

Location: Ennis, Co. Clare		Unique ID: 270474 (from PFRA database)	
Initial OPW Designation	APSR <input checked="" type="checkbox"/>	AFRR <input type="checkbox"/>	IRR <input type="checkbox"/>
Co-ordinates	Easting: 134500		Northing: 177000
River / Catchment / Sub-catchment	Claureen River (Inch River) and Fergus River / Shannon Estuary		
Type of Flooding / Flood Risk (identify all that apply)	Fluvial non-tidal <input checked="" type="checkbox"/> Fluvial tidal <input checked="" type="checkbox"/> Coastal <input type="checkbox"/>		

Stage 1: Desktop Review

1.1 Flood History (include review of Floodmaps.ie)	<p>River Flow Path</p> <p>The Fergus River from the North and the Inch River (Claureen) from the West converge at the eastern boundary of Ennis Town. The Fergus also has smaller branch that splits form the main channel in the north of Ennis, flowing eastwards then southwards before joining the main Fergus River on the east of the town. In addition the River Gauras (a much smaller river) meets the Fergus southeast of Ennis.</p> <p>There are also important fluvial and groundwater interactions in Ennis, including the groundwater-fed Lough Girroga inn the north of Ennis, and the swallow-hole for the stream flowing into St Flannan's college grounds in the south of Ennis.</p> <p>Flood event records</p> <p>There is a long history of flood events with 13 thirteen flood records listed: 2 recurring, 8 singular events and 3 flood areas. Reports are dated from 1947-2009, including "detailed report of Ennis floods" which includes receptors affected and photos for the most recent flood event in 2009.</p> <p>In Ennis town the combination of prolonged intense rainfall over a period of several days, the tidal peak itself and the exacerbation of the tidal peak by south westerly winds at critical times resulted in the highest ever recorded water levels on the River Fergus in the town centre in 2009.</p> <p>Flooding occurrences are as a result of a mixture of fluvial, tidal, pluvial and groundwater influences.</p>
1.2 Relevant information on flooding issues from OPW and LA staff	<p>PFRA database comments (<i>in italics</i>):</p> <p>OPW comments <i>None</i></p> <p>LA comments <i>Frequent Flooding of Town – Domestic and Commercial Properties at risk. Flooding Mechanism = Shannon, Flooding at St Flannan's College caused by Swallow Hole Turlough Flooding: - Lough Girroga</i></p> <p>Meeting / discussion summary comments:</p> <p>OPW comments</p> <ul style="list-style-type: none"> Significant fluvial flooding issues at Ennis. There is a tidal barrage south of Ennis, by Clarecastle, closing when the tide is in. Questions raised on the effect of the barrage on flood levels in the town (2009) were answered by the consultants on the

	<p>Ennis scheme to the effect that it would not matter if there was an abyss at the location.</p> <ul style="list-style-type: none"> • The river Fergus is a very slow system; u/s this is influenced by lakes and karst geology. Fergus Minor – a section of channel that bypasses some of the town that may be man-made - has had a sewer laid along its length with manholes in the channel. • The Claureen (or Inch) river is very flashy and can cause problems when the Fergus is high. • A dump (now decommissioned) operated on a designated storage site on the left bank of the River Fergus to the east of the town. Storage downstream of the town for when the barrage was closed was assessed and a further requirement to that remaining in the designated area was identified. At present a large area (outside of the designated area) downstream of the town floods under, through or over the embankments that form part of the Fergus DD thus satisfying this need. • Areas between Ennis and Clarecastle are also considered to be at risk. The channels overground at problem locations but discharge to swallow holes which are of insufficient capacity. There is a detailed design being carried out at Ballybeg. • Embankments u/s of Clarecastle are maintained by Clare CoCo. The OPW are responsible for defences d/s of this bridge, but also have a scheme to protect the town in the second part of the Fergus Flood Relief scheme. <p>LA comments</p> <ul style="list-style-type: none"> • A 2-3 year Flood risk management scheme already complete – the Fergus Upper Scheme. Another FRM OPW scheme – the Fergus Lower Scheme – is scheduled for construction start in late 2011. Other FRM schemes (some small) are either in design stage or should shortly start construction. These include schemes at Gort Road, plus an embankment and pumping station elsewhere in Ennis. • Claureen River is prone to flash flooding as opposed to Fergus River which is much slower responding. • Flooding is a combination of Tidal/Fluvial. • Tidal gate constructed in 1954 at Clarecastle. (Prior to this regular flooding occurred every 2-3 years in Ennis). • After the 2009 event aerial images/videos were used to digitize a flood outline. • Indicative flow information prior to and during the 2009 flood event: 80 m³/s on 19th Nov 2009 d/s of confluence with Claureen. 25m³/s of this flow was from the Claureen. The Fergus peaked five days later (23rd Nov) also at 80m³/s. Hence there was a double peak on the Fergus due to two different mechanisms. • Previous major events recorded have been in Jan / Feb 1995 and Christmas 1999 when flow was recorded at around 60m³/s. • Turlough Lough (Lough Girroga) has overtopped its banks and flooded Gort Road. • Saint Flannan's college scheme currently underway (Proposing overflow culverts, increasing size and strength of embankments). Town centre currently at risk from extreme events. • The completion of the recent Upper Fergus Scheme has reduced flood risk in the town. • Flood plain area to the southeast of Ennis is very important as a flood storage area. • Flooding issues in Ennis also include groundwater and pluvial flooding problems.
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1.4 PFRA Data			
1.4.1 PFRA hazard mapping	PFRA mapping available in GIS layer:		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
	PFRA mapping included on FRR map:		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1.4.2 Summary of Principal Receptors	Type	Number (approx.)	FRI score (if available)
	PostPrimary_Weighted_F_S		252.5
	OPW_EV_Weighted_F_S		2500
	Arch_Regional_Weighted_F_E		80.3
	Monument_LV_Weighted_F_E		63.3
	Primary_Weighted_T_S		376.75
	'Civil_Defence_Weighted_T_S		34.25
	'OPW_LV_Weighted_T_S		1.37
	Arch_Regional_Weighted_T_E		83.71
Total		20362	
1.7 Stage 1 Evaluation	Aspect	Clearly APSR	Uncertain
	Flood History (1.1)	X	
	OPW / LA Information (1.2)	X	
	PFRA Evaluation (1.4)	X	
	Overall Desktop Evaluation (if any above aspect is uncertain then overall designation is uncertain)	X	
1.8 Proposed level of assessment for Stage 2 site visits	Level A Site Visit		
	Level B Site Visit		X

Stage 2: Site Inspection		Level B Assessment	
Date and Time of Inspection		Date: 09/06/11	
		Time: 13:00	
Names of inspection team (including OPW/LA staff if present)		Iain Blackwell	
		Lewis Maani	
2.3 Local knowledge - on-site comments (OPW, LA and any info volunteered by local residents during visit)	No on site comments		
2.4 Comments on hydraulic constrictions (bridges, etc.) and conveyance routes	<p>Ennis has numerous bridge and culvert crossings on the River Fergus, River Inch (or Claureen River) and the northern "bypass" channel of the River Fergus. There are also significant sluice and weir arrangements in the centre of town on the River Fergus.</p> <p>Bridges include wide spanning single arch bridges as well as multi-arch bridges. There are also splits in the river channels at various locations providing dual conveyance routes before joining again further downstream (generally short distances).</p> <p>There is a tidal barrage downstream of Ennis, approximately 200m north of the crossing of the River Fergus on the R458 at Clarecastle, which prevents tidal inflow, but also causes backing up of the rivers during times of tidelock.</p> <p>Flows can be conveyed from Lough Girroga in the north of Ennis, west to the River Fergus. There is also a groundwater swallow hole in the St Flannan's college grounds providing conveyance of flows to the River Fergus.</p>		
2.6 Defence Assets			
Formal and Informal Flood Defence Assets <i>(include effective and ineffective assets to inform asset survey and potential mitigation measures)</i>	Open Channel Watercourses		
	Man-made river channel <input checked="" type="checkbox"/>	Flood relief channel <input checked="" type="checkbox"/>	Canal <input type="checkbox"/>
	Mill leat <input type="checkbox"/>	Drainage channels / back drains	<input type="checkbox"/>
	Bridges and Culvert crossings		
	Single Arch bridge <input checked="" type="checkbox"/>	Multi-Arch bridge <input checked="" type="checkbox"/>	
	Single Span bridge <input checked="" type="checkbox"/>	Multi-Span bridge <input type="checkbox"/>	
	Box culvert(s) <input checked="" type="checkbox"/>	Pipe culvert(s) <input type="checkbox"/>	Arch Culvert(s) <input type="checkbox"/>
	Culverted Watercourses (culvert length is greater than just a crossing)		
	Box culvert(s) <input type="checkbox"/>	Pipe culvert(s) <input type="checkbox"/>	Arch Culvert(s) <input type="checkbox"/>
	Irregular Culvert(s) <input type="checkbox"/>		
Walls and Embankments			
Embankment(s) <input checked="" type="checkbox"/>	Raised wall(s) <input checked="" type="checkbox"/>	Retaining wall(s) <input checked="" type="checkbox"/>	
Control Structures – weirs, gates, dams			
Fixed crest weir <input checked="" type="checkbox"/>	Adjustable weir <input type="checkbox"/>	Dam / Barrage <input checked="" type="checkbox"/>	
Sluice gates <input checked="" type="checkbox"/>	Lock gates <input type="checkbox"/>	Radial gates <input type="checkbox"/>	
Storage			
On-line storage (natural) <input type="checkbox"/>	On-line storage (artificial) <input type="checkbox"/>	Off-line storage <input checked="" type="checkbox"/>	

	<p>Outfalls Flapped outfall(s) into watercourse <input checked="" type="checkbox"/> Unflapped outfall(s) into watercourse <input checked="" type="checkbox"/> <i>i.e. from smaller watercourses, drains etc. into river / estuary / sea</i> Tidal flap(s) <input type="checkbox"/> Tidal sluice(s) <input type="checkbox"/> <i>i.e. from main watercourse into estuary / sea</i></p> <p>Other Pumping Station <input type="checkbox"/> Erosion Protection <input type="checkbox"/> Sand Dunes <input type="checkbox"/></p> <p>Additional notes (if required): The scale of Ennis, its flat low-lying topography, and the nature of the watercourses flowing through the town is such that there are a wide range of flood defence related assets. This includes a recently completed Fergus Upper Scheme in the town centre, as well as other assets that provide a flood defence function. The tidal barrage identified is the major structure at Clarecastle on the River Fergus.</p>
<p>2.8 Initial Potential Mitigation Measures</p>	
<p>Non-structural measures</p>	<p>Planning and Development control <input checked="" type="checkbox"/> Sustainable Urban Drainage Systems <input checked="" type="checkbox"/> Flood forecasting / warning <input checked="" type="checkbox"/> Change in Operating Procedures for water level control: <input checked="" type="checkbox"/> Public awareness campaign <input checked="" type="checkbox"/> Individual property protection <input type="checkbox"/> Land use management <input type="checkbox"/></p>
<p>Structural measures</p>	<p>Strategic development management for floodplain development: <input checked="" type="checkbox"/> <i>(integration of measures into strategic development proposals)</i></p> <p>Storage: On-line <input checked="" type="checkbox"/> Off-line <input checked="" type="checkbox"/></p> <p>Flow diversion: Flood relief channel <input checked="" type="checkbox"/> Flood relief culvert <input checked="" type="checkbox"/></p> <p>Increase conveyance: Bridge works <input type="checkbox"/> Channel works <input type="checkbox"/> Floodplain <input type="checkbox"/></p> <p>Flood defences: Walls <input checked="" type="checkbox"/> Embankments <input checked="" type="checkbox"/></p> <p>Localised works: Defence raising <input type="checkbox"/> In-fill gaps <input type="checkbox"/> Trash screen <input type="checkbox"/></p> <p>Maintenance works: Culvert / channel clearance <input type="checkbox"/> Asset maintenance <input checked="" type="checkbox"/></p> <p>Relocation of properties: <input type="checkbox"/></p> <p>Improve existing defences: <input type="checkbox"/> (describe)</p> <p>Other (describe): There are numerous flood defence schemes currently planned for Ennis which are either in design stage or shortly to be constructed. Details of the purpose and impact of these schemes will be taken into account in the overall assessment of flood mitigation options. The options for flood risk management in Ennis cover a wide range of possibilities, and are likely to include multiple options in combination rather than any single flood risk management option. Groundwater and surface water flooding are also noted to be of concern in Ennis, and the interaction of these sources of flooding with any proposed fluvial / tidal flood risk options will be taken into account.</p>

<p>Outcomes</p>	
<p>Recommended Designation</p>	<p>APSR <input checked="" type="checkbox"/> not an APSR <input type="checkbox"/> IRR <input type="checkbox"/></p>
<p>Summary Comments (if required)</p>	<p>Ennis has major flooding risk from fluvial and tidal related sources. There are also groundwater and surface water flooding problems.</p>



Photo 1: River Fergus looking south d/s towards Ennis



Photo 2: Sluices on the River Fergus near Mill Rd in northern Ennis



Photo 3: Cusack Rd Bridge over the Inch River d/s of the bridge



Photo 4: The ground water feed lake east of Gort Rd (Lough Girroga), a known cause of flooding on the Gort Rd and adjacent Industrial Estate west of the lake



Photo 5: Northern branch of the Fergus River after it splits from the main Fergus on the northwest edge of town. This crossing is on Gort Road.



Photo 6: Flood defence embankment on the northern branch of the Fergus River at Gort Road



Photo 7: River Fergus flowing adjacent to Newbridge Rd in Ennis



Photo 8: Swallow hole for stream adjacent to St Flannan's college

