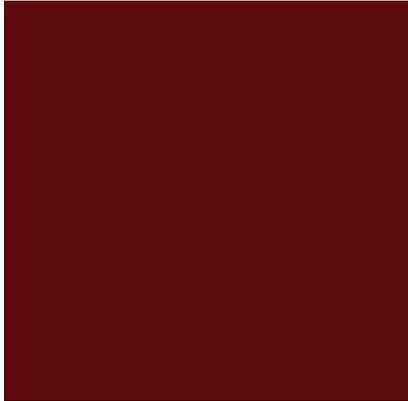
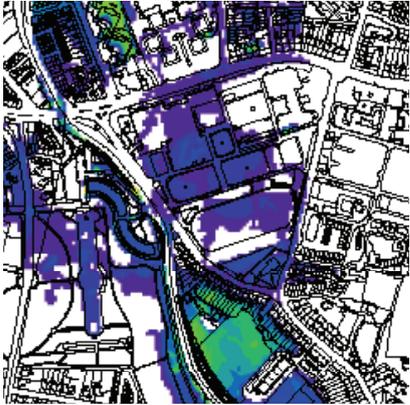
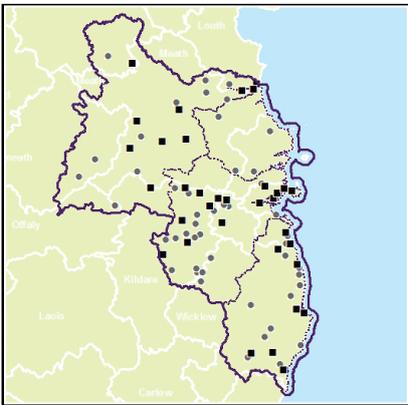




Eastern CFRAM Study

Flood Risk Review - Final Report

IBE0600-Rp0001-F02/Dec 2011



Eastern CFRAM Study

Flood Risk Review

Final Report

DOCUMENT CONTROL SHEET

Client	OPW					
Project Title	Eastern CFRAM Study					
Document Title	Flood Risk Review – Final Report					
Document No.	IBE0600Rp0001					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	3	43	1	1	5

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
D01	Draft	M Wilson	M Brian		Belfast	02-09-2011
D02	Draft Final	M Wilson	M Brian	G Glasgow	Belfast	30-09-2011
F01	Final	M Wilson	M Brian	G Glasgow	Belfast	04-11-2011
F02	Final	M Wilson	M Brian	G Glasgow	Belfast	22-12-2011

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	BACKGROUND	1
2	METHODOLOGY	4
2.1	GENERAL	4
2.2	DATA REVIEW & SITE INSPECTION PREPARATION	4
2.3	DATA COLLECTION.....	6
2.3.1	Local Authority Consultation.....	6
2.3.2	Site Inspections	7
2.3.3	Consultation with OPW Regional Drainage Maintenance Staff	10
2.3.4	Vulnerability of Environmental Receptors	10
2.3.5	Flood Risk Review.....	13
3	RESULTS OF THE FLOOD RISK REVIEW	15
3.1	CAVAN	15
3.1.1	Mullagh	15
3.1.2	Virginia.....	15
3.2	DUBLIN CITY.....	15
3.2.1	Clontarf	15
3.2.2	Dublin City	16
3.2.3	Raheny	16
3.2.4	Santry	16
3.3	DUNLAOGHAIRE-RATHDOWN	17
3.3.1	ESB Blackrock.....	17
3.3.2	Loughlinstown.....	17
3.3.3	Old Connaught/Wilford	17
3.3.4	Shankill (Crinken)	18
3.4	FINGAL	18
3.4.1	Balrothery	18
3.4.2	Bloody Stream (Howth)	18
3.4.3	NUR Luttrells	19
3.4.4	Santry Demesne.....	19
3.4.5	Sutton & Baldoyle.....	19
3.4.6	Sutton & Howth North.....	19
3.5	KILDARE	20
3.5.1	Ballymore Eustace	20
3.5.2	Blacktrench.....	20
3.5.3	Carragh.....	20

3.5.4	Celbridge	21
3.5.5	Clane	21
3.5.6	Grange.....	21
3.5.7	Johnstown Bridge.....	22
3.5.8	Johnstown	22
3.5.9	Kilcock	22
3.5.10	Kilcullen	23
3.5.11	Kill.....	23
3.5.12	Leixlip	23
3.5.13	ESB Longstone.....	24
3.5.14	Maynooth.....	24
3.5.15	Naas	24
3.5.16	Newbridge	24
3.5.17	Roestown.....	25
3.5.18	Sallins	25
3.5.19	Straffan	25
3.5.20	Turnings.....	25
3.6	LOUTH.....	26
3.6.1	Baltray	26
3.6.2	Drogheda.....	26
3.6.3	Tullyallen	26
3.7	MEATH.....	27
3.7.1	Athboy	27
3.7.2	Ballivor.....	27
3.7.3	N2 Balrath.....	28
3.7.4	ESB Grangeageeth	28
3.7.5	SCH Kilbride.....	28
3.7.6	Kildalkey	28
3.7.7	Kilmessan.....	29
3.7.8	Longwood.....	29
3.7.9	Mornington.....	29
3.7.10	Navan	29
3.7.11	ESB Randalstown	30
3.7.12	Slane Bridge.....	30
3.7.13	WT Stalleen	30
3.7.14	Trim	30
3.8	OFFALY.....	31
3.8.1	Edenderry.....	31
3.9	SOUTH DUBLIN	31
3.9.1	Esker South.....	31

3.9.2	Finnstown	31
3.9.3	Hazelhatch.....	32
3.9.4	Lucan to Chapelizod.....	32
3.9.5	Rathcoole, Saggart & Baldonnel	32
3.10	WEST MEATH	32
3.10.1	Milltownpass	32
3.10.2	Riverstown.....	33
3.11	WICKLOW.....	33
3.11.1	Annacurragh	33
3.11.2	Arklow	33
3.11.3	Ashford / Rathnew.....	33
3.11.4	Aughrim	34
3.11.5	Avoca.....	34
3.11.6	Ballinaclesh	34
3.11.7	Blessington	34
3.11.8	Bray	35
3.11.9	Brittas Bay	35
3.11.10	Charlesland	35
3.11.11	Enniskerry.....	36
3.11.12	Glendalough	36
3.11.13	Greystones	36
3.11.14	Hollywood.....	36
3.11.15	Kilcoole	37
3.11.16	Killiskey.....	37
3.11.17	Kilmacanoge.....	37
3.11.18	Newcastle	38
3.11.19	ESB Pollaphuca.....	38
3.11.20	Rathdrum.....	38
3.11.21	ESB Shelton Abbey.....	38
3.11.22	Wicklow	38
4	SUMMARY OF RECOMMENDATIONS	39

LIST OF FIGURES

Figure 2.1	Natura 2000 sites qualifying as Probable AFAs within the ECFRAMS area.....	11
Figure 2.2	Natura 2000 sites qualifying as Possible AFAs within the ECFRAMS area.....	12

LIST OF TABLES

Table 1.1:	ECFRAMS Probable & Possible Areas for Further Assessment from PFRA.....	2
Table 1.2	Matrix for Determining the Flood Risk Index (from PFRA).....	3
Table 2.1	Datasets used in risk review process	4
Table 2.2	ECFRAMS Flood Risk Review Site Inspection Pro-forma	9
Table 4.1	Recommended Areas for Further Assessment	39
Table 4.2	Areas Rejected for Further Assessment in the ECFRAMS	41
Table 4.3	Additional Sites Identified for Possible Flood Risk Review	43
Table 4.4	Natura 2000 Sites to be Considered for Further Assessment.....	43

APPENDICES

		No. of Pages
APPENDIX A	SITE INSPECTION RECORDS	156
APPENDIX B	OPW REGIONAL DRAINAGE MAINTENANCE STAFF CONSULTATION FEEDBACK	4
APPENDIX C	CHANNEL CAPACITY CALCULATIONS	7
APPENDIX D	FLOOD HAZARD TO ENVIRONMENTAL RECEPTORS	50
APPENDIX E	SITE INSPECTION MAPS (bound separately)	83

GLOSSARY

AEP	Annual Exceedance Probability - the percentage probability of a given severity of flood occurring or being exceeded at a given location in any given year. For example, a 1% annual exceedance probability (AEP) flood has a 1%, or 1 in a 100, chance of occurring or being exceeded this year, or next year, or the following year, etc.
AFA	Area for Further Assessment - Areas where, based on the Preliminary Flood Risk Assessment and the ECFRAMS Flood Risk Review, the risks associated with flooding are potentially significant, and where further, more detailed assessment is required to determine the degree of flood risk, and develop measures to manage and reduce the flood risk.
CFRAM	Catchment Flood Risk Assessment and Management – The ‘CFRAM’ Studies will develop more detailed flood mapping and measures to manage and reduce the flood risk for the AFAs.
DTM	Digital Terrain Model – A computer-based digital representation of the land surface (location and elevation)
ECFRAMS	Eastern Catchment Flood Risk Assessment and Management Study.
FRAM	Flood Risk Assessment and Management – FRAM Studies have developed detailed flood mapping and measures to manage and reduce the flood risk to AFAs at a sub-catchment level.
FRI	Flood Risk Index - a metric that allows the risk to different types of asset (e.g., home, business, monument, utility asset, etc.) to be expressed numerically, but without attempting to assign monetary values to all types of damage.
FRR	Flood Risk Review – an appraisal of the output from the PFRA involving ground truthing of the predictive mapping and receptors and historic information.
PFRA	Preliminary Flood Risk Assessment - A national screening exercise, based on available and readily-derivable information, to identify areas where there may be a significant risk associated with flooding.

1 INTRODUCTION

This document has been prepared to provide a background to and present the recommendation of the flood risk review aspect of the Eastern Catchment Flood Risk Assessment and Management Study (ECFRAMS) as undertaken by RPS. This section of the report gives a brief summary of the background to the Preliminary Flood Risk Assessment (PFRA) being undertaken by OPW in parallel with this review, and the purpose of the ECFRAMS flood risk review. Section 2 outlines the methodology adopted by RPS in undertaking this aspect of the Eastern CFRAM Study while Section 3 presents our assessment of the accuracy of the output from the PFRA process and Section 4 presents a summary of our final recommendations.

1.1 BACKGROUND

The Office of Public Works (OPW) is undertaking a Preliminary Flood Risk Assessment, fulfilling the requirements of the EU “Floods” Directive (2007/60/EC) based on available and readily-derivable information, to identify the Probable and Possible Areas for Further Assessment (AFAs) under the CFRAM Programme, including both Communities and Individual Receptors. This assessment is based primarily upon:

1. Information on past flood events;
2. OPW staff and Local Authority knowledge of probable flood risk areas;
3. Analysis of available and readily-derivable predictive flood hazard information (such as localised flood extent mapping and coastal flood extent mapping (both where available) and also broad-scale mapping of areas potentially prone to fluvial flooding based on DTM data and normal-depth calculation) and flood risk receptor data.

RPS was required to review the output of the initial preliminary flood risk assessment and all other information and knowledge readily available during the initial stages of the ECFRAM Study to assess and identify:

1. Areas for Further Assessment (AFA) where potential significant flood risk exists or might be considered likely to exist including areas other than those identified through the PFRA;
2. Areas identified through the PFRA process where further examination indicates potential significant flood risk does not exist or is not considered likely to occur and no further assessment is required.

Excluding those areas already included as part of the Dodder, Tolka and Fingal East Meath Flood Risk Assessment and Management (FRAM) Studies the PFRA process identified some 34 Probable Areas for Further Assessment and a further 48 Possible Areas for Further Assessment, for consideration as part of the Eastern CFRAM Study as detailed in Table 1.1 below.

Table 1.1: ECFRAMS Probable & Possible Areas for Further Assessment from PFRA

Local Authority	Probable AFAs	Possible AFAs
Cavan	Mullagh	Virginia
Dublin City	Clontarf	
	Dublin City	
	Raheny	
	Santry	
DunLaoghaire / Rathdown	Loughlinstown	ESB Blackrock
		Old Connaught / Wilford
		Shankill (Cringen)
Fingal	Sutton & Baldoyle	Balrothery
	Sutton & Howth North	NUR Luttrels
		Santry Demesne
Kildare	Celbridge	Ballymore Eustace
	Clane	Blacktrench
	Johnstown Bridge	Carragh
	Kilcock	Grange
	Leixlip	Johnstown
	Maynooth	Kilcullen
	Naas	Kill
	Newbridge	ESB Longstone
		ESB Pollaphuca
		Roestown
		Sallins
		Straffan
Louth	Baltray	Turnings
	Drogheda	Tullyallen
Meath	Athboy	N2 Balrath
	Ballivor	ESB Grangeageeth
	Kilmessan	SCH Kilbride
	Mornington	Kildalkey
	Navan	Longwood
	Trim	ESB Randalstown
		Slane
Offaly		Stalleen WTW
South Dublin	Lucan to Chapelizod	Edenderry
	Rathcoole, Saggart & Baldonnel	Esker South
		Finnstown
Westmeath		Hazelhatch
		Milltownpass
		Riverstown
Wicklow	Arklow	ESB Shelton Abbey
	Ashford / Rathnew	Annacurragh
	Aughrim	Ballinaclash
	Avoca	Blessington
	Bray	Brittas Bay
	Enniskerry	Charlesland
	Greystones	Glendalough
	Wicklow	Hollywood
		Kilcoole
		Killiskey
		Kilmacanoge
		Newcastle
	Rathdrum	

The selection of locations as Probable or Possible AFAs was based on a combination of predictive broad scale flood modelling, evidence of previous flooding and input received from Local Authorities and OPW Regional Engineering staff. In broad terms Probable AFAs are locations where the predictive modelling indicated the Flood Risk Index (FRI), derived from an assessment of hazard and

impact, exceeded 250 or there was a substantive body of evidence to suggest that flooding has been a significant problem in the past. The PFRA Flood Risk Index is calculated based on the matrix set out in Table 1.2, which integrates the probability of flooding and the vulnerability classification of the asset or activity potentially at risk. Further information on the methodologies used in the PFRA process to derive the FRI scores are detailed in the various PFRA reports, available on the National CFRAM website (www.cfram.ie).

Table 1.2 Matrix for Determining the Flood Risk Index (from PFRA)

Vulnerability Class	Vulnerability Class Factor	Probability of Flood Event (Annual Exceedance Probability)		
		10% - High	1% - Medium	0.1% - Low
Critical Vulnerability	2500	25000	2500	250
Extreme Vulnerability	250	2500	250	25
High Vulnerability	25	250	25	2.5
Moderate Vulnerability	2.5	25	2.5	0.25
Low Vulnerability	1	10	1	0.1

The Probable AFAs identified through the PFRA process were intended to be designated as AFAs, and hence subject to further assessment through the CFRAM Studies, unless information was identified through subsequent processes to indicate that this should not be the case. Possible AFAs were not expected to be designated as AFAs, unless information arose to indicate that this should not be the case. These were areas where the degree of risk, based on the PFRA work done to date, did not indicate that area should be designated as an AFA, but where there was some degree of risk and where sites inspections and consultation were required to validate the risk.

It is important to note that even if an area is not designated as an AFA, then that area is not excluded from any further action to address flood risk, and works to reduce or manage the flood risk could still be considered through channels other than the CFRAM Programme e.g. the OPW Minor Works Programme.

In addition to providing independent verification of the output of the PFRA the Flood Risk Review (FRR) was specifically required to consider the flood risk to environmental receptors as this aspect of flood impact was not initially considered in the PFRA process. Information on the flood risk to designated environmental receptors was provided by OPW for this purpose.

2 METHODOLOGY

2.1 GENERAL

The procedure employed by RPS in undertaking the Flood Risk Review for the Eastern CFRAM Study area was developed to make best use of the limited time available between the date of award of the contract and the delivery deadline set by the need to meet the reporting schedule specified in the EU Floods Directive. The resulting methodology includes elements of desk based review and site inspections to ground truth information and assumptions made as part of the PFRA process and the desk based elements of this earlier task.

2.2 DATA REVIEW & SITE INSPECTION PREPARATION

The OPW provided a project dataset which included background mapping, output from the Preliminary Flood Risk Assessment (historical and predictive polygons, topographical data plus an access database containing validation comments and supporting information recording the OPW decision process to draft PFRA reporting stage) and available county development plan boundaries. The OPW also provided a summary of the process followed during the PFRA study which was further elaborated on at the Inception Meeting and through subsequent communications and information requests. In addition, the OPW provided aerial photography and a property geo-database to help inform the flood risk review. The datasets used during the risk review process are listed in Table 2.1. RPS reviewed all this information in order to develop an understanding of the PFRA process and decision mechanisms to date and hence identify and prioritise issues and areas for investigation e.g. large areas of predicted frequent flooding, individual receptors that contributed significantly to the overall FRI score etc. during subsequent stages of the flood risk review.

Table 2.1 Datasets used in risk review process

Dataset	Description	Owner
OSi Maps	50k and 5k mapping.	OPW
Aerial Photography		OPW
Local Authority Local Area Plan	Establishes the development limits for each review area.	DOE LA
Probable and possible AFA centroids	Designating the centre of the risk review areas.	OPW
Blue line network	Marks the river centreline.	EPA
PFRA 0.1%AEP flood extent	The estimated flood extent during a 1 in 1000yr flood event.	OPW
PFRA 1%AEP flood extent	The estimated flood extent during a 1 in 100yr flood event.	OPW
PFRA 10%AEP flood extent	The estimated flood extent during a 1 in 10yr flood event.	OPW
PFRA predictive analysis flood risk grid	500m x 500m grid squares which zone flood areas where damage is predicted.	OPW
PFRA historical analysis flood risk polygon	Areas where historical flood event have occurred.	OPW
River nodes	Marking the control locations for the PFRA predictive mapping.	OPW

Dataset	Description	Owner
Flood incident nodes	Marking the reference location for historical flood records.	OPW
Geodirectory	Location of properties within each review area.	An Post Geodirectory
Higher vulnerability receptors	Details of schools, emergency services, government buildings, utility infrastructure and health, medical and care services.	Department of Education Higher Education Authority DEHLG Department of Defence OPW HSE
Environmental receptors	Details of architectural heritage, national monuments and environmentally designated areas (SAC, SPA, NHA)	NAH DEHLG NPWS
FEM FRAM report	Details of the study carried out in Fingal East Meath.	OPW
Dodder CFRAMS	Details of the study carried in Dodder catchment in Dublin.	Dublin City Council
Irish Coastal Protection Strategy	Details of the coastal study carried out along the Irish coast line.	OPW

RPS also downloaded and reviewed all relevant historical flood reports from www.floodmaps.ie that is all recorded reports of flooding within the defined development boundaries of the locations identified in Table 1.1, in order to check the accuracy of the automated database analysis process used in the PFRA study. By this means any “gross errors” in the identification of historic flood risk during the PFRA process due to the non-unique nature of town/asset names or the inclusion of reports of out of town flooding instances were detected.

After these initial screening tasks were completed RPS prepared a series of maps at appropriate local scales illustrating the PFRA predictive extreme flood outline (0.1% AEP), development area boundaries (produced by amalgamating various individual development zone polygons centred around each FRR centroid) and other relevant information for each Probable and Possible Area for Further Assessment in preparation for subsequent site inspections and consultation meetings. Web-based mapping tools such as Google maps and Bing maps were also used to establish access routes and identify salient features prior to site inspections being undertaken.

Finally RPS ranked the various areas in terms of their perceived certainty i.e. areas with very high FRI scores backed up with proven records of flooding having occurred were given a lesser priority for site inspection than other areas where the demarcation between Possible and Probable AFA was less certain. This prioritisation exercise also took account of certain watercourses being defined as High Priority Watercourses (HPW) in the project brief and thus automatically being subject to detailed assessment under the ECFRAMS irrespective of the findings of the flood risk review. For example many of the watercourses within Dublin City have been specified as HPWs and consequently where AFAs were affected by these watercourses only limited site inspections were undertaken. Similarly detailed site inspections were not completed in some of the coastal AFAs as RPS already had knowledge of the coastal flood risk to many of these areas through their work on the Irish Coastal Protection Strategy Study.

2.3 DATA COLLECTION

2.3.1 Local Authority Consultation

Although all Local Authorities had been consulted during the PFRA process, many at least twice, the feedback recorded in the PFRA database was insufficient for RPS to fully correlate all reported flooding incidents (both those contained on www.floodmaps.ie and those identified during the PFRA consultation process) with the Probable and Possible AFA centroids specified in the project brief. Thus it was decided that in conjunction with undertaking any site inspections RPS would contact the various Local Authorities within which the identified Probable and Possible AFAs for the Eastern CFRAM Study lay to try and obtain more detail on known flooding problems.

Initial contact with the Local Authorities was made at Director or Senior level, who were offered a meeting or presentation to introduce the project and asked to provide contact details for the more detailed consultation on flooding history. The presentation offers were declined but contacts, generally at Area Engineer level were established thus enabling follow up consultation to proceed. The subsequent detailed consultations took the form of a combination of face to face meetings, telephone conversations' and e-mail exchanges however in every case any discussion was preceded by the issue of the mapping developed from the PFRA datasets.

Prioritisation of the Local Authority visits/consultations was on the basis of the number of risk review areas within the Local Authority boundary but availability of nominated representatives was also taken into account in developing the schedule. The purpose of the series of consultations was primarily to obtain any additional information that would inform the RPS site inspections. The following points were discussed with the Local Authorities:

1. evidence of any reported flood risk
2. details of any works undertaken
3. details of any maintained defences
4. any additional areas for consideration as possible AFAs.

A combined visit to site was also offered where no documented evidence of flooding could be provided and it was considered necessary by the Local Authority representative. A summary of the relevant Local Authority comments on each Probable or Possible Area for Further Assessment listed in Table 1.1 is included on the site inspection reports contained in Appendix A.

One Local Authority made available results of further flood risk mapping procured to inform the preparation of their development plans. This information was reviewed and considered for use in the ECFRAMS flood risk review, however as this was of a similar strategic nature to the PFRA predictive

mapping and was not consistently available over all of the study area a conscious decision was made not to use this data further in this review.

During consultation with the Local Authorities additional areas were identified for possible further assessment. These areas are presented in table 4.3 .

2.3.2 Site Inspections

RPS undertook a programme of site inspections between June and September 2011 with the purpose of ground truthing the outputs of the PFRA and where possible the important input datasets to the PFRA. During these inspections the following information was targeted for collection:

1. Size of river (channel width/depth)
2. Nature of channel and floodplain vegetation
3. Presence of any hydraulic structures (type, potential for blockage, location)
4. Condition of channel (eroded, armoured, vegetated)
5. Presence of flood defences (type, location)
6. Locations of properties relative to channel (type, position)
7. Nature of flood plain (wide, constrained)
8. Nature of flow (steep, meandering, etc)
9. Evidence of flooding (Wrack levels, temporary protection measures etc)
10. Presence of non-domestic or vulnerable receptors, including strategic infrastructure, schools, health care facilities and nursing homes.

During the site inspections any gross errors in the PFRA predictive mapping were also noted (e.g. where outlines followed railway cuttings or other linear features rather than river courses, or where topography was not commensurate with the indicated flood extent). Particular emphasis was paid to two key elements during the site inspections as these were considered to potentially have the most significant impact on the outcome of the PFRA process, namely:

1. assessing the accuracy of the PFRA assumption that the in bank flow capacity of the watercourse channel was equivalent to Q_{med} and consequently all flows greater than this would contribute to flooding;
2. confirming the presence or otherwise of non-domestic receptors and particularly vulnerable receptors within the PFRA predictive mappings.

A project specific site inspection report form as illustrated in Table 2.2 was developed for the site inspections both to facilitate recording of pertinent information and also to act as a prompt to those undertaking the Flood Risk Review site inspections. A full set of completed site inspection report forms for all of the locations reviewed is included in Appendix A.

Table 2.2 ECFRAMS Flood Risk Review Site Inspection Pro-forma

Name:	County:	Unique ID:	PFRA Status:
<u>PFRA Review</u>			
Reason for inclusion in OPW database:			
Historical Analysis			
Historical Risk (0-4):		Historical Hazard (0-4):	
Number of flood report locations on floodmaps.ie:		Closest searchable town on floodmaps.ie:	
LA comments confirm flood risk?:			
Predictive Analysis			
Predictive mapping indicates flooding?:		Flood Risk Index:	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4):		Historical Validation Hazard (0-4):	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?:			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments:			
<u>Summary of Site Inspection</u>			
Site inspection observations:			
Size of river ¹ :		Channel vegetation:	
Channel condition ² : -		Structures ³ :	
Flood defences ⁴ :		Nature of flow ⁵ :	
Nature of floodplain ⁶ :		Floodplain vegetation:	
Properties ⁷ :		Evidence of flooding ⁸ :	
Photographs:			

¹ Width and depth² Erosion/armoured/sedimentation³ Type/location/potential for blockages⁴ Type/location⁵ Steep/meandering/etc⁶ Wide/constricted⁷ Type/location⁸ Wrack levels/temporary protection measures

2.3.3 Consultation with OPW Regional Drainage Maintenance Staff

In addition to consulting with the Local Authorities to obtain more details of the flooding history at the various locations, over and above that documented in the PFRA database, RPS also undertook a similar exercise with OPW Regional Engineers with specific knowledge of the Eastern CFRAM Study area. Again the OPW Regional Engineers had been consulted during the PFRA process and the purpose of the RPS consultation was primarily to enable the OPW Regional Engineers to review the proposed recommendations for each location. Following initial contact the OPW Regional Engineers expressed a preference for a single workshop to provide input to the flood risk review. Consequently RPS attended a meeting on 28th July 2011 and presented the mapping, photography, initial site inspection findings and Local Authority comments for each Probable and Possible Area for Further Assessment. The OPW Regional Engineers were then invited to comment on the information presented and submit any additional information which they possessed. A summary of the information gained through the discussions with the OPW Regional Engineers is contained in Appendix B.

2.3.4 Vulnerability of Environmental Receptors

RPS commenced their assessment of flood risk to environmental receptors by undertaking a GIS exercise to map all environmental assets within the various available PFRA predictive mapping and in the case of large spatial assets the percentage of the asset within the 0.1%AEP flood zone. This provided an indication of the likely significance of fluvial and tidal flooding in terms of environmental receptors within the Eastern CFRAM Study area. A similar exercise was also undertaken by OPW and receptor vulnerability criteria used to score each asset and calculate a corresponding Flood Risk Index. The results of the OPW assessment of the flood hazard to environmental receptors, contained in Appendix D indicate three Natura 2000 sites within the ECFRAMS area to have made the criteria for consideration as Probable AFAs. The sites with an environmental flood risk index (FRI) score of greater than 250 are the Lambay Island SPA, the Rye Water Valley/Carton SAC and the North Dublin Bay SAC the locations of which are shown in Figure 2.1. Two further Natura 2000 sites within the ECFRAMS area were identified as having sufficient FRI scores to be identified as a Possible AFA, the Rogerstown Estuary SAC and the Malahide Estuary SAC, the locations of which are shown in Figure 2.2.



Figure 2.1 Natura 2000 sites qualifying as Probable AFAs within the ECFRAMS area

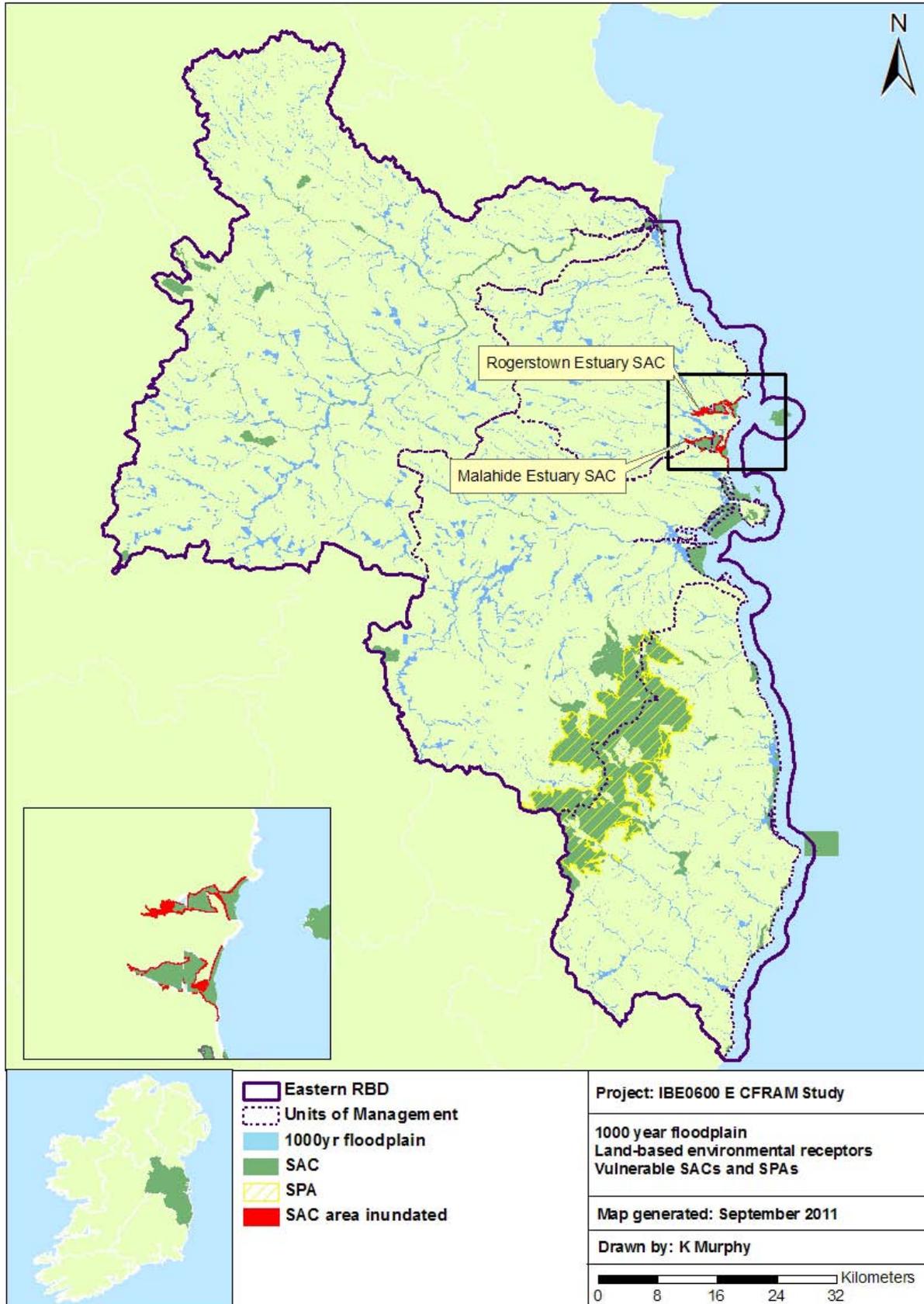


Figure 2.2 Natura 2000 sites qualifying as Possible AFAs within the ECFRAMS area

2.3.5 Flood Risk Review

Following completion of the site inspections and further data collection exercises RPS undertook a review of the various findings with the aim of defining;

1. Those areas which could be confirmed as Areas for Further Assessment (AFAs);
2. Those Probable and Possible AFAs identified during the PFRA process that are not to be taken forward for further assessment
3. And any additional towns/assets raised as potential AFAs during the consultations.

To inform these decisions a semi-quantitative approach was adopted to determine a modified flood risk index (FRI) score based on the ground truthing of receptors and PFRA predictive mapping. By this approach the FRI score was modified to account for removal or introduction of receptors to the flood risk zone either as a result of reclassification of receptors or re-definition of the flood mapping outlines. The FRI threshold for the decision as to whether an area should be classed as an Area for Further Assessment, remained unaltered from that taken for the PFRA.

2.3.5.1 Change in Receptors: If a school or similar facility within the PFRA predictive mapping was observed to be abandoned for a new facility located outside the floodplain the relevant receptor element of the FRI scoring was reduced accordingly. Similarly if the site inspection revealed that multi residency addresses have contributed significantly to the FRI scoring this was amended to account for only those properties directly affected by floodwaters resulting in a lower modified receptor score. Conversely where new receptors or more vulnerable receptors were identified during the site inspections these were added to the calculation and the FRI scoring increased accordingly.

2.3.5.2 Amended PFRA Predictive Mapping: Originally RPS had intended to undertake additional broad scale modelling to refine the predicted flood mapping where the site inspections had indicated “gross errors” in the depiction of the flood hazard. However due to the compressed timescale available for completion of the flood risk review this was not possible. Consequently RPS adopted a simplified approach whereby gross errors in the shape of the PFRA predictive mapping observed during the site inspections were noted and revised FRI scores calculated by excluding the affected assets. In cases where the channel capacity was considered to be more than Q_{med} a simplified 1-Dimensional modelling approach was employed to assess the in-channel capacity using readily available or derivable data to confirm the likely change in flood hazard. This analysis was only undertaken at locations where significant numbers of receptors had been identified within the 10%AEP flood outline. Where out of channel flooding during a 10%AEP event was considered unlikely a revised FRI score was calculated by removing the contribution to the FRI score associated with all properties indicated to be situated within the 10%AEP PFRA predictive mapping.

In order to provide consistency with similar work being undertaken in other regions the final stage of the flood risk review involved presenting the draft recommendations to a meeting with the OPW management team and Progress Group for the Eastern CFRAM Study on 6th October 2011. Each recommendation was discussed, the underlying reasons for making the recommendations highlighted and the Local Authority representatives on the Progress Group invited to submit comments. In this way the OPW and representatives of the other organisations on the Progress Group with knowledge of more than one study area were able to provide input thus ensuring a consistent definition of “Areas for Further Assessment” was adopted and that an agreed set of recommendations were formulated for inclusion in this final report.

3 RESULTS OF THE FLOOD RISK REVIEW

The outcome of the flood risk review process for each of the locations listed in Table 1.1 and the justification for the decision reached is outlined in the following paragraphs. For ease of presentation locations are listed alphabetically in terms of Local Authority Area and location.

3.1 CAVAN

3.1.1 Mullagh

Mullagh was originally listed as a Probable Area for Further Assessment with a FRI score of 324. Local Authority comments indicated a potential for flooding due to large numbers of properties backing on to the river but could not confirm significant flooding history. The www.floodmaps.ie site contained one report of flooding at Main Street in Mullagh, however it is not clear what the source of this flooding was. The site inspection revealed the watercourse to be a small stream draining the nearby Mullagh Lough which appeared to be the headwaters of the catchment. The inspection confirmed that a significant number of properties are relatively low-lying in relation to the stream and that the general outline of the PFRA predictive mapping appears reasonable. At the time of the inspection there was very little flow in the stream while relatively nearby at Virginia the rivers were in spate. Conversations with locals during the site inspection did not establish any knowledge of flooding from the stream in the recent past. Due to the lack of any knowledge of previous flooding from the stream and the disparity between the potential flood extent indicated by the PFRA predictive mapping and the observed size of the stream it is recommended that **Mullagh is not considered an AFA.**

3.1.2 Virginia

Virginia was originally listed as a Possible Area for Further Assessment despite having a FRI score of 594. Examination of the PFRA database established that much of this score was associated with potential flood risk to dispersed properties out with the development limits of Virginia. The Local Authority advised that there was no known flooding history affecting either properties or the N3 at Virginia although agricultural land around Lough Ramor was known to flood. The site inspection confirmed the extent of the PFRA predictive mapping within Virginia to be quite accurate and indicated that between 12 and 19 residential properties lay within the likely flood plain. Thus a more reflective FRI score for Virginia would be circa 120-190 consequently **Virginia is not considered an AFA.**

3.2 DUBLIN CITY

3.2.1 Clontarf

Clontarf was originally listed as a Probable Area for Further Assessment with a FRI score of 796. The Irish Coastal Protection Strategy and knowledge of the site indicate that Clontarf is potentially at

significant risk from coastal flooding and it is therefore recommended that **Clontarf should be considered an AFA.**

3.2.2 Dublin City

Dublin City was originally identified as a Probable Area for Further Assessment with a FRI score of 604,059. Extensive anecdotal evidence and various previous studies confirm that many parts of Dublin City have experienced flooding during extreme events therefore it was considered extremely unlikely that the PFRA predictive mapping would be modified sufficiently to achieve a FRI score of <250 and hence it is recommended that **Dublin City is considered an AFA.** However closer examination of the extents of the flood risk within the Dublin City AFA, suggests that this AFA should be further sub-divided for future stages of the analysis along the line of hydraulic sub-catchments e.g. Dublin City (Liffey), Dublin City (Poddle), Dublin City (Camac).

3.2.3 Raheny

Raheny was originally listed as a Probable Area for Further Assessment with a FRI score of 2662. While there is a history of flooding at one of the roads in Raheny from the Santry River there has been no recorded flooding of properties. The lack of evidence of historical flooding questions whether the 10%AEP flood extent shown in the PFRA predictive mapping has overestimated the flood risk. A sensitivity analysis was carried out to assess the affect of removing the 10%AEP flood risk from the Raheny FRI calculation. The removal of all properties from the 10%AEP flood extent has the effect of reducing the FRI score by approximately a factor of 10 and under this scenario the FRI score would be reduced to 272.9. There is therefore enough damage accrued from within the predicted 1%AEP and 0.1%AEP flood extents at Raheny for the FRI score to remain greater than 250. It is therefore recommended that **Raheny should be considered an AFA.**

3.2.4 Santry

Santry was originally listed as a Probable Area for Further Assessment with a FRI score of 1060. The indication of properties at risk in Santry Close by the predictive mapping is supported by historical flood records and looks to be reasonable. Downstream of the M50 there are no records of previous flooding incidents and some of the properties are situated high above the river, namely at Woodlawn Crescent and the apartments at The Park. However the fact that the river channel is relatively deep and that the green corridor that it flows through would provide flood storage makes it difficult to estimate by how much the PFRA predictive mapping extents might be reduced. However even assuming all these properties can be removed from the 10%AEP flood extent the FRI score would only be reduced from 1060.2 to 311.8 which remains above the 250 threshold. It is therefore recommended that **Santry should be considered an AFA**

3.3 DUNLAOGHAIRE-RATHDOWN

3.3.1 ESB Blackrock

An ESB sub-station at Blackrock was identified as an Individual Risk Receptor with a FRI score of 342. Site inspection confirmed that the Blackrock ESB HV station is located adjacent to the coast and examination of the output of the Irish Coastal Protection Strategy indicates the ESB station to lie within the undefended coastal 0.5% AEP floodplain. Consequently there is a potential flood risk to this station and ESB should be notified however as this is a single asset it is recommended that **Blackrock should not be considered an AFA.**

3.3.2 Loughlinstown

Loughlinstown was originally listed as a Probable Area for Further Assessment with a FRI score of 4660. Site inspection has revealed that many of the watercourses within Loughlinstown are culverted and thus the flood risk is likely to be less than indicated in the PFRA predictive mapping, which assumes open watercourses throughout. However there are still extensive lengths of open watercourse within Loughlinstown and while the site inspections have shown some of the flow paths assumed in the PFRA modelling to be incorrect it is unlikely that modification to the PFRA predictive mapping would reduce the FRI score to less than 250. Consequently it is recommended that **Loughlinstown should be considered an AFA.**

3.3.3 Old Connaught/Wilford

The Old Connaught/Wilford area was added to the list of Possible Areas for Further Assessment in a tender clarification following a request by the Local Authority. No FRI score or further details of the Local Authority comments were available in the PFRA database. Examination of the available datasets and initial site inspection indicated that the watercourse flowing through the Wilford area was incorrectly incorporated within the Bray catchment during the PFRA process. (The modelled watercourse linking to the River Dargle does not exist, the Crinken/Woodford stream running through Wilford actually enters the sea some distance north of the Dargle.) Further information obtained from Dunlaoghaire Rathdown Co Co indicates the previous flooding incidents at Wilford to be restricted to two locations on the Crinken Stream. However this flooding is believed to have been related to blockages within the stream rather than a lack of conveyance capacity within the natural stream channel. Analysis of the PFRA predictive mapping for this area indicates that 6-9 residential properties and a school lie within its 10%AEP flood extent, thus **Wilford should be considered an AFA.**

Within Old Connaught recorded flooding has been reported in lands to the rear of properties along Old Connaught Avenue upstream of a culvert which it is believed flows beneath some of these properties. Examination on site confirmed the presence of an open water course upstream of these properties and observed some features which may be indicative of flood relief immediately upstream of the indicated location of the culvert. However only around 6 properties were considered to be likely to be

affected by flooding from this source therefore the FRI score would be less than 250 and hence **Old Connaught should not be considered an AFA.**

3.3.4 Shankill (Crinken)

Shankill was added to the list of possible Areas for Further Assessment in a tender clarification following a request by the Local Authority. No FRI score or further details of the local authority comments were found in the PFRA database. Examination of available datasets and site inspection has failed to identify any open watercourses within the Shankill area therefore it is unclear why this area was put forward for flood risk review. Further discussions with Dunlaoghaire Rathdown Co Co have established that the particular area of interest in Shankill is around New Vale and that Crinken is the same area as Wilford. A further site inspection at Shankill did not identify any open watercourses in the New Vale area and discussions with RPS staff involved in the Greater Dublin Strategic Drainage Study established that the flooding at New Vale is related to out of sewer flooding. Consequently it is recommended that **Shankill should not be considered an AFA.**

3.4 FINGAL

3.4.1 Balrothery

Balrothery was originally listed as a Possible Area for Further Assessment with a FRI score of 2730 due principally to the PFRA predictive mapping indicating significant flood risk to a large residential home. No history of flooding was reported by the Local Authority or OPW Regional Engineers, nor was any evidence of flooding observed at this location during the site inspection. Subsequent enquiries revealed that the watercourse in question, the Bracken Stream, had been modelled during the FEM FRAMS and the more detailed flood maps available from this source indicated the site of the residential home to be unaffected. Consequently **Balrothery is not considered to be an AFA.**

3.4.2 Bloody Stream (Howth)

The Bloody Stream at Howth was suggested for inclusion in the ECFRAM study during the flood risk review process by Fingal Co Co due to reported on-going flooding issues. Review of previous reports etc. indicates that the principal flooding problem is associated with a manhole on a culvert located within the basement of the Bloody Stream Pub. Site inspection, review of previous studies, and local knowledge of other RPS staff indicates that the flooding at this location is most likely associated with a separate parallel watercourse to the Bloody Stream. Given the number of properties known to be affected by the flooding from the Bloody Stream and the secondary parallel watercourse it is extremely unlikely that the FRI score associated with this source of flood risk would exceed 250 consequently it is recommended that **the Bloody Stream area should not be considered an AFA.**

3.4.3 NUR Luttrells

The residential home at Luttrells was originally identified as an Individual Risk Receptor for inclusion in the Flood Risk Review with a FRI score of 2520. No knowledge of flooding at this location was reported by either the Local Authority or OPW Regional Engineers. The site inspection confirmed the site to be located on the inside of a bend in the Ward River however no visible evidence of any flooding was observed. Enquires following the site inspection established that this part of the Ward River was modelled during the FEM FRAMS and the more detailed flood maps arising from this assessment indicated only the 0.1% AEP event to affect the site. Consequently when the FRI score is adjusted to reflect the reduced flood risk **Luttrells should not be considered an AFA.**

3.4.4 Santry Demesne

Santry Demesne was originally listed as a Possible Area for Further Assessment with a FRI score of 2,990. The PFRA predictive mapping at Santry Demesne looks to be incorrect as large spikes protrude from the flood extent which if removed would reduce the FRI score significantly. The 10%AEP, 1%AEP, and 0.1%AEP flood extents are also exactly the same which further indicates potential unreliability in the results of the PFRA predictive mapping. Santry Demesne is located along the Santry River, which is contained within a relatively deep green corridor and all of the properties shown to be at risk by the PFRA predictive mapping are well raised above the normal river level and are unlikely to be at risk in reality. Consequently the FRI score is likely to be reduced to near 0 and therefore **Santry Demesne should not be considered an AFA.**

3.4.5 Sutton & Baldoyle

Sutton & Baldoyle was originally listed as a Probable Area for Further Assessment with a FRI score of 3,484. The Irish Coastal Protection Strategy has indicated that these areas are at significant risk from coastal flooding which has been confirmed by site inspection. Based on the site inspection there is no obvious justification for reducing the FRI score, and since it would require a significant reduction to fall below the AFA threshold, it is therefore recommended that **Sutton and Baldoyle should be considered an AFA.**

3.4.6 Sutton & Howth North

Sutton & Howth was originally listed as a Probable Area for Further Assessment with a FRI score of 323. The Irish Coastal Protection Strategy has indicated that this area is at significant risk from coastal flooding as confirmed during the site inspection. Consequently there is no obvious justification for reducing the FRI score, and it is therefore recommended that **Sutton and Howth North should be considered an AFA.**

3.5 KILDARE

3.5.1 Ballymore Eustace

Ballymore Eustace was originally listed as a Possible Area for Further Assessment although no FRI score was recorded in the PFRA database. Review of the results of the predictive analysis and historical records did not reveal a significant flood hazard and it appears that this area was identified by the Local Authority as a result of the potential implications of a dam breach. The site inspection found most properties to be located on elevated sites above the river outside of the likely normal floodplain, confirming the results of the predictive and historic assessment. It was also observed that the flow in the Liffey at Ballymore Eustace is controlled by the ESB dams upstream and therefore the greatest flood risk to this location was confirmed to be from a dam breach rather than natural out of bank flooding. Consequently **Ballymore Eustace is not considered to be an AFA.**

3.5.2 Blacktrench

Blacktrench was originally listed as a Possible Area for Further Assessment with a FRI score of 270, principally attributable to the PFRA predictive mapping prepared by OPW indicating 26 properties to lie within the 10%AEP floodplain generating a FRI score of 260. The flood extents for the 10%AEP, 1%AEP and 0.1%AEP events are identical which suggests a degree of inaccuracy in the PFRA predictive mapping. The predicted flood outlines also do not appear to be commensurate with the contours of the ground as depicted on OS mapping and observed during the site inspection. (During the site inspection it was noted that the ground to the south of the main road rises and therefore would not flood during the lower return period events). There are 11 properties within this area and if these are removed from the 10%AEP floodplain in the FRI analysis the score is reduced to 150. Neither the Local Authority nor OPW Regional Engineers reported any knowledge of a history of flooding at Blacktrench, although www.floodmaps.ie reports low lying areas to flood after heavy rain (the site inspection observations tend to support this). Consequently although there appears to be a flood hazard, **Blacktrench is not considered to be an AFA.**

3.5.3 Carragh

Carragh was originally listed as a Possible Area for Further Assessment with a FRI score of 151.6. Local Authority comments and www.floodmaps.ie have highlighted that flooding does occur at the upstream extent of Carragh near the road bridge. However no evidence of additional flood risk was noted during the site inspection. Thus although the Local Authority and OPW Regional Engineers comments confirm the existence of a flood risk, this is not considered significant in the national context and consequently **Carragh is not considered to be an AFA.**

3.5.4 Celbridge

Celbridge was originally listed as a Probable Area for Further Assessment with a FRI score of 5654. The historical records of the Liffey having flooded at Celbridge and affected properties was confirmed by both the Local Authority and OPW Regional Engineers. The PFRA predictive mapping indicates extensive flooding and nothing was noted during the site inspection to contradict this. It is therefore recommended that **Celbridge is considered an AFA.**

3.5.5 Clane

Clane was originally listed as a Probable Area for Further Assessment with a FRI score of over 7000. All sources of information (Local Authority, OPW Regional Engineers, PFRA predictive mapping and historical) confirm the existence of a flood risk at Clane. The PFRA assigns a FRI score of 7224 to Clane, however the majority of the flood damage appears to be associated with the Butterstream and there is some uncertainty over this risk for the following reasons;

A flood alleviation scheme has been carried out on the Butterstream,

The route of the Butterstream towards the downstream extent where it joins the Liffey has been incorrectly represented in the PFRA process, consequently the predictive flood mapping in this area are therefore likely to be incorrect,

The flood extent on the Butterstream links with another minor watercourse to the north which looks unrealistic. In other areas there is no difference in the 10%AEP, 1%AEP and 0.1%AEP flood extents which suggests inaccuracy in the PFRA predictive mapping process.

However even taking a conservative approach and excluding all areas of flooding where there are significant grounds to doubt the PFRA predictive mapping the revised FRI score remains greater than 500. Consequently it is recommended that **Clane is considered an AFA.**

3.5.6 Grange

Grange was originally listed as a Possible Area for Further Assessment although no FRI score or comments from either the Local Authority or OPW Regional Engineers were found within the PFRA database. No significant flood risk was observed at Grange during the site inspection nor is any significant flood risk indicated by the PFRA predictive mapping. Following discussions with OPW it appears that Grange, Co Kildare may have been identified in error and that the flood reports mentioned in the PFRA analysis actually relate to Grange, Co Sligo. Therefore **Grange Co Kildare is not an AFA.**

3.5.7 Johnstown Bridge

Johnstown Bridge was originally listed as a Probable Area for Further Assessment with a FRI score of 390, principally due to predicted flooding of a relatively recent housing development, Dunferth Park, located at the confluence of a minor watercourse and the River Blackwater. During the site inspection it was observed that neither of the channels associated with the watercourses looked natural and as a consequence the accuracy of the PFRA predictive mapping assumption of channel capacity being limited the Q_{med} was considered questionable. OPW Regional Engineers confirmed that both watercourses were subject to an OPW drainage scheme and can convey a greater flow than the Q_{med} . RPS therefore undertook a channel capacity assessment on the two watercourses at the housing estate which established that both watercourses can contain between the 10%AEP and 1%AEP flow. By removing the affected properties from the 10%AEP flood extent and recalculating the FRI score would be reduced from 390 to 121 which would be below the threshold for an AFA. However OPW policy is to ignore the impact of flood alleviation works in assessing the potential flood risk therefore **Johnstown Bridge should be considered an AFA.**

3.5.8 Johnstown

Johnstown was originally listed as a Possible Area for Further Assessment with a FRI score of 1890. There is a history of flooding at Johnstown, as depicted by the PFRA predictive mapping and review of flooding incident records on www.floodmaps.ie and confirmed in discussions with the Local Authority. An OPW funded flood alleviation scheme is currently under construction which will provide protection for up to 1%AEP flows in the Morell River however a residual risk will remain and therefore **Johnstown should be considered an AFA.** Further to this, section 3.5.20 details a recommendation for the Morell River catchment to be considered as a single AFA and consequently Johnstown would then lie within the Morell Catchment AFA.

3.5.9 Kilcock

Kilcock was originally listed as a Probable Area for Further Assessment due to the fact that a previous Flood Risk Study had been undertaken by the Local Authority. No FRI score was recorded in the PFRA database nor did the predictive mapping indicate a significant flood risk. Historical flood records for Kilcock on www.floodmaps.ie and OPW Regional Engineers have identified that the pub at The Square has flooded in the past. This suggests that the predictive flood mapping at this point on the Ryewater has been underestimated as the pub is shown to be outside the 0.1%AEP flood extent. Whilst it is unknown what size of event flooded the pub, OPW Regional Engineers have raised concerns about the potential flood risk to the whole of The Square area. The site inspection found that this area is very flat and looks low lying relative to the river, it is therefore considered reasonable to assume that there is a flood risk to this area. The OPW Regional Engineers also indicated a flood risk to houses at the downstream extent of Kilcock which again would suggest that the PFRA predictive mapping has been underestimated. Given the density of properties at these two locations it is

reasonable to assume that the FRI score should be greater than 250. Consequently it is recommended that **Kilcock should be considered an AFA.**

3.5.10 Kilcullen

Kilcullen was originally listed as a Possible Area for Further Assessment although no FRI score was available, despite the PFRA predictive mapping showing some properties to potentially be flooded. Historical records from www.floodmaps.ie indicate that the Bank on the downstream side of the bridge was flooded in 1993. However the properties shown to be flooded by the PFRA predictive mapping look to be well raised and therefore generates some doubt as to its accuracy. Similarly neither the Local Authority nor the OPW Regional Engineers had any knowledge of flooding having occurred in Kilcullen. An intermediate channel capacity assessment of the Liffey at Kilcullen indicates that the existing “natural” channel can almost contain the 1%AEP flow and while the analysis method employed is very approximate it does give an indication that the 10%AEP flow is likely to be contained within the channel. The historical records support this as the 1993 flood would have been of larger magnitude than a 10%AEP event and it only flooded one property, mainly in the basement. Even being conservative and including the properties downstream of the bridge that are shown in the 10%AEP flood extent the revised FRI score would be 75.4. Consequently it is recommended that **Kilcullen should not be considered an AFA.**

3.5.11 Kill

Kill was originally listed as a Possible Area for Further Assessment with a FRI score of 255. The PFRA predictive mapping outputs are generally supported by the historical flood information provided on www.floodmaps.ie. Kildare Co Co has identified the principal flooding risk in Kill to be associated with undersized culverts. The PFRA predictive mapping at the downstream limit looks to be inaccurate as the 10%AEP, 1%AEP and 0.1%AEP flood outlines are the exact same and contain three properties which if they were excluded from the FRI score would drop it to 225. So although there seems to be flood risk at Kill it is not considered significant enough in a national context for Kill to be classed as an AFA in its own right. It is therefore recommended that **Kill should not be considered an AFA.** The Kill River which flows through Kill is a tributary of the Morell River and if the recommendation in section 3.5.20 for the adoption of a Morell River AFA is accepted should be designated as a high priority watercourse. If this is the case then the flood risk to Kill will be considered as part of the assessment for a Morell catchment AFA.

3.5.12 Leixlip

Leixlip was originally listed as a Probable Area for Further Assessment with a FRI score of 27,157. PFRA predictive mapping shows extensive flooding to Leixlip from the River Liffey and Ryewater. The Local Authority identified the Ryewater as the main source of flood risk and confirmed that Leixlip has flooded in the past and that a minor works scheme has been carried out on one of the minor watercourses. There was nothing noted from the site inspection to contradict the PFRA analysis and

given that the FRI score is 27,156 it would be extremely unlikely that it could drop to below 250. It is therefore recommended that **Leixlip should be considered an AFA.**

3.5.13 ESB Longstone

Longstone is an ESB power station on the River Liffey located just upstream of Ballymore Eustace and was originally listed as an Individual Risk Receptor. The River Liffey flows adjacent to this station but flows are regulated by both the dam at Longstone and the Pollaphuca dam further upstream. Due to the managed nature of the river flow at this location flooding from the river is not considered to be a significant flood risk to this station the principal risk is from a dam breach. It is therefore recommended that **Longstone should not be considered an AFA.**

3.5.14 Maynooth

Maynooth was originally listed as a Probable Area for Further Assessment with a FRI score of 2,299. The PFRA predictive mapping shows extensive flooding to Maynooth, which is confirmed by historic records. The historical evidence and information provided by the Local Authority indicate that additional properties beyond what is identified in the PFRA predictive mapping have flooded and there was nothing noted during the site inspection to contradict this. It is therefore recommended that **Maynooth should be considered an AFA.**

3.5.15 Naas

Naas was originally listed as a Probable Area for Further Assessment with a FRI score of 3,364. The PFRA predictive mapping shows significant flooding to Naas which is supported by historic evidence. A canal feeder stream flowing through Naas has been identified by the Local Authority give rise to a significant flood risk. From the site inspection it was found that the culvert this stream flows through before entering the canal is undersized and looks prone to blockages causing flows to impact on the Limerick Road area. This stream was not modelled as part of the PFRA process and it is therefore likely that the FRI score for Naas should if anything be increased. It is therefore recommended that **Naas should be considered an AFA.**

3.5.16 Newbridge

Newbridge was originally listed as a Probable Area for Further Assessment with a FRI score of 2,109. The PFRA predictive mapping shows significant flooding within Newbridge which is supported by historical flooding information. The Local Authority identified two areas which had experienced flood damage in the past. One area is affected by flooding from a tributary to the Liffey and the other is adjacent to the Liffey. The site inspection confirmed that the PFRA predictive mapping looks reasonable and given that the original FRI score was 2109 it is unlikely that minor changes to flood extents would drop this to less than 250. It is therefore recommended that **Newbridge should be considered an AFA.**

3.5.17 Roestown

Roestown was originally listed as a Possible Area for Further Assessment due to Local Authority comments on a potential flood risk to the M4/N4, although no FRI score was recorded in the PFRA database. Discussion with the Local Authority and the site inspection confirmed the observations of the desk top assessment that there is no community at risk. The M4 may be at risk but this alone is not considered significant enough to justify the inclusion of Roestown as an AFA. It is therefore recommended that **Roestown should not be considered an AFA.**

3.5.18 Sallins

Sallins was originally listed as a Possible Area for Further Assessment although no FRI score was recorded within the PFRA database nor are any supporting comments from the Local Authority or OPW Regional Engineers. The PFRA predictive mapping and the site inspection indicate that there is a relatively low flood risk to Sallins from the Liffey. The main flood risk is from a canal feeder stream which was not modelled as part of the PFRA and a scheme to alleviate this flood risk has commenced. The scheme has not yet finished and at the time of our visit appeared to have been put on hold, this observation was subsequently confirmed by OPW Regional Engineers. This stream has flooded properties in the past, OPW Regional Engineers indicated that approximately 70 apartments were affected, and until the scheme is complete the flood risk remains. It is not known what size of flood event affected the apartments but it does not appear unreasonable that 25 properties or more could be affected during a 10%AEP flood event which would therefore qualify Sallins to be an AFA. It is therefore recommended that **Sallins should be considered an AFA.**

3.5.19 Straffan

Straffan was originally listed as a Possible Area for Further Assessment with a FRI score of 154. The historical flooding at Straffan is from surface water ponding and the Local Authority and OPW Regional Engineers have no knowledge of any watercourse causing flooding to properties. The PFRA predictive mapping, which may be an overestimate, does not indicate enough flooding to qualify it to be an AFA. It is therefore recommended that **Straffan should not be considered an AFA.**

3.5.20 Turnings

The Turnings area was originally listed as a Possible Area for Further Assessment with a FRI score of 463. The Local Authority confirmed that flooding has occurred in Turnings which has affected properties although these properties are situated outside the PFRA predictive mapping extents which may suggest that the FRI score could increase. The Turnings review area is quite expansive and there is a lot of uncertainty associated with it. In parts of the Turnings review area the 10%AEP, 1%AEP and 0.1%AEP extents are exactly the same, suggesting that the PFRA predictive mapping may be inaccurate. However given that the Morell River has a history of flooding, that properties have flooded in the past, that OPW has carried out a small scheme in the Turnings area and that the FRI score is

463.1 it can be assumed that there is a significant flood risk. Further to this both Kildare County Council and OPW regional engineering staff have identified the full Morell catchment, of which the Turnings area is part, as an area of significant flood risk. There is a known recurring flood risk from the Morell River and associated tributaries that has flooded properties outside the Turnings area in the past. It is therefore recommended that the Morell River and its tributaries, the Painestown River, Slane River, Kill River and Hartwell River, be considered for designation as high priority watercourses and that the Turnings AFA be expanded to consider the full Morell catchment and consequently it is recommended that the **Morell catchment should be considered an AFA.**

3.6 LOUTH

3.6.1 Baltray

Baltray was originally listed as a Probable Area for Further Assessment with a FRI score of 323. There is a known history of significant tidal flooding at Baltray and as a consequence the Local Authority has constructed a flood defence consisting of flood walls and earth embankments. However as with any flood alleviation scheme there will be an associated residual flood risk and as such it is recommended that **Baltray should be considered an AFA.**

3.6.2 Drogheda

Drogheda was originally listed as a Probable Area for Further Assessment with a FRI score of 6,917. There is a well proven history of flooding from the River Boyne and associated tributaries within Drogheda with www.floodmaps.ie recording many recurring flood areas. Both the Local Authority and OPW Regional Engineers agree that there is a significant flood risk to Drogheda and the relatively high FRI score reaffirms this potential flood risk. It is therefore recommended that **Drogheda should be considered an AFA.**

3.6.3 Tullyallen

Tullyallen was originally listed as a Possible Area for Further Assessment with a FRI score of 372. Although there is one recorded incident of previous flooding this was associated with a bank slip blocking the stream which has been rectified and is no longer a risk. The predictive mapping produced by the PFRA process shows significant flooding through Tullyallen although in parts the flood extent is the same for the 10%AEP, 1%AEP and 0.1%AEP flood events which suggests some inaccuracy in the model. Out of bank flooding is first predicted to occur at Townley Manor in Tullyallen, where this is shown to occur the stream is culverted and thus it is unlikely that flooding could occur. Further downstream the channel deepens which is likely to keep the flood risk low. The fact that the only known record of flooding in Tullyallen was associated with the bank slippage mentioned previously gives confidence that no flooding would occur during a 10%AEP event. By removing the FRI values associated with flooding during the 10%AEP flood event the overall FRI

score for Tullyallen is reduced from 372 to 132. It is therefore recommended that **Tullyallen should not be considered an AFA.**

3.7 MEATH

3.7.1 Athboy

Athboy was originally listed as a Probable Area for Further Assessment with a FRI score of 293, the majority of which was attributable to predicted flooding of apartments on the former mill site. The floor levels in the apartments in question look high compared to the river and out of bank flooding would occur in the timber yard on the Right Hand Bank first. Neither the Local Authority nor the OPW Regional Engineers have any knowledge of flooding to the apartments and www.floodmaps.ie holds no records. It is considered likely that the Athboy River has experienced a 10%AEP flow or greater since the apartments were constructed which if it had caused flooding would have been brought to the attention of the OPW Regional Engineers or Local Authority. Consequently a channel capacity check was carried out for the Athboy River at the apartments and the results indicate that the channel capacity is approximately equal to the 1%AEP flow and although this method is relatively inaccurate it does provide a good indication that the 10%AEP flow can be conveyed within the channel of the Athboy River without any flooding occurring. By removing the 10% AEP flood risk to the apartments from the FRI score calculation the revised FRI score would be 68.1. However as the increased channel capacity at Athboy is the result of Arterial Drainage works undertaken previously by the OPW, which can effectively be considered a flood alleviation measure it is recommended the **Athboy should be considered an AFA.**

3.7.2 Ballivor

Ballivor was originally listed as a Probable Area for Further Assessment with a FRI score of 940. During the site inspection it was noted that the predicted flood extent at Ballivor looks to be more extensive than would be expected given the size of channel and that there may be inaccuracies in the analysis due to the angular outline of the 10%AEP, 1%AEP and 0.1%AEP flood extents. OPW Regional Engineers confirmed that this river is maintained by OPW and was subject to a drainage scheme and is therefore likely to convey a flow greater than Q_{med} . A channel capacity assessment was carried out where out of bank flooding is the most significant (adjacent to the former primary school) and the results show that the channel capacity lies between the 10%AEP and 1%AEP flows. By removing the 10%AEP flood extent around this area and recalculating the FRI the score would be reduced from 940 to 115. The site inspection also identified that a new Primary School had been constructed outside the PFRA predictive mapping extents and that the former school was abandoned. If the FRI score is only modified to account for the relocation of the primary school i.e. the flood mitigation benefit associated with the Arterial Drainage works is ignored, then the revised FRI score is 690. It is therefore recommended that **Ballivor should be considered an AFA.**

3.7.3 N2 Balrath

The N2 road at Balrath was originally included as an Individual Risk Receptor in the flood risk review although no FRI score was given. The River Nanny at this point was modelled as part of the FEM FRAM study and the results show the road is at risk during the 0.1%AEP flood event only. The model used in the FEM FRAM study is considered to be significantly more accurate than that used for the PFRA analysis and should therefore be given more credence in the risk review. **Balrath is therefore not an AFA.**

3.7.4 ESB Grangeageeth

The ESB sub-station at Grangeageeth was originally identified as an Individual Risk receptor for inclusion in the flood risk review with a FRI score of 2,550. The evidence on the ground suggests that this ESB facility is at risk of flooding (a road closed flooding sign was observed at the site, as was some debris caught in the site fence). The PFRA predictive mapping shows the same extents for the 10%AEP, 1%AEP & 0.1%AEP events suggesting some modelling inaccuracy at this location. Therefore although the river is predicted to flood at this location the extent of flooding may not be as the PFRA predictive mapping shows. It is therefore recommended that ESB be advised of possible flood risk but that the **ESB sub-station at Grangeageeth is not an AFA.**

3.7.5 SCH Kilbride

Kilbride Primary School was originally listed as an Individual Risk Receptor for inclusion in the flood risk review with a FRI score of 265, due primarily to the PFRA predictive mapping indicating the primary school to fall within its 10%AEP flood extent. The Local Authority had no knowledge of a flooding history at this site but could not confirm that it had never flooded nor are there any records on www.floodmaps.ie. The site inspection confirmed that the Ward River runs along the boundary of the primary school site, and established that the flood plains on both sides of the watercourse are quite flat. It was also observed that the channel appeared to have been modified i.e. the channel section appeared trapezoidal which may indicate greater capacity than the PFRA assumed Q_{med} . Review of the draft outputs of the FEM FRAMS indicates that this stretch of the Ward River was not modelled therefore no more detailed flood outlines are available at present. On balance it is likely that the school is subject to some degree of flood hazard, however given that the flood risk is primarily associated with a single receptor it is likely that this could be dealt with through the minor works procedure and consequently it is suggested that **Kilbride Primary School is not an AFA.**

3.7.6 Kildalkey

Kildalkey was originally listed as a Possible Area for Further Assessment with a FRI score of 157. There is no reported history of flooding in Kildalkey and the stream flowing through Kildalkey is culverted making it likely that the PFRA predictive mapping extents and therefore the FRI score should be reduced. It is therefore recommended that **Kildalkey should not be considered an AFA.**

3.7.7 Kilmessan

Kilmessan was originally listed as a Probable Area for Further Assessment with a FRI score of 405. The site inspection to Kilmessan has found that during the PFRA process a disused millrace had erroneously been taken as the primary channel of the Skane River through Kilmessan to the exclusion of the actual route of the Skane river channel. The millrace has been in-filled in parts and consequently does not represent a continuous flow channel. Inspection of the actual route of the Skane River established that the majority of properties are located on relatively elevated sites and are therefore not considered to be subject to a significant flood hazard. Neither OPW Regional Engineers nor the Local Authority had any knowledge of flooding in the area despite a large event having occurred in 2002 giving confidence in the perceived lack of flood risk. In order to illustrate the likely effect of the reduced flood hazard associated with adopting the correct route for the Skane River the properties located within the 10%AEP flood extent were excluded from the FRI calculation, with the result that the overall FRI was reduced from 405.2 to 58.7. It is therefore recommended that **Kilmessan should not be considered an AFA.**

3.7.8 Longwood

Longwood was originally included as a Possible Area for Further Assessment, due to perceived high flood risk reported by both the Local Authority and OPW Regional Engineers. No FRI score was available from the PFRA database as the minor stream affecting Longwood was not modelled as part of the PFRA process. The channel of the minor watercourse has been subject to arterial drainage works and is estimated by OPW Regional Engineers to have a 33%AEP capacity. During the site inspection it was also noted that there are a number of undersized culverts through agricultural accommodation bridges along this watercourse. The principal flood risk from this stream is to the housing estate upstream of the new school. Although this stream has not been modelled it is estimated from the information available that these properties would be at risk during a 10%AEP flood event. This could potentially affect over 30 properties which would give a FRI score of over 300. It is therefore recommended that **Longwood should be considered an AFA.**

3.7.9 Mornington

Mornington was originally listed as a Probable Area for Further Assessment due to the fact that the OPW is presently constructing a major flood relief scheme. No FRI score was available in the PFRA database. RPS has previously prepared a flood risk study for Mornington on behalf of the OPW that proved there was a significant flood risk at Mornington and justified the flood alleviation scheme presently under construction. It is therefore recommended that **Mornington should be an AFA.**

3.7.10 Navan

Navan was originally listed as a Probable Area for Further Assessment with a FRI score of 3,670. Predictive and historical data both show Navan to be at risk and this has been confirmed by the Local

Authority and OPW Regional Engineers. The PFRA predictive mapping for Navan appears reasonable therefore it is unlikely that the FRI score could be reduced to below 250. Consequently it is recommended that **Navan should be considered an AFA.**

3.7.11 ESB Randalstown

The flood risk at Randalstown is associated with an ESB sub-station adjacent to a small watercourse and in the vicinity of a large tailings dam. No evidence was found to rule out a flood risk to this site however in isolation it would not be considered significant, it is therefore recommended that the **ESB sub-station at Randalstown should not be considered an AFA.**

3.7.12 Slane Bridge

Slane was originally included as a Possible Area for Further Assessment due to potential flood risk to the N2. No FRI score was available within the PFRA database. The site inspection confirmed the principal flood risk at Slane is to the N2 Road bridge and the old mill downstream of the bridge which is now being used as apartments. These receptors will not generate a FRI score of greater than 250. The Local Authority considers the potential disruption from the road being flooded to be easily manageable given the close proximity of the M1, N51 and M3. It is therefore recommended that **Slane Bridge should not be considered an AFA.**

3.7.13 WT Stalleen

Stalleen Water Treatment Works was originally identified as an Individual Risk Receptor for inclusion in the flood risk review. The actual water treatment works at Stalleen is situated on a hill remote from the River Boyne and therefore is not directly at risk of flooding. The only potential flood risk observed is to the water extraction from the River Boyne/Boyne Canal near Dunore. Any flooding to the plant may prevent water being pumped temporarily to the water treatment works although there is likely to be sufficient reserve at the WTW to avoid disruption. The plant is operated by Drogheda Borough Council and discussion with them did not indicate any known loss of supply at this facility due to flooding of the inlet works. It is therefore recommended that **Stalleen Water Treatment Works should not be considered an AFA.**

3.7.14 Trim

Trim was originally listed as a Probable Area for Further Assessment with a FRI score of 902. Predictive and historical information both show Trim to be at risk of flooding from the River Boyne. This risk was confirmed by both the Local Authority and OPW Regional Engineers, who also indicated that works had been undertaken to alleviate the known flooding problem. The PFRA predictive mapping at Trim does not appear unreasonable, therefore it is unlikely that the FRI score could be reduced to below 250. Consequently it is recommended that **Trim should be considered an AFA.**

3.8 OFFALY

3.8.1 Edenderry

Edenderry was originally listed as a Possible Area for Further Assessment on the basis of concerns raised by the Local Authority and OPW Regional Engineers and the fact that a previous study had been completed. No FRI score was available within the PFRA database as the PFRA predictive mapping shows relatively little flood damage to properties in Edenderry from the River Boyne and this was confirmed by the site inspection as Edenderry is elevated above the River Boyne. OPW Regional Engineers confirmed their concern over flooding from the Weavers Drain which flows through Edenderry to the River Boyne. The Weavers Drain is known to have caused flooding in the past however this watercourse was not modelled as part of the PFRA process and no predicted flood extents are available. The site inspection found no evidence of recent flooding from the Weavers Drain however there are numerous residential houses and commercial building within the vicinity of this watercourse. The level of risk is however difficult to estimate with any certainty and further analysis would be required, consequently **Edenderry should be considered an AFA.**

3.9 SOUTH DUBLIN

3.9.1 Esker South

Esker South was originally listed as a Possible Area for Further Assessment as a result of the historic assessment element of the PFRA. No FRI score was available in the PFRA database, however Esker South is potentially affected by the Griffeen River and experienced flooding during the 1954 flood as shown on www.floodmaps.ie. Inspection of the site confirmed that the Griffeen River presently flows through a linear park and that the bed of the channel is significantly lower than the thresholds of the adjoining properties. It was also considered that the PFRA predictive mapping shown extending into the adjoining housing area is incorrect and that the flood risk is Esker South is very low. Consequently it is recommended that **Esker South should not be considered an AFA.** However this section of the Griffeen River is included in the scope of the survey for the Lucan to Chapelizod Probable AFA and therefore the site inspection observations can be confirmed at a later stage.

3.9.2 Finnstown

Finnstown was originally listed as a Possible Area for Further Assessment as a result of the historic assessment element of the PFRA. No FRI score was available in the PFRA database despite the PFRA predictive mapping showing properties to be at risk in this area. Evidence suggests that Finnstown has experienced flooding in the past, the historical flood extent from the Dec 1954 flood is presented on www.floodmaps.ie. Finnstown appears to be potentially affected by a tributary of the Griffeen River however this watercourse was found to be totally dry and discontinuous during the site inspection. Consequently it would appear that the PFRA predictive mapping is inaccurate in this area and hence it is recommended that **Finnstown should not be considered an AFA.**

3.9.3 Hazelhatch

Hazelhatch was originally listed as a Possible Area for Further Assessment due principally to the fact that the OPW has completed a flood relief scheme. No FRI score was available in the PFRA database, however Hazelhatch has a history of flooding which has been addressed by the OPW scheme. The Shinkeen Stream flowing through Hazelhatch is a tributary of the Liffey and the majority of this watercourse is included in the Celbridge Probable AFA. Given the history of flooding and the fact that an alleviation scheme has been progressed it is recommended that **Hazelhatch should be included as an AFA** or possibly amalgamated with the Celbridge AFA.

3.9.4 Lucan to Chapelizod

The Lucan to Chapelizod area was originally listed as a Probable Area for Further Assessment with a FRI score of 10,424. Site inspections and a review of historic evidence suggests that there is a flood risk, particularly in the Chapelizod area, however there is some doubt as to the accuracy of the predicted 10%AEP flood outline. However even if 10%AEP flooding is eliminated completely the revised FRI score would be 1043 which is still robustly higher than the threshold of 250, consequently it is recommended that the **Lucan to Chapelizod area should be considered an AFA**.

3.9.5 Rathcoole, Saggart & Baldonnel

These areas were originally listed as a Probable Area for Further Assessment with a combined FRI score of 7251. Consideration of the output of the PFRA predictive modelling shows Rathcoole and Saggart to be within the flood extent of the Camac River which forms part of the Dublin City Probable AFA and as such it is recommended that these areas are included within this AFA. The Baldonnel area is affected by flooding from the Griffeen River and as such should be considered a separate Probable AFA. Review of the PFRA predictive mapping and FRI calculation indicates that the FRI score for Baldonnel on its own should be robustly greater than 250. Site inspection revealed much of this potential damage to be associated with flood risk to commercial properties within the Greenogue Business Park where two open watercourses flow through heavily modified channels and culverts. Consequently it is recommended that **Baldonnel should be considered an AFA**.

3.10 WEST MEATH

3.10.1 Milltownpass

Milltownpass was originally listed as a Possible Area for Further Assessment with a FRI score of 291, due principally to the predicted flood risk to the primary school. There is no known history of flooding at the Primary School in Milltownpass and the watercourse is maintained by OPW Regional Engineers who confirmed that the channel capacity would almost certainly be greater than Q_{med} . A channel capacity check was carried out and it was found that the channel has a capacity of greater than the 1%AEP flow and while the analysis method employed by RPS is very approximate this does give

confidence that the channel could convey the 10%AEP flow. If the FRI for Milltownpass was recalculated with the primary school excluded from the 10%AEP flood risk the FRI score would be reduced to 66.3. The OPW has stated that the effects of flood alleviation works should be ignored in the assessment of potential flood risk and consequently Milltownpass could therefore be considered an AFA. However the vast majority of the FRI score is associated with a single receptor, the local primary school, which could be protected under the OPW minor works programme and therefore it is suggested that **Milltownpass should not be considered an AFA.**

3.10.2 Riverstown

Riverstown was originally listed as a Possible Area for Further Assessment although the reason for inclusion is unclear in the PFRA database. No FRI score was available in the PFRA database and neither the predictive mapping nor historical records show any properties flooding. The Local Authority and OPW Regional Engineers also had no knowledge of flooding at Riverstown. It is therefore considered likely that Riverstown was brought forward for review in error, consequently it is recommended that **Riverstown should not be considered an AFA.**

3.11 WICKLOW

3.11.1 Annacurragh

Annacurragh was originally listed as a Possible Area for Further Assessment with a FRI score of 630. The Local Authority has no knowledge of previous flooding in this area affecting property and during the site inspection the nearest properties were observed to be 4-5m above the river level. Thus **Annacurragh should not be an AFA.**

3.11.2 Arklow

Arklow was originally listed as a Probable Area for Further Assessment with a FRI score of 2,994. Both the predictive flood mapping and the Local Authority comments confirm the existence of a flood risk in Arklow, particularly to the low lying areas around the harbour. During the site inspection individual property protection measures were observed along the South Quay. Consequently **Arklow should be an AFA.**

3.11.3 Ashford / Rathnew

Ashford and Rathnew were originally listed as a Probable Area for Further Assessment with a FRI score of 1,442. The site inspection did not identify any reasons to significantly modify the extents of the PFRA predictive mapping, and discussions with the Local Authority confirmed some history of flooding, particularly during Hurricane Charley. Consequently it is recommended that **Ashford/Rathnew should be considered an AFA.**

3.11.4 Aughrim

Aughrim was originally listed as a Probable Area for Further Assessment with a FRI score of 466. Historically flooding has been reported at Fogarty Terrace and Meath Terrace and the Local Authority reported having undertaken some remedial works. The site inspection confirmed the potential for flooding to properties such as the Lawless Hotel and the terraces mentioned previously. No reasons were found to significantly alter the PFRA predictive mapping and hence the FRI score consequently it is recommended that **Aughrim should be considered an AFA.**

3.11.5 Avoca

Avoca was originally listed as a Probable Area for Further Assessment with a FRI score of 413. There are three reports on www.floodmaps.ie relating to flooding in Avoca and the site inspection confirmed the potential flood risk on the minor stream at Brook Meadow. The flood risk from the main river is less certain however there are a number of properties close to the river on both banks and therefore some flood risk exists. Consequently it is recommended that **Avoca should be an AFA.**

3.11.6 Ballinaclesh

Ballinaclesh was originally listed as a Possible Area for Further Assessment with a FRI score of 161. The only reported history of flooding relates to the WwTW although the site inspection indicated that potentially 8-10 houses may lie within the predicted floodplain (5 of these are protected by a low earth embankment). Evidence of recent flooding (flood wrack caught in fence) was observed at the WwTW however no reason was found to extend the PFRA predictive mapping or bring additional assets into the flood risk zone and hence increase the FRI score. Consequently it is recommended that **Ballinaclesh should not be considered an AFA.**

3.11.7 Blessington

Blessington was originally listed as a Possible Area for Further Assessment with a FRI score of 1,220. There are numerous small streams that flow through Blessington, and at the time of the site inspections they were all either dry or had low flows. A stream flowing from the north west through the Glending Estate, is shown by the PFRA analysis to represent a significant flood risk in Blessington. However downstream of Glen Ding Way this channel was dry and heavily grassed suggesting that it doesn't convey flow very often. Work has been carried out during the construction of the Glending Estate resulting in the watercourse being re-routed to avoid the housing areas downstream. Consequently the predicted flood extent for this stream downstream of Glending Estate is questionable and it is unlikely that there is a flood risk to the housing at Deerpark. Further downstream after a couple of additional small streams have joined the watercourse is culverted through a major recent housing development at Kilmalum Road, the houses here are elevated and are unlikely to flood. Downstream of Kilmalum Road three houses and a new school are situated adjacent to the stream and consequently may be subject to flood risk. Flood damage has also been assigned to monuments

however on inspection no monuments lie within the predicted floodplain. Correcting the FRI calculations for all of the above reduces the overall score to circa 350 due principally to the location of the new school. It is therefore recommended that **Blessington should be considered an AFA.**

3.11.8 Bray

Bray was originally listed as a Probable Area for Further Assessment with a FRI score of 4,381. Significant flooding is shown by the PFRA predictive mapping for the River Dargle and associated tributaries. Flood reports on www.floodmaps.ie show the historical flood extent from the River Dargle to be larger than the predicted 0.1%AEP flood extent from the PFRA predictive modelling, however there was no evidence on site of the minor watercourse shown in the PFRA predictive modelling to join the Dargle at Bray Bridge. An error in the calculation of the FRI score was identified for Bray and it is more likely that the overall FRI score would be approximately 1860. If the predicted flooding from the minor watercourse that could not be found on site is excluded from the FRI calculation the score would be further reduced to 940. However given that the historical flood extent is larger than the predicted 0.1%AEP flood extent it is likely that the flood extent in Bray has been underestimated and consequently the FRI score should be robustly greater than 250. Therefore it is recommended that **Bray should be considered an AFA.**

3.11.9 Brittas Bay

Brittas Bay originally listed as a Possible Area for Further Assessment following receipt of comments from Local Authority on possible flood risk to a number of properties. No FRI score was given in the PFRA database and no records of historic flooding were found on www.floodmaps.ie and this was confirmed during discussions with the Local Authority. The site inspection and discussions with the Local Authority identified the risk at Brittas Bay to be related to coastal erosion and the potential loss of the coastal dune system that presently prevents tidal flooding of the properties behind. As there is presently no actual flood risk at Brittas Bay it is recommended that **Brittas Bay should not be considered an AFA.**

3.11.10 Charlesland

Charlesland was originally listed as a Possible Area for Further Assessment with a FRI score of 3,840. Two housing estates are shown to be within the predicted flood extent at Charlesland. The predicted flood extents look to be inaccurate as there are wedges present and the 10%AEP, 1%AEP and 0.1%AEP extents are exactly the same. Historical records on www.floodmaps.ie show that the Burnaby housing estate flooded in November 2003 causing significant damage. The fields upstream of the Burnaby housing estate are low lying beside the river and look to be a natural floodplain. By continuing this estimated floodplain through the housing estate and eliminating the wedges produced in the predictive flood model we can exclude the houses unlikely to flood while keeping the houses likely to have flooded previously. Even with this modification the FRI score within the Burnaby estate

alone is still greater than 250. It is therefore recommended that **Charlesland should be considered an AFA**, however there is scope for it to be combined with Greystones Probable AFA.

3.11.11 Enniskerry

Enniskerry was originally included as a Probable Area for Further Assessment with a FRI score of 380. On review it was noted that the occurrence of out of bank flooding on the Glencullen River through Enniskerry was questionable due to the observed large in-channel capacity. The natural river banks are approximately 8m above the channel bed through Enniskerry. A basic channel capacity assessment indicates that the Glencullen River is likely to be able to convey a flow of in excess of the 0.1%AEP flow through Enniskerry. While the channel capacity assessment is considered very approximate it does give an indication that the channel would be able to convey the 10%AEP flow and that the 10%AEP flood damage should be removed from the FRI score. This reduces the FRI score from 380 to 74 and it is therefore recommended that **Enniskerry should not be considered an AFA**.

3.11.12 Glendalough

Glendalough was originally listed as a Possible Area for Further Assessment with a FRI score of 753. Discussions with the Local Authority confirmed that the Hotel and OPW interpretative centre had flooded in the past, however this was not considered a significant flooding problem. The site inspection confirmed the potential flood risk to the various tourist amenities, the river actually flows below the entrance to the hotel, however given that the flood risk is primarily associated with risk to historic monuments (two ruined Churches lie within the 0.1%AEP predictive mapping outline) and individual receptors **Glendalough is not considered an AFA**.

3.11.13 Greystones

Greystones was originally identified as a Probable Area for Further Assessment with a FRI score of 1,180. There are two sources of flood risk at Greystones tidal and fluvial. Historical flood records confirm that flooding has occurred in the past from both sources, the stream flowing under Redford Bridge has caused flooding in the past which has knocked down garden walls. The stream at Mount Haven looks to be culverted and although the houses are in a hollow it looks unlikely that they will flood. Removing these 30 properties from the FRI score reduces it from 1180 to 880. However it is still recommended that **Greystones should be considered an AFA**.

3.11.14 Hollywood

Hollywood was originally listed as a Possible Area for Further Assessment with a FRI score of 471, due principally to the PFRA predictive mapping including a primary school within the 10%AEP flood outline. Hollywood is affected by a small mountain stream and although it is likely to be flashy it is unlikely to flood any more properties than that shown in the PFRA predictive mapping. The PFRA predictive mapping shows a wedge extending out and including the school, however given the storage

available from the field between the stream and the school it is considered unlikely that the school would be at risk during a 10%AEP flood event. Historical flood records show that some roads have experienced flooding in the past but no properties, which strengthens the assumption that the school is not at risk from a 10%AEP flood event. Removing the school from the FRI calculation reduces the Hollywood score to 221. Consequently it is recommended that **Hollywood should not be considered an AFA.**

3.11.15 Kilcoole

Kilcoole was originally listed as a Possible Area for Further Assessment with a FRI score of 3,405. Site inspection revealed that the route of the watercourse flowing through Kilcoole and shown in the PFRA predictive mapping is incorrect. This watercourse has been diverted to join another stream which flows through Kilcoole. Consequently the entire predicted flood extent at Kilcoole can be considered inaccurate and the FRI scoring incorrect. The actual route of the watercourse that flows through Kilcoole was not modelled as part of the PFRA hence the flood risk is therefore unknown. Records on www.floodmaps.ie confirm that properties were affected by flooding in the Beechdale Estate which is adjacent to the actual watercourse through Kilcoole and suggests that a flood hazard exists. On this basis it is recommended that **Kilcoole should be considered an AFA.**

3.11.16 Killiskey

Killiskey was originally listed as a Possible Area for Further Assessment with a FRI score of 152. Killiskey is located on the side of a hill and the stream flowing through it is relatively steep and can be expected to be flashy. With this in mind the flood extent shown in the PFRA predictive mapping looks reasonable however a couple of houses look well raised and may not be at risk. The PFRA predictive mapping at this point takes the form of a wedge which may suggest it is inaccurate. The FRI score is not expected to increase from 152 and therefore it is recommended that **Killiskey should not be considered an AFA.**

3.11.17 Kilmacanoge

Kilmacanoge was originally listed as a Possible Area for Further Assessment with a FRI score of 160. The PFRA predictive mapping shows the stream flowing through Kilmacanoge to affect 13 properties. The predicted flood extent for the 10%AEP, 1%AEP and 0.1%AEP events are exactly the same and which may suggest some instabilities in the model. An attenuation pond is located at the upstream extent of Kilmacanoge and is likely to reduce flows and hence flood risk. Therefore it is likely that the FRI score could be reduced from the currently predicted 160 and consequently **Kilmacanoge should not be considered an AFA.**

3.11.18 Newcastle

Newcastle was originally listed as a Possible Area for Further Assessment with a FRI score of 537. The PFRA predictive mapping at Newcastle look reasonable until 0.5km down the Sea Road when it spreads out over a large area which may not be correct. However the flood damage affecting the FRI score is contained within the part of the flood extent which looks reasonably accurate. The site inspection showed that the actual channel is small and the surrounding land is very flat thus any out of channel flow will spread widely. Historical flood records also confirm that the Sea Road floods regularly, therefore there is no strong evidence for reducing the FRI score of 537.5. Consequently it is recommended that **Newcastle should be considered an AFA.**

3.11.19 ESB Pollaphuca

Pollaphuca is an ESB generating station and was included in the original list of sites as an Individual Risk Receptor with a FRI score of 25,000. The majority of the infrastructure at Pollaphuca station is located at the top of a gorge which the Liffey flows through immediately after Pollaphuca Dam. As the river is controlled by the dam and most of the infrastructure appears to be well raised it is recommended that **Pollaphuca should not be considered an AFA.**

3.11.20 Rathdrum

Rathdrum was originally listed as a Possible Area for Further Assessment with a FRI score of 197. Rathdrum bridge is known to have caused flow on the Avonmore River to have backed up during high flow events e.g. Hurricane Charley. The PFRA predictive mapping incorrectly shows a wedge of flooding extending towards the village which is actually located on top of a hill therefore if anything the FRI score may be over-estimated. Consequently it is recommended that **Rathdrum should not be considered an AFA.**

3.11.21 ESB Shelton Abbey

The ESB sub-station at Shelton Abbey was originally listed as an Individual Risk Receptor with a FRI score of 2,587. While the site inspection confirmed that this asset is potentially located on the floodplain of the Avoca River, it appears to be within a larger defended site and as an individual receptor **should not be considered an AFA.**

3.11.22 Wicklow

Wicklow was originally listed as a Probable Area for Further Assessment with a FRI score of 690. Wicklow can be affected by flooding from both the sea and the river and the site inspection did not identify any reasons to modify the extent of the PFRA predictive mapping and hence modify the FRI scoring. Consequently **Wicklow should be considered an AFA.**

4 SUMMARY OF RECOMMENDATIONS

The recommended Areas for Further Assessment as part of the Eastern CFRAM Study as identified through the Flood Risk Review process undertaken by RPS are listed in Table 4.1 below. Highlighted entries in Table 4.1 indicate where an area has been recommended for upgrading to an AFA as a result of our review. The selection of AFAs to be taken forward under the ECFRAMS is generally based on the OPW advised PFRA criteria of such areas being those with a FRI score of greater than 250 or areas where there is a proven history of significant fluvial flooding.

Table 4.1 Recommended Areas for Further Assessment

Location (Local Authority)	Unit of Management	Original Status for Further Assessment	Original FRI Score	Amended FRI Score	Comment
Clontarf (Dublin City)	09	Probable	796	-	FRI > 250
Dublin City (Dublin City)	09	Probable	604058	-	FRI >>250
Raheny (Dublin City)	09	Probable	2662	-	FRI >>250
Santry (Dublin City)	09	Probable	1060	-	FRI > 250
Loughlinstown (Dunlaoghaire / Rathdown)	10	Probable	4660	-	FRI >>250
Wilford [Shankill (Crinken)] (Dunlaoghaire / Rathdown)	10	Possible	-	310	FRI>250
Sutton & Baldoyle (Fingal)	09	Probable	3484	-	FRI >>250
Sutton & Howth North (Fingal)	09	Probable	323	-	FRI > 250
Celbridge (Kildare)	09	Probable	6466	-	FRI >>250
Clane (Kildare)	09	Probable	7224	-	FRI >>250
Johnstown (Kildare)	09	Possible	1890		FRI >>250
Johnstown Bridge (Kildare)	07	Probable	390	121	FRI > 250 ignoring effect of AD scheme
Kilcock (Kildare)	09	Probable	-	> 250	FRI estimated > 250
Leixlip (Kildare)	09	Probable	27157	-	FRI >>250
Maynooth (Kildare)	09	Probable	2299	-	FRI >>250

Location (Local Authority)	Unit of Management	Original Status for Further Assessment	Original FRI Score	Amended FRI Score	Comment
Naas (Kildare)	09	Probable	3364	-	FRI >>250
Newbridge (Kildare)	09	Probable	2109	-	FRI >>250
Sallins (Kildare)	09	Possible	-	> 250	FRI > 250 due to unmodelled flooding from feeder streams
Turnings (Kildare)	09	Possible	463	-	FRI > 250, FAS implemented
Baltray (Louth)	07	Probable	323	-	FRI > 250, FAS provided
Drogheda (Louth)	07	Probable	6917	-	FRI >>250
Athboy (Meath)	07	Probable	293	66	FRI > 250 ignoring effect of AD scheme
Ballivor (Meath)	07	Probable	940	115	FRI > 250 ignoring effect of AD scheme
Longwood (Meath)	07	Possible	-	300+	FRI > 250
Mornington (Meath)	07	Probable	-	-	FAS under Construction
Navan (Meath)	07	Probable	4121	-	FRI >>250
Trim (Meath)	07	Probable	902	-	FRI > 250
Edenderry (Offaly)	07	Possible	-	-	Flooding history but no predictive mapping available to quantify risk
Lucan to Chapelizod (South Dublin)	09	Probable	10424	-	FRI >>250
Hazelhatch (South Dublin)	09	Possible	-	-	FAS provided
Rathcoole & Saggart (South Dublin)	09	Probable	-	-	Incorporated within Dublin City AFA limits
Baldonnel (South Dublin)	09	Probable	5000+	5000+	FRI>>250
Arklow (Wicklow)	10	Probable	2994	-	FRI >>250
Ashford / Rathnew (Wicklow)	10	Probable	1442	-	FRI > 250
Aughrim (Wicklow)	10	Probable	465	-	FRI > 250
Avoca (Wicklow)	10	Probable	413	-	FRI > 250
Blessington (Wicklow)	09	Possible	1220	350	FRI > 250 due to possible inclusion of new primary school
Bray (Wicklow)	10	Probable	4381	-	FRI >>250

Location (Local Authority)	Unit of Management	Original Status for Further Assessment	Original FRI Score	Amended FRI Score	Comment
Charlesland (Wicklow)	10	Possible	3840	-	FRI >>250
Greystones (Wicklow)	10	Probable	1180	-	FRI > 250
Kilcoole (Wicklow)	10	Possible	3405	-	PFRA modelling incorrect, FRI unknown
Newcastle (Wicklow)	10	Possible	537	-	FRI > 250
Wicklow (Wicklow)	10	Probable	690	-	FRI > 250

Similarly the locations recommended to be rejected for further assessment during the Eastern CFRAM Study as a consequence of the RPS flood risk review process are listed in Table 4.2 along with a brief summary of the reason for rejection. Highlighted entries in Table 4.2 indicate where an area has been recommended for de-selection as an AFA as a result of the review.

Table 4.2 Areas Rejected for Further Assessment in the ECFRAMS

Location (Local Authority)	Unit of Management	Original Status for Further Assessment	Original FRI Score	Final FRI Score	Reason for Rejection & Recommendation
Mullagh (Cavan)	07	Probable	324	-	Flood extent appears excessive but not supported by historic evidence
Virginia (Cavan)	07	Possible	594	190	FRI < 250
ESB Blackrock (Dunlaoghaire / Rathdown)	09	IRR	342	-	Individual asset Notify ESB
Old Connaught (Dunlaoghaire / Rathdown)	10	Possible	-	60	FRI < 250
Shankill (Crinken) (Dunlaoghaire / Rathdown)	10	Possible	-	-	Flooding associated with combined sewerage
Balrothery (Fingal)	08	Possible	2730	230	FRI < 250
Bloody Stream (Fingal)	09	Possible	-	50	FRI < 250
NUR Luttrells (Fingal)	08	IRR	2520	45	FRI < 250
Santry Demesne (Fingal)	09	Possible	2990	≈0	FRI < 250
Ballymore Eustace (Kildare)	09	Possible	-	-	FRI < 250
Blacktrench (Kildare)	09	Possible	270	150	FRI < 250
Carragh (Kildare)	09	Possible	151	-	FRI < 250
Grange (Kildare)	09	Possible	-	-	Incorrectly identified in PFRA
Kilcullen (Kildare)	09	Possible	-	75	FRI < 250
Kill (Kildare)	09	Possible	255	225	FRI < 250
ESB Longstone (Kildare)	09	IRR	25000	-	Individual asset
Roestown (Kildare)	09	Possible	-	-	FRI < 250

Location (Local Authority)	Unit of Management	Original Status for Further Assessment	Original FRI Score	Final FRI Score	Reason for Rejection & Recommendation
Straffan (Kildare)	09	Possible	154	-	FRI < 250
Tullyallen (Louth)	07	Possible	372	132	FRI < 250
N2 Balrath (Meath)	08	IRR	-	-	Individual asset
ESB Grangeageeth (Meath)	07	IRR	2550	-	Individual asset Notify ESB
SCH Kilbride (Meath)	08	IRR	265	-	Majority of FRI score associated with single asset Minor works scheme
Kildalkey (Meath)	07	Possible	157	-	FRI < 250
Kilmessan (Meath)	07	Probable	405	58	FRI < 250
ESB Randalstown (Meath)	07	IRR	-	-	Individual asset Notify ESB
Slane (Meath)	07	Possible	-	-	FRI < 250
WTW Stalleen (Meath)	07	IRR	-	-	Individual asset
Esker South (South Dublin)	09	Possible	-	-	FRI < 250
Finnstown (South Dublin)	09	Possible	-	-	FRI < 250
Milltownpass (West Meath)	07	Possible	291	-	Majority of FRI score associated with single asset
Riverstown (West Meath)	07	Possible	-	-	FRI < 250
Annacurragh (Wicklow)	10	Possible	630	<250	FRI < 250
Ballinaclesh (Wicklow)	10	Possible	161	-	FRI < 250
Brittas Bay (Wicklow)	10	Possible	-	-	Erosion Problem
Enniskerry (Wicklow)	10	Probable	380	74	FRI < 250
Glendalough (Wicklow)	10	Possible	753	-	FRI score principally related to historic ruins
Hollywood (Wicklow)	09	Possible	471	221	FRI < 250
Killiskey (Wicklow)	10	Possible	152	-	FRI < 250
Kilmacanoge (Wicklow)	10	Possible	160	-	FRI < 250
ESB Pollaphuca (Wicklow)	09	IRR	25000	-	Individual asset
Rathdrum (Wicklow)	10	Possible	197	-	FRI < 250
ESB Shelton Abbey (Wicklow)	10	IRR	2587	-	Individual asset

A final decision on the recommendations indicated in Tables 4.1 and 4.2 will be made by the OPW following review by the Eastern CFRAM Study progress and steering groups and receipt of feedback from the PFRA public consultation process.

In addition to the various Probable and Possible Areas for Further Assessment identified in the Eastern CFRAM Study tender documentation, during discussions with OPW Regional Engineers and Local Authorities three additional locations were suggested as potentially experiencing significant fluvial flood risk as listed in Table 4.3.

Table 4.3 Additional Sites Identified for Possible Flood Risk Review

Location (Local Authority)	Unit of Management	Raised By	Comment
M3 at Royal Tara (Meath)	07	OPW Regional	Motorway constructed at low level to reduce visual impact crosses River Skane upstream of old road bridge which is known to cause flows to back up, may flood motorway
Robinhood / Ballymount (South Dublin)	09	Local Authority	Mapping provided by South Dublin Co Co confirms that this area of known flood risk lies within the extent of the Dublin City AFA
Poddle, Tymon Park (South Dublin)	09	Local Authority	The area is part of a defined HPW within the Dublin City AFA

Preliminary investigations have identified that two of the areas listed in Table 4.3, lie within the boundary of the Dublin City AFA and therefore are already recommended for inclusion in the Eastern CFRAM Study. Thus only the M3 at Royal Tara remains as possible additional area for future review.

The assessment of existing flood risk to significant environmental receptors has identified five areas where the FRI score was sufficient to qualify as either Probable or Possible AFAs. However the designated Natura 2000 sites cover extensive geographic areas and the distribution of designated species and habitat within these is not uniform. The flood risk assessed to date is a natural phenomenon which these sites are presently exposed to and as such it is considered likely that those species which would be adversely affected by either fluvial or coastal inundation will naturally be located in areas less affected by flooding. Consequently we would not recommend any environmental site being taken forward as an AFA in isolation, rather the sites listed in Table 4.4 below should be considered as particularly sensitive receptors when developing flood management options for water bodies with potential to affect them.

Table 4.4 Natura 2000 Sites to be Considered for Further Assessment

Location (Local Authority)	Unit of Management	Original Status for Further Assessment	Original FRI Score	Comment
Rye Water Valley/Caroon SAC (Kildare)	09	Probable	1092	SAC identified as a result of potential impact on Whorl Snail
Lambay Island SPA (Fingal)	09	Probable	422	Impact on seabirds (Gulls)
North Dublin Bay SAC (Fingal)	09	Probable	1120	Identified as a result of potential impact on Petalwort
Rogerstown Estuary SAC (Fingal)	08	Possible	166	No specific species identified
Malahide Estuary SAC (Fingal)	08	Possible	143	No specific species identified

APPENDIX A

SITE INSPECTION RECORDS

A1.1 Mullagh, Co Cavan

Name: Mullagh	County: Cavan	Unique ID: 70038	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Mullagh	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 324.0	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: One entry on floodmaps.ie reports flooding in Main Street			
Has any works been undertaken?: Channel does not look natural, some culverting			
Are there any maintained defences?: None observed			
LA comments: Indicated a possibility of flooding due to large number of houses backing on to the river, but no definite confirmation of flooding.			
Summary of Site Inspection			
Site inspection observations: 11/08/11			
River is a small stream draining Mullagh Lough which appears to be at the headwaters of the stream. Very little flow observed while rivers in Virginia observed same day were in spate. Stream flows behind new housing and heritage centre on Virginia road, low wall to gardens and rear of heritage centre and raised ground levels. New children's play area on left bank adjacent to heritage centre not embanked, land rises towards road, flood polygon probably over predicted in this area, land on right bank agricultural rises away from stream. Primary School on opposite side of road beside Church unlikely to be in flood plain.			
Masonry arch culvert on minor road (Brooksville) u/s of new housing developments on left bank, d/s stream channel looks modified (1.0mx0.7m) to flow along rear of wall (right bank) adjacent to minor road. Culvert under housing access road (Millstream) consists of 2x200mm dia pipes. Open water course continues through grass area to twin 450 culverts under second minor road (Brooksville/Main St).			
New housing development immediately d/s of second minor road partially completed, stream culverted to rear of houses in single 750-900 pipe (transition from twin 450 to single not visible). Open channel continues downstream past WwTW (double right angle bends at WwTW) and along rear boundary of properties south of R194. Channel circa 3-4m wide by 1.5-2m deep at this point, flood polygon extending to R194 looks excessive.			
Local staff at Heritage Centre had no knowledge of flooding from River/Stream although flooding has occurred due to blocked road drainage. Doubtful if this should be an AFA.			
Size of river: Varies between <1m wide by 0.5-0.75m deep to 3-4m wide by 1.5-2m deep		Channel vegetation: Extensive vegetation both within and adjacent to channel	
Channel condition: Evidence of channel having been modified through town		Structures: Masonry culvert and pipe culverts through town	
Flood defences: None observed		Nature of flow: Generally sluggish flow	
Nature of floodplain: Relatively unconstrained on left bank, narrower on right bank		Floodplain vegetation: Predominantly grass, some trees and hedgerows.	
Properties: Many residential properties within predictive flood plain. Site inspection and local opinion cast doubt as to PFRA model accuracy.		Evidence of flooding: No visible evidence, very little flow in river during visit despite rivers in nearby Virginia being in spate	

Photographs:



Recommendation:

Mullagh was originally listed as a Probable Area for Further Assessment with a FRI score of 324. Local Authority comments indicated a potential for flooding due to large numbers of properties backing on to the river but could not confirm significant flooding history. The www.floodmaps.ie site contained one report of flooding at Main Street in Mullagh, however it is not clear what the source of this flooding was. The site inspection revealed the watercourse to be a small stream draining the nearby Mullagh Lough which appeared to be the headwaters of the catchment. The visit confirmed that a significant number of properties are relatively low-lying in relation to the stream and that the general outline of the PFRA predictive mapping appears reasonable. At the time of the visit there was very little flow in the stream while relatively nearby at Virginia the rivers were in spate. Conversations with locals during the site inspection did not establish any knowledge of flooding from the stream in the recent past. Due to the lack of any knowledge of previous flooding from the stream and the disparity between the potential flood extent indicated by the PFRA predictive mapping and the observed size of the stream it is recommended that **Mullagh is not considered an AFA.**

A1.2 Virginia, Co Cavan

Name: Virginia	County: Cavan	Unique ID: 70044	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Virginia	
LA comments confirm flood risk?: None provided			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 594.8	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
Summary of LA Meeting			
Has there been a history of flooding?: None known			
Has any works been undertaken?: None notified			
Are there any maintained defences?: No			
LA comments: Known flooding of agricultural land from Lough Ramor but no known flooding of N3 or any properties.			
Summary of Site Inspection			
Site inspection observations: 11/08/11			
Significant flows in both water courses observed, on the main river development is generally set back from river banks u/s of town. Through town there are properties close to river on left bank u/s of N3 bridge (converted mill building and 2-3 bungalows) immediately d/s of bridge 3-4 residential properties on the right bank are located on a low area on inside of bend. Further downstream a development of 5 houses lies relatively low on the right bank of the river and may be at risk.			
On the western watercourse there is a wide flood plain u/s of the road bridge, downstream there is a wide undeveloped flood plain on the right bank. Development on the left bank encroaches to the river bank although levels look higher than right bank and are 2-3m above river level.			
Probably not enough flood risk for an AFA.			
Size of river: 8-10m wide, depth unknown, banks typically 1-1.5m, right bank lower generally		Channel vegetation: Extensive reed beds u/s of town, overhanging trees through town	
Channel condition: Evidence of channel protection works at locations, otherwise natural grassy banks		Structures: N3 road bridge, possible fishery weirs, drowned out at time of visit	
Flood defences: None observed		Nature of flow: Varied, sluggish u/s of town, rapid through town to Lough	
Nature of floodplain: Wide floodplain u/s of town, constrained in "deep" valley through town. Bottom section wide to right, constrained on left		Floodplain vegetation: Mixture of grass, trees and gardens	
Properties: 8-10 residential properties on right bank potentially at risk also basement properties of converted mill building u/s N3 bridge		Evidence of flooding: No visible evidence, river in spate during visit and still showing some freeboard.	

Photographs:



Recommendation:

Virginia was originally listed as a Possible Area for Further Assessment despite having a FRI score of 594. Examination of the PFRA database established that much of this score was associated with potential flood risk to dispersed properties out with the development limits of Virginia. The Local Authority advised that there was no known flooding history affecting either properties or the N3 at Virginia although agricultural land around Lough Ramor was known to flood. The site inspection confirmed the extent of the PFRA predictive mapping within Virginia to be quite accurate and indicated that between 12 and 19 residential properties lay within the likely flood plain. Thus a more reflective FRI score for Virginia would be circa 190 consequently **Virginia is not considered an AFA.**

A2.1 Clontarf, Dublin City

Name: Clontarf	County: Dublin City	Unique ID: 90081	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive and historic			
Historical Analysis			
Historical Risk (0-4): -		Historical Hazard (0-4): -	
Number of flood report locations on floodmaps.ie: 8		Closest searchable town on floodmaps.ie: Clontarf	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 796	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 4		Historical Validation Hazard (0-4): 3	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Extensive tidal flooding occurred in this area in 2002 and 2004.			
Summary of Site Inspection			
Site inspection observations: 23/08/11			
Much of this area is relatively low lying and open to the coast with only a low seawall protecting numerous properties. The ICPSS broad scale modelling indicates extensive tidal flood risk to the Clontarf area. Historical and visual evidence gives little reason to question PFRA FRI scoring, therefore should be an AFA.			
Size of river:		Channel vegetation:	
Channel condition:		Structures:	
Flood defences: Low sea walls		Nature of flow:	
Nature of floodplain: Broad		Floodplain vegetation: Urbanised	
Properties: Numerous residential properties.		Evidence of flooding: None observed	
Photographs: None taken			
Recommendation: Clontarf was originally listed as a Probable Area for Further Assessment with a FRI score of 796. The Irish Coastal Protection Strategy and knowledge of the site indicate that Clontarf is potentially at significant risk from coastal flooding and it is therefore recommended that Clontarf should be considered an AFA.			

A2.2 Dublin City,

Name: Dublin City	County: Dublin City	Unique ID: 90082	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive & Historical			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: Multiple		Closest searchable town on floodmaps.ie: Dublin City South	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 604059	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 4		Historical Validation Hazard (0-4): 4	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: LA indicated that many parts of Dublin City are low lying and at risk from tidal and fluvial flooding from many watercourses.			
<u>Summary of Site Inspection</u>			
Site inspection observations: No site inspection was undertaken as the balance of evidence, both historic and predictive is so strong that there can be no doubt Dublin City should be considered an AFA. Any modification of the flood polygons and FRI score resulting from a site inspection would be insignificant in terms of the overall FRI score assigned to this area.			
Size of river: -		Channel vegetation: -	
Channel condition: -		Structures: Numerous bridges/culverts	
Flood defences: -		Nature of flow: -	
Nature of floodplain: Urbanised with parkland		Floodplain vegetation: -	
Properties: Residential and commercial		Evidence of flooding: -	
Photographs: None taken			
Recommendation: Dublin City was originally identified as a Probable Area for Further Assessment with a FRI score of 604,059. Anecdotal evidence and various previous studies confirm that many parts of Dublin City have experienced flooding during extreme events therefore it was considered extremely unlikely that the PFRA predictive mapping would be modified significantly to achieve a FRI score of <250 and hence it is recommended that Dublin City is considered an AFA . However closer examination of the extents of the flood risk within the Dublin City AFA, suggests that this should be further sub-divided for future stages of the analysis along the line of hydraulic sub-catchments e.g. Dublin City (Liffey), Dublin City (Poddle), Dublin City (Camac).			

A2.3 Raheny, Dublin City

Name: Raheny	County: Dublin City	Unique ID: 90096	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Raheny	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2662.4	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: LA indicated that part of Raheny is low lying and the road has flooded approximately every 5 years.			
Summary of Site Inspection			
Site inspection observations: 23/08/11			
The Santry River flows through Raheny. It is difficult to ascertain the capacity of the watercourse however it is very urbanised with a high density of receptors throughout. If out of bank flooding was to occur numerous properties would be affected.			
Size of river: 5m x 3m		Channel vegetation: Short grass and trees	
Channel condition: -		Structures: Numerous road bridge/culverts	
Flood defences: -		Nature of flow: -	
Nature of floodplain: Urbanised with parkland		Floodplain vegetation: Short grass or hard standing	
Properties: Residential and commercial		Evidence of flooding: -	
Photographs: None taken			
Recommendation: Raheny was originally listed as a Probable Area for Further Assessment with a FRI score of 2662. While there is a history of flooding at one of the roads in Raheny from the Santry River there has been no recorded flooding of properties. The lack of evidence of historical flooding questions whether the 10%AEP flood extent shown in the PFRA predictive mapping has overestimated the flood risk. A sensitivity analysis was carried out to assess the affect of removing the 10%AEP flood risk from the Raheny FRI calculation. The removal of all properties from the 10%AEP flood extent has the effect of reducing the FRI score by approximately a factor of 10 and under this scenario the FRI score would be reduced to 272.9. There is therefore enough damage accrued from within the predicted 1%AEP and 0.1%AEP flood extents at Raheny for the FRI score to remain greater than 250. It is therefore recommended that Raheny should be considered an AFA.			

A2.4 Santry, Dublin City

Name: Santry	County: Dublin City	Unique ID: 90099	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Santry	
LA comments confirm flood risk?: -			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 1060.2	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 2		Historical Validation Hazard (0-4): 2	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: -			
Summary of Site Inspection			
Site inspection observations: 23/08/11			
<p>The Santry River flows through a large pond in Santry Demesne before entering Santry. As it flows under the old Swords Road it flows adjacent to Santry Close which has experienced flooding in the past. The river follows a green corridor adjacent to Oak Crescent which is set back from the river and then flows under the M50 and past Woodlawn Crescent and Park. Woodlawn Crescent sits quite high and is likely out of the 10yr floodplain however Woodlawn Park is more level with the top of bank and may be at risk. The apartments further downstream at The Park sit quite high and are likely to be outside the 10yr floodplain. The green corridor between the properties and river will provide flood storage along with the green area on the LHB. The river channel looks to be quite large</p>			
Size of river: 4m x 4m		Channel vegetation: Tree lined	
Channel condition: -		Structures: Road bridges	
Flood defences: -		Nature of flow: -	
Nature of floodplain: -		Floodplain vegetation: Short grass and sub-urban	
Properties: Residential and commercial		Evidence of flooding: -	
Photographs: None taken			
<p>Recommendation: Santry was originally listed as a Probable Area for Further Assessment with a FRI score of 1060. The indication of properties at risk in Santry Close by the predictive mapping is supported by historical flood records and looks to be reasonable. Downstream of the M50 there are no records of previous flooding incidents and some of the properties are situated high above the river, namely at Woodlawn Crescent and the apartments at The Park. However the fact that the river channel is relatively deep and that the green corridor that it flows through would provide flood storage makes it difficult to estimate by how much the PFRA predictive mapping extents might be reduced. However even assuming all these properties can be removed from the 10%AEP flood extent the FRI score would only be reduced from 1060.2 to 311.8 which remains above the 250 threshold. It is therefore recommended that Santry should be considered an AFA</p>			

A3.1 ESB Blackrock, Dunlaoghaire-Rathdown

Name: ESB Blackrock	County: Dun Laoghaire- Rathdown	Unique ID: 90067	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Blackrock	
LA comments confirm flood risk?: -			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 342	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: -			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: Primary asset is an ESB sub-station, LA have no specific knowledge of this flooding, however general area is relatively low lying and close to sea.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 31/08/11 ESB sub-station confirmed within park adjacent to railway lines. No specific flood protection measures identified only protection against tidal flooding is provided by adjacent railway and associated seawall. The ICPSS coastal flood risk modelling indicates the park in which the ESB sub-station is located to be subject to tidal flood risk and no definitive reason was observed to contradict this assessment.			
Size of river: -		Channel vegetation: -	
Channel condition:		Structures: sea wall adjacent to railway line	
Flood defences:		Nature of flow:	
Nature of floodplain:		Floodplain vegetation: -	
Properties: ESB sub-station		Evidence of flooding: -	

Photographs:



Recommendation:

An ESB sub-station at Blackrock was identified as an Individual Risk Receptor with a FRI score of 342. Site inspection confirmed that the Blackrock ESB HV station is located adjacent to the coast and examination of the output of the Irish Coastal Protection Strategy indicates the ESB station to lie within the undefended coastal 0.05% AEP floodplain. Consequently there is a potential flood risk to this station and ESB should be notified however as this is a single asset it is recommended that **Blackrock should not be considered an AFA.**

A3.2 Loughlinstown, Dunlaoghaire-Rathdown

Name: Loughlinstown	County: Dun Laoghaire- Rathdown	Unique ID: 100121	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive & Historic			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 6		Closest searchable town on floodmaps.ie: Loughlinstown	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 4660	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 3	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: Extensive works have been undertaken as part of the GSDSDS, principally culverting of various watercourses etc. to resolve known flooding issues.			
Summary of Site Inspection			
Site inspection observations: 30/06/11 & 01/07/11			
Local Authority seems to have undertaken a number of flood relief schemes, principally culverting over recent years. This significantly reduces the risk of flooding to the town. Given that 70% of watercourses in Loughlinstown are culverted it is very easy to see the areas that are most likely to flood (i.e. upstream of culverts). At most of the upstream ends of the culverts the area likely to flood due to the system backing up would be park lands and playing fields.			
Within the town the main sources of flooding would be through surcharging of culvert manholes or overland flow from the culvert inlets.			
Size of river: -		Channel vegetation: -	
Channel condition: general very poor in open parts		Structures: culverts, bridges & weirs	
Flood defences: Walls/Embankments & Floodplains		Nature of flow: meandering	
Nature of floodplain: Wide		Floodplain vegetation: -	
Properties: -		Evidence of flooding: -	

Photographs:



Recommendation:

Loughlinstown was originally listed as a Probable Area for Further Assessment with a FRI score of 4660. Site inspection has revealed that many of the watercourses within Loughlinstown are culverted and thus the flood risk is likely to be less than indicated in the PFRA predictive mapping, which assumes open watercourses throughout. However there are still extensive lengths of open watercourse within Loughlinstown and while the site inspections have shown some of the flow paths assumed in the PFRA modelling to be incorrect it is unlikely that modification to the PFRA predictive mapping would reduce the FRI score to less than 250. Consequently it is recommended that **Loughlinstown should be considered an AFA.**

A3.3 Old Connaught/Wilford, Dunlaoghaire-Rathdown

Name: Old Connaught / Wilford	County: Dun Laoghaire- Rathdown	Unique ID: 105456	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive & Historic			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 2		Closest searchable town on floodmaps.ie: Bray (Wicklow)	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: None recorded	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): -		Historical Validation Hazard (0-4): -	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Inlet grill @ St Brendans College			
LA comments: LA indicated that there have been reported flooding incidents in a field to the rear of properties on Old Connaught Avenue u/s of the culvert which possibly runs beneath some of these houses. LA have advised of two areas of historic flooding on the Crinken Stream in Wilford, u/s/ of the N11 crossing (investigations subsequent to this have indicated that this flooding was due to blockage of the inlet grill on the N11 crossing and flooding of property was avoided by clearing this). The second are of flooding was upstream of the Shankill development and the LA have indicated that 2 properties were affected.			
Summary of Site Inspection			
Site inspection observations: 30/08/11 & 26/09/11			
Watercourse in Old Connaught difficult/impossible to access due to route through secure residential properties. Where visible stream channel is heavily vegetated and flows quite steeply. Appears to be culverted through residential properties along Old Connaught Avenue although one wall was noted to contain a number of "letterbox" type slots which might be to allow flood water to spill on to Old Connaught Avenue just upstream of second culverted section. Possible flood risk to 5-6 residential properties in Old Connaught if culvert capacity is insufficient.			
The Crinken stream flows through the Wilford area and this open watercourse runs along the western boundary of the Shankill housing development and the northern boundary of the St Brendan's College site before entering a culver under the N11. A relatively new inlet structure appears to have been constructed within the grounds of St Brendan's and were this to block or the culver capacity to be exceeded there is a risk of flooding to the school property. Within the Shankill development 5-6 houses may potentially be a risk of out of bank flooding from the Crinken Stream.			
Size of river: 2m x 1m at Ferndale Road, 1m x 0.75m @ N11 (Crinken)		Channel vegetation: Trees/Shrubs-	
Channel condition: -		Structures: culverts, inlet grills	
Flood defences: none noted		Nature of flow:	
Nature of floodplain:		Floodplain vegetation: -	
Properties: 6 houses Old Connaught, School and 6 houses Wilford		Evidence of flooding: None noted-	

Photographs:



Recommendation:

The Old Connaught/Wilford area was added to the list of Possible Areas for Further Assessment in a tender clarification following a request by the Local Authority. No FRI score or further details of the Local Authority comments were available in the PFRA database. Examination of the available datasets and initial site inspection indicate that watercourse flowing through the Wilford area was incorrectly incorporated within the Bray catchment during the PFRA process. (The modelled watercourse linking to the Dargle does not exist, the Crinken/Woodford stream running through Wilford actually enters the sea some distance north of the Dargle.) Further information obtained from Dunlaoghaire Rathdown Co Co indicates the previous flooding incidents at Wilford to be restricted to two locations on the Crinken Stream. However this flooding is believed to have been related to blockages within the stream rather than a lack of conveyance capacity within the natural stream channel. Analysis of the PFRA predictive mapping for this area indicates that 6 residential properties and a school lie within its 10%AEP flood extent, thus **Wilford should be considered an AFA.**

Within Old Connaught recorded flooding has been reported in lands to the rear of properties along Old Connaught Avenue upstream of a culvert which it is believed flows beneath some of these properties. Examination on site confirmed the presence of an open water course upstream of these properties and observed some features which may be indicative of flood relief immediately upstream of the indicated location of the culvert. However only around 6 properties were considered to be likely to be affected by flooding from this source therefore the FRA score would be less than 250 and hence **Old Connaught should not be considered an AFA.**

A3.4 Shankill (Crinken), Dunlaoghaire-Rathdown

Name: Shankill (Crinken)	County: Dun Laoghaire- Rathdown	Unique ID: 105455	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive & Historic			
Historical Analysis			
Historical Risk (0-4): -		Historical Hazard (0-4): -	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Bray (Wicklow)	
LA comments confirm flood risk?: Unclear			
Predictive Analysis			
Predictive mapping indicates flooding?: No		Flood Risk Index: None recorded	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): -		Historical Validation Hazard (0-4): -	
Summary of LA Meeting			
Has there been a history of flooding?:			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: LA indicated that there is a flooding problem at New Vale in Shankill.			
Summary of Site Inspection			
Site inspection observations: 30/08/11 & 26/09/11 No watercourse was found at New Vale, review of GSDSDS and M50 drainage studies indicates that flooding in New Vale area is associated with combined sewer capacity issues rather than flooding from watercourses i.e. not a CFRAMS issue.			
Size of river: -		Channel vegetation: -	
Channel condition: -		Structures:	
Flood defences:		Nature of flow:	
Nature of floodplain:		Floodplain vegetation: -	
Properties:		Evidence of flooding:	

Photographs:



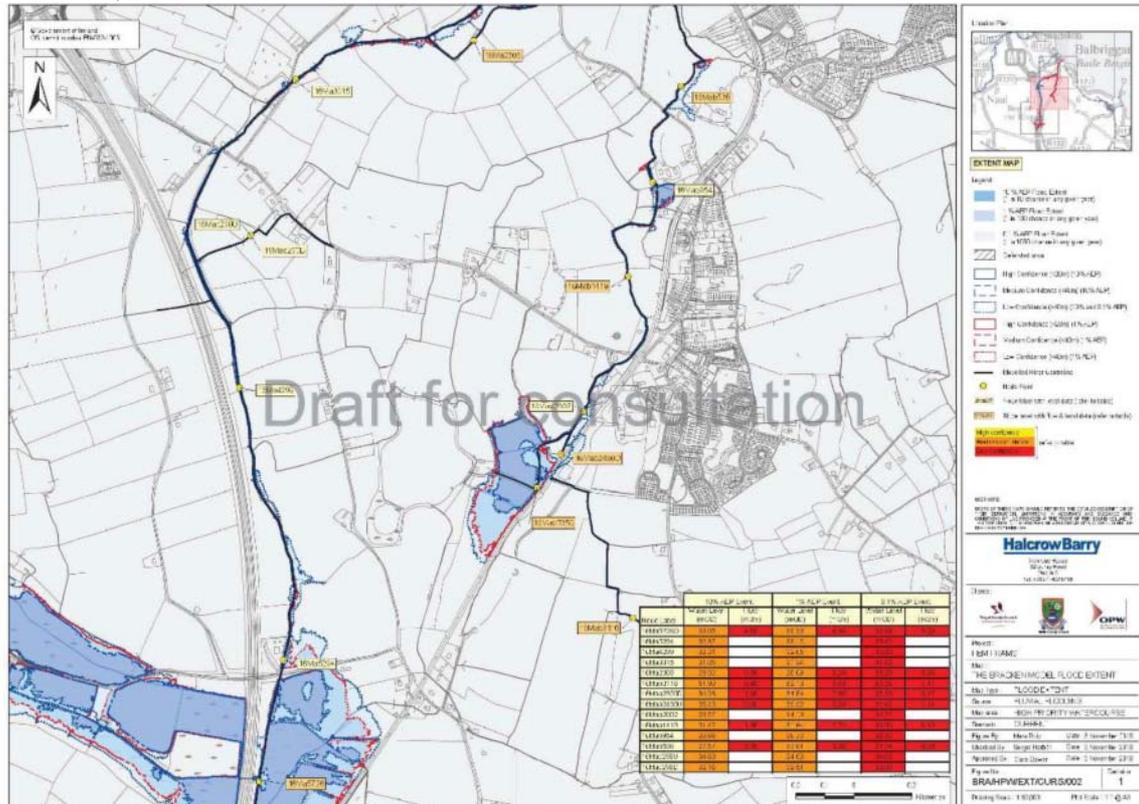
Recommendation:

Shankill was added to the list of possible Areas for Further Assessment in a tender clarification following a request by the Local Authority. No FRI score or further details of the local authority comments were found in the PFRA database. Examination of available datasets and site inspection has failed to identify any open watercourses within the Shankill area therefore it is unclear why this area was put forward for flood risk review. Further discussions with Dunlaoghaire Rathdown Co Co have established that the particular area of interest in Shankill is around New Vale and that Crinken is the same area as Wilford. A further site inspection at Shankill did not identify any open watercourses in the New Vale area and discussions with RPS staff involved in the GSDS established that the flooding at New Vale is related to out of sewer flooding. Consequently it is recommended that **Shankill should not be considered an AFA.**

A4.1 Balrothery, Fingal

Name: Balrothery	County: Dublin	Unique ID: 80046	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): -		Historical Hazard (0-4): -	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Balrothery	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2730	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
Summary of LA Meeting			
Has there been a history of flooding?: None known			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: No history of flooding at the areas identified.			
Summary of Site Inspection			
Site inspection observations: 11/08/11			
A large nursing home complex is located on the right bank of Bracken River downstream of Balrothery. The predictive mapping for the PFRA indicates that this may lie within the flood risk zone, however more detailed modelling undertaken as part of the FEM FRAM Study indicates the site to be unaffected, although agricultural land immediately u/s is shown to be flooded in a 10% AEP event (see drawing below).			
Limited evidence of flooding was found in this area however some indication was observed from sediment deposition along the stone lane adjacent to the watercourse at the access to a number of detached residential properties at Gibbonsmoor further upstream.			
It is therefore unlikely that this would be an AFA.			
Size of river: 4-5m wide, 1-1.5m deep channel		Channel vegetation: Heavily vegetated	
Channel condition: unclear due to overgrowth		Structures: None visible locally	
Flood defences: None visible		Nature of flow: Sluggish	
Nature of floodplain: Unconfined, u/s v-shaped valley adjacent to Balrothery, and more open d/s at nursing home		Floodplain vegetation: Predominantly grass/scrub	
Properties: 1-2 residential properties u/s of Balrothery		Evidence of flooding: No	

FEM FRAMS, Bracken Model Flood Extent:



Photographs:



Recommendation:

Balrothery was originally listed as a Possible Area for Further Assessment with a FRI score of 2730 due principally to the PFRA predictive mapping indicating significant flood risk to a large nursing home. No history of flooding was reported by the Local Authority or OPW Regional Engineers, nor was any evidence of flooding observed at this location during the site inspection. Subsequent enquiries revealed that the watercourse in question, the Bracken Stream, had been modelled during the FEM FRAMS and the more detailed flood maps available from this source indicated this site to be unaffected. Consequently **Balrothery is not considered to be an AFA.**

A4.2 NUR Luttrells, Fingal

Name: NUR Luttrells	County: Dublin	Unique ID: 80047	PFRA Status: IRR
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Swords	
LA comments confirm flood risk?: No Knowledge			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2520	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: None known			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: No knowledge of flooding to nursing home, some flooding at St Margarets Road.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 11/08/11			
Riverside Nursing Home located on site on inside of bend in river, golf course on other side of river.			
No obvious sign of any evidence of previous flooding, inspection of FEM FRAMS MPW and HPW modelling output indicates site not affected by 1% or 10% AEP flooding and only limited impact with low confidence for 0.1% AEP event (see drawing below).			
It is therefore unlikely that this would be an AFA.			
Size of river: 3+m wide, 1.5-2m deep channel		Channel vegetation: Heavily vegetated	
Channel condition: unclear due to overgrowth		Structures: None visible locally, ponded area in golf course d/s	
Flood defences: None visible		Nature of flow: Sluggish	
Nature of floodplain: Un confined, both banks		Floodplain vegetation: Predominantly grass although dense tree/hedge line along boundary of golf course	
Properties: Riverside Nursing Home		Evidence of flooding: No	

FEM FRAMS, Ward Model Flood Extent Map:



Photographs:



Recommendation:

The residential home at Luttrells was originally identified as an Individual Risk Receptor for inclusion in the Flood Risk Review with a FRI score of 2520. No knowledge of flooding at this location was reported by either the Local Authority or OPW Regional Engineers. The site inspection confirmed the site to be located on the inside of a bend in the Ward River however no visible evidence of any flooding was observed. Enquires following the site inspection established that this part of the Ward River was modelled during the FEM FRAMS and the more detailed flood maps arising from this assessment indicated only the 0.1% AEP event to affect the site. Consequently when the FRI score is adjusted to reflect the reduced flood risk **Luttrells should not be considered an AFA.**

A4.3 Santry Demesne, Fingal

Name: Santry Demesne	County: Fingal	Unique ID: 90100	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Santry	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2990	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: No			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: -			
Summary of Site Inspection			
Site inspection observations: 23/08/11			
The PFRA predictive mapping is very spiky and looks incorrect. The properties shown to be at risk are all well raised and look to be out of the floodplain.			
Size of river: 4m x 3m		Channel vegetation: Tree lined and short grass	
Channel condition: -		Structures: Road bridges	
Flood defences: -		Nature of flow: -	
Nature of floodplain: Constricted		Floodplain vegetation: Short grass, parkland	
Properties: Residential and commercial		Evidence of flooding: -	
Photographs: None taken			
Recommendation: Santry Demesne was originally listed as a Possible Area for Further Assessment with a FRI score of 2,990. The PFRA predictive mapping at Santry Demesne looks to be incorrect as large spikes protrude from the flood extent which if removed would reduce the FRI score significantly. The 10%AEP, 1%AEP, and 0.1%AEP flood extents are also exactly the same which further indicates potential unreliability in the results of the PFRA predictive mapping. Santry Demesne is located along the Santry River, which is contained within a relatively deep green corridor and all of the properties shown to be at risk by the PFRA predictive mapping are well raised above the normal river level are unlikely to be at risk in reality. Consequently the FRI score is likely to be reduced to near 0 and therefore Santry Demesne should not be considered an AFA			

A4.4 Sutton & Baldoyle, Fingal

Name: Sutton & Baldoyle	County: Fingal	Unique ID: 90102	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive and historic			
Historical Analysis			
Historical Risk (0-4): - 0		Historical Hazard (0-4): - 0	
Number of flood report locations on floodmaps.ie: 4		Closest searchable town on floodmaps.ie: Sutton	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 3484	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 4		Historical Validation Hazard (0-4): 2	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: Extensive tidal flooding occurred in this area in 2002.			
Summary of Site Inspection			
Site inspection observations: 23/08/11			
Much of this area is relatively low lying and open to the coast with only a low seawall protecting numerous properties. The ICPSS broad scale modelling indicates extensive tidal flood risk to parts of Sutton & Baldoyle. FEM FRAMS coastal flood modelling appears to indicate that walls along north side may be high enough to prevent tidal inundation at Baldoyle. However historical evidence gives little reason to question PFRA FRI scoring, therefore definitely an AFA.			
Size of river: n/a		Channel vegetation: n/a	
Channel condition: n/a		Structures: -	
Flood defences: Low sea walls		Nature of flow: n/a	
Nature of floodplain: Broad		Floodplain vegetation: Urbanised	
Properties: Numerous residential properties also possible risk to schools.		Evidence of flooding: None observed	
Photographs: None taken			
Recommendation: Sutton & Baldoyle was originally listed as a Probable Area for Further Assessment with a FRI score of 3,484. The Irish Coastal Protection Strategy has indicated that these areas are at significant risk from coastal flooding which has been confirmed by site inspection. Based on the site inspection there is no obvious justification for reducing the FRI score, and since it would require a significant reduction to fall below the AFA threshold, it is therefore recommended that Sutton and Baldoyle should be considered an AFA.			

A4.5 Sutton & Howth North, Fingal

Name: Sutton & Howth North	County: Fingal	Unique ID: 90103	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive and historic			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 4		Closest searchable town on floodmaps.ie: Sutton	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 323	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 4		Historical Validation Hazard (0-4): 2	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: Various LA reports document tidal flooding having occurred in the Greenfields road area in 2002. Reports also mention flooding at Bloody Stream Pub which appears to be a result of tidal and pluvial flooding "The road is susceptible to flooding due to a combination of high tides and surface runoff from Howth Hill. The 'Bloody Stream' Pub, which is located under Dart Station, was flooded in November 2002. Insufficient culvert capacity is cause. . (Ref. Report on Flooding in Fingal, 2004).			
Summary of Site Inspection			
Site inspection observations: 23/08/11			
The area around Greenfields/Strand Road is relatively low lying and open to the coast with only a low seawall potentially providing protection to numerous properties. The ICPSS broad scale modelling also indicates tidal flood risk to this area. Historical evidence and the ICPSS modelling gives little reason to question PFRA FRI scoring, therefore definitely an AFA. Flooding from the Bloody Stream has also been raised as an issue by the LA. Examination of floodmaps.ie reports indicates the only recorded instances to be at the Bloody Stream Pub/Dart Station in Howth which appears to be some 500m east of the actual course of the Bloody Stream.			
Size of river: -		Channel vegetation:	
Channel condition:		Structures: Sea Wall/Culvert	
Flood defences: Low sea walls		Nature of flow:	
Nature of floodplain: Broad		Floodplain vegetation: Urbanised	
Properties: Numerous residential properties also possible risk to schools.		Evidence of flooding: None observed	
Photographs: None taken			
Recommendation: Sutton & Howth was originally listed as a Probable Area for Further Assessment with a FRI score of 323. The Irish Coastal Protection Strategy has indicated that this area is at significant risk from coastal flooding as confirmed during the site inspection. Consequently there is no obvious justification for reducing the FRI score, and it is therefore recommended that Sutton and Howth North should be considered an AFA.			

A5.1 Ballymore Eustace, Co Kildare

Name: Ballymore Eustace	County: Kildare	Unique ID: 91019	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Ballymore Eustace	
LA comments confirm flood risk?: Yes (Dam)			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 0	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: No			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: Close downstream of Pollaphuca Dam, major threat considered to be dam breach, no reported history of flooding.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 24/06/11			
The river is large with a moderately fast flow. A couple of properties look be low enough to be at risk however this is difficult to judge as the river is artificially controlled by the dam upstream and the attenuation from Pollaphuca Reservoir.			
Size of river: 30m (w) 5m (d)		Channel vegetation: Low veg in channel	
Channel condition: -		Structures: Road bridge	
Flood defences: None visible		Nature of flow: Modified	
Nature of floodplain: Restricted US, widens at town		Floodplain vegetation: Trees and grassland	
Properties: Comm. Prop US of bridge. Res prop DS		Evidence of flooding: none	

Photographs:



Recommendation:

Ballymore Eustace was originally listed as a Possible Area for Further Assessment although no FRI score was recorded in the PFRA database. Review of the results of the predictive analysis and historical records did not reveal a significant flood hazard and it appears that this area was identified by the Local Authority as a result of the potential implications of a dam breach. The site inspection found most properties to be located on elevated sites above the river outside of the likely normal floodplain, confirming the results of the predictive and historic assessment. It was also observed that the flow in the Liffey at Ballymore Eustace is controlled by the ESB dams upstream and therefore the greatest flood risk to this location was confirmed to be from a dam breach rather than natural out of bank flooding. Consequently **Ballymore Eustace is not considered to be an AFA.**

A5.2 Blacktrench, Co Kildare

Name: Blacktrench	County: Kildare	Unique ID: 90073 & 91032	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical and Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Naas	
LA comments confirm flood risk?: No, Question map over predictive mapping			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 270	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: No knowledge of any flood risk.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 28/06/11			
The Blacktrench area is very flat with a lot of land drains. The predictive flood mapping looks unusual but it is obvious that if the river breached its bank and there was sufficient quantity of water the flood extent could spread over a large area. The flow is contained within a significant channel. The southern extent of the flooding may not be accurate as the road travelling south away from Blacktrench rises.			
Size of river: 3m (w) 2m (d)		Channel vegetation: Long grass	
Channel condition -		Structures: Road br DS of Blacktrench	
Flood defences: -		Nature of flow: slow	
Nature of floodplain: Flat and wide		Floodplain vegetation: Long grass. Trees along river corridor	
Properties: Res props		Evidence of flooding: none	

Photographs:



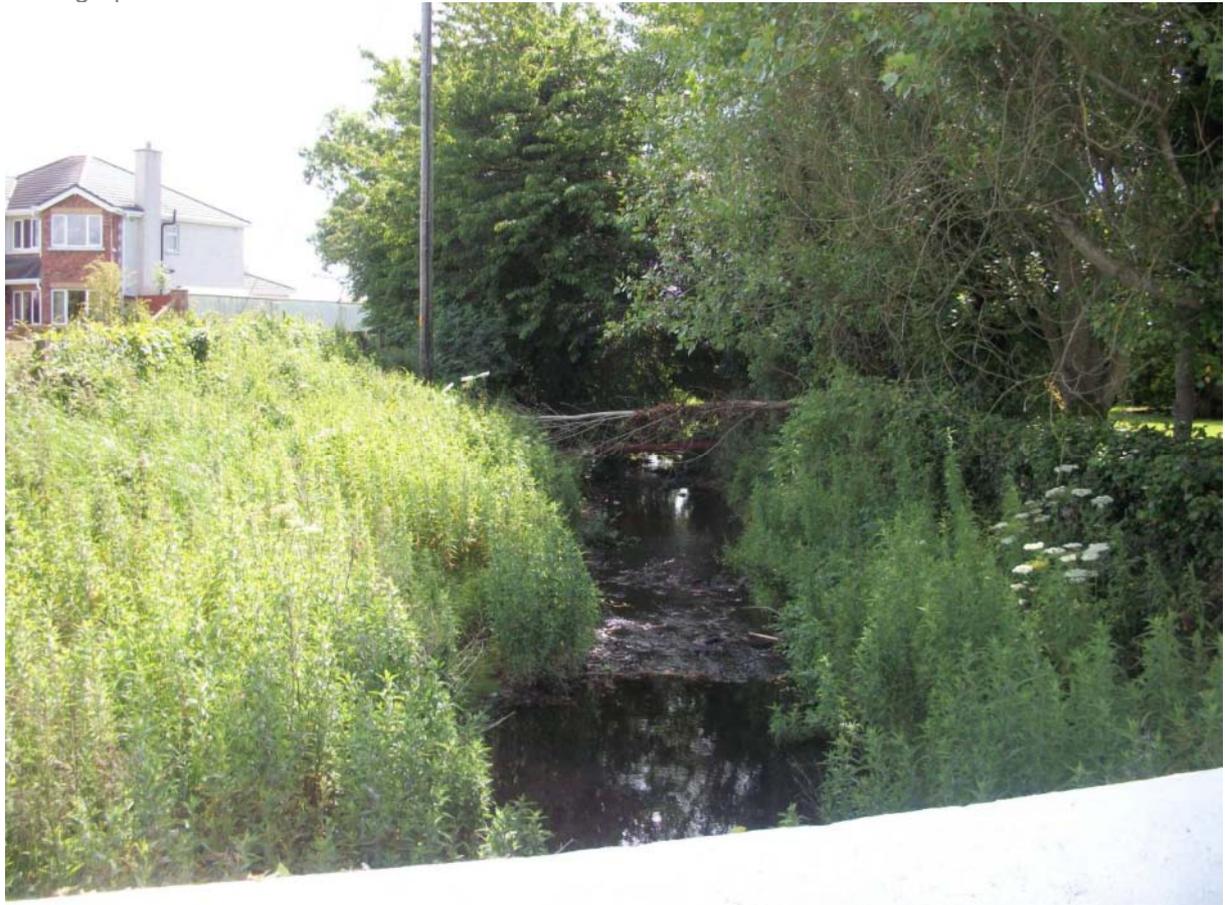
Recommendation:

Blacktrench was originally listed as a Possible Area for Further Assessment with a FRI score of 270, principally attributable to the PFRA predictive mapping prepared by OPW indicating 26 properties to lie within the 10%AEP floodplain generating a FRI score of 260. The flood extents for the 10%AEP, 1%AEP and 0.1%AEP events are identical which suggests a degree of inaccuracy in the PFRA predictive mapping. The predicted flood outlines also do not appear to be commensurate with the contours of the ground as depicted on OS mapping and observed during the site inspection. (During the site inspection it was noted that the ground to the south of the main road rises and therefore would not flood during the lower return period events). There are 11 properties within this area and if these are removed from the 10%AEP floodplain in the FRI analysis the score is reduced to 150. Neither the Local Authority nor OPW Regional Engineers reported any knowledge of a history of flooding at Blacktrench, although www.floodmaps.ie reports low lying areas to flood after heavy rain (the site inspection observations tend to support this). Consequently although there appears to be a flood hazard, **Blacktrench is not considered to be an AFA.**

A5.3 Carragh, Co Kildare

Name: Carragh	County: Kildare	Unique ID: 90075	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Naas	
LA comments confirm flood risk?: No comment			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 151.6	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Some flooding has occurred in the past from tributary stream. No details of extent or if properties were affected.			
Summary of Site Inspection			
Site inspection observations: 28/06/11			
Visited Awillyinish Stream at US extent of Carragh. Channel is very overgrown US of road bridge. Residential estate DS of road bridge on LHB is higher than RHB. Flooding would occur to the right first. Minor wc flowing through residential estates in Carragh is also overgrown with low flow. Railway bridge does not look to be at risk of blockages.			
Size of river: 3m (w) 2m (d) A 2m (w) 2m (d) mnr wc		Channel vegetation: Dense veg	
Channel condition:		Structures: Road Bridge & Railway Bridge (A) Road bridges (mnr wc)	
Flood defences: -		Nature of flow: Slow	
Nature of floodplain: wide		Floodplain vegetation: Urban or long grass	
Properties: Residential		Evidence of flooding: None	

Photographs:



Recommendation:

Carragh was originally listed as a Possible Area for Further Assessment with a FRI score of 151.6. Local Authority comments and www.floodmaps.ie have highlighted that flooding does occur at the upstream extent of Carragh near the road bridge. However no evidence of additional flood risk was noted during the site inspection. Thus although the Local Authority and OPW Regional Engineers comments confirm the existence of a flood risk, this is not considered significant in the national context and consequently **Carragh is not considered to be an AFA.**

A5.4 Celbridge, Co Kildare

Name: Celbridge	County: Kildare	Unique ID: 90076 & 91048	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical and Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 2		Historical Hazard (0-4): 3	
Number of flood report locations on floodmaps.ie: 11		Closest searchable town on floodmaps.ie: Celbridge	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 5653.9	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 2		Historical Validation Hazard (0-4): 3	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Flooding in Celbridge occurred during the Aug 08 and Nov 09 floods. The LA confirmed that flooding has affected both commercial and residential property. The following areas were highlighted as areas where the river has breached its banks or as an area of potential risk: Hazelhatch Road crossing the River Liffey, breached its banks Main Street at the River Liffey/Tony River junction Tony River adjacent to Vanessa Close and St Patricks Park Tony River adjacent to the Oldtown Rd/The Lawn/Willowbrook Rd cross roads			
<u>Summary of Site Inspection</u>			
Site inspection observations: 07/07/11			
The Tony River shows flooding in the predictive mapping at the US development boundary in Celbridge. The land is very flat here with numerous land drains. The river is overgrown with a very low flow. The grassland does look to be at risk of flooding but it is unclear as to the risk to Oldtown Road. LA did identify the Oldtown/Willowbrook crossroads as a flood risk area. The Tony River flows into a culvert at the Old town Road and the flood extent shown immediately DS may not be accurate. The wc opens at Venessa Close. There is little freeboard afforded to the houses if out of bank flooding were to occur. The Tony River flows through a culvert under Main St before entering the Liffey. This has flooded in the past. There is potential risk of blockages here and the access road slopes down to Main street where numerous shops are located. The minor watercourses located to the north of Celbridge flows through residential housing estates. The channel is relatively large and there has been no history of flooding. This was confirmed by a local resident at Crodaun Forest Park housing estate of 30yrs. The Liffey has caused flooding in the past and the risk point is at the footbridge where the millrace enters the Liffey.			
Size of river: 1.5m (w) 1.5m (d) Tony 3m (w) 3m (d) mnr 25m (w) 4m (d) Liffey		Channel vegetation: Dense veg (tony) Dense veg – short grass in res est (mnr) Low veg (Liffey)	
Channel condition: -		Structures: Numerous culverts and bridge. Tony River Culver under main st risk of blockage	
Flood defences: -		Nature of flow: Low (tony) Low (mnr) Mod (Liffey)	
Nature of floodplain: Wide US narrows DS (tony)		Floodplain vegetation: Mainly sub urban	
Properties: Residential and commercial inc a school and		Evidence of flooding: None	

church

Photographs:



Recommendation:

Celbridge was originally listed as a Probable Area for Further Assessment with a FRI score of 5654. The historical records of the Liffey having flooded at Celbridge and affected properties was confirmed by both the Local Authority and OPW Regional Engineers. The PFRA predictive mapping indicates extensive flooding and nothing was noted during the site inspection to contradict this. It is therefore recommended that **Celbridge is considered an AFA.**

A5.5 Clane. Co Kildare

Name: Clane	County: Kildare	Unique ID: 90078 & 91049	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Historical and Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 4		Closest searchable town on floodmaps.ie: Clane	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 7223.8	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: LA confirmed that flooding has occurred in Clane. The following areas were identified as areas at potential risk: US and DS of Sallins Rd Bridge over the Liffey and adjacent to Alexandra Manor. Along the tributary Butter Stream at Main St and Prosperous Rd at the junctions with Butterstream Dr, Butterstream Rd and along Butterstream Rd itself. This has flooded 8-10 houses and an old people's home in the past. A scheme to alleviate the flooding along parts of the Butterstream has been carried out consisting of a 1500mm dia pipe 560m in length beside the hospital and GAA grounds.			
Summary of Site Inspection			
Site inspection observations: 05/07/11			
Walked from development limit on the Butterstream DS to the confluence with the Liffey. Butterstream starts as a small wc with limited capacity, the surrounding road and houses are flat with little freeboard. Stream cross a numerous access bridges to houses. If stream has insufficient capacity or bridges constrict flow or block then out of bank flood could occur as shown in PFRA mapping. Butterstream crosses Prosperous Road, extra wall has been added at the inlet, water less likely to go out of bank. Wc enters hospital, footbridge looks undersized. Culverted under carpark, inlet grille difficult to rake and may be prone to blockages. DS of hospital wc enters culvert under GAA grounds. Small culvert (600mm?) with grille. Undersized, scheme has been carried out with overspill weir and diversion culvert (1500mm?). Stop logs at outlet of diversion culvert cause the culvert to attenuate flow before releasing in on DS. As PFRA does not consider this scheme the question is does the scheme solve the flooding problem around Prosperous Road? The PFRA mapping looks to show overland flooding from around the hospital areas which flows through Clane town and joins a Liffey trib. If this does not in fact happen the flood damage would be significantly reduced. Also as the model shows most of the flow being diverted through the town if this is not actually the case then there may be an increased possibility of flooding at the DS section of the Butterstream around Aldi. The channel approaching the Liffey is deep and may contain a large flow within it. The play park area DS of Aldi does have a shallow channel and may be at risk. US of Sallins Rd Br over the Liffey apartments located on the LHB. Channel is not overly deep here and there is little freeboard afforded to the aprts. Would agree with the PFRA mapping. DS of Sallins Road Bridge housing estate is protected by earth embankment although there are a few low points located along it however the field on the LHB look lower is general than the RHB. FFL of the houses appear to be quite low. The meander where flooding is shown looks to be high ground and may not flood but the apartments behind this are low and there may be a flood route into them from further DS. There is limited flooding shown from the Liffey trib. The wc is small and heavy vegetated and the surrounding land is flat. It is reasonable to assume that if out of bank flooding were to occur the properties shown as flooding would. The flood route from the Butterstream enters this trib. The overland flood route is quite flat but does generally fall to the trib. The bisecting Capdoo Park road is raised and may not actually allow for this flood route as shown.			

Size of river: BS 1m (w) 1m (d) – 3m (w) 3m (d) Trib 2m (w) 1m (d) Liffey 20m (w) 5m (d)	Channel vegetation: BS – mod veg Trib – dense veg Liffey – mod veg
Channel condition: - BS – canalised in parts	Structures: BS – series of access bridges, potential blockages
Flood defences: BS – diversion culvert DS of hospital	Nature of flow: BS – low flow Trib – low flow Liffey – mod flow
Nature of floodplain: Clane is relatively flat	Floodplain vegetation: BS – mainly urban Trib – long grass Liffey – grass fields
Properties: BS – within hospital, adj to supermarket and houses	Evidence of flooding: BS - Flood alleviation scheme

Photographs:



Recommendation:

Clane was originally listed as a Probable Area for Further Assessment with a FRI score of 7223.8. All sources of information (Local Authority, OPW Regional Engineers, PFRA predictive mapping and historical) confirm the existence of a flood risk at Clane. The PFRA assigns a FRI score of 7223.8 to Clane, however the majority of the flood damage appears to be associated with the Butterstream and there is some uncertainty over this risk for the following reasons;

A flood alleviation scheme has been carried out on the Butterstream,

The route of the Butterstream towards the downstream extent where it joins the Liffey has been incorrectly represented in the PFRA process, consequently the predictive flood mapping in this area are therefore likely to be incorrect,

The flood extent on the Butterstream links with another minor watercourse to the north which looks unrealistic. In other areas there is no difference in the 10%AEP, 1%AEP and 0.1%AEP flood

extents which suggests inaccuracy in the PFRA predictive mapping process. However even taking a conservative approach and excluding all areas of flooding where there are significant grounds to doubt the PFRA predictive mapping the revised FRI score remains greater than 500. Consequently it is recommended that **Clane is considered an AFA.**

A5.6 Grange, Co Kildare

Name: Grange	County: Kildare	Unique ID: 91080	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Historical			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Grange	
LA comments confirm flood risk?: No comment			
Predictive Analysis			
Predictive mapping indicates flooding?: No		Flood Risk Index: 0	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: No			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: No knowledge of flooding, some history of flooding at Newtown which is close by, Meath Co Co believed to have undertaken scheme.			
Summary of Site Inspection			
Site inspection observations: 30/06/11			
It is unclear as to why this is included as a possible AFA. It is located on the side of a hill with no watercourse near it. This should be looked at further by OPW.			
OPW response: The Grange that is to be included as a possible AFA is located in Sligo. Grange Kildare should not have been added.			
Size of river:		Channel vegetation:	
Channel condition:		Structures:	
Flood defences:		Nature of flow:	
Nature of floodplain:		Floodplain vegetation:	
Properties:		Evidence of flooding:	
Photographs: None taken			
Recommendation: Grange was originally listed as a Possible Area for Further Assessment although no FRI score or comments from either the Local Authority or OPW Regional Engineers were found within the PFRA database. No significant flood risk was observed at Grange during the site inspection nor is any significant flood risk indicated by the PFRA predictive mapping. Following discussions with OPW it appears that Grange, Co Kildare may have been identified in error and that the flood reports mentioned in the PFRA analysis actually relate to Grange, Co Sligo. Therefore Grange Co Kildare is not an AFA.			

A5.7 Johnstown Bridge, Co Kildare

Name: Johnstown Bridge	County: Kildare	Unique ID: 70035 & 70868	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Historical and Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Johnstown Bridge	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 390	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: No			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: OPW maintain Blackwater and Fear English Rivers as arterial drainage schemes, no knowledge of any flooding to housing development at confluence.			
Summary of Site Inspection			
Site inspection observations: 30/06/11			
Flood risk is to Dunferth Park where the minor wc meets the Blackwater. The flooding seems to be primarily from the minor wc although could be exacerbated by the backwater effect from the Blackwater. US from the housing estate the wc has a small channel (2m wide 1m deep) and quite a pronounced floodplain with reeds growing in it. It looks like the fields US do flood as shown in the flood mapping. This would suggest that the housing estate was built in the wc's flood plain however the channel has been widened and deepened through the housing estate to 4m wide and 3m deep. The road culvert is extremely large and it is questionable as to what return period the channel would contain. If the channel did breach its banks however there is little freeboard afforded to the houses shown in the flood mapping. The RHB is slightly lower than the LHB. While there is a risk of overland flow coming from out of bank flooding upstream a brickwork wall acts as a barrier and only two houses on the US side of the wall would therefore be affected. A resident gave an account of the 08 or 09 flood and said the water reached where the short grass started within the channel. No out of bank flooding occurred. Although we do not know the size of this flood event it may be reasonable to assume that the channel can contain a larger event than the <i>Q_{med}</i> assumed in the PFRA. The flood extent shown may therefore be reduced. OPW local area staff should be contacted to ascertain if a section 50 approval was provided for the culverting of this wc which may give details of a hydraulic analysis carried out.			
Size of river: 4m (w) 4m (d) Blackwater 4m (w) 3m (d) Fear English		Channel vegetation: Medium length grass	
Channel condition: -		Structures: Road bridge (BW) Road culvert and footbridge (FE)	
Flood defences: -		Nature of flow: Slow	
Nature of floodplain: Relatively flat but gently sloping		Floodplain vegetation: Long grass	
Properties: Residential estate		Evidence of flooding: None	

Photographs:



Recommendation:

Johnstown Bridge was originally listed as a Probable Area for Further Assessment with a FRI score of 390, principally due to predicted flooding of a relatively recent housing development, Dunferth Park, located at the confluence of a minor watercourse and the River Blackwater. During the site inspection it was observed that neither of the channels associated with the watercourses looked natural and as a consequence the accuracy of the PFRA predictive mapping assumption of channel capacity being limited the Q_{med} was considered questionable. OPW Regional Engineers confirmed that both watercourses were subject to an OPW drainage scheme and can convey a greater flow than the Q_{med} . RPS therefore undertook a channel capacity assessment on the two watercourses at the housing estate which established that both watercourses can contain between the 10%AEP and 1%AEP flow. By removing the affected properties from the 10%AEP flood extent and recalculating the FRI score would be reduced from 390 to 121 which would be below the threshold for an AFA. However OPW policy is to ignore the impact of flood alleviation works in assessing the potential flood risk therefore **Johnstown Bridge should be considered an AFA.**

A5.8 Johnstown, Co Kildare

Name: Johnstown	County: Kildare	Unique ID: 90086	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive (mapping error?)			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Johnstown	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 1890.1	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 2	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: 1:100yr scheme currently under construction along Hartwell River (Embankments) Stone arch bridge supplemented with 3 dry concrete box culverts to provide 1:100 +20% capacity on Morell River Bypass channel proposed from Owenmore Stream to Morell River to resolve known flooding issue.			
Summary of Site Inspection			
Site inspection observations: 28/06/11			
OPW scheme currently under construction. Consists of walls and embankment along with culvert upgrades with flap valves. Owenmore channel further upstream has many access bridges over it with a relatively small channel capacity. Properties have sand bags stored.			
Size of river: 3m (w) 2m (d) Morell 2m (w) 1m (d) Owenmore		Channel vegetation: Long grass on banks	
Channel condition: -		Structures: Numerous access bridges	
Flood defences: OPW Scheme on going		Nature of flow: Low	
Nature of floodplain: Flat		Floodplain vegetation: Sub urban	
Properties: Residential estates. Few commercial properties.		Evidence of flooding: Sandbags	

Photographs:



Recommendation:

Johnstown was originally listed as a Possible Area for Further Assessment with a FRI score of 1890. There is a history of flooding at Johnstown, as depicted by the PFRA predictive mapping and review of flooding incident records on www.floodmaps.ie and confirmed in discussions with the Local Authority. An OPW funded flood alleviation scheme is currently under construction which will provide protection for up to 1%AEP flows in the Morell River however a residual risk will remain and therefore **Johnstown should be considered an AFA**. Further to this, section 3.5.20 details a recommendation for the Morell River catchment to be considered as a single AFA and consequently Johnstown would then lie within the Morell Catchment AFA.

A5.9 Kilcock, Co Kildare

Name: Kilcock	County: Kildare	Unique ID: 91095	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 4		Closest searchable town on floodmaps.ie: Maynooth	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 0	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: LA identified two places where flooding has occurred which affected properties. At the R125 road bridge and the R158 road bridge.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 30/06/11			
There is little flooding to Kilcock shown in the flood mapping. Although what flooding is shown looks to be reasonable. A study has been carried out of Kilcock and should be looked at to assess the risk.			
Size of river: 7m (w) 3m (d)		Channel vegetation: Long grass	
Channel condition: -		Structures: Road bridges, may cause constriction	
Flood defences: -		Nature of flow: Mod flow	
Nature of floodplain: flat		Floodplain vegetation: Long grass of urban	
Properties: Pub, residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Kilcock was originally listed as a Probable Area for Further Assessment due to the fact that a previous Flood Risk Study had been undertaken by the Local Authority. No FRI score was recorded in the PFRA database nor did the predictive mapping indicate a flood risk. Historical flood records for Kilcock on www.floodmaps.ie and OPW regional staff have identified that the pub at The Square has flooded in the past. This suggests that the predictive flood mapping at this point on the Ryewater has been underestimated as the pub is shown to be outside the 0.1%AEP extent. Whilst it is unknown what size of event flooded the pub, OPW Regional Engineering staff have raised concerns about the flood risk to the whole of The Square area. The site inspection found that this area is very flat and looks low lying relative to the river, it is therefore considered reasonable to assume that there is a flood risk to this area. The OPW regional staff also indicated a flood risk to houses at the downstream extent of Kilcock which again would suggest that the PFRA predictive mapping has been underestimated. Given the density of properties at these two locations it is reasonable to assume that the FRI score should be greater than 250. Consequently it is recommended that **Kilcock should be considered an AFA.**

A5.10 Kilcullen, Co Kildare

Name: Kilcullen	County: Kildare	Unique ID: 91096	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: LA feedback			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Kilcullen	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 0	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: -			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: No major flooding has ever been witnessed.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 24/06/11			
The River Liffey flows through Kilcullen and shows to flood a property block consisting of apartments and commercial units. The Liffey channel is large here and the property blocks well raised. It is difficult to assess the potential for out of bank flooding however if this were to occur the ground floor properties would be affected along with the underground car parking. A similar risk would be afforded to the buildings DS of the Kilcullen Bridge. A low point exists to the east of the Kilcullen bridge and ponding would occur during out of bank flooding.			
Size of river: 20m (w) 5m (d)		Channel vegetation: Low veg	
Channel condition: -		Structures: Kilcullen Bridge	
Flood defences: -		Nature of flow: Mod	
Nature of floodplain: constricted		Floodplain vegetation: urban	
Properties: Residential and commercial		Evidence of flooding: none	

Photographs:



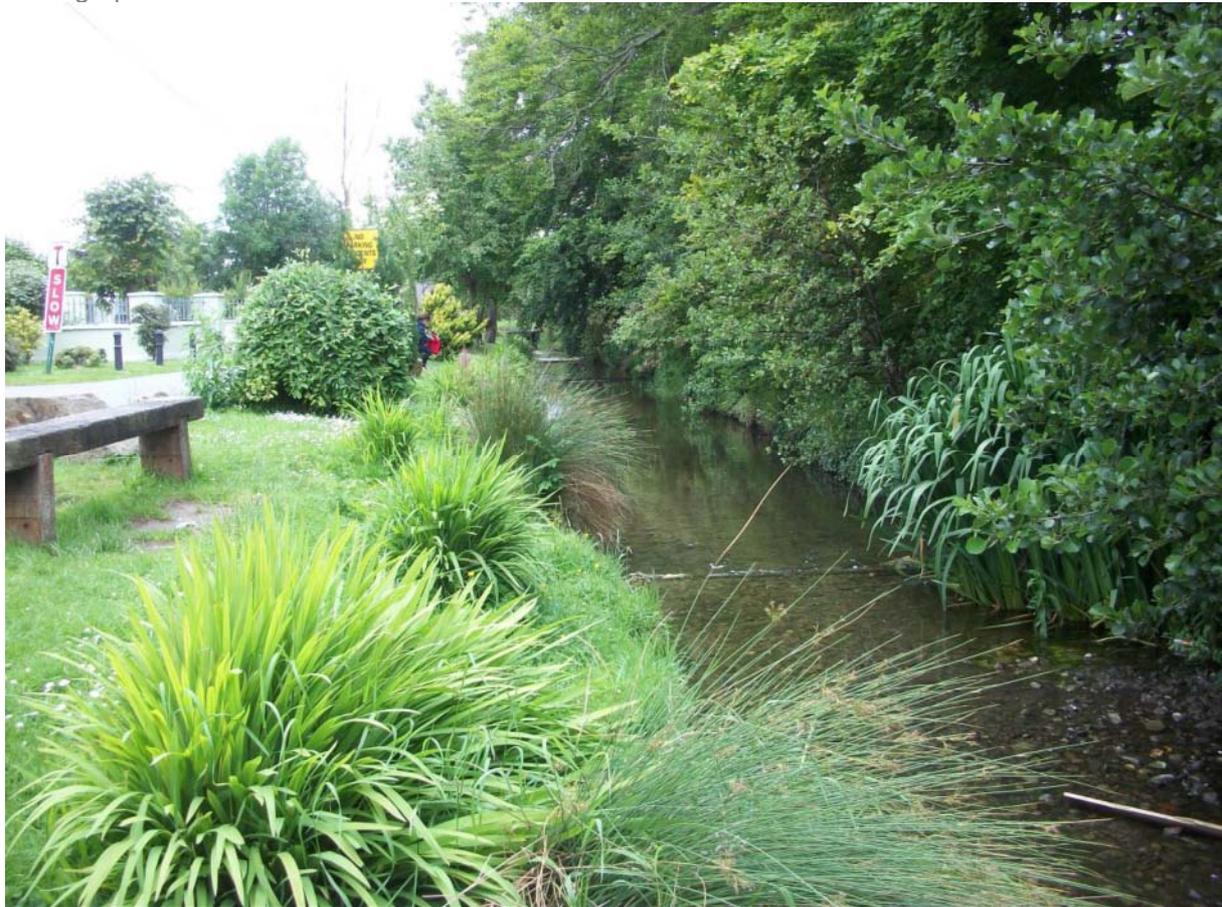
Recommendation:

Kilcullen was originally listed as a Possible Area for Further Assessment although no FRI score was available, despite the PFRA predictive mapping showing some properties to potentially be flooded. Historical records from www.floodmaps.ie indicate that the Bank on the downstream side of the bridge was flooded in 1993. However the properties shown to be flooded by the PFRA predictive mapping look to be well raised and therefore generate some doubt as to the accuracy of the PFRA predictive mapping. Similarly neither the Local Authority nor the OPW Regional Engineers had any knowledge of flooding having occurred in Kilcullen. An intermediate channel capacity assessment of the Liffey at Kilcullen indicates that the existing "natural" channel can almost contain the 1%AEP flow and while the analysis method employed is very approximate it does give an indication that the 10%AEP flow is likely to be contained within the channel. The historical records support this as the 1993 flood would have been of larger magnitude than a 10%AEP event and it only flooded one property, mainly in the basement. Even being conservative and including the properties downstream of the bridge that are shown in the 10%AEP flood extent the revised FRI score would be 75.4. Consequently it is recommended that **Kilcullen should not be considered an AFA.**

A5.11 Kill, Co Kildare

Name: Kill	County: Kildare	Unique ID: 90087 & 91097	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Historical and Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 2	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Kill	
LA comments confirm flood risk?: Yes (Monasterevin?)			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 255	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 2	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Known drainage network problem in Kill, no knowledge of significant flooding directly from river. Comment in PFRA relates to a different Kill.			
Summary of Site Inspection			
Site inspection observations: 28/06/11			
The river channel through Kill is relatively small and there is little protection afforded to the roads and houses located adjacent to it. The wc flows through a culvert which looks reasonably sized. A fence separates Kill from the N7 but there is no freeboard to prevent water flowing onto the N7. The channel DS of the N7 is shallow also with numerous access bridges spanning it.			
Size of river: 2m (w) 0.5m (d)		Channel vegetation: Short grass	
Channel condition: -		Structures: Road bridges, small weirs	
Flood defences: -		Nature of flow: low	
Nature of floodplain: Flat		Floodplain vegetation: Sub urban, short grass	
Properties: residential		Evidence of flooding: none	

Photographs:



Recommendation:

Kill was originally listed as a Possible Area for Further Assessment with a FRI score of 255. The PFRA predictive mapping outputs are generally supported by the historical flood information provided on www.floodmaps.ie. Kildare Co Co has identified the principal flooding risk in Kill to be associated with undersized culverts. The PFRA predictive mapping at the downstream limit looks to be inaccurate as the 10%AEP, 1%AEP and 0.1%AEP flood outlines are the exact same and contain three properties which if they were excluded from the FRI score would drop it to 225. So although there seems to be flood risk at Kill it is not considered significant enough in a national context for Kill to be classed as an AFA in its own right. It is therefore recommended that **Kill should not be considered an AFA**. The Kill River which flows through Kill is a tributary of the Morell River and if the recommendation in section 3.5.20 for the adoption of a Morell River AFA is accepted should be designated as a high priority watercourse. If this is the case then the flood risk to Kill will be considered as part of the assessment for a Morell catchment AFA.

A5.12 Leixlip, Co Kildare

Name: Leixlip	County: Kildare	Unique ID: 90089, 91111 & 91112	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical and Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 3		Historical Hazard (0-4): 4	
Number of flood report locations on floodmaps.ie: 9		Closest searchable town on floodmaps.ie: Leixlip	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 27,156.7	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 3		Historical Validation Hazard (0-4): 4	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: The majority of the flood risk comes from the Rye Water. Ryemount Abbey and Ryevale Lawns were identified as risk areas. Along with Station Rd, Pound St and Main St before the Ryewater enters the Liffey. A risk from the Liffey is present at Dublin Rd and Castle Park. The Dam US of Dublin Rd bridge was highlighted as a potential risk and would have severe consequences if breached. A small stream known as the Shilacon enters the Ryewater. A scheme has been carried out on Captains Hill bridge over the Shilacon.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 07/07/11			
The Ryewater stays is a relatively deep channel through the residential estates as it enters Leixlip but some houses do look to be low in the valley and may be at risk. The town centre is low lying and would flood substantially if out of bank flooding were to occur from the lower part of the Ryewater or from the Liffey. The Shilacon is a small wc which shows flooding mainly in its upper reaches. A scheme has been carried out to prevent flooding on the Dunboyne Rd.			
Size of river: 20m x 5m (Liffey) 15m x 4m (Ryewater) 3m x 2m (Shilacon)		Channel vegetation: Tree lined with long grass (L) Tree lined with short grass, canalised DS (R) Dense – mod veg (S)	
Channel condition: -		Structures: Road bridges	
Flood defences: Scheme on the Shilacon		Nature of flow: Mod flow	
Nature of floodplain: Constricted through Leixlip, flat US on the Shilacon		Floodplain vegetation: Urban and parkland	
Properties: Residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Leixlip was originally listed as a Probable Area for Further Assessment with a FRI score of 27,157. PFRA predictive mapping shows extensive flooding to Leixlip from the River Liffey and Ryewater. The Local Authority identified the Ryewater as the main source of flood risk and confirmed that Leixlip has flooded in the past and that a minor works scheme has been carried out on one of the minor watercourses. There was nothing noted from the site inspection to contradict the PFRA analysis and given that the FRI score is 27,156 it would be extremely unlikely that it could drop to below 250. It is therefore recommended that **Leixlip should be considered an AFA.**

A5.13 ESB Longstone, Co Kildare

Name: ESB Longstone	County: Kildare	Unique ID: 90068	PFRA Status: IRR
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Ballymore Eustace	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 25000	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: Not known			
Has any works been undertaken?: Not a LA asset			
Are there any maintained defences?: Not Known			
LA comments: This is an ESB asset therefore LA has no knowledge			
Summary of Site Inspection			
Site inspection observations: 24/06/11			
Direct access to site prevented by security fence and locked gates. However inspection from remote locations and via Google maps indicated power infrastructure to be located immediately below dam adjacent to river Liffey.			
Not possible to ascertain height of assets above river however flow is controlled by sluices on dam with significant upstream storage available at Longstone and particularly further upstream at Pollaphuca therefore risk of natural flooding is limited, main risk is associated with potential dam breach.			
Size of river: -		Channel vegetation: Tree lined	
Channel condition: -		Structures: Dam/sluices US	
Flood defences: None obvious		Nature of flow: Mod flow	
Nature of floodplain: Confined		Floodplain vegetation: Wooded	
Properties: ESB power station		Evidence of flooding: -	
Photographs: None taken			
Recommendation: Longstone is an ESB power station on the River Liffey located just upstream of Ballymore Eustace and was originally listed as an Individual Risk Receptor. The River Liffey flows adjacent to this station but flows are regulated by both the dam at Longstone and the Pollaphuca dam further upstream. Due to the managed nature of the river flow at this location flooding from the river is not considered to be a significant flood risk to this station the principal risk is from a dam breach. It is therefore recommended that Longstone should not be considered an AFA.			

A5.14 Maynooth, Co Kildare

Name: Maynooth	County: Kildare	Unique ID: 90092 & 91127	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical and Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 3		Historical Hazard (0-4): 2	
Number of flood report locations on floodmaps.ie: 7		Closest searchable town on floodmaps.ie: Maynooth	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2299.95	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 3		Historical Validation Hazard (0-4): 2	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: LA highlighted that flooding occurred from Meadow Brook at the railway bridge although there is no record of any houses flooding. DS from this is a culverted section, the flood extent shown in the PFRA may need to be checked. LA confirmed the flood risk along the tributary of the Rye Water adjacent to Kilcock Rd. affects NUI campus.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 30/06/11			
Starting at the M4 on the Meadow Brook or Janie Slate and working DS. The wc flows through Meadowbrook housing estate. The wc has been canalised and the channel has been lowered slightly by cutting into bed rock. The channel is trapezoidal and relatively large in comparison with the flow. The channel is approx 6m wide and 3m deep at its largest and flows through 6 bridges and 2 culverts before passing under the Grand Canal. There is a moderate risk of blockages from some of the culverts and bridges and there is relatively little freeboard between the top of bank and the FFL of the surrounding houses. The flood extent shown looks reasonable however the effect of the bridges and culverts is unknown. Before passing under the railway line and Grand Canal the wc emerges from a culvert for a short period. If it were to breach its banks at this point there is the potential for some additional houses on the LHB to be affected which are not shown in the flood extent mapping. However the effect of the culvert US acting as a control structure is unknown. The wc crosses the railway and canal and open again parallel to Parsons Street. The LHB is contained behind a large stone wall approx 4m and would contain the flood water. This would alter the flood mapping. The RHB also has a wall although not quite as substantial. If the wc were to breach its banks here the houses adjacent to Parsons Street have no freeboard. The wc then turns 90° and flows under a house turns 90° again and flows behind the street of houses before flowing under a footbridge, a weir and the Parson Street road bridge. There is potential for out of bank flooding at this point. A Garda station is located within the flood mapping along with the council building yard. The fire station and health centre are outside. DS of Parson Street bridge the wc flows straight to the Layleen River. A large stone wall runs along the LHB protecting the old castle behind it. A smaller wall runs along the RHB where shops and cafes are located. There is a potential flood risk to them as shown in the flood mapping. Little flooding is shown on the Layleen river within the town centre. At the confluence with Meadow Brook the shopping centre on the LHB is well elevated and looks to be at low risk. The apartments DS of the confluence and Mill St bridge are at potential risk. Further US on the Layleen the old library and new library that is being constructed look to be at a lower level than the wc (the wc is not at the lowest level) a history of flooding has occur here before and although a stone wall exists between the wc and the libraries if it were to breach or overtop a large amount of flooding would occur. The top of the wall seems to be lower than the road on the LHB of the wc.			
Size of river: 5m x 3m (Meadow Brook) 8m x 4m (Layleen River)		Channel vegetation: Mod veg	

Channel condition: -	Structures: Numerous culverts, weirs
Flood defences: -	Nature of flow: Low flow (MB) Mod flow (L)
Nature of floodplain: Flat	Floodplain vegetation: Urban – sub urban
Properties: Residential and commercial	Evidence of flooding: None

Photographs:



Recommendation:

Maynooth was originally listed as a Probable Area for Further Assessment with a FRI score of 2,299. The PFRA predictive mapping shows extensive flooding to Maynooth, which is confirmed by historic records. The historical evidence and information provided by the Local Authority indicate that additional properties beyond what is identified in the PFRA predictive mapping have flooded and there was nothing noted during the site inspection to contradict this. It is therefore recommended that **Maynooth should be considered an AFA.**

A5.15 Naas, Co Kildare

Name: Naas	County: Kildare	Unique ID: 90094	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 2		Closest searchable town on floodmaps.ie: Naas	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 3364	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: The main flooding problem in Naas is from surface water. From a river flooding source the following areas were identified: The Grand Canal feeder stream that crosses Limerick Rd – the culvert is undersized and breaches its banks. The minor wc that flows adjacent to Blessington Rd is at risk of breaching its banks. Fishery lane where it crosses the Morell River is at risk.			
Summary of Site Inspection			
Site inspection observations: 24/06/11			
Feeder stream visited at Limerick Road. The culvert does look undersized and prone to blockages. Following the Grand Canal and watercourse, there may be potential for out of bank flooding as shown from the wc but more likely to extend out on the RHB as the canal will act as a barrier on the left. Unclear as to flood extent at Mill Lane, Millbridge Av and Sallins Rd. Hard to gain access. Stone wall running along Mill Lane and Millbridge Av may contain the flood water and the extent may be less than shown. Minor wc at Blessington Road – the An Post may be at risk if out of bank flooding were to occur.			
Size of river: 4m x 2m (feeder stream) 4m x 2m (Stream through Naas)		Channel vegetation: Mod veg (FS) Dense veg (StN)	
Channel condition: Pond (StN)		Structures: Road bridges	
Flood defences: -		Nature of flow: Low flow	
Nature of floodplain: Relatively flat		Floodplain vegetation: Urban with wooded areas	
Properties: Residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Naas was originally listed as a Probable Area for Further Assessment with a FRI score of 3,364. The PFRA predictive mapping shows significant flooding to Naas which is supported by historic evidence. A canal feeder stream flowing through Naas has been identified by the Local Authority give rise to have a significant flood risk. From the site inspection it was found that the culvert this stream flows through before entering the canal is undersized and looks prone to blockages causing flows to impact on the Limerick Road area. This stream was not modelled as part of the PFRA process and it is therefore likely that the FRI score for Naas should if anything be increased. It is therefore recommended that **Naas should be considered an AFA.**

A5.16 Newbridge, Co Kildare

Name: Newbridge	County: Kildare	Unique ID: 90095	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 5		Closest searchable town on floodmaps.ie: Newbridge	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2109.5	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 2	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Considered to have major flood risk if ESB dams u/s were to fail. Flooding has occurred within housing estate adjacent to Liffey, but flood waters did not actually enter property. Liffey has been observed at bank full capacity through town.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 24/06/11			
River Liffey flows through Newbridge. The PFRA predictive mapping shows significant damage to the properties in Newbridge. The site inspection confirms the potential flood risk however the flood extent looks very angular raising questions over accuracy. The housing estate mentioned by the LA was visited and the properties do look to be at potential flood risk. A minor watercourse flows through an industrial estate and housing estate before joining the Liffey. If out of bank flooding was to occur the land is very flat and the flood extent looks reasonable.			
Size of river: 20m x 5m (Liffey) 3m x 2m (minor watercourse)		Channel vegetation: Grass and trees along bank (L) Dense veg (mw)	
Channel condition: -		Structures: Road bridges and culverts	
Flood defences: -		Nature of flow: Mod flow (L) Low flow (mw)	
Nature of floodplain: Wide		Floodplain vegetation: Urban with grassed areas	
Properties: Residential and Commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Newbridge was originally listed as a Probable Area for Further Assessment with a FRI score of 2,109. The PFRA predictive mapping shows significant flooding within Newbridge which is supported by historical flooding information. The Local Authority identified two areas which had experienced flood damage in the past. One area is affected by flooding from a tributary to the Liffey and the other is adjacent to the Liffey. The site inspection confirmed that the PFRA predictive mapping looks reasonable and given that the original FRI score was 2109 it is unlikely that minor changes to flood extents would drop this to less than 250. It is therefore recommended that **Newbridge should be considered an AFA.**

A5.17 Roestown, Co Kildare

Name: Roestown	County: Kildare	Unique ID: 91153	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 2		Closest searchable town on floodmaps.ie: Maynooth	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 0	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: No knowledge of flooding, possible issue with M4 drainage to Brook Stream but no known evidence.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 30/06/11			
It is unclear as to the flood risk at Roestown. Little flooding is shown and there is no community at risk apart some scattered houses. The M4 is shown as flooding which may be the reason. The wc flowing away from the M4 is approx 3m wide and 3m deep however the upstream end of the culvert under the M4 could not be accessed. There is little difference in level between the field US of the M4 and the M4 itself although the field would flood first providing storage before any flooding would occur to the road. The RHB is much higher than the LHB and flooding would occur on the LHB first.			
Size of river: -		Channel vegetation: -	
Channel condition: -		Structures: -	
Flood defences: -		Nature of flow: -	
Nature of floodplain: -		Floodplain vegetation: -	
Properties: -		Evidence of flooding: -	

Photographs:



Recommendation:

Roestown was originally listed as a Possible Area for Further Assessment due to Local Authority comments on a potential flood risk to the M/N4, although no FRI score was recorded in the PFRA database. Discussion with the Local Authority and the site inspection confirmed the observations of the desk top assessment that there is no community at risk. The M4 may be at risk but this alone is not considered significant enough to justify the inclusion of Roestown as an AFA. It is therefore recommended that **Roestown should not be considered an AFA.**

A5.18 Sallins, Co Kildare

Name: Sallins	County: Kildare	Unique ID: 91156 & 91157	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Historical			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Sallins	
LA comments confirm flood risk?: Yes, (treatment plant)			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 0	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: Major flooding problem recently circa 40 houses flooded due to culvert capacity issue on canal feeder stream at road/railway crossing. 1:100yr upgrade being implemented by Kildare Co Co.			
Summary of Site Inspection			
Site inspection observations: 28/06/11			
There appears to be a low flood risk from the River Liffey. A housing estate to the north is shown to lie within the 100yr floodplain however the flood extent forms a wedge suggesting model inaccuracies and the site inspection revealed that the housing estate is slightly higher than the field located between the houses and the river. It is more likely that flood waters will be stored within the fields. The significant flood risk comes from a canal feeder stream which has flooded houses in the past. This stream was not modelled however it has caused flood damage in the past. A scheme has been started but has not yet been completed. The flood risk therefore remains.			
Size of river: 25m x 5m		Channel vegetation: Reeds in channel and long grass on banks	
Channel condition: -		Structures: -	
Flood defences: -		Nature of flow: Low to mod flow	
Nature of floodplain: Wide		Floodplain vegetation: Grass fields	
Properties: Residential		Evidence of flooding: None	

Photographs:



Recommendation:

Sallins was originally listed as a Possible Area for Further Assessment although no FRI score was recorded within the PFRA database nor are any supporting comments from the Local Authority or OPW Regional Engineers. The PFRA predictive mapping and the site inspection indicate that there is a relatively low flood risk to Sallins from the Liffey. The main flood risk is from a canal feeder stream which was not modelled as part of the PFRA and a scheme to alleviate this flood risk has commenced. The scheme has not yet finished and at the time of our visit appeared to have been put on hold, this observation was subsequently confirmed by OPW Regional Engineers. This stream has flooded properties in the past, OPW Regional Engineering staff indicated that approximately 70 apartments were affected, and until the scheme is complete the flood risk remains. It is not known what size of flood event affected the apartments but it does not appear unreasonable that 25 properties or more could be affected during a 10%AEP flood event which would therefore qualify Sallins to be an AFA. It is therefore recommended that **Sallins should be considered an AFA.**

A5.19 Straffan, Co Kildare

Name: Straffan	County: Kildare	Unique ID: 90101 & 91166	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical and Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 2	
Number of flood report locations on floodmaps.ie: 2		Closest searchable town on floodmaps.ie: Straffan	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes?		Flood Risk Index: 154.2	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Public House floods, Church has almost flooded in past. PFRA flood polygon looks accurate.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 28/06/11			
Straffan visited, no evidence of flooding could be found at public house and church, no watercourse in the vicinity. The Liffey flows adjacent to Straffan and may cause flood risk to some properties but nothing significant. Some tribs to the Liffey show a flood risk which may be reasonable.			
Size of river: 30m x 5m		Channel vegetation: Grass and trees along banks	
Channel condition: -		Structures: Road bridge and weir	
Flood defences: -		Nature of flow: Mod Flow	
Nature of floodplain: Constricted		Floodplain vegetation: Short grass at golf course, trees and long grass fields elsewhere	
Properties: Residential		Evidence of flooding: None	

Photographs:



Recommendation:

Straffan was originally listed as a Possible Area for Further Assessment with a FRI score of 154. The historical flooding at Straffan is from surface water ponding and the Local Authority and OPW Regional Engineering staff have no knowledge of any watercourse causing flooding to properties. The PFRA predictive mapping, which may be an overestimate, does not indicate enough flooding to qualify it to be an AFA. It is therefore recommended that **Straffan should not be considered an AFA.**

A5.20 Turnings, Co Kildare

Name: Turnings	County: Kildare	Unique ID: 90105	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 3		Closest searchable town on floodmaps.ie: Clane	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 463.1	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 2	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: LA indicated that flooding has occurred at Turnings from the Morell River.			
Summary of Site Inspection			
Site inspection observations: 28/06/11			
The Morell River flows through Turnings. The properties shown to be at flood risk are scattered over a large area. The area surrounding the Morell River is flat and given the size of the Morell River the PFRA predictive mapping is not unreasonable. This is backed up by the historical flooding and that work has been carried out on the Morrell River at the Old Morrell Bridge where the second arch of the bridge has been upgraded.			
Size of river: 8m x 4m		Channel vegetation: Long grass and trees	
Channel condition: -		Structures: Road bridges	
Flood defences: Bridge upgraded & earth embankment		Nature of flow: Low flow	
Nature of floodplain: Flat		Floodplain vegetation: Grass fields	
Properties: Residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

The Turnings area was originally listed as a Possible Area for Further Assessment with a FRI score of 463. The Local Authority confirmed that flooding has occurred in Turnings which has affected properties although these properties are situated outside the PFRA predictive mapping extents which may suggest that the FRI score could increase. The Turnings review area is quite expansive and there is a lot of uncertainty associated with it. In parts of the Turnings review area the 10%AEP, 1%AEP and 0.1%AEP extents are exactly the same, suggesting that the PFRA predictive mapping may be inaccurate. However given that the Morell River has a history of flooding, that properties have flooded in the past, that OPW has carried out a small scheme in the Turnings area and that the FRI score is 463.1 it can be assumed that there is a significant flood risk. Further to this both Kildare County Council and OPW regional engineering staff have identified the full Morell catchment, of which the Turnings area is part, as an area of significant flood risk. There is a known recurring flood risk from the Morell River and associated tributaries that has flooded properties outside the Turnings area in the past. It is therefore recommended that the Morell River and its tributaries, the Painestown River, Slane River, Kill River and Hartwell River, be considered for designation as high priority watercourses and that the Turnings AFA be expanded to consider the full Morell catchment and consequently it is recommended that the **Morell catchment should be considered an AFA.**

A6.1 Baltray, Co Louth

Name: Baltray	County: Louth	Unique ID: 70030	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 2		Closest searchable town on floodmaps.ie: Baltray	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: No		Flood Risk Index: 323.05	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 3		Historical Validation Hazard (0-4): 2	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: Extensive flooding occurred in February 2002, up to window sill level at the 19 th hole. Louth Co Co presently completing upgrade to sea wall, height being raised to 3.9-4.0m AOD. Low/weak points still remain at listed bridge and cottage in middle of seawall. LCC has contingency plan in place to deploy sandbags in event of large tidal event occurring – relies on OPW storm surge forecast for advance warning.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 15/06/11			
Visited Baltray with Vincent Toner (Louth Co Co) and inspected the defences. Sea wall raised on top of existing wall and low point beside reservoir blocked with rock armour and earth fill. Levels also raised on access road around reservoir. Cottage located beside flood wall. The existing defences remain unchanged here and it a definite weak point. Flood wall falls to existing road bridge on the R167. Surge waves at this point are not expected to be as large.			
Size of river: 100m – 500m (w)		Channel vegetation: -	
Channel condition: -		Structures: Road bridge where small watercourse discharges to Boyne. No sign of blockages	
Flood defences: Flood wall, rock armour and raised road		Nature of flow: Flat, tidal	
Nature of floodplain: Wide		Floodplain vegetation: -	
Properties: Multiple houses		Evidence of flooding: None	

Photographs:



Recommendation:

Baltray was originally listed as a Probable Area for Further Assessment with a FRI score of 323. There is a known history of significant tidal flooding at Baltray and as a consequence the Local Authority has constructed a flood defence consisting of flood walls and earth embankments. However as with any flood alleviation scheme there will be an associated residual flood risk and as such it is recommended that **Baltray should be considered an AFA.**

A6.2 Drogheda, Co Louth

Name: Drogheda	County: Louth	Unique ID: 70033 & 70841	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive and Historical			
Historical Analysis			
Historical Risk (0-4): 2		Historical Hazard (0-4): 4	
Number of flood report locations on floodmaps.ie: 26		Closest searchable town on floodmaps.ie: Drogheda	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 6917.65	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 2		Historical Validation Hazard (0-4): 3	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: Yes			
LA comments: Reliant on Quay Walls for flood protection. Drogheda Borough Council has contingency arrangements in place for distribution of sand bags during high tide events. High tides seen as principal source of flood risk. Ushers Corner is only area where DBC is aware of any flood risk due to backing up of secondary streams (virtually all water courses culverted through town). Baltray road known to flood out as far as Premier Periclase during high tide events. Donors Green siphon critical to operation of Drogheda Sewerage scheme, main pumping station may be located in flood risk area. North Quay flooded downstream of St Marys bridge in 2002, area between BRU's and Dominic's bridge is also a significant flood risk area (existing 1.2m high masonry wall forms incidental flood defence). Other flood risk areas are Garda Base, Flo-Gas installation (considered of national importance) Ship Street (listed buildings). DBC highlighted presence of a large number of basements/cellars in Drogheda. Drogheda port maintains low wall along Quay edge which acts as flood defence.			
Summary of Site Inspection			
Site inspection observations: 15/06/11			
Predicted flood plain along River Boyne appears accurate.			
Size of river: 30m – 80m (w)		Channel vegetation: Canalised DS, low veg US	
Channel condition: -		Structures: Multiple bridges	
Flood defences: Quay walls		Nature of flow: Mod flow	
Nature of floodplain: Constricted		Floodplain vegetation: Urban DS, parkland US	
Properties: Multiple properties inc FloGas		Evidence of flooding: None	

Photographs:



Recommendation:

Drogheda was originally listed as a Probable Area for Further Assessment with a FRI score of 6,917. There is a well proven history of flooding from the River Boyne and associated tributaries within Drogheda with www.floodmaps.ie recording many recurring flood areas. Both the Local Authority and OPW Regional Engineers agree that there is a significant flood risk to Drogheda and the relatively high FRI score reaffirms this potential flood risk. It is therefore recommended that **Drogheda should be considered an AFA.**

A6.3 Tullyallen, Co Louth

Name: Tullyallen	County: Louth	Unique ID: 70043 & 70932	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive and Historical			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Tullyallen	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 372	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: No			
LA comments: Flooding from stream occurred in the past due to bank slippage, culvert installed 2005, no flooding since.			
Summary of Site Inspection			
Site inspection observations: 15/06/11 & 28/07/11			
A minor watercourse flows through Tullyallen. The wc flows in between a residential estate, Townley Manor, initially within a deep channel and is unlikely to breach its bank provided the culvert that it flows into is adequately sized. The wc flows through the culvert for the remainder of the housing estate and opens before reaching Townley Hall Road where it cross the under a road bridge that shows no signs of blockages. The wc flows through and adjacent to 2 residential properties at Burton Hall. A shed has been built over the wc and may present a blockage problem or a severe restriction to flow. The wc flows through another culvert adjacent to Burton Manor, there are no signs of blockages, before opening up again. Houses in Burton Hall are relatively high above the wc. It is here that the slipped embankment that's caused the flooding is thought to have occurred and may be the reason for the short stretch of culvert.			
Size of river: 1m (w), 2m (d)		Channel vegetation: Dense	
Channel condition: -		Structures: Culvert through Townley Manor Bridge across Townley Hall Road Culvert adjacent to Burton Hall	
Flood defences: -		Nature of flow: Moderate	
Nature of floodplain: Restricted within urban area		Floodplain vegetation: Urban	
Properties: Multiple houses and a public house		Evidence of flooding: None	

Photographs:



Recommendation:

Tullyallen was originally listed as a Possible Area for Further Assessment with a FRI score of 372. Although there is one recorded incident of previous flooding this was associated with a bank slip blocking the stream which has been rectified and is no longer a risk. The predictive mapping produced by the PFRA process shows significant flooding through Tullyallen although in parts the flood extent is the same for the 10%AEP, 1%AEP and 0.1%AEP flood events which suggests some inaccuracy in the model. Out of bank flooding is first predicted to occur at Townley Manor in Tullyallen, where this is shown to occur the stream is culverted and thus it is unlikely that flooding could occur. Further downstream the channel deepens which is likely to keep the flood risk low. The fact that the only known record of flooding in Tullyallen was associated with the bank slippage mentioned previously gives confidence that no flooding would occur during a 10%AEP event. By removing the FRI values associated with flooding during the 10%AEP flood event the overall FRI score for Tullyallen is reduced from 372 to 132. It is therefore recommended that **Tullyallen should not be considered an AFA.**

A7.1 Athboy, Co Meath

Name: Athboy	County: Meath	Unique ID: 70028	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Athboy	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 293.1	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: None known			
Has any works been undertaken?: Yes			
Are there any maintained defences?: No			
LA comments: Meath Co Co area engineers had limited knowledge of Athboy. Minor scheme of works has been undertaken on N51 to solve local ponding problem. JBA modelling shows extensive flooding in Athboy.			
Summary of Site Inspection			
Site inspection observations: 17/06/11			
Watercourse flows adjacent to old mill converted to apartments on LHB. The millrace has been filled in. The apartments are well raised and not at risk. Opposite on RHB a timber yard has a warehouse adjacent to the watercourse which looks at risk. A road bridge crosses the watercourse immediately downstream of the apartments. Low risk of blockages at bridge. Houses located downstream of bridge at iron footbridge and could be possibly at risk. Predictive mapping shows flooding of the apartments which is unlikely. A re-calculation of the FRI would likely drop below 250 and not qualify as an AFA.			
Size of river: 8m (w) 3m (d)		Channel vegetation: Bushes or long grass	
Channel condition: Urbanised in parts with walls along the banks		Structures: Road Bridge – Low risk of blockages Footbridge – Low risk of blockages	
Flood defences: -		Nature of flow: Moderate	
Nature of floodplain: Moderate		Floodplain vegetation: Long grass and bushes	
Properties: Timber warehouses adj to wc, US of road bridge Apartments adj to wc, US of road bridge Residential houses adj to wc at footbridge		Evidence of flooding: None	

Photographs:



Recommendation:

Athboy was originally listed as a Probable Area for Further Assessment with a FRI score of 293, the majority of which was attributable to predicted flooding of apartments on the former mill site. The floor levels in the apartments in question look high compared to the river and out of bank flooding would occur in the timber yard on the Right Hand Bank first. Neither the Local Authority nor the OPW Regional Engineers have any knowledge of flooding to the apartments and www.floodmaps.ie holds no records. It is considered likely that the Athboy River has experienced a 10%AEP flow or greater since the apartments were constructed which if it had caused flooding would have been brought to the attention of the OPW Regional Engineers or Local Authority. Consequently a channel capacity check was carried out for the Athboy River at the apartments and the results indicate that the channel capacity is approximately equal to the 1%AEP flow and although this method is relatively inaccurate it does provide a good indication that the 10%AEP flow can be conveyed within the channel of the Athboy River without any flooding occurring. By removing the 10% AEP flood risk to the apartments from the FRI score calculation the revised FRI score would be 68.1. However as the increased channel capacity at Athboy is the result of Arterial Drainage works undertaken previously by the OPW, which can effectively be considered a flood alleviation measure it is recommended the **Athboy should be considered an AFA.**

A7.2 Ballivor, Co Meath

Name: Ballivor	County: Meath	Unique ID: 70029 & 70792	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical & Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Ballivor	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 940	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: School flooded in past due to blocked drain, no knowledge of significant flooding in past 10 years.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 17/06/11			
Watercourse visited at Ballivor. Relatively small at the upstream limit of the town where single dwelling is located but forms a deep channel adjacent to the factory further downstream. Area showing large flood extent in predictive mapping is relatively flat but does rise along the road and perhaps would not be as extensive as the mapping is showing. It is questionable whether out of bank flooding occurs along the deep channel section. Downstream the watercourse crosses road bridge, no signs of blockages. Downstream from bridge WWTW located adjacent to watercourse and is possibly at risk. Gauging station located at WWTW. Primary Scholl now relocated to more elevated site.			
Size of river: 3m (w), 2m (d)		Channel vegetation: Dense	
Channel condition: Gabions at bridge		Structures: Road bridge – No signs of blockages	
Flood defences: -		Nature of flow: Slow	
Nature of floodplain: Wide		Floodplain vegetation: Long grass	
Properties: Single dwelling US adj to wc Factory adj to wc Single dwellings US & DS of road bridge WWTW adj to wc		Evidence of flooding: None	

Photographs:



Recommendation:

Ballivor was originally listed as a Probable Area for Further Assessment with a FRI score of 940. During the site inspection it was noted that the predicted flood extent at Ballivor looks to be more extensive than would be expected given the size of channel and that there may be inaccuracies in the analysis due to the angular outline of the 10%AEP, 1%AEP and 0.1%AEP flood extents. OPW Regional Engineers confirmed that this river is maintained by OPW and was subject to a drainage scheme and is therefore likely to convey a flow greater than Q_{med} . A channel capacity assessment was carried out where out of bank flooding is the most significant (adjacent to the former primary school) and the results show that the channel capacity lies between the 10%AEP and 1%AEP flows. By removing the 10%AEP flood extent around this area and recalculating the FRI the score would be reduced from 940 to 115. The site inspection also identified that a new Primary School had been constructed outside the PFRA predictive mapping extents and that the former school was abandoned. If the FRI score is only modified to account for the relocation of the primary school i.e. the flood mitigation benefit associated with the Arterial Drainage works is ignored, then the revised FRI score is 690. It is therefore recommended that **Ballivor should be considered an AFA.**

A7.3 N2 Balrath, Co Meath

Name: N2 Balrath	County: Meath	Unique ID: 80947	PFRA Status: IRR
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Balrath	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: No		Flood Risk Index: 0	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: No knowledge of flooding to N2 at this point, River Nanny believed to have been modelled as part of FEM FRAMS.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 15/06/11			
The watercourse flows under the R153 and then turns and crosses the N2. There are no signs of blockages likely at either road bridge. The road looks to be elevated above the fields adjacent to the river and given the potential flood storage available from the fields it is unlikely that the road would flood. If the road were to flood it would also flood the residential dwelling adjacent to it.			
Size of river: 3m (w), 1.5m (d)		Channel vegetation: Moderate	
Channel condition: -		Structures: 2 road bridges	
Flood defences: -		Nature of flow: Slow to moderate	
Nature of floodplain: Moderately wide		Floodplain vegetation: Fields, long grass	
Properties: N2 road Single dwelling adj to road		Evidence of flooding: None	

Photographs:



Recommendation:

The N2 road at Balrath was originally included as an Individual Risk Receptor in the flood risk review although no FRI score was given. The River Nanny at this point was modelled as part of the FEM FRAM study and the results show the road is at risk during the 0.1%AEP flood event only. The model used in the FEM FRAMS study is considered to be significantly more accurate than that used for the PFRA analysis and should therefore be given more credence in the risk review. **Balrath is therefore not an AFA.**

A7.4 ESB Grangeageeth, Co Meath

Name: ESB Grangeageeth	County: Meath	Unique ID: 70025	PFRA Status: IRR
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Grangeageeth	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2550	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Not Known			
Has any works been undertaken?: Not Known			
Are there any maintained defences?: Not Known			
LA comments: No knowledge of this ESB asset.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 17/06/11			
The Devlin River flowing adjacent to the ESB station is confined to a reasonably steep valley. The river channel looked small in comparison with the valley and the catchment size and characteristics should be looked at. It looked likely that the ESB station would flood. A road flooding sign was found within the ESB site and the grass verge by the road side has been scraped away in places to facilitate surface water drainage.			
Size of river: 3m (w), 2m (d)		Channel vegetation: Heavy vegetation along banks	
Channel condition: -		Structures: Road bridge – No signs of blockages	
Flood defences: -		Nature of flow: Slow	
Nature of floodplain: V shaped valley		Floodplain vegetation: Long grass	
Properties: ESB station		Evidence of flooding: Road flooded sign	

Photographs:



Recommendation:

The ESB sub-station at Grangeageeth was originally identified as an Individual Risk receptor for inclusion in the flood risk review with a FRI score of 2,550. The evidence on the ground suggests that this ESB facility is at risk of flooding (a road closed flooding sign was observed at the site, as was some debris caught in the site fence). The PFRA predictive mapping shows the same extents for the 10%AEP, 1%AEP & 0.1%AEP events suggesting some modelling inaccuracy at this location. Therefore although the river is predicted to flood at this location the extent of flooding may not be as the PFRA predictive mapping shows. It is therefore recommended that ESB be advised of possible flood risk but that the **ESB sub-station at Grangeageeth is not an AFA.**

A7.5 SCH Kilbride, Co Meath

Name: SCH Kilbride	County: Meath	Unique ID: 80049	PFRA Status: IRR
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Kilbride	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 265	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Not Known			
Has any works been undertaken?: Not Known			
Are there any maintained defences?: Not Known			
LA comments: -			
<u>Summary of Site Inspection</u>			
Site inspection observations: 11/08/11			
The Ward River flows adjacent to the Primary School at Kilbride. At this location the river is slow moving and flows through a relatively flat area of farmland. There is a minor road bridge immediately upstream of the primary school and were the capacity of the river channel to be exceeded at this location flood waters could affect the school. The PFRA predictive mapping indicates extensive out of channel flooding in this area however this part of the Ward does not appear to have been modelled for the FEM-FRAMS.			
Further analysis is required to more accurately define the flood risk, possible AFA?			
Size of river: 5m (w), 2m (d)		Channel vegetation: Heavy vegetation along banks	
Channel condition: -		Structures: Road bridge – No signs of blockages	
Flood defences: -		Nature of flow: Slow	
Nature of floodplain: Flat unconstrained both banks		Floodplain vegetation: Long grass/arable crops	
Properties: Primary School, two houses and filling station		Evidence of flooding: None observed	

Photographs:



Recommendation:

Kilbride was originally listed as an Individual Risk Receptor for inclusion in the flood risk review with a FRI score of 265, due primarily to the PFRA predictive mapping indicating a primary school to fall within its 10%AEP flood extent. The Local Authority had no knowledge of a flooding history at this site but could not confirm that it had never flooded nor are there any records on www.floodmaps.ie. The site inspection confirmed that the Ward River runs along the boundary of the primary school site, and established that the flood plains on both sides of the watercourse are quite flat. It was also observed that the channel appeared to have been modified i.e. the channel section appeared trapezoidal which may indicate greater capacity than the PFRA assumed Q_{med} . Review of the draft outputs of the FEM FRAMS indicates that this stretch of the Ward River was not modelled therefore no more detailed flood outlines are available at present. On balance it is likely that the school is subject to some degree of flood hazard, however given that the flood risk is primarily associated with a single receptor it is likely that this could be dealt with through the minor works procedure and consequently it is suggested that **Kilbride is not an AFA**.

A7.6 Kildalkey, Co Meath

Name: Kildalkey	County: Meath	Unique ID: 70036 & 70872	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical and Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Kildalkey	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 157	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Watercourse is culverted through village. Culvert is an old masonry arch circa 1.5m high. Some ponding known to occur on lands adjacent to new housing, probably pluvial.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 17/06/11			
The watercourse that flows through Kildalkey is culverted. The only open part is at the outlet where it flows adjacent to a small housing estate. The culvert inlet was submerged and could not be seen. 2 small watercourses enter at this point approximately 1m wide. The culvert outlet joins to an old stone arch bridge. It is not clear if the culvert is also a stone arch or just at the outlet where the bridge is.			
There are no obvious signs of flood risk at Kildalkey. If the culvert was not considered in the predictive flood mapping the actual flood extent could be considerably less.			
Size of river: 1m (w), 1m (d) US of culvert 1m (w), 1.5m (d) DS of culvert		Channel vegetation: Moderate to dense	
Channel condition: -		Structures: Culvert through Kildalkey	
Flood defences: Culvert		Nature of flow: Slow	
Nature of floodplain: -		Floodplain vegetation: -	
Properties: Housing estate DS of Culvert, adjacent to wc		Evidence of flooding: none	

Photographs:



Recommendation:

Kildalkey was originally listed as a Possible Area for Further Assessment with a FRI score of 157. There is no reported history of flooding in Kildalkey and the stream flowing through Kildalkey is culverted making it likely that the PFRA predictive mapping extents and therefore the FRI score should be reduced. It is therefore recommended that **Kildalkey should not be considered an AFA.**

A7.7 Kilmessan, Co Meath

Name: Kilmessan	County: Meath	Unique ID: 70037 & 70875	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive and Historical			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Kilmessan	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 405.2	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: No history of flooding to property			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: PFRA mapping appears to be in error, flood outline diverges from line of river and follows former railway line/mill race. No history of any property flooding			
<u>Summary of Site Inspection</u>			
Site inspection observations: 17/06/11 & 28/07/11			
The flood route shown in the predictive mapping is questionable. The bend in river where the out of bank flooding occurs was visited. It is not obvious that water would breach the bank. Further to this a small earth wall would deflect the flood water through the fields parallel to the river rather than through the residential estate as shown in the predictive flood mapping. Road bridge located downstream and house located adjacent to the watercourse immediately downstream of the bridge. Sheet piles have been used to protect the house and raise the garden area up. There are no signs however of any flood risk. Downstream from road bridge the Bective housing estate is located adjacent to the watercourse. Houses looked well raised and fields on the RHB are lower than the housing estate and would store flood water first. There are no signs of flood risk.			
Size of river: 5m (w), 3m (d)		Channel vegetation: Moderate to low	
Channel condition: -		Structures: Stone Bridge – No signs of blockages	
Flood defences: DS of stone bridge, sheet piles located adj to res house, garden raised.		Nature of flow: Moderate to low	
Nature of floodplain: Moderate to wide		Floodplain vegetation: Long grass	
Properties: Single dwelling DS of bridge, adj to wc Bective housing estate, adj to wc		Evidence of flooding: None	

Photographs:



Recommendation:

Kilmessan was originally listed as a Probable Area for Further Assessment with a FRI score of 405. The site inspection to Kilmessan has found that during the PFRA process a disused millrace had erroneously been taken as the primary channel of the Skane River through Kilmessan to the exclusion of the actual route of the Skane river channel. The millrace has been in-filled in parts and consequently does not represent a continuous flow channel. Inspection of the actual route of the Skane River established that the majority of properties are located on relatively elevated sites and are therefore not considered to be subject to a significant flood hazard. Neither OPW Regional Engineers nor the Local Authority had any knowledge of flooding in the area despite a large event having occurred in 2002 giving confidence in the perceived lack of flood risk. In order to illustrate the likely effect of the reduced flood hazard associated with the correct route of the Skane River the properties located within the 10%AEP flood extent were excluded from the FRI calculation, with the result that the overall FRI was reduced from 405.2 to 58.7. It is therefore recommended that **Kilmessan should not be considered an AFA.**

A7.8 Longwood, Co Meath

Name: Longwood	County: Meath	Unique ID: 70888	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical (predictive of minor stream not carried out)			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Longwood	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: No		Flood Risk Index: 0	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Minor trib has flooded in the past but has not affected property. Agricultural accommodation bridges thought to restrict flow.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 17/06/11			
The Blackwater at Longwood was visited. A WWTW is located adjacent to watercourse downstream of a road bridge. There are no obvious signs of flood risk however if out of bank flooding were to occur the WWTW is lower than the road and flood water would pond there. A minor watercourse flows through Longwood adjacent to Brackinrainey housing estate and a school before joining the Blackwater. 3 accommodation bridges cross the watercourse one of which looks undersized and susceptible to blockages. Banks are well raised however adjacent to the housing estate and school and flow in the watercourse is very sluggish. There are no obvious signs of previous flood risk.			
Size of river: 10m (w), 4m (d) Blackwater 3m (w), 2m (d) Minor Stream		Channel vegetation: (BW) Moderate (MS) Moderate	
Channel condition: -		Structures: (BW) Road Bridge – No signs of blockages (MS) 3 acc bridges – 2 nd bridge between res est and school susceptible to blockage	
Flood defences: -		Nature of flow: (BW) Moderate (MS) Low, very sluggish	
Nature of floodplain: (BW) Moderate (MS) Moderately wide on at least on side		Floodplain vegetation: Long grass	
Properties: (BW) WWTW adjacent to wc (MS) Housing estate & School adjacent to wc		Evidence of flooding: None	

Photographs:



Recommendation:

Longwood was originally included as a Possible Area for Further Assessment, due to perceived high flood risk reported by both the Local Authority and OPW Regional Engineers. No FRI score was available from the PFRA database as the minor stream affecting Longwood was not modelled as part of the PFRA process. The channel of the minor watercourse has been subject to arterial drainage works and is estimated by OPW Regional Engineering staff to have a 33%AEP capacity. During the site inspection it was also noted that there are a number of undersized culverts through agricultural accommodation bridges along this watercourse. The principal flood risk from this stream is to the housing estate upstream of the new school. Although this stream has not been modelled it is estimated from the information available that these properties would be at risk during a 10%AEP flood event. This could potentially affect over 30 properties which would give a FRI score of over 300. It is therefore recommended that **Longwood should be considered an AFA.**

A7.9 Mornington, Co Meath

Name: Mornington	County: Meath	Unique ID: 70880	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: TBC			
<u>Historical Analysis</u>			
Historical Risk (0-4): 3		Historical Hazard (0-4): 3	
Number of flood report locations on floodmaps.ie: 4		Closest searchable town on floodmaps.ie: Mornington	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: -	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: Scheme presently being constructed by OPW. Potential overlap with FEM FRAMS, scheme proposed for Pilltown Road to solve local ponding problem (fluvial). Donacarney area has not be considered by FEM FRAMS possible coastal risk?			
<u>Summary of Site Inspection</u>			
Site inspection observations: 15/06/11			
Confirmation is required as to the actual area being considered. As a scheme is underway for Mornington East and Parts of Bettystown. A site inspection of Mornington was carried out in case this is the area considered at risk. The Drogheda road runs parallel to the Boyne Estuary with residential houses located on the land side of the road. The road falls to a low point at Mornington at the junction with Church road. Here a small watercourse crosses the Drogheda Road before discharging to the Boyne. Residential houses are located adjacent to Church Road which runs adjacent to the small watercourse. There is potential risk from tidal flooding although without knowing the FFLs of the houses it is difficult to say for sure.			
Size of river: 5m x 3m		Channel vegetation: Low veg	
Channel condition: -		Structures: Road bridge over small wc, no signs of blockages	
Flood defences: Wall along Drogheda road but not a flood defence		Nature of flow: Slow	
Nature of floodplain: Wide		Floodplain vegetation: Salt march and long grass	
Properties: Residential properties in proximity of Boyne Est and Small wc		Evidence of flooding: None	

Photographs:



Recommendation:

Mornington was originally listed as a Probable Area for Further Assessment due to the fact that the OPW is presently constructing a major flood relief scheme. No FRI score was available in the PFRA database. RPS has previously prepared a flood risk study for Mornington on behalf of the OPW that proved there was a significant flood risk at Mornington and designed the flood alleviation scheme presently under construction. It is therefore recommended that **Mornington should be an AFA.**

A7.10 Navan, Co Meath

Name: Navan	County: Meath	Unique ID: 70039 & 70040	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 12		Closest searchable town on floodmaps.ie: Navan	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 3669.8	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 3	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Not known			
LA comments: Liscarton area zoned for development, no flood risk. Swan River, Meath Co Co scheme @ tender stage. Leigh Brook stream, culverted through town possible upgrade required, Flooding from Boyne was noted as being relatively frequent.			
Summary of Site Inspection			
Site inspection observations: 17/06/11			
The Boyne flows through Navan and the River Blackwater joins the Boyne at the centre of Navan. Both watercourse are relatively large and have a history of flooding. The surrounding properties are located very close to the river and the numerous bridges some of which are old stone arch bridges may cause a constriction to flow which may increase the flood risk. If out of bank flooding was to occur a significant number of receptors would be put at risk.			
Size of river: 50m x 7m		Channel vegetation: Low veg	
Channel condition: -		Structures: Road bridges	
Flood defences: -		Nature of flow: Mod to low flow	
Nature of floodplain: -		Floodplain vegetation: Urban	
Properties: Residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Navan was originally listed as a Probable Area for Further Assessment with a FRI score of 3,670. Predictive and historical data both show Navan to be at risk and this has been confirmed by the Local Authority and OPW Regional Engineering staff. The PFRA predictive mapping for Navan appears reasonable therefore it is unlikely that the FRI score could be reduced to below 250. Consequently it is recommended that **Navan should be considered an AFA.**

A7.11 ESB Randalstown, Co Meath

Name: ESB Randalstown	County: Meath	Unique ID: 70026	PFRA Status: IRR
PFRA Review			
Reason for inclusion in OPW database: Unknown			
Historical Analysis			
Historical Risk (0-4): -		Historical Hazard (0-4): -	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Navan	
LA comments confirm flood risk?: No knowledge			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2500	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: None known			
Has any works been undertaken?: Not by LA			
Are there any maintained defences?: None maintained by LA			
LA comments: This is close to tailings pond			
Summary of Site Inspection			
Site inspection observations: Access not possible due to locked gates. From inspection of aerial imagery ESB sub-station appears to be located below large tailings dam. No visible sign of significant water courses in area therefore flood risk is associated with potential dam breach at tailings pond. Significant breach of tailings dam would probably lead to flooding all the way to and through Navan. Assets at risk include ESB sub-station and numerous dispersed houses between tailing pond/dam and Navan.			
Size of river: N/A		Channel vegetation: -	
Channel condition: -		Structures: Tailing Pond Dams	
Flood defences: Tailing pond dams		Nature of flow: Dam breach	
Nature of floodplain: Wide		Floodplain vegetation: Agricultural land/hedges etc.	
Properties: ESB sub-station, dispersed housing		Evidence of flooding: No	
Photographs: None taken			
Recommendation: The flood risk at Randalstown is associated with an ESB sub-station adjacent to a small watercourse and in the vicinity of a large tailings dam. No evidence was found to rule out a flood risk to this site however in isolation it would not be considered significant, it is therefore recommended that the ESB sub-station at Randalstown should not be considered an AFA.			

A7.12 Slane Bridge, Co Meath

Name: Slane Bridge	County: Meath	Unique ID: 70915	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 2	
Number of flood report locations on floodmaps.ie: 3		Closest searchable town on floodmaps.ie: Slane	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 0	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: None known			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: No knowledge of N2 bridge actually being overtopped, M1 and M3 now provide easy diversion routes therefore closure of N2 not seen as critical. It was requested that the name of this area be changed to Slane Bridge and not Slane as it gives the impression that Slane is at risk when it is not.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 15/06/11			
Slane bridge visited. The Boyne canal starts just upstream from the bridge on the RHB. A weir is located just upstream of the bridge and a millrace is taking flow from the river. There is no strong evidence that the bridge is at risk or that it would be prone to blockages.			
Size of river: 40m (w)		Channel vegetation: Low – mod veg	
Channel condition: -		Structures: Road bridge Canal Weir & Millrace	
Flood defences: -		Nature of flow: Moderate	
Nature of floodplain: Steep V shaped valley		Floodplain vegetation: Grass fields	
Properties: Old mill ds of bridge		Evidence of flooding: None	

Photographs:



Recommendation:

Slane was originally included as a Possible Area for Further Assessment due to potential flood risk to the N2. No FRI score was available within the PFRA database. The site inspection confirmed the principal flood risk at Slane is to the N2 Road bridge and the old mill downstream of the bridge which is now being used as apartments. These receptors will not generate a FRI score of greater than 250. The Local Authority considers the potential disruption from the road being flooded to be easily manageable given the close proximity of the M1, N51 and M3. It is therefore recommended that **Slane should not be considered an AFA.**

A7.13 WTW Stalleen, Co Meath

Name: WTW Stalleen	County: Meath	Unique ID: 70919	PFRA Status: IRR
PFRA Review			
Reason for inclusion in OPW database: Historical			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 2		Closest searchable town on floodmaps.ie: Drogheda	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: No		Flood Risk Index: 0	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Stalleen water treatment works is located near top of hill, intake is from Boyne Canal at Dunore. Neither Meath Co Co nor Drogheda Borough Council have any knowledge of inlet pumping station being out of action due to flooding.			
Summary of Site Inspection			
Site inspection observations: 15/06/11			
Water extraction point visited. Extraction taken from canal with an overspill weir to the Boyne. The canal and extraction point are raised above the Boyne and it is unclear if they lie within the Boyne floodplain. There is a potential risk to the water extraction point.			
Size of river: 40m (w)		Channel vegetation: -	
Channel condition: -		Structures: Canal Water extraction point	
Flood defences: -		Nature of flow: -	
Nature of floodplain: Steep on LHB, moderately wide on the RHB		Floodplain vegetation: Grass fields	
Properties: Water extraction point		Evidence of flooding: None	

Photographs:



Recommendation:

Stalleen Water Treatment Works was originally identified as an Individual Risk Receptor for inclusion in the flood risk review. The actual water treatment works at Stalleen is situated on a hill remote from the River Boyne and therefore is not directly at risk of flooding. The only potential flood risk observed is to the water extraction from the River Boyne/Boyne Canal near Dunore. Any flooding to the plant may prevent water being pumped temporarily to the water treatment works although there is likely to be sufficient reserve at the WTW to avoid disruption. The plant is operated by Drogheda Borough Council and discussion with them did not indicate any known loss of supply at this facility due to flooding of the inlet works. It is therefore recommended that **Stalleen Water Treatment Works should not be considered an AFA.**

A7.14 Trim, Co Meath

Name: Trim	County: Meath	Unique ID: 70041 & 70042	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 7		Closest searchable town on floodmaps.ie: Trim	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 653.4	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 3	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: No			
LA comments: Upstream of old masonry bridge below OPW offices has flooded in the past causing flood waters to enter Main Street almost as far as the Courthouse Former flooding problem on the Butter Stream has been resolved following recent culverting.			
Summary of Site Inspection			
Site inspection observations: 17/06/11			
The River Boyne flows through Trim where two minor watercourses join it. Trim has a history of flooding and the PFRA predictive mapping looks reasonable although some areas form wedges which if corrected may reduce the risk slightly. Nothing was found from the site inspection that would contradict with the predicted flood extent and significantly change the flood risk.			
Size of river: 30m x 5m		Channel vegetation: Some reeds in bed, grass on banks	
Channel condition: -		Structures: Multiple bridges	
Flood defences: -		Nature of flow: Mod flow	
Nature of floodplain: Relatively constricted		Floodplain vegetation: Urban and agricultural fields	
Properties: Multiple houses		Evidence of flooding: None	

Photographs:



Recommendation:

Trim was originally listed as a Probable Area for Further Assessment with a FRI score of 902. Predictive and historical information both show Trim to be at risk of flooding from the River Boyne. This risk was confirmed by both the Local Authority and OPW Regional Engineering staff, who also indicated that works had been undertaken to alleviate the known flooding problem. The PFRA predictive mapping at Trim does not appear unreasonable, therefore it is unlikely that the FRI score could be reduced to below 250. Consequently it is recommended that **Trim should be considered an AFA.**

A8.1 Edenderry, Co Offaly

Name: Edenderry	County: Offaly	Unique ID: 70849	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 6		Closest searchable town on floodmaps.ie: Edenderry	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: -	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Confirm flood risk from Weaver Drain			
<u>Summary of Site Inspection</u>			
Site inspection observations: 05/07/11			
The flood risk from the River Boyne is restricted to the agricultural land surrounding Edenderry some of which has been zoned for development. There are some residential properties located near the Boyne floodplain which may be at risk. Weaver's Drain which flows through Edenderry has a history of flooding however no evidence of flood risk could be found. The lower extent of Weaver's Drain has been modelled as part of the PFRA but not the upper reaches where the majority of receptors are located. While there appears to be a flood risk from Weaver's Drain it cannot be quantified and remains unknown.			
Size of river: 5m x 3m (Boyne) 3m x 2m (Weaver's Drain)		Channel vegetation: Long grass on banks (B) Dense veg (W)	
Channel condition: -		Structures: Road bridges and a weir	
Flood defences: -		Nature of flow: Sluggish (B) Very low flow (W)	
Nature of floodplain: wide		Floodplain vegetation: Long grass	
Properties: Residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Edenderry was originally listed as a Possible Area for Further Assessment on the basis of concerns raised by the Local Authority and OPW Regional Engineers and the fact that a previous study had been completed. No FRI score was available within the PFRA database as the PFRA predictive mapping shows relatively little flood damage to properties in Edenderry from the River Boyne and this was confirmed by the site inspection as Edenderry is elevated above the River Boyne. OPW Regional Engineers confirmed their concern over flooding from the Weavers Drain which flows through Edenderry to the River Boyne. The Weavers Drain is known to have caused flooding in the past however this watercourse was not modelled as part of the PFRA process and no predicted flood extents are available. The site inspection found no evidence of recent flooding from the Weavers Drain however there are numerous residential houses and commercial building within the vicinity of this watercourse. The level of risk is however difficult to estimate with any certainty and further analysis would be required, consequently **Edenderry should be considered an AFA.**

A9.1 Esker South, South Dublin

Name: Esker South	County: South Dublin	Unique ID: 91074	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical			
<u>Historical Analysis</u>			
Historical Risk (0-4): 4		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Lucan	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: No		Flood Risk Index: -	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): -		Historical Validation Hazard (0-4): -	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?:			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: Esker South adjoins the Griffeen River, park land floods but no recent knowledge of property flooding.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 26/09/11			
Griffeen River flows through a wide strip of parkland with channel bed circa 3m below floor levels of nearby properties. PFRA flood polygons shown extending into housing area on west bank incorrect, no significant flood risk observed.			
Size of river: 2m x 0.3-0.5m deep		Channel vegetation: Light weed growth	
Channel condition: Some localised armouring		Structures: Bridges, large spans	
Flood defences: None Observed		Nature of flow: Rapid	
Nature of floodplain: Wide, particularly on right bank		Floodplain vegetation: grassland	
Properties: Residential and commercial		Evidence of flooding: Nothing observed	

Photographs:



Recommendation:

Esker South was originally listed as a Possible Area for Further Assessment as a result of the historic assessment element of the PFRA. No FRI score was available in the PFRA database, however Esker South is potentially affected by the Griffeen River and experienced flooding during the 1954 flood as shown on www.floodmaps.ie. Inspection of the site confirmed that the Griffeen River flows through a linear park and that the bed of the channel is significantly lower than the thresholds of the adjoining properties. It was also considered that the PFRA predictive mapping shown extending into the adjoining housing area is incorrect and that the flood risk to Esker South is very low. Consequently it is recommended that **Esker South should not be considered an AFA**. However this section of the Griffeen River is included in the scope of the survey for the Lucan to Chapelizod Probable AFA and therefore the site inspection observations can be confirmed at a later stage.

A9.2 Finnstown, South Dublin

Name: Finnstown	County: South Dublin	Unique ID: 91077	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical			
<u>Historical Analysis</u>			
Historical Risk (0-4): 4		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Lucan	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: No		Flood Risk Index: -	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): -		Historical Validation Hazard (0-4): -	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?:			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: -			
<u>Summary of Site Inspection</u>			
Site inspection observations: 26/09/11			
Tributary of Griffeen River shown in PFRA mapping found to be totally dry during site inspection, disappears within housing developments upstream and could not be traced. No sign of culvert beyond point at which dry channel disappeared but difficult to inspect due to high fences and very heavy undergrowth. Suspect former minor water courses no longer exists and any surface water run-off now enters stormwater systems installed during development of this area. Where found route of dry channel appears further south than shown by PFRA mapping.			
Size of river:		Channel vegetation:	
Channel condition:		Structures:	
Flood defences: None Observed		Nature of flow: None	
Nature of floodplain:		Floodplain vegetation:	
Properties: Residential		Evidence of flooding: Nothing observed	

Photographs:



Recommendation:

Finnstown was originally listed as a Possible Area for Further Assessment as a result of the historic assessment element of the PFRA. No FRI score was available in the PFRA database despite the PFRA predictive mapping showing properties to be at risk in this area. Evidence suggests that Finnstown has experienced flooding in the past, the historical flood extent from the Dec 1954 flood is presented on www.floodmaps.ie. Finnstown appears to be potentially affected by a tributary of the Griffeen River however this watercourse was found to be totally dry and discontinuous during the site inspection. Consequently it would appear that the PFRA predictive mapping is inaccurate in this area and hence it is recommended that **Finnstown should not be considered an AFA.**

A9.3 Hazelhatch, South Dublin

Name: Hazelhatch	County: South Dublin	Unique ID: 91086	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Historical			
Historical Analysis			
Historical Risk (0-4): 2		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 2		Closest searchable town on floodmaps.ie: Hazelhatch	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: No		Flood Risk Index: -	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: Yes			
Are there any maintained defences?: Yes			
LA comments: -			
Summary of Site Inspection			
Site inspection observations: -			
Size of river: -		Channel vegetation: -	
Channel condition: -		Structures: Culverts	
Flood defences: OPW flood relief scheme		Nature of flow: -	
Nature of floodplain: -		Floodplain vegetation: -	
Properties: Residential and commercial		Evidence of flooding: -	
Photographs: None taken			
Recommendation: Hazelhatch was originally listed as a Possible Area for Further Assessment due principally to the fact that the OPW has completed a flood relief scheme. No FRI score was available in the PFRA database, however Hazelhatch has a history of flooding which has been addressed by the OPW scheme. The Shinkeen Stream flowing through Hazelhatch is a tributary of the Liffey and the majority of this watercourse is included in the Celbridge Probable AFA. Given the history of flooding and the fact that an alleviation scheme has been progressed it is recommended that Hazelhatch should be included as an AFA or possibly amalgamated with the Celbridge AFA.			

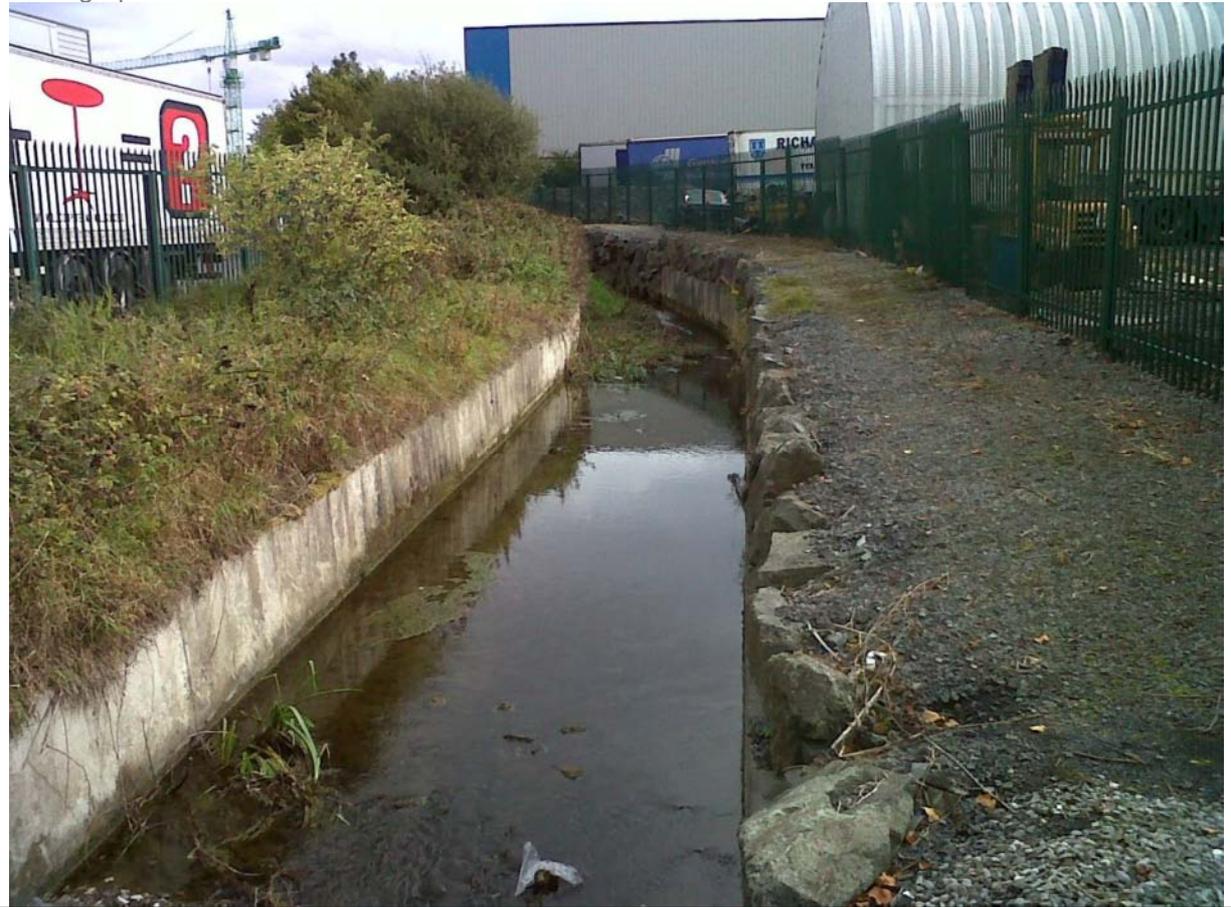
A9.4 Lucan to Chapelizod, South Dublin

Name: Lucan to Chapelizod	County: Dublin	Unique ID: 90090	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 8		Closest searchable town on floodmaps.ie: Lucan	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 10424.35	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 4		Historical Validation Hazard (0-4): 4	
Summary of LA Meeting			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: LA indicated that flooding has occurred in Chapelizod from the River Liffey and Furry Park Stream which affected properties.			
Summary of Site Inspection			
Site inspection observations: 26/09/11			
A River Liffey flows through Lucan to Chapelizod. It is difficult to ascertain the capacity of the watercourse however it is very urbanised with a high density of receptors throughout. If out of bank flooding was to occur numerous properties would be affected.			
Size of river: 30m x 5m		Channel vegetation: Short grass and trees	
Channel condition: -		Structures: Road bridges, weir and mill race	
Flood defences: -		Nature of flow: -	
Nature of floodplain: -		Floodplain vegetation: Urbanised and grassland fields	
Properties: Residential and commercial		Evidence of flooding: -	
Photographs: None taken			
Recommendation: The Lucan to Chapelizod area was originally listed as a Probable Area for Further Assessment with a FRI score of 10,424. Site inspections and a review of historic evidence suggests that there is a flood risk, particularly in the Chapelizod area, however there is some doubt as to the accuracy of the predicted 10%AEP flood outline. However even if 10%AEP flooding is eliminated completely the revised FRI score would be 1043 which is still robustly higher than the threshold of 250, consequently it is recommended that the Lucan to Chapelizod area should be considered an AFA.			

A9.5 Rathcoole, Saggart & Baldonnel, South Dublin

Name: Rathcoole, Saggart & Bald	County: South Dublin	Unique ID: 90097	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): -		Historical Hazard (0-4): -	
Number of flood report locations on floodmaps.ie: 3		Closest searchable town on floodmaps.ie: Rathcoole, Saggart & Bald	
LA comments confirm flood risk?: -			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 7251	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
Summary of LA Meeting			
Has there been a history of flooding?:			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: -			
Summary of Site Inspection			
Site inspection observations: 26/09/11			
Rathcoole and Saggart are potentially at risk of flooding from the River Camac which is listed as a HPW within the Dublin City AFA and therefore these two areas should be incorporated within this AFA. Bald(onnell) is potentially at risk from flooding from the River Griffeen and therefore should be considered a separate possible AFA from Rathcoole and Saggart.			
Inspection of the Baldonnel AFA identified two watercourses flowing through the Aerodrome and Greenogue Business Parks rather than the single watercourse shown in the PFRA modelling. Both these watercourses are heavily modified with numerous short sections of culverts. The PFRA flood polygon is incorrect in this area however it is likely that the flood risk area should be more extensive than shown and hence the FRI score should be higher. Along with a wide range of commercial properties two ESB sub-stations were observed to be located on the banks of the two watercourses found in this area. Downstream of the Business parks the land is generally very flat and consequently the flood outlines created by the PFRA process do not appear unreasonable.			
Size of river: 2-3m x 1.0-1.5m deep		Channel vegetation: Light weed growth	
Channel condition: Some localised armouring		Structures: Bridges, culverts	
Flood defences: None Observed		Nature of flow: Slow	
Nature of floodplain: Wide		Floodplain vegetation: grassland	
Properties: Residential and commercial		Evidence of flooding: Nothing observed	

Photographs:



Recommendation:

These areas were originally listed as a Probable Area for Further Assessment with a combined FRI score of 7251. Consideration of the output of the PFRA predictive modelling shows Rathcoole and Saggart to be within the Camac catchment which forms part of the Dublin City Probable AFA and as such it is recommended that these areas are included within this AFA. The Baldonnell area is affected by flooding from the Griffeen and as such should be considered a separate Probable AFA. Review of the PFRA predictive mapping and FRI calculation indicates that the FRI score for Baldonnell on its own should be robustly greater than 250. Site inspection revealed much of this potential damage to be associated with flood risk to commercial properties within the Greenogue Business Park where two open watercourses flow through heavily modified channels and culverts. Consequently it is recommended that **Baldonnell should be considered an AFA.**

A10.1 Milltownpass, Co Westmeath

Name: Milltownpass	County: West Meath	Unique ID: 70027	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive Analysis			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Milltownpass	
LA comments confirm flood risk?: No			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 291.3	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: WMCC have no knowledge of flooding at Milltownpass and the school identified at risk has never flooded. The road bridge DS of the school is prone to blockages.			
Summary of Site Inspection			
Site inspection observations: 13/06/11			
Visited the Milltown River, the residential estate and the school adjacent to the watercourse. The school is situated on the LHB of the river, accommodation bridges are situated immediately US and DS of the school. The channel is heavily vegetated and there are low hanging branches along the river in the area of the school. The RHB is higher than the LHB. The road bridge DS that is prone to blockages consists of twin culverts approx 1.2 – 1.6m dia. Debris was found at the inlet to the culverts.			
Size of river: 4m (w), 2m (d)		Channel vegetation: Densely vegetated, low hanging branches	
Channel condition: -		Structures: Acc bridge US of PS, Acc bridge DS of PS, Twin culvert road bridge DS, potential for blockages.	
Flood defences: None		Nature of flow: Moderate flow	
Nature of floodplain: LHB lower than RHB. Small floodplain area, PS & Telecoms infrastructure lie within floodplain		Floodplain vegetation: Playing fields, and hard standing.	
Properties: PS adjacent to WC		Evidence of flooding: None	

Photographs:



Recommendation:

Milltownpass was originally listed as a Possible Area for Further Assessment with a FRI score of 291, due principally to the predicted flood risk to the primary school. There is no known history of flooding at the Primary School in Milltownpass and the watercourse is maintained by OPW Regional Engineers who confirmed that the channel capacity would almost certainly be greater than Q_{med} . A channel capacity check was carried out and it was found that the channel has a capacity of greater than the 1%AEP flow and while the analysis method employed by RPS is very approximate this does give confidence that the channel could convey the 10%AEP flow. If the FRI for Milltownpass was recalculated with the primary school excluded from the 10%AEP flood risk the FRI score would be reduced to 66.3. The OPW has stated that the effects of flood alleviation works should be ignored in the assessment of potential flood risk and consequently Milltownpass could therefore be considered an AFA. However the vast majority of the FRI score is associated with a single receptor, the local primary school, which could be protected under the OPW minor works programme and therefore it is suggested that **Milltownpass should not be considered an AFA.**

A10.2 Riverstown, Co Westmeath

Name: Riverstown	County: West Meath	Unique ID: 70911	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historical Analysis			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 1	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Killucan	
LA comments confirm flood risk?: No (contradicting comments)			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: NO		Flood Risk Index: 0	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: WMCC have no knowledge of flooding at Riverstown. There are two Riverstown areas and the second area to the east experiences road flooding. WMCC could not provide a reason why Riverstown was included.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 13/06/11			
Visited the Riverstown River. All properties near the watercourse are quite high up and do not look to be at risk. No reason could be found as to why this is a possible AFA site.			
Size of river: 4m (w), 2m (d)		Channel vegetation: Low hanging trees & long grass (LHB), long grass (RHB)	
Channel condition: -		Structures: Stone bridge, no suggestion of blockages	
Flood defences: None		Nature of flow: Moderate flow	
Nature of floodplain: Moderately restricted. Ground rises quickly to Killucan		Floodplain vegetation: Agricultural fields, mainly long grass with trees on LHB.	
Properties: None adjacent. All relatively high		Evidence of flooding: None	

Photographs:



Recommendation:

Riverstown was originally listed as a Possible Area for Further Assessment although the reason for inclusion is unclear in the PFRA database. No FRI score was available in the PFRA database and neither the predictive mapping nor historical records show any properties flooding. The Local Authority and OPW Regional Engineering staff also had no knowledge of flooding at Riverstown. It is therefore considered likely that Riverstown was brought forward for review in error, consequently it is recommended that **Riverstown should not be considered an AFA.**

A11.1 Annacurragh, Co Wicklow

Name: Annacurragh	County: Wicklow	Unique ID: 100108	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Annacurragh	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 630	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?:			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: No known history of flooding in this area.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11			
Two channels converge upstream of bridge, right bank looks lower than left downstream of bridge, all properties located on left bank circa 4-5m above normal river level – Not an AFA.			
Size of river: 10m x 2m		Channel vegetation: Weedy	
Channel condition: Deposition/gravel		Structures: Single arch bridge	
Flood defences: No		Nature of flow: Rapid	
Nature of floodplain: Semi-constrained		Floodplain vegetation: Trees and open grassland	
Properties: School church pub on left bank well above likely river levels		Evidence of flooding: No	

Photographs:



Recommendation:

Annacurragh was originally listed as a Possible Area for Further Assessment with a FRI score of 630. The Local Authority has no knowledge of previous flooding in this area affecting property and during the site inspection the nearest properties were observed to be 4-5m above the river level. Thus **Annacurragh should not be an AFA.**

A11.2 Arklow, Co Wicklow

Name: Arklow	County: Wicklow	Unique ID: 100109	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive & Historic			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 15		Closest searchable town on floodmaps.ie: Arklow	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2994.3	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 2		Historical Validation Hazard (0-4): 3	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: Extensive coastal flood risk, South Green, Rockview, Dublin Road, South Quay, Lower Main Street etc scheme proposed.			
Summary of Site Inspection			
Site inspection observations: 22/06/11			
Definite flood risk, some minor works completed recently, evidence of individual property protection, some gaps in low flood wall along South Quay at slipways, looks like provision for stop logs but none observed.			
Definitely an AFA			
Size of river: . Varies		Channel vegetation: Variable, clear in lower reaches, more vegetated upstream	
Channel condition:		Structures:	
Flood defences: Low wall along south quay		Nature of flow: Tidal	
Nature of floodplain: Constrained		Floodplain vegetation:	
Properties: Numerous houses and commercial premises around dock area		Evidence of flooding: Flood stop boards fitted to houses on south green.	

Photographs:



Recommendation:

Arklow was originally listed as a Probable Area for Further Assessment with a FRI score of 2,994. Both the predictive flood mapping and the Local Authority comments confirm the existence of a flood risk in Arklow, particularly to the low lying areas around the harbour. During the site inspection individual property protection measures were observed along the South Quay. Consequently **Arklow should be an AFA.**

A11.3 Ashford/Rathnew, Co Wicklow

Name: Ashford & Rathnew	County: Wicklow	Unique ID: 100110	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Ashford	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 1442.1	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: -			
Are there any maintained defences?:-			
LA comments: A number of locations in Rathnew susceptible to flooding 2-3yr RP. No record of flooding to property. N11 bridge in Ashford caused backing up during Hurricane Charley.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11			
R763 3 arch bridge, wide flood plain downstream on right bank, steep left bank. Some properties on right bank, no obvious sign of flooding. N11 Ashford – weir immediately upstream, little freeboard to pub, also properties downstream extend right to river bank. Rathnew – river 5-6m wide x 1m deep, properties close by both banks upstream of N11 bridge.			
Size of river: 10m x 2m @ R763,		Channel vegetation: Overhanging trees/scrub	
Channel condition: -		Structures: Various bridges	
Flood defences: -		Nature of flow: -	
Nature of floodplain: Rural upstream, Urbanised lower		Floodplain vegetation: -	
Properties: -		Evidence of flooding: None	

Photographs:



Recommendation:

Ashford and Rathnew were originally listed as a Probable Area for Further Assessment with a FRI score of 1,442. The site inspection did not identify any reasons to significantly modify the extents of the PFRA predictive mapping, and discussions with the Local Authority confirmed some history of flooding, particularly during Hurricane Charley. Consequently it is recommended that **Ashford/Rathnew should be considered an AFA.**

A11.4 Aughrim, Co Wicklow

Name: Aughrim	County: Wicklow	Unique ID: 100111	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive & Historic			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Aughrim	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 465.8	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: Fogarty Terrace, Meath Terrace – flooded historically, some remedial works undertaken? Probable flood risk at Lawless Hotel.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11 Potential flood risk to low lying properties on right bank downstream of weir and bridge including Lawless hotel and Fogarty terrace.			
Size of river: 15-20m x 2m		Channel vegetation: Clear	
Channel condition: Gravel/armoured		Structures: Weir, bridge and mill race	
Flood defences: None evident		Nature of flow: Fast	
Nature of floodplain: Constrained		Floodplain vegetation: -	
Properties: Houses downstream and hotel?		Evidence of flooding: No	

Photographs:



Recommendation:

Aughrim was originally listed as a Probable Area for Further Assessment with a FRI score of 466. Historically flooding has been reported at Fogarty Terrace and Meath Terrace and the Local Authority reported having undertaken some remedial works. The site inspection confirmed the potential for flooding to properties such as the Lawless Hotel and the terraces mentioned previously. No reasons were found to significantly alter the PFRA predictive mapping and hence the FRI score consequently it is recommended that **Aughrim should be considered an AFA.**

A11.5 Avoca, Co Wicklow

Name: Avoca	County: Wicklow	Unique ID: 100112	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive & Historic			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Avoca	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 413.2	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: Main bridge washed away in Hurricane Charley? Flooding at WWTW, Station Road, Woodview Park, Ballanagh Crescent, and Brook Meadow			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11			
Flooding at Ballanagh Crescent/Close and Brook Meadow probably due to blockage or lack of capacity in one of many small culverts associated with multiple road crossings. Main bridge cannot have been completed destroyed in Hurricane Charley, as still is use, property located close to both river banks upstream and downstream therefore potential flood risk exists. Unclear how Station Road flooded without also flooding properties on left bank.			
Size of river: 20m x 3-4m		Channel vegetation: Clear – tree lined banks	
Channel condition: Gravel, stable		Structures: 3 arch bridge	
Flood defences: None visible		Nature of flow: Rapid	
Nature of floodplain: constrained		Floodplain vegetation: -	
Properties: Multiple particularly upstream		Evidence of flooding: Abandoned house Ballagh Close?	

Photographs:



Recommendation:

Avoca was originally listed as a Probable Area for Further Assessment with a FRI score of 413. There are three reports on www.floodmaps.ie relating to flooding in Avoca and the site inspection confirmed the potential flood risk on the minor stream at Brook Meadow. The flood risk from the main river is less certain however there are a number of properties close to the river on both banks and therefore some flood risk exists. Consequently it is recommended that **Avoca should be an AFA**

A11.6 Ballinaclesh, Co Wicklow

Name: Ballinaclesh	County: Wicklow	Unique ID: 100113	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Ballinaclesh	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 160.7	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: WwTW reported to flood 2-3 times/year, regular flooding at bridge			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11			
New housing @ Furnace Grove (RB u/s bridge) protected by earth embankment 1.5m to rear of gardens.			
WwTW on flood plain evidence of strand line on fence.			
Potential flood risk to two houses u/s bridge on LB?			
Size of river: 15-20m x 1-2m		Channel vegetation: Overhanging trees	
Channel condition: Gravel, stable?		Structures: 3 arch bridge	
Flood defences: Embankment to rear of houses		Nature of flow: -	
Nature of floodplain: Constrained		Floodplain vegetation: Grass/trees	
Properties: WwTW and 6-7 houses?		Evidence of flooding: Yes @ WwTW	

Photographs:



Recommendation:

Ballinaclesh was originally listed as a Possible Area for Further Assessment with a FRI score of 161. The only reported history of flooding relates to the WwTW although the site inspection indicated that potentially 8-10 houses may lie within the predicted floodplain (5 of these are protected by a low earth embankment). Evidence of recent flooding (flood wrack caught in fence) was observed at the WwTW however no reason was found to extend the PFRA predictive mapping or bring additional assets into the flood risk zone and hence increase the FRI score. Consequently it is recommended that **Ballinaclesh should not be considered an AFA.**

A11.7 Blessington, Co Wicklow

Name: Blessington	County: Wicklow	Unique ID: 90074	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive & Historic			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Blessington	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 1220	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: No knowledge of any significant flooding			
Summary of Site Inspection			
Site inspection observations: 24/06/11			
Upstream of R410 stream through Deerpark Crescent is culverted, unable to access headwall due to keypad access on gates, stream reverts to open channel by upstream boundary of development. (possible flood risk to apartments if culvert blocks). Upstream of gated development (Deerpark Crescent), housing (The Green) is above and well back from stream which is contained in circa 2m deep vegetated channel. Stream parallel to R410 upstream of inner relief road (Deerpark Crescent) through Deerpark Close/Drive/Green is culverted and dry upstream of culvert inlet. (250-300mm dia conc pipe exits Glending Estate to dry watercourse, no discharge observed at time of visit).			
Upstream of Glending Estate, open water course runs "parallel" to R410, to pond one field above Glending Estate. Area of open water in field discharges to 250-300mm dia conc pipe heading towards Glending Estate. Investigations within Glending Estate established incoming pipe carrying watercourse is circa 750mm dia but changes to 450mm dia prior to exiting Estate and flowing along R410 to unknown discharge point. Large drainage channel at green in Glending Estate to intercept overland flow from NE, attempt at provision of flood wall along boundary of Estate has gap, some debris observed in fence. 8-10 houses abandoned in Glending Way due to frequent flooding, sand bags stored at virtually all houses along Glending Way (circa 21 additional properties).			
Housing @ Killmalum Drive/Way/Avenue, site infilled (2-3m) stream culverted through development (circa 1.8m dia), reinforced concrete walls retain fill and provide flood protection, no likely risk to properties. Potential flood risk to three properties further downstream after stream crosses Killmalum Road also new school built adjacent to stream further down Killmalum Road, possible flood risk although property appears to be elevated relative to stream levels.			
Size of river: 1-1.5m wide 2+m deep upstream		Channel vegetation: Vegetated	
Channel condition: Modified		Structures: Culverts	
Flood defences: No specific defences		Nature of flow: Steep	
Nature of floodplain: -		Floodplain vegetation: Sub urban and grass fields	
Properties: Apartments u/s R410 Housing development @ Killmalum		Evidence of flooding: No	

Photographs:



Recommendation:

Blessington was originally listed as a Possible Area for Further Assessment with a FRI score of 1,220. There are numerous small streams that flow through Blessington, and at the time of the site inspections they were all either dry or had low flows. A stream flowing from the north west through the Glending Estate, is shown by the PFRA analysis to represent a significant flood risk in Blessington. However downstream of Glen Ding Way this channel was dry and heavily grassed suggesting that it doesn't convey flow very often. Work has been carried out during the construction of the Glending Estate resulting in the watercourse being re-routed to avoid the housing areas downstream. Consequently the predicted flood extent for this stream downstream of Glending Estate is questionable and it is unlikely that there is a flood risk to the housing at Deerpark. Further downstream after a couple of additional small streams have joined the watercourse is culverted through a major recent housing development at Kilmalum Road, the houses here are elevated and are unlikely to flood. Downstream of Kilmalum Road three houses and a new school are situated adjacent to the stream and consequently may be subject to flood risk. Flood damage has also been assigned to monuments however on inspection no monuments lie within the predicted floodplain. Correcting the FRI calculations for all of the above reduces the overall score to circa 350 due principally to the location of the new school. It is therefore recommended that **Blessington should be considered an AFA.**

A11.8 Bray, Co Wicklow

Name: Bray	County: Wicklow	Unique ID: 100114	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive & Historic			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 5		Closest searchable town on floodmaps.ie: Bray	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 4381.2	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 2	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Bray has experienced extensive flooding in the past from the Dargle.			
Summary of Site Inspection			
Site inspection observations: 15/07/11			
<p>The wc enters bray from the south west and the predictive mapping shows flooding to the apartments. The channel is large and the buildings are raised fairly high with gabions protecting the bank. There is underground parking and a crèche, the risk is higher as a consequence. The RHB is higher and out of bank flooding could only occur to the left. One house shown at tributary near the main wc junction lies in the PFRA predictive mapping. Couldn't see the trib but discharges to main wc through culvert at a raised level, affect backing up from main wc. The wc flows adjacent to residential houses which show as flooding. The park DS has a small wall running adjacent to the wc but looks vulnerable to flooding. The RHB is raised higher is less likely to flood. A second wall runs along the boundary of the park approaching the main road and provides protection to the main road. Flood wall (check) protects houses DS of the road bridge on the LHB. RHB very high. A trib flows into main wc at the park. It is a steep wc and very deep mainly. There are places where the channel becomes shallow and is more likely to experience out of bank flooding, housing estate at the US end and housing estate at the DS end. The predictive flood mapping shows secondary wc joining River Dargle from north, however on investigation there was no sign of a watercourse. Need to check this.</p>			
Size of river: 20m x 5m		Channel vegetation: Low veg	
Channel condition: -		Structures: Road bridges	
Flood defences: -		Nature of flow: Mod flow	
Nature of floodplain: -		Floodplain vegetation: Urban and parkland	
Properties: Residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Bray was originally listed as a Probable Area for Further Assessment with a FRI score of 4,381. Significant flooding is shown by the PFRA predictive mapping for the River Dargle and associated tributaries. Flood reports on www.floodmaps.ie show the historical flood extent from the River Dargle to be larger than the predicted 0.1%AEP flood extent from the PFRA predictive modelling, however there was no evidence on site of the minor watercourse shown in the PFRA predictive modelling to join the Dargle at Bray Bridge. An error in the calculation of the FRI score was identified for Bray and it is more likely that the overall FRI score would be approximately 1860. If the predicted flooding from the minor watercourse that could not be found on site is excluded from the FRI calculation the score would be further reduced to 940. However given that the historical flood extent is larger than the predicted 0.1%AEP flood extent it is likely that the flood extent in Bray has been underestimated and consequently the FRI score should be robustly greater than 250. Therefore it is recommended that **Bray should be considered an AFA.**

A11.9 Brittas Bay, Co Wicklow

Name: Brittas Bay	County: Wicklow	Unique ID: 105454	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Historic			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Arklow	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: No		Flood Risk Index: 0	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Erosion of dune face may place properties at risk from coastal flooding No history of any actual flooding to date.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11 Small watercourse at southern end of beach, unlikely to represent a significant flood risk to any properties. Main risk appears to be associated with erosion of dune which could lead to increased coastal flood risk to low lying properties behind.			
Size of river: 2m x 1-1.5m		Channel vegetation: Heavily vegetated	
Channel condition: N/A		Structures: N/A	
Flood defences: Natural dune system		Nature of flow: Stagnant	
Nature of floodplain: -		Floodplain vegetation: -	
Properties: Low lying housing along road		Evidence of flooding: -	

Photographs:



Recommendation:

Brittas Bay originally listed as a Possible Area for Further Assessment following receipt of comments from Local Authority on possible flood risk to a number of properties. No FRI score was given in the PFRA database and no records of historic flooding were found on www.floodmaps.ie and this was confirmed during discussions with the Local Authority. The site inspection and discussions with the Local Authority identified the risk at Brittas Bay to be related to coastal erosion and the potential loss of the coastal dune system that presently prevents tidal flooding of the properties behind. As there is presently no actual flood risk at Brittas Bay it is recommended that **Brittas Bay should not be considered an AFA.**

A11.10 Charlesland, Co Wicklow

Name: Charlesland	County: Wicklow	Unique ID: 100115	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive & Historic			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Greystones	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 3840	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: LA housing adjacent to Three Trout's Stream floods, JBB report provided.			
Summary of Site Inspection			
Site inspection observations: 14/07/11			
One main wc flows through Charlesland. Starting US at the Kilcoole Rd the wc lies in a deep valley which flattens out DS of the bridge and the land to the left looks like natural floodplain on which the Burnaby housing estate is located. The predictive mapping shows flooding through the housing estate. There are walls present which may stop out of bank flooding if they are suitable, however if flooding occurs US they may trap flood water in. The Charlesland development is quite flat with a gentle slope to the main central street. If out of bank flooding was to occur it may possibly spread as shown in the predictive mapping.			
Size of river: 2.5m (w) 1m (d)		Channel vegetation: Mod dense veg	
Channel condition: -		Structures: Kilcoole rd br – low blockage risk Bypass br – low blockage risk	
Flood defences: -		Nature of flow: Slow to moderate	
Nature of floodplain: Widens DS of Kilcoole rd br		Floodplain vegetation: Short grass or urban	
Properties: Residential housing estate		Evidence of flooding: none	

Photographs:



Recommendation:

Charlesland was originally listed as a Possible Area for Further Assessment with a FRI score of 3,840. Two housing estates are shown to be within the predicted flood extent at Charlesland. The predicted flood extents look to be inaccurate as there are wedges present and the 10%AEP, 1%AEP and 0.1%AEP extents are exactly the same. Historical records on www.floodmaps.ie show that the Burnaby housing estate flooded in November 2003 causing significant damage. The fields upstream of the Burnaby housing estate are low lying beside the river and look to be a natural floodplain. By continuing this estimated floodplain through the housing estate and eliminating the wedges produced in the predictive flood model we can exclude the houses unlikely to flood while keeping the houses likely to have flooded previously. Even with this modification the FRI score within the Burnaby estate alone is still greater than 250. It is therefore recommended that **Charlesland should be considered an AFA**, however there is scope for it to be combined with Greystones Probable AFA.

A11.11 Enniskerry, Co Wicklow

Name: Enniskerry	County: Wicklow	Unique ID: 100116	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive & Historic			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Enniskerry	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 380	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 2		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: -			
<u>Summary of Site Inspection</u>			
Site inspection observations: 15/07/11			
A large wc flows around Enniskerry. The wc is contained within a deep channel. At the location where out of bank flooding is shown to occur the banks are approx 6m high. While the water level will realistically reach a high level during a large flood event it is unlikely to go out of bank along the Enniskerry development.			
A local resident did highlight a small trib that causes flooding at the Mill Field housing estate. This has not been included in the PFRA predictive mapping.			
Size of river: 8m x 8m		Channel vegetation: Mod veg with trees	
Channel condition: -		Structures: Road bridge	
Flood defences: -		Nature of flow: Low flow	
Nature of floodplain: -		Floodplain vegetation: -	
Properties: Residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Enniskerry was originally included as a Probable Area for Further Assessment with a FRI score of 380. On review it was noted that the occurrence of out of bank flooding on the Glencullen River through Enniskerry was questionable due to the observed large in-channel capacity. The natural river banks are approximately 8m above the channel bed through Enniskerry. A basic channel capacity assessment indicates that the Glencullen River is likely to be able to convey a flow of in excess of the 0.1%AEP flow through Enniskerry. While the channel capacity assessment is considered very approximate it does give an indication that the channel would be able to convey the 10%AEP flow and that the 10%AEP flood damage should be removed from the FRI score. This reduces the FRI score from 380 to 74 and it is therefore recommended that **Enniskerry should not be considered an AFA.**

A11.12 Glendalough, Co Wicklow

Name: Glendalough	County: Wicklow	Unique ID: 100107	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Laragh	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 753.4	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: -			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: Glendalough Hotel, Road and OPW interpretative centre flooded previously. Not considered a significant flooding problem.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11			
Hotel & visitor centre situated on natural flood plain, and capacity issue with road bridge upstream of hotel will cause river to flood car park on right bank and potentially cross road to flow across front of Hotel.			
Size of river: 6-8m x 1m		Channel vegetation: None	
Channel condition: Exposed gravel/cobble		Structures: 2 arch bridge	
Flood defences: None		Nature of flow: Rapid	
Nature of floodplain: constrained		Floodplain vegetation: Grass and trees	
Properties: Hotel and visitor facilities		Evidence of flooding: None visible	

Photographs:



Recommendation:

Glendalough was originally listed as a Possible Area for Further Assessment with a FRI score of 753. Discussions with the Local Authority confirmed that the Hotel and OPW interpretative centre had flooded in the past, however this was not considered a significant flooding problem. The site inspection confirmed the potential flood risk to the various tourist amenities, the river actually flows below the entrance to the hotel, however given that the flood risk is primarily associated with risk to historic monuments (two ruined Churches lie within the 0.1%AEP PFRA predictive mapping) and individual receptors **Glendalough is not considered an AFA.**

A11.13 Greystones, Co Wicklow

Name: Greystones	County: Wicklow	Unique ID: 100117	PFRA Status: Probable AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive & Historic			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 4		Closest searchable town on floodmaps.ie: Greystones	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 1180.3	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Houses have been identified at Greystones Harbour which have flooded or are at risk.			
Summary of Site Inspection			
Site inspection observations: 14/07/11			
The predictive flood mapping shows that flooding occurs from one WC at the northern extent of the town. One area shows flooding in isolation with no flood source from any wc. The ground is low relative to the surrounding area however.			
Starting near the US limit of flood mapping on the wc the stream's catchment includes part of Little Sugar Loaf and may produce rapid flows. The cottage adjacent to the wc has had its boundary wall rebuilt recently and included two openings. This looks like a flood alleviation measure. The wc continues in a relatively deep channel DS of the road crossing at the cottage. There are culverts along this length although no real signs of blockages or out of bank flooding. The weakest part appears to be at the cottage and if this were to occur the road travelling down to the Rathdown Rd would convey the flow. A local resident provided information at the area of the Rathdown Rd, The Groove road junction. Flooding has occurred here in the past. Flood water travelled down the Rathdown Road from a wc further north again and possibly from the wc being looked at. This flooding knocked a wall down and flooded houses. Sand bags are currently placed across one resident's garage. The predictive mapping shows flooding through the Redford housing estate. This is realistic given the flooding experienced US. The WC through this estate shows signs of severe erosion suggesting large flows.			
Size of river: 2m (w) 2m (d)		Channel vegetation: Long grass US, dense veg DS	
Channel condition: Erosion in Redford estate		Structures: Numerous culverts	
Flood defences: -		Nature of flow: Mod flow	
Nature of floodplain: Fairly steep and constricted		Floodplain vegetation: Long grass or urban	
Properties: Residential housing		Evidence of flooding: Rebuilt walls	

Photographs:



Recommendation:

Greystones was originally identified as a Probable Area for Further Assessment with a FRI score of 1,180. There are two sources of flood risk at Greystones tidal and fluvial. Historical flood records confirm that flooding has occurred in the past from both sources, the stream flowing under Redford Bridge has caused flooding in the past which has knocked down garden walls. The stream at Mount Haven looks to be culverted and although the houses are in a hollow it looks unlikely that they will flood. Removing these 30 properties from the FRI score reduces it from 1180 to 880. However it is still recommended that **Greystones should be considered an AFA.**

A11.14 Hollywood, Co Wicklow

Name: Hollywood	County: Wicklow	Unique ID: 90085	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Hollywood	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 471	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: No			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: No knowledge of any flooding history			
<u>Summary of Site Inspection</u>			
Site inspection observations: 24/06/11 Small stream crosses below local road, very shallow and any overflow likely to flow down road and affect 2 cottages & pub. Flood polygon extending to school downstream appears excessive.			
Size of river: 1m x 0.3m		Channel vegetation: None	
Channel condition: Eroding - gravel		Structures: Bridge/culvert	
Flood defences: No		Nature of flow: Rapid	
Nature of floodplain: Constrained RB, wide LB		Floodplain vegetation: Gardens & grass	
Properties: 2-3 houses & pub		Evidence of flooding: No	

Photographs:



Recommendation:

Hollywood was originally listed as a Possible Area for Further Assessment with a FRI score of 471, due principally to the PFRA predictive mapping including a primary school within the 10%AEP flood outline. Hollywood is affected by a small mountain stream and although it is likely to be flashy it is unlikely to flood any more properties than that shown in the PFRA predictive mapping. The PFRA predictive mapping shows a wedge extending out and including the school, however given the storage available from the field between the stream and the school it is considered unlikely that the school would be at risk during a 10%AEP flood event. Historical flood records show that some roads have experienced flooding in the past but no properties, which strengthens the assumption that the school is not at risk from a 10%AEP flood event. Removing the school from the FRI calculation reduces the Hollywood score to 221. Consequently it is recommended that **Hollywood should not be considered an AFA.**

A11.15 Kilcoole, Co Wicklow

Name: Kilcoole	County: Wicklow	Unique ID: 100118	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive & Historic			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Kilcoole	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 3405.9	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: LA indicated houses which have flooded on the Sea Road			
Summary of Site Inspection			
Site inspection observations: 14/07/11			
PFRA flood extent in Kilcoole is very angular and may need to be verified. The wc flowing into Kilcoole shows flooding in the field US which is very flat. No out of bank flooding occurs through the estate. The wc flows through twin culverts which may be prone to blockages. It is unclear if there is a flood risk to the surrounding houses, a model may be required to confirm this. To the north a wc used to flow towards the main road before being diverted to the first wc. This wc used to cause flooding, although the flood risk has been removed along the old river corridor. Surface water runoff still remains a problem however (local resident knowledge). Flood extent very angular and looks to originate from the old wc. If this is the case then the flood risk would be removed. However the main wc which would as a result be taking the full flow has only a relatively moderate channel size and the surrounding houses have little or no freeboard from top of bank level. Extra houses have been constructed since the 5k mapping was produced. Overall, if out of bank flooding occurred it would extend to a narrower extent			
Size of river: 3m x 2m		Channel vegetation: Dense veg	
Channel condition: -		Structures: culverts	
Flood defences: -		Nature of flow: Mod flow	
Nature of floodplain: -		Floodplain vegetation: Urban	
Properties: Residential		Evidence of flooding: None	

Photographs:



Recommendation:

Kilcoole was originally listed as a Possible Area for Further Assessment with a FRI score of 3,405. Site inspection revealed that the route of the watercourse flowing through Kilcoole and shown in the PFRA predictive mapping is incorrect. This watercourse has been diverted to join another stream which flows through Kilcoole. Consequently the entire predicted flood extent at Kilcoole can be considered inaccurate and the FRI scoring incorrect. The actual route of the watercourse that flows through Kilcoole was not modelled as part of the PFRA hence the flood risk is therefore unknown. www.floodmaps.ie records that properties were affected by flooding in the Beechdale Estate which is adjacent to the actual watercourse through Kilcoole and suggests that a flood hazard exists. On this basis it is recommended that **Kilcoole should be considered an AFA.**

A11.16 Killiskey, Co Wicklow

Name: Killiskey	County: Wicklow	Unique ID: 100119	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Killiskey	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 152	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: -			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: -			
<u>Summary of Site Inspection</u>			
Site inspection observations: 14/07/11			
Upper reaches of review area			
Before culvert			
<ul style="list-style-type: none">• Steeply sloping channel• Rocky/gravelly substrate• 1m wide, 1-1.5m deep• Heavily vegetated bank• Tree-lined and generally fully shaded in some sections			
After culvert			
<ul style="list-style-type: none">• Slope is less steep• Grassy bank, no trees• The school is gone• 1.5 to 2m wide, 1 m deep• Probably potential to come out-of-bank and flow on road, unlikely to affect properties in upper reaches			
Middle reaches of review area (row of houses)			
<ul style="list-style-type: none">• Row of houses - first 5 properties are raised, next two are level with the road surface, next 2 are lower than the road surface• Houses would be protected from flooding by being divided from the stream by a wall on the other side of the road plus a small field beyond that.• Cannot rule out flood risk here either from channel opposite the houses or water travelling along the road from upstream flooding			
Middle reaches of the review area (where stream crosses road near cross-roads)			
<ul style="list-style-type: none">• 2m wide, 1.5 m deep• Rock and gravel substrate• Heavily vegetated, tree-lined• 90deg bend in river, possible flood risk?			
Middle reaches of review area (beside farmstead)			
<ul style="list-style-type: none">• High gradient, stepped• 1-2m wide, 1 m deep• Tree-lined• Possibility for out-of-bank flooding			
Lower reaches of review area			
<ul style="list-style-type: none">• Linear development along road, most houses were raised?			

Size of river: 3m x 2m	Channel vegetation: Mod – dense veg
Channel condition: -	Structures: Culverts
Flood defences: -	Nature of flow: Low flow
Nature of floodplain: Steep and restricted	Floodplain vegetation: Grass fields
Properties: Residential	Evidence of flooding: None

Photographs:



Recommendation:

Killiskey was originally listed as a Possible Area for Further Assessment with a FRI score of 152. Killiskey is located on the side of a hill and the stream flowing through it is relatively steep and can be expected to be flashy. With this in mind the flood extent shown in the PFRA predictive mapping looks reasonable however a couple of houses look well raised and may not be at risk. The PFRA predictive mapping at this point takes the form of a wedge which may suggest it is inaccurate. The FRI score is not expected to increase from 152 and therefore it is recommended that **Killiskey should not be considered an AFA.**

A11.17 Kilmacanoge, Co Wicklow

Name: Kilmacanoge	County: Wicklow	Unique ID: 100120	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Kilmacanoge	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 160	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: -			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: -			
<u>Summary of Site Inspection</u>			
Site inspection observations: 15/07/11			
Predictive mapping shows flooding to residential houses, a grave yard, the N11, residential houses, petrol station and warehouses. At the US extent the flooding affects the N11 however the ground on the LHB looks to be lower and is quite marshy looking suggesting that it would store water before the N11 is affected. DS and across the overpass a pond is located on the LHB which would store flood water before it would affect the N11 or the adjacent houses and grave yard. If this is sufficient then it is questionable whether any flooding would occur from this wc. All culverts look adequately sized but the wc does flow open adjacent to a house and may be at risk. A small trib flows into the main wc at the N11. A significant weir and headwall looks to control the flow on the trib. There are no signs of flooding from it.			
Size of river: 2.5m (w) 2m (d)		Channel vegetation: Dense veg	
Channel condition: -		Structures: Culverts	
Flood defences: Attenuation pond		Nature of flow: Low flow	
Nature of floodplain: Narrow		Floodplain vegetation: Dense veg	
Properties: Residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Kilmacanoge was originally listed as a Possible Area for Further Assessment with a FRI score of 160. The PFRA predictive mapping shows the stream flowing through Kilmacanoge to affect 13 properties. The predicted flood extent for the 10%AEP, 1%AEP and 0.1%AEP events are exactly the same and which may suggest some instabilities in the model. An attenuation pond is located at the upstream extent of Kilmacanoge and is likely to reduce flows and hence flood risk. Therefore it is likely that the FRI score could be reduced from the currently predicted 160 and consequently **Kilmacanoge should not be considered an AFA.**

A11.18 Newcastle, Co Wicklow

Name: Newcastle	County: Wicklow	Unique ID: 100122	PFRA Status: Possible AFA
PFRA Review			
Reason for inclusion in OPW database: Predictive			
Historical Analysis			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Newcastle	
LA comments confirm flood risk?: Yes			
Predictive Analysis			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 537.5	
Historical Validation of Predictive Analysis			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
Summary of LA Meeting			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: No major flooding of property, road floods, high ground water levels common in winter, believed to be associated with restricted discharge at the Breaches. The stream has been known to flood after it was diverted during footpath works.			
Summary of Site Inspection			
Site inspection observations: 14/07/11			
A relatively large wc flows through Newcastle. Out of bank flooding is shown in PFRA on the RHB at the bar and restaurant. The RHB is lower than the LHB and flood water would breach the left bank first. There is little freeboard for all the buildings in the immediate area. The banks are fairly well raised with low/mod veg. It may be worth checking channel capacity. It may take more than a (Qmed). However immediately DS of road bridge there is a low point in the LHB which may allow flood water out. The wc flows adjacent to residential houses and an estate flowing under a few access bridges. The channel capacity is reduced here and there is little freeboard afforded to the houses. The estate is flat and may flood more if out of bank flooding occurred. A STW is located on the RHB and would flood during out of bank flooding. A GAA club house and fields may also be at risk. Extensive flooding is shown DS of this which is questionable. The surrounding fields are very flat and may produce a large flood extent however the quantity of water required to produce this flood extent is unlikely. An airfield is located in this flood extent. Overall PFRA flood extent is Newcastle town looks reasonable with the possibility of a couple of extra houses within the housing estate mentioned previously.			
Size of river: 8m x 4m		Channel vegetation: Mod – low veg	
Channel condition: -		Structures: Road bridges	
Flood defences: -		Nature of flow: Low flow	
Nature of floodplain: flat		Floodplain vegetation: Rural fields	
Properties: Residential and commercial		Evidence of flooding: None	

Photographs:



Recommendation:

Newcastle was originally listed as a Possible Area for Further Assessment with a FRI score of 537. The PFRA predictive mapping at Newcastle look reasonable until 0.5km down the Sea Road when it spreads out over a large area which may not be correct. However the flood damage affecting the FRI score is contained within the part of the flood extent which looks reasonably accurate. The site inspection showed that the actual channel is small and the surrounding land is very flat thus any out of channel flow will spread widely. Historical flood records also confirm that the Sea Road floods regularly, therefore there is no strong evidence for reducing the FRI score of 537.5. Consequently it is recommended that **Newcastle should be considered an AFA.**

A11.19 ESB Pollaphuca, Co Wicklow

Name: ESB Pollaphuca	County: Wicklow	Unique ID: 90069	PFRA Status: IRR
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Ballymore Eustace (Kildare)	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 25000	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: -			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: -			
<u>Summary of Site Inspection</u>			
Site inspection observations: 24/06/11			
Unable to access site, sub-stations located on right bank high above river probably safe from flooding.			
Google indicates power house located in bottom of ravine adjacent to river, potential flood risk if excess water released from dam upstream			
Size of river: Deep gorge difficult to estimate		Channel vegetation: -	
Channel condition: -		Structures: Road bridge	
Flood defences: Dam upstream		Nature of flow: Mod flow	
Nature of floodplain: Gorge		Floodplain vegetation: Forested	
Properties: Power station		Evidence of flooding: None	

Photographs:



Recommendation:

Pollaphuca is an ESB generating station and was included in the original list of sites as an Individual Risk Receptor with a FRI score of 25,000. The majority of the infrastructure at Pollaphuca station is located at the top of a gorge which the Liffey flows through immediately after Pollaphuca Dam. As the river is controlled by the dam most of the infrastructure appears to be well raised it is recommended that **Pollaphuca should not be considered an AFA.**

A11.20 Rathdrum, Co Wicklow

Name: Rathdrum	County: Wicklow	Unique ID: 100123	PFRA Status: Possible AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 1		Closest searchable town on floodmaps.ie: Rathdrum	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 197.1	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 1	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: No			
Are there any maintained defences?: No			
LA comments: Significant flooding during Hurricane Charley, Rathdrum bridge caused flow on Avonmore river to back up, no risk to majority of town.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11			
PRFA flood polygon shown extending toward village incorrect, ground rises steeply from river at this point.			
Wide flood plain on RB immediately d/s of bridge, zoned for development but potentially at flood risk.			
Flood plain u/s of bridge contains caravan site, holiday chalets and public amenity site all potentially at flood risk, also possibly Glanbia facility on LB d/s and new retail/apartment units on RB.			
Size of river: 30m x 1m		Channel vegetation: Little	
Channel condition: LB eroding		Structures: Multi arch bridge	
Flood defences: None obvious		Nature of flow: rapid	
Nature of floodplain: Constrained at bridge, wide u/s and d/s		Floodplain vegetation: Grass and trees	
Properties: Caravans and chalets		Evidence of flooding: No	

Photographs:



Recommendation:

Rathdrum was originally listed as a Possible Area for Further Assessment with a FRI score of 197. Rathdrum bridge is known to have caused flow on the Avonmore River to have backed up during high flow events e.g. Hurricane Charley. The PFRA predictive mapping incorrectly shows a wedge of flooding extending towards the village which is actually located on top of a hill therefore if anything the FRI score may be over-estimated. Consequently it is recommended that **Rathdrum should not be considered an AFA.**

A11.21 ESB Shelton Abbey, Co Wicklow

Name: ESB Shelton Abbey	County: Wicklow	Unique ID: 100106	PFRA Status: IRR
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: None		Closest searchable town on floodmaps.ie: Arklow	
LA comments confirm flood risk?: No			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 2587	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: None known			
Has any works been undertaken?:			
Are there any maintained defences?:			
LA comments: Wicklow Co Co did not report any knowledge of flood risk to this site			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11 ESB sub station located adjacent to large industrial site, Avoca River Park. Potentially on flood plain, site appears to be protected by embankments.			
Size of river: Wide		Channel vegetation:	
Channel condition:		Structures:	
Flood defences: Possible flood embankment		Nature of flow:	
Nature of floodplain: Wide		Floodplain vegetation: Grass, trees, hard standing	
Properties: ESB sub-station and industrial site		Evidence of flooding: No	

Photographs:



Recommendation:

The ESB sub-station at Shelton Abbey was originally listed as an Individual Risk Receptor with a FRI score of 2,587. While the site inspection confirmed that this asset is potentially located on the floodplain of the Avoca River, it appears to be within a larger defended site and as an individual receptor **should not be considered an AFA**.

A11.22 Wicklow, Co Wicklow

Name: Wicklow	County: Wicklow	Unique ID: 100124	PFRA Status: Probable AFA
<u>PFRA Review</u>			
Reason for inclusion in OPW database: Predictive & Historic			
<u>Historical Analysis</u>			
Historical Risk (0-4): 0		Historical Hazard (0-4): 0	
Number of flood report locations on floodmaps.ie: 2		Closest searchable town on floodmaps.ie: Wicklow	
LA comments confirm flood risk?: Yes			
<u>Predictive Analysis</u>			
Predictive mapping indicates flooding?: Yes		Flood Risk Index: 690	
<u>Historical Validation of Predictive Analysis</u>			
Historical Validation Risk (0-4): 0		Historical Validation Hazard (0-4): 0	
<u>Summary of LA Meeting</u>			
Has there been a history of flooding?: Yes			
Has any works been undertaken?: -			
Are there any maintained defences?: -			
LA comments: Burken Stream – Culvert capacity causes flooding. Marlton Stream – Throttle @ bridge causes flooding to Abbey St/Marlton Road. North Quay area – coastal flood risk.			
<u>Summary of Site Inspection</u>			
Site inspection observations: 22/06/11			
Masonry multi span bridge represents significant potential for flow restriction, no obvious flood defence structures upstream or downstream of bridge – majority of town rises quickly from river however North Quay/Murrough area and ribbon along river on southern side are potentially at risk from flooding.			
Size of river: Varies		Channel vegetation:	
Channel condition:		Structures: Multi arch bridge	
Flood defences:		Nature of flow:	
Nature of floodplain: Constrained RB/ wide LB		Floodplain vegetation:	
Properties:		Evidence of flooding:	

Photographs:



Recommendation:

Wicklow was originally listed as a Probable Area for Further Assessment with a FRI score of 690. Wicklow can be affected by flooding from both the sea and the river and the site inspection did not identify any reasons to modify the extent of the PFRA predictive mapping and hence modify the FRI scoring. Consequently **Wicklow should be considered an AFA.**

APPENDIX B

OPW REGIONAL DRAINAGE MAINTENANCE STAFF CONSULTATION FEEDBACK

ECFRAMS – Risk Review meeting notes

Meeting with OPW Regional Drainage Maintenance staff, 28/07/11

Attendees:

Mark Wilson

Malcolm Brian

John G Murphy

Jamie Keogh

Patrick Gallagher

The following risk review areas were discussed with the OPW Regional Engineers.

Athboy:

The Athboy River is maintained by OPW, they have no knowledge of flooding in Athboy from this river.

Ballivor

The river through Ballivor is maintained by OPW, they have no knowledge of flooding in Ballivor from this river. A scheme was completed on the river in 86/87, cross sectional information may be available for RPS to carry out a river capacity analysis.

Kilmessan

The Skane River is maintained by OPW, they have no knowledge of flooding in Kilmessan from this river. A large flood occurred in this area in 2002 giving confidence in the historical flooding information. The flooding shown follows an old millrace. This route has since been filled in (found from site inspection).

Kildalkey

The river through Kildalkey is maintained by OPW, they have no knowledge of flooding in Kildalkey from this river.

Longwood

OPW have concerns with the minor watercourse that flows adj to a housing estate before passing the school and into the Blackwater. They estimate the minor wc to have a 1 in 3yr capacity with the accommodation bridges being undersized. On review of the houses at risk over 25 houses would be affected during the 10yr flood event and would therefore be given an FRI score of >250.

Slane

The weir in the Boyne at Slane is maintained by the OPW every year or two and trees are removed from it. OPW have no knowledge of flooding in this area.

Stalleen

OPW have no knowledge of flooding in this area.

Ballymore Eustace

OPW have no knowledge of flooding but would have limited knowledge in this area.

Blacktrench

OPW have no knowledge of flooding but would have limited knowledge in this area.

Carragh

OPW have no knowledge of flooding in this area. There may be section 50 information available for a housing estate in Carragh.

Clane

OPW confirmed the flood risk in Clane. The flood outline of the 1984 event should be available from ESB or on floodmaps.ie.

Johnstown Bridge

The Blackwater and Fear English River that flow through Johnstown Bridge are maintained by OPW and were part of the drainage scheme, The capacity of both watercourses through or adjacent to the residential estate at risk have been deepened as part of the scheme and have a capacity much greater than the Qmed. The housing estate is not shown in the damage land mapping. OPW have no knowledge of flooding from these two watercourses in Johnstown Bridge.

Johnstown

OPW are currently carrying out a scheme here to a 1 in 100yr standard. Flood risk is from the Morell River and tributary which has low capacity and numerous access bridge over it. A diversion channel is proposed to connect the tributary to the Morell before entering Johnstown. Flood risk is also from the Hartwell River which has flooded houses in the part. Flood embankment are being construction along the=is river and flap valves installed at the N7 associated road to prevent backwater entering Johnstown.

Kilcock

OPW confirmed that flooding has occurred in Kilcock which flooded a pub at the R125 road bridge and have concerns of the flood risk to the surrounding properties in that area also as the ground is low. Flooding also occurred to houses near the R158 road bridge where flood water reached them from downstream. The Ryewater is maintained by OPW. RPS have carried out a study of the Ryewater in Kilcock which may provide more information.

Kilcullen

OPW have no knowledge of flooding but would have limited knowledge in this area.

Kill

OPW have no knowledge of flooding in this area. There should be a section 50 report or flow available for the culvert passing under the M7.

Sallins

OPW confirmed flood risk from the feeder stream to the Grand Canal. They have no knowledge of flooding from the Liffey. A scheme is underway on the feeder canal but has not been completed and is currently on hold. The risk to the apartments that flooded previously is still high. 70 apartments were affected.

Straffan

OPW have carried out work on the Morell River near Straffan. OPW have no knowledge of flooding in Straffan from any watercourse. Historical flooding in Straffan is from a pluvial source.

Turnings

OPW are aware of flooding in this area but suggested that Kildare Council would have more detailed knowledge. A large flood event occurred in Jan 2002. OPW have carried out a small scheme at the horse processing plant upgrading the road bridge and constructing an embankment approximately 300m in length.

Tullyallen

OPW have no knowledge of flooding in this area.

Milltownpass

OPW maintain this watercourse and confirmed that the channel would have a capacity greater than the Qmed flow. OPW have no knowledge of flooding. River is part of the Arterial drainage scheme.

Edenderry

Study has been commissioned by Offaly coco, carried out by N O'Dwyer. OPW have concerns with flood risk to Edenderry from the minor watercourse which feed into the River Boyne. Significant flooding from Weavers Drain. OPW maintain the watercourse in Edenderry.

County Wicklow

OPW have no direct knowledge of flooding from the watercourses in County Wicklow at present.

APPENDIX C

CHANNEL CAPACITY CALCULATIONS

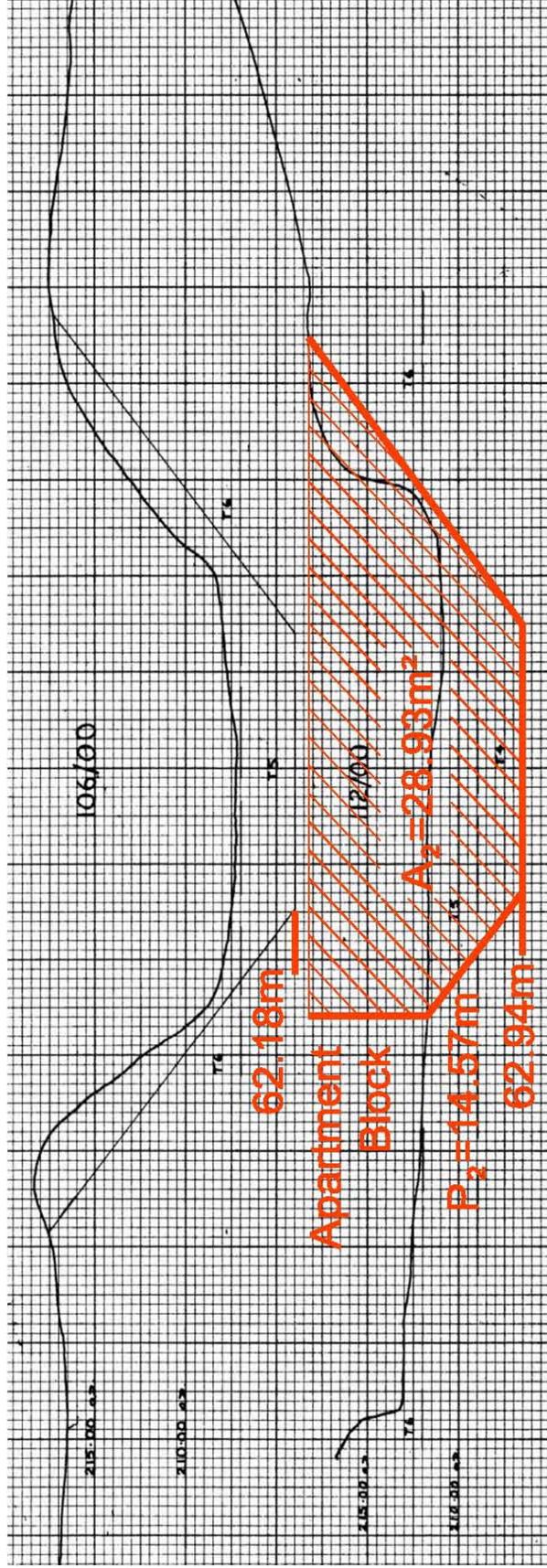
Athboy - Channel Capacity Calcs using Manning's Equation

$$Q = Av = AR^{2/3}S^{1/2}/n$$

Q	Flow in river channel (m ³ /s)
A	Area of river channel (m ²)
P	Wetted perimeter of river channel (m)
R	Hydraulic radius (A/P)
S	Water surface slope (m/m)
n	Manning n value (friction coefficient)

Athboy	C1/21	Historic Drawing Ref.		Chainage 1		Chainage 2		Chainage Study		A	P	R	R ^{2/3}	S ₂	S ^{1/2}	I _{n2}	Q	Q _{Med}	PFRA	
		11200 Yds	N.A.	A2	P2	P1	P2	14.57	11140 Yds										28.93	14.57
		N.A.		28.93m	N.A.	N.A.		14.57		28.93	14.57	1.985587	1.579765	0.0013	0.036056	0.05	32.95662	15.87	22.9	32.74

¹ Cross sectional information received from OPW



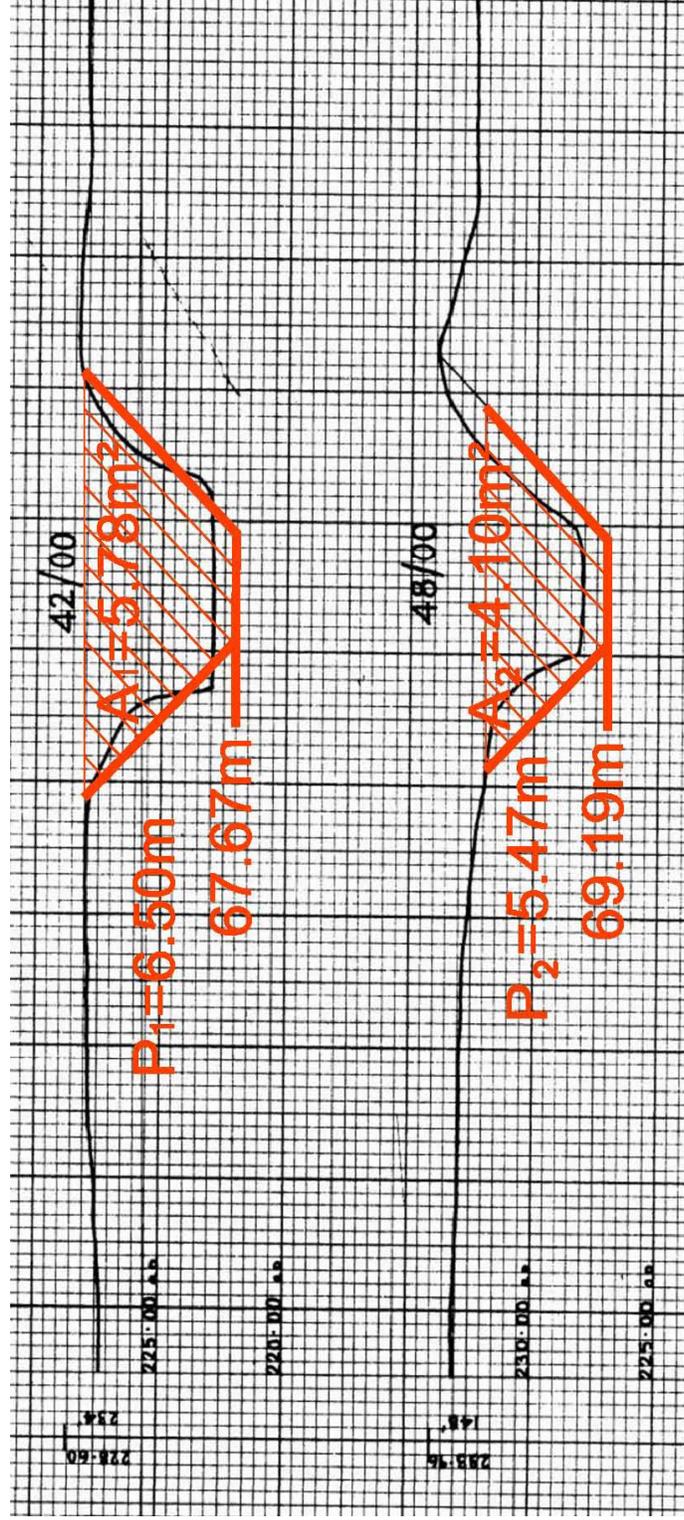
Ballivor - Channel Capacity Calcs using Manning's Equation

$$Q = AV = AR^{2/3} S^{1/2} / n$$

Q	Flow in river channel (m ³ /s)
A	Area of river channel (m ²)
P	Wetted perimeter of river channel (m)
R	Hydraulic radius (A/P)
S	Water surface slope (m/m)
n	Manning n value (friction coefficient)

Ballivor	Historic Drawing Ref. ¹	Chainage 1		Chainage 2		Chainage Study		A	P	R	R ^{2/3}	S ₂	S ^{1/2}	n ₂	Q	PFRA			
		4200 Yds	4800 Yds	A1	A2	P1	P2									4200-4800 Average	Q _{MED}	Q ₁₀	Q ₁₀₀
	C/1/32/4			5.78m ²	4.10m ²	6.50m	5.47m	4200-4800 Average	4.94	5.985	0.825397	0.879917	0.0027	0.051962	0.05	4.517318	2.71	3.91	5.59

¹ Cross sectional information received from OPW



Enniskerry - Channel Capacity Calcs using Mannings Equation

$$Q = AV = AR^2 S^{1/2} n$$

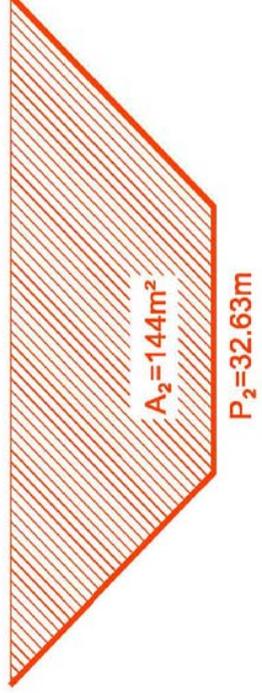
Q	Flow in river channel (m ³ /s)
A	Area of river channel (m ²)
P	Wetted perimeter of river channel (m)
R	Hydraulic radius (AP)
S	Water surface slope (m/m)
n	Manning n value (friction coefficient)

Historic Drawing Ref.	Chainage 1		Chainage 2		A1	A2	P1	P2	Chainage A	P	R	R ^{2/3}	S ₂	S ^{1/2}	n ²	Q	PFRA		
	Narrowest Channel	Widest Channel	Q ₁₀	Q _{MED}													Q ₁₀₀		
Kilcullen	N.A.		104	144	27.63m	32.63m	104	27.63	3.764025	2.419738	0.001	0.031623	0.05	159.1592	9.52	13.5	19.64		

Minimum Channel Profile



Maximum Channel Profile



Johnstown Bridge - Channel Capacity Calcs using Manning's Equation

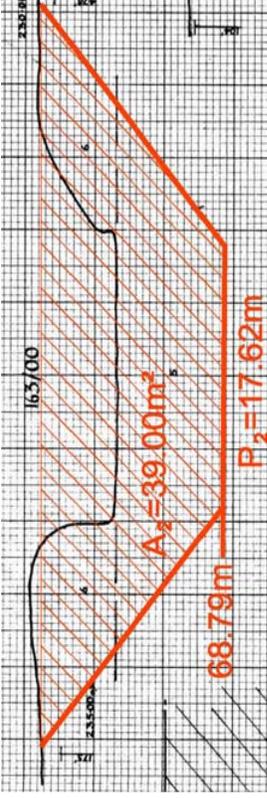
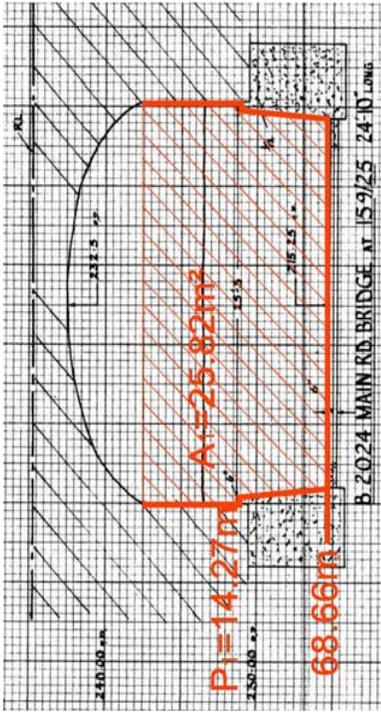
$$Q = AV = AR^{2/3} S^{1/2} / n$$

Q	Flow in river channel (m ³ /s)
A	Area of river channel (m ²)
P	Wetted perimeter of river channel (m)
R	Hydraulic radius (A/P)
S	Water surface slope (m/m)
n	Manning n value (friction coefficient)

Main Channel (Blackwater)

Historic Drawing Ref. 1	Chainage 1	Chainage 2	A1	A2	P1	P2	Chainage Study	A	P	R	R ^{2/3}	S	S ^{1/2}	n ²	Q	Q _{MED}	Q ₁₀	Q ₁₀₀	
Johnstown C1736	15925 Yds	16300 Yds	25.82	39	14.27	17.62	Between 15925- 16300	163.00	39	17.62	2.213394	1.698397	0.00038	0.019494	0.05	25.82412	14.6	21.06	30.13

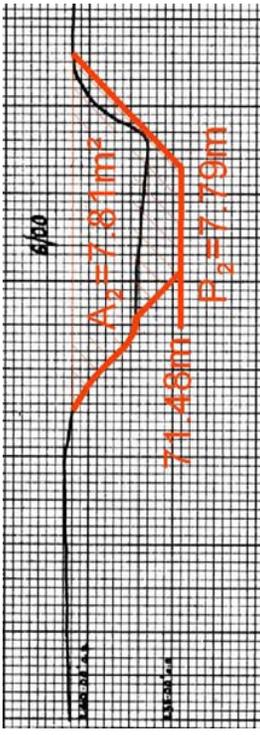
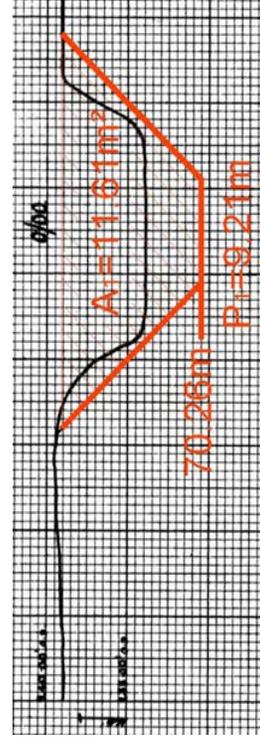
¹ Cross sectional information received from OPW



Tributary

Historic Drawing Ref. 1	Chainage 1	Chainage 2	A1	A2	P1	P2	Chainage Study	A	P	R	R ^{2/3}	S2	S ^{1/2}	n ²	Q	Q _{MED}	Q ₁₀	Q ₁₀₀	
Johnstown C1736/19	0 Yds	600 Yds	11.61	7.81	7.81	9.21	7.79 10 - 300 Yds	71.48	7.81	7.79	1.002567	1.001711	0.0022	0.046904	0.07	5.242117	3.15	4.56	6.51

¹ Cross sectional information received from OPW



Kilcullen - Channel Capacity Calcs using Manning's Equation

$$Q = AV = AR^2 S^{1/2} / n$$

Q	Flow in river channel (m ³ /s)
A	Area of river channel (m ²)
P	Wetted perimeter of river channel (m)
R	Hydraulic radius (A/P)
S	Water surface slope (m/m)
n	Manning n value (friction coefficient)

Kilcullen	Historic Drawing Ref. 1	Chainage 1	Chainage 2	A1	A2	P1	P2	Chainage : A	P	R	R ²	S2	S ^{1/2}	n2	Q	PFRA				
																Q _{med}	Q ₁₀	Q ₁₀₀		
N.A.	N.A.	Channel	Narrowest Channel	100	100	150	29.14m	39.14m	N.A.	100	29.14	3.431709	2.275134	0.001	0.031623	0.05	143.8921	72.22	104.14	148.99

¹ Cross sectional information received from OPW

Minimum Channel Profile



Minimum Channel Profile

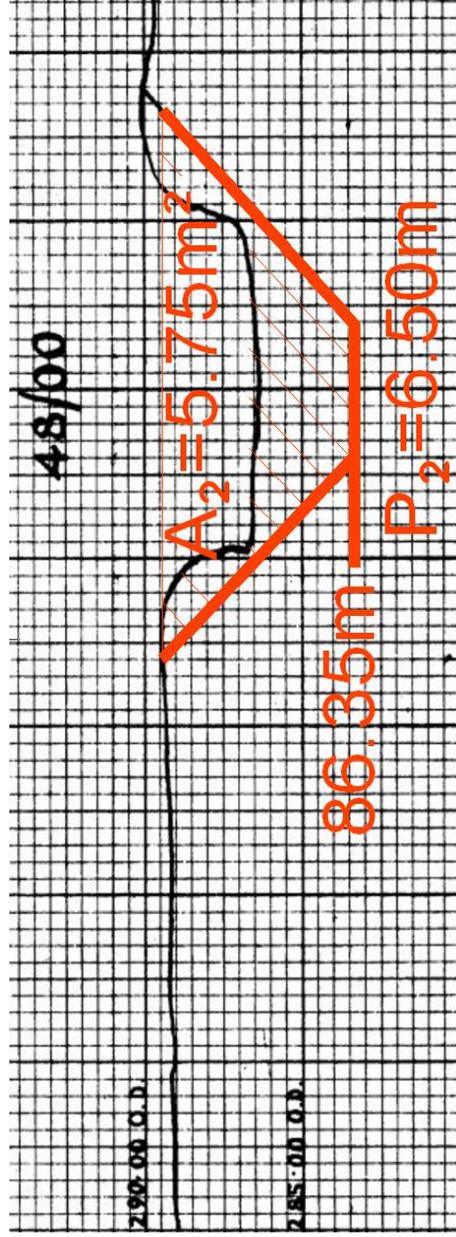


Milftownpass - Channel Capacity Calcs using Manning's Equation

Q	$Q=AV=S^{1/2}$	Flow in river channel (m ³ /s)
A		Area of river channel (m ²)
P		Wetted perimeter of river channel (m)
R		Hydraulic radius (A/P)
S		Water surface slope (m/m)
n		Manning n value (friction coefficient)

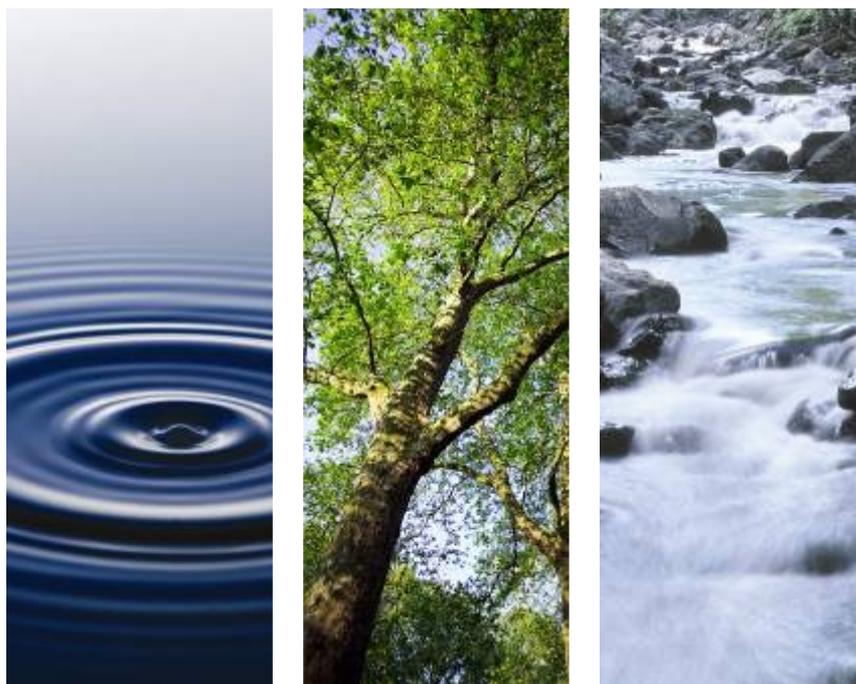
Historic Drawing Ref. 1		Chainage 1	Chainage 2	A1	A2	P1	P2	Chainage Study	A	P	R	R ^{7/3}	S2	S/P	In2	Q	Q _{Med}	Q ₁₀	Q ₁₀₀	PFRA	
Milftownpass	C1/64/1/11	3800 Yds	4800 Yds	7.76	7.76	5.75	8.89	6.54400 Yds	5.75	6.5	0.884615	0.921516	0.0013	0.036056	0.05	3.82096	1.77	2.51	3.65		

¹ Cross sectional information received from OPW



APPENDIX D

FLOOD HAZARD TO ENVIRONMENTAL RECEPTORS



Preliminary Flood Risk Assessment

Flood Vulnerability Assessment of Natura 2000 Sites
Volume I: Method Statement

July 2011

The Office of Public Works



Preliminary Flood Risk Assessment

Flood Vulnerability Assessment of Natura 2000 Sites
Volume I: Method Statement

July 2011

The Office of Public Works

The Office of Public Works, Trim, County Meath

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
A	June 2010	Elaine Bennett / Rita Mc Evoy	Barry O'Connor	Barry O'Connor	Draft Method Statement
B	July 2010	Elaine Bennett / Rita Mc Evoy	Barry O'Connor	Barry O'Connor	First Issue
C	July 2010	Tony Donovan / Elaine Bennett	Barry O'Connor	Barry O'Connor	Minor Revisions
D	Aug 2010	Elaine Bennett / Anthony Badcock	Rita Mc Evoy	Barry O'Connor	Revisions
E	Aug 2010	Anthony Badcock / Rita Mc Evoy	Elaine Bennett	Barry O'Connor	Revisions
F	Jan 2011	Rita Mc Evoy	Elaine Bennett	Barry O'Connor	Revisions
G	July 2011	Rita Mc Evoy / Olivia Crowe (BWI)	Anthony Badcock	Barry O'Connor	Final Issue following feedback from Bird Watch Ireland

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from The Office of Public Works.

Content

Chapter	Title	Page
1.	Introduction	1
1.1	Brief Overview of the Project	1
1.2	Special Areas of Conservation	2
1.3	Special Protection Areas	2
2.	Method Statement	3
2.1	Introduction	3
2.2	Overview of Approach – Vulnerability of Individual Species and Habitats	3
2.3	Overview of Approach – Vulnerability of Overall SACs and SPAs	4
2.4	Vulnerability Assessment - Special Areas of Conservation	4
2.5	Vulnerability Assessment - Special Protection Areas	6
3.	Overview of SAC and SPA Vulnerability to Flooding	8
3.1	Vulnerability Classifications for Habitats, Species and Natura 20000 Sites	8
	Appendices	9
Appendix A.	Vulnerability Assessments by Species / Habitat	10
A.1.	Vulnerability Assessments by Species - SACs	11
A.2.	Vulnerability Assessments by Species - SPAs	18
Appendix B.	Vulnerability Assessments by Site	27
B.1.	Vulnerability Assessments by Site - SACs	28
B.2.	Vulnerability Assessments by Site - SPAs	39
	Tables	
Table 2.1:	SAC Habitat Vulnerability Classifications	5
Table 2.2:	SAC Species Vulnerability Classifications	6
Table 2.3:	SPA Species Vulnerability Classifications	7

Acknowledgements

We are extremely grateful to Bird Watch Ireland for their assistance in assigning vulnerability classifications to the Special Protection Areas in the Republic of Ireland, as detailed in Section 2.5 and Appendix A.2 of this report.

We also wish to thank Mr. Jim Ryan of the National Parks and Wildlife Services for his time in providing expert opinion on the vulnerability classification assigned to habitats and species (excluding birds) in the Republic of Ireland.

1. Introduction

1.1 Brief Overview of the Project

Articles 4 and 5 of the European Floods Directive (2007/60/EC) require Member States to undertake a Preliminary Flood Risk Assessment (PFRA). This initial flood assessment for each Member State is designed to identify those areas where there is potentially significant flood risk. The Office of Public Works (OPW) is carrying out the PFRA in Ireland, as lead agency for flood risk management. Mott MacDonald is assisting the OPW in carrying out some aspects of this assessment. In order to carry out a preliminary analysis on the potential risk to the natural environment from flooding it has been necessary to carry out an initial assessment on the vulnerability of European conservation designated sites to flooding. The methods used in this assessment are based on 'available or readily derivable' information, which is in keeping with the principles relating to the PFRA set out in the Floods Directive.

This initial, high level ecological assessment has been designed to determine the potential for damage of, or adverse consequences on, European designated sites (Natura 2000 sites) that could arise from flooding. The Natura 2000 network of sites comprises Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). The Natura 2000 network is the centrepiece of EU nature and biodiversity policy. It is an EU-wide network of nature protection areas established under the Habitats Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats.

At the outset of the project, the scope of works included conducting vulnerability assessments of Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs), in addition to the Natura 2000 sites. NHAs are the basic Irish national designation for the protection of habitats, flora and fauna. NHAs are given legal protection under the Irish Wildlife Acts (1976-2000) from the date that they are proposed for designation. There are over 140 designated NHAs in Ireland. In addition, there are over 800 pNHAs which were published on a non-statutory basis in 1995. Despite the fact that the pNHA sites have not been statutorily proposed or designated, their significance in terms of their flora, fauna and habitats has been identified. Although spatial data on the locations and extents of the NHAs and pNHAs is available, it is not supported by available or readily-derivable data on the designated species and ecology for these areas. Given the absence of this type of data and the number of sites involved, it has not been possible to extend the vulnerability analysis for these areas.

The objective of this document is to define the 'vulnerability' of the important ecological assets of Ireland to flooding. This report does not cover the subsequent stage of defining 'flood risk' where the vulnerability of the designated area is spatially evaluated against 'flood hazard' areas (areas of predicted inundation from flood events of a specific magnitude). The results of the flood risk assessment for the ecological areas are detailed in the accompanying report for the full PFRA process¹.

¹ Preliminary Flood Risk Assessment, The Predictive Assessment of Potentially Significant Risk (Mott MacDonald, 2011)

1.2 Special Areas of Conservation

Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, commonly known as the Habitats Directive, requires the designation of SACs for the protection and restoration of habitats and species considered to be of European importance. The Habitats Directive was transposed into Irish law through the European Communities (Natural Habitats) Regulations, 1997-2010.

Habitats of European Community interest whose conservation requires the designation of a SAC are listed in 'Annex I' of the Directive. These are habitats which:

- are in danger of disappearance in their natural range; or
- have a small natural range following their regression or by reason of their intrinsically restricted area; or
- present outstanding examples of typical characteristics of one or more of the nine following biogeographical regions: Alpine, Atlantic, Black Sea, Boreal, Continental, Macaronesian, Mediterranean, Pannonian and Steppic.

Annex I habitats which are in danger of disappearance are further classified as 'priority natural habitat types'.

Species (animals and plants) of European Community interest are listed in 'Annex II', 'Annex IV' or 'Annex V' of the Habitats Directive. Those species of European Community interest for which SACs must be designated are listed in Annex II of the Habitats Directive. These are species which are:

- endangered; or
- vulnerable, i.e. believed likely to move into the endangered category in the near future if the causal factors continue operating; or
- rare, i.e. with small populations that are not at present endangered or vulnerable, but are at risk. These species are located within restricted geographical areas or are thinly scattered over a more extensive range; or
- endemic and are requiring particular attention by reason of the specific nature of their habitat and/or the potential impact of their exploitation on their habitat and/or the potential impact of their exploitation on their conservation status.

1.3 Special Protection Areas

Council Directive 79/409/EEC on the conservation of wild birds, commonly referred to as the Birds Directive, requires designation of Special Protection Areas (SPAs) for bird species. The Birds Directive is implemented in Ireland under the Wildlife Acts (1976 – 2000).

SPAs are designated for the following reasons:

- Rare and vulnerable bird species (listed in Annex I of the Directive);
- Regularly occurring migratory species, such as ducks, geese and waders; and
- Wetlands, especially those of international importance, which attract large numbers of migratory birds each year. (Internationally important means that 1% of the population of a species uses the site or more than 20,000 birds regularly use the site.)

2. Method Statement

2.1 Introduction

The following sections outline the method that has been applied for the initial vulnerability assessment of European Designated Sites, as presented in the Appendices to this report.

The overview of the method has been split between the determination of vulnerability to flooding for specific species and habitats in a designated area (Section 2.2) and combining these to approximate the vulnerability of the overall designated area (Section 2.3). These sections are followed by more detailed discussions of the approach that has been used to define flood vulnerabilities for the individual components of SACs and SPAs (Sections 2.4 and 2.5).

2.2 Overview of Approach – Vulnerability of Individual Species and Habitats

Site synopses for all SACs and SPAs were obtained from the National Parks and Wildlife Service (NPWS). It should be noted that synopses were not available for a small number of designated sites (approximately 13 sites in the country), when compared to the list of sites in the NPWS Site Designation Database that has been received from NPWS for a separate project. This difference in the number of designated sites since 2007 may be due to some sites being combined into larger designated areas or due to changes to the designation status for specific sites.

A comprehensive assessment of the spatial distribution of key species and habitats is not available in GIS (Geographical Information System) format at a higher resolution than the European Community designated areas. Therefore for the PFRA, the ecological impact of flooding has been assessed at the level of the overall SAC and SPA areas.

Specific criteria were set to achieve a systematic and consistent method of assigning vulnerability classifications for the different species and habitats at each of the sites. These criteria are set out in Tables 2.1-2.3 in Sections 2.3 and 2.4. The assessment of the vulnerability of a designated area to flooding is complex, in view of the different types of habitats and species concerned, and will also be site specific. In addition, considering the level, frequency and type of each specific flood event, the degree of impact on different species and habitats across each designated areas will also vary.

However, the detailed variations in the number of species and distribution of habitats represented within each SPA or SAC could not be taken into account during this assessment due to the preliminary nature of the study and lack of current or readily-derivable data on species numbers. Ideally, this level of local, site specific information would be important in ensuring a more accurate assessment of the vulnerability of flooding for each habitat and site and therefore the vulnerability of the overall SACs and SPAs.

In addition, SPAs, whilst designated for particular species or numbers of species, are also designated for the habitat that supports these species. During this assessment, account was only taken of the potential impact of flooding on feeding areas inside these habitats in the short-term; i.e. restriction of the availability of, and potential damage to, important feeding and breeding areas. However, in reality the level, frequency and type of flood may also have additional impacts on the habitat. Therefore a specific flood event could

result indirectly in a change in species composition or degradation of the habitat, potentially causing fewer species or numbers of each species using the site in the future.

The discussion in the preceding sections illustrates the significant absence of readily-derivable detailed spatial data on the local distribution of specific species and habitats. Therefore the results of this preliminary assessment of ecological vulnerability to flooding should be viewed in terms of certain key assumptions and limitations. The assumptions include the following points:

- All habitats or species designated for each SAC / SPA are assumed to be at equal probability of flooding (even though it is unlikely some habitats will be impacted eg. steep cliffs, uplands);
- The occurrence of a flood is equally likely during winter and summer months;
- The flood event may potentially impact the reproductive success for the entire population of each species (flora and fauna) which is identified as potentially being impacted;
- The flood event will only impact the environment in terms of inundation of floodwater and also increased sedimentation and potentially nutrients (even though the impacts would be locally complex and include for example, potential decreased water quality, changes in hydrodynamics and flow, erosion and deposition, increased disturbance of flora and fauna);
- For SPAs, impacts were only considered in terms of feeding and breeding areas.

2.3 Overview of Approach – Vulnerability of Overall SACs and SPAs

In order to complete the PFRA, the vulnerability assessment for the individual species and habitats has had to be converted into overall vulnerability levels for the designated areas. The assumptions of the method and the limitations of the available data sets (including local habitat locations, species counts and their proximity to watercourses during nesting, feeding etc.) indicate that a precautionary approach should be taken.

Therefore, the highest flood vulnerability classification of the constituent designated species or habitats has been taken as the overall vulnerability of that area. However, for some sites which have, for example, six species with 'high' vulnerability, the overall site vulnerability may be higher. It is very clear that this method to estimate overall vulnerability to flooding could be improved by the use of more detailed spatial data of individual species and habitat distribution within the designated areas, information that was not available for the PFRA.

It should also be noted that the number of types of habitats or species per site does not reflect the importance of the SPA or SAC, which, in some cases, are designated for only one species. Therefore, as an example, despite significant differences in the number of types of species and habitats included in the designation lists for two different areas, both could be judged to be equally important in terms of ecological 'value'.

2.4 Vulnerability Assessment - Special Areas of Conservation

Data on the species and habitats present in each designated SAC was obtained from the NPWS through their website: <http://www.npws.ie>

The dataset obtained identifies each SAC and the associated qualifying interests or conservation features. A ‘qualifying interest’ is one of the listed species or habitats that is present in the site and for which the site merits designation.

Vulnerability classification for each species and habitat was based on the assessment of their susceptibility to damage (intrinsic vulnerability). Where the likely damage is none/not significant, the vulnerability classification is low. Habitats that are water-dependent were given the lowest vulnerability classification. The assessment of vulnerability also took account of whether the habitat was an ‘Annex I habitat’ or an ‘Annex I priority type habitat’. While the intrinsic vulnerability may be low, where the habitat is identified as ‘priority’ in the Directive, a higher vulnerability class was assigned (where they are not water-dependent) in recognition of its priority status. Similarly, rarity was considered. Where a species (or habitat) is rare, the vulnerability classification was raised by one level from its intrinsic value on the basis that where a non-negligible impact was identified there would be greater impact than for other species on the national stock. If flooding has no or negligible impact on a rare species / habitat then there would be no change in the vulnerability classification that has been assigned.

An initial (intrinsic) vulnerability classification is therefore provided together with a final classification.

Tables 2.1 and 2.2 detail the vulnerability classifications for SAC habitats and species respectively.

Table 2.1: SAC Habitat Vulnerability Classifications

Habitat Vulnerability Classification	Reasoning
Low	<ul style="list-style-type: none"> Water dependent habitat (Annex I and Priority Habitats) where flooding is likely to have minimal / low impacts.
Moderate	<ul style="list-style-type: none"> Annex I Habitat where flooding is likely to have a moderate / high impact. Annex I Priority Habitats where flooding is likely to have a low impact.
High	<ul style="list-style-type: none"> Annex I Habitat and Annex I Priority Habitat where flooding is likely to have a moderate / high impact.
Extreme	<ul style="list-style-type: none"> Annex I Habitat and Annex I Priority Habitat where the nature of the habitat a flood event would have the potential to cause a very significant impact.
Critical	<ul style="list-style-type: none"> Annex I Habitat and Annex I Priority Habitat where, because of the nature of the habitat, a flood event would have the potential to cause a profound impact.

The dataset obtained from the NPWS also contained information on the ‘representivity’ and ‘percentage cover’ of each habitat type. This data was not used in the current flood vulnerability assessment as there was no comprehensive data set available or easily derivable showing the local distribution of particular species and habitats within the SACs (which range in total size from less than one square kilometre to over 750km²). Without a spatial aspect to this data it would be difficult to use the ‘representivity’ and ‘percentage cover’ information in evaluating the impact of flooding of specific parts of SACs (and SPAs) to define flood risk. However, it is recommended that consideration be given to representivity and percentage cover of each habitat type in future revisions of the PFRA and for the more detailed Catchment-Based Flood Risk Assessment and Management (CFRAM) studies, if the local data within SACs (SPAs) can be improved (see Section 3.2).

The reader should also note that it was assumed that all habitats were equally susceptible to flooding, even if it is highly unlikely that this would occur, e.g. upland habitats. The objective of the analysis was to use a systematic method to assign flood vulnerability levels to important species and habitats. This assessment does not include any reference to the evaluation of flood hazard combined with the vulnerability levels to define flood risk. This latter exercise was completed in GIS in a subsequent step of the PFRA method².

Table 2.2: SAC Species Vulnerability Classifications

Species Vulnerability Classification	Reasoning
Low	<ul style="list-style-type: none"> ■ Annex II species unlikely to be impacted by flooding.
Moderate	<ul style="list-style-type: none"> ■ Annex II species found in wetland habitats and are tolerant to periodic flooding. However flooding has the potential to impact during extreme / prolonged events.
High	<ul style="list-style-type: none"> ■ Annex II species where, due to the nature of the species, a flood event would cause a large impact.
Extreme	<ul style="list-style-type: none"> ■ Annex II species where, due to the nature of the species, a flood event would cause a profound impact.
Critical	<ul style="list-style-type: none"> ■ Annex II species where, due to the nature of the species, a flood event would cause a complete loss.

2.5 Vulnerability Assessment - Special Protection Areas

Data on the Special Conservation Interests (SCI), the selection bird species present in each SPA (i.e., those which occur in significant numbers at a given SPA and which are thereby listed in the designation citation), were obtained from each site synopsis and were included in a spreadsheet. The details of each site were available in pdf format from NPWS and were supplemented by information held by Bird Watch Ireland. Other common bird species not cited as SCIs but mentioned in the site synopses (e.g. the Hooded Crow), were not included in the assessment.

A classification was assigned to each SCI species in each SPA which is reflective of their potential vulnerability during flood events. Breeding sites were generally considered more vulnerable than sites designated for non-breeding species (such as wintering waterbirds). Nesting birds are highly reliant on specific sites and / or habitats, especially as the season and thereby the degree of investment by the birds in the nesting process progresses (i.e. time spent incubating, producing and incubating clutches, and brooding chicks). Ground-nesting species were generally considered to be the highest risk group. SPAs supporting highly scarce ground-nesters and those for which Ireland supports a significant proportion of the biogeographical population were assigned the most vulnerable classifications of 'Critical' or 'Extreme'. An additional category termed 'Low (unlikely)' was assigned to those species which would be affected by a flood event, but whose nesting habitat is unlikely to flood (such as uplands and some of the offshore SPA islands such as Great Blasket).

Additional (non-SCI) species included in this assessment include the Marsh Harrier (*Circus aeruginosus*). This species was formerly bred in Ireland but is not included on the BoCCI list. While this species is not known to be breeding yet in Ireland, increasing numbers have been visiting in recent years.

² See reference in Footnote 1 on Page 1.

As discussed for the SACs in Section 2.4, the vulnerability classification is only based on the potential impact of flooding on the breeding and feeding habitats required by each species in each SPA. The process has not included an assessment of the probability of flood occurrence in each area. The analysis of the spatial distribution of the flood hazard areas and the vulnerability classifications for each of the designated areas has been completed as part of a separate stage of the PFRA method.

Table 2.3 details the criteria that have been applied in evaluating the vulnerability of SPAs to flooding.

Table 2.3: SPA Species Vulnerability Classifications

Species Vulnerability Classification	Reasoning
Low	<ul style="list-style-type: none"> ■ Selection Species unlikely to be impacted by flooding.
Low (unlikely)	<ul style="list-style-type: none"> ■ Species considered extremely vulnerable to flooding (as they are ground nesters), but the susceptibility of their nesting habitats to flooding is very low (e.g. uplands and seabird islands).
Moderate	<ul style="list-style-type: none"> ■ Selection Species where, due to the nature of the species, a flood would cause a moderate detrimental impact.
High	<ul style="list-style-type: none"> ■ Selection Species where, due to the nature of the species, a flood event would cause a large impact.
Extreme	<ul style="list-style-type: none"> ■ Selection Species where, due to the nature of the species, a flood event would cause a profound impact and would impact at national (all-Ireland) level.
Critical	<ul style="list-style-type: none"> ■ Selection Species where, due to the nature of the species, a flood event would cause a complete loss. Includes species that would be impacted at a population scale from flood events.

3. Overview of SAC and SPA Vulnerability to Flooding

3.1 ***Vulnerability Classifications for Habitats, Species and Natura 2000 Sites***

An overview of the results of the vulnerability classification process is presented in the Appendices to this document.

Appendix A provides a breakdown of the vulnerability class assigned to each species or habitat, with reasoning in each case.

Appendix B provides a summary list of the overall vulnerability class assigned to each SAC and SPA site. Full details of the vulnerability classifications of the sites are contained in a separate volume of this report.³

Table 3.1 provides a summary overview of the overall Natura 2000 site vulnerability and lists the number of SAC and SPA sites per vulnerability classification category.

Table 3.1: Overview of Overall Natura 2000 Site Vulnerability Classifications

Vulnerability Classification	No. of SAC Sites	No. of SPA Sites
Low	58	47
Moderate	154	64
High	117	28
Extreme	94	13
Critical	0	2

³ Preliminary Flood Risk Assessment, Flood Vulnerability Assessment of Natura 2000 Sites, Volume II – Detailed Assessment of Specific SAC and SPA Sites (Mott MacDonald, 2011)

Appendices

Appendix A. Vulnerability Assessments by Species / Habitat _____	10
Appendix B. Vulnerability Assessments by Site _____	27

Appendix A. Vulnerability Assessments by Species / Habitat

A.1. Vulnerability Assessments by Species - SACs

Code	Species / Habitat Name	Latin Name	Vulnerability	Reasoning for Vulnerability
7110	Active raised bogs		Moderate	Waterlogged systems therefore minimal impact if flooded. Fluvial flooding may however deposit sediment that can cause habitat alteration. However a high level of sedimentation would be necessary for this problem to occur. Note that these systems are identified as priority habitats in Annex I of the Directive.
7230	Alkaline fens		Moderate	Permanently waterlogged systems. However fluvial flooding may result in deposition that could alter the habitat. Final classification therefore elevated to Moderate.
91	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)		Low	Riparian habitat in alluvial areas (wet woodland) with periodical flooding. Habitat is tolerant to flooding. Note these systems are identified as priority habitats in Annex I of the Directive Note: threats to this ecosystem include flood prevention measures, river control and channelisation, which impacts on the natural disturbance-succession balance.
4060	Alpine and Boreal heaths		Moderate	Occurs on ridges and summits of upland areas (also present in areas of the Burren). Unlikely to be located near areas of flooding therefore initially characterised as low vulnerability. If flooding was to occur, habitat would be impacted and therefore final classification is moderate.
1210	Annual vegetation of drift lines		Low	Occurs on deposits of shingle lying at or above mean high-water spring tides. These are unstable habitats and species are able to tolerate periodic disturbance by wave action. Prolonged periods of flooding however may not be tolerated. Note: Artificial re-profiling of shingle beaches as a flood risk management measure affects this habitat type as it impacts availability of sediment.
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)		High	Occurs on mature, stable, dry sand dunes. These systems are above the high tide mark. Coastal flooding could result in a change in habitat structure. This habitat is listed as a priority habitat in Annex I of the Directive. Note: Construction of sea defence can starve the systems of sediment.
1106	Atlantic salmon	<i>Salmo salar</i>	Low	Flash flooding can result in reed displacement during spawning season and therefore loss of eggs. Regular flooding can cause siltation of river and alteration of river bed which can result in loss of suitable habitat. However aquatic species, because of the nature of the environment in which they live, are adapted to periodic disturbance and can recover from disturbance by flooding as long as the bed isn't scoured out to such an extent to remove the suitable habitat.
1330	Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>)		Low	Saltmarsh is already subject to tidal inundation. However coastal flooding can cause a change in species structure and composition and can cause erosion of the seaward side of the saltmarsh.

7130	Blanket bog (*active only)		Moderate	These systems have naturally high water retention and there is therefore a minimal impact if flooded. They are also typically associated with high water table levels. Irish Lowland Atlantic Blanket Bogs are of very particular importance in a European context. Also where the blanket bog is active it is classified as a priority habitat under the Directive. Note however that deposition of sediment through fluvial flooding could alter the habitat.
91D0	Bog woodland		Low	This habitat consists of woodland on wet peaty ground and therefore there would be minimal impact if flooded, i.e. low vulnerability. These systems are identified as priority habitats in Annex I of the Directive and are therefore elevated to a final classification of moderate.
1349	Bottle-nosed dolphin	<i>Tursiops truncatus</i>	Low	Occurs in marine habitat.
1096	Brook lamprey	<i>Lampetra planeri</i>	Low	Brook lamprey spawn in spring in freshwater gravel areas. Flooding can result in disturbance to the gravel areas and can result in the washing out of the eggs. Sediment may also be disturbed resulting in the loss of juvenile lamprey. However aquatic species, because of the nature of the environment in which they live, are adapted to periodic disturbance and can recover from disturbance by flooding.
6130	Calaminarian grasslands of the <i>Violetalia calaminariae</i>		High	Grasslands associated with soils with high heavy metals content - typically associated with mines. Need dampness but not inundation.
8120	Calcareous and calcshist screes of the montane to alpine levels (<i>Thlaspietea rotundifolii</i>)		High	Upland habitat type, unlikely to be located near areas of flooding. Flooding would impact habitat.
7210	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>		Moderate	These habitats are fed by groundwater and by drainage from the surrounding area. They are waterlogged systems and therefore flooding has a negligible effect. Sediment deposition could, however, alter the habitat therefore final vulnerability is moderate. Note the habitat is classified as a priority habitat under the Directive.
8210	Calcareous rocky slopes with chasmophytic vegetation		High	Upland habitat type, unlikely to be located near areas of flooding therefore initially classified as low. In the event of the habitat being subjected to flooding, it would be highly impacted.
8310	Caves not open to the public		Low	This habitat type is important to support lesser horseshoe bat populations. Flooding however would have negligible impact on the habitat itself.
1150	Coastal lagoons		Moderate	Lagoons are subject to natural salinity fluctuations caused by freshwater and sea water influence, evaporation and precipitation. Large flood event would however generate and impact; coastal lagoons are a priority habitat and are therefore considered to be moderately vulnerable.
1365	Common seal	<i>Phoca vitulina</i>	Low	Coastal flooding has the potential to cause disturbance to terrestrial breeding grounds during breeding season. Seals are readily adaptable to such disturbance.

2140	Decalcified fixed dunes with <i>Empetrum nigrum</i>		High	Occurs on mature, stable, acidic, sand dunes. These systems are above the high tide mark. Coastal flooding could cause a change in habitat structure. This habitat is listed as a priority habitat in Annex I of the Directive and is therefore deemed to have high vulnerability. Note: Construction of a sea defence can starve the systems of sediment.
7120	Degraded raised bogs still capable of natural regeneration		Low	Waterlogged systems therefore minimal impact if flooded with the exception of where sediment deposition could alter habitat.
7150	Depressions on peat substrates of the Rhynchosporion		Low	Waterlogged systems therefore minimal impact if flooded.
1016	Desmoulin's Whorl Snail	<i>Vertigo moulinsiana</i>	High	Require damp/wet habitats. Flooding can disturb habitat and species - very sensitive to hydrological changes.
2170	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salix arenariae</i>)		Moderate	This system requires a high water table. Temporary flooding is a natural feature of these systems. Fluvial flooding while unlikely to occur would cause impact - therefore moderate vulnerability.
2110	Embryonic shifting dunes		Low	Unstable systems subject to erosion by wave action. Unlikely to be subject to fluvial flooding.
1130	Estuaries		Low	Subject to tidal influence and natural flooding.
4030	European dry heaths		Moderate	Occurs on slopes/hills/mountains. Unlikely to be located near areas of flooding. Fluvial flooding while unlikely to occur would cause impact - therefore moderate vulnerability.
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)		High	Stable sand dunes. These systems are above the high tide mark. Coastal flooding of the system could cause a change in habitat structure. Classified as a priority habitat under the Directive.
1029	Freshwater pearl mussel	<i>Margaritifera margaritifera</i>	High	The glochidia (larval stage) are released in the summer and young mussels bury into gravel in summer. A flood at this time could result in loss of species however a high level of scouring would be required. Siltation caused by flood can cause death of adult mussels. Where high siltation occurs, the species have a higher vulnerability.
1013	Geyer's whorl snail	<i>Vertigo geyeri</i>	Extreme	<i>Vertigo geyeri</i> require damp/wet habitats. Has a very niche habitat. Flooding can destroy habitat and can disturb species - very sensitive to hydrological changes.
1364	Grey seal	<i>Halichoerus grypus</i>	Low	Found distributed along the Irish coastline. Coastal flooding has the potential to cause disturbance to terrestrial breeding grounds during breeding season (autumn and winter). However seal are readily adaptable and can remove young to safer areas.
1351	Harbour porpoise	<i>Phocoena phocoena</i>	Low	Occurs in marine habitat.
3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.		Moderate	These habitats are typically confined to limestone areas which are free-draining therefore have a lower flood potential. Nutrient enrichment of these lakes may occur following a flood event where the surrounding land-use includes intensive agriculture - therefore moderate vulnerability.

2190	Humid dune slacks		Moderate	This system requires a high, but often fluctuating water table. Temporary flooding is a natural feature of these systems. Fluvial flooding is unlikely but would impact habitat if it occurred - moderate vulnerability.
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels		Low	Found along water courses and woodland borders. Tolerant to periodic flooding.
5130	Juniperus communis formations on heaths or calcareous grasslands		High	Found in free-draining soil. <i>Juniperus communis</i> are not tolerant of flooding.
1024	Kerry slug	<i>Geomalacus maculosus</i>	High	Eggs are deposited between July and October. Prolonged flooding could result in loss of habitat/disturbance to food source.
1421	Killarney fern	<i>Trichomanes speciosum</i>	Moderate	Found in shaded wet habitats e.g. near waterfall. Requires wet habitat, however delicate species and increased water velocity during flood conditions may impact.
1160	Large shallow inlets and bays		Low	These systems are not subject to freshwater input and are subject to periodic coastal inundation.
1303	Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	Extreme	Would not expect flooding to be a factor in the loss of roosting/foraging habitat with the exception of where the entrances to cave hibernation sites are blocked by flooding. In such cases the species are extremely vulnerable.
8240	Limestone pavements		High	Flooding may cause loss of flora in grykes. Note that these systems are identified as priority habitats in Annex I of the Directive.
6510	Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>)		Low	Habitat typically found in lowland floodplains and is tolerant of seasonal flooding.
21A0	Machairs (* in Ireland)		Moderate	Machair is mosaic of wet and dry areas, some degree of flooding is normal, exceptional fluvial flooding could however cause some damage - therefore moderate vulnerability. Note that these systems, where they occur in Ireland, are identified as priority habitats in Annex I of the Directive.
1065	Marsh fritillary	<i>Euphydryas aurinia</i>	Extreme	Typically occurs in wetland habitat; potential for loss of larvae and webs to be impacted if inundated.
1528	Marsh saxifrage	<i>Saxifraga hirculus</i>	Moderate	Flowering begins in mid July and continues until early October. Flooding during this period could inhibit pollination & seed dispersal. Also reproduce asexually.
1420	Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>)		Low	Perennial Glasswort is restricted to the south-east of Ireland in areas of waterlogged saltmarsh.
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)		Moderate	This habitat is typically located in the upper zone of the salt marsh and is therefore not under diurnal tidal inundation. Prolonged fluvial flooding will cause a negative impact - therefore moderate vulnerability.

6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)		Low	This habitat occurs in naturally wet substrate, often with fluctuating water table.
1140	Mudflats and sandflats not covered by seawater at low tide		Low	This habitat is an important feeding ground for wading birds and wildfowl. The habitat is subject to regular tidal inundation.
1014	Narrow-mouthed whorl snail	<i>Vertigo angustior</i>	Extreme	Require damp/wet habitats. Suitable habitat includes floodplains. Also found in coastal areas. Flash flooding can disturb habitat and species - very sensitive to hydrological changes.
3160	Natural dystrophic lakes and ponds		Low	Found in peaty/bog areas - naturally waterlogged. Fluvial flooding can alter naturally acidic pH of the lake.
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation		Low	Eutrophic lakes in Ireland are typically as a result of the surrounding geology. Deposition of sediment through flooding can impact on the habitat.
1990	Nore freshwater pearl mussel	<i>Margaritifera durrovensis</i>	High	The glochidia (larval stage) are released in the summer and young mussels bury into gravel in summer. A flood at this time could result in loss of species, although a high level of scouring would be required. Siltation caused by flood can cause death of adult mussels. Where high siltation occurs, the species have a higher vulnerability.
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>		Low	Found in upland shallow peaty areas with fluctuating water table. Substrate is moist rather than waterlogged. Tolerant to periodical flooding. Fluvial flooding may disturb habitat.
91A0	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles		High	Tend to occur in upland areas away from areas of flooding. However if subjected to frequent flood events, waterlogging of substrate may result in habitat loss.
3130	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>		Moderate	Nutrient enrichment of these lakes may occur following a flood event where the surrounding landuse includes intensive agriculture - therefore Moderate vulnerability.
3110	Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)		Moderate	Nutrient enrichment of these lakes may occur following a flood event where the surrounding landuse includes intensive agriculture.
1355	Otter	<i>Lutra lutra</i>	Moderate	Accustomed to periodic disturbance. However flooding of holts in breeding season i.e. when there is a possibility of young cubs being present in the holt can result in loss of young.
1220	Perennial vegetation of stony banks		Low	This habitat is tolerant to periodic disturbance. Coastal flooding may cause the shingle to become unstable. This is particularly a risk at the pioneer stage where the flora is in the early stages of establishment and the shingle is unstable.
1395	Petalwort	<i>Petalophyllum ralfsii</i>	Extreme	Present in damp, calcareous dunes. Cannot tolerate flood inundation.

7220	Petrifying springs with tufa formation (Cratoneurion)		Moderate	Springs typically fed by groundwater associated with bog/fen habitats. The springs require an almost constant flow of water. These systems are identified as priority habitats in Annex I of the Directive. Potential impact from fluvial flood due to change in pH.
1170	Reefs		Low	Areas are typically permanently flooded.
1099	River lamprey	<i>Lampetra fluviatilis</i>	Low	River lamprey spawn in April in freshwater gravel areas. Flooding can result in disturbance to the gravel areas and can result in the washing out of the eggs. Sediment may also be disturbed resulting in the loss of juvenile lamprey. However aquatic species, because of the nature of the environment in which they live, are adapted to periodic disturbance and can recover from disturbance by flooding.
3270	Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidention</i> p.p. vegetation		Low	Habitat is subject to natural flooding. Occurs in only a few sites nationally.
1310	Salicornia and other annuals colonizing mud and sand		Low	Saltmarsh habitat. Not subject to fluvial impact. Tolerant of tidal influence, however large flood event could cause habitat disturbance.
1110	Sandbanks which are slightly covered by sea water all the time		Low	Permanently submerged coastal habitat.
1095	Sea lamprey	<i>Petromyzon marinus</i>	Low	Sea lamprey spawn between May and August in freshwater gravel areas. Flooding can result in disturbance to the gravel areas and can result in the washing out of the eggs. Sediment may also be disturbed resulting in the loss of juvenile lamprey. However aquatic species, because of the nature of the environment in which they live, are adapted to periodic disturbance and can recover from disturbance by flooding.
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>)(*important orchid sites)		High	Occurs in shallow well-drained soils unlikely to be subject to flooding therefore initially low vulnerability. If flooding were to occur it would have a high impact and would cause habitat degradation. Important orchid sites within this classification are priority habitats.
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)		Moderate	Habitat is dynamic in nature and tolerant to periodical disturbance. Large flood may be destructive - therefore moderate vulnerability.
1393	Shining sickle moss	<i>Drepanocladus vernicosus</i>	Moderate	Associated with wetland habitat, tolerant to periodic flooding, however prolonged inundation with silt and nutrients may impact.
8220	Siliceous rocky slopes with chasmophytic vegetation		High	Upland habitat type, unlikely to be located near areas of flooding - low initial vulnerability. In the unlikely event of flooding flora may be impacted - therefore high vulnerability.
8110	Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>)		High	Upland habitat type, unlikely to be located near areas of flooding - low initial vulnerability. In the unlikely event of flooding flora may be impacted - therefore high vulnerability.

1833	Slender naiad	<i>Najas flexilis</i>	Moderate	Submerged aquatic plant found in lakes. Flooding may cause change in trophic condition of lake due to nutrient input causing moderate vulnerability.
1320	Spartina swards (<i>Spartinion maritimae</i>)		Low	Saltmarsh habitat. Not subject to fluvial impact. Tolerant of tidal influence.
6230	Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)		High	Occurs in upland sloping areas unlikely to be subject to flooding. These systems are identified as priority habitats in Annex I of the Directive. In the unlikely event of flooding there is potential for habitat disturbance.
8330	Submerged or partly submerged sea caves		Low	Marine habitat subject to regular tidal influence.
91J0	<i>Taxus baccata</i> woods of the British Isles		Extreme	This habitat is classified as a priority habitat under the Directive. This habitat is present on karst substrate with shallow dry soils, which are well drained. This habitat type is concentrated to only a few areas in Ireland. Prolonged flooding, e.g. by groundwater, would result in unfavourable conditions for the yew wood.
7140	Transition mires and quaking bogs		Moderate	Wet substrate, typically waterlogged. Flooding would have only slight impact. However moderate impact if a significant of nutrients and sediment entered the system - therefore moderate vulnerability.
3180	Turloughs		Low	This habitat is periodically flooded by groundwater. These systems are identified as priority habitats in Annex I of the Directive. Extreme prolonged flooding may affect zonation.
1103	Twait shad	<i>Alosa fallax</i>	Low	Adult life spent in sea/estuaries. Spawn in freshwater at tidal limits in summer. Flooding has the potential to disturb spawning grounds (gravel pools), damage eggs and inhibit shad movement to appropriate spawning areas and can cause silting up of the interstitial spaces in the gravel which then become unsuitable spawning areas. However aquatic species, because of the nature of the environment in which they live, are adapted to periodic disturbance and can recover from disturbance by flooding.
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts		Moderate	This habitat occurs on steep sea cliffs. Not under tidal influence but affected by sea spray. In the unlikely event of flooding, a shift in habitat floral composition may occur.
3260	Water courses of plain to montane levels with the <i>Ranuncion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation		Low	Flooding may result in loss of in-stream flora.
1092	White-clawed crayfish	<i>Austropotamobius pallipes</i>	Moderate	Brooding females require undisturbed shelter over a prolonged winter-spring period. Flooding may disturb habitat however a strong flood would be required to cause such disturbance.

A.2. Vulnerability Assessments by Species - SPAs

Important Note: The table below provides the typical vulnerability assessment for each species. The vulnerability of a species for each particular site also takes into account the particular context or importance of that site, such as:

- whether or not it is a breeding site;
- whether the site is of particularly importance for that species;
- whether the site is cited for the species.

The assigned vulnerability of a site related to a species may hence vary from the vulnerability given below. The full set of vulnerabilities per species for each site is given in Volume II of this report.

Species Name	Species Name (Latin)	Conservation concern	Annex 1	Vulnerability	Reasoning for Vulnerability Classification
Arctic Tern	<i>Sterna paradisaea</i>	Amber	1	High	Most breeding colonies on west coast, yet some important colonies located on the east coast (Rockabill Island) and south (Lady's Island Lake). With the exception of key sites, a flood event at any one site at inappropriate time would impact on the colony but probably not on the population.
Barnacle Goose	<i>Branta leucopsis</i>	Amber	1	Low	Roosts on water, feeds on grasslands (mostly on islands) and intertidal areas - would not be affected by short-term flooding event.
Bar-tailed Godwit	<i>Limosa lapponica</i>	Amber	1	Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event.
Bewick's Swan	<i>Cygnus bewickii</i>	Red (winter)	1	Low	Roosts on water, feeds in fields (mostly).
Black Guillemot	<i>Cephus grylle</i>	Amber		Low (unlikely)	Nests usually high up in cliff crevices, some nests may be affected by storm surges.
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Red (breeding)		High	Widely occurring in variety of terrestrial/ aquatic habitats. Non-breeders unlikely to be affected by short-term flood events. Breeding birds nest on islands (including offshore and lake islands) - ground nesters would be affected by flooding, especially at key sites such as Lady's Island Lake and Lough Corrib.
Black-tailed Godwit	<i>Limosa limosa</i>	Amber		Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event.
Black-throated Diver	<i>Gavia arctica</i>	Amber	1	Low	Wintering species with offshore distribution.
Chough	<i>Pyrrhocorax pyrrhocorax</i>	Amber	1	Low (unlikely)	Nests usually high up in cliff crevices, some nests may be affected by storm surges.
Common Gull	<i>Larus canus</i>	Amber		High	Non-breeding birds are widely occurring in variety of terrestrial/ aquatic habitats. Non-breeders unlikely to be affected by short-term flood events. Breeding distribution predominantly along the west coast. Some inland colonies on lakes such as Lough Corrib, Lough Mask, Lough Conn and Carrowmore Lake – they would be highly susceptible to flood events.

Common sandpiper	<i>Actitus hypoleucos</i>	Amber		Low	Occurrence on SPAs is outside breeding period. No impact of flooding expected.
Common Scoter	<i>Malanitta nigra</i>	Red (breeding)		Extreme	Wintering birds occur offshore distribution. Breeding population declining and currently restricted to a selection of sites (extreme vulnerability for breeding sites where species is listed)
Common Tern	<i>Sterna hirundo</i>	Amber	1	High	Most breeding colonies on west coast, yet some important colonies located on the east coast (Rockabill Island) and south (Lady's Island Lake). With the exception of key sites, a flood event at any one site at inappropriate time would impact on the colony but probably not on the population.
Coot	<i>Fulica atra</i>	Amber		Low	Wintering species, remains on waterbody
Cormorant	<i>Phalacrocorax carbo</i>	Amber		High	Wintering birds remain on water. However, breeding birds are either tree or ground-nesters – those nesting on the ground are highly vulnerable.
Corncrake	<i>Crex crex</i>	Red (breeding)	1	Extreme	Corncrake population now highly restricted in Ireland to few sites. Importance of maintaining breeding range
Curlew	<i>Numenius arquata</i>	Red (breeding)		High	Requires intertidal/ coastal grasslands for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event. Vulnerability classification higher for birds breeding in Ireland – the breeding population in Ireland is undergoing a significant decline.
Curlew Sandpiper	<i>Calidris ferruginea</i>			Low	Passage migrant.
Dunlin	<i>Calidris alpina</i>	Amber		High	Non-breeding birds require intertidal zone for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event. . The vulnerability classification is high for breeding birds – ground nesters at a variety of locations which are possibly susceptible to flooding.
Eider	<i>Somateria mollissima</i>	Amber		High	Breeding birds nest on ground and would be affected (hence High vulnerability classification). Wintering birds remain on the sea.
Fulmar	<i>Fulmarus glacialis</i>			Low	Cliff nester. Occasional nest may suffer from storm surge
Gadwall	<i>Anas strepera</i>	Amber		Low	Wintering birds remain mostly on waterbody

Gannet	<i>Morus bassana</i>	Amber		Low (unlikely)	Few breeding colonies in Ireland – these are steep offshore islands which would not flood.
Garganey	<i>Anas querquedula</i>	Amber		High	Scarce breeding bird in Ireland. Nests would be vulnerable to flooding.
Golden Plover	<i>Pluvialis apricaria</i>	Red (breeding)	1	Moderate	Feeds in intertidal/ grasslands and roosts in secure areas near wetlands/ intertidal zone). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event.
Goldeneye	<i>Bucephala clangula</i>	Amber		Low	Wintering species, remains on waterbody.
Goosander	<i>Mergus merganser</i>	Amber		Low	Nests in trees, and otherwise remains on water.
Grasshopper Warbler	<i>Locustella naevia</i>	Amber		Low	
Great Black-backed Gull	<i>Larus marinus</i>	Amber		Low	Wintering birds occur in a variety of coastal habitats, unlikely to be affected by short-term inundation. Breeding birds are ground-nesting. Most of their main colonies are on cliffs or offshore islands that do not flood.
Great Crested Grebe	<i>Podiceps cristatus</i>	Amber		Low	Wintering birds remain on water.
Great Northern Diver	<i>Gavia immer</i>		1	Low	No breeding birds in Ireland, non-breeders occur in offshore waters.
Green Sandpiper	<i>Tringa ochropus</i>			Low	
Greenland White-fronted Goose	<i>Anser albifrons flavirostris</i>	Amber	1	Moderate	Roosts on water, feeds in fields (mostly) - higher fidelity to feeding areas than other geese/ swans.
Greenshank	<i>Tringa nebularia</i>	Amber		Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event.
Grey Heron	<i>Ardea cinerea</i>			Low	Nests in trees, wintering birds not affected by inundation.
Grey Plover	<i>Pluvialis squatarola</i>	Amber		Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event.
Greylag Goose	<i>Anser anser</i>	Amber		Low	Roost on water and feed in fields (mostly). Birds of Icelandic origin (wild birds) occur at most sites.
Guillemot	<i>Uria aalge</i>	Amber		Low (unlikely)	Cliff nester. Occasional nest may suffer from storm surge.

Hen Harrier	<i>Circus cyaneus</i>	Amber	1	Low (unlikely)	Scarce breeding bird in Ireland. Ground nester in uplands. Flooding would impact, but highly unlikely to occur.
Herring Gull	<i>Larus argentatus</i>	Red (breeding)		Extreme	Colonial nester, undergone massive decline in past decade and is red listed. Lambay Island is the biggest colony in Ireland and a flood event would impact significantly on the national population. There are many other sites that support significant numbers and a flood event would impact certainly at colony level, hence High vulnerability classification.
Kestrel	<i>Falco tinnunculus</i>	Amber		Low	
Kingfisher	<i>Alcedo atthis</i>		1	High	Nests can be flooded by high water levels in summer caused by floods/ heavy rainfall. Species widespread in Ireland so flood event on particular river system may result in loss of many nests.
Kittiwake	<i>Rissa tridactyla</i>	Amber		Low (unlikely)	Nests on cliffs - often affected by storm surges, will nest again in season if lost.
Knot	<i>Calidris canutus</i>	Red (winter)		Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event.
Lapwing	<i>Vanellus vanellus</i>	Red (breeding)		High	Requires intertidal/ coastal grasslands for feeding and secure roosting area (e.g. saltmarsh).. Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event. Small & declining breeding population in Ireland at low-lying sites that would be susceptible to flooding, hence High vulnerability classification.
Leach's Petrel	<i>Oceanodroma leucorhoa</i>	Amber	1	Low (unlikely)	Unknown breeding status. Few breeding sites in the Republic of Ireland, and these are offshore islands that would not be expected to flood.
Lesser Black-backed Gull	<i>Larus fuscus</i>	Amber		High	Wintering birds occur in a variety of coastal habitats, unlikely to be affected by short-term inundation. During the breeding season, this species is a ground nester and some sites are susceptible to flooding (e.g. lake islands).
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>	Amber		Low	Roosts on water, feeds on grasslands and intertidal areas - would not be affected by short-term flooding event
Little Egret	<i>Egretta garzetta</i>		1	Low	nests in trees, wintering birds not affected by inundation
Little Grebe	<i>Tachybaptus ruficollis</i>	Amber		Low	Wintering sites designated for this species – they remain on waterbody

Little Stint	<i>Calidris minuta</i>			Low	Passage migrant
Little Tern	<i>Sterna albifrons</i>	Amber	1	High	Breeds in colonies on low-lying coastline. There are 4-5 key colonies, which are very susceptible to tidal inundation, hence vulnerability classification is High.
Long-tailed Duck	<i>Clangula hyemalis</i>			Low	Wintering species with offshore distribution
Mallard	<i>Anas platyrhynchos</i>			Low	Wintering species, remains mostly on waterbody
Manx Shearwater	<i>Puffinus puffinus</i>	Amber		Low (unlikely)	Burrow nester. Highly vulnerable to flooding, but regular nesting areas are offshore islands which are not likely to flood.
Marsh Harrier	<i>Circus aeruginosus</i>			Low	Not proven as nesting in Republic of Ireland yet - flooding would be big risk if they do
Meadow Pipit	<i>Anthus pratensis</i>			Low	
Mediterranean Gull	<i>Larus melanocephalus</i>	Amber	1	Critical	Few breeding pairs in Ireland (<20), most on Lady's Island Lake. A flood event would possibly result in the loss of this species as a breeding species in Ireland. Low vulnerability for non-breeding sites - birds able to use a variety of coastal habitats.
Merlin	<i>Falco columbarius</i>	Amber	1	Low	
Mute Swan	<i>Cygnus olor</i>	Amber		Moderate	Nests adjacent to waterbodies/ waterways. Flooding expected to impact on nests. But distribution is widespread, and it is not likely that many nests would be affected during a particular single event.
Oystercatcher	<i>Haematopus ostralegus</i>	Amber		Moderate	Requires intertidal/ coastal grasslands for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event.
Pectoral Sandpiper	<i>Calidris melanotos</i>			Low	Passage migrant
Peregrine	<i>Falco peregrinus</i>		1	Low (unlikely)	Nests usually high up in cavities, mostly in quarries and sea-cliffs), sparse distribution so not likely that more than one nest would be affected during a given storm surge event.
Pink-footed Goose	<i>Anser brachyrhynchus</i>			Low	Roosts on waterbody, feeds in fields (mostly). Scarce in Ireland.
Pintail	<i>Anas acuta</i>	Red (winter)		Low	Wintering species, remains on waterbody.
Pochard	<i>Aythya ferina</i>	Amber		Low	Wintering species, remains on waterbody.
Puffin	<i>Fratercula arctica</i>	Amber		Low (unlikely)	Burrow nester. Highly vulnerable to flooding, but regular nesting areas are offshore islands which are not likely to flood.

Purple Sandpiper	<i>Calidris maritima</i>			Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event
Quail	<i>Coturnix coturnix</i>	Red (breeding)		High	Highly scarce breeding bird in Ireland. Shannon Callows a regular site. Likely to be affected by flood event.
Razorbill	<i>Alca torda</i>	Amber		Low (unlikely)	Cliff nester. Occasional nest may suffer from storm surge.
Red Grouse	<i>Lagopus lagopus</i>	Red (breeding)		Low (unlikely)	Nests mostly in uplands. Flood event would be catastrophic. But very unlikely.
Red-breasted Merganser	<i>Mergus serrator</i>			Low	Wintering species, remains on water.
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Red (breeding)	1	Low	Species has not bred in Ireland in more than 20 years.
Redshank	<i>Tringa totanus</i>	Red (breeding)		Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event Higher vulnerability classification for breeding sites - ground-nester.
Red-throated Diver	<i>Gavia stellata</i>	Amber	1	Low	Outside the breeding season, this species occurs in offshore waters. There are very few breeding in Ireland (<20 pairs) (edge of their breeding range). Breeding birds occur in upland lakes in Donegal which carries a critical vulnerability classification.
Reed Bunting	<i>Emberiza schoeniclus</i>			Low	Widespread breeding passerine. Occasional nest may be affected by a flood.
Reed Warbler	<i>Acrocephalus scirpaceus</i>	Amber		Low	Widespread breeding passerine. Occasional nest may be affected by a flood.
Ring Ouzel	<i>Turdus torquatus</i>	Red (breeding)		Low (unlikely)	Nests mostly in uplands. Flood event would be catastrophic on this highly scarce species. But the likelihood of a flood event occurring in their preferred upland breeding habitat is very minimal.
Ringed Plover	<i>Charadrius hiaticula</i>	Amber		High	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event. Species also breeds in Ireland, largely on coastal shingle banks which are very susceptible to tidal inundation, hence vulnerability classification increased to High.

Rock Pipit	<i>Anthus petrosus</i>			Low (unlikely)	
Roseate Tern	<i>Sterna dougallii</i>	Amber	1	Extreme	Few breeding colonies in Ireland, yet Ireland supports a significant proportion of the northwest European breeding population – most occur at Rockabill Island which would be very unlikely to flood. A substantial proportion nest at Lady’s Island Lake which would have a higher chance of flooding and which would impact on the biogeographic population.
Ruff	<i>Philomachus pugnax</i>	Amber		Low	Scarce migrant outside the breeding season.
Sanderling	<i>Calidris alba</i>			Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event.
Sandwich Tern	<i>Sterna sandvicensis</i>	Amber	1	Extreme	Several colonies in Ireland, especially on west coast. A flood event would impact on the colony, and if occurred at key colonies such as Lady’s Island Lake would impact on national population.
Scaup	<i>Aythya marila</i>	Amber		Low	Wintering species, remains on waterbody.
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>			Low	Widespread and non-colonial. Occasional nest may suffer from flooding.
Shag	<i>Phalacrocorax aristotelis</i>			Low (unlikely)	Cliff nester. Occasional nest may suffer from storm surge.
Shelduck	<i>Tadorna tadorna</i>	Amber		Low	Coastal species. Requires intertidal zone for feeding - unlikely to be affected by short-term flood event.
Short-eared Owl	<i>Asio flammeus</i>	Amber	1	Low	
Shoveler	<i>Anas clypeata</i>	Red (winter)		Low	Wintering species, remains mostly on waterbody.
Skylark	<i>Alauda arvensis</i>	Amber		Moderate	Very vulnerable as a ground-nesting species. But relatively widespread in Ireland (although their population is declining), and loss of few sites due to a flood event unlikely to impact significantly on the population. Not colonial.
Slavonian Grebe	<i>Podiceps auritus</i>	Amber		Low	Wintering species, occurs mostly in offshore waters.
Snipe	<i>Gallinago gallinago</i>	Amber		Moderate	Requires intertidal/ grasslands/ marshes for feeding and secure roosting (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event .Especially high vulnerability for breeding birds. Snipe are ground-nesters which are highly susceptible to flooding.
Snowy Owl	<i>Nyctea scandiaca</i>	Amber	1	Low	

Spotted Redshank	<i>Tringa erythropus</i>			Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by frequent movement of flocks or a shift in distribution some distance away in response to a flood event.
Storm Petrel	<i>Hydrobates pelagicus</i>	Amber	1	Low (unlikely)	Burrow-nesting. Highly vulnerable to flooding, but regular nesting areas are offshore islands which are not likely to flood.
Teal	<i>Anas crecca</i>	Amber		Low	Wintering species, remains mostly on waterbody.
Tree Sparrow	<i>Passer montanus</i>	Amber		Low (unlikely)	
Tufted Duck	<i>Aythya fuligula</i>	Amber		Low	Wintering species, remains on waterbody.
Turnstone	<i>Arenaria interpres</i>			Moderate	Requires intertidal for feeding and secure roosting area (e.g. saltmarsh). Energetic constraints on this small migratory waterbird may be caused by their shift distribution regularly/ some distance away in response to a flood event.
Water Rail	<i>Rallus aquaticus</i>	Amber		Low	
Wheatear	<i>Oenanthe oenanthe</i>	Amber		Low	
Whimbrel	<i>Numenius phaeopus</i>			Low	Passage migrant, occurring in Ireland for brief periods in the autumn and spring.
Whinchat	<i>Saxicola rubetra</i>	Amber		Low	
Whitethroat	<i>Sylvia communis</i>			Low	
Whooper Swan	<i>Cygnus cygnus</i>	Amber	1	Low	Roosts on waterbody, feeds in fields (mostly).
Wigeon	<i>Anas penelope</i>	Amber		Low	Wintering species, remains on waterbody most of the time, but also grazes on intertidal flats/ in fields.
Wood Sandpiper	<i>Tringa glareola</i>	Amber	1	Low	
Wood Warbler	<i>Phylloscopus sibilatrix</i>	Amber		Low	

Appendix B. Vulnerability Assessments by Site

B.1. Vulnerability Assessments by Site - SACs

SAC Code	SAC Name	Vulnerability
000006	Killyconny Bog (Cloghbally)	Moderate
000007	Lough Oughter and Associated Loughs	Moderate
000014	Ballyallia Lake	Low
000016	Ballycullinan Lake	Moderate
000019	Ballyogan Lough	Moderate
000020	Black Head-Poulsallagh Complex	Extreme
000030	Danes Hole, Poulnalecka	Extreme
000032	Dromore Woods and Loughs	Extreme
000036	Inagh River Estuary	High
000037	Pouladatig Cave	Extreme
000051	Lough Gash Turlough	Low
000054	Moneen Mountain	Extreme
000057	Moyree River System	Extreme
000064	Poulnagordon Cave (Quin)	Extreme
000077	Ballymacoda (Clonpriest and Pillmore)	Low
000090	Glengarriff Harbour and Woodland	Extreme
000091	Clonakilty Bay	High
000093	Caha Mountains	High
000097	Lough Hyne Nature Reserve and Environs	Low
000101	Roaringwater Bay and Islands	Moderate
000102	Sheep's Head	High
000106	St. Gobnet's Wood	High
000108	The Gearagh	High
000109	Three Castle Head to Mizen Head	Moderate
000111	Aran Island (Donegal) Cliffs	High
000115	Ballintra	High
000116	Ballyarr Wood	High
000129	Croaghonagh Bog	Moderate
000133	Donegal Bay (Murvagh)	High
000138	Durnesh Lough	Moderate
000140	Fawnboy Bog/Lough Nacung	High
000142	Gannivegil Bog	Moderate
000147	Horn Head and Rinclevan	Extreme
000154	Inishtrahull	Moderate
000163	Lough Eske and Ardnamona Wood	High
000164	Lough Nagreany Dunes	High
000165	Lough Nillan Bog (Carrickatlieve)	Moderate
000168	Magheradrumman Bog	Moderate

000172	Meenaguse/Ardbane Bog	Moderate
000173	Meentygrannagh Bog	Moderate
000174	Curraghchase Woods	Extreme
000181	Rathlin O'Birne Island	Low
000185	Sessiagh Lough	Moderate
000189	Slieve League	High
000190	Slieve Tooley/Tormore Island/Loughros Beg Bay	Extreme
000191	St. John's Point	High
000194	Tranarossan and Melmore Lough	Extreme
000197	West of Ardara/Maas Road	Extreme
000199	Baldoye Bay	Moderate
000202	Howth Head	Moderate
000204	Lambay Island	Moderate
000205	Malahide Estuary	High
000206	North Dublin Bay	Extreme
000208	Rogerstown Estuary	High
000210	South Dublin Bay	Low
000212	Inishmaan Island	High
000213	Inishmore Island	Extreme
000216	River Shannon Callows	High
000218	Coolcam Turlough	Low
000231	Barroughter Bog	Moderate
000238	Caherglassaun Turlough	Extreme
000242	Castletaylor Complex	High
000248	Cloonmoylan Bog	Moderate
000252	Coole-Garryland Complex	High
000255	Croaghill Turlough	Low
000261	Derrycrag Wood Nature Reserve	High
000268	Galway Bay Complex	High
000278	Inishbofin and Inishshark	Moderate
000285	Kilsallagh Bog	Moderate
000286	Kiltartan Cave (Coole)	Extreme
000295	Levally Lough	Low
000296	Lisnageeragh Bog and Ballinastack Turlough	Moderate
000297	Lough Corrib	Extreme
000299	Lough Cutra	Extreme
000301	Lough Lurteen Bog/Glenamaddy Turlough	Moderate
000304	Lough Rea	Moderate
000308	Loughatorick South Bog	Moderate
000318	Peterswell Turlough	Low
000319	Pollnacknockaun Wood Nature Reserve	High
000322	Rahasane Turlough	Low

000324	Rosroe Bog	Moderate
000326	Shankill West Bog	Moderate
000328	Slyne Head Islands	Low
000330	Tully Mountain	Moderate
000332	Akeragh, Banna and Barrow Harbour	High
000335	Ballinskelligs Bay and Inny Estuary	Extreme
000343	Castlemaine Harbour	Extreme
000353	Old Domestic Building, Dromore Wood	Extreme
000364	Kilgarvan Ice House	Extreme
000365	Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment	Extreme
000370	Lough Yganavan and Lough Nambrackdarrig	High
000375	Mount Brandon	High
000382	Sheheree (Ardagh) Bog	Moderate
000391	Ballynafagh Bog	Moderate
000396	Pollardstown Fen	Extreme
000397	Red Bog, Kildare	Moderate
000404	Hugginstown Fen	Moderate
000407	The Loughans	Low
000412	Slieve Bloom Mountains	Moderate
000428	Lough Melvin	Moderate
000432	Barrigone	Extreme
000439	Tory Hill	High
000440	Lough Ree	High
000448	Fortwilliam Turlough	Low
000453	Carlingford Mountain	High
000455	Dundalk Bay	Moderate
000458	Killala Bay/Moy Estuary	Extreme
000461	Ardkill Turlough	Low
000463	Balla Turlough	Low
000466	Bellacorick Iron Flush	Moderate
000470	Mullet/Blacksod Bay Complex	Extreme
000471	Brackloon Woods	High
000472	Broadhaven Bay	Low
000474	Ballymaglancy Cave, Cong	Extreme
000475	Carrowkeel Turlough	Low
000476	Carrowmore Lake Complex	Moderate
000479	Cloughmoyne	High
000480	Clyard Kettle-holes	Moderate
000484	Cross Lough (Killadoon)	Moderate
000485	Corraun Plateau	High
000492	Doocastle Turlough	Low
000495	Duvillaun Islands	Moderate

000497	Flughany Bog	Moderate
000500	Glenamoy Bog Complex	Extreme
000503	Greaghans Turlough	Low
000504	Kilglassan/Caheravoostia Turlough Complex	Low
000507	Inishkea Islands	Extreme
000516	Lackan Saltmarsh and Kilcummin Head	High
000522	Lough Gall Bog	Moderate
000525	Shrule Turlough	Low
000527	Moore Hall (Lough Carra)	Extreme
000532	Oldhead Wood	High
000534	Owenduff/Nephin Complex	High
000541	Skealaghan Turlough	Low
000542	Slieve Fyagh Bog	Moderate
000566	All Saints Bog and Esker	High
000571	Charleville Wood	High
000572	Clara Bog	Extreme
000575	Ferbane Bog	Moderate
000576	Fin Lough (Offaly)	Extreme
000580	Mongan Bog	Moderate
000581	Moyclare Bog	Moderate
000582	Raheenmore Bog	Moderate
000584	Cuilcagh - Anierin Uplands	High
000585	Sharavogue Bog	Moderate
000588	Ballinturly Turlough	Low
000592	Bellanagare Bog	Extreme
000595	Callow Bog	Extreme
000597	Carrowbehy/Caher Bog	Extreme
000600	Cloonchambers Bog	Extreme
000604	Derrinea Bog	Moderate
000606	Lough Fingall Complex	Extreme
000607	Errit Lough	Moderate
000609	Lisduff Turlough	Low
000610	Lough Croan Turlough	Low
000611	Lough Funshinagh	Low
000612	Mullygollan Turlough	Low
000614	Cloonshanville Bog	Moderate
000622	Ballysadare Bay	Extreme
000623	Ben Bulbin, Gleniff and Glenade Complex	Extreme
000625	Bunduff Lough and Machair/Trawalua/Mullaghmore	Extreme
000627	Cummeen Strand/Drumcliff Bay (Sligo Bay)	Extreme
000633	Lough Hoe Bog	Extreme
000634	Lough Nabrickkeagh Bog	Moderate

000636	Templehouse and Cloonacleigha Loughs	Moderate
000637	Turloughmore (Sligo)	Low
000638	Union Wood	High
000641	Ballyduff/Clonfinane Bog	Moderate
000646	Galtee Mountains	High
000647	Kilcarren-Firville Bog	Moderate
000665	Helvick Head	Moderate
000668	Nier Valley Woodlands	High
000671	Tramore Dunes and Backstrand	High
000679	Garriskil Bog	Moderate
000685	Lough Ennell	Moderate
000688	Lough Owel	Moderate
000692	Scragh Bog	Extreme
000696	Ballyteige Burrow	High
000697	Bannow Bay	High
000700	Cahore Polders and Dunes	High
000704	Lady's Island Lake	Moderate
000707	Saltee Islands	Moderate
000708	Screen Hills	Moderate
000709	Tacumshin Lake	Moderate
000710	Raven Point Nature Reserve	High
000713	Ballyman Glen	Moderate
000714	Bray Head	High
000716	Carriggower Bog	Moderate
000717	Deputy's Pass Nature Reserve	High
000719	Glen of the Downs	High
000725	Knocksink Wood	Moderate
000729	Buckronev-Brittis Dunes and Fen	High
000733	Vale of Clara (Rathdrum Wood)	High
000764	Hook Head	Moderate
000770	Blackstairs Mountains	Moderate
000781	Slaney River Valley	High
000831	Cullahill Mountain	High
000849	Spahill and Clomantagh Hill	High
000859	Clonaslee Eskers and Derry Bog	Extreme
000869	Lisbigney Bog	High
000919	Ridge Road, SW of Rapemills	High
000925	The Long Derries, Edenderry	High
000930	Clare Glen	High
000934	Kilduff, Devilsbit Mountain	High
000939	Silvermine Mountains	High
000979	Corratirrim	High

000994	Ballyteige (Clare)	Low
000996	Ballyvaughan Turlough	Low
001013	Glenomra Wood	High
001021	Carrowmore Point to Spanish Point and Islands	Moderate
001040	Barley Cove to Ballyrisode Point	High
001043	Cleanderry Wood	High
001058	Great Island Channel	Low
001061	Kilkeran Lake and Castlereke Dunes	High
001070	Myross Wood	Moderate
001090	Ballyness Bay	Extreme
001107	Coolvoy Bog	Moderate
001125	Dunragh Loughs/Pettigo Plateau	Moderate
001141	Gweedore Bay and Islands	Extreme
001151	Kindrum Lough	Moderate
001179	Muckish Mountain	High
001190	Sheephaven	High
001195	Termon Strand	Moderate
001197	Keeper Hill	High
001209	Glenasmole Valley	High
001228	Aughrusbeg Machair and Lake	Moderate
001230	Courtmacsherry Estuary	High
001242	Carrownagappul Bog	Moderate
001251	Cregduff Lough	Moderate
001257	Dog's Bay	High
001271	Gortnandarragh Limestone Pavement	High
001275	Inisheer Island	High
001285	Kiltiernan Turlough	Low
001309	Omey Island Machair	Extreme
001311	Rusheenduff Lough	Moderate
001312	Ross Lake and Woods	Extreme
001313	Rosturra Wood	High
001321	Termon Lough	Low
001342	Cloonee and Inchiquin Loughs, Uragh Wood	Extreme
001371	Mucksna Wood	High
001387	Ballynafagh Lake	Extreme
001398	Rye Water Valley/Cartron	Extreme
001403	Arroo Mountain	High
001430	Glen Bog	Low
001432	Glenstal Wood	High
001459	Clogher Head	Moderate
001482	Clew Bay Complex	Extreme
001497	Doogort Machair/Lough Doo	Extreme

001501	Erris Head	Moderate
001513	Keel Machair/Menaun Cliffs	Extreme
001529	Lough Cahasy, Lough Baun and Roonah Lough	Moderate
001536	Mocorha Lough	Moderate
001547	Castletownshend	Moderate
001571	Urlaur Lakes	High
001625	Castlesampson Esker	High
001626	Annaghmore Lough (Roscommon)	Extreme
001637	Four Roads Turlough	Low
001656	Bricklieve Mountains & Keishcorran	Extreme
001669	Knockalongy and Knockachree Cliffs	High
001673	Lough Arrow	Moderate
001680	Streedagh Point Dunes	Extreme
001683	Liskeenan Fen	Moderate
001741	Kilmuckridge-Tinnaberna Sandhills	High
001742	Kilpatrick Sandhills	High
001757	Holdenstown Bog	Moderate
001766	Magherabeg Dunes	High
001774	Lough Carra/Mask Complex	Extreme
001776	Pilgrim's Road Esker	High
001786	Kilroosky Lough Cluster	Moderate
001810	White Lough, Ben Loughs and Lough Doo	Moderate
001818	Lough Forbes Complex	High
001831	Split Hills and Long Hill Esker	High
001847	Philipston Marsh	Moderate
001858	Galmoy Fen	Moderate
001873	Derryclogher (Knockboy) Bog	Moderate
001879	Glanmore Bog	High
001880	Meenaguse Scragh	Low
001881	Maulagowna Bog	Moderate
001890	Mullaghanish Bog	Moderate
001898	Unshin River	Moderate
001899	Cloonakillina Lough	Moderate
001912	Glendree Bog	Moderate
001913	Sonnagh Bog	Moderate
001919	Glenade Lough	Moderate
001922	Bellacorick Bog Complex	Extreme
001926	East Burren Complex	Extreme
001932	Mweelrea/Sheeffry/Erriff Complex	Extreme
001952	Comeragh Mountains	High
001955	Croaghaun/Slievemore	Moderate
001957	Boyne Coast and Estuary	High

001975	Ballyhoorisky Point to Fanad Head	Extreme
001976	Lough Gill	High
001992	Tamur Bog	Moderate
002005	Bellacragher Saltmarsh	Moderate
002006	Ox Mountains Bogs	Extreme
002008	Maumturk Mountains	High
002010	Old Domestic Building (Keevagh)	Extreme
002012	North Inishowen Coast	Extreme
002031	The Twelve Bens/Garraun Complex	High
002032	Boleybrack Mountain	Moderate
002034	Connemara Bog Complex	Extreme
002036	Ballyhoura Mountains	Moderate
002037	Carrigeenamronety Hill	Moderate
002041	Old Domestic Building, Curraglass Wood	Extreme
002047	Cloghernagore Bog and Glenveagh National Park	High
002070	Tralee Bay and Magharees Peninsula, West to Cloghane	Extreme
002074	Slyne Head Peninsula	Extreme
002081	Ballinafad	Extreme
002091	Newhall and Edenvale Complex	Extreme
002098	Old Domestic Building, Askive Wood	Extreme
002110	Corliskea/Trien/Cloonfelliv Bog	Moderate
002111	Kilkieran Bay and Islands	Moderate
002112	Ballyseedy Wood	Low
002117	Lough Coy	Low
002118	Barnahallia Lough	Moderate
002119	Lough Nageeron	Moderate
002120	Lough Bane and Lough Glass	Moderate
002121	Lough Lene	Moderate
002122	Wicklow Mountains	High
002123	Ardmore Head	Moderate
002124	Bolingbrook Hill	High
002125	Anglesey Road	High
002126	Pollagoona Bog	Moderate
002129	Murvey Machair	Extreme
002130	Tully Lough	Moderate
002135	Lough Nageage	Moderate
002137	Lower River Suir	Extreme
002141	Mountmellick	High
002144	Newport River	High
002147	Lisduff Fen	Extreme
002157	Newgrove House	Extreme
002158	Kenmare River	Extreme

002159	Mulroy Bay	Moderate
002161	Long Bank	Low
002162	River Barrow and River Nore	High
002164	Lough Golagh and Breesy Hill	Moderate
002165	Lower River Shannon	High
002170	Blackwater River (Cork/Waterford)	Extreme
002171	Bandon River	High
002172	Blasket Islands	Moderate
002173	Blackwater River (Kerry)	Extreme
002176	Leannan River	High
002177	Lough Dahybaun	Moderate
002179	Towerhill House	Extreme
002180	Gortacarnaun Wood	High
002181	Drummin Wood	High
002185	Slieve Mish Mountains	High
002187	Drongawn Lough	Moderate
002189	Farranamanagh Lough	Moderate
002193	Ireland's Eye	Moderate
002213	Glenloughaun Esker	High
002214	Killeglan Grassland	High
002236	Island Fen	High
002241	Lough Derg, North-East Shore	Extreme
002243	Clare Island Cliffs	High
002244	Ardrahan Grassland	High
002245	Old Farm Buildings, Ballymacrogan	Extreme
002246	Ballycullinan, Old Domestic Building	Extreme
002247	Toonagh Estate	Extreme
002249	The Murrough Wetlands	Moderate
002250	Carrowmore Dunes	Extreme
002252	Thomastown Quarry	Moderate
002256	Ballyprior Grassland	High
002257	Moanour Mountain	High
002258	Silvermines Mountains West	High
002259	Tory Island Coast	Moderate
002261	Magharee Islands	Low
002262	Valencia Harbour/Portmagee Channel	Low
002263	Kerry Head Shoal	Low
002264	Kilkee Reefs	Low
002265	Kingstown Bay	Low
002268	Achill Head	Low
002269	Carnsore Point	Low
002274	Wicklow Reef	Low

002279	Askeaton Fen Complex	Moderate
002280	Dunbeacon Shingle	Moderate
002281	Reen Point Shingle	Moderate
002283	Rutland Island and Sound	High
002287	Lough Swilly	High
002293	Carrowbaun, Newhall and Ballylee Turloughs	Low
002294	Cahermore Turlough	Low
002295	Ballinduff Turlough	Low
002296	Williamstown Turloughs	Low
002298	River Moy	High
002299	River Boyne and River Blackwater	Moderate
002301	River Finn	Moderate
002303	Dunmuckrum Turloughs	Low
002306	Carlingford Shore	Low
002312	Slieve Bernagh Bog	Moderate
002313	Ballymore Fen	Moderate
002314	Old Domestic Buildings, Rylane	Extreme
002315	Glanlough Woods	Extreme
002316	Ratty River Cave	Extreme
002317	Cregg House Stables, Crusheen	Extreme
002318	Knockanira House	Extreme
002319	Kilkishen House	Extreme
002320	Kildun Souterrain	Extreme
002324	Glendine Wood	Moderate
002327	Belgica Mound Province	Low
002328	Hovland Mound Province	Low
002329	South-West Porcupine Bank	Low
002330	North-West Porcupine Bank	Low
002331	Mouds Bog	Moderate
002332	Coolrain Bog	Moderate
002333	Knockacoller Bog	Moderate
002336	Carn Park Bog	Moderate
002337	Crosswood Bog	Moderate
002338	Drumalough Bog	Moderate
002339	Ballynamona Bog and Corkip Lough	Moderate
002340	Moneybeg and Clareisland Bogs	Moderate
002341	Ardagullion Bog	Moderate
002342	Mount Hevey Bog	Moderate
002343	Tullaher Lough and Bog	Moderate
002346	Brown Bog	Moderate
002347	Camderry Bog	Moderate
002348	Clooneen Bog	Moderate

002349	Corbo Bog	Moderate
002350	Curraghlahanagh Bog	Moderate
002351	Moanveanlagh Bog	Moderate
002352	Monivea Bog	Moderate
002353	Redwood Bog	Moderate
002354	Tullaghanrock Bog	Moderate
002356	Ardgraique Bog	Moderate

B.2. Vulnerability Assessments by Site - SPAs

SPA code	Spa Name	Vulnerability
4002	Saltee Islands Spa	Low
4003	Puffin Island Spa	Low
4004	Inishkea Islands Spa	High
4005	Cliffs Of Moher Spa	Low
4006	North Bull Island Spa	Moderate
4007	Skelligs Spa	Low
4008	Blasket Islands Spa	Low
4009	Lady's Island Lake Spa	Critical
4013	Drumcliff Bay Spa	Moderate
4014	Rockabill Spa	Low
4015	Rogerstown Estuary Spa	Moderate
4016	Baldoyle Bay Spa	Moderate
4019	The Raven Spa	Moderate
4020	Ballyteigue Burrow Spa	Moderate
4021	Old Head Of Kinsale Spa	Low
4022	Ballycotton Bay Spa	Moderate
4023	Ballymacoda Bay Spa	Moderate
4024	South Dublin Bay And River Tolka Estuary Spa	High
4025	Malahide Estuary Spa	Moderate
4026	Dundalk Bay Spa	Moderate
4027	Tramore Back Strand Spa	Moderate
4028	Blackwater Estuary Spa	Moderate
4029	Castlemaine Harbour Spa	Moderate
4030	Cork Harbour Spa	High
4031	Inner Galway Bay Spa	High
4032	Dungarvan Harbour Spa	Moderate
4033	Bannow Bay Spa	Moderate
4034	Trawbreaga Bay Spa	Moderate
4035	Cummeen Strand Spa	Moderate
4036	Killala Bay/Moy Estuary Spa	Moderate
4037	Blacksod Bay/Broadhaven Spa	High
4039	Derryveagh And Glendowan Mountains Spa	Critical
4040	Wicklow Mountains Spa	Low
4041	Ballyallia Lake Wildfowl Sanctuary Spa	Moderate
4042	Lough Corrib Spa	Extreme
4043	Lough Derravaragh Spa	Moderate
4044	Lough Ennell Spa	Moderate
4045	Glen Lough Spa	Moderate
4046	Lough Iron Spa	Moderate
4047	Lough Owel Spa	Moderate
4048	Lough Gara Spa	Moderate
4049	Lough Oughter Spa	Moderate

4050	Lough Arrow Spa	High
4051	Lough Carra Spa	Moderate
4052	Carrowmore Lake Spa	High
4056	Lough Cutra Spa	High
4057	Lough Derg (Donegal) Spa	High
4058	Lough Derg (Shannon) Spa	High
4060	Lough Fern Spa	Low
4061	Lough Kinale And Derragh Lough Spa	Moderate
4062	Lough Mask Spa	High
4063	Poulaphouca Reservoir Spa	Moderate
4064	Lough Ree Spa	Extreme
4065	Lough Sheelin Spa	Moderate
4066	The Bull And The Cow Rocks Spa	Low
4068	Inishmurray Spa	Low
4069	Lambay Island Spa	Extreme
4072	Stags Of Broad Haven Spa	Low
4073	Tory Island Spa	Extreme
4074	Illanmaster Spa	Low
4075	Lough Swilly Spa	High
4076	Wexford Harbour And Slobs Spa	High
4077	River Shannon And River Fergus Estuaries Spa	Moderate
4078	Carlingford Lough Spa	Moderate
4080	Boyne Estuary Spa	High
4081	Clonakilty Bay	Moderate
4082	Greers Isle Spa	High
4083	Inishbofin, Inishdoeey And Inishbeg Spa	Extreme
4084	Inishglora And Inishkeeragh Spa	Low
4086	River Little Brosna Callows Spa	High
4087	Lough Foyle Spa	Moderate
4089	Rahasane Turlough Spa	Moderate
4090	Sheskinmore Lough Spa	High
4091	Stabannan-Braganstown Spa	Moderate
4092	Tacumshin Lake Spa	High
4093	Termoncarragh Lake And Annagh Machair Spa	Extreme
4094	Blackwater Callows Spa	Moderate
4095	Kilcolman Bog Spa	Moderate
4096	Middle Shannon Callows Spa	Extreme
4097	River Suck Callows Spa	Moderate
4098	Owenduff/Nephin Complex Spa	Moderate
4100	Inishtrahull Spa	High
4107	Coole-Garryland Spa	Moderate
4110	Lough Nillan Bog Spa	High
4111	Duvillaun Islands Spa	Low
4113	Howth Head Coast Spa	Low
4114	Illeunonearaun Spa	Moderate
4115	Inishduff Spa	Low

4116	Inishkeel Spa	Low
4117	Ireland's Eye Spa	Low
4118	Keeragh Islands Spa	Low
4119	Loop Head Spa	Low
4120	Rathlin O'birne Island Spa	Low
4121	Roaninish Spa	Low
4122	Skerries Islands	High
4123	Slyne Head Islands Spa	Low
4124	Sovereign Islands Spa	Low
4125	Magharee Islands	Low
4129	Ballysadare Bay Spa	Moderate
4132	Illancrone And Inishkeeragh Spa	Low
4134	Lough Rea Spa	Low
4135	Ardboline Island And Horse Island Spa	Low
4136	Clare Island Spa	Low
4137	Dovegrove Callows Spa	Moderate
4139	Lough Croan Turlough Spa	Moderate
4140	Four Roads Turlough Spa	Moderate
4142	Cregganna Marsh Spa	Moderate
4143	Cahore Marshes Spa	Moderate
4144	High Island, Inishark And Davillaun Spa	Low
4145	Durnesh Lough Spa	Moderate
4146	Malin Head Spa	Extreme
4148	Fanad Head Spa	Extreme
4149	Falcarragh To Meenlaragh Spa	Extreme
4150	West Donegal Coast Spa	High
4151	Donegal Bay Spa	Moderate
4152	Inishmore Spa	Low
4153	Dingle Peninsula Spa	Moderate
4154	Iveragh Peninsula Spa	Moderate
4155	Beara Peninsula Spa	Moderate
4156	Sheep's Head To Toe Head Spa	Moderate
4158	River Nanny Estuary And Shore Spa	Moderate
4160	Slieve Bloom Mountains Spa	Low
4161	Stack's To Mullaghareirk Mountains, West Limerick Hills And Mount Eagle Spa	Low
4162	Mullaghanish To Musheramore Mountains Spa	Low
4165	Slievefelim To Silvermines Mountains Spa	Low
4167	Slieve Beagh Spa	Low
4168	Slieve Aughty Mountains Spa	Low
4170	Cruagh Island Spa	Moderate
4172	Dalkey Islands Spa	Low
4175	Deenish Island And Scariff Island Spa	Low
4177	Bills Rocks Spa	Low
4181	Connemara Bog Complex Spa	High
4182	Mid-Clare Coast Spa	Moderate
4186	The Murrough Spa	Moderate

4187	Sligo/Leitrim Uplands Spa	Moderate
4188	Tralee Bay Complex Spa (4011,4018,4079)	Moderate
4189	Kerry Head Spa	Low
4190	Galley Head To Duneen Point Spa	Low
4191	Seven Heads Spa	Low
4192	Helvick Head To Ballyquin Spa	Low
4193	Mid-Waterford Coast Spa	Low
4194	Horn Head To Fanad Head Spa	High
4212	Cross Lough (Killadoon) Spa	Moderate
4219	Courtmacsherry Bay Spa	Moderate
4220	Corofin Wetlands Spa	Moderate
4221	Illeannanooon Spa	High
4227	Mullet Peninsula Spa	Extreme
4228	Lough Conn & Lough Cullin Spa	High
4230	West Donegal Islands Spa	Extreme
4231	Inishbofin, Omey Island And Turbot Island Spa	Extreme
4232	River Boyne And Blackwater Spa	High
4233	River Nore Spa	High
4234	Ballintemple And Ballygilgan Spa (New Spa)	Low
4999	Castlegregory Chough (New Spa)	Moderate

