

<b>Location: Carrowmore, Co. Clare</b>		<b>Unique ID: 280484</b> (from PFRA database)	
<b>Initial OPW Designation</b>	<b>APSR</b> <input checked="" type="checkbox"/>	<b>AFRR</b> <input type="checkbox"/>	<b>IRR</b> <input type="checkbox"/>
<b>Co-ordinates</b>	<b>Easting: 98741</b>		<b>Northing: 166936</b>
<b>River / Catchment / Sub-catchment</b>	<b>Skivileen River/ Inagh Catchment</b>		
<b>Type of Flooding / Flood Risk</b> (identify all that apply)	<b>Fluvial non-tidal</b> <input type="checkbox"/> <b>Fluvial tidal</b> <input checked="" type="checkbox"/> <b>Coastal</b> <input type="checkbox"/>		

## Stage 1: Desktop Review

<b>1.1 Flood History (include review of Floodmaps.ie)</b>	<b>River Flow Path / Area Detail</b>  This area is has an extensive network of drains in addition to the Skivileen River, and the coast. The village of Doonbeg is located west of the townland of Carrowmore. Carrowmore itself is dominated by a golf club and related facilities.  <b>Flood event records</b>  There are no flood recorded for the townland of Carrowmore. The nearest flood record is within Caherfennick North, adjacent to Carrowmore. This is a recurring flood record related to road flooding: <ul style="list-style-type: none"> <li>Caherfeenick (near Doonbeg Golf Club entrance) - The N67 is flooded over a length of 200m to 300m and adjacent lands also flooded. Road is barely passable – depth in excess of 150mm. Frequency is once per year.</li> </ul>
<b>1.2 Relevant information on flooding issues from OPW and LA staff</b>	<b>PFRA database comments (<i>in italics</i>):</b>  <b>OPW comments</b> <i>FRI = 594 (mix of coastal and fluvial) - LA comment confirms status as APSR</i>  <b>LA comments</b> <i>APSR Score of 593.86, Fluvial and Tidal Residential. Local Authority would regard greatest risk of flooding from coastal erosion. Most residential properties in area are holiday homes.</i>  <b>Meeting / discussion summary comments:</b>  <b>OPW comments</b> <ul style="list-style-type: none"> <li>PFRA is underestimated. Refer to the benefiting lands for more accurate indication of flood extents.</li> <li>Flood risk in this area is associated with the sea outfall. In the 1960's, this outfall blocked and flooded the area where the golf course lakes are now located.</li> <li>The Golf Course owners were informed of the flood risk and therefore these buildings are probably elevated.</li> <li>The OPW remove gravel from the river mouth approx every 2 years.</li> <li>Properties northeast of the Golf Course are considered at risk, but have not experienced problems since the construction of the golf course grounds (including lakes).</li> </ul>

	<b>LA comments</b> <ul style="list-style-type: none"> <li>• Extensive flood history (mainly to road)</li> <li>• Main threat is coastal erosion (Dune Breaching)</li> </ul>		
<b>1.4 PFRA Data</b>			
<b>1.4.1 PFRA hazard mapping</b>	<b>PFRA mapping available in GIS layer:</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	<b>PFRA mapping included on FRR map:</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<b>1.4.2 Summary of Principal Receptors</b>	<b>Type</b>	<b>FRI score (if available)</b>	
	Monuments	10	
	<b>Total</b>	<b>593.86</b>	
<b>1.7 Stage 1 Evaluation</b>	<b>Aspect</b>	<b>Clearly APSR</b>	<b>Uncertain</b>
	<b>Flood History (1.1)</b>		<b>X</b>
	<b>OPW / LA Information (1.2)</b>		<b>X</b>
	<b>PFRA Evaluation (1.4)</b>	<b>X</b>	
	<b>Overall Desktop Evaluation</b> (if any above aspect is uncertain then overall designation is uncertain)		<b>X</b>
<b>1.8 Proposed level of assessment for Stage 2 site visits</b>	<b>Level A Site Visit</b>	<b>X</b>	
	<b>Level B Site Visit</b>		

<b>Stage 2: Site Inspection</b>		<b>Level A Assessment</b>		
<b>Date and Time of Inspection</b>		<b>Date: 08/06/11</b>		
		<b>Time: 12:00</b>		
<b>Names of inspection team (including OPW/LA staff if present)</b>		<b>Iain Blackwell</b>		
		<b>Lewis Maani</b>		
<b>2.1 Ground-truthing of Hazard Mapping</b>	<b>Fluvial non-tidal</b> <input type="checkbox"/> <b>Fluvial tidal</b> <input checked="" type="checkbox"/> <b>Coastal</b> <input type="checkbox"/> <b>Not available</b> <input type="checkbox"/>			
	Outline appears to be reasonable for most areas. However, the accommodation associated with the golf club is shown as being flooded. This looks over estimated as the properties are built on elevated land, approximately 1.5 to 2.0m above the surrounding flood plain. These properties are not considered to be at significant risk of flooding.			
<b>2.2 Spot check ground-truthing of selected receptor vulnerability</b>	<b>Receptor Type</b>	<b>Location description (if not obvious)</b>	<b>Exists?</b>	<b>Overall Vulnerability / Risk (L / M / H)</b>
<b>(also note any key receptors noted during visit that are not identified by PFRA)</b>	Houses	Isolated properties along road to Carrowmore, north off the N67	Y	L
	Accommodation for golf club	Group of 30+ properties behind dunes at Carrowmore	Y	L
<b>2.3 Local knowledge - on-site comments</b>  <b>(OPW, LA and any info volunteered by local residents during visit)</b>	No on-site comments			
<b>2.4 Comments on hydraulic constrictions (bridges, etc.) and conveyance routes</b>	<p>Main bridge crossing the Skivileen River on the N67 is a three-arch bridge approximately 1km south of Carrowmore.</p> <p>On the road approaching Carrowmore from the N67 (north of the N67) there are two crossings of a small tributary to the Skivileen River, both of which are large culverts and unlikely to present a flow restriction.</p> <p>The area is very low lying with a very flat gradient in the vicinity and therefore hydraulic restrictions are minimal as flow rates will typically be low. However, there is a tidal flap on the outfall from a drain / tributary on the right bank of the Skivileen River, close to where the river discharges to the sea.</p> <p>There are no alternative conveyance routes. The only outlet to the sea through the natural defences is the Skivileen River itself.</p>			

## 2.5 SVRS Assessment Matrix

### Weightings:

A - x1 - reasonable expectation of flooding

B - x2 - high expectation of flooding  
or flooding is tidal (any risk)

C - x5 - risk to life

Approx. Number	1 to 4				5 to 20				>20			
Weighting		A	B	C		A	B	C		A	B	C
Property (domestic)	10		X		100				200			
Property (small retail or business)	20		X		200				400			
Property (large retail or business)	50				500				1000			
Road or Rail Infrastructure	30				300				600			
Critical Infrastructure (local) [hospital, school, police/fire/ambulance station, substation, WTW/WWTW, gov bldg, other (specify)]	50				500				1000			
Critical Infrastructure (national importance)	250				1000				2000			
Cultural Heritage Site	20				200				400			
Environmental Designated Site	20				200				400			
Hazardous Substances Site	50				500				1000			
Total SVRS									60			

## 2.6 Defence Assets

### Formal and Informal Flood Defence Assets

(include effective and ineffective assets to inform asset survey and potential mitigation measures)

### Open Channel Watercourses

Man-made river channel ☐ Flood relief channel ☐ Canal ☐  
Mill leat ☐ Drainage channels / back drains ☒

### Bridges and Culvert crossings

Single Arch bridge ☐ Multi-Arch bridge ☒  
Single Span bridge ☐ Multi-Span bridge ☐  
Box culvert(s) ☐ Pipe culvert(s) ☒ Arch Culvert(s) ☐

### Culverted Watercourses (culvert length is greater than just a crossing)

Box culvert(s) ☒ Pipe culvert(s) ☐ Arch Culvert(s) ☐ Irregular Culvert(s) ☐

### Walls and Embankments

Embankment(s) ☒ Raised wall(s) ☐ Retaining wall(s) ☐

### Control Structures – weirs, gates, dams

Fixed crest weir ☐ Adjustable weir ☐ Dam / Barrage ☐  
Sluice gates ☐ Lock gates ☐ Radial gates ☐

### Storage

On-line storage (natural) ☒ On-line storage (artificial) ☐ Off-line storage ☐

	<p><b>Outfalls</b></p> <p>Flapped outfall(s) into watercourse <input type="checkbox"/>      Unflapped outfall(s) into watercourse <input type="checkbox"/>  <i>i.e. from smaller watercourses, drains etc. into river / estuary / sea</i></p> <p>Tidal flap(s) <input checked="" type="checkbox"/>      Tidal sluice(s) <input type="checkbox"/>  <i>i.e. from main watercourse into estuary / sea</i></p> <p><b>Other</b></p> <p>Pumping Station <input type="checkbox"/>      Erosion Protection <input type="checkbox"/>      Sand Dunes <input checked="" type="checkbox"/></p> <p><b>Additional notes (if required):</b></p> <p>From a coastal flooding perspective, there is an extensive dune system protecting the area.</p> <p>There are embankments along much of the length of the River, and a tidal flap on the main drain / tributary from the right bank. Natural storage is provided in the system through the extensive drainage network for periods during which the drainage system is tidelocked.</p>
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## 2.8 Initial Potential Mitigation Measures

<b>Non-structural measures</b>	<p>Planning and Development control <input checked="" type="checkbox"/></p> <p>Sustainable Urban Drainage Systems <input type="checkbox"/></p> <p>Flood forecasting / warning <input type="checkbox"/></p> <p>Change in Operating Procedures for water level control: <input type="checkbox"/></p> <p>Public awareness campaign <input type="checkbox"/></p> <p>Individual property protection <input checked="" type="checkbox"/></p> <p>Land use management <input type="checkbox"/></p>
<b>Structural measures</b>	<p><b>Strategic development management for floodplain development:</b> <input type="checkbox"/>  <i>(integration of measures into strategic development proposals)</i></p> <p><b>Storage:</b>      On-line <input checked="" type="checkbox"/>      Off-line <input type="checkbox"/></p> <p><b>Flow diversion:</b> Flood relief channel <input type="checkbox"/>      Flood relief culvert <input type="checkbox"/></p> <p><b>Increase conveyance:</b> Bridge works <input type="checkbox"/>      Channel works <input type="checkbox"/>      Floodplain <input type="checkbox"/></p> <p><b>Flood defences:</b>      Walls <input type="checkbox"/>      Embankments <input checked="" type="checkbox"/></p> <p><b>Localised works:</b>      Defence raising <input type="checkbox"/>      In-fill gaps <input checked="" type="checkbox"/>      Trash screen <input type="checkbox"/></p> <p><b>Maintenance works:</b> Culvert / channel clearance <input checked="" type="checkbox"/>      Asset maintenance <input checked="" type="checkbox"/></p> <p><b>Relocation of properties:</b> <input type="checkbox"/></p> <p><b>Improve existing defences:</b> <input type="checkbox"/> (describe)</p> <p><b>Other (describe):</b></p> <p>Main concern in relation to providing adequate protection is to keep the river mouth open by appropriate maintenance of the channel at the outfall – i.e. keeping clear of gravel / sediment / beach material. The tidal flap on the tributary from the right bank must also function adequately. Both of these are currently done as part of routine maintenance.</p>

## Outcomes

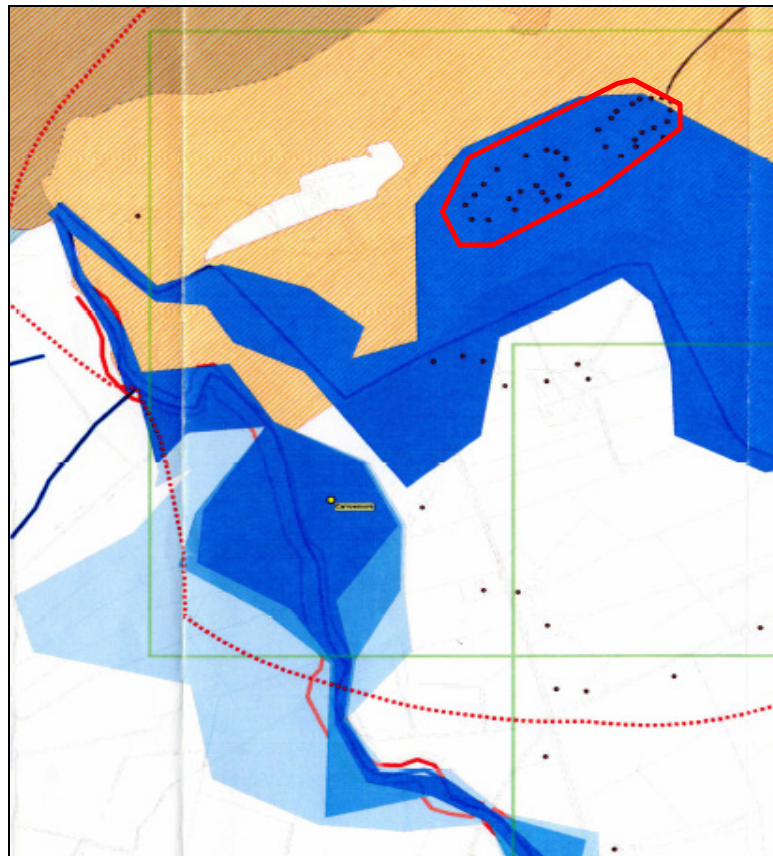
<b>PFRA Designation</b>	APSR <input checked="" type="checkbox"/> not an APSR <input type="checkbox"/> IRR <input type="checkbox"/> <b>FRI Score: 593.86</b>			
<b>Site Ground-truthing of PFRA Assessment (hazard mapping and receptors)</b>	<b>High Confidence (good)</b>	<b>Uncertain</b>	<b>Low Confidence (poor)</b>	<b>Not available</b>
		X		
<b>Site Visit Review Score</b>	60			
<b>Recommended Designation</b>	APSR <input type="checkbox"/> not an APSR <input checked="" type="checkbox"/> IRR <input type="checkbox"/>			

**Summary comments (if required):**

The area is very low lying, but protected by embankments and tidal outfall on one of the main tributaries.

There is very little at risk of flooding – just a handful of properties at relatively low risk. The golf club and associated accommodation is elevated well above the surrounding floodplain. The 30+ properties shown as being at risk of flooding on the PFRA map (when overlaid with the Geo-directory database) is considered to be an over-estimate of the flood outline. OPW noted that the golf club was requested to build the properties elevated, which has been done. All of these are about 1.5 to 2.0m above the surrounding flood plain. As these properties contribute significantly to the PFRA FRI score, the removal of the properties would dramatically reduce FRI score.

The location of these 30+ properties is shown in the red outline on the figure below.



Clare County Council noted that there are flooding problems on the N67 just to the east of the small road leading to Carrowmore. On inspection, this is considered to be surface water flooding. The area is very flat, but also elevated up to 2m above the N67 road level at the crossing of the Skivleen River. Hence, this reported regular flooding of the road is considered to be a surface water / land drainage issue rather than fluvial flooding.

Taking account of the above considerations with regard to both the properties included in the PFRA score, and the considerations regarding road flooding, it is concluded that Carrowmore should not be designated as an APSR.





**Photo 1:** The mouth of the Skivileen river



**Photo 2:** Extensive length and height of dune system protecting Carrowmore from coastal flooding.



**Photo 3:** Tidal flap on a tributary to the Skivileen River on the right bank, close to the river mouth.



**Photo 4:** Skivileen River looking inland, flowing through a very flat area with raised embankments on both sides of the river.



**Photo 5:** Golf club residences (30+ properties) all located 1.5m to 2m above the surrounding flood plain (to the right of the road).



**Photo 6:** Back drain adjacent to the embankment on the right bank.



**Photo 7:** Upstream side of the bridge over the Skivileen River on the N67 south of Carrowmore (in Caherfeenick South).



**Photo 8:** N67 just east of the crossing of the Skivileen River. This road is approximately 2m higher than the road level at the bridge crossing. Flooding here is considered to be surface water and land drainage related, rather than fluvial.



