

**Drumshanbo Town Centre Regeneration
Project**

**Site Specific Flood Risk Assessment
221211-PUNCH-XX-XX-RP-C-0001**

December 2023

Document Control

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1 Introduction

1.1 Background

PUNCH Consulting Engineers were appointed by CST Group to carry out a Stage 2 Flood Risk Assessment for the proposed town centre regeneration project in Drumshanbo, 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 McCabe Architects in the planning documentation.

1.2 Existing Site

The site location is illustrated in Figure 1-1 below, with a proposed area of 0.794 hectares. The site is categorized as mostly brownfield. The topography is primarily influenced by the Drumshanbo stream, defining the lowest elevation at approximately 55mOD. The stream forms a central line through the site, running in a south to north direction.

The site exhibits a gradual rise towards the east and west directions from the river banks. The highest elevations are found at approximately 63.5mOD on the western boundary and 60.5mOD on the eastern boundary.

Existing vacant commercial buildings are situated on the eastern side of the Drumshanbo stream. On the western side, the area comprises a riverside and town park.

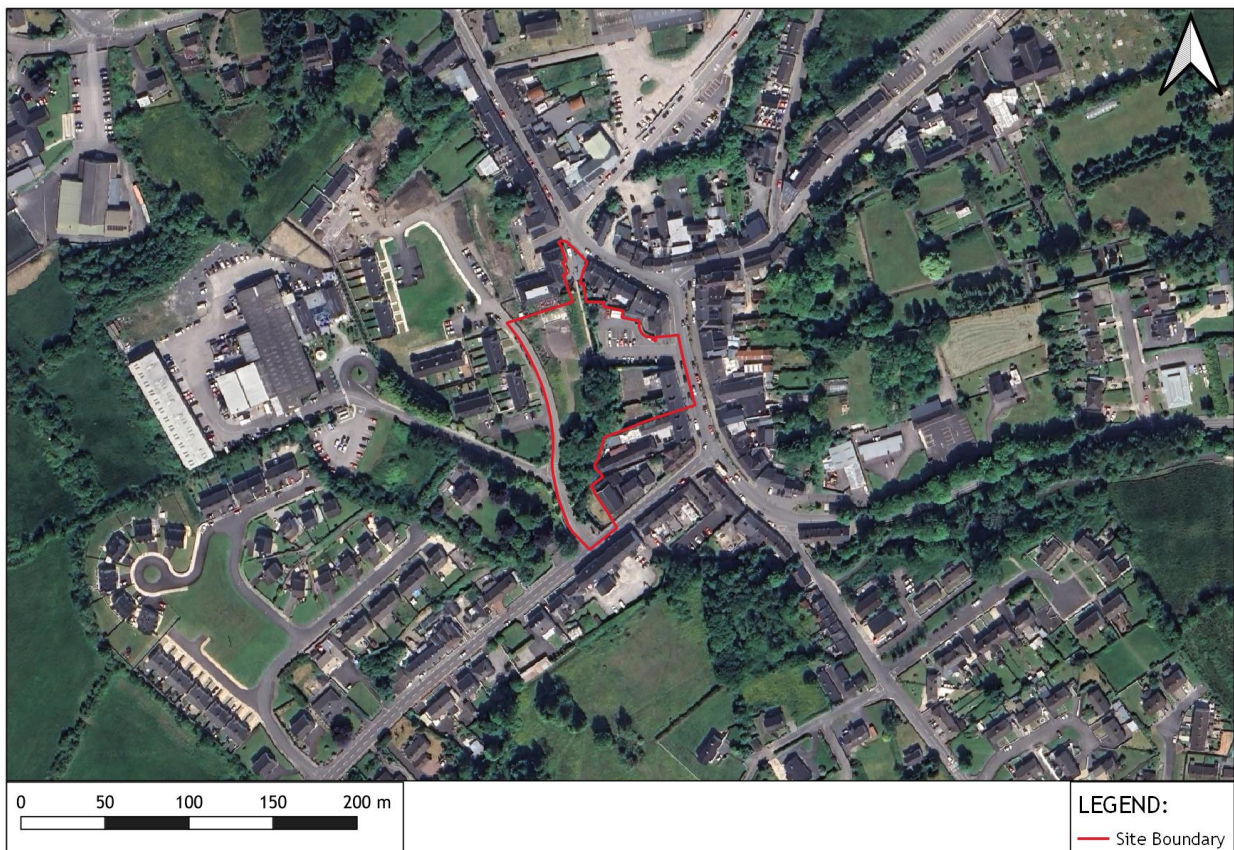


Figure 1-1: Location of the Proposed Development

1.3 Nature of the Proposed Development

The proposed development comprises of the following:

1. **The redevelopment of two vacant buildings on Main Street**, namely the former Bank of Ireland, a three-storey building, and the adjacent commercial building formerly known as 'Earley's', a three-storey building. Development works will include the demolition of the rear extensions to the respective buildings and the erection of a linear two- storey extension to the south side linking both buildings to provide commercial use to the entire ground floor and new smart working facility to the entire first and second floors. Works will include the creation of a new pedestrian walkway on the ground floor through 'Earley's' building to link a new public realm to the rear. All services will connect to existing public mains.
2. **The creation of a public realm and additional parking** to the rear of the renovated and extended commercial buildings on Main Street. The nature of the public realm works includes, inter alia, the opening of vehicular and pedestrian access routes through the existing stone boundary wall between the existing Market Street carpark and the former Bank of Ireland Building, lowering the height of the entire wall to 1m high, realignment works to the existing Market Street Carpark, the provision of new public lighting, a dedicated pedestrianized public realm that will incorporate seating, the provision of hard and soft landscaping, ramp access between Main Street and the redeveloped riverside walkway and a car park for seven car parking spaces
3. **The redevelopment and partial reconstruction of two derelict outbuildings** to the east of the Drumshanbo River. Both two-storey buildings will be redeveloped and repurposed to provide commercial use on both ground and first floors respectively, which will entail elevational changes and connections to existing foul and storm mains.
4. **Riverside and town park improvement works** to enhance the existing parklands and riverside walkway (known locally as 'People's Park'). The nature of the riverside and town park works includes inter-alia, the extension of the pedestrian walkway along the west of the river under the existing park footbridge to connect with a new footbridge 30m to the south which will in turn connect with the new public realm (to the rear of Main Street), an extension of the pedestrian walkway along the eastern side of the river to connect through the curtilage of Drumshanbo Methodist Church, a protected structure on the Leitrim County Council Record of Protected Structures (RPS No.14) to connect via a new pedestrian bridge with the junction of the Carrick Road and the Food Hub/Carraig Breac housing development road. Works will also include the altering of the existing hard landscaping area at the entrance to the Food Hub/Carrig Breac housing development, provision of new footpath along Carraig Breac housing development to include new entrance to the People's Park, new steps and ramp access within the park, the erection of new way finding signs, the provision of new public lighting, new hard and soft landscaping, new boundary treatments inclusive of railings, hedgerows and walls. The extension of the bridge structure over the river will utilize supports placed on the walls instead of installing a culvert extension. This approach is subject to review and approval by the Office of Public Works (OPW). Additionally, the soffit of any proposed structures must be at the same level as or above the soffits of existing structures.

The proposed finished floor levels range from 57.20mOD to 60.51mOD. An extract from the architect's site layout is included in Figure 1-2.



Figure 1-2: Extract from 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

Chapter 9 Infrastructure and Energy Flood Risk Management Policy 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.

Chapter 6 Urban Settlements Land Use Zoning Objectives Land Use Zoning Matrix

Constrained Land Use - the Planning Authority has not included Constrained Land Use within the Zoning Matrix as sufficient guidance has been provided in section 4.3.1. A couple of footnotes have been included in the Zoning Matrix which should also be consulted.

Note: With regard to the consideration of uses within lands identified with a Tourism, Open Space or Agricultural land use zoning objective which are also subject to the Constrained Land Use Objective, permissible uses shall be constrained to those water compatible and less vulnerable uses as relevant to the particular Flood Zone.

LAND USE POL 4: The approach to Constrained Land Use described under the Constrained Land Use objective shall be complied with by proposals for development in zoned areas where flood risk presents constraints to prospective land uses.

Chapter 9 Infrastructure and Energy

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.

Chapter 9 Infrastructure and Energy Flood Risk Management Policy 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.

Chapter 9 Infrastructure and Energy Flood Risk Management Policy 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 facilitate 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.

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%, Flood Zone C), 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.

Chapter 9 Infrastructure and Energy Flood Risk Management Policy 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) and the Flood Risk Management - Climate Change Sectoral Adaptation Plan 2019, and the guidance on potential future scenarios contained therein, shall be consulted with to this effect.

Chapter 9 Infrastructure and Energy Flood Risk Management Policy 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.

Volume II Settlement Plans

Drumshanbo - Permissible uses for undeveloped lands within Flood Zones A and B that are zoned Social & Community and Tourism Related Development in this settlement shall be constrained to those 'water compatible' and 'less vulnerable' uses as appropriate to the particular Flood Zone (please refer to the Flood Risk Management provisions in Volume I of the Draft Plan and to the accompanying Strategic Flood Risk Assessment (SFRA)).

2.3 Land Zoning

The land on which the development is proposed is currently zoned as follows in the Leitrim County Development Plan 2023-2029:

- Open Space,
- Social & Community,
- Town/Village Centre,
- Constrained Land Use.

3 Flood Risk Identification

3.1 Existing Hydrogeological Environment

The existing hydrological environment is primarily defined by the presence of the Drumshanbo Stream, which serves as a central axis running from south to north through the site. Within the development boundary, there are three existing stream crossing structures. Figure 3-1 below illustrates the hydrological environment surrounding the site. It is important to note that in the Catchment Flood Risk Assessment and Management Study (CFRAMS), the Drumshanbo Stream is identified as the Aghagrana River, and this classification will be consistently used throughout the report.

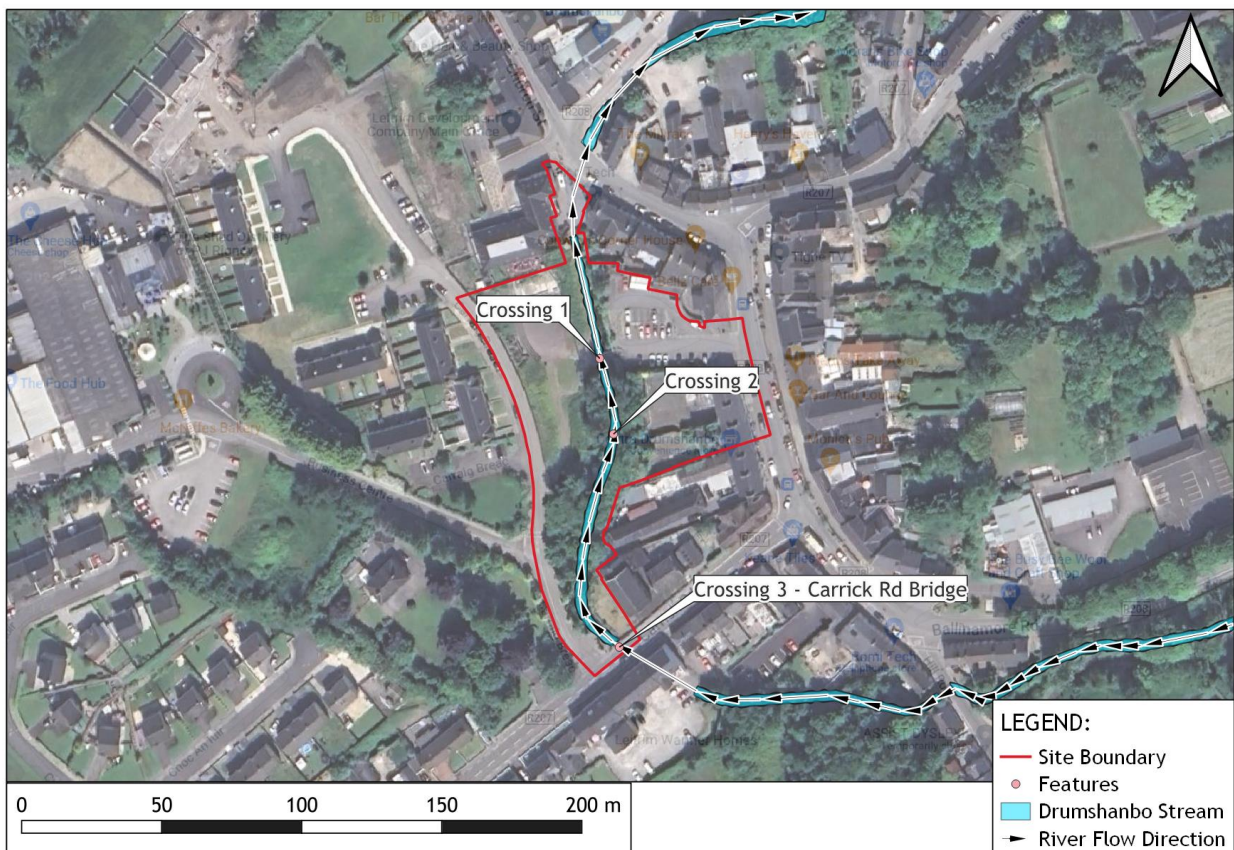


Figure 3-1: Hydrological Environment around the site

3.2 Topographical Survey

A topographical survey of the site and its surroundings was conducted by Digital Land Surveyors in November 2023.

The topography is predominantly shaped by the Aghagrana River, establishing the lowest elevation at approximately 55mOD. The river serves as a central axis running from south to north through the site. The site gradually ascends towards the east and west from the river banks, reaching peak elevations of approximately 63.5mOD on the western boundary and 60.5mOD on the eastern boundary.

Within the red line boundary, vacant buildings forming part of the development proposals exhibit varying finished floor levels, ranging from 59.57mOD to 60.51mOD.

3.3 Site Walkover

CST Group Consulting Engineers visited the site on 15th November 2023 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 Main Street and Carrick Road Drumshanbo.
- b) Ground was firm underfoot at the time of the visit.
- c) There is an existing embankment located to the west bank of the river.
- d) There is an existing masonry arched bridge structure located to the south boundary of the site (referred to as B1 - see image below for location). There is also a steel bridge located close to the Northern boundary of the site (referred to as B3 - see image below for location). There is an existing crossing formed with flagstones and steel beams located within the site (referred to as B2 - see image below).
- e) There is an existing underground culvert which connects to the masonry arched bridge referred to in (d) above.

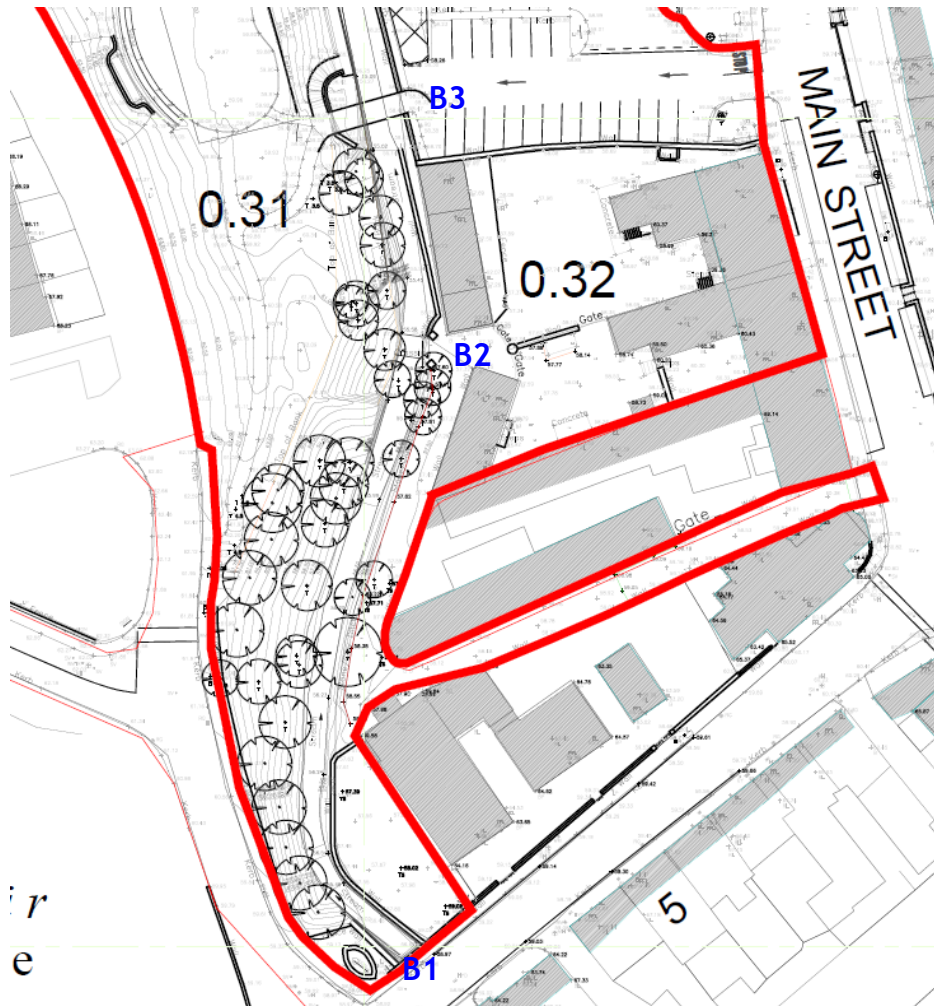


Figure 3-2: Overview of the site showing river crossings (see images for B1, B2 and B3 in Appendix A)

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 Made Ground, as seen in Figure 3-3. The surrounding areas comprise mainly of Mineral poorly drained subsoils.

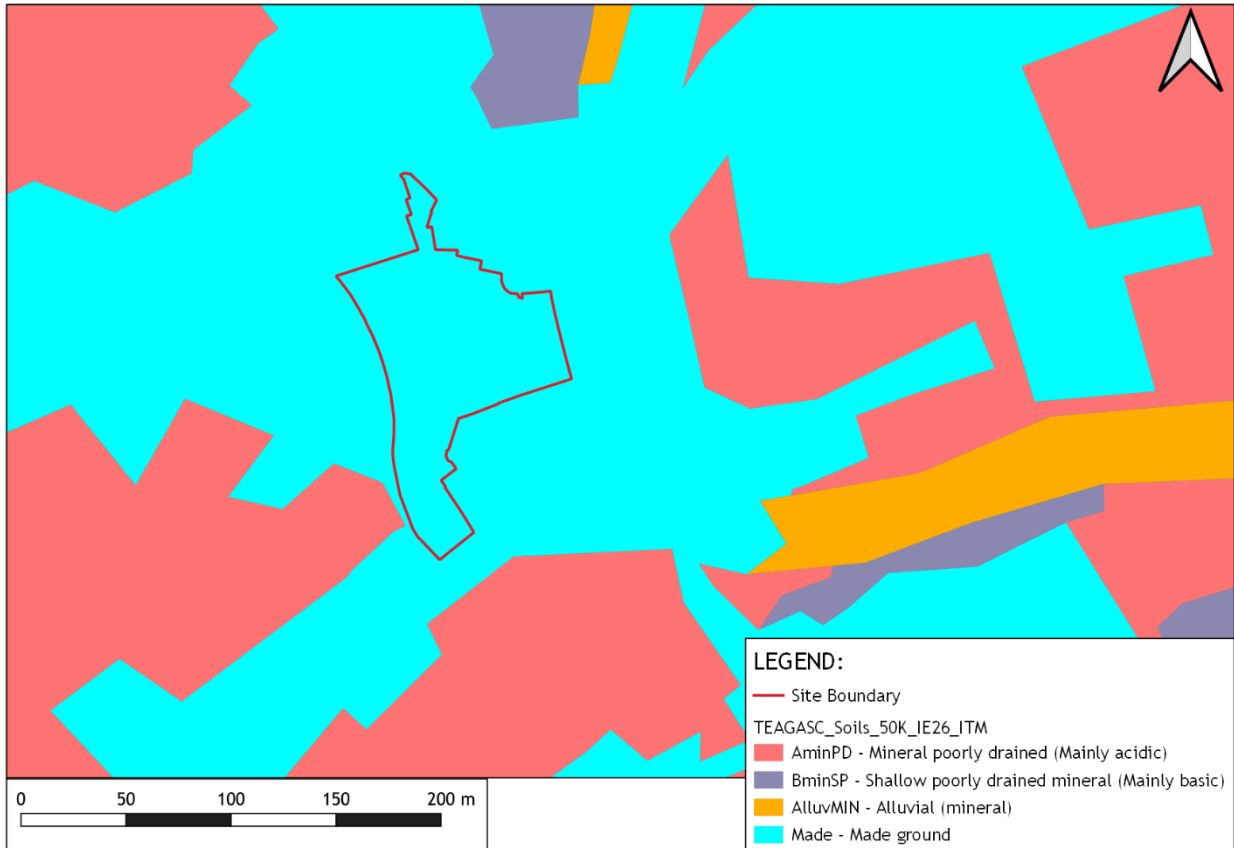


Figure 3-3: Geology of the surrounding area (source: Geological Survey of Ireland (www.gsi.ie))

3.5 Groundwater Flooding

Geological Survey Ireland (GSI) Groundwater Flooding maps were reviewed and it was found that the site is not noted as being prone to groundwater flooding.

3.6 Review of Existing Surface Water Infrastructure

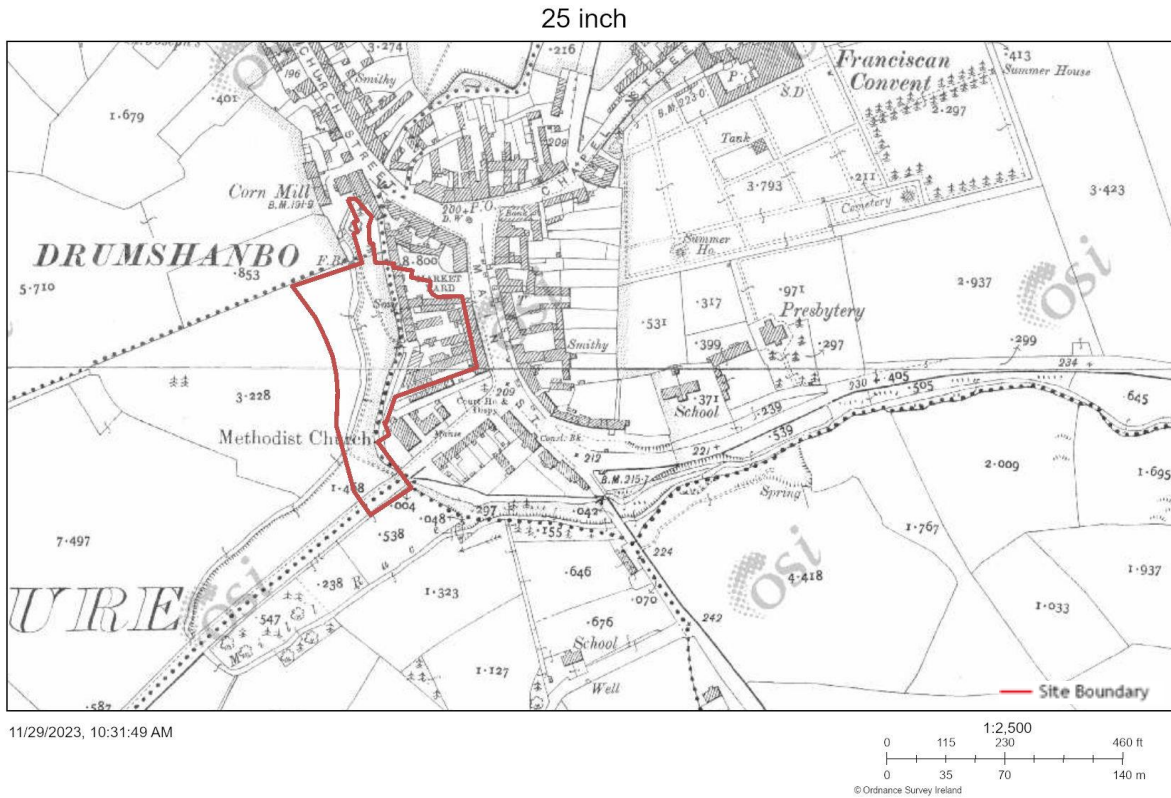
Online Irish Water database was reviewed for existing surface water infrastructure in the vicinity of the site. Figure 3-4 below is an extract from online existing drainage records. The drawing indicates the presence of two combined/foul lines traversing the site. It is not clear from the surveys undertaken if the surface water generated within the site boundary currently discharges to the river - this should be established with further investigative works.



Figure 3-4: Existing Public Drainage in the vicinity of the site (source: Irish Water)

3.7 Review of Historic Mapping

A review of the OSI Historical maps was carried out. Figure 3-5 shows an extract from the 25-inch historic map for the site. The site is not indicated as “liable to flood” in the available historic OSI maps.



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Figure 3-5: Extract from OSI historical 25-inch map

3.8 History of Flooding

The Office of Public Works (OPW) Flood Hazard Mapping website holds a record of historic flood events. A review of the database indicated that there have been no reported instances of flooding on the proposed site as shown in Figure 3-6.

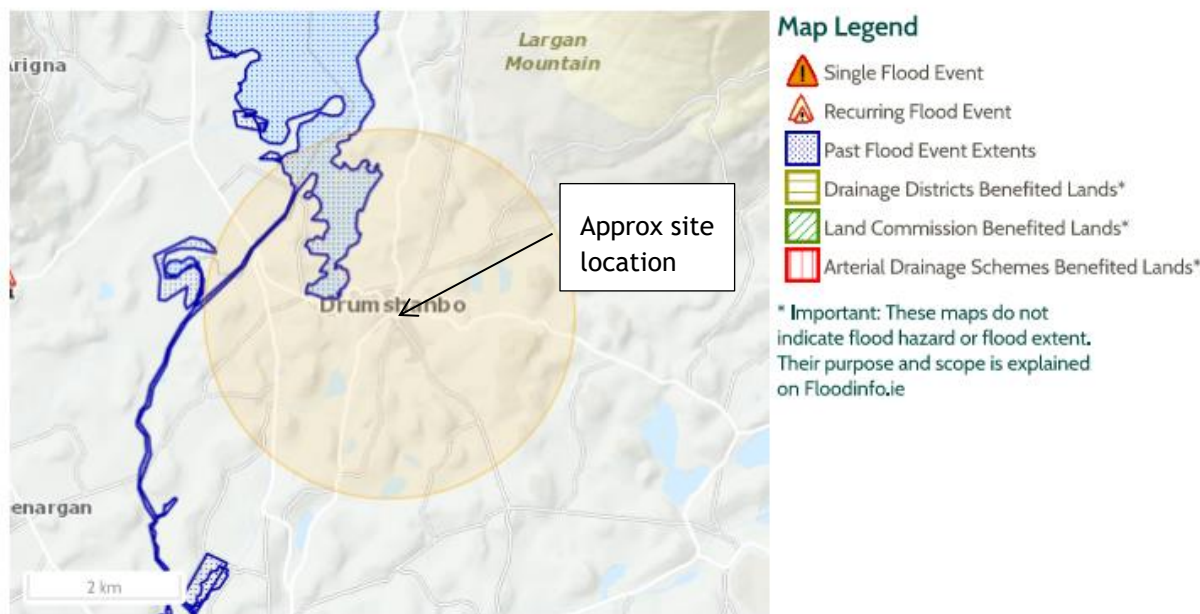
Past Flood Event Local Area Summary Report



Report Produced: 29/11/2023 10:48

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.



2 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Shannon Winter 1999/2000 (ID-2) Additional Information: Reports (26) , Press Archive (19)	30/11/1999	Area
2.	Shannon December 1954 (ID-3) Additional Information: Reports (4) , Press Archive (16)	01/12/1954	Area

Figure 3-6: Extract from OPW Floodmaps Database Report
<http://www.floodmaps.ie/index.aspx?ReturnUrl=%2fView%2fDefault.aspx>

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

3.9 National Indicative Fluvial Mapping

The Office of Public Works (OPW) released the National Indicative Fluvial Mapping (NIFM) in 2021, and it is now accessible to the public at <https://www.floodinfo.ie/map/floodmaps/>. The NIFM comprises preliminary maps for catchments greater than 5 km², not included in the CFRAMS program. These 'predictive' flood maps indicate areas likely to be inundated during a theoretical fluvial flood event, with an estimated probability of occurrence.

Since the site area is within the CFRAMS program coverage, the NIFM mapping does not extend to cover the site area.

3.10 CFRAMS Mapping

As part of the CFRAM programme, detailed flood hazard mapping is available online for public viewing, specifically for the local area assessed under the Shannon CFRAMS. The OPW has published comprehensive flood hazard mapping based on CFRAMS results, providing information on flood extent and depth for various return periods for both fluvial and coastal flood events. The assessment in this area relies on hydraulic modelling of the Aghagrania River and its tributaries.

Figure 3-7 below presents an excerpt from the relevant fluvial flood map for the Drumshanbo area, covering the proposed development site and its surroundings. The complete CFRAMS fluvial flood map for the area is included in Appendix B of this report.

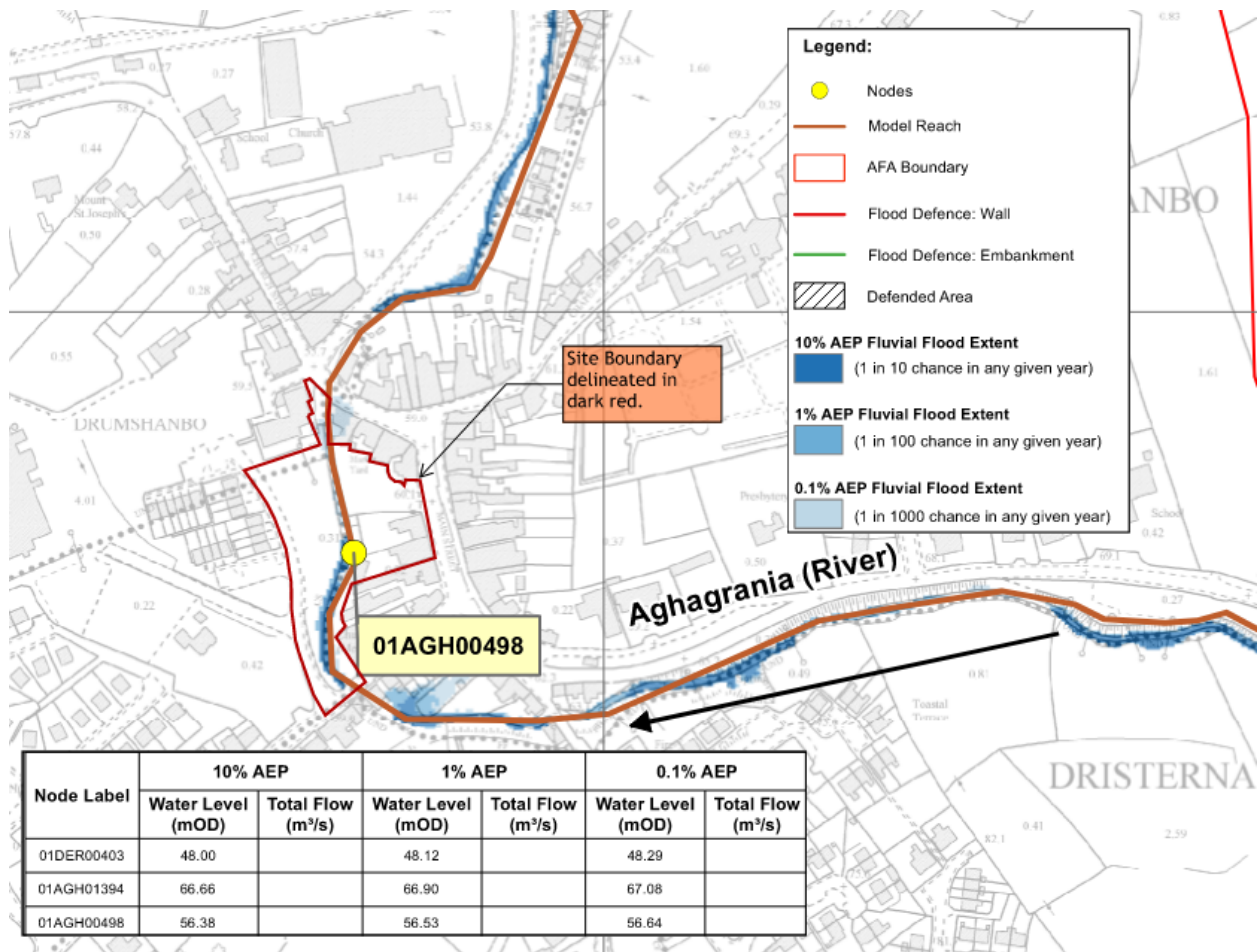


Figure 3-7: Extract from the CFRAMS fluvial map for the area; Maps available: <http://www.floodinfo.ie/map/floodmaps/>

The CFRAM mapping indicates fluvial flooding on the site, primarily confined to the extents of the river banks. The closest node to the site specifies flood levels in the Aghagrania River, as detailed in Table 3-1 below:

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

Node	10% AEP (mOD)	1% AEP (mOD)	0.1% AEP (mOD)
01AGH00498	56.38	56.53	56.64

3.11 Existing Flood Defences

The CFRAM map shown in Figure 3-8 does not identify any flood defences in the vicinity of the site.

3.12 Estimate of Flood Zone

Upon a thorough review of the provided information, PUNCH Consulting Engineers have determined that a small portion of the site falls within Flood Zone A for Aghagrania River floodplains, indicating a higher risk of flooding. However, this risk seems to be confined to the riverbanks and the existing pedestrian walkway along the west of the river. The main portion of the site where development works are proposed is within Flood Zone C.

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. Aghagrana River traverses the site centrally in a south to north direction. From a review of the available information, and given the site levels, it is considered that parts of the site are at risk of fluvial flooding. This appears to be limited to river banks and the existing pedestrian walkway along the west of the river only.

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 in excess of 45km from the coast and is not considered at risk of coastal flooding.

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. There are some within the site which may be subject to pluvial flooding due to their naturally low depressions. However, the provision of a suitable surface water drainage system for any proposed development on the site will mitigate against this risk.

Groundwater Flooding

Groundwater flooding occurs when the level of the water stored in the ground rises as a result of prolonged rainfall. From a review of the available information, there is no risk of groundwater flooding at the site.

4.2 Site Vulnerability

The proposed development is mixed use in nature, and classified as follows:

- Proposed buildings are commercial in nature - classified as “Less Vulnerable Development”,
- Public open space - classified as “Water-compatible 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 proposed buildings are located in Flood Zone C, and the proposed pedestrian river walkway is located in Flood Zone A, a Justification Test is not required as each type of development is considered appropriate in the relevant designated flood zone 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		

Leitrim County Development Plan 2023-2029 does not explicitly state an allowance for Flood Flow increase due to climate change, therefore reference is made to the Greater Dublin Strategic Drainage Study Table 4.2. A 20% increase in flows for all return periods up to 100 years due to climate change should be applied. 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 is considered adequate.

There is no reference to river flows at the site location in the CFRAM Fluvial Flood Extent Map. Without completing any additional hydraulic modelling, we can see that the CFRAM 0.1% flows represent a 110mm increase in flood level from the 1% flow at Node 01AGH00498, as stated in Table 4-2.

Table 4-2: Predicted CFRAMS flood levels

Node	0.1% AEP (mAOD)	1% AEP (mAOD)	Depth Increase
01AGH00498	56.64	56.53	0.11

Proposed finished floor levels are required to be above the 1% AEP accounting for climate change plus adequate freeboard. The lowest proposed finished floor level of 57.20mOD currently provides a freeboard of 560mm for the worst case 0.1% AEP event and is therefore deemed 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. Currently we would recommend that minimum finished floor levels at this site be set at 610mm above the 1%AEP (+110mm for climate change and +500mm for freeboard) giving a recommended minimum FFL for the proposed development of **57.14mAOD**. If this level is not achievable on the site for other reasons, we would recommend the installation of demountable flood barriers which would be set up to this level as a minimum.
2. The proposed development will provide stormwater drainage in accordance with the Local Authority Development Plan to alleviate pluvial flooding risk.
3. The proposed pedestrian walkway levels to be set at the same level as the existing walkway, where practicable so as to not impede on the floodplain.
4. Existing crossing proposed as being modified to be approved by OPW, including soffit levels.

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 CST Group to carry out a Site-Specific Flood Risk Assessment for a proposed town centre regeneration mixed use development in Drumshanbo, 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 in the hydrological area of River Aghagrania, which traverses the site in a south to north direction.

Flood Maps produced as part of the CFRAMS were consulted to establish the Flood Zone. It was determined that a small portion of the proposed development site is currently located in Flood Zone A for Fluvial flooding, however this is limited to a proposed pedestrian walkway, which is classed as water-compatible development.

Subject to recommendations in Section 4.4 above being implemented, the proposed development is deemed appropriate at the site location.

Appendix A Site Visit Images

Image 1: B1 (image looking from south to north)



Image 2: B1 (Image looking from north to south)



Image 3: B2 (Image taken from west embankment)



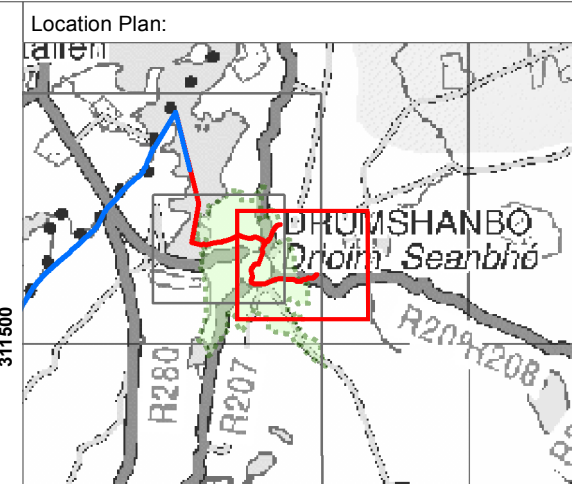
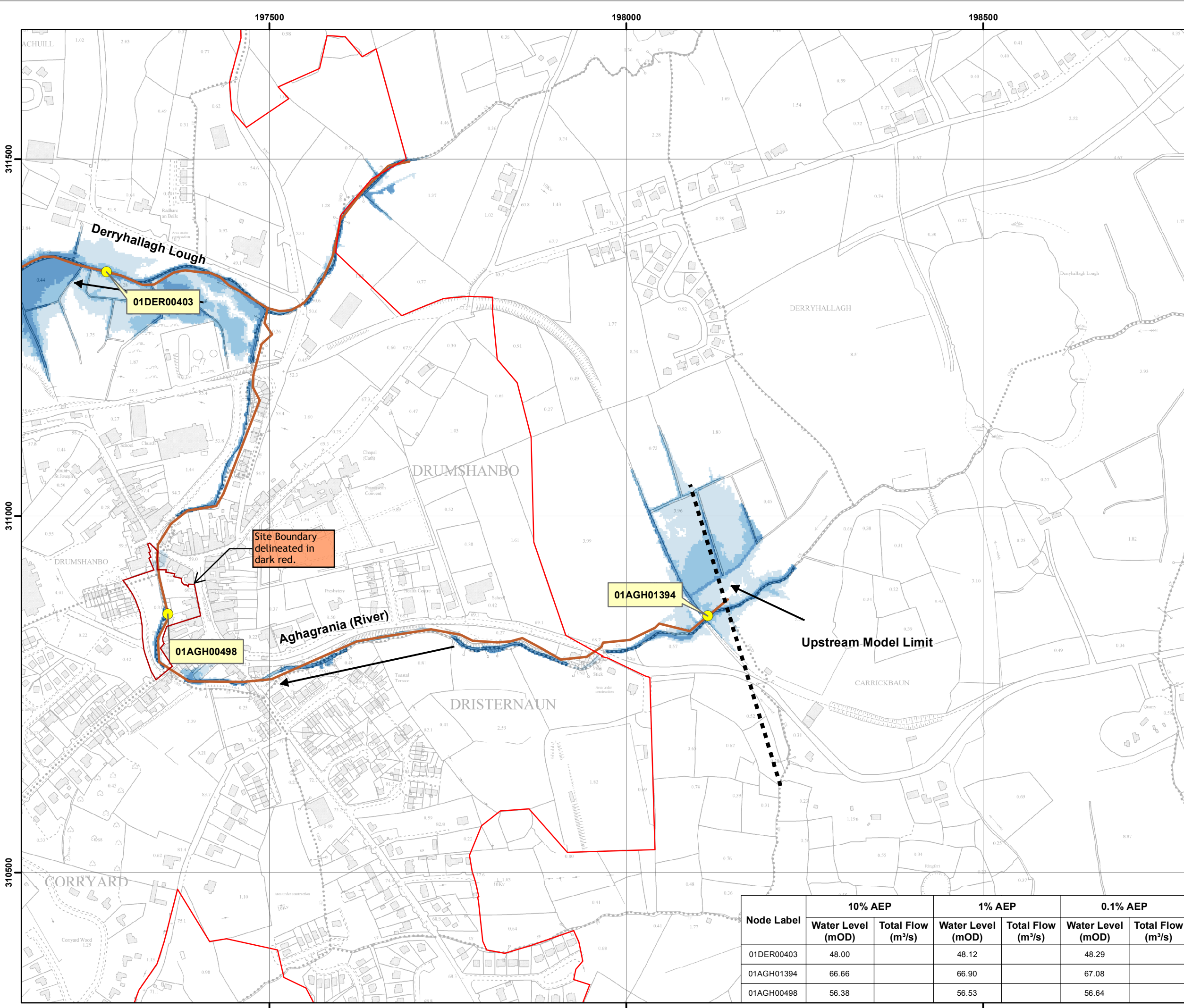
Image 4: B3 (Image taken from steel bridge, facing northwards)



Image 5: B3 (Image taken from steel bridge, facing southwards)



Appendix B CFRAMS Mapping



Legend:

- Nodes
- Model Reach
- AFA Boundary
- Flood Defence: Wall
- Flood Defence: Embankment
- Defended Area

10% AEP Fluvial Flood Extent
 (1 in 10 chance in any given year)

1% AEP Fluvial Flood Extent
 (1 in 100 chance in any given year)

0.1% AEP Fluvial Flood Extent
 (1 in 1000 chance in any given year)

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The Office of Public Works
 Jonathan Swift Street
 Trim
 Co. Meath
 C15 NX36

Merrion House
 Merrion Road
 Dublin 4
 D04 R2C5

Project:	SHANNON CFRAM STUDY
Map Type:	EXTENT
Source:	FLUVIAL
Area:	DRUMSHANBO
Scenario:	EXISTING
Drawn by:	EF Date: JULY 2016
Checked by:	PT Date: JULY 2016
Reviewed by:	PT Date: JULY 2016
Approved by:	PS Date: JULY 2016
Map Number:	S2526DRO_EXFCD_F1_02
Sheet:	2 of 3
Scale:	1:5000
Plot Scale:	1 : 1 @ A3

Node Label	10% AEP		1% AEP		0.1% AEP	
	Water Level (mOD)	Total Flow (m³/s)	Water Level (mOD)	Total Flow (m³/s)	Water Level (mOD)	Total Flow (m³/s)
01DER00403	48.00		48.12		48.29	
01AGH01394	66.66		66.90		67.08	
01AGH00498	56.38		56.53		56.64	