



Cork County Council
Comhairle Contae Chorcaí

**Mitchelstown Public Realm
Enhancement Scheme, Co. Cork**
Flood Risk Assessment



Public Realm Enhancement Scheme, Mitchelstown, Co. Cork

Flood Risk Assessment

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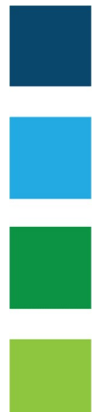


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1.0 INTRODUCTION

TOBIN Consulting Engineers have been appointed as a subconsultant to REDscape Landscape and Urbanism to provide design services for Mitchelstown Public Realm Enhancement Scheme, including a Flood Risk Assessment (FRA) of the subject site (see Figure 1—1)

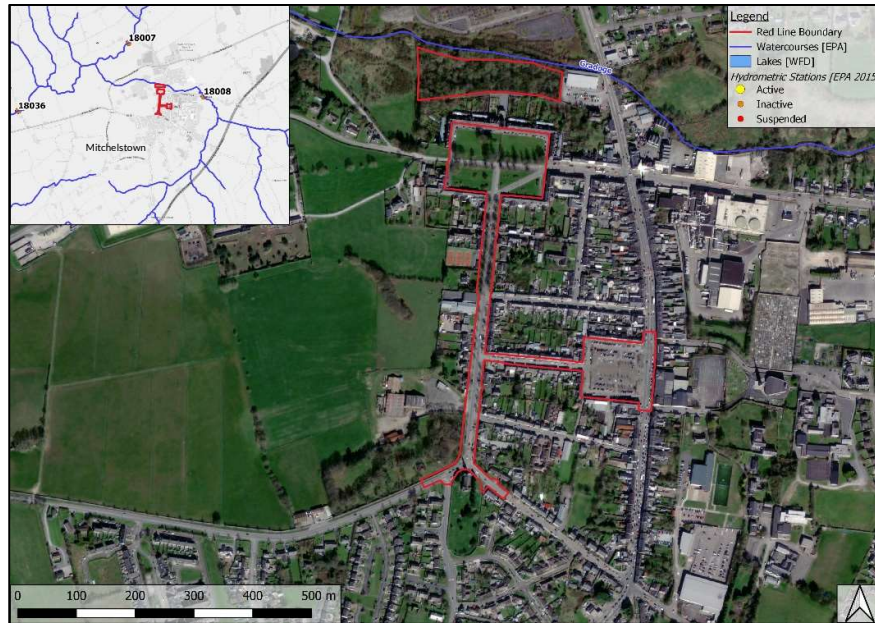


Figure 1—1 Site Location

The Main Works proposed is public realm enhancement in Mitchelstown, Cork including the relevant civil engineering elements that relate to upgrade of the pavement and associated ground works and services.

The Mitchelstown Georgian Quarter is comprised of the following parts:

Kings College Wood is a small forest (approximate area of 1.5 ha) north of Kings Square in Mitchelstown. The wood is located along the River Gradoge. Kings Wood will include a track way forest walk and a small car park for the trail.

New Square is a largely sized urban square (approximate area of 1ha) in Mitchelstown. There are 4 roads into the square, King Street, Lána an Phoist, R665 and a one way slip road down to Robert Street. It is strategically located near the R665 Regional Route, Mitchelstown to Clonmel. The New square will be developed as an accessible, attractive, and active space, with improved and more legible connections to community facilities, key town attractions and redefined parking locations. The project shall take account of the existing uses of New Square while providing for future potential uses.

In summary, the project involves:

- Enhancing the public realm at New Square and Kings Square, reducing the dominance of vehicles and promoting a sense of place in Mitchelstown town centre.
- Refurbishing Kings Square as a focal point for a range of activities with additional public lighting.
- Refurbishing Georges Street road and footpath, the installation of a cycle lane.
- Refurbishing of Kings Street adding an amenity route to Kings College Wood.

Georges Street lies at an altitude of 89-110mOD, with the land gently sloping down from the Junction to Kings Square. The car park in New Square has existing elevations ranging from 95mOD at the south-eastern corner to 99mOD at the north-western side of the square.

The proposed site is in the centre of Mitchelstown, southeast of the N73. The Gradoge River flows past the northern boundary of the proposed site boundary (See Figure 1—1).

The purpose of this report is to identify, quantify, and communicate the risks of flooding, if any, to the proposed subject site.

2.0 FLOOD RISK MANAGEMENT GUIDANCE

This Strategic Flood Risk Assessment was carried out in accordance with the following flood risk management guidance documents:

- The Planning System and Flood Risk Management Guidelines for Planning Authorities
- Flood Risk Management Climate Change Sectoral Adaptation Plan
- Cork County Development Plan 2022-2028
- Fermoy Local Area Plan (LAP)

2.1 The Planning System and Flood Risk Management Guidelines

The Planning System and Flood Risk Management Guidelines for Planning Authorities (PSFRM Guidelines) were published in 2009 by the Office of Public Works (OPW) and Department of the Environment, Heritage and Local Government (DoEHLG). Their aim is to ensure that flood risk is considered in development proposals and the assessment of planning applications.

2.1.1 Flood Zones and Vulnerability Classes

The PSFRM Guidelines discuss flood risk in terms of flood zones A, B, and C, which correspond to areas of high, medium, or low probability of flooding, respectively. The extents of each flood zone are based on the Annual Exceedance Probability (AEP) of various flood events.

The PSFRM Guidelines also categorise different types of development into three vulnerability classes based on their sensitivity to flooding. Amenity open space, outdoor sports and recreation developments (such as the works proposed as part of the proposed urban enhancement scheme) are considered “water compatible” development and, as such, are appropriate in any flood zone.

Table 2-1 shows a decision matrix that indicates which types of development are appropriate in each flood zone and when the Justification Test (see Section 2.1.2) must be satisfied. The annual exceedance probabilities used to define each flood zone are also provided.

Table 2-1 Decision Matrix for Determining the Appropriateness of a Development

Flood Zone (Probability)	Annual Exceedance Probability (AEP)	Development Appropriateness		
		Highly Vulnerable	Less Vulnerable	Water Compatible
A (High)	<u>Fluvial & Pluvial Flooding</u> More frequent than 1% AEP	Justification Test	Justification Test	Appropriate
	<u>Coastal Flooding</u> More frequent than 0.5% AEP			
B (Medium)	<u>Fluvial & Pluvial Flooding</u> 0.1% to 1% AEP	Justification Test	Appropriate	Appropriate
	<u>Coastal Flooding</u> 0.1% to 0.5% AEP			
C (Low)	<u>Fluvial, Pluvial & Coastal Flooding</u> Less frequent than 0.1% AEP	Appropriate	Appropriate	Appropriate

2.1.2 The Justification Test

Any proposed development being considered in an inappropriate flood zone (as determined by Table 2-1) must satisfy the criteria of the Justification Test outlined in Figure 2—1 (taken from the PSFRM Guidelines).

Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
 - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
 - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
 - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
 - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Figure 2—1 Criteria of the Justification Test

2.2 The Flood Risk Management Climate Change Adaptation Plan

The Flood Risk Management Climate Change Sectoral Adaptation Plan was published in 2019 under the National Adaptation Framework and Climate Action Plan. This plan outlines the OPW's approach to climate change adaptation in terms of flood risk management.

This approach is based on a current understanding of the potential impacts of climate change on flooding and flood risk. Research has shown that climate change is likely to worsen flooding through more extreme rainfall patterns, more severe river flows, and rising mean sea levels.

To account for these changes, the Adaptation Plan presents two future flood risk scenarios to consider when assessing flood risk:

- Mid-Range Future Scenario (MRFS)
- High-End Future Scenario (HEFS)

Table 2-2 indicates the allowances that should be added to estimates of extreme rainfall depths, peak flood flows, and mean sea levels for the future scenarios.

Table 2-2 Climate Change Adaptation Allowances for Future Flood Risk Scenarios

Parameter	Mid-Range Future Scenario (MRFS)	High-End Future Scenario (HEFS)
Extreme Rainfall Depths	+ 20%	+ 30%
Peak River Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 0.5 m	+ 1 m

The proposed development has considered a Mid-Range Future Scenario (MRFS) as this represents a likely future scenario.

2.3 Draft Cork County Development Plan 2022-2028

The Draft Cork County Development Plan for 2022 to 2028 is currently still under review and will replace the previous development plan when finalised and published. The Cork County Development Plan 2022-2028 will come into effect on Monday the 6th of June 2022.

Chapter 11 of the Draft Cork County Development Plan 2022-2028 outlines the County plan for Water Management.

2.4 Cork County Development Plan 2014 - 2020 (as varied)

The current Cork County Development Plan (CDP) was adopted on the 8th of December 2014 and came into effect on the 15th of January 2015. The Cork County Development Plan 2014-2020 has been extended until the Cork County Development Plan 2022-2028 is drafted and comes into effect. The CDP provides a strategic framework for land use planning for 2017 to 2023.

Chapter 11 of the Cork County Development Plan 2014 outlines the County plan for Water Services, Surface Water and Waste. Section 11.6 of the Cork County Development Plan discusses Flood Risks for the County.

The Draft Cork County Development Plan outlines two Flood Risk objectives:

WS 6-1: Flood Risks – Overall Approach

Take the following approach in order to reduce the risk of new development being affected by possible future flooding:

- *Avoid development in areas at risk of flooding; and*
- *Where development in floodplains cannot be avoided, to take a sequential approach to flood risk management based on avoidance, reduction and mitigation of risk.*

In areas where there is a high probability of flooding 'Zone A' it is an objective of this plan to avoid development other than 'water compatible development' as described in Section 3 of 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' issued in November 2009 by DoEHLG.

In areas where there is a moderate probability of flooding 'Zone B' it is an objective of this plan to avoid 'highly vulnerable development' described in section 3 of 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' issued in November 2009 by DoEHLG.

Implement the recommendations of the Southwestern CFRAM study.

WS 6-2: Development in Flood Risk Areas

Ensure that all proposals for development falling within flood zones 'A' or 'B' are consistent with the Ministerial Guidelines – 'The Planning System and Flood Risk Management. In order to achieve this, proposals for development identified as being at risk from flooding will need to be supported by a site-specific flood risk assessment prepared in line with Paragraph 11.6.16 of this plan.

Where the planning authority is satisfied that it can be satisfactorily shown in the site-specific flood risk assessment required under objective WS 61 that the proposed development, and its infrastructure, will avoid significant risks of flooding in line with the principles set out in the Ministerial Guidelines, then, subject to other relevant proper planning considerations, permission may be granted for the development.

Where the site-specific flood risk assessment required under WS 61 shows that there are significant residual flood risks to the proposed development or its occupiers, conflicting with the approach recommended in the Ministerial Guidelines, it is an objective of this plan to, normally, avoid development vulnerable to flooding unless all of the following are satisfied:

- *The development is within an urban settlement, targeted for growth under the National Spatial Strategy, Regional Planning Guidelines, and statutory plans.*
- *The development of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:*
 - o Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement.*
 - o Comprises significant previously developed and/or underutilised lands.*
 - o Is within or adjoining the core of an established or designated urban settlement.*
 - o Will be essential in achieving compact and sustainable urban growth; and*
 - o There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.*
- *The development is assessed not to have the potential to give rise to negative or adverse impacts on the integrity of Natura 2000 sites.*

2.5 Fermoy Municipal District Local Area Plan (LAP)

The Fermoy Municipal District Local Area Plan (LAP) covers the town of Mitchelstown as one of the main towns. Section 1.8 of the Fermoy Municipal District LAP discusses Flooding Risk Assessment and Management plans for the area.

The Fermoy Municipal District LAP outlines one Flood Risk objective:

IN-01

All proposals for development within the areas identified as being at risk of flooding will need to comply with Objectives WS 6-1 and WS 6-2 as detailed in Chapter 11, Volume 1 of the Cork County Development Plan, 2014, as appropriate, and with the provisions of the Ministerial Guidelines – ‘The Planning System and Flood Risk Management’. In particular, a site-specific flood risk assessment will be required as described in WS 6-2.

Figure 2—2 indicates what each area in Mitchelstown is zoned for in terms of development.

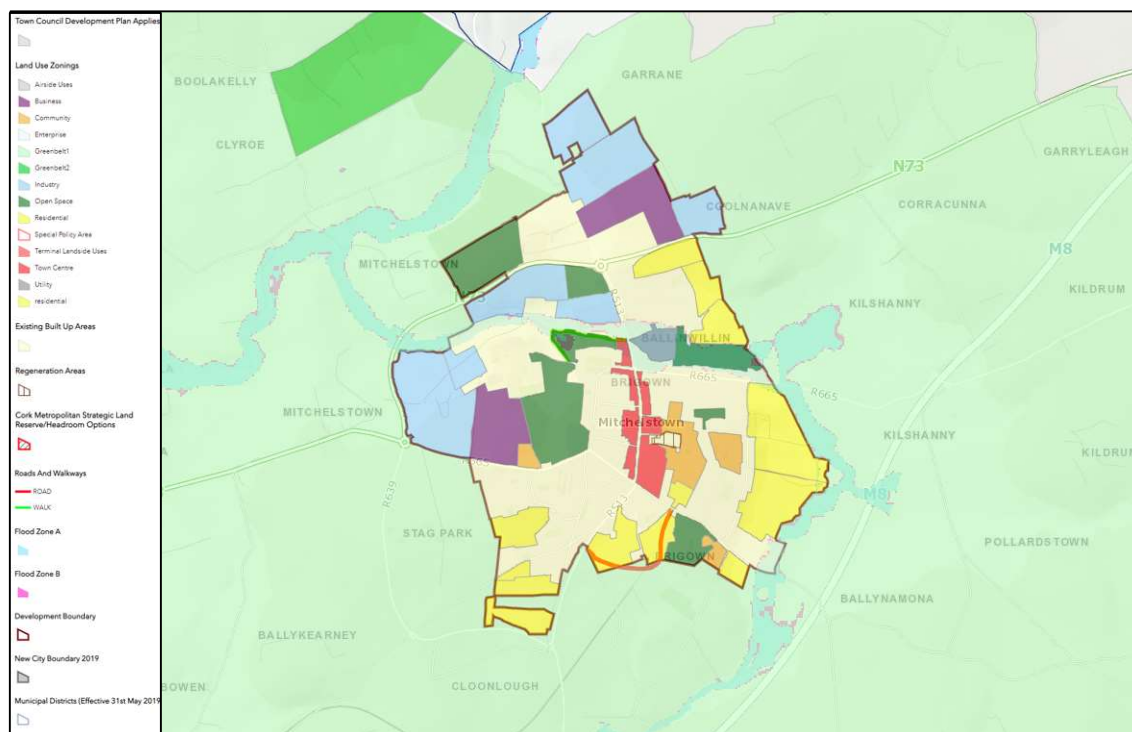


Figure 2–2 Fermoy Local Area Plan (LAP) Mitchelstown Zoning Map

3.0 INITIAL FLOOD RISK ASSESSMENT

3.1 Past Flood Events

The OPW's National Flood Information Portal¹ provides past flood event mapping with records of flooding reports, meeting minutes, photos, and/or hydrometric data.



Figure 3— 1 OPW Flood Map of Past Flood Events

Meeting minutes from a meeting with the North Cork - Mitchelstown Area Engineer on the 22nd of April 2005² note recurring flooding to the south-west of the subject site at:

- Mitchelstown Sewage Works flooded in 1985, submerged from Gradoge River (Flood ID: 1218).
- Recurring flood in floodplain of Gradoge river, townland of Ballinwillin (Flood ID: 1226)
- A recurring flood at Ballynamona Bridge L-1418 (Flood ID: 1219)

There is no record of past/recurring flood events within the subject site boundary on the OPW's National Flood Information Portal.

¹ floodinfo.ie

² https://www.floodinfo.ie/map/pf_addinfo_report/1218/

3.2 OPW Preliminary Flood Risk Assessment (PFRA) Study

In 2009, the OPW produced a series of maps to assist in the development of a broad-scale FRA throughout Ireland. These maps were produced from several sources.

The OPW's National Preliminary Flood Risk Assessment (PFRA) Overview Report from March 2012 noted that *"the flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location"*³.

Limitations on potential sources of error associated with the PFRA maps include:

- Assumed channel capacity (due to absence of channel survey information)
- Absence of flood defences and other drainage improvements and channel structures (bridges, weirs, culverts)
- Local errors in the national Digital Terrain Model (DTM)

Figure 3—2 provides an overview of the fluvial, coastal, pluvial, and groundwater indicative flood extents in the vicinity of the subject site.

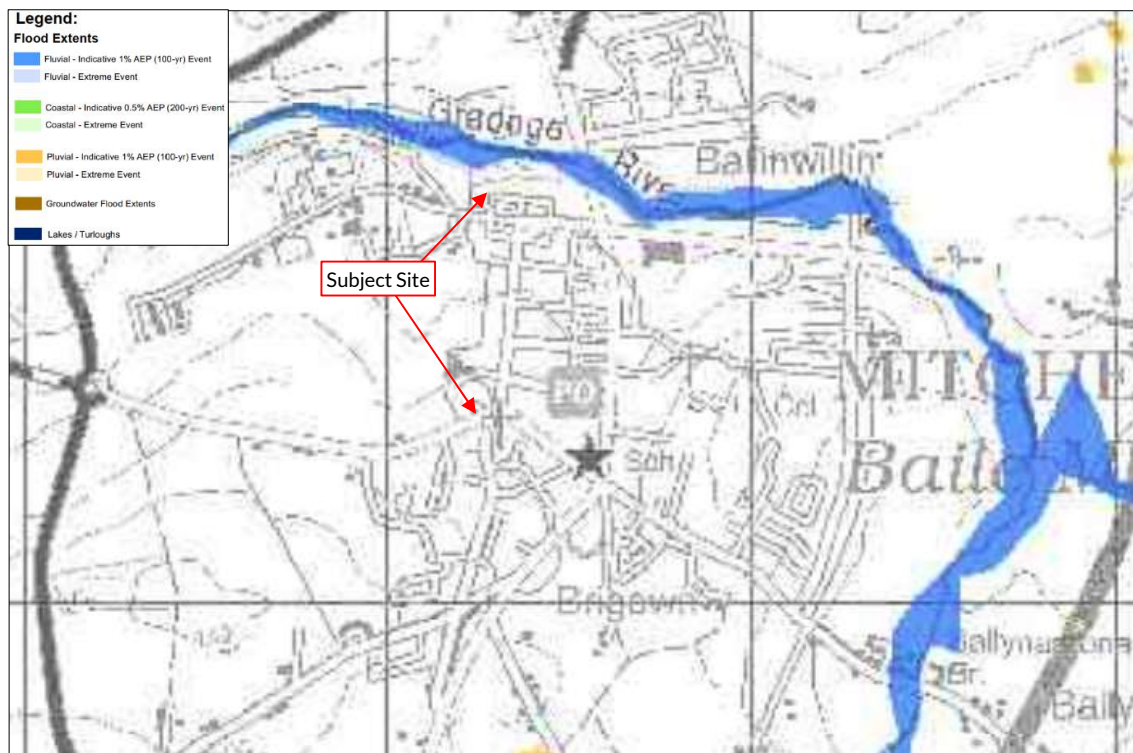


Figure 3—2 Indicative Flood Mapping [extract from PFRA Map 84]

The OPW PFRA flood mapping indicates that the subject site is not liable to predicted flooding.

³ The National Preliminary Flood Risk Assessment (PFRA) Overview Report, OPW (March 2012)

3.2.1 National Indicative Fluvial Mapping (NIFM)

In 2020, the OPW produced the second-generation indicative fluvial flood mapping, improving upon the first generation PFRA and producing higher quality flood maps⁴.

The NIFM Flood Mapping Technical Data notes that *“Cross sectional surveys have not been used to define the dimensions of river channels and structures within the 2D model. Channels have been represented in the 2D model by assuming their channel capacity is equivalent to the estimation of [the index flood flow]”*⁵. The 2D model uses a Digital Terrain Model with a grid scale of 5m.

Figure 3—3 provides an overview of the 1% and 0.1% AEP indicative fluvial flood mapping of the Gradoge River.



Figure 3—3 National Indicative Fluvial Mapping 2020- Existing Scenario

⁴ National Indicative Fluvial Mapping; Applying and Updating FSU Data to Support Revised Flood Risk Mapping for Ireland, Brown et al., Irish National Hydrology Conference 2019

⁵ https://www.floodinfo.ie/map/nifm_user_guidance_notes/

The NIFM update also included an assessment of the likely impact of climate change on flood risk in the area. The flood extents for the Mid-Range Future Scenario are shown in Figure .

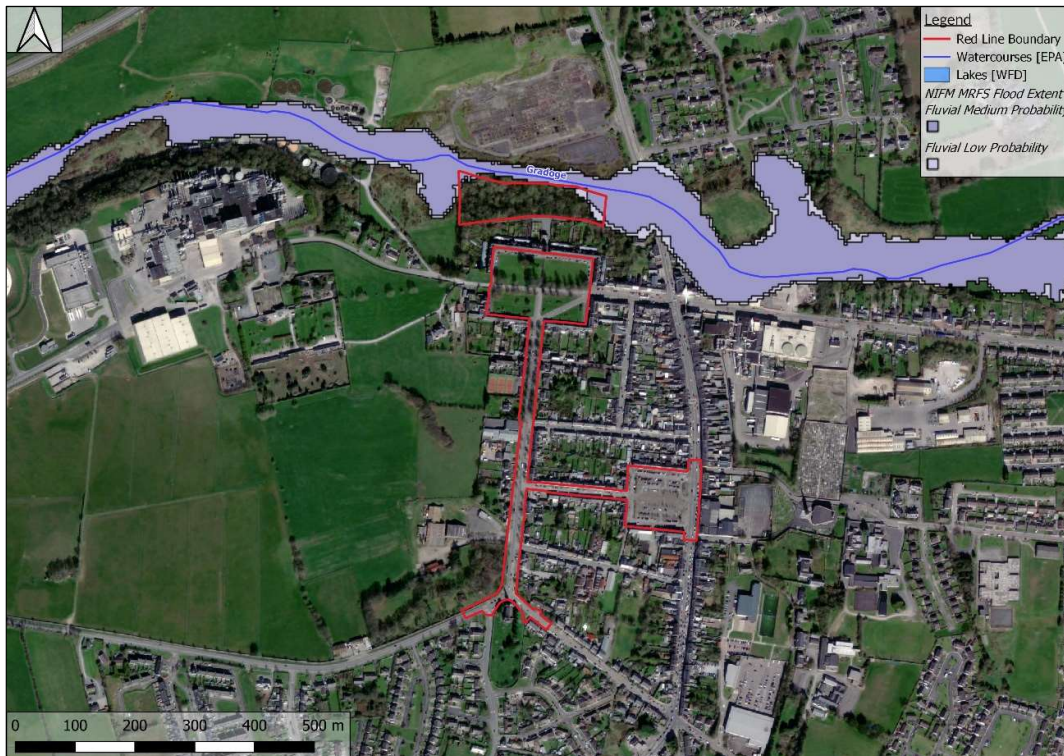


Figure 3—4 National Indicative Fluvial Mapping 2020- Mid-Range Future Scenario

As per Figure 3—3 and Figure 3—4, the predicted fluvial flood extents (Current and MRFS) as part of the National Indicative Fluvial Mapping (2020), there is a small area of predicted flooding located within the boundary of Kings Wood walking trail. Kings Wood walking trail is considered ‘water compatible’.

3.3 Geological Survey Ireland Mapping

The Geological Survey Ireland (GSI) provides mapping⁶ with data related to Ireland's subsurface. Based on the map shown in Figure 3—5, a cave and a spring are located approximately 1.2km and 1.3km from the subject site respectively. There are no karst features (caves, springs, turloughs, etc.) in the vicinity of the proposed subject site.

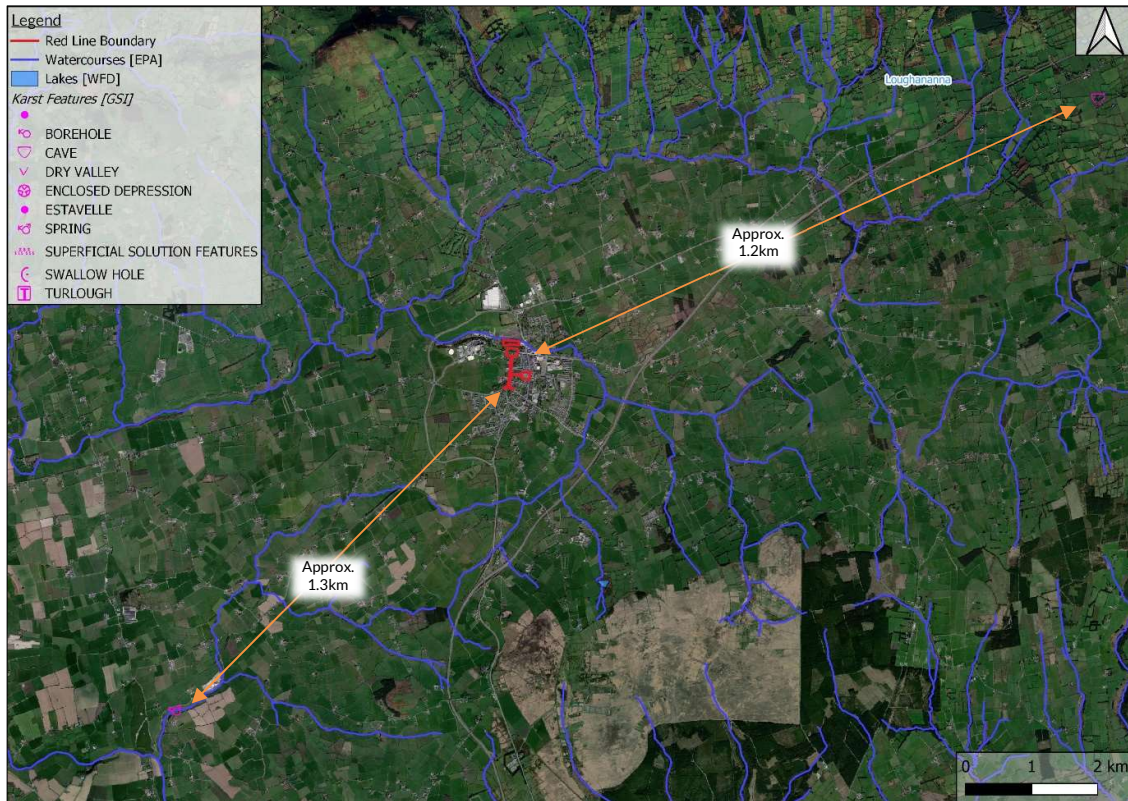


Figure 3—5 GSI Mapping of Karst Features

⁶ <https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx>

As shown in Figure 3—6, as part of a recent GW Flood project, the GSI identified some lands northeast and northwest of Mitchelstown which may be liable to groundwater flooding. It is estimated that the extents of this predicted flooding (approx. 43.5km northwest of the subject site) will not impact the proposed development.

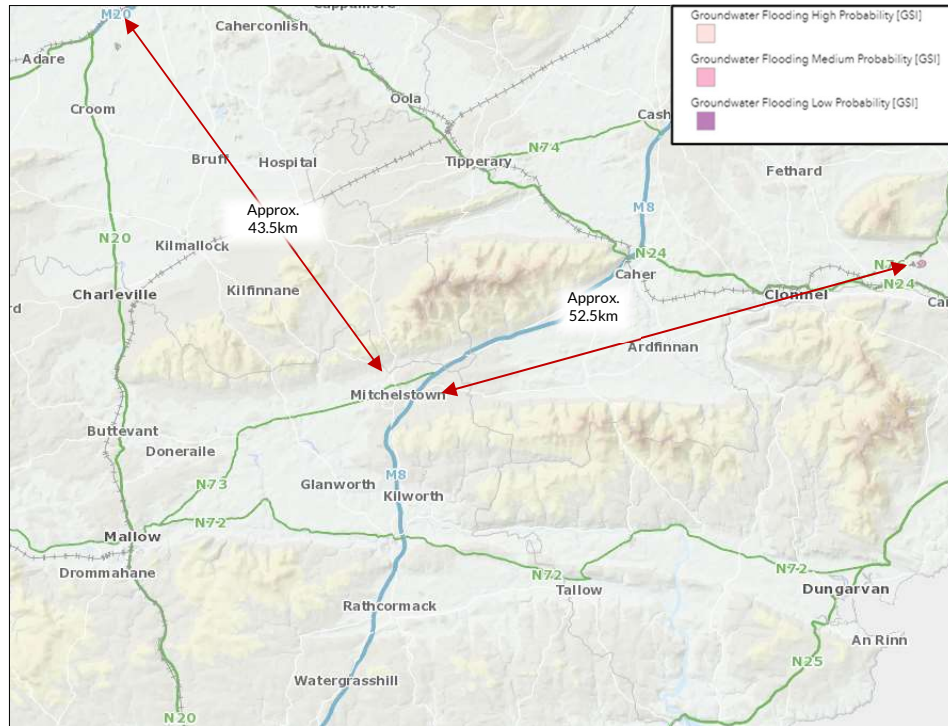


Figure 3—6 GSI Indicative Groundwater Flood Mapping

4.0 DETAILED FLOOD RISK ASSESSMENT

With reference to the PSFRM Guidelines, the proposed outdoor urban enhancement works are classified as “water compatible” in terms of sensitivity to flooding. As such, the proposed upgrades to Kings Square, Kings Wood, New Square and Georges Street are appropriate in any Flood Zone (A, B or C).

4.1 Fluvial Flooding

The subject site is located within Mitchelstown town centre, south of the Gradoge River.

Based on the results of OPW modelling (PFRA, NIFM), the subject site is partially located within the predicted 1% and 0.1% AEP flood extents (see Figure 3—2, Figure 3—3 and Figure 3—4).

However, the predicted flooding is located within the Kings Wood walking trail which is considered ‘water compatible’ in terms of flooding.

The proposed works will predominantly consist of the upgrading of surfacing materials and reconfiguring parking areas and public spaces, with most engineering works below ground. The public realm improvements will not involve major level changes and will improve site drainage, and therefore will not exacerbate flood risk elsewhere.

It is estimated that risk of fluvial flooding to the proposed scheme is minimal.

4.2 Pluvial Flooding

Based on the indicative pluvial flood mapping presented in the OPW Preliminary Flood Risk Assessment, it is estimated that the subject site is not at risk from pluvial flooding during an extreme 0.1% AEP pluvial flood event (see Figure 3—2).

The proposed urban enhancement scheme includes the provision of drainage works, including a drainage investigation of existing infrastructure and design of a new drainage system suitable to public spaces used by pedestrians and cyclists and the aesthetic nature of the area.

Surface water arising at the site will be managed by a dedicated stormwater drainage system in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates.

The landscaping and topography of the developed site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with an extreme flood event or a scenario where the stormwater drainage system becomes blocked.

Therefore, it is estimated that risk of pluvial flooding associated with the proposed development is minimal.

4.3 Groundwater Flooding

There are no karst features located within a 1km radius of the proposed subject site (see Figure 3—5). The nearest predicted groundwater flooding is 52.5km north-east and 43.5km north-west of the site.

Hydraulic modelling completed by HR Wallingford as part of the PFRA project (see Figure 3–2) also indicated that there is no predicted groundwater flooding in the vicinity of the proposed subject site.

Based on a review of Geological Survey Ireland (GSI) subsurface mapping of karst features, historic and predicted groundwater flooding in the area (Figure 3–6), and the PFRA study (Figure 3–2), it is estimated that the risk of groundwater flooding to the proposed subject site is minimal.

4.4 Coastal Flooding

The subject site in Mitchelstown is located more than 50km inland, with site elevations in the region of 87mOD to 111mOD. The nearest predicted 0.1% AEP MRFS coastal flood level at Youghal is estimated by the Irish Coastal Protection Strategy Study (ICPSS) to be approximately 3.31mOD⁷; therefore, it is estimated that the risk of coastal flooding at the proposed site is minimal.

4.5 The Justification Test

With reference to the PSFRM Guidelines, the proposed outdoor urban enhancement works are classified as “water compatible” in terms of sensitivity to flooding.

As the Planning System and Flood Risk Management Guidelines consider water compatible developments appropriate in any flood zone (Flood Zone A, B, C), the Justification Test does not need to be applied.

⁷ Irish Coastal Protection Strategy Study Phase III Map No: S / RA / EXT / MRFS / 26

5.0 CONCLUSIONS

TOBIN Consulting Engineers have been appointed to provide design services by Cork County Council (The Contracting Authority) for Mitchelstown Public Realm Enhancement Scheme Flood Risk Assessment (FRA) of the proposed subject site at Kings Square, Kings Wood, New Square and Georges Street, Mitchelstown, Co. Cork.

The Main Works proposed is public realm enhancement in Mitchelstown, Cork including the relevant civil engineering elements that relate to upgrade of the pavement and associated ground works and services.

The proposed development is considered “water compatible” in terms of its sensitivity to flooding as per the Planning System and Flood Risk Management (PSFRM) Guidelines (OPW/DoEHLG, 2009). The proposed works are therefore considered appropriate in any flood zone (Flood Zone A, B or C).

Fluvial Flooding:

Based on the results of OPW modelling (PFRA, NIFM), the subject site is partially located within the predicted 0.1% and 1% AEP flood extents (see Figure 3—2, Figure 3—3 and Figure 3—4).

However, the King’s Wood walking trail is considered ‘water compatible’ in terms of flooding.

Therefore, it is estimated that risk of fluvial flooding associated with the proposed scheme is minimal.

Pluvial Flooding:

Based on the indicative pluvial flood mapping presented in the OPW Preliminary Flood Risk Assessment, it is estimated that the risk of pluvial flooding at the subject site is minimal.

The proposed urban enhancement scheme includes the provision of drainage works, including a drainage investigation of existing infrastructure and design of a new drainage system in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates.

The landscaping and topography of the site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with extreme flooding or blockage of the stormwater drainage system, minimizing the potential for pluvial flooding.

Therefore, it is estimated that risk of fluvial flooding associated with the proposed scheme is minimal.

Groundwater Flooding:

Based on a review of Geological Survey Ireland (GSI) subsurface mapping of karst features, historic and predicted groundwater flooding in the area (Figure 3—6), and the PFRA study (Figure 3—2), it is estimated that the risk of groundwater flooding to the proposed subject site is minimal.

Coastal Flooding:

As per Section 4.4, it is estimated that the proposed subject site is not at risk of coastal flooding due to its existing ground surface elevations and distance from the coast.

Based on the information contained within this flood risk assessment report, the proposed development is mostly located in Flood Zone C with a small section of the Kings Wood walking trail located within Flood Zone B. The proposed developments are considered 'water compatible' and is therefore, appropriate in Flood Zones A, B and C as per the Planning System and Flood Risk Management Guidelines.

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