Offaly County Council Redevelopment of St. Joseph's Convent, Ferbane, Co. Offaly Flood Risk Assessment



BUILT ON KNOWLEDGE

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1. INTRODUCTION

TOBIN were appointed by Offaly County Council (Tullamore) to undertake a Flood Risk Assessment for a site (see Figure 1-1) and proposed alterations (see Figure 1-2) to an existing convent, known as St. Joseph's Convent, at Ferbane, Co. Offaly.

The subject site is located along the River Brosna in Ferbane, east of Ferbane Main Road, approximately 22km west of Tullamore, between Athlone and Birr. Offaly County Council intends to develop this existing part-greenfield part-brownfield site. The development shall comprise of the following:

- 1. The provision of a multipurpose community, enterprise and learning hub (3 no. stories Gross Floor Area: 1,486m²)
- 2. The provision of a Workshop Building (Gross Floor Area: 150 m²)
- 3. The provision of 48 no. car parking spaces (including 3 no. accessible spaces)
- 4. The provision of 50 no. bicycle parking bays across the site
- 5. The provision of roof mounted solar PV panels and plant enclosure
- 6. The provision of new access road as well as internal access roads, set-down areas and surface level accessible parking.
- 7. The provision of signage, landscaping and boundary treatments and all other associated site development works and services necessary to facilitate the proposed development.

Existing ground Levels range from 42.90mOD to 45.64mOD with a basement level 43.29mOD.

Ferbane Main Road forms the western boundary of the subject site. Ballycumber Road and residential properties are located to the north. The Ferbane GAA Club's sports grounds is located to the east. There are also residential properties west of the site.

River Brosna forms the southern boundary of the subject site. This river is the closest hydraulic feature to the subject site, located within approximately 15m. It flows in a southwestern direction towards River Shannon (lower). River Shannon is located 11km to the subject site.

The purpose of this Stage 2 FRA report is to identify, quantify, and communicate the risks of flooding, if any, to the proposed development. It is anticipated that the main risk to the site is of fluvial flooding given that the subject site is located adjacent to River Brosna.





Figure 1-1: Site Location



Figure 1-2: Site Layout Plan

2. FLOOD RISK MANAGEMENT GUIDANCE

This Stage 2 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
- Offaly County Development Plan (2021 2027)
 - Offaly County Strategic Flood Risk Assessment

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 three 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. The guidelines classify commercial and industrial properties as "less vulnerable" (appropriate in Flood Zone B, less frequently than 1% AEP fluvial flood risk).

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.

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

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



2.1.2 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

2.1.3 Minor Proposals

Section 5.28 of the PSFRM Guidelines notes the following in relation to the assessment of "minor proposals" in areas of potential flood risk:

"Applications for minor development, such as small extensions to houses, and most changes of use of existing buildings and or **extensions and additions to existing commercial and industrial enterprises**, are unlikely to raise significant flooding issues, unless they obstruct important flow paths, introduce a significant additional number of people into flood risk areas or entail the storage of hazardous substances. **Since such applications concern existing buildings, the sequential approach cannot be used to locate them in lower-risk areas and the Justification Test will not apply**. However, a commensurate assessment of the risks of flooding should accompany such applications to demonstrate that they would not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities. These proposals should follow best practice in the management of health and safety for users and residents of the proposal."

On this basis, the works proposed at the St. Joseph's Convent are considered a 'minor proposal' and the Justification Test is not applicable. The proposed refurbishment must therefore be assessed against the following criteria if the proposed works are found to be in Flood Zone A:

- (1) Effect of the development on flood risk elsewhere:
 - a. Impact on flow paths
 - b. Impact on floodplain storage
- (2) Effect of development on flood risk for people using the site:
 - a. Impact on flood levels at the site
 - b. Increase in number of people using the site
 - c. Safe access/egress for people to/from the site
 - d. Safe access/egress for emergency vehicles to/from the site
- (3) Effect of development on access to the adjacent watercourse for maintenance or potential future flood alleviation works
- (4) Storage of hazardous substances



2.1.4 Designing for Residual Flood Risk (Technical Appendices Section 4)

Where possible, the design of minor proposals (see Section 2.1.3) in areas of flood risk should consider residual risk (see Figure 2-2) and flood resilient design, as demonstrated in the figure below. Notably, the guidance highlights the importance of "*designing new buildings in flood risk areas to reduce the consequences of flooding and facilitate recovery from its effects*".



Figure 2-2: Excerpt of PSFRM Technical Appendix Fig. B6 "Responding to Residual Risk"



2.2 THE FLOOD RISK MANAGEMENT CLIMATE ADAPTION 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.

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

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

For the purpose of this flood risk assessment, the proposed development has been assessed against the Mid-Range Future Scenario as it represents a likely future scenario.



2.3 OFFALY COUNTY DEVELOPMENT PLAN (2021 – 2027)

The current Offaly County Development Plan¹ provides a strategic framework for planning and sustainable development in County Offaly for 2021-2027. The Offaly County Development Plan (OCDP) for 2021-2027 was adopted by the Elected Members of Offaly County Council on 10th September 2021 and it came into effect on 22nd October 2021.

Chapter 3 of the Offaly County Development Plan 2021-2027 outlines the city plan for Climate Action and Energy. Chapter 13 of the Offaly County Development Plan 2021-2027 outlines the Development Management Standards. Section 3.5 and 13.8.3 of the Offaly County Development Plan discusses Flood Risk Management for the City.

Flood Risk Policies for Offaly County are as follows:

- Support, in co-operation with the OPW, the implementation of EU Flood Risk Directive (2007/60/EC), the Flood Risk Regulations (SI No, 122 of 2010) and the DECLG and OPW Guidelines for Local Authorities, the Planning System and Flood Risk Assessment Management (2009), Department Circular Pl2/2014 or any updated/superseding legislation or departmental guidelines and have regard to the findings and relevant identified actions of the Catchment Flood Risk Assessment and Management (CFRAM) study.
- 2. All development proposals within or incorporating areas at moderate to high risk of flooding will require site specific and appropriately detailed Flood Risk Assessments (FRAs). The detail of these site-specific FRAs will depend on the level of risk and scale of development but it is advised that The Planning System and Flood Risk Management, Guidelines for Planning Authorities (DEHLG and OPW, 2009) (or any superseding document) and available information from CFRAM Studies, including existing and emerging CFRAMS mapping (including National Indicative Fluvial mapping) and the most up to date CFRAM Programme climate scenario mapping shall be consulted with to this effect. A detailed site-specific FRA should quantify the risks, the effects of selected mitigation and the management of any residual risks. The assessments shall consider and provide information on the implications of climate change with regard to flood risk in relevant locations.
- 3. All development proposals within or incorporating areas at moderate or high risk of flooding will require the application of the Development Management Justification Test in accordance with the Planning System and Flood Risk Management-Guidelines for Planning Authorities (DEHLG and OPW, 2009). Where developments/land uses are proposed that are considered inappropriate to the Flood Zone, then a Development Management Justification Test and site-specific FRA will be required in accordance with The Planning System and Flood Risk Management Guidelines 2009 (and as updated).
- 4. Any proposal that is considered acceptable in principle shall demonstrate the use of the sequential approach to inform the site layout and design of development. Proposals shall also demonstrate that mitigation and management measures can be put in place and that the development will not increase flood risk elsewhere.
- 5. Ensure the recommendations of the Strategic Flood Risk Assessment (SFRA) for the Offaly County Development Plan 2021-2027 are also taken into consideration in the assessment of developments in identified areas of flood risk.



¹ https://www.offaly.ie/c/county-development-plan/

6. Applications for development in flood vulnerable zones shall provide details of structural and non-structural risk management measures that are listed in Chapter 13 of the Offaly County Development Plan 2021-2027

The Offaly County Development Plan zones the subject site as mostly "Open Space, Amenity and Recreation" land with "Town Centre/ Mixed Use" and "Constrained Land Use", as seen in Figure 2-3.





The constrained land use falls within the flood risk area. The constrained land use approach mitigates potential conflict between zonings and high and less vulnerable developments for developed land. This method has been tried, tested, and aligns with the standards set out in the Flood Risk Management Guidelines and Circular PL 2/2014.

2.3.1 Offaly County Strategic Flood Risk Assessment (2021 – 2027)

A Strategic Flood Risk Assessment (SFRA) was prepared by Conservation and Amenity Advisory Services (CAAS) in 2021 to inform the current Offaly County Development Plan.

It sets out the following regarding the constrained land use:

"Flood risk areas in settlement plans are represented by a 'Constrained Land Use' designation. This designation generally limits new development but will facilitate existing development uses within these areas that may require small scale development such as small extensions. Development proposals within these areas shall be accompanied by a detailed Flood Risk Assessment, carried out in accordance with The Planning System and Flood Risk Assessment Guidelines and Circular PL 2/2014 (or as updated), which shall assess the risks of flooding associated with the proposed development."



In terms of Coastal Flooding (1.4.4.4), the SFRA notes that:

"Coastal flooding is not relevant to County Offaly."

It also sets out the standard for dealing with climate change and ensuring that the designed floor levels of structures are adequate:

"Ensuring that the levels of structures designed to protect against flooding such as flood defences, land raising or raised floor levels are sufficient to cope with the effects of climate change over the lifetime of the development they are designed to protect (normally 85-100 years)".

Corresponding to Table 5, Offaly County Council recommended minimum allowances that correlates to the climate adaption plan discussed in Section 2.2.

And further recommended principles of flood resilient design be applied where possible for minor developments (see Section 2.1.3).

An assessment of Ferbane was prepared as part of the Offaly County SFRA noting the following findings:

- The Brosna flows through the south of the Plan area.
- Most built development within Ferbane is not within the flood plain and has been developed on higher ground. Elevated levels of flood risk exist to the west of Gallen View and east of Mill Race.
- The Ferbane Stream was not included within the scope of the CFRAMS mapping however there are numerous flood risk indicators here and flood paths and topographical features are generally consistent with these.

The indicative flood zones are indicated in Figure 2-4, extracted from Appendix 2 of the SFRA. The majority of the subject site is located in Flood Zone B, with a small portion extending into Flood Zone A.





Figure 2-4: Indicative Flood Zones (Source: Offaly County Development Plan 2021-2027: SFRA Appendix II Flood Mapping)



3. INITIAL FLOOD RISK ASSESSMENT

3.1 PAST FLOOD EVENTS

The OPW's National Flood Information Portal² provides past flood event mapping with records of flooding reports, meeting minutes, photos, and/or hydrometric data. Based on the flood map shown in Figure 3-1, there are no flood events in the immediate vicinity of the subject site. The closest flood event (ID 2907) is located 2km northeast from the subject site in Derrica Beg (within Ferbane ED). "Low lying land" was highlighted as a source of flooding in the event. The recorded past flood event is not hydraulically linked to the subject site.



Figure 3-1: OPW Recorded Past Flood Events



² floodinfo.ie

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".*

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 215]

Findings based on the PFRA mapping indicate that the site does not appear to be at risk of fluvial, coastal and groundwater flooding since these flood extent fall outside the site boundary. The site is however at risk of pluvial flooding as indicated on Figure 3-2.

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)

Improved hydraulic modelling was carried out through the Catchment Flood Risk Assessment and Management Study (CFRAM) in 2015 (discussed in Section 3.3) and is considered more accurate than the PFRA study as it utilised surveyed river geometry and was subject to greater model calibration.



3.3 CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

In 2015, the OPW produced flood maps as part of the Catchment Flood Risk Assessment and Management (CFRAM) Study. The flood extents in these maps are based on detailed modelling of Areas for Further Assessment identified by the National Preliminary Flood Risk Assessment.³.

The River Brosna, which is located along the southern boundary of the subject site was modelled as part of the CFRAM Study. CFRAM mapping of the 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) predicted fluvial flood extents are shown in Figure 3-3. The predicted flood mapping produced as part of the CFRAM study indicates that the subject site is liable to fluvial flood ing during a 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) event. Based on the fluvial flood extent mapping produced as part of the CFRAM study, the subject site is located mainly within Flood Zone B with some areas being within Flood Zone A. Water levels for the subject site were not recorded in the CFRAM study. However, water levels have been estimated based on the topographical survey and flood extents. Water levels vary across the subject site given its' size and the slope of the river. A maximum water level of 43.22mOD has been estimated in the location of the proposed refurbishment for the current 1 in 1000-year (0.1% AEP) event.



Figure 3-3: CFRAM Current Fluvial Flood Extents

The CFRAM Study also completed mapping which included an allowance for climate change for the mid-range future scenario (MRFS). Figure 3-4 shows the MRFS fluvial flood extents produced as part of the CFRAM Study during the 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) MRFS flood events. The subject site is again shown to be at risk of fluvial flooding.



³<u>https://www.floodinfo.ie/about_frm/</u>

Approximately, 20% more inundated in the 1 in 100-year (1% AEP) MRFS flood event and 10% more in the 1 in 1000-year (0.1% AEP) MRFS flood event. A maximum water level of 43.52mOD has been estimated in the location of the proposed refurbishment for the current 1 in 1000-year (0.1% AEP) MRFS event.



Figure 3-4: CFRAM MRFS Fluvial Flood Extents

3.4 OPW DRAINAGE DISTRICTS AND ARTERIAL DRAINAGE SCHEMES

The OPW Drainage Districts were carried out by the commissioners of Public Works under several drainage and navigation acts from 1842 to the 1930s to improve land for agriculture and to mitigate flooding.⁴ The local authorities are charged with the responsibility to maintain Drainage Districts.

Benefited lands are areas that were previously to poor drainage and/or flooding but that have benefited from the implementation of Arterial Drainage Schemes carried out under the Arterial Drainage Act 1945.

Although the River Brosna is a land commissioned watercourse the subject site has not benefited from any arterial drainage scheme and is not located in a Drainage District.

⁴ www.floodinfo.ie





3.5 GEOLOGICAL SURVEY IRELAND MAPPING

Based on a review of the OPW's Preliminary Flood Risk Assessment (PFRA) mapping (see Figure 3-2) there is no noted risk of groundwater flooding to the subject site.

GSI Groundwater Flooding Probability Maps⁵ for the subject site were reviewed (as shown in Figure 3-5). There are no areas of GSI historic groundwater or surface water flood extents noted in the vicinity of the subject site. Surface water has been recorded within 1km northeast and southwest of the subject site on the opposite side of the River Brosna and Ferbane Stream.



Figure 3-5: GSI Mapping of Groundwater and Surface Water Flooding

Geological Survey Ireland (GSI) subsurface mapping of karst features⁶ in the area show that there is no karst features located in the vicinity of the subject site (see Figure 3-6). The closest karst feature to the subject site is a superficial solution feature located approximately 2.1km north of the subject site, south of the Holy Well Clongawny watercourse.

⁶GSI Groundwater Data Viewer, Available at: <u>https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b7</u> <u>48ef</u>



⁵FloodInfo.ie | National Flood Information Portal, Available at: <u>https://www.floodinfo.ie/map/floodmaps/</u>



Figure 3-6: GSI Mapping of Karst Features



4. DETALED FLOOD RISK ASSESMENT

With reference to the PSFRM guidelines, the proposed development is comprised of "less vulnerable" (commercial and industrial properties) elements.

Therefore, commercial and industrial properties are "less vulnerable" and therefore should be located in Flood Zone B or C (less than 0.1% AEP river flood risk).

4.1 FLUVIAL FLOODING

The hydraulic feature of consideration for the subject site is a tributary of the River Brosna. CFRAM mapping indicates that the 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) MRFS flood extents inundate the subject site.

Based on the topography of the site and CFRAM flood extents the 1 in 1000-year (0.1% AEP) flood event water level was estimated to be 43.22mOD. The 1 in 1000-year (0.1% AEP) MRFS flood event water level was estimated to be 43.52mOD.

As the proposed works are a refurbishment to an existing development, the proposed Finished Floor Levels (FFLs) for the ground floor elements must tie into the existing infrastructure and have been set to a minimum of 44.20mOD. This gives a freeboard of 0.68m above the 1 in 1000-year (0.1% AEP) MRFS flood event water level.

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

4.2 COASTAL FLOODING

The subject site is approximately located within the centre of Ireland, more than 76km inland, with minimum site elevations of approximately 42mOD. The nearest predicted 0.1% AEP HEFS coastal flood level at Galway (75km west of the subject site) is estimated by the West Coast ICWWS Study to be approximately 5.28mOD [Point 5].⁷ Therefore, it is estimated that risk of coastal flooding associated with the proposed development is minimal.

4.3 PLUVIAL FLOODING

The PFRA indicative mapping indicates that the nearest area of pluvial flooding is a small zone located to the north of the subject site.

Surface water arising on the proposed development 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 subject 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.



⁷ <u>Coastal Map - Floodinfo.ie</u>

4.4 **GROUNDWATER FLOODING**

Based on a review of Geological Survey Ireland (GSI) subsurface mapping of karst features (Figure 3-6), predicted no groundwater flooding in the area (Figure 3-5), and the PFRA study (Figure 3-2), there is no evidence to suggest liability to groundwater flooding at the subject site.

4.5 MINOR PROPOSALS

The PSFRM Guidelines state that commercial and industrial properties are considered "less vulnerable" in terms of sensitivity to flooding. The guidelines recommend that developments of this category should be constructed in Flood Zone B or C, where there is less than 1% Annual Exceedance Probability (AEP) of Fluvial flooding.

Based on review of the available information, the proposed refurbishment within the subject site is primarily located in Flood Zone B (less than 0.1% AEP). A portion of the development falls within Flood Zone B. Floor levels are required to be raised to mitigate flood risk. The paved areas and car park are within Flood Zone A and B. These areas can be considered to be "water compatible" if permeable paving/ materials are implemented in these areas.

As outlined in Section 2.1.3, the proposed refurbishment to the St. Joseph's Convent is considered a 'minor proposal' in the PSFRM guidelines. The 'Justification Test' therefore does not apply, and the following items have been considered, as recommended in Section 5.28 of the PSFRM guidance document:

- (1) Effect of the development on flood risk elsewhere:
 - a. Impact on flow paths
 - b. Impact on floodplain storage
- (2) Effect of development on flood risk for people using the site:
 - a. Impact on flood levels at the site
 - b. Increase in number of people using the site
 - c. Safe access/egress for people to/from the site
 - d. Safe access/egress for emergency vehicles to/from the site
- (3) Effect of development on access to the adjacent watercourse for maintenance or potential future flood alleviation works
- (4) Storage of hazardous substances

Effect of development on flood risk elsewhere

Since the proposed development is within an existing development it is predicted that the flood risk elsewhere would be minimal. Catchment delineation was carried out for the proposed refurbishment area and car park to roughly estimate runoff, which ranges between 0.02 to 0.04 m^3 /s. This suggests that the flood risk to surrounding areas downstream of the development would be minimal.

Effects of development on flood risk for users of development

Based on the available information, it is predicted that the proposed refurbishment to the existing buildings is located in Flood Zone C, i.e. predicted to be liable to flooding during less than the current 0.1% AEP event.

As the proposed works are a refurbishment to an existing development, the proposed FFLs for the ground floor elements must tie into the existing and have been set to a minimum of



44.20mOD. This gives a freeboard of 0.68m above the 1 in 1000-year (0.1% AEP) MRFS flood event water level.

The existing access/egress routes for people and emergency vehicles to/from the site will not be altered by this renovation.

Effect of development on access to watercourse for maintenance or potential flood alleviation works.

The proposed buildings to remain are set back slightly from the banks of the river, allowing for maintenance and flood alleviation works if required. The opposite side of the river has large open space which will also allow access to the watercourse for the same.

Storage of hazardous substances

The proposed development does not include proposals for the storage of hazardous substances.



5. CONCUSIONS

TOBIN were appointed by Offaly County Council (Tullamore). to carry out a Stage 2 FRA for the proposed extension to the existing St. Joseph's Convent at Ferbane, Co. Offaly.

The PSFRM Guidelines also categorise different types of development into three vulnerability classes based on their sensitivity to flooding. The guidelines classify commercial and industrial properties as "less vulnerable" (appropriate in Flood Zone B, less frequently than 1% AEP fluvial flood risk).

Fluvial Flooding

The hydraulic feature of consideration for the subject site is a tributary of the River Brosna. CFRAM mapping indicates that the 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) MRFS flood extents inundate the subject site.

As the proposed works are a refurbishment to an existing development, the proposed FFLs for the ground floor elements must tie into the existing infrastructure and have been set to a minimum of 44.20mOD. This gives a freeboard of 0.68m above the 1 in 1000-year (0.1% AEP) MRFS flood event water level. The freeboard is significantly above the typical value of 0.3 m, which is commonly used for FFLs.

Therefore, it is estimated that the risk of fluvial flooding to the proposed extension is minimal. Residual risks for future proposed development areas should be considered during the design phase. These developments are located within Flood Zone C.

Potential residual risks associated with the proposed multifunctional sports area include temporary water accumulation, ground saturation, and damage to infrastructure such as pathways, lighting, seating or artificial turf surfaces. Additional risks may involve restricted access, challenges with evacuation, and erosion or sedimentation that could impact maintenance processes.

The proposed future development area west of the sports area may increase runoff, alter flow paths, overload drainage systems, reduce floodplain storage, and contribute to cumulative flood risk. These residual risks should be managed through mitigation measures such as implementing SuDS for runoff management, ensuring adequate drainage and flood resilience, conducting flood impact assessments for future developments, and maintaining communication with planning authorities to anticipate and address potential future flood risks.

It should be noted that these risks depend on the type of development. Residential developments, classified as "more vulnerable", would have additional residual risks compared to alternative developments such as industrial and commercial areas, classified as "less vulnerable", and open spaces, classified as a "water compatible development".

Coastal Flooding

The subject site is approximately located within the centre of Ireland, more than 76km inland, indicating a minimal potential risk of coastal flooding to the site.



Pluvial Flooding

The PFRA indicative mapping indicates that the nearest area of pluvial flooding is a small zone located to the north of the subject site.

Surface water arising on the proposed development 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 proposed system will collect runoff from buildings, roadways, footways, and car parking areas, directing it through a petrol interceptor before reaching a soakaway. A combination of channel drains and precast concrete gullies, fitted with lockable cast iron gratings and frames, will channel surface water into a piped drainage network. The new network will consist of 300mm diameter pipes, laid at a gradient of 1/200, based on site area and topography. Flow velocities within these gradients will be maintained between 0.8 m/s and 3 m/s, in accordance with the 'Recommendations for Site Development Works' published by the Department for the Environment. For further details, refer to the Engineering Feasibility Report (Stage 1).

The operation and maintenance of the surface water drainage system should be actively implemented. This includes routine quarterly and annual inspections of flood protection measures, such as the surface water drainage system (SuDS). Regular silt and debris removal from drainage structures (e.g. channels, gullies and pipes) is essential for effective runoff management. Additionally, periodic assessments of material durability should be carried out to ensure long-term maintenance.

The landscaping and topography of the developed subject 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.

Groundwater Flooding

There is no evidence to suggest groundwater as a potential source of flood risk to the proposed development at the subject site.

Based on the results of this flood risk assessment, the proposed refurbishment is appropriately located in Flood Zone B and that the development will not increase the risk of flooding elsewhere. The development has been assessed against the criteria for Minor Proposals and found to be suitable. There is a freeboard of 0.68m above the 1 in 1000-year (0.1% AEP) MRFS flood event water level.

The area downstream of the development falls within Flood Zone C and is minimally impacted by estimated runoff based on catchment delineation.

The OPW Flood Information Service and Met Éireann⁸ alerts should be referred to for timely notifications of yellow, orange and red storm warnings. Emergency evacuations should follow the same safe access/ egress routes outlined in the fire evacuation procedures, with



⁸ met.ie

corresponding signage implemented throughout the development. The emergency exit route should be to the north of the development, avoiding River Brosna as much as possible.



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