Ringwood Phase 2 Blarney, Co. Cork

Flood Risk Assessment

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Abbreviation

AEP	Annual Exceedance Probability
CDP	County Development Plan
CFRAM	Catchment Flood Risk Assessment and Management
DoHELG	Department of the Environment, Heritage and Local Government
DTM	Digital Terrain Model
EPA	Environmental Protection Agency
FB	Freeboard
FFL	Finish Floor Level
FRA	Flood Risk Assessment
FSR	Flood Studies Report
GSI	Geological Survey of Ireland
GWB	Groundwater Body
HEFS	High-End Future Scenario
LiDAR	Light Detection and Ranging
NIFM	National Indicative Fluvial Mapping
OPW	Office of Public Works
PFRA	Preliminary Flood Risk Assessment
RMS	Root Mean Square
RR	Rainfall-Runoff
SAAR	Standard Average Annual Rainfall (mm)
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Urban Drainage System
TII	Transport Infrastructure Ireland
WL	Water Level

1 Introduction

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) to ensure sustainability and effective management of flood risk.

1.1 Terms of Reference

JBA Consulting was commissioned by Coakley O'Neill Town Planning to prepare a Site-Specific Flood Risk Assessment (FRA) for the proposed large-scale residential development at Ringwood, Shean Upper, Blarney, Co. Cork. This assessment also addresses the comments issued by Cork City Council in their LRD Opinion, with relevant extracts provided in Appendix B.

1.2 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.
- Specifically respond to the points raised in the FI request noted above.

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.

1.3 Proposed Development

The proposed development will consist of a large-scale residential development (LRD), representing Phase 2 of development in the Blarney East / Ringwood Expansion Area, and comprising the construction of (i) 323 no. residential dwellings comprising of 157 no. terraced, end-of-terrace, and detached houses (including 129 no. 3-bed and 28 no. 4-bed units); 52 no. duplexes provided in 5 no. 3-storey buildings (including 26 no. 2-bed and 26

no. 3-bed units) and 114 no. apartments provided in 2 no. 5-storey buildings (including 54 no. 1-bed and 60 no. 2-bed units); (ii) a primary care centre, over 2 stories and 1,724sqm in area, incorporating GP services (iii) the refurbishment and redevelopment of existing farm outbuildings for conversion to a retail/pharmacy use, 80sqm in area, and café/restaurant use, 380sqm in area; (iv) a new access roadway into the site from the R617 with associated pedestrian and cyclist infrastructure, which will form the 1st phase of the proposed Stoneview Access Link Road, (v) a new signalised junction on the R617 road which will provide a single lane approach to the west and a two lane approach to the east, comprising one lane for through traffic on the R617 and a right turn lane for traffic turning into the site, and associated footpath improvements and cycle lane provision (vi) a new signalised junction at the R617 and Killard Road junction which will provide a two lane approach from the west, one lane for through traffic heading eastbound on the R617 and a right turn lane onto the Killard Road, with associated footpath improvements and pedestrian and cyclist infrastructure; (vii) a new signalised junction on Station Road that reflects the junction permitted under the Phase 1 LRD scheme (Reg. Ref. 2443031); (viii) private, communal, and public open spaces and hard and soft landscaping, boundary treatments and amenity areas, including a new wetland public amenity area, (ix) drainage works and nature-based SuDS measures (x) foul sewer infrastructure, including 1no. pump station, the diversion of existing foul and water sewers and other new network works, (xi) car parking, including EV charging points, bicycle parking, and motorcycle parking bays (xii) 2no. substations, all associated ancillary site, drainage and development works.

The proposed development as described above will hereafter collectively be referred to as the “Proposed Development. Figure 1-1 presents the layout of the residential areas, and Figure 1-2 illustrates the overall site boundary, including the residential and service areas, open spaces, and access roads.

1.4 Report Overview

Section 2 outlines the study area, planning and policy context, relevant watercourses, local topography, and site geology. Section 3 presents flood history and provides detailed identification of flood risk. Section 4 discusses site-specific flood risk and proposed mitigation measures, with the conclusion set out in Section 5.



Figure 1-1 Proposed Development: residential area



Figure 1-2: Proposed Development Site Layout

2 Background

This section describes the receiving environment of the Proposed Development in the context of the Blarney area, focusing on local watercourses, geology, and the wider geographical setting relevant to flood risk assessment.

2.1 Location

The Proposed Development site is located approximately 500 m northeast of Blarney town centre and 7.5 km northwest of Cork City. The site is bounded by agricultural land to the north, south, and east, and by existing residential development to the west. It adjoins the eastern side of Ringwood, at a distance of approximately 75 m. The N20 Blarney Bypass defines the eastern site boundary. Blarney Business Park lies to the east, directly across the N20, while the Cork–Dublin railway line is situated approximately 400 m northeast of the site, beyond the N20 corridor.

Access to the site is provided by two existing agricultural entrances: one from Local Road Station Road L2784 along the western boundary and another from the Regional Road R617 Shean Lower to the south.

The Proposed Development and its local context are illustrated in Figure 2-1.

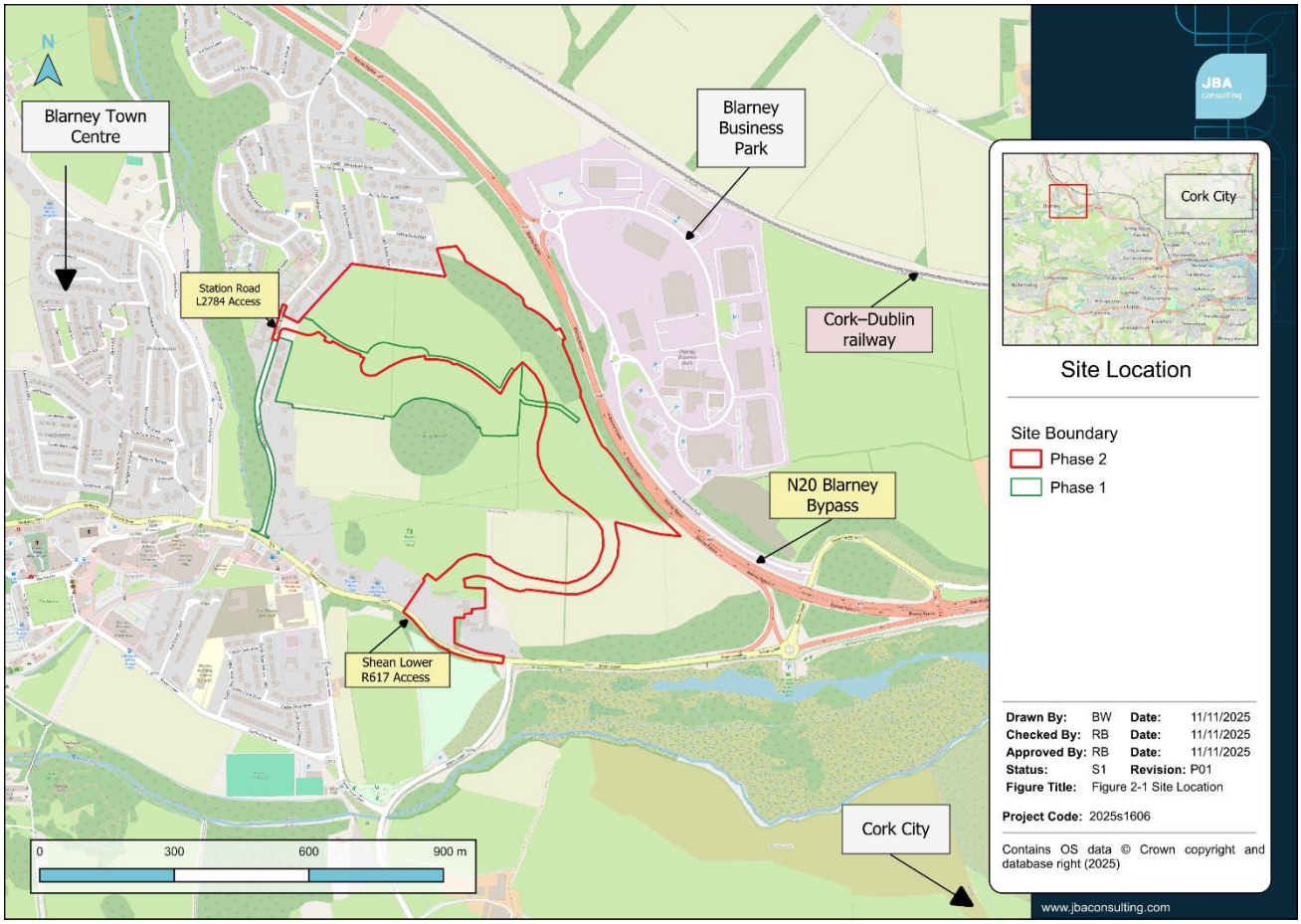


Figure 2-1 Site Location

2.1.1 Cork City Development Plan 2022 – 2028.

The *Cork City Development Plan 2022–2028* (CCDP) is the primary statutory planning document guiding development within the Cork City administrative area, including Blarney and its hinterland. The Proposed Development site comprises several zoning designations, as shown in (Figure 2-2).

- **ZO 1 – Sustainable Residential Neighbourhoods**: This area accommodates the proposed new signalised junction and access roadway from the R617, forming the first phase of the Stoneview Access Link Road.
- **ZO 2 – New Residential Neighbourhoods**: This zoning covers the main residential and service areas, including the proposed dwellings, primary care centre, and supporting community and commercial uses.
- **ZO 15 – Public Open Space**: This area corresponds to the existing Wetwood that will be retained as part of the open-space network.
- **Long-Term Strategic Development Land**: This area is designated for future growth beyond the current Plan period and is identified in the Proposed Development as the location of the new wetland public amenity area.

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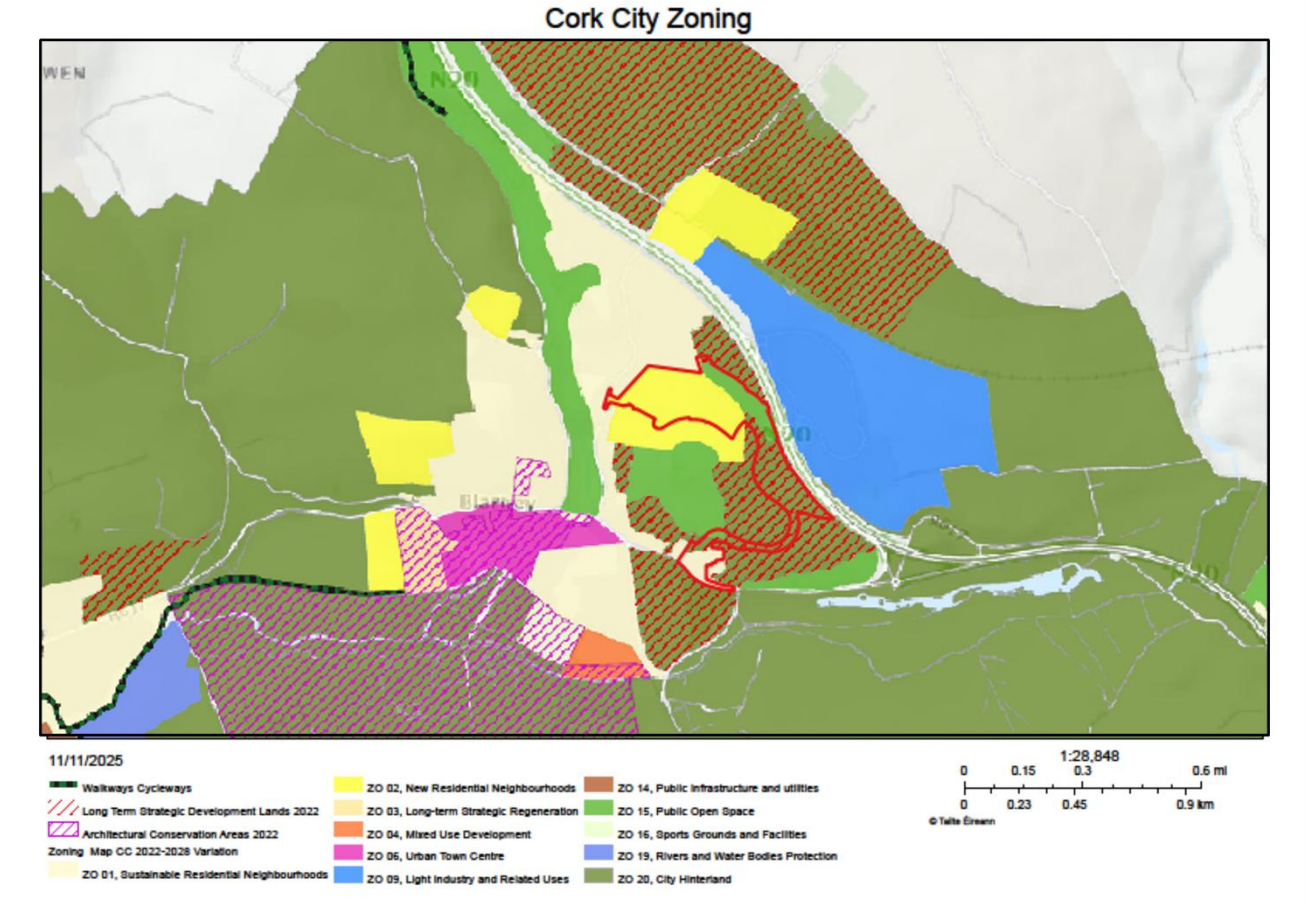


Figure 2-2 Extract Zoning Map Cork City Development Plan: Blarney and Hinterland

The CCDP identifies Blarney as a key location for compact growth within the metropolitan area. In this context, the following objectives provide the strategic framework for development in Blarney East and its hinterland:

- **Objective 10.63 Blarney East – Ringwood Expansion Area**. To support the compact growth and development of Blarney East / Ringwood as a strategic consolidation and expansion area identified in the Core Strategy.
- **Objective 10.67 Blarney Hinterland.** To consolidate future development within the defined town boundary and maintain the hinterland between Blarney and Tower and Kerry Pike, respectively.

In addition to zoning designations, the CCDP sets out several policy objectives relevant to the management of surface water and the consideration of flood risk. The Plan recognises that increased rainfall intensities, fluvial and pluvial flooding, and rising sea levels pose a significant risk to Cork City and its environs. The CCDP is informed by a Strategic Flood Risk Assessment (SFRA), which supports implementation of the *Planning System and Flood Risk Management Guidelines for Planning Authorities* (DoEHLG 2009; Circular PL2/2014). The CCDP SFRA is discussed further in Section 3.2.1.

2.1.2 The N/M20 Cork to Limerick Project

The *N/M20 Cork to Limerick Project* is a key consideration for the Blarney area. The scheme forms part of the *National Development Plan (Project Ireland 2040)* and aims to deliver a safer and more efficient transport corridor between Cork and Limerick. The project is currently at Phase 3 – Design and Environmental Evaluation, with a planning application to *An Bord Pleanála* anticipated in 2026 following Government approval of the Business Case.

The developing design adjoins the eastern boundary of the Proposed Development. The available drawings indicate that the existing culverted section of the Shean Upper Stream along this boundary is proposed to be daylighted as part of the N/M20 works, with only short culverted lengths retained at road crossings. Under the current proposed design, the entire reach of the stream crossing the Proposed Development site would be reinstated as open channel. Figure 2-3 the relevant section of the stream that is proposed for daylighting.

Given the two projects overlap, it is important that the Proposed Development design remains aligned with the finalised N/M20 design once confirmed. Further commentary on this matter is provided in Appendix B.1 – N20/M20 Project Office.

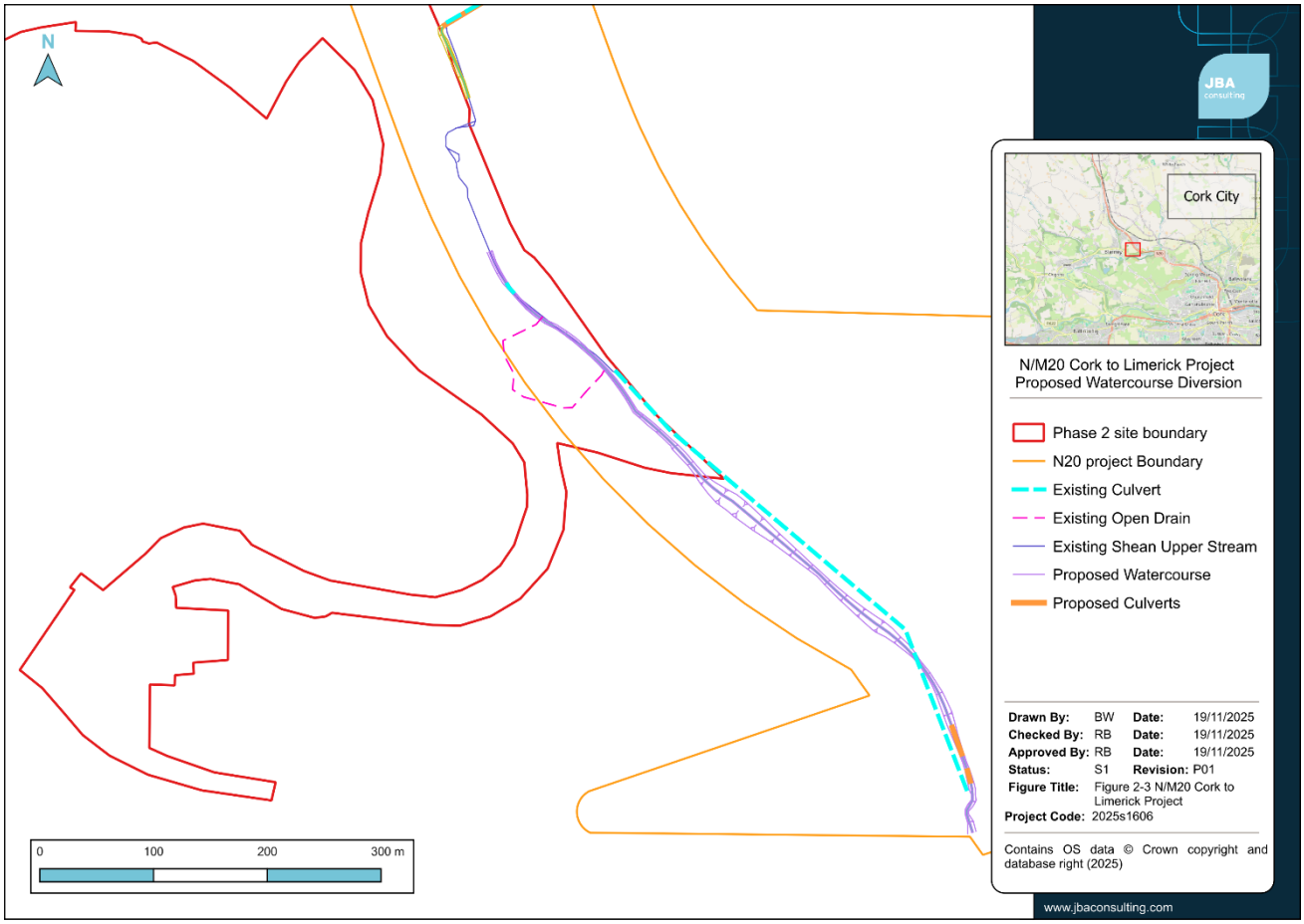


Figure 2-3 Developing design plan for the N/M20 Cork to Limerick Project (section overlapping the Proposed Development site boundary).

2.2 Watercourses

Two main rivers are located in the vicinity of the Proposed Development (Figure 2-4): the River Blarney, including its tributary the Shean Upper Stream, and the River Martin.

2.2.1 River Blarney

The River Blarney flows east to west approximately 150 m south of the Proposed Development site. It originates approximately 9 km upstream, located about 5 km north of the site in a straight-line distance, and its upper and middle reaches primarily traverse agricultural land.

2.2.2 Shean Upper Stream

A minor tributary of the River Blarney, known as the Shean Upper Stream, flows along the eastern boundary of the Proposed Development. The stream traverses the site before continuing south through agricultural fields adjacent to the N20. It then passes beneath the R617 and the N20 slip road before joining the River Blarney approximately 600 m downstream of its crossing at the site boundary.

The Shean Upper Stream contains a culverted footbridge within the site and is further culverted downstream along the site boundary. An open drainage channel within the proposed development connects to the Shean Upper Stream. The *Inland Fisheries Ireland (IFI) Opinion* (Appendix B.1) advises that no interference should occur with existing culverts, drainage features, or watercourses as part of the proposed works. Accordingly, it is anticipated that the design of the proposed wetland amenity area will integrate and retain the existing open drain and culvert network to maintain current hydrological connectivity and comply with IFI guidance.

2.2.3 River Martin

The Martin River lies to the west of the Proposed Development, flowing southwards towards its confluence with the River Blarney. It rises approximately 12 km north of the site (about 13.8 km upstream of its nearest point) and flows mainly within a narrow vegetated corridor parallel to the N20, bounded by the road and adjacent farmland. The Martin River is located approximately 130 m west of the site, separated by Station Road and existing residential properties. Downstream of this point, the river continues south to its confluence with the River Blarney.

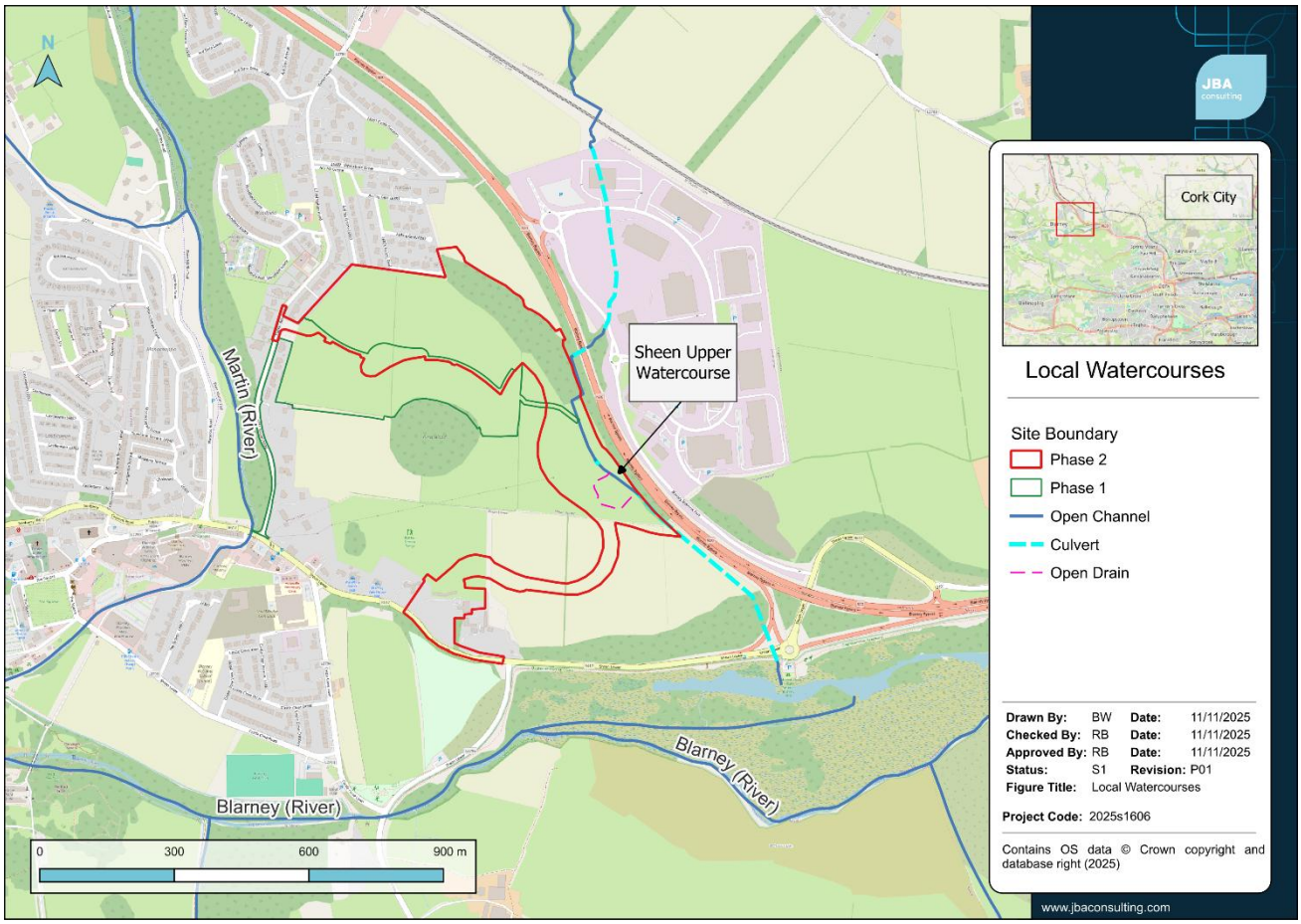


Figure 2-4: Local Watercourses

2.3 Local Topography

LiDAR data for the study area were obtained from Transport Infrastructure Ireland (TII), captured between May 2010 and May 2011, and accessed via the Open Topographic Data Viewer. The 2 m resolution dataset covers the majority of the Proposed Development site, as shown in Figure 2-5, and forms part of the Ireland Aligned LiDAR collection.

The site topography is variable and defined by a distinct elevated area at Ringwood, which forms a prominent hilltop feature in the local landscape. To the west, ground levels fall steeply by approximately 20 m from Station Road towards the River Martin, while to the east, a more gradual slope extends from around 60 mOD to 50 mOD over a distance of approximately 120 m towards the Shean Upper watercourse.

The south-eastern portion of the site, traversed by the Shean Upper Stream, is lower-lying at around 45 mOD and has been identified for the proposed wetland recreation area within the development.

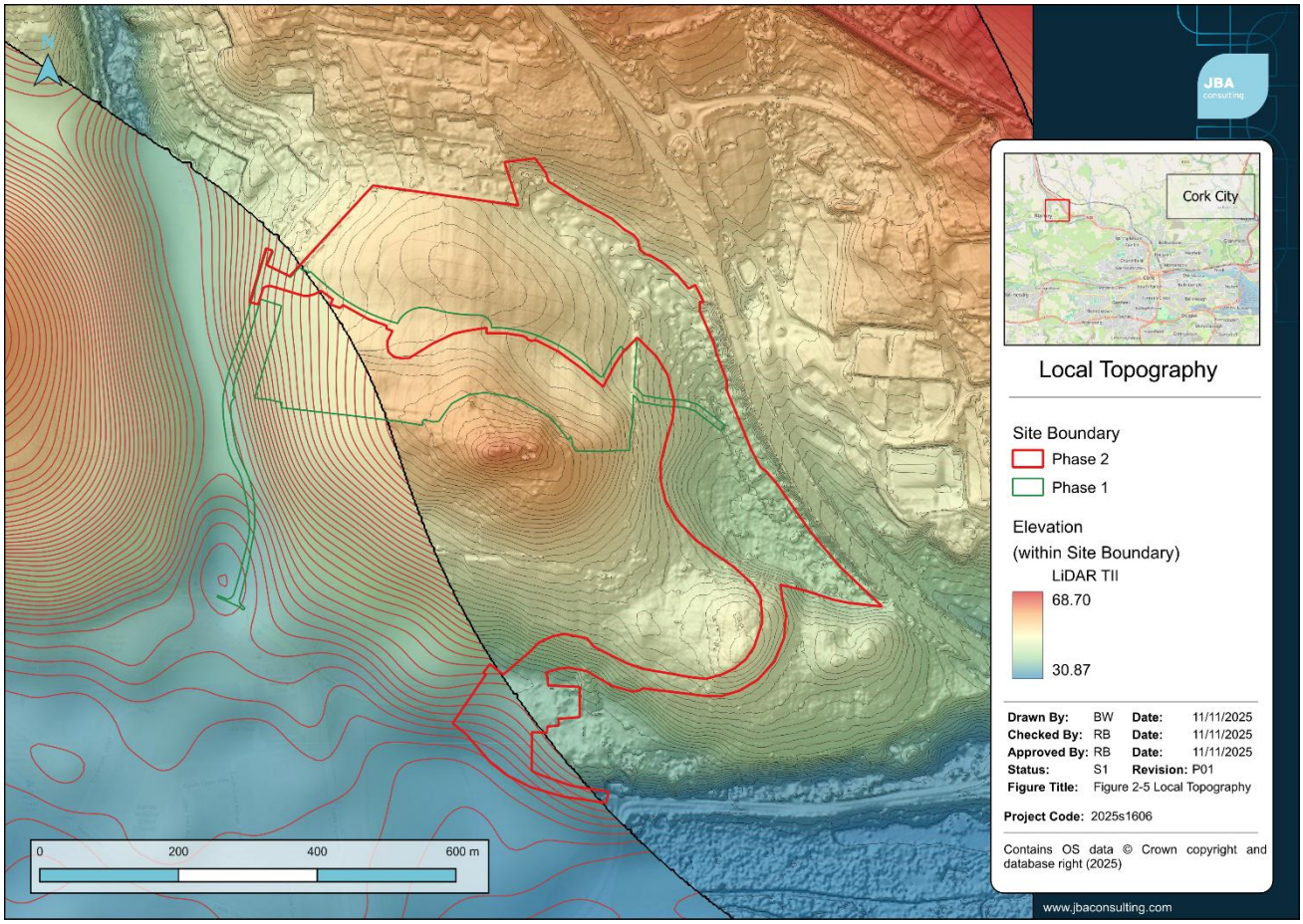


Figure 2-5 Local Topography

2.4 Site Geology

The subsoils underlying the site are predominantly well-drained mineral soils, indicating good infiltration potential and a relatively low susceptibility to pluvial (surface water) flooding under natural conditions. The subsoils of the Proposed Development site are shown in

Figure 2-6. Localised areas of Made Ground may impede infiltration and alter surface drainage patterns, resulting in a slightly increased risk of ponding following heavy rainfall.

The underlying Gyleen Formation and Cuskinny Member bedrock, comprising sandstone, mudstone, and siltstone, are typically of moderate permeability, while the Ballysteen Formation and Waulsortian Limestones present in the southern part of the site may exhibit karstic features that enhance groundwater movement.

Overall, the geological and subsoil conditions suggest a moderate infiltration capacity and a low likelihood of groundwater or pluvial flooding, except where localised impermeable surfaces or Made Ground are present.

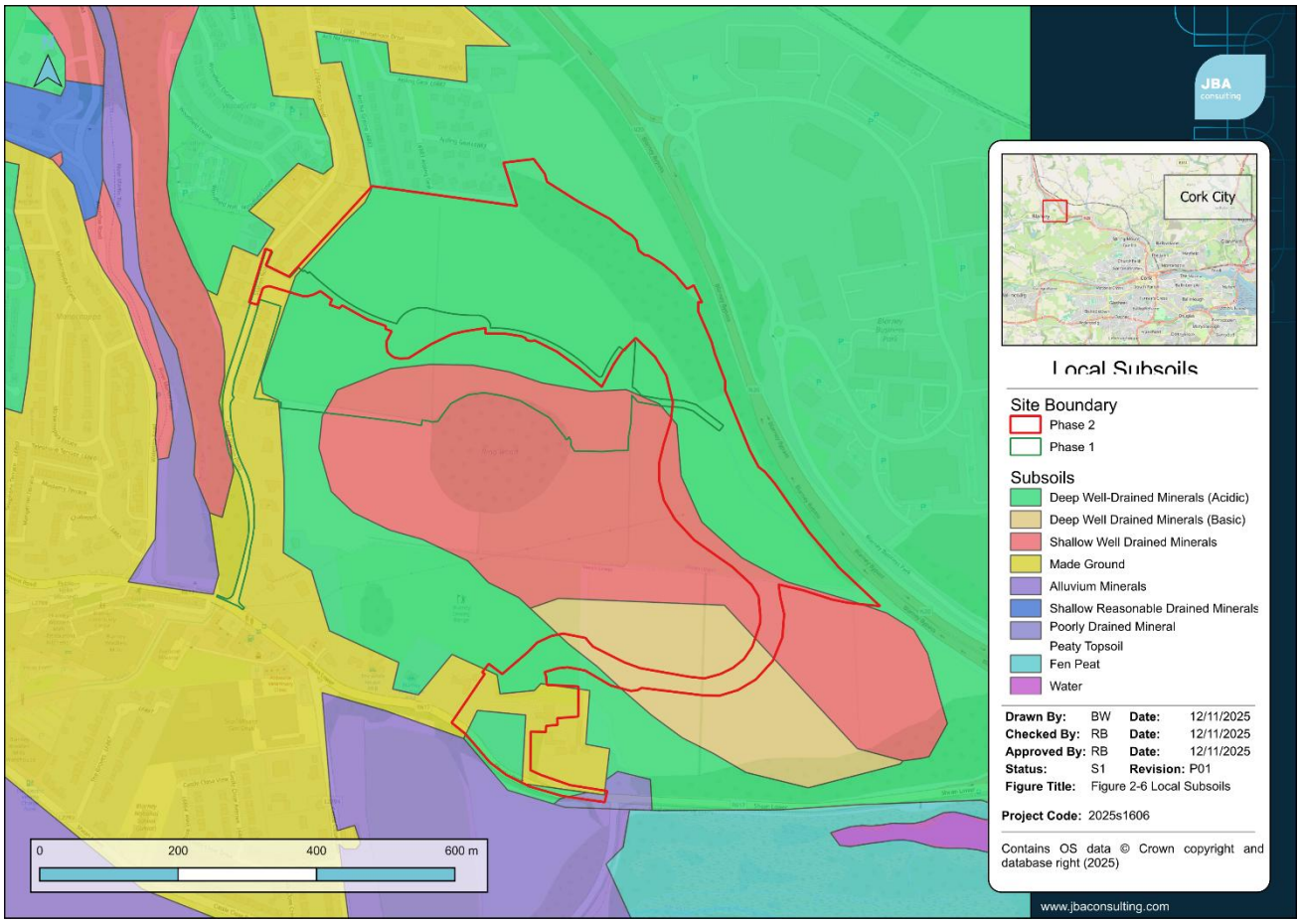


Figure 2-6: Local Subsoils

3 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 historical 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 is provided in Appendix A.

3.1 Flood History

A number of information sources were reviewed to determine whether any historic flooding has occurred at or near the site. These include online searches, the OPW national flood information portal (www.floodinfo.ie), and datasets published by the Geological Survey Ireland (GSI).

3.1.1 Internet Searches

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.

3.1.2 Floodinfo.ie

The Office of Public Works (OPW) maintains a national flood hazard mapping portal *www.floodinfo.ie* that records historical flood events and mapped flood extents across Ireland. A review of this database identified four recorded flood events in the vicinity of the Proposed Development site. A summary of these events is presented in Table 3-1, with their approximate locations shown in Figure 3-1.

Table 3-1 Overview Flood Events (source: Floodinfo.ie)

Overview Flood Events and Extents
Flood Event ID-1477, February 1990. Martin Blarney Village Cork Feb 1990 - River Martin flooding in Blarney village
Flood Event ID-1525, November 2000 Martin River Waterloo Junction Blarney Nov 2000 - Road and land flooding – Putlands Bridge to Waterloo Junction as a result of the River Martin flood flows.
Flood Event ID-5239, November 2000 Martin River Blarney Shamrock Terrace Nov 2000 - Blarney – Shamrock Terrace – houses flash flooded
Flood Event ID-3614, recurring N20 at Dairygold, Co. Cork recurring - Road flooding on N20 at Dairygold factory
Flood Event ID-14064, 23 February 2021 Flooding at Blarney Castle

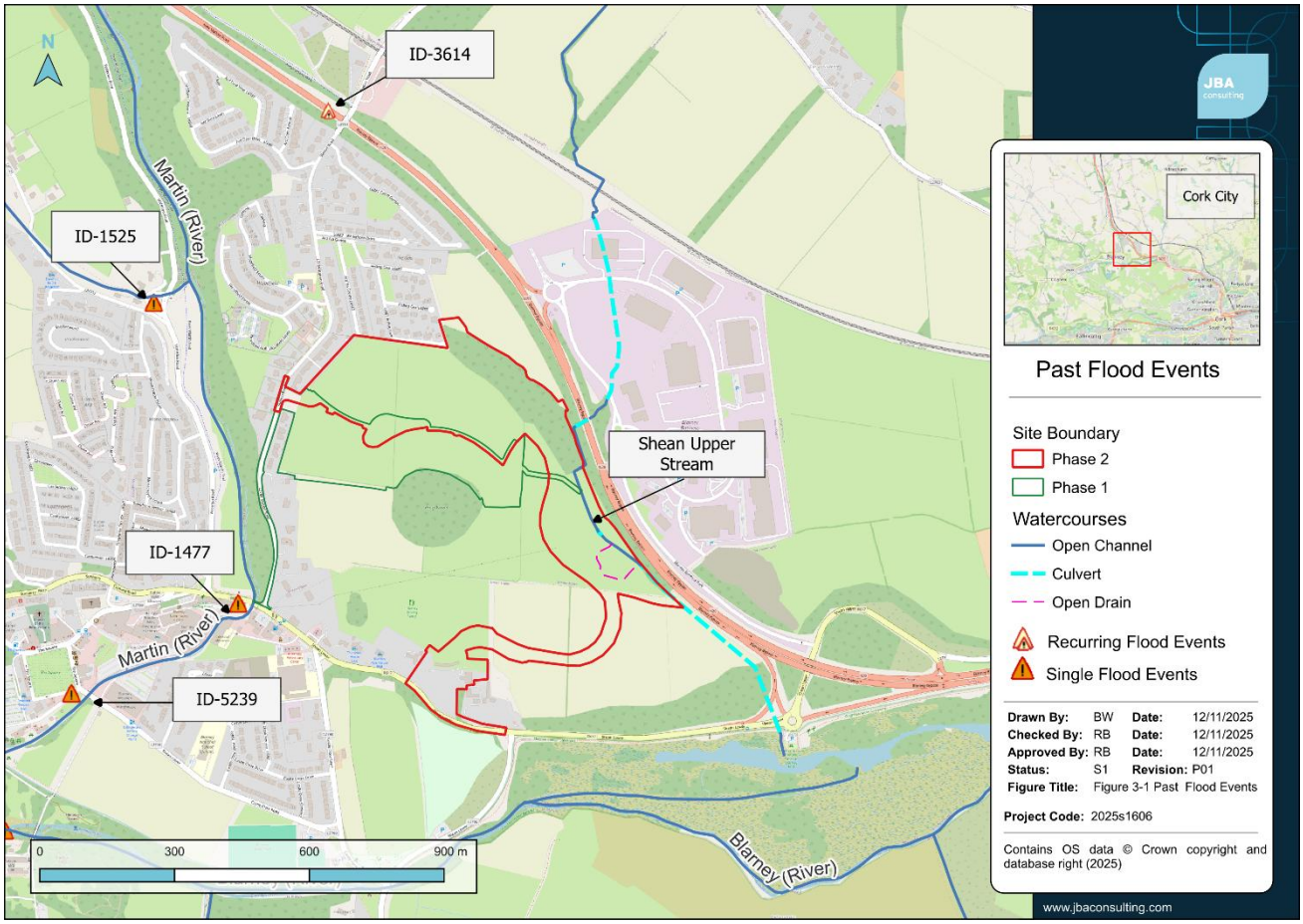


Figure 3-1 Past flood events within the vicinity of the development site

3.1.3 Historic Groundwater flooding

The GSI Historic Groundwater Flood Map illustrates the maximum observed extent of groundwater flooding, primarily derived from the winter 2015–2016 flood event, which was one of the most extensive on record in many parts of Ireland. The mapping focuses on groundwater-driven flooding in karst landscapes, developed using Synthetic Aperture Radar (SAR) imagery supported by additional evidence. It should be noted that this dataset is limited to areas where groundwater flood patterns were detectable and could be reliably mapped (primarily seasonally flooded wetlands known as turloughs).

A review of the mapping indicates that no historic groundwater flooding has been recorded on or in the vicinity of the Proposed Development site.

3.1.4 Historic Surface water flooding

The GSI applied a similar methodology to develop a Winter Surface Water Flood Map, representing fluvial and pluvial flooding in non-urban areas since the 2015–2016 flood event. In addition, Seasonal Surface Water Flood Maps were produced using multi-temporal SAR data to capture the extent and frequency of surface water flooding across different seasons.

A review of these datasets indicates no recorded surface water flooding within the site boundary. However, the mapping shows a low-confidence indication of potential surface water ponding on the greenfield areas located opposite the R617 (Lower Shean Regional Road), as illustrated in Figure 3-2.

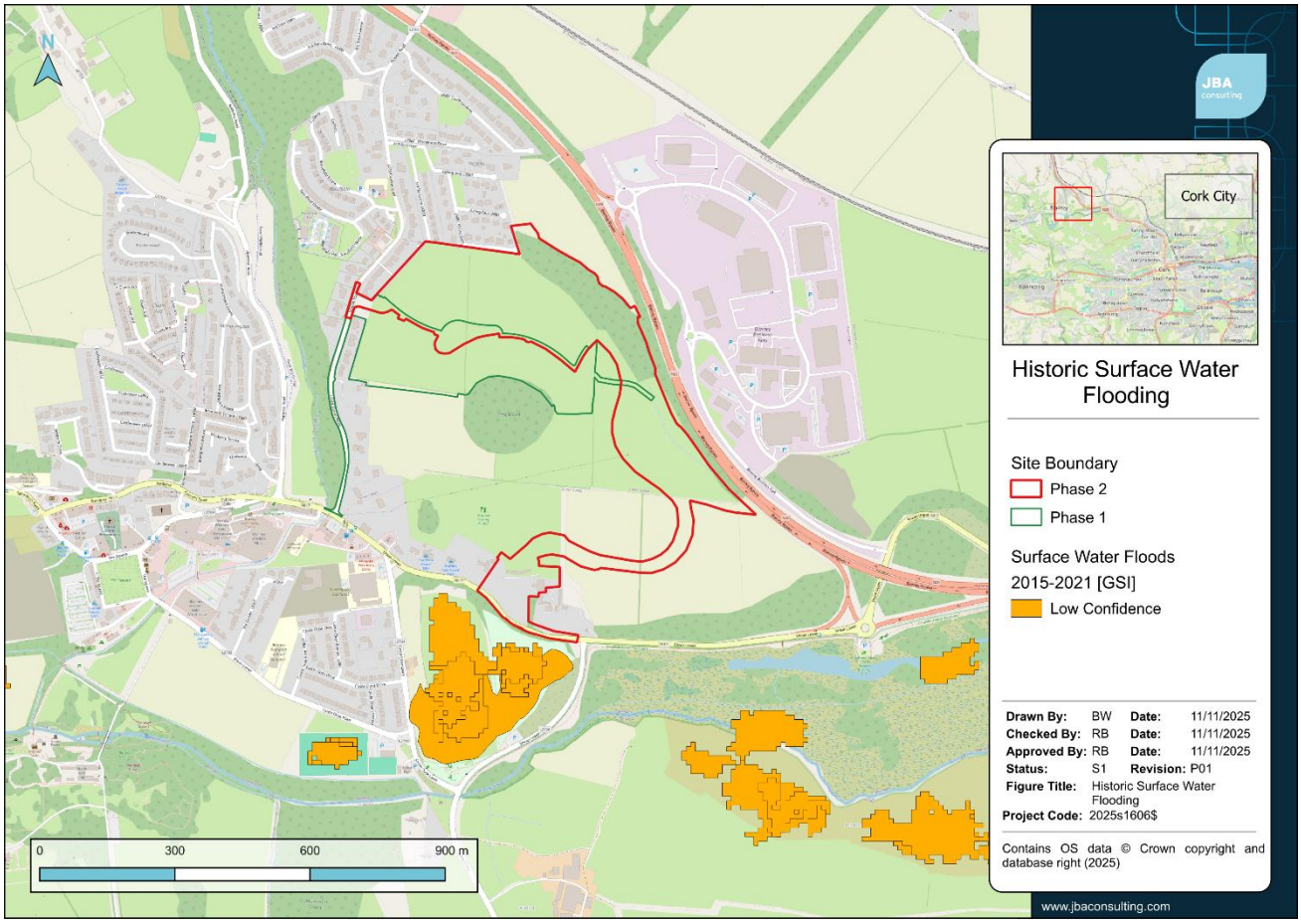


Figure 3-2 Historic Surface water flooding (source: GSI)

3.2 Predictive Flood Mapping

The wider area has been subject to predictive flood mapping or modelling studies and other related studies and plans.

- Cork City Development Plan 2022-2028 Strategic Flood Risk Assessment
- National Indicative Fluvial Mapping (NIFM)
- Lee Catchment Flood Risk Assessment and Management Study (CFRAM)
- Ringwood Phase 1 – Flood Risk Assessment (JBA Consulting)
- Predictive Groundwater Flood Mapping – GSI Projects

The Lee CFRAM Study represents the most detailed assessment of fluvial flood risk for the River Martin and River Blarney, while the *Ringwood Phase 1 Flood Risk Assessment* provides the most detailed hydraulic modelling available for the Shean Upper Stream, which flows along the eastern boundary of the Proposed Development site.

3.2.1 Cork City Development Plan 2022–2028 – Strategic Flood Risk Assessment

The Cork City Development Plan (CCDP) *Strategic Flood Risk Assessment* (SFRA) manages flood risk in accordance with *The Planning System and Flood Risk Management Guidelines for Planning Authorities* (OPW, 2009).

The SFRA flood mapping, shown in Figure 3-3, indicates that the majority of the Proposed Development site lies within Flood Zone C, with a low-lying area in the southeastern corner identified as Flood Zone A. This corresponds with the local topography, where levels fall towards the Shean Upper Stream, and aligns with the location of the proposed wetland recreation area.

Both site access points, Station Road to the west and Shean Lower Road to the east, are situated within Flood Zone C.

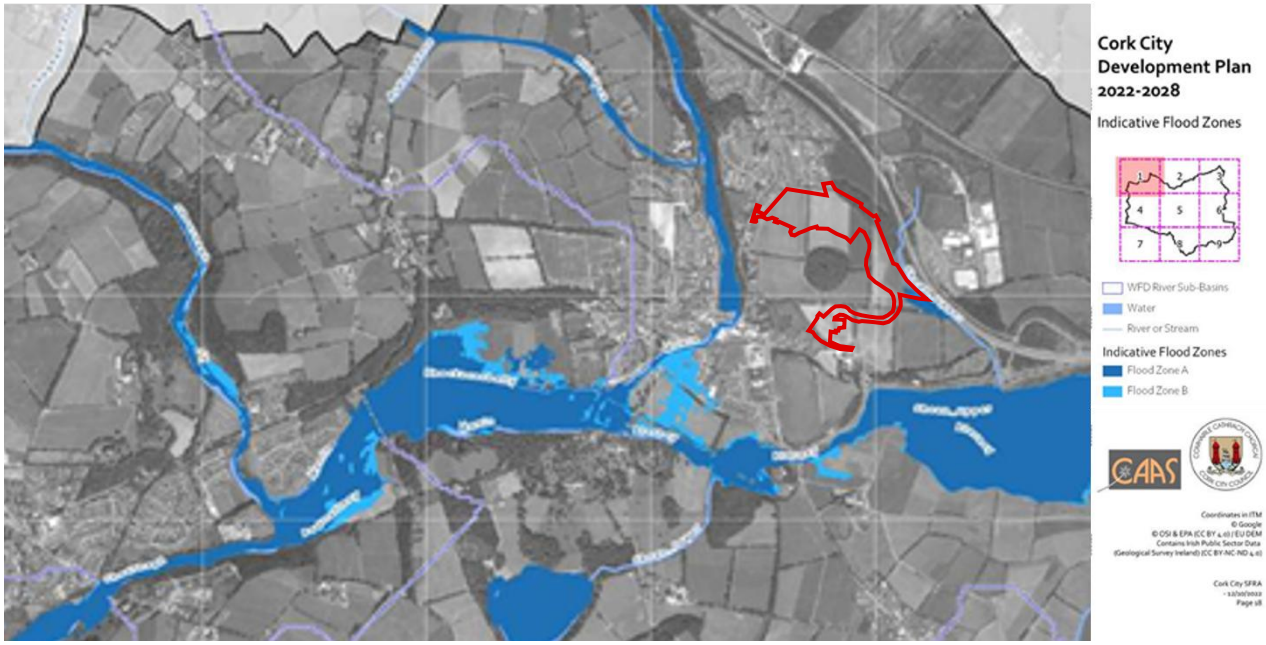


Figure 3-3 Extraction modified from Cork City Development Plan SFRA Flood Zones

3.2.2 Lee Catchment Flood Risk Assessment and Management Study (CFRAM)

The Office of Public Works (OPW), in partnership with Cork City Council and Cork County Council, undertook a catchment-based flood risk assessment for the Lee Catchment – the *Lee Catchment Flood Risk Assessment and Management (CFRAM) Study*. The study commenced in June 2011, with final flood maps issued in 2016. It involved detailed hydraulic modelling of the River Lee and its principal tributaries, focusing on areas of known or potentially significant flood risk. Finalised flood extents for the 10% (1-in-10-year), 1% (1-in-100-year), and 0.5% coastal (1-in-200-year), as well as the 0.1% fluvial (1-in-1000-year) AEP events, are publicly available via *data.gov.ie* and *floodmaps.ie*.

It should be noted that for the Cork City area, High-End Future Scenario (HEFS) flood extents are not available; only Mid-Range Future Scenario (MRFS) flood extents were produced as part of the Lee CFRAM Study. Refer to Appendix A.2 – Flood Zones for a detailed explanation of how flood extents correspond to Flood Zones.

The River Martin and Blarney River were modelled as part of the study, and corresponding flood extents were produced. As shown in Figure 3-4, the site is not identified as being at risk of flooding during the 1% or 0.1% AEP fluvial events. Both site access points are situated above the mapped flood extents; the R617 entrance lies approximately 5 m above the River Blarney flood levels, while the Station Road access is around 5 m above the River Martin flood levels.

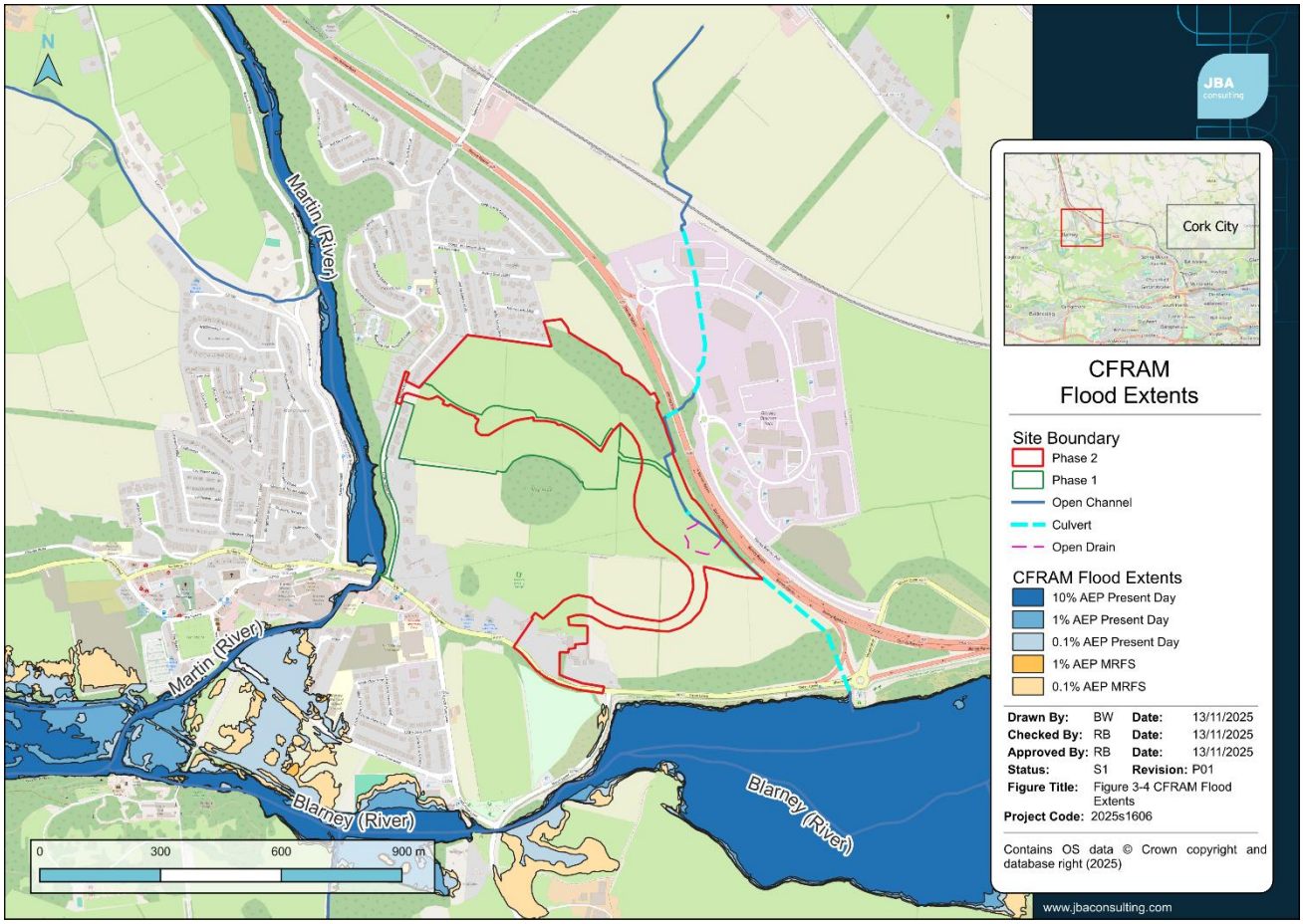


Figure 3-4 Lee CFRAM Present Day 0.1%, 1%, 10% and MRFS 1% and 0.1% AEP

As shown in Figure 3-4, the Lee CFRAM Study indicates that the Proposed Development site is not affected by fluvial flooding during either the 1% AEP or 0.1% AEP Mid-Range Future Scenario (MRFS) events.

3.2.3 National Indicative Fluvial Mapping

The Office of Public Works recently published the NIFM data which included all watercourses on the EPA watercourse layer excluding:

- Any section of watercourse with an upstream catchment area of less than 5km^2.
- Any section of watercourse for which flood spatial data has been produced under the National CFRAM Programme bar a 500m overlap at the upstream boundary of the National CFRAM Programme spatial data.

The River Martin, River Blarney or the Shean Upper Watercourse have not been mapped under the National Indicative Fluvial Mapping.

3.2.4 Ringwood Phase 1 – Flood Risk Assessment (JBA Consulting)

A detailed hydrological and hydraulic assessment was undertaken to quantify fluvial flood risk for the Phase 2 lands. Peak flows were estimated using the FSU Small Catchment (SC) method for two Hydrological Estimation Points, representing the upstream inflow and a downstream check flow. A hydraulic model was developed in TUFLOW ESTRY, incorporating a 1D channel network based on 2023 topographic survey data and a 2D domain constructed from OPW LiDAR (2011) supplemented with a detailed 2022 site survey. The model simulated present-day and future climate scenarios (MRFS +20% and HEFS +30%) for the 1% AEP and 0.1% AEP events to delineate Flood Zones A and B, respectively. The results are visualised in Figure 3-5.

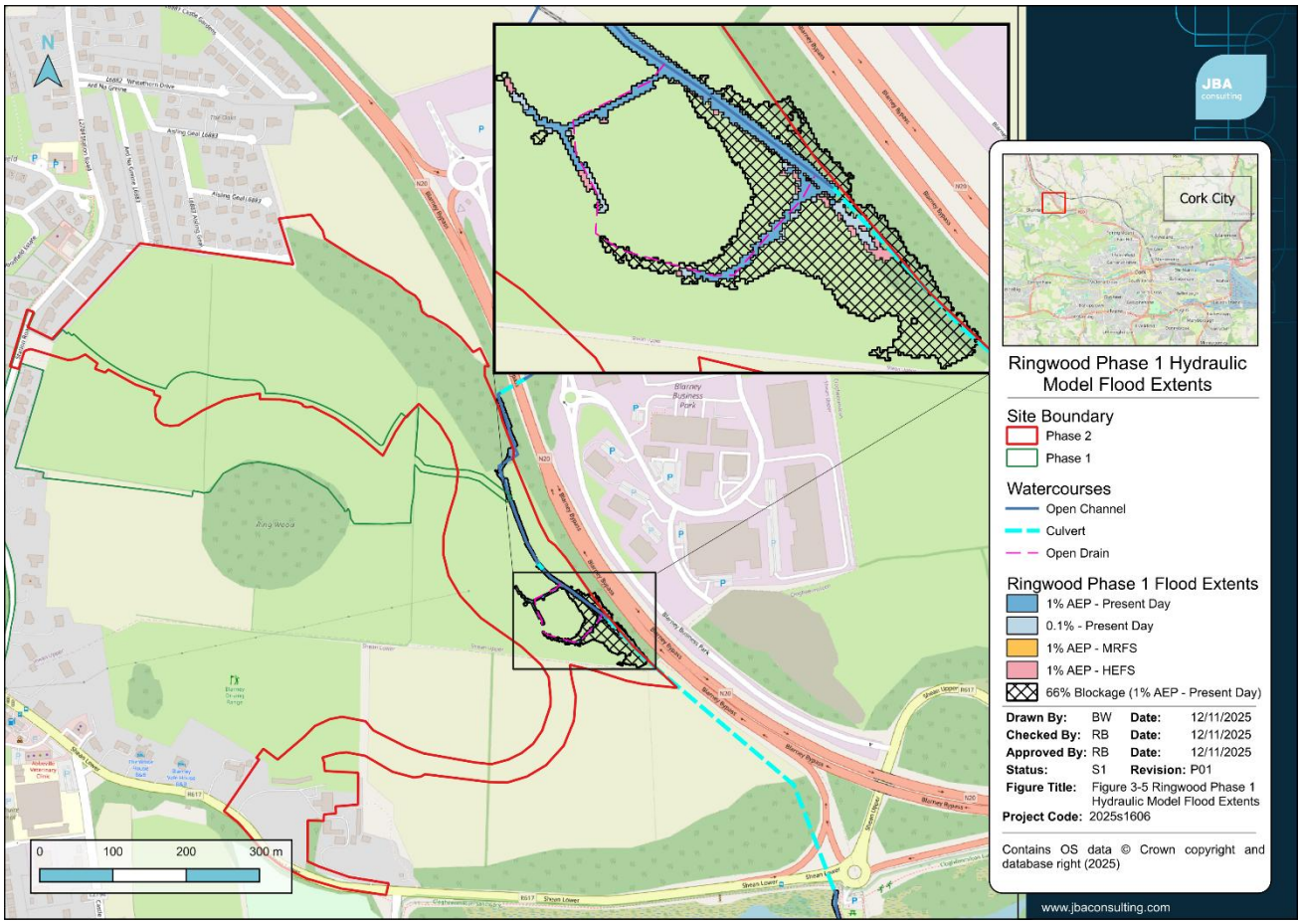


Figure 3-5 Ringwood Phase 1 Hydraulic Modelling (source: JBA Consulting)

Model results indicate that the site is predominantly located outside the modelled flood extents, with only the eastern boundary adjoining the Shean Upper Stream intersecting localised flooding associated with the open drainage channel between the two southern culverts during the 1% and 0.1% AEP events. The 1% AEP MRFS and HEFS flood extents marginally exceed those of the present-day scenario; however, the increase is negligible.

A residual risk assessment was undertaken for a 66% culvert blockage scenario. This resulted in a maximum increase of approximately 1 m in water levels at the downstream culvert inlet, leading to a slightly larger flood extent confined to the proposed wetland amenity area. This area lies approximately 15 m below the area where residential development is proposed, and the access road from the Lower Shean Regional Road remains around 2 m above the blockage flood levels.

Overall, the highly vulnerable elements of the Proposed Development are not at risk of fluvial flooding under existing or future climate scenarios, and residual risks associated with culvert blockage are negligible as predicted fluvial flood extents remain confined to water-compatible components (the proposed wetland amenity area).

Note, the N20/M20 Cork to Limerick Project proposes to daylight the Upper Shean Stream, resulting in the full length of the watercourse within the Proposed Development becoming open channel. If the scheme receives planning approval, the modelled extents presented in this section would change. Blockage-related exceedance flows are likely to be conveyed downstream of the site, reducing residual flood extents within the Proposed Development. The redesigned open channel would also be incorporated into the wetland amenity area, improving the efficiency of surface-water conveyance and attenuation.

3.2.1 Predictive Groundwater Flood Mapping – GSI GWFlood & GWClimate Projects

The Predictive Groundwater Flood Map, developed by Geological Survey Ireland (GSI) through the GWFlood and GWClimate projects, presents probabilistic flood extents for areas prone to recurrent karst groundwater flooding. The mapping focuses primarily on seasonally inundated wetlands (turloughs), using SAR imagery, observed hydrograph data, hydrological modelling, and extreme value analysis.

Each site is represented by stacked polygons corresponding to 10-year (0.1 AEP), 100-year (0.01 AEP), and 1000-year (0.001 AEP) flood events. Over 400 sites were mapped, although not all known turloughs could be reliably modelled.

There are no predictive groundwater flood extents identified in the vicinity of the Proposed Development site.

3.3 Sources of Flooding

The initial stage of a Flood Risk Assessment involves identifying the probable sources of flooding that may affect the site. For the Ringwood Phase 2 at, fluvial, pluvial, groundwater and tidal sources of flooding have been considered based on available historic and predictive, local topography, and Proposed Development site setting.

3.3.1 Fluvial

Fluvial flooding occurs when a watercourse exceeds its channel capacity, resulting in overtopping and inundation of adjacent low-lying land. This typically follows intense or prolonged rainfall and may be exacerbated by channel blockages, structural constrictions, or, in estuarine settings, tidal conditions that restrict downstream conveyance.

The principal hydrological features near the site are the River Martin and the Shean Upper Stream. There are no recorded flood events within the Proposed Development boundary (floodinfo.ie), and the nearest historic observations occur approximately 300 m southwest in lower-lying areas.

The Cork City Development Plan SFRA mapping places most of the site within Flood Zone C, with a small area in the southeast identified as Flood Zone A.

The Lee CFRAM Study indicates no fluvial flood risk at the Proposed Development site during the 1% or 0.1% AEP events associated with the River Martin or River Blarney.

Site-specific modelling of the Shean Upper Stream shows flows remaining predominantly in-bank for the 1% and 0.1% AEP design events, with blockage-related out-of-bank flow confined to the lowest part of the site.

The developing N20/M20 project drawings propose daylighting the existing culvert, which would redirect any blockage-related exceedance flows downstream and remove residual extents from within the Proposed Development boundary.

Fluvial risk is assessed in further detail in Section 4.1.2.

3.3.2 Pluvial

Pluvial, or surface water, flooding arises when rainfall-generated overland flows occur before runoff can enter a watercourse or drainage system, typically during high-intensity events. The GSI Surface Water Flood Maps (2016–2021) show no recorded surface water flooding within the Proposed Development boundary, although low-confidence ponding is mapped east of the R617 (Lower Shean Regional Road).

LiDAR data (TII, 2010–2011) indicate that the site is shaped by a prominent hilltop at Ringwood, generating two natural flow paths: a steep westward fall of approximately 20 m towards the River Martin and a gentler eastward gradient from around 60 mOD to 50 mOD, terminating at a lower-lying area of approximately 45 mOD where the Shean Upper Stream flows. This eastern low point, underlain by deep well-drained mineral subsoils, forms the location of the proposed wetland amenity area.

The N20/M20 Cork to Limerick Project proposes to daylight the existing culverted reach of the Shean Upper Stream. Reinstating the full section as open channel would reinforce the natural eastward drainage route, improve conveyance efficiency, and reduce reliance on the current culvert system. Combined with the permeable subsoils and planned wetland, the open channel is expected to support more effective interception and conveyance of runoff, reducing the likelihood of localised ponding across the eastern portion of the site.

Pluvial flood risk is assessed further in Section 4.1.1.

3.3.3 Groundwater

Review of available groundwater and geological data indicates a low potential for groundwater flooding at the Proposed Development site. There are no historic or predictive groundwater flood extents affecting the site, as confirmed by the GSI Predictive Groundwater Flood Map and Historic Groundwater Flood Map (2015/2016 event).

Accordingly, groundwater is not considered a significant source of flood risk at this location and is screened out of further assessment.

3.3.1 Tidal

Coastal flooding events are typically associated with storm surges, particularly when combined with spring tides. Local or remote storm systems can generate large wind or swell waves that may overtop coastal defences, leading to flooding and erosion.

The Proposed Development site is located inland and at a sufficient elevation above the coastal influence. As such, it is not affected by tidal or storm surge flooding. Coastal flood risk has therefore been screened out from further assessment.

4 Flood Risk Assessment and Mitigation

4.1 Flood Risk Assessment

The Proposed Development site at Ringwood, Shean Upper, Blarney, Co. Cork, forms Phase 2 of the Blarney East / Ringwood Expansion Area. It is located approximately 500 m northeast of Blarney town centre and 7.5 km northwest of Cork City, within a primarily greenfield setting bounded by Station Road to the west and the N20 Blarney Bypass to the east. The Shean Upper Stream forms the eastern boundary of the site and flows southwards through the proposed wetland amenity area before joining the River Blarney approximately 600 m downstream.

Groundwater and tidal flooding were screened out in Section 3.3 and are not considered further.

4.1.1 Pluvial Flood Risk

Pluvial (surface water) flooding represents the primary potential flood risk at the Proposed Development site, with the capacity to generate localised exceedance flows that could affect the Highly Vulnerable and Less Vulnerable elements of the Proposed Development.

Figure 4-1 illustrates the anticipated post-development surface-water flow paths based on the finished road levels. The arrows indicate the direction and gradient of flow, with darker blue arrows denoting steeper gradients, and the purple line marking the division between westward and eastward flow directions.



Figure 4-1 Post-Development Natural Flow Paths

Surface water preferentially drains along the clearly defined post-development flow paths, which convey runoff away from the residential dwellings (classified as Highly Vulnerable development) and towards the perimeter road network, ultimately directing flows to the Proposed Signalised Junction – Access Station Road and the Proposed Access Roadway from the R617 forming the Stoneview Access Link Road, and consequently no localised ponding is anticipated within the residential zone.

Runoff flowing west towards Station Road is expected to follow the road corridor and continue through the existing Phase 1 drainage network, which incorporates attenuation and controlled discharge measures designed to manage runoff from the upstream catchment. The *Ringwood Phase 1 Stormwater Audit* (Stage 1 SWA, JBA Consulting, 2023) confirms that this system provides appropriate flow control and attenuation, thereby reducing pluvial flood risk within and downstream of the wider development area.

Surface water draining east towards the Proposed Access Roadway from the R617 forming the Stoneview Access Link Road will flow towards the location of the primary care centre and the retail/pharmacy and café/restaurant units in the southern area of the development. In accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities (2009), the primary care centre is classified as Highly Vulnerable development, while the retail/pharmacy and café/restaurant units are classed as Less Vulnerable development.

The pluvial risk to these Highly Vulnerable and Less Vulnerable elements is examined further in Section 4.2, where the need for risk-appropriate mitigation measures is assessed.

4.1.2 Fluvial Flood Risk

Fluvial flooding presents a low potential flood risk to the Proposed Development, as the modelled 1% and 0.1% AEP extents are fully contained within the proposed water-compatible wetland amenity area and do not intersect any Highly Vulnerable or Less Vulnerable components of the scheme. The site-specific hydraulic model shows limited residual out-of-banking between the southern culverts; however, this remains low risk due to the water-compatible land use and the significant level difference between the amenity area and the proposed residential zones.

The Phase 2 development will likely increase impermeable areas and associated runoff to the Shean Upper Stream. Preliminary N/M20 Cork to Limerick Project drawings indicate the daylighting of the existing culverted reach of the Shean Upper Stream within the Proposed Development boundary. Under a daylighted scenario, conveyance capacity and attenuation potential within the wetland amenity area would be improved, and blockage flood extents would likely move downstream outside the Proposed Development site, thereby reducing residual fluvial extents. Under both the current and proposed configurations, the proposed wetland amenity area would operate as the functional floodplain, located well below Highly Vulnerable development and providing storage, infiltration and controlled discharge to the downstream system in line with IFI guidance in the LRD opinion report.

The need for mitigation is addressed in Section 4.2.

4.2 Flood Risk Mitigation

In accordance with the *Planning System and Flood Risk Management Guidelines for Planning Authorities* (DoEHLG & OPW, 2009) and the *Cork City Development Plan 2022–2028*, a risk-based approach should be applied to site layout and design. The Proposed Development represents Phase 2 of the Blarney East / Ringwood Expansion Area and comprises a Highly Vulnerable use (residential and community development).

Although the site is located within Flood Zone C for fluvial sources, parts of the southeastern proposed wetland amenity area fall within Flood Zone A as defined by the CCDP Strategic Flood Risk Assessment. Given that the development proposal aligns with the zoning objectives for sustainable residential and mixed uses, and the proposed vulnerable elements are located entirely within Flood Zone C, the project is not subject to a Development Management Justification Test.

This section outlines the recommended measures to manage and mitigate flood risk in accordance with OPW Guidelines and relevant local policy.

4.2.1 Site Layout and Design

The site layout has been developed to integrate with local topography and the natural drainage regime. The highly vulnerable development (residential dwellings, and associated access roads) is located on higher ground above 60 mOD, while lower-lying areas adjacent to the Shean Upper Stream are proposed for a wetland amenity area and existing Wetwood to function as a natural flood-storage and attenuation zone.

This layout maintains the existing floodplain function of the Shean Upper Stream and is consistent with IFI guidance (LRD Opinion Report – Appendix B.1), which requires that no reduction in natural drainage or flood-storage capacity occurs as part of the LRD.

4.2.2 Finished Floor Levels

The proposed Finished Floor Levels (FFL) for the highly vulnerable residential elements range from 67.73 mAOD to 60.45 mAOD. These levels are approximately 15 m above the 0.1% and 1% AEP HEFS flood levels on the Shean Upper watercourse and the River Martin.

The proposed FFL for the highly vulnerable primary care centre and the less vulnerable retail/pharmacy and café/restaurant located along the new access road from the R617 (Stoneview Access Link Road) range from 40.15 mAOD to 40.30 mAOD. These levels are approximately 5 m below the 0.1% and 1% AEP HEFS flood levels on the Shean Upper watercourse and the River Martin. However, the modelled flood extents do not reach the access road, and overland flow from the watercourses is not expected to influence these components of the Proposed Development.

It is recommended that all FFL are set at least 150 mm above adjacent hardstanding to reduce the risk of surface water draining eastwards from higher ground within the Proposed Development site. As neither the *Cork City Development Plan 2022–2028* nor the

accompanying SFRA defines minimum freeboard requirements for the Blarney area, this recommendation is based on professional judgement and best practice.

4.2.1 Access and Egress

Two vehicular access points are proposed: Station Road to the west and the R617 / Shean Lower Road to the south. Both are located within Flood Zone C and are approximately 5 m above the mapped fluvial flood levels of the River Martin and River Blarney, ensuring operability during the 1% and 0.1% AEP events.

Under pluvial conditions, surface water naturally drains towards the perimeter road network. Runoff directed towards Station Road is conveyed along the carriageway and into the existing Phase 1 drainage system, which provides attenuation and controlled discharge. The Phase 1 Stormwater Audit (JBA Consulting, 2023) confirms that this network maintains safe access and egress during intense rainfall.

The R617 / Shean Lower Road access will require further assessment as part of the Phase 2 Surface Water Management Plan to verify performance during extreme rainfall and to ensure resilience equivalent to the Station Road route.

4.2.2 Surface Water Drainage Management Plan

As the stormwater design progresses, the following requirements apply:

- The detailed drainage design must demonstrate compliance with the Greater Dublin Strategic Drainage Strategy (GDSDS) and the Cork City Development Plan 2022–2028 SFRA, incorporating Sustainable Drainage Systems (SuDS) to manage and attenuate post-development runoff to greenfield discharge rates.
- The Phase 2 design should provide sufficient attenuation and storage to maintain pre-development (greenfield) discharge rates and ensure no increase in flood risk on-site or downstream.

In line with Transport Infrastructure Ireland (TII) correspondence (TII25-131551, 5 June 2025 – Appendix B.2), stormwater proposals located adjacent to the N20 boundary must clearly demonstrate how the SuDS design interacts with the existing N20 drainage regime and TII-managed assets, including how SuDS components, exceedance routing and construction methodologies will safeguard the operational function and integrity of national road infrastructure.

Documentation submitted at detailed design stage should therefore confirm that no part of the SuDS network, exceedance pathways or construction works would adversely affect the capacity, safety, structural integrity or maintenance of the N20.

4.3 Residual Risk

Residual risks are defined as those remaining after all avoidance and mitigation measures are implemented.

4.3.1 Failure of the Surface Water Drainage System

A residual risk remains that the surface water drainage system could fail during periods of high-intensity rainfall. This may occur if culverts or drains become blocked or if rainfall exceeds the system's design capacity, particularly under future climate conditions.

Although the proposed development includes stormwater drainage infrastructure within the natural flow path, the absence of detailed information on the capacity and condition of the existing system introduces uncertainty. The potential for increased rainfall intensity due to climate change further elevates this residual risk.

4.3.2 Future Modifications Associated with the N/M20 Project

Future changes to the Shean Upper Stream alignment, including the proposed daylighting under the N/M20 design, may marginally alter local flood dynamics. Consistent with the LRD Opinion Report, continued coordination with TII, Cork City Council and IFI is recommended to ensure hydraulic consistency and no loss of floodplain capacity.

4.4 Climate Change

In line with OPW guidance, the design accounts for potential increases in rainfall intensity and river flows under the Mid-Range Future Scenario (MRFS), as High-End Future Scenario (HEFS) flood extents were not produced for the Cork City area in the Lee CFRAM Study. The Ringwood Phase 1 site specific model demonstrated negligible variation in flood extent between present-day and MRFS conditions, indicating limited sensitivity of local flood risk to projected climate change.

Surface-water management measures and SuDS infrastructure are recommended to be designed in accordance with the GDSDS, which advises incorporating a 20–30 % allowance for increased rainfall intensity under climate-change scenarios. Given the substantial elevation difference between the proposed development and the nearest modelled floodplain, no further mitigation at FFL level is considered necessary.

5 Conclusion

This Site-Specific Flood Risk Assessment has been prepared in accordance with *The Planning System and Flood Risk Management Guidelines for Planning Authorities* (DoEHLG & OPW, 2009) to inform the proposed Large-scale Residential Development (Phase 2) at Ringwood, Shean Upper, Blarney, Co. Cork.

Pluvial flooding is the primary potential source of flood risk. Fluvial risk is low, with the Lee CFRAM identifying Flood Zone C across the development area and both access points located approximately 5 m above mapped fluvial levels. Site-specific hydraulic modelling of the Shean Upper Stream shows flooding confined to the proposed wetland amenity area, with all residential and community development situated well above modelled fluvial flood levels. Groundwater and tidal sources are screened out.

The Phase 2 drainage design will be required to comply with the GDSDS and the Cork City Development Plan SFRA, incorporating SuDS to attenuate post-development runoff to greenfield rates and to manage exceedance safely along identified flow paths. In line with TII correspondence (Ref. TII25-131551), the detailed surface-water design must also confirm that the SuDS network and exceedance routing will not adversely interact with N20 drainage assets or affect the operational integrity of national road infrastructure.

Emergency access and egress can therefore be maintained under both fluvial and pluvial scenarios, provided that the Phase 2 Surface Water Management Plan confirms design measures to deliver a comparable standard of protection for the R617 / Shean Lower Road access during extreme pluvial events. It is recommended that all FFL are set at least 150 mm above adjacent hardstanding to reduce the risk of surface water draining eastwards from higher ground within the Proposed Development site.

Residual risks relate to performance of the Phase 2 surface-water system during extreme rainfall events and future modifications to the Shean Upper Stream. The IFI Opinion (refer to Appendix D of the LRD Opinion Report) requires that no interference with existing watercourses or loss of floodplain occurs. The Proposed Development is consistent with this requirement, as the design retains the existing drainage network and maintains floodplain capacity through the provision of the wetland, which delivers additional temporary storage.

The developing N/M20 Cork–Limerick Project includes the proposed daylighting of sections of the Shean Upper Stream. Continued coordination with TII and Cork City Council is therefore recommended to ensure hydraulic consistency between both projects and maintenance of floodplain capacity once the N/M20 detailed design is confirmed.

Subject to implementation of the Stormwater Management Plan and ongoing coordination with TII / Cork City Council on the N/M20, the Proposed Development is considered appropriate in the context of flood risk and compliant with the OPW / DoEHLG Guidelines (2009).

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

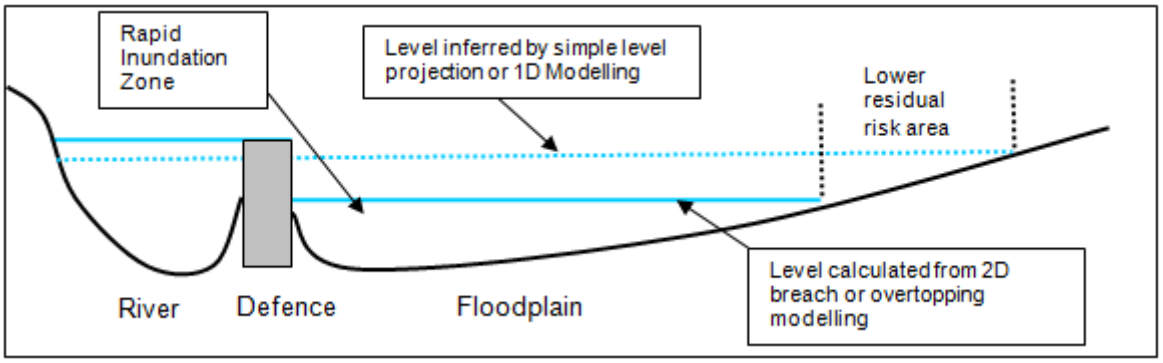
Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation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

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.



B Cork City Council LRD Opinion Report

B.1 Inland Fisheries Ireland

The screenshot below is taken from Appendix D – External Consultee Reports of the *LRD25-05 Opinion Report* for the proposed *Ringwood Phase 2 Large-Scale Residential Development* in Blarney, Cork.

Inland Fisheries Ireland

A chara,

Thank you for your recent email regarding the above-mentioned.
It appears it may be proposed to dispose of septic effluent from the development to the public sewer. IFI would ask that Irish Water signifies there is sufficient capacity in existence so that it does not overload either hydraulically or organically existing treatment facilities or result in polluting matter entering waters. Should this not be the case then please forward proposals for alternative treatment and disposal options.
IFI would ask that there be no interference with, bridging, draining, or culverting of any watercourse, their banks or bankside vegetation to facilitate this development, without the prior approval of IFI and that full cognisance is given to IFI "Guidelines on protection of fisheries during construction works in and adjacent to waters"
https://www.fisheriesireland.ie/media/guidelines-on-protection-of-fisheries-during-construction-works-in-and-adjacent-to-waters

Furthermore, there should be no loss of flood plain as a result of the proposed development.

Michael Mc Partland
Senior Fisheries Environmental Officer.

Iascach Intíre Éireann
Inland Fisheries Ireland

The correspondence from Inland Fisheries Ireland (IFI) highlights the requirement to ensure there is no interference with, or modification of, existing watercourses, drainage channels, or associated bankside vegetation without prior IFI approval. It also specifies that no loss of floodplain should occur as a result of the proposed development and that works must comply with IFI's *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*.

This is directly relevant to the Proposed Development, as the Shean Upper Stream forms part of the site's eastern boundary and connects to downstream aquatic environments. Adherence to IFI guidance will therefore be essential to ensure construction activities, culvert design, and wetland integration measures are undertaken in a manner that protects water quality, maintains existing hydrological connectivity, and prevents any reduction in local floodplain capacity.

B.2 Transport Infrastructure Ireland (TII)

Transport Infrastructure Ireland (TII) issued correspondence on 5 June 2025 (Ref. TII25-131551) in relation to the proposed LRD at Ringwood, Shean Upper, Blarney. While the submission focuses primarily on national road considerations, several points are directly relevant to drainage and SuDS design adjacent to the N20 boundary.

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Anthony Angelini
Development Management
Community, Culture & Placemaking Directorate,
Cork City Council,
City Hall,
Anglesea Street,
Cork City
T12 T997

By email :

Dáta|Date	Ár dTag|Our Ref.
5/6/2025	TII25-131551

Re: Planning Referral for LRD Opinion at Ringwood, Shean Upper, Blarney, Cork. (LRD25-05)

Dear Mr. Angelini,

Transport Infrastructure Ireland (TII) acknowledges receipt of your LRD Opinion Meeting Request ref .no. LRD25-04 in respect of the above proposed project.

The approach adopted by TII in making submissions or comments to statutory planning consultations seek to uphold official policy and guidance as outlined in the DHPLG Spatial Planning and National Roads Guidelines for Planning Authorities (2012) and other relevant guidance and circulars available at www.TII.ie.

Therefore, the issuing of this correspondence is provided as best practice guidance only and does not prejudice TII's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid planning application referred.

With respect to the material forwarded on this development proposal TII consider that the Council should have regard, inter alia, to the following:

1) The Authority is of the opinion that insufficient data has been submitted with the planning application to demonstrate that the proposed development will not have a detrimental impact on the capacity, safety or operational efficiency of the national road network in the vicinity of the site.
2) TII considers that arrangements for these proposed works adjacent to the N20 . has not been addressed appropriately in the documentation submitted as follows:
    a. It would be expected that intended works adjacent to theN20 such as landscaping, boundary treatment, lighting, security and drainage as well construction methodologies would be documented, evaluated and designed in manner that has regard to the extents and function of the national road assets and also where relevant TII publications. TII notes with concern that this has not been undertaken.
    b. TII with concern are unable to ascertain or evaluate that the requirements to safeguard and maintain the TII maintained area and all associated infrastructure assets on the N20 has been addressed in relation to the proposed SUDS area located adjacent to the N20 boundary . TII is unable how this proposal interacts with the N20's drainage regime and physical structural integrity of the N20 in

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general. This is documented in the lack of recognition of proximity to the national road in accompanying analysis and cross sections.

TII advises that prior to the application being submitted the developer should be requested to provide plans and details which demonstrate that any proposals at the location address the national road asset and take account of of all relevant elements of TII Publications.

3) Any proposals related to future public transport provision are a matter for the NTA. Consultation with the NTA would be essential on rail and BusConnects.

Notwithstanding, any of the above, this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practise.

Yours sincerely,

Tara Spain,
Head of Land Use Planning.

B.3 N20/M20 Project Office

The extract below is taken from the *Notice of Large-Scale Residential Development Opinion* (Reference LRD25-05) for the proposed *Ringwood Phase 2 LRD* in Blarney, Cork.

3. N20/M20 Project Office

Further consideration and amendment of the proposed development in relation to the N20/M20 Cork to Limerick Project. Limerick City and County Council has made observations to the proposed development in respect of the N/M20 Cork to Limerick Project.

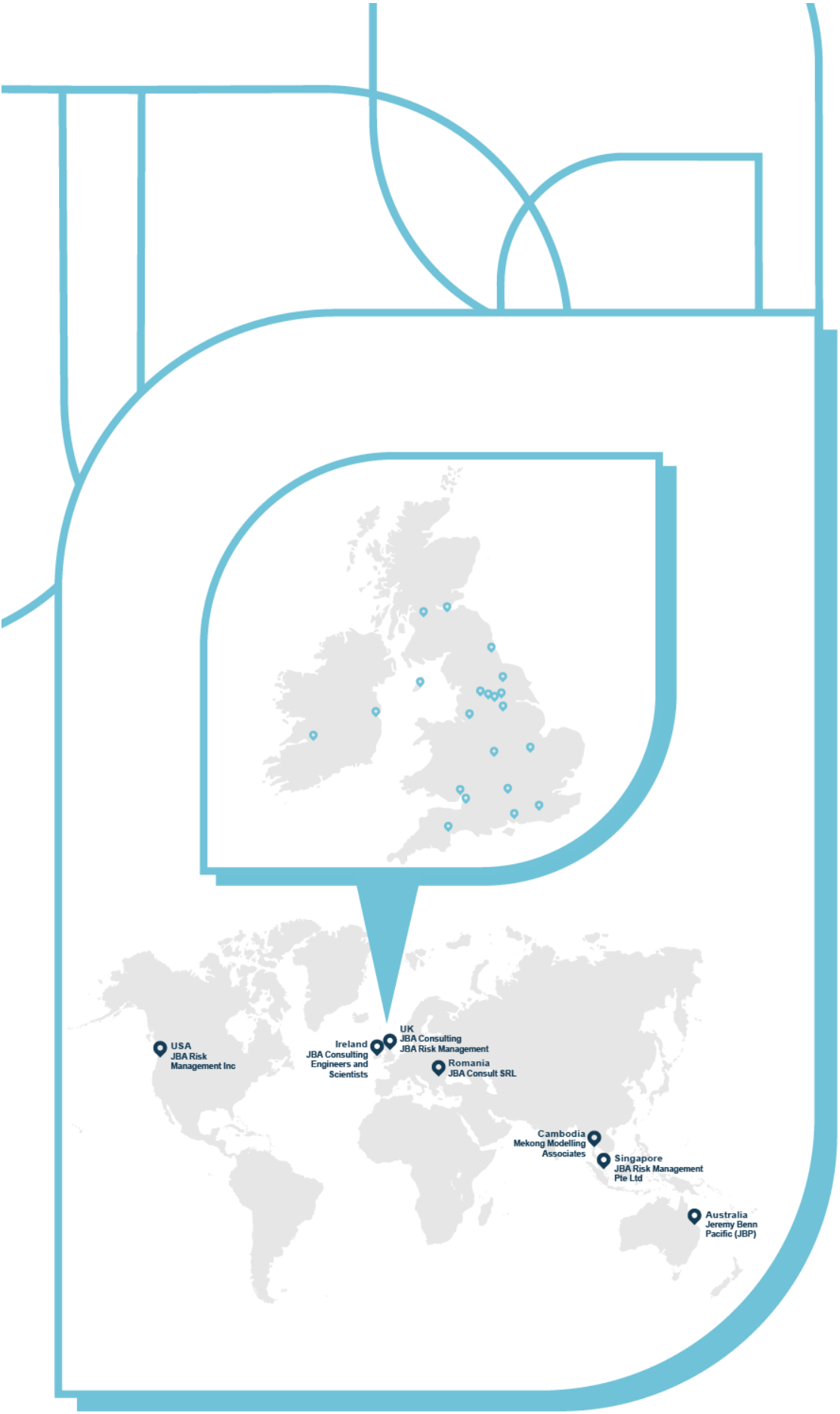
Clarification is sought on the provision of the TII traffic growth sensitivity test results for the Phase 1 application and request a similar test be undertaken for Phase 2 application. The Phase 2 test should assess the cumulative impacts of traffic (Phase 1 + Phase 2) on the N20/R617 Blarney junction in both the existing (N20/R617) and reconfigured (M20/R617) Blarney junction layouts.

Please consider the traffic generated noise from the N20 and future M20 and ensure the proposed residential development includes adequate noise mitigation and separation in accordance with the relevant noise policy and guidelines.

The N/M20 Cork to Limerick published a Project Update on the 16th June 2025 with the developing design. Further details are available on the project website www.corklimerick.ie. The applicant should consider the updated design information and integrate same as part of their future application.

While the correspondence primarily addresses traffic considerations, the final paragraph is of particular relevance to this project, as it references the developing design of the N/M20 Cork to Limerick Project. Current design drawings for the N/M20 indicate an extended culvert on the Shean Upper Stream in comparison with the structure presently in situ.

This has implications for the Proposed Development, as the stream flows along the shared boundary between both projects.



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