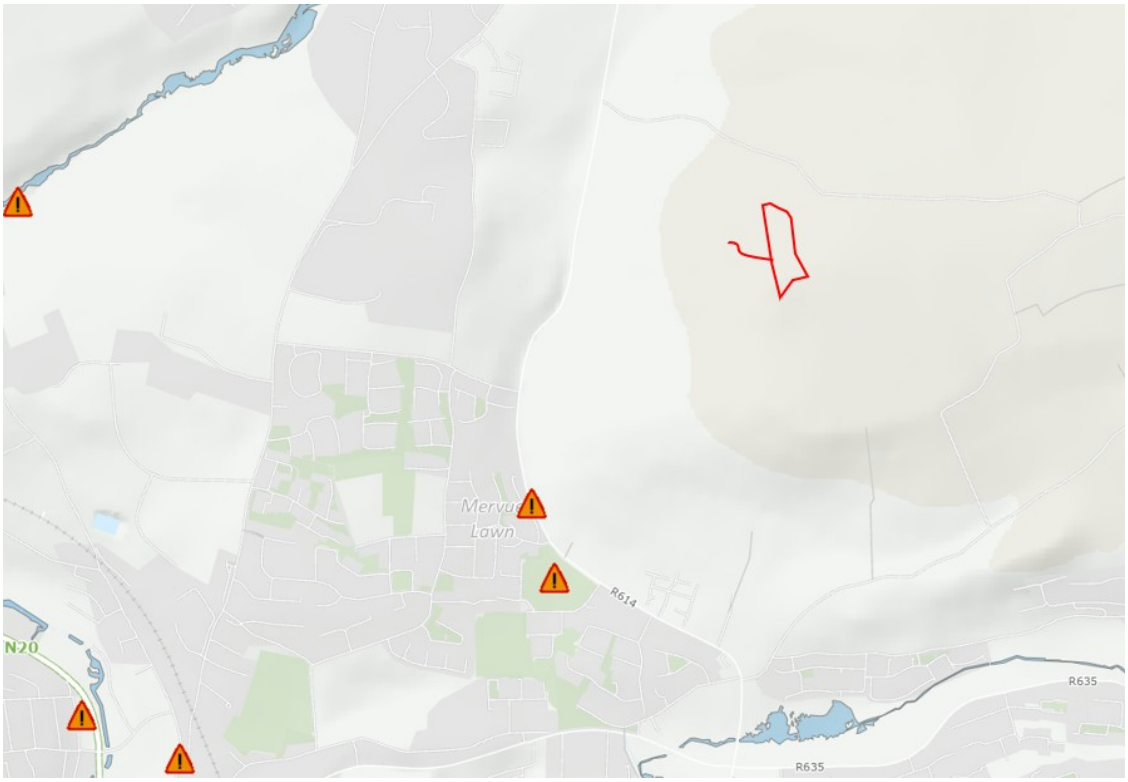


Figure 4.1: Historical flooding within 1km approx. of the proposed development (source: Floodinfo.ie)

Figure 4.2: Flooding at the entrance of Mervue Lawn, Ballyhooly Rd looking south

Figure 4.3: Flooding during Storm Babet at the entrance to Meelick Park, Ballyhooly Road, looking north

b) Internet Search

An internet search was conducted to gather information about whether the site was affected by flooding previously. No flooding incidents were recorded at the site; however, several news sources had reported on the flash flooding that occurred in June of 2012 all of which mention Ballyvolane as an affected area.

A review of the Preliminary Flood Risk Assessment (PFRA) mentions a pluvial flood event in the Ballyvolane area. The cause of the flooding was a result of blockage of the storm-water drainage system.

4.2 Predictive Flood Mapping

The site has not been subject to predictive flood mapping / modelling study. The closest mapped watercourse is the River Bride to the west and south of the site (detailed below).

Southeastern Catchment Flood Risk Assessment and Management Study (CFRAM).

The closest existing source of data that may be utilised to identify flood risk to this site is the Southeastern CFRAM. The CFRAM consists of detailed hydraulic modelling of rivers and their tributaries. Flood maps have been finalised for Cork City and the surrounding

area, but the flood extents that have been modelled do not reach the site, as can be seen in Figure 4.4.

Figure 4.4: CFRAM Flood Map (with site location indicated)

4.2.1 National Indicative Fluvial Mapping

The National Indicative Flood Mapping (NIFM) is the second generation of spatial flood data available at a national level. It supersedes the Preliminary Flood Risk Assessment (PRFA) in terms of data quality and accuracy and allows for improved assessment of flood risk, particularly in areas outside of zones designated as Areas for Further Assessment (AFAs).

The NIFM Study did not include assessment of the site stream. Only parts of the Glennamought River were assessed, as shown in Figure 4.5.

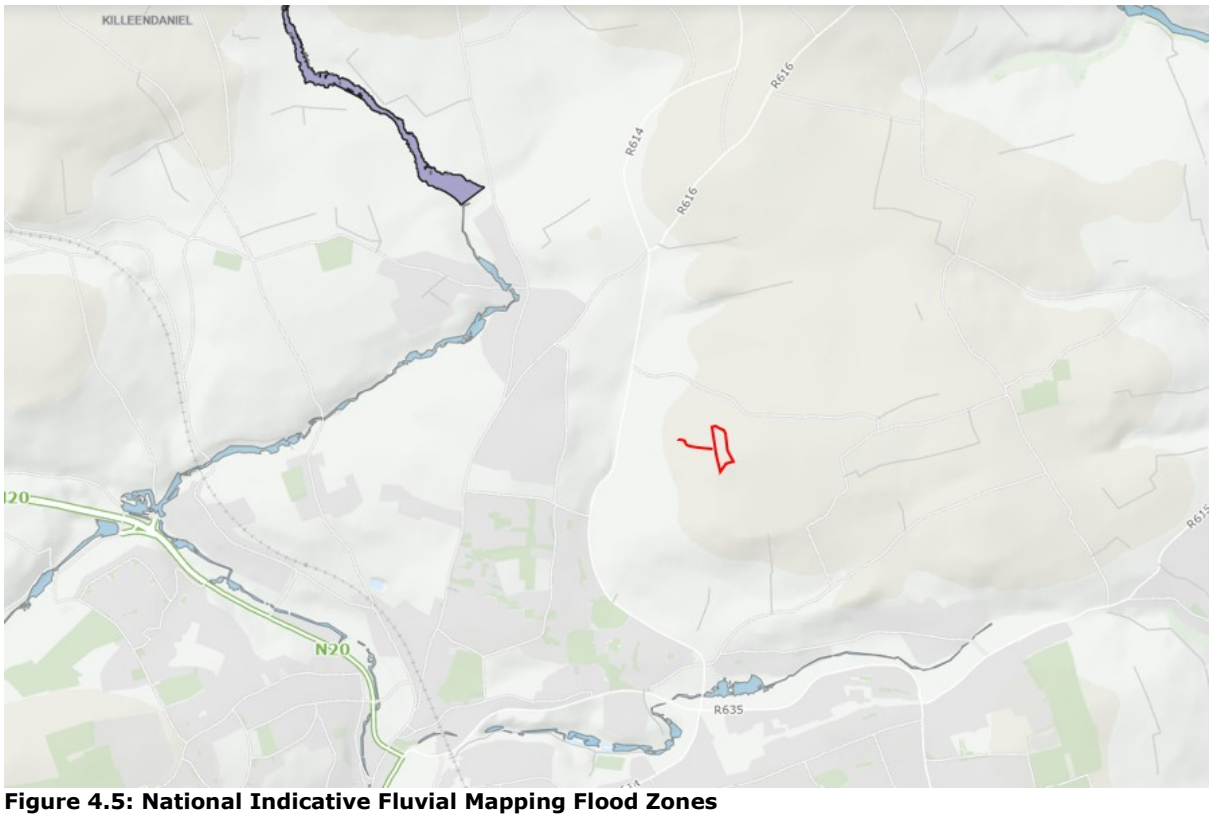


Figure 4.5: National Indicative Fluvial Mapping Flood Zones

4.2.2 Cork City Development Plan Strategic Flood Risk Assessment 2022-2028

The overarching guidance document governing the development at the site is the Cork City Development Plan (CDP) 2022-2028.

The document sets out a number of policies relating to flood risk and stormwater management, which are used to guide development.

The Ballyvolane area is identified in the Plan as an area for future growth including residential, employment, local services, and open space development. Specific zoning of lands in northern city centre environs is detailed in the Cobh Local Area Plan.

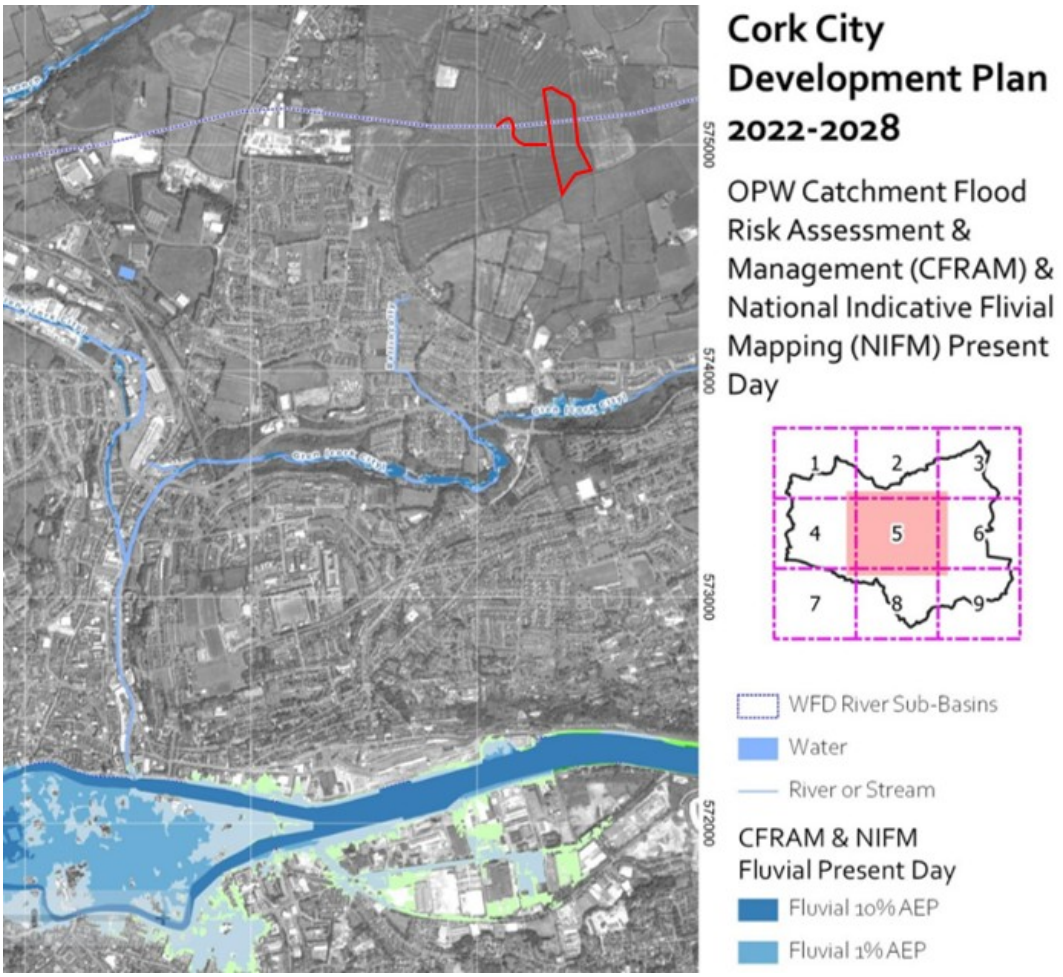


Figure 4.6: Cork City SFRA Flood Zones

4.2.3 Cobh Municipal District Local Area Plan 2017

The proposed site is zoned for school development in the Cobh MD LAP. The Strategic Flood Risk Assessment for the area places the site in Flood Zone C and appropriate for development.

4.3 Sources of Flooding

The initial stage of a Flood Risk Assessment requires the identification and consideration of probable sources of flooding. Following this initial phase of this Flood Risk Assessment, it is possible to summarize the level of potential risk posed by each source of flood source is described below.

4.3.1 Fluvial

Due to the elevated location of the site there is no flood risk from watercourses.

4.3.2 Pluvial

Pluvial or surface water flooding is the result of rainfall-generated flows that arise before run-off can enter a watercourse or sewer.

There is always the risk that change in land cover could result in an increase in speed of runoff and therefore an increase in flood risk to neighbouring lands. Therefore, it is important to consider all aspects of the site as well as existing drainage works.

Adequate finished floor levels, a surface water management strategy and maintenance plan for the drains are important for the management of surface water flood risk at the site were that applicable in a low lying location adjacent to a watercourse.

The stormwater management measures proposed to mitigate this risk have been reviewed and will be discussed further in Section 5.

4.3.3 Coastal

Due to the location of the proposed development site, the risk of coastal flooding has been screened out of further assessment.

4.3.4 Groundwater

Groundwater flooding results from high sub-surface water levels that impact upper levels of the soil strata and overland areas that are usually dry. The GSI maps were reviewed and do not indicate groundwater flooding at the site or surrounding area. Based on this information, there is a low risk of groundwater flooding at the site.

5 DETAILED FLOOD RISK ASSESSMENT

Given the location of the site in relation to the receiving stream and in particular their relative elevations there is no flood risk to the site. The primary flood risk that may be generated by the site is that it could generate a downstream flood risk due to increases in run off. Detailed flood risk assessments have been carried out on the receiving stream as part of nearby applications, the findings of which have been noted.

In this instance the storm water discharge from the site is controlled to greenfield run-of rate prior to entering into the existing storm network constructed as part of the Longview Scheme. There is no warrant to provide a detailed flood risk assessment for the proposed scheme.

5.1 Flood Risk Assessment and Mitigation

There is no flood risk to the site.

The primary flood risk that may be generated by a site such as this is that it could generate a downstream flood risk due to increases in run off.

In this instance, there is no flood risk from an increased level of run off as the discharge rates from the single Longview surface water discharge does not exceed the permitted levels as the flows are constrained. These are set out in the submitted Drainage Impact Assessment.

5.2 Access

Flooding is an existing occurrence along parts of Ballyhooly Road upstream and downstream of the site. The proposed site entrance remains in Flood Zone C under both the 1% and 0.1% AEPs post-development (as per the findings of recent Flood Risk Assessments carried out on adjoining sites).

However, blockages in the area of the proposed culvert results in overtopping of the left bank and flooding of the Ballyhooly Road adjacent to the site. Flood depths range from 0.005 -0.21m at the site entrance and along the Ballyhooly Road.

5.3 Residual Risk

There is no residual risk from the site.

5.4 Storm Water Design

Onsite surface water will be managed through the development's proposed SuDS features and stormwater drainage system. Surface water will discharge via the existing Longview surface water drainage infrastructure.

The proposal includes attenuation tanks, swales and tree pits and green roofs in places. A Hydro-brake flow control device will be installed downstream of attenuation tanks to manage and restrict all outflow to established rates. All stormwater shall convey through

the cellular storage before discharging from site through the Longview Site to the Ballyhooly Rd Stream.

The stormwater drainage strategy has been set out in the submitted Drainage Impact Assessment.

5.5 Climate Change

The assessment of flood risk to the proposed development as a result of climate change is based on the Medium-Range Future Scenario (MRFS) and High-End Future Scenario (HEFS) which represent 20% and 30% increases in peak flood flows under the 1% AEP event, respectively. The results show that the development is not at risk as a result of climate change. Finished Floor Levels (FFLs) are set with an appropriate freeboard as discussed earlier.

6 THE JUSTIFICATION TEST FOR DEVELOPMENT MANAGEMENT

6.1 Strategy

As the development is partially located in Flood Zone C, no Justification Test has been undertaken.

6.2 Conclusion

MHL Consulting Engineers has undertaken a Flood Risk Assessment for the proposed housing development having regard to FRA's prepared for adjacent schemes.

The stream running through the site along the Ballyhooly road was not included in OPW flood mapping studies (CFRAM or NIFM), however, there are reports and photos available of flooding that occurred in 2023 along Ballyhooly Road and at the entrances to Mervue Lawn and Meelick Park during Storm Babet.

This confirms that downstream reaches of the waterbody into which the site flows are susceptible to flooding and blockage of the Mervue Lawn Culvert, and therefore it is critical to robustly assess any potential negative impacts that may occur due to any development upstream of this location.

A review of the hydraulic model show that the development the subject of this application is within Flood Zone C and at low risk of flooding.

The Ballyhooly Road experiences flooding upstream and downstream of the site under the pre-development scenario. The proposed surface water management to be adopted as part of this application implies that there will be negligible changes to flood extents, peak flows, and water levels across the channel in a post development scenario.

Current design FFLs for housing has an adequate freeboard.

7 APPENDIX A: UNDERSTANDING FLOOD RISK

Flood risk is generally accepted to be a combination of the likelihood (or probability) of flooding and the potential consequences arising. Flood risk can be expressed in terms of the following relationship:

Flood Risk = Probability of Flooding x Consequences of Flooding

A.1 Probability of Flooding

The likelihood or probability of a flood event (whether tidal or fluvial) is classified by its Annual Exceedance Probability (AEP) or return period (in years). A 1% AEP flood has a 1 in 100 chance of occurring in any given year.

In this report, flood frequency will primarily be expressed in terms of AEP, which is the inverse of the return period, as shown in the table below and explained above. This can be helpful when presenting results to members of the public who may associate the concept of return period with a regular occurrence rather than an average recurrence interval and is the terminology which will be used throughout this report.

Table A-1: Conversion between return periods and annual exceedance probabilities

Return period (years)	Annual exceedance probability (%)
2	50
10	10
50	2
100	1
200	0.5
1000	0.1

A.2 Flood Zones

Flood Zones are geographical areas illustrating the probability of flooding. For the purposes of the Planning Guidelines, there are 3 types or levels of flood zones, A, B and C

Table A-2: Flood Zones

Zone	Description
Flood Zone A	Where the probability of flooding is highest; greater than 1% (1 in 100) from river flooding or 0.5% (1 in 200) for coastal/tidal flooding.
Flood Zone B	Moderate probability of flooding; between 1% and 0.1% from rivers and between 0.5% and 0.1% from coastal/tidal.
Flood Zone C	Lowest probability of flooding; less than 0.1% from both rivers and coastal/tidal.

It is important to note that the definition of the flood zones is based on an undefended scenario and does not take into account the presence of flood protection structures such as flood walls or embankments. This is to allow for the fact that there is a residual risk of flooding behind the defences due to overtopping or breach and that there may be no guarantee that the defences will be maintained in perpetuity.

A.3 Consequence of Flooding

Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc.).

The 'Planning System and Flood Risk Management' provides three vulnerability categories, based on the type of development, which are detailed in Table 3.1 of the Guidelines, and are summarised as:

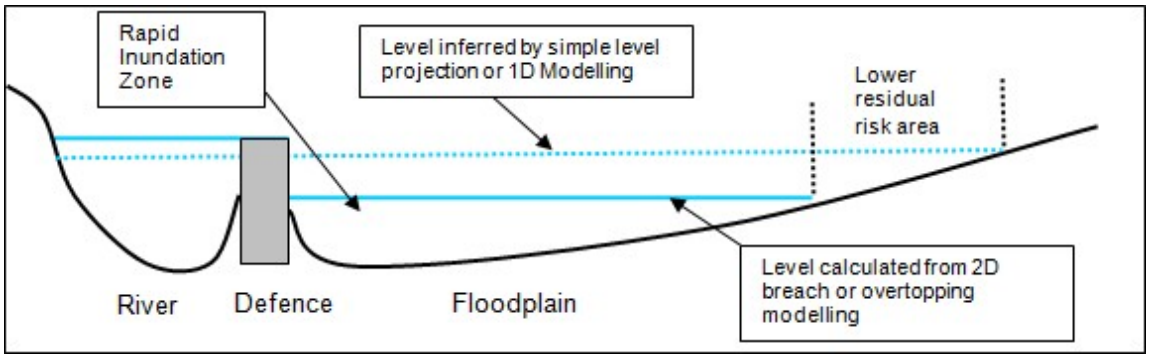
Highly vulnerable, including residential properties, essential infrastructure and emergency service facilities;

Less vulnerable, such as retail and commercial and local transport infrastructure; Water compatible, including open space, outdoor recreation and associated essential infrastructure, such as changing rooms.

Low vulnerable such as car parks and playing pitches.

A.4 Residual Risk

The presence of flood defences, by their very nature, hinder the movement of flood water across the floodplain and prevent flooding unless river levels rise above the defence crest level, or a breach occurs. This is known as residual risk.



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