Manorhamilton Fire Station, Co. Leitrim

Site Specific Flood Risk Assessment
221323-PUNCH-XX-XX-RP-C-0001

May 2023

Document Control

Document Number: **221323-PUNCH-XX-XX-RP-C-0001**

Status	Rev	Description	Date	Prepared	Checked	Approved
S3	P01	Draft Issue	21 December 2022	R. Lee	J. Tiernan	J. Tiernan
A0	P01	Final Issue	9 February 2023	R. Lee	J. Tiernan	J. Tiernan
A0	P02	Final Issue	3 March 2023	R. Lee	J. Tiernan	J. Tiernan
A0	P03	Final Issue - Updated	10 May 2023	R. Lee	J. Tiernan	J. Tiernan

Table of Contents

1 Introduction

1.1 Background

PUNCH Consulting Engineers were appointed by Leitrim County Council to carry out a Site-Specific Flood Risk Assessment for the proposed Fire Station in Manorhamilton, County Leitrim.

The assessment is carried out in full compliance with the requirements of "The Planning System & Flood Risk Management Guidelines" published by the Department of the Environment, Heritage and Local Government in November 2009.

The proposed site layout is detailed in a series of planning drawings provided by Rhatigan Architects in the planning documentation.

1.2 Existing Site

The site location is shown in Figure 1-1 below. The proposed site is bordered by N16 Sligo Road to the south, Manorhamilton Recycling Centre to the north-east, undeveloped land to the north and west of the site. The Owenmore River is located approximately 120m to the west of the proposed site. The greenfield site is approximately 0.34ha.

Figure 1-1: Location of the Proposed development (site boundary indicated in red)

1.3 Nature of the Proposed Development

The proposed development comprises of a fire station, drill tower, attenuation lagoon, carpark and associated out building. The proposed finished floor levels of the fire station is 42.170mAOD. An extract from Rhatigan Architect's Drawing No. 19077_A_003, showing the proposed site layout, is presented below as Figure 1-2.

Figure 1-2: Proposed Site Layout

2 Relevant Guidance

2.1 The Planning System and Flood Risk Management Guidelines

In September 2008, "The Planning System and Flood Risk Management" Guidelines were published by the Department of the Environment, Heritage and Local Government in Draft Format. In November 2009, the adopted version of the document was published.

The Flood Risk Management Guidelines give guidance on flood risk and development. The guidelines recommend a precautionary approach when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a flood risk sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding. The guidelines include definitions of Flood Zones A, B and C, as noted in Table 2-1 below. It should be noted that these do not take into account the presence of flood defences, as there remain risks of overtopping and breach of the defences.

Table 2-1: Flood Zone Designation

Flood Zone	Type of Flooding	Annual Exceedance Probability (AEP)
Flood Zone A	Coastal	Less than a 1:200 (0.5% AEP) year event
	Fluvial	Less than a 1:100 (1% AEP) year event
Flood Zone B	Coastal	Greater than a 1:200 (0.5% AEP) and less than a 1:1000 (0.1% AEP) year event
	Fluvial	Greater than a 1:100 (1% AEP) and less than a 1:1000 (0.1% AEP) year event
Flood Zone C	Coastal	Greater than a 1:1000 (0.1% AEP) year event
	Fluvial	Greater than a 1:1000 (0.1% AEP) year event

Once a flood zone has been identified, the guidelines set out the different types of development appropriate to each zone. Exceptions to the restriction of development due to potential flood risks are provided for through the use of the **Justification Test**, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. This recognises that there will be a need for future development in existing towns and urban centres that lie within flood risk zones, and that the avoidance of all future development in these areas would be unsustainable.

A three staged approach to undertaking an FRA is recommended:

Stage 1: Flood Risk Identification – Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment;

Stage 2: Initial Flood Risk Assessment – Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measures;

Stage 3: Detailed Flood Risk Assessment – Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

This report addresses the requirements for Stage 2.

2.2 Leitrim County Development Plan 2023-2029

At the time of writing, the Leitrim County Development Plan 2023-2029 has been published. The plan states the following policies with regard to flood risk management:

FRM POL 1	To adopt a comprehensive risk-based planning approach to flood management to prevent or minimise future flood risk. In accordance with the Planning System and Flood Risk Management – Guidelines for Planning Authorities, the avoidance of development in areas where flood risk has been identified shall be the primary response.
FRM POL 2	To ensure that a flood risk assessment is carried out for any development proposal, in accordance with the Planning System and Flood Risk Management (DoEHLG/OPW 2009) and Circular PL2/2014. This assessment shall be appropriate to the scale and nature of risk to the potential development.
FRM POL 3	To consult with the OPW in relation to proposed developments in the vicinity of drainage channels and rivers for which the OPW are responsible, and to retain a strip on either side of such channels where required, to facilitate maintenance access thereto. In addition, to promote the sustainable management and uses of water bodies and avoid culverting or realignment of these features
FRM POL 4	To protect and enhance the county's floodplains and wetlands as 'Green Infrastructure' which provides space for storage and conveyance of floodwater, enabling flood risk to be more effectively managed and reducing the need to provide flood defences in the future, subject to normal planning and environmental criteria.
FRM POL 5	To protect the integrity of any formal flood risk management infrastructure, thereby ensuring that any new development does not negatively impact any existing defence infrastructure or compromise any proposed new defence infrastructure.
FRM POL 6	To ensure that where flood risk management works take place that the natural, cultural and built heritage, rivers, streams and watercourses are protected and enhanced to the maximum extent possible.
FRM POL 7	To ensure each flood risk management activity is examined to determine actions required to embed and provide for effective climate change adaptation as set out in the OPW Climate Change Sectoral Adaptation Plan Flood Risk Management applicable at the time.
FRM POL 8	To consult, where necessary, with Inland Fisheries Ireland, the National Parks and Wildlife Service and other relevant agencies in the provision of flood alleviation measures in the county.
FRM POL 9	To ensure that in assessing applications for developments, that consideration is had to the impact on the quality of surface waters having regard to targets and measures set out in the River Basin Management Plan for Ireland 2018-2021 and any subsequent local or regional plans.
FRM POL 10	Development proposals will need to be accompanied by a Development Management Justification Test when required by the Guidelines. Where only a small proportion of a site is at risk of flooding, the sequential approach shall be applied in site planning, in order to seek to ensure that no encroachment onto or loss of the flood plain occurs

and/or that only water compatible development such as 'Open Space' would be permitted for the lands which are identified as being at risk of flooding within that site.

FRM POL 11 To require proposals for development to comply with requirements of the Planning System and Flood Risk Assessment Guidelines including providing detailed design specifications as may be required to assess the impact of development.

a) Extensions of existing uses or minor development within flood risk areas shall not: obstruct important flow paths; introduce a number of people into flood risk areas; entail the storage of hazardous substances; have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities; or increase the risk of flooding elsewhere.

b) Applications for development within Flood Zones A or B, shall be subject to site specific flood risk assessment and shall provide details of structural and non- structural flood risk management measures, to include, but not be limited to specifications of the following:

Floor Levels

In areas of limited flood depth, the specification of the threshold and floor levels of new structures shall be raised above expected flood levels to reduce the risk of flood losses to a building, by raising floor heights within the building structure using a suspended floor arrangement or raised internal concrete platforms.

When designing an extension or modification to an existing building, an appropriate flood risk reduction measure shall be specified to ensure the threshold levels into the building are above the design flood level. However, care must also be taken to ensure access for all is provided in compliance with Part M of the Building Regulations.

Where threshold levels cannot be raised to the street for streetscape, conservation or other reasons, the design shall specify a mixing of uses vertically in buildings - with less vulnerable uses located at ground floor level, along with other measures for dealing with residual flood risk.

Internal Layout

Internal layout of internal space shall be designed and specified to reduce the impact of flooding [for example, living accommodation, essential services, storage space for provisions and equipment shall be designed to be located above the predicted flood level]. In addition, designs and specifications shall ensure that, wherever reasonably practicable, the siting of living accommodation (particularly sleeping areas) shall be above flood level.

With the exception of single storey extensions to existing properties, new single storey accommodation shall not be deemed appropriate where predicted flood levels are above design floor levels. In all cases, specifications for safe access, refuge and evacuation shall be incorporated into the design of the development.

Flood-Resistant Construction

Developments in flood vulnerable zones shall specify the use of flood-resistant construction aimed at preventing water from entering buildings - to mitigate the damage floodwater caused to buildings.

Developments shall specify the use of flood resistant construction prepared using specialist technical input to the design and specification of the external building

envelope – with measures to resist hydrostatic pressure (commonly referred to as "tanking") specified for the outside of the building fabric.

The design of the flood resistant construction shall specify the need to protect the main entry points for floodwater into buildings - including doors and windows (including gaps in sealant around frames), vents, air-bricks and gaps around conduits or pipes passing through external building fabric. The design of the flood resistant construction shall also specify the need to protect against flood water entry through sanitary appliances as a result of backflow through the drainage system.

Flood-Resilient Construction

Developments in flood vulnerable zones that are at risk of occasional inundation shall incorporate design and specification for flood resilient construction which accepts that floodwater will enter buildings and provides for this in the design and specification of internal building services and finishes. These measures limit damage caused by floodwater and allow relatively quick recovery. This can be achieved by specifying wall and floor materials such as ceramic tiling that can be cleaned and dried relatively easily, provided that the substrate materials (e.g. blockwork) are also resilient. Electrics, appliances and kitchen fittings shall also be specified to be raised above floor level, and one-way valves shall be incorporated into drainage pipes.

Emergency Response Planning

In addition to considering physical design issues for developments in flood vulnerable zones, the developer shall specify that the planning of new development also takes account of the need for effective emergency response planning for flood events in areas of new development.

Applications for developments in flood vulnerable zones shall provide details that the following measures will be put in place and maintained:

• provision of flood warnings, evacuation plans and ensuring public awareness of flood risks to people where they live and work

• coordination of responses and discussion with relevant emergency services i.e. Local Authorities, Fire and Rescue, Civil Defence and An Garda Siochána through the SFRA; and

• awareness of risks and evacuation procedures and the need for family flood plans.

Access and Egress

During Flood Events Applications for developments in flood vulnerable zones shall include details of arrangements for access and egress during flood events. Such details shall specify that:

• flood escape routes have been kept to publicly accessible land;

• such routes will have signage and other flood awareness measures in place, to inform local communities what to do in case of flooding;

• this information will be provided in a welcome pack to new occupants.

Further Information

Further and more detailed guidance and advice can be found at http://www.flooding.ie and in the Building Regulations.

c) In Flood Zone C, where the probability of flooding is low (less than 0.1%), site- specific Flood Risk Assessment may be required and the developer should satisfy themselves that

	the probability of flooding is appropriate to the development being proposed. The County Development Plan SFRA datasets and the most up to date information on flood risk, including that relating to climate scenarios, should be consulted by prospective applicants for developments in this regard and will be made available to lower-tier Development Management processes in the Council
FRM POL 12	To require that Strategic Flood Risk Assessments and site-specific Flood Risk Assessments shall provide information on the implications of climate change with regard to flood risk in relevant locations. The 2009 OPW Draft Guidance on Assessment of Potential Future Scenarios for Flood Risk Management (or any superseding document) shall be consulted with to this effect.
FRM POL 13	To require the submission of site-specific Flood Risk Assessments for developments undertaken within Flood Zones A & B and on lands subject to the mid-range future scenario floods extents, as published by the Office of Public Works. These Flood Risk Assessments shall consider climate change impacts and adaptation measures including details of structural and non-structural flood risk management measures, such as those relating to floor levels, internal layout, flood-resistant construction, flood-resilient construction, emergency response planning and access and egress during flood events.
FRM POL 14	To require the undertaking of site-specific flood risk assessments for applications for development on land identified as benefitting land which may be prone to flooding.
FRM POL 15	To ensure that new developments proposed in Arterial Drainage Schemes and Drainage Districts do not result in a significant negative impact on the integrity, function and management of these areas.
FRM POL 16	Any potential future variations to and review of the Plan shall consider, as appropriate any new and/or emerging data relating to flood risk.

2.3 Strategic Flood Risk Assessment

As part of the Leitrim County Development Plan 2023 - 2029 noted above, a Strategic Flood Risk Assessment (SFRA) was carried out. The SFRA includes an assessment of Manorhamilton, concluding that there is a relatively low level of flood risk to this community from rivers and no structural flood relief measures are therefore proposed at this time. The current level of risk will be reviewed, along with all areas, on a regular basis into the future.

The SFRA includes a series of flood extent maps including a map of indicative flood zones. An extract from this map is presented here as Figure 2-1 below. The proposed development site is not located in Flood Zone A or B on this map.

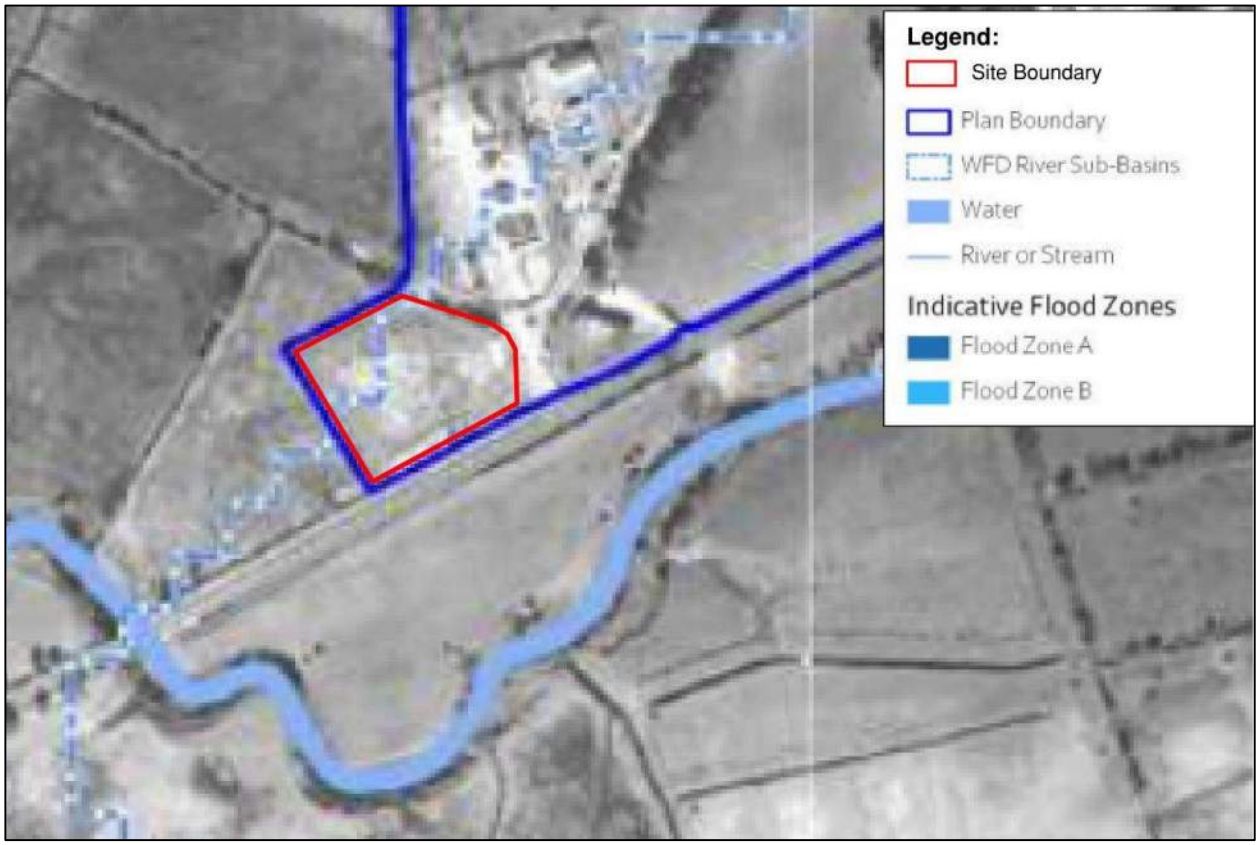


Figure 2-1: Extract from Leitrim County Development Plan 2023-2029 SFRA Manorhamilton Indicative Flood Zone Map

2.4 Land Zoning

The land on which the development is proposed is currently zoned as "*Utilities*" in the Leitrim County Development Plan 2023-2029. An extract from the Development Plan Map 15 (Manorhamilton Land Use Zoning Map) is presented here as Figure 2-2.

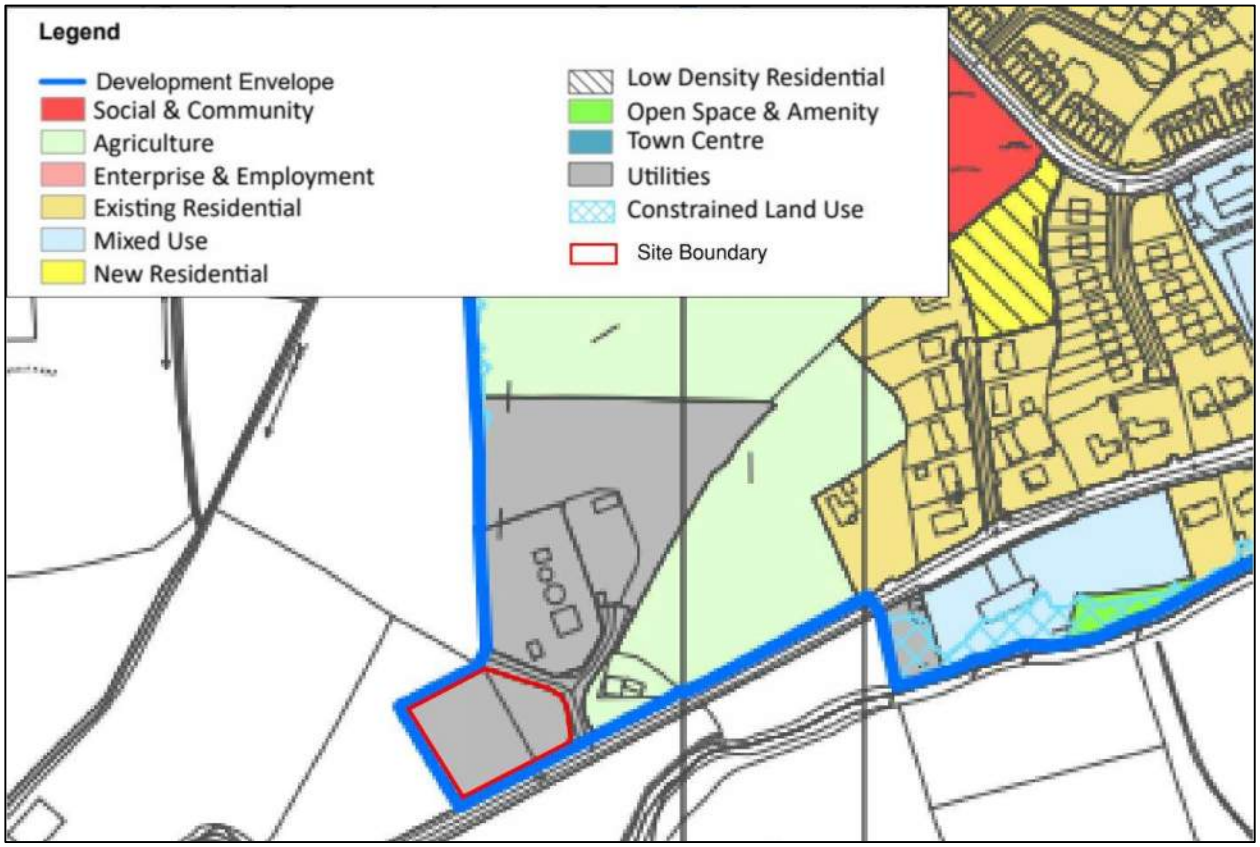


Figure 2-2: Extract from Leitrim County Development Plan 2023-2029 Map 15 (Manorhamilton Land Use Zoning Map)

3 Flood Risk Identification

3.1 Existing Hydrogeological Environment

The existing hydrological environment is characterised primarily by the presence of the Owenmore River which is located approximately 120m to the west of the site and 100m south separated by the N16. The N16 crosses the Owenmore River approximately 120m south-west of the site. The Owenmore River flows into the River Bonet shortly after crossing the N16. The River Bonet ultimately drains into Lough Gill near Sligo town, to the west. The hydrological environment around the site is shown in Figure 3-1 below.

Figure 3-1: Hydrological Environment around the site

3.2 Topographical Survey

Topographical information for the site shows that the site levels range from 43.9mOD at the eastern end of the site to 41mOD at the western side of the site.

3.3 Site Walkover

PUNCH Consulting Engineers visited the site on Tuesday 20th December 2022 to assess the conditions and key features of the site, to establish any potential sources of flooding and to identify the likely routes of flood waters. Appendix A contains a selection of key images taken during the site visits.

The following was established from the site visit:

a) The site was accessed via N16 national primary road located to the south of the proposed site.
b) Ground was soft underfoot at the time of the visit after a prolonged period of rain.
c) The site slopes from east (highest) to west (lowest) towards the Owenmore River approximately 100m to the west;
d) There is an existing open drain that runs along the southern boundary of the site parallel with the N16 road
e) There is a wastewater treatment plant located to the northeast of the site.

3.4 Site Geology

The geology of the site was reviewed using data from the Geological Survey of Ireland (available at www.gsi.ie). The soil type at the location of the proposed development is identified as Metamorphic Till and Cut Peat as seen in Figure 3-2.The surrounding areas comprise mainly of Metamorphic Till, Cut Peat and Alluvium, which suggests historic flooding on the site.

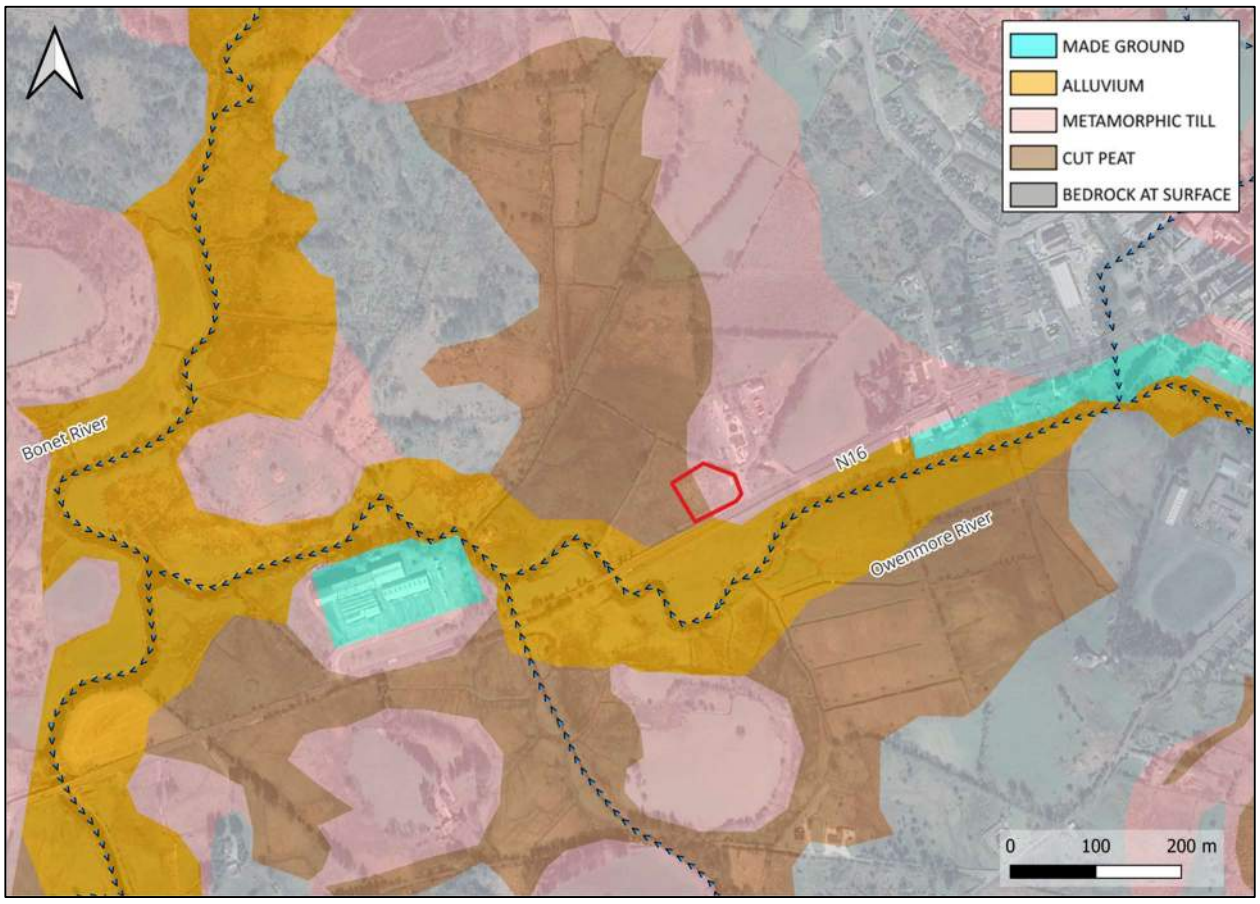


Figure 3-2:Geology of the surrounding area (source: Geological Survey of Ireland (www.gsi.ie))

3.5 Review of Existing Surface Water Infrastructure

A review of the existing surface water infrastructure indicates that there is no existing drainage network in the vicinity of the site.

3.6 Review of Historic Mapping

A review of the OSI Historical maps[1] was carried out. Figure 3-3 shows an extract from the 6-inch historic map for the site. Areas surrounding the Owenmore River and Bonet River were indicated as "liable to flood" in the available historic OSI maps. However, it is unclear if the note extents include the proposed site.

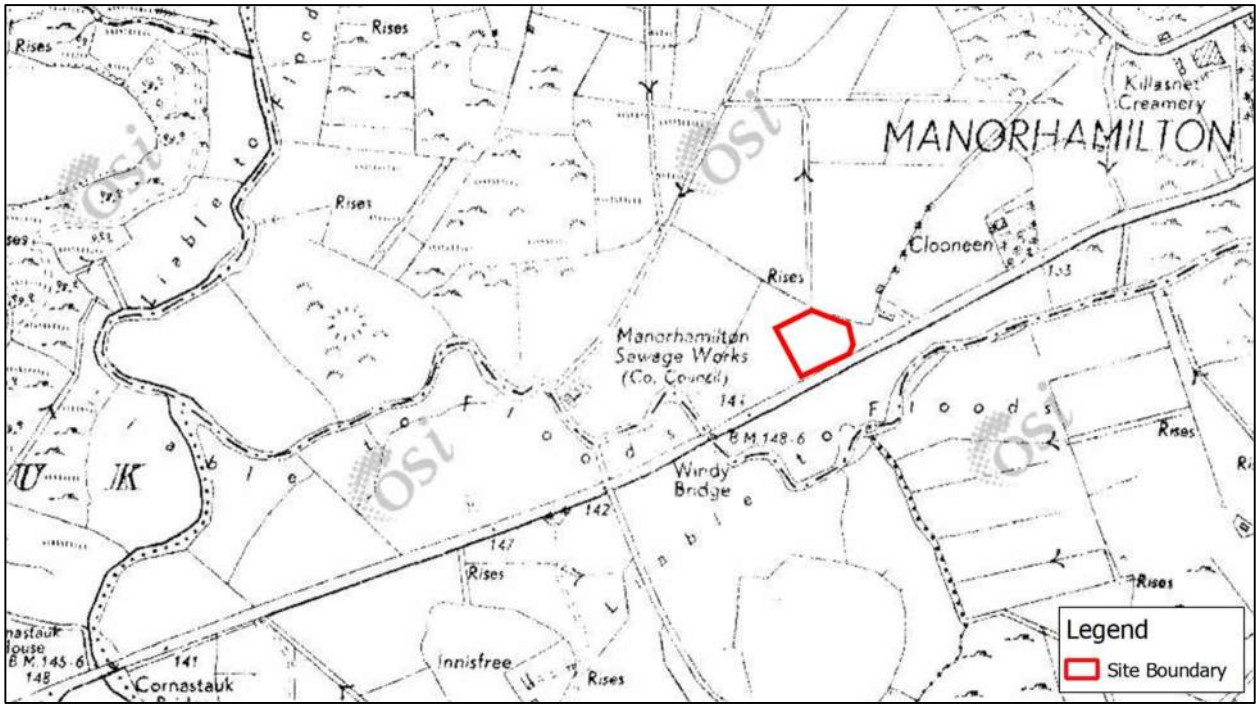


Figure 3-3: Extract from OSI historical 6-Inch Last Edition map

[1] Maps available: http://map.geohive.ie/mapviewer.html

3.7 History of Flooding

The Office of Public Works (OPW) Flood Hazard Mapping website holds a record of historic flood events. See extract below and Appendix B for full report.

A review of the database indicated that, while there have been reported incidences of flooding to the south of Manorhamilton and one flooding event in Manorhamilton town, there has been no occurrence within the site of the proposed development.

The site is located near a designated area of Benefitting Lands. On the Floodmaps.ie website, this is described as a dataset "prepared by the Office of Public Works identifying land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land subject to flooding or poor drainage."

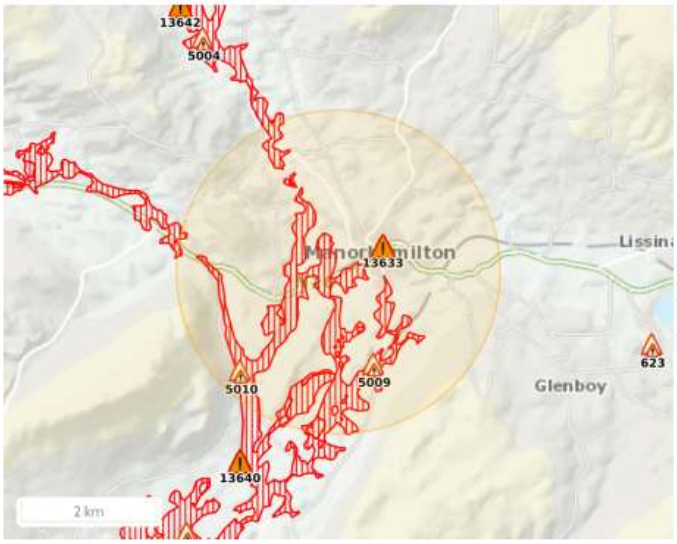
Past Flood Event Local Area Summary Report

OPW

Report Produced: 15/12/2022 16:55

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "Website"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

3 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Owenmore tributary stream at Tawnymanus recurring (ID-5009)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
2.	Bonet River L169 Srabrick bridge recurring (ID-5010)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
3.	Flooding at Manorhamilton on 07/12/2018 (ID-13633)	07/12/2018	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		

Figure 3-4: Extract from OPW Floodmaps Database Report (see Appendix B for full report)
http://www.floodmaps.ie/index.aspx?ReturnUrl=%2fView%2fDefault.aspx

Please note that this is not a guaranteed record of all flood events.

3.8 CFRAMS Mapping

The Catchment Flood Risk Assessment and Management Study (CFRAMS) is a national programme which to date has produced both a series of Preliminary Flood Risk Assessments (PFRA) which cover the entire country, as well as more detailed flood maps in certain catchments across the country.

As part of the CFRAMS programme, mapping is available online for public viewing, and the local area has been assessed as part of the Western CFRAMS study. The OPW has published detailed flood hazard mapping for the area based on results from the CFRAMS. This includes flood extent and flood depth mapping for a number of return periods for fluvial and coastal flood events. The CFRAMS assessment in this area is based on hydraulic modelling of the Owenmore River.

Figure3-5 below is an extract from the relevant CFRAMS fluvial flood map. Full CFRAMS maps for the area are included in Appendix C of this report.

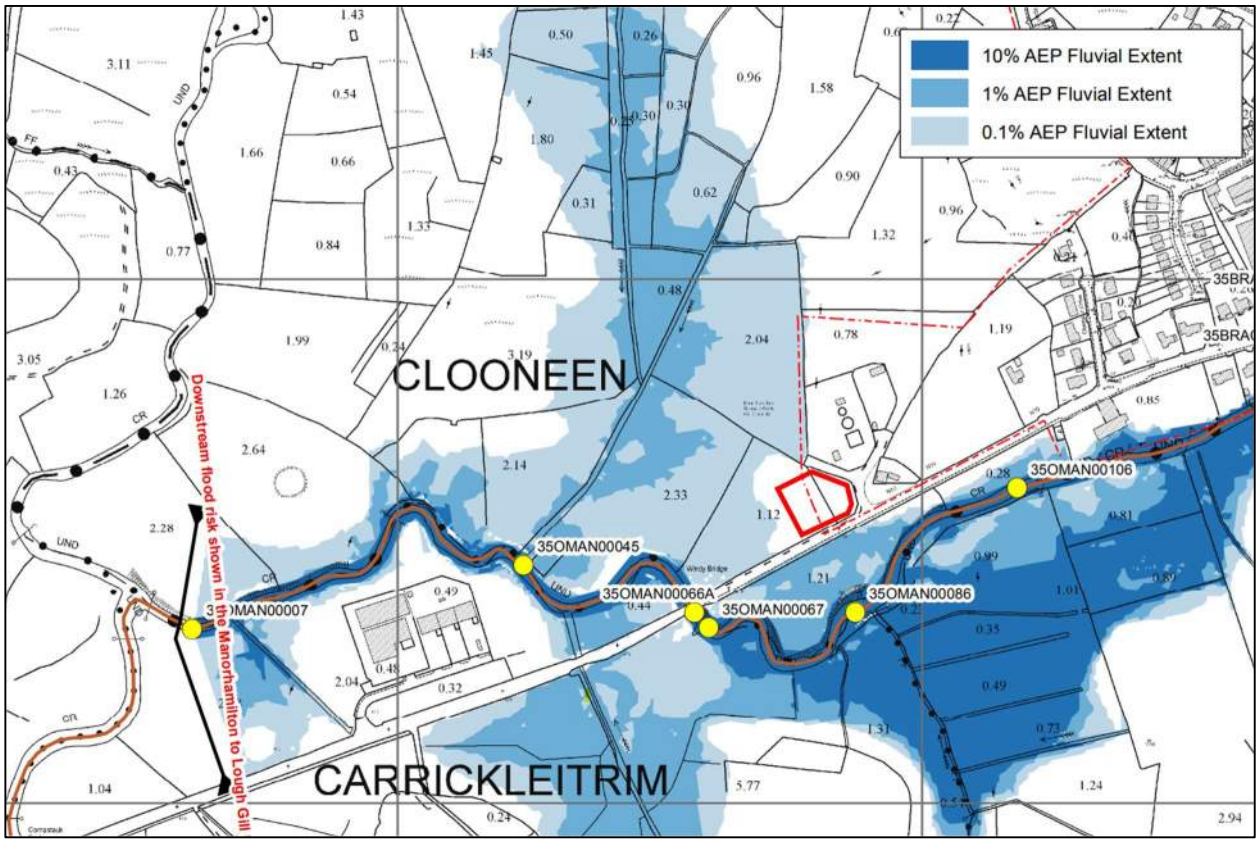


Figure 3-5: Extract from the CFRAMS fluvial map for the area (site indicated in red) Maps available: http://www.floodinfo.ie/map/floodmaps/

The CFRAM mapping indicates no fluvial flooding predicted on the site. The closest nodes to the site notes flood levels in the Owenmore River as per Table 3-1.

Table 3-1: CFRAM Fluvial Predicted Flood Levels in Owenmore River in Vicinity of Site

Node	10% AEP (mAOD)	1% AEP (mAOD)	0.1% AEP (mAOD)
35OMAN00045	39.69	40.15	40.66
35OMAN00066A	40.08	40.59	41.21
35OMAN00086	40.38	40.91	41.47

3.9 Estimate of Flood Zone

PUNCH Consulting Engineers have reviewed the available information as outlined in the above sections. We have concluded that the site is located in Flood Zone C for coastal and fluvial floodplains and is therefore at low risk of flooding.

The site is located adjacent to a flood zone and a highly vulnerable development therefore has been brought forward for Stage 2 flood risk assessment.

4 Flood Risk Assessment

4.1 Sources of Flooding

When carrying out a Flood Risk Assessment, one should consider all potential risk and sources of flood water at the site. In general, the relevant flood sources are:

Fluvial Flooding

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain. The proposed site is not at risk from fluvial flooding, however the surrounding lands are susceptible to fluvial flooding.

Coastal Flooding

Coastal flooding is the result of sea levels which are higher than normal and result in sea water overflowing onto the land during high tides or storm surges. The site is located 20km from the coast and over 40m above sea level. As such, coastal flooding is not considered to be an issue on this site.

Pluvial Flooding

Pluvial Flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high-intensity rainfall. The site is not subject to pluvial flooding.

Groundwater Flooding

Groundwater flooding occurs when the level of the water stored in the ground rises as a result of prolonged rainfall. The study area is not identified as being at risk of groundwater flooding

4.2 Site Vulnerability

The proposed development is a fire station, which is classified as a “Highly Vulnerable Development”. The Planning System and Flood Risk Management Guidelines gives definitions for the type of developments that can take place in each Flood Zone. Only Coastal and Fluvial flood zones are considered in determining whether a Justification Test is required.

Table 4-1: Matrix of Vulnerability versus Flood Zone to indicate Justification Requirement

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

As the site is located in Flood Zone C, a Justification Test is not required as this type of development is considered appropriate as per Table 4-1 above.

4.3 Climate Change

CFRAMS Maps consulted as part of this SSFRA did not show results for the future scenario with climate change taken into account.

Advice on the expected impacts of climate change and the allowances to provide for future flood risk management in Ireland is given in the "OPW Assessment of Potential Future Scenarios, Flood Risk Management Draft Guidance", 2009. Two climate change scenarios are considered. These are the Mid-range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). The MRFS is intended to represent a "likely" future scenario based on the wide range of future predictions available. The HEFS represents a more "conservative" future scenario at the upper boundaries of future projections. Based on these two scenarios the OPW recommended allowances for climate change are given in Table 4-2.

Table 4-2 Recommended allowances for climate change (Taken from OPW – Assessment of Potential Future Scenarios for Flood Risk Management)

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+20%	+30%
Flood Flows	+20%	+30%
Mean Sea Level Rise	+500 mm	+1000 mm
Land Movement	-0.5 mm/year*	-0.5 mm/year*
Urbanisation	No general allowance – Review on Case by Case Basis	No General allowance – Review on Case by Case Basis
Forestation	-1/6Tp**	-1/3Tp** +10% SPR***
Notes: * Applicable to the southern part of the country (Dublin – Galway and south of this) ** Reduce the time to peak (Tp) by a third; this allows for potential accelerated runoff that may arise as a result of drainage of afforested land *** Add 10% to the Standard Percentage Runoff (SPR) rate; this allows for increased runoff rates that may arise flowing felling of forestry		

Based on the recommendations presented in Table 4-2 a 20% increase in flood flows due to climate change for the Mid-Range Future Scenario should be applied. Without completing any additional hydraulic modelling, we can see that the CFRAM 0.1% flows represent a 31% increase in flow at Node 35OMAN00007 and a 54% increase in flow at Nose 35BRAC00009 so we can therefore deduce that the 1% AEP flood levels plus climate change would be below the 0.1% AEP flood levels as stated in Table 3-1.

The finished floor level currently provides a freeboard of 700mm for the worst case 1000-year event and is therefore sufficient for a 20% increase in flood levels due to climate change for the 1%AEP event.

4.4 Flood Mitigation Measures

The following measures should be considered in the development design at a minimum:

1. The proposed Finished Floor level for the proposed fire station is set at 42.170m AOD which is above the 1% including allowance for climate change plus adequate freeboard.
2. Emergency access for the proposed development should easily be provided onto the adjacent N16 Sligo Road during an extreme flood event.
3. The proposed development will provide stormwater drainage in accordance with the Leitrim County Development Plan to alleviate pluvial flooding risk.
4. PUNCH Consulting Engineers recommend that as part of the site maintenance plan, all future proprietors inspect all road gullies in the vicinity and report any blockages to the Local Authority and/or Irish Water. The proprietor should also inspect all surface water drainage within the site, in particular following heavy rain which may cause debris to obstruct the ACO drain and road gullies.

With the implementation of the above measures the site will be at low risk of flooding and will not increase the risk of flooding to any adjacent or nearby area.

5 Conclusions

PUNCH Consulting Engineers were appointed by Leitrim County Council to carry out a Site-Specific Flood Risk Assessment for a proposed fire station in Manorhamilton, County Leitrim.

This Site-Specific Flood Risk Assessment has been carried out in accordance with *"The Planning System & Flood Risk Management Guidelines"* published by the Department of the Environment, Heritage and Local Government in November 2009 and the Leitrim County Development Plan 2023 - 2029.

A review of the flood risk in the area was carried out as the site is located near the Owenmore River.

Flood Maps produced as part of the CFRAMS were consulted to establish the Flood Zone. It was determined that the proposed development site is currently located in Flood Zone C.

The site is at a low risk of flooding and is deemed appropriate for the type of development proposed at the site. The proposed development will not increase the risk of flooding elsewhere

Appendix A Site Visit Images

Image 1 - General Image of Site from N16 looking north

Image 2 - General Image of Site from eastern boundary looking west

Image 3 - General Image of Site taken from northern boundary looking east

Image 4 - Site adjacent between Owenmore River, taken from western boundary looking west

Image 5 - General Image of Site from N16 looking northeast

Image 6 - Owenmore River taken from bridge, looking east, site in background

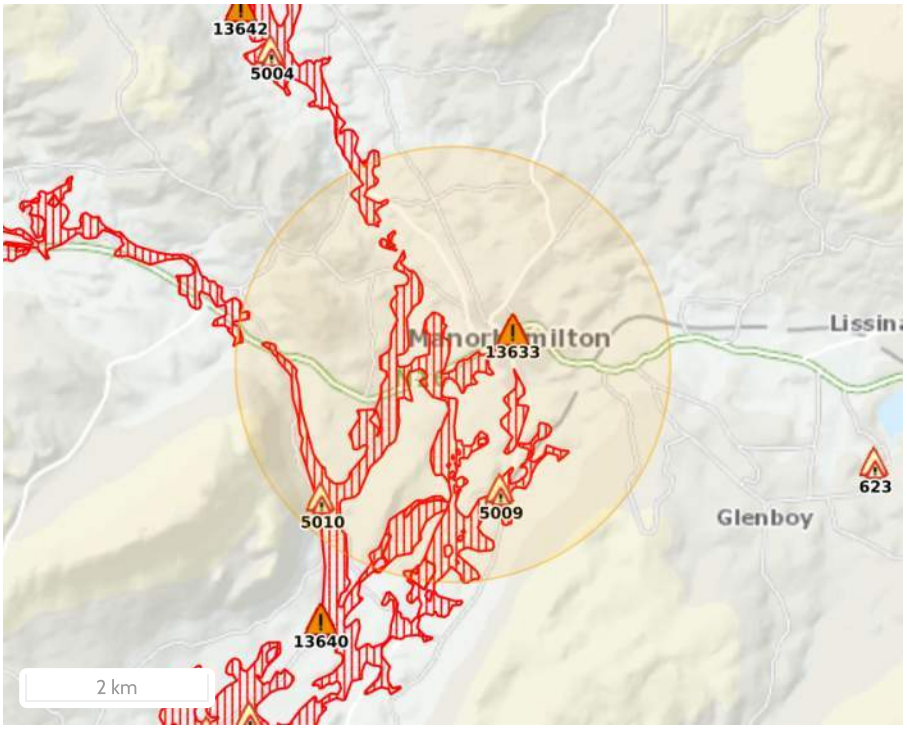
Appendix B OPW Historic Flood Events Record

Past Flood Event Local Area Summary Report

Report Produced: **15/12/2022 16:55**

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "**Website**"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

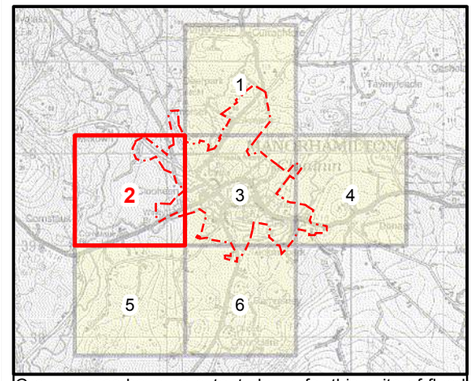
3 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Owenmore tributary stream at Tawnymanus recurring (ID-5009)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
2.	Bonet River L169 Srabrick bridge recurring (ID-5010)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
3.	Flooding at Manorhamilton on 07/12/2018 (ID-13633)	07/12/2018	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		

Appendix C CFRAMS Mapping

Modelled Water Level (m OD)			
Node Point	10%AEP	1%AEP	0.1%AEP
35OMAN00106	40.64	41.01	41.49
35OMAN00086	40.38	40.91	41.47
35OMAN00067	40.07	40.58	41.21
35OMAN00066A	40.08	40.59	41.21
35OMAN00045	39.69	40.15	40.66
35OMAN00007	39.18	39.65	40.16
35BRAC00009	42.74	43.03	43.48
35BRAC00008A	42.76	43.06	43.51

Modelled Flow (m^3/s)			
Node Point	10%AEP	1%AEP	0.1%AEP
35OMAN00007	53	67	88
35BRAC00009	9.1	13	20



Grey squares have no extent shown for this suite of flood maps so no maps have been produced.

AFA Boundary

Model Nodes

Modelled River Centreline

10% AEP Fluvial Extent

1% AEP Fluvial Extent

0.1% AEP Fluvial Extent

IMPORTANT USER NOTE:
THE FLOWS PRESENTED IN THIS MAP ARE RELEVANT TO THE LOCATION SHOWN ONLY. THEY SHOULD NOT BE USED WITHOUT FIRST REFERRING TO THE HYDRAULIC MODELLING REPORT TO UNDERSTAND THE CONTEXT OF THE HYDROLOGY AT THE SITE.

THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

JBA Consulting
24 Grove Island
Corbally
Limerick, Ireland

WESTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

Map: Manorhamilton Flood Extent			Final
Map Type: Flood Extent			
Map Area: HPW		Source: Fluvial	Scenario: Current
Drawn by: DR	Date: Oct 2016	Scale: 1:5,000	
Checked by: JC	Date: Oct 2016		
Approved by: SPW	Date: Oct 2016		Original @ A3
Map No: W35MNH_EXFCD_F2_02		**Sheet:**	2 of 6