

<b>Location: Banna, Co. Kerry</b>		<b>Unique ID: 230345</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: 75750</b>		<b>Northing: 123000</b>
<b>River / Catchment / Sub-catchment</b>	<b>River Tyshe / North Kerry Tralee Bay</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</b> <b>(include review of Floodmaps.ie)</b>	<p><b>River Flow Path</b></p> <p>The River Tyshe flows north of Ardfert from an east to west direction where it has an extensive network of tributaries. It then turns north through Banna and ultimately discharges to the estuary in the townland of Ballinprior (at Black Rock), between Banna and Ballyheige.</p> <p><b>Flood event records</b></p> <p>There are no OPW flood records for the Banna area the nearest is located south in Carrahan. From the OPW flood report on the Carrahan:</p> <p><i>“This area is near Ballyheige and drained by the same system. A stretch of road which connects the L10481 to the L6095 and is not in public ownership floods on a regular basis, several times per year. Road is not passable. The cause of the flooding is tidal.”</i></p>
<b>1.2 Relevant information on flooding issues from OPW and LA staff</b>	<p><b>PFRA database comments (<i>in italics</i>):</b></p> <p><b>OPW comments</b>  <i>Flat rural area - Mix of fluvial and extensive tidal flooding leading to fairly high Predictive score - No history nor LA opinion</i>  <i>FRI = 980 (mix of fluvial &amp; coastal) - Maintain as ASPR, and Risk Review (as required for all APSRs) can confirm status.</i></p> <p><b>LA comments</b>  <i>LA confirm also that some flooding of lands occurs here associated with the Banna – Akeragh drainage system with some houses at risk</i></p> <p><b>Meeting / discussion summary comments:</b></p> <p><b>OPW comments</b></p> <ul style="list-style-type: none"> <li>• There are two DD systems in place at Banna and Ballyheigue, both of which discharge at Black Rock.</li> <li>• Both systems are sluiced at Black Rock.</li> <li>• DD Channels back up when the area at Black Rock blocks with sand. Needs to be maintained.</li> <li>• The Banna area is very flat.</li> <li>• One area known to be at significant flood risk is the new development at Commons, north of Banna-Mountain. The Council implement maintenance measures in place to alleviate this.</li> </ul> <p><b>LA comments</b></p> <ul style="list-style-type: none"> <li>• Outfall from the Arkeragh drainage system is the biggest issue.</li> <li>• Risk of fluvial flooding due to tidelock conditions and blockage of channel downstream of outfall.</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>
	No principal receptors within the area for flood risk review. The FRI score is from residential and commercial properties.  <b>Total</b>		  <b>980.21</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: 25/05/11</b>		
		<b>Time: 09:00</b>		
<b>Names of inspection team (including OPW/LA staff if present)</b>		<b>Kelly Kasperczyk</b>		
		<b>Iain Blackwell</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"/>			
	Overall, mapping appears reasonable. Visibly higher locations are not in the hazard areas. Local anomalies in places as gradients on flood plain are very flat. Possible over-estimation of flooded area at the NW edge of Banna-mountain – properties identified at risk may not be.			
<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	Bannamountain is main area of concern, not Banna.	Yes	M
<b>2.3 Local knowledge - on-site comments</b>	<b>Kerry County Council</b>			
<b>(OPW, LA and any info volunteered by local residents during visit)</b>	Discussion with foreman working for Kerry CC indicated ongoing maintenance requirements to keep the outfall clear at Black Rock.  Sand and seaweed are excavated out of the channel opening and stockpiled next to the existing sand dunes. The annual cost of this maintenance is around €150,000. Clearance works at Black Rock take place at least every two weeks, but this can be daily in the winter months.  Also, the importance of keeping the tidal flaps functioning (approx. 600m upstream of the outfall, in the Commons area north of Banna-Mountain).  Sluice gates (2 no.) are manually operated to close on high tides to prevent tide backing up on Tyshe River, typically closed once every few weeks.			
<b>2.4 Comments on hydraulic constrictions (bridges, etc.) and conveyance routes</b>	Bridges / culverts are located at several crossings from upstream of Banna-Mountain on the R551, to the Commons area north of Banna-Mountain.  There are 4 road crossings in total, plus footbridge and access track. Typically, these would be unlikely to be a hydraulic control as the gradient is so flat, and velocities are low, hence head loss across the structures will be very small. This would be even more the case under tidelock conditions, where the drainage network will fill up without any head loss across the bridges / culverts.  The main Tyshe channel marked on the EPA Blue-line network is incorrect at the main crossing in Banna. The main conveyance route is the channel flowing to the NNE rather than the one continuing to the NNW, downstream of the main road crossing.			

## 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				100				200		X	
Property (small retail or business)	20				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									400			

## 2.6 Defence Assets

<b>Formal and Informal Flood Defence Assets</b> <i>(include effective and ineffective assets to inform asset survey and potential mitigation measures)</i>	<b>Open Channel Watercourses</b> Man-made river channel <input checked="" type="checkbox"/> Flood relief channel <input type="checkbox"/> Canal <input type="checkbox"/> Mill leat <input type="checkbox"/> Drainage channels / back drains <input checked="" type="checkbox"/>		
	<b>Bridges and Culvert crossings</b> Single Arch bridge <input checked="" type="checkbox"/> Multi-Arch bridge <input 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"/>		
	<b>Culverted Watercourses</b> (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"/>		
	<b>Walls and Embankments</b> Embankment(s) <input type="checkbox"/> Raised wall(s) <input type="checkbox"/> Retaining wall(s) <input type="checkbox"/>		
	<b>Control Structures – weirs, gates, dams</b> Fixed crest weir <input type="checkbox"/> Adjustable weir <input type="checkbox"/> Dam / Barrage <input type="checkbox"/> Sluice gates <input type="checkbox"/> Lock gates <input type="checkbox"/> Radial gates <input type="checkbox"/>		
	<b>Storage</b> On-line storage (natural) <input checked="" type="checkbox"/> On-line storage (artificial) <input checked="" type="checkbox"/> Off-line storage <input checked="" type="checkbox"/>		

	<p><b>Outfalls</b></p> <p>Flapped outfall(s) into watercourse <input type="checkbox"/>      Unflapped outfall(s) into watercourse <input checked="" 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 checked="" 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>Extensive drainage network of man-made channels. On-line storage provided though large volume available in the drainage network. Further natural storage provided by extensive flood plain areas behind dunes.</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 checked="" 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 checked="" type="checkbox"/>      Floodplain <input type="checkbox"/></p> <p><b>Flood defences:</b>      Walls <input type="checkbox"/>      Embankments <input type="checkbox"/></p> <p><b>Localised works:</b>      Defence raising <input type="checkbox"/>      In-fill gaps <input 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 checked="" type="checkbox"/></p> <p><b>Improve existing defences:</b> <input type="checkbox"/> (describe)</p> <p><b>Other (describe):</b></p> <ul style="list-style-type: none"> <li>The main issue is maintaining a clear outfall at Black Rock.</li> <li>A potential option could involve ceasing maintenance at the outfall, allowing entrance to block and then pump water through sand dunes. This would require pumping station that could also deal with flows from the northern part of the Akeragh drainage system.</li> </ul>

## Outcomes

<b>PFRA Designation</b>	APSR <input checked="" type="checkbox"/> not an APSR <input type="checkbox"/> IRR <input type="checkbox"/> <b>FRI Score:</b> 980.21			
<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>	400			
<b>Recommended Designation</b>	APSR <input checked="" type="checkbox"/> not an APSR <input type="checkbox"/> IRR <input type="checkbox"/>			

<p><b>Summary Comments (if required)</b></p>	<p>Fundamental issue for Banna-Mountain and surrounding area is how to maintain fluvial flow to the sea, i.e. continue to maintain the outfall at Black Rock or pump through dunes.</p> <p>A cost-effective solution for managing water levels in the drainage system discharging to Black Rock is required, however, the active coastal processes at the outfall limits feasible options.</p> <p>Banna should not be looked at in isolation – the solution should address the wider issues presented by the Akeragh Drainage System, including drainage from the north and northeast, as well as from the south and southeast (via the Tyshe River and Banna).</p> <p><b>Note:</b> There are two Bannas marked on OSi mapping in the area. The Banna of interest is marked next to Banna-Mountain, west of the R551. The other Banna (not of interest) is marked 1.5km NNE of Banna-Mountain, located on the east side of the R551.</p>
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**Photo 1:** Sand dune system immediately west of Banna (looking NW) protecting inland low lying areas



**Photo 2:** Low lying land to the east inshore of the dune system. The group of properties shown is in Banna.



**Photo 3:** Low lying land in Banna and Banna Mountain, inshore of the dune system



**Photo 4:** SE of Banna, part of the Akeragh drainage system looking south at the crossing of the drain at the R551 (which flows into the Tyshe River). Large storage area in the event of tide lock.





**Photo 5:** South of Banna / Banna-Mountain looking north at the Tyshe River, properties potentially at risk on the right bank



**Photo 6:** Single arch crossing of the Tyshe River looking north d/s



**Photo 7:** Removal of seaweed and sand from the channel entrance. Clearance works take place at least every two weeks, but this can be daily in the winter months



**Photo 8:** Manually operated tidal sluice structure on the Tyshe River at its outlet at Black Rock



