Appendices

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Appendix A. – Data Register

Register of all incoming documents and drawings

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Sort by Data_ID before entering a new data item	Has data been superseded?		Description	Enter person (if available)	Enter Organisation (if available)	Drawing / Document / Photo / GIS etc.		Software / File extension	Can be a range of drawings if in digital format	Server location / Cabinet & file number	Online Location/Sharepoint Location if Applicable - Hyperlink	Halcrow Barry person		OPW / other organisation/ person	Halcrow person that data is sent to		Change to copy if you have copied the original and returned it			
Data_ID	**Superseded**	**Category**	**Name of data item**	**Data available from**	**Data available from**	**Type of data**	**Hard / Digital**	**File format**	**File name / Drawing No.**	**File location**	**File Location**	**Requested by**	**Date requested**	**Request sent to**	**Received by**	**Date received**	**Original / copy**	**Quality Check to be carried out by**	**Quality Checked**	**Quality Check carried out by**
1	N	Hydrology	Matt River Catchment Study, Balbriggan, Co. Dublin	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	001.FCC.Matt River Catchment Study Balbriggan Co. Dublin.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Matt River Report	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
2	N	Flood Risk	Mayne Stream Improvement Scheme	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	002.FCC.Mayne Stream Improvement Scheme.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Mayne Stream Improvement Scheme	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
3	N	Hydrology	Effects of extreme weather conditions on FCC area 5.11.2000 - 6.11.2000	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	003.FCC.Effects of extreme weather conditions on 5.11.2000 - 6.11.2000	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Effects of extreme weather conditions on FCC	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
4	N	Flood Risk	Assessment reports on severe flooding (09/11/2000)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	004.FCC.Assessment reports on severe flooding 09.11. 2000.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Assessment of Reports on Flooding	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
5	N	Flood Risk	Mill Stream Flood Prevention Skerries (May 1983)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	005.FCC.Mill Stream Flood Prevention Skerries May 1983.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Mill Stream Flood Prevention	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
6	N	Hydrology	Report on Flooding in Fingal County Nov 2004	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	006.Report on Flooding in Fingal County Nov 2004.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Report on Flooding in Fingal Nov 2004	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		Keshav Bhattarai	Y	External Report
7	N	Flood Risk	Flooding in Nov 2002 Report	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	007.Flooding in Nov 2002 Report.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Flooding in Nov 2002	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
8	N	Hydrology	Report on Flooding in North Dublin Nov 14th & 15th 2002	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	008.Report on Flooding in North Dublin Nov 14th & 15th 2002.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Not Available	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
9	N	Flood Risk	Letter from member of public concerning flooding in Nov 2002	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	009.Letter from member of public concerning flooding in Nov 2002.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Letter from member of Public concerning Flooding	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
10	N	Flood Risk	Flooding Report 14/15th Nov 2002	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	010.Flooding Report 14.15th Nov 2002.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Flooding Report 14th & 15th Nov 2002	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
11	N	Hydrology	Mayne River Catchment Study	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	011.Mayne River Catchment Study.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Mayne River Catchment	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
12	N	Hydrology	Mayne River Flood Study (Oct 2002)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	012.Mayne River Flood Study Oct 2002.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Mayne River Flood Study (Oct 2002)	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
13	N	Hydrology	Design of upgrading Kealy's Stream (Feb 1997)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	013. Aer Rianta Design of upgrading Kealy's Stream Feb 1997.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Design of upgrading Kellys stream	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
14	N	Flood Risk	Trotting Track Lands, Portmarnock, Flood assessment for the River Sluice (Aug 2005)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	014.Portmarnock Flood assessment for the River Sluice (Aug 2005).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Portmarnock, Flood Assessment for the River Sluice	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
15	N	Hydrology	Balgriffen report on flood extent assessment for River Mayne	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	015.Balgriffen report on flood extent assessment for River Mayne.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Balgriffen report on flood assessment for the River Mayne	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
16	N	Hydrology	Mayne River and Baldoyle Flood Relief Scheme	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	016.Mayne River and Baldoyle Flood Relief Scheme.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Mayne River and Baldoyle Flood Relief Scheme	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
17	N	Hydrology	Grange Development, Flood exent assessment River Mayne (Oct 2003)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	017.Grange Development, Flood exent assessment River Mayne (Oct 2003).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Grange Development, Flood Extent assessent River Mayne	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
18	N	Hydrology	Baldoyle Flood Relief Scheme, Supplementary Report 1 (May 1987)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	018.Baldoyle Flood Relief Scheme 1, Supplementary Report (May 1987).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Baldoyle Flood Relief Scheme, Supplementary Report 1	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
19	N	Hydrology	Baldoyle Flood Relief Scheme, Supplementary Report 2 (March 1992)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	019.Baldoyle Flood Relief Scheme, Supplementary Report 2 (March 1992).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Baldoyle Flood Relief Scheme Report 2	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
20	N	Flood Risk	Baldoyle Flooding Report (June 1993)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	020.Baldoyle Flooding Report (June 1993).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Baldoyle Flooding Report	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
21	N	Hydrology	Baldoyle Flood Relief Scheme (Prelim Report May 1987)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	021.Baldoyle Flood Relief Scheme (Prelim Report May 1987).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Baldoyle Flood Relief Scheme	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
22	N	Hydrology	Baldoyle Flood Relief Scheme (Revised Prelim Report Vol. 1 June 1996)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	022.Baldoyle Flood Relief Scheme (Revised Prelim Report Vol. 1 June 1996).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Baldoyle Flood Relief Scheme	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
23	N	Hydrology	Baldoyle Flood Relief Scheme (Revised Prelim Report Vol. 2 June 1996)	Patrick Marshall (JBB)	JBB	Document	Hard	pdf	023.Baldoyle Flood Relief Scheme (Revised Prelim Report Vol. 2 June 1996).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Baldoyle Flood Relief Scheme	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		External Report	Y	External Report
24	N	Mapping	Meath County Boundary	Patrick Marshall (JBB)	JBB	GIS Data	Digital		024.Meath county boundary.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 1\County	County Boundary - Meath	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08				

Register of all incoming documents and drawings

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Sort by Data_ID before entering a new data item	Has data been superseded?		Description	Enter person (if available)	Enter Organisation (if available)	Drawing / Document / Photo / GIS etc.		Software / File extension	Can be a range of drawings if in digital format	Server location / Cabinet & file number	Online Location/Sharepoint Location if Applicable - Hyperlink	Halcrow Barry person		OPW / other organisation/ person	Halcrow person that data is sent to		Change to copy if you have copied the original and returned it			
Data_ID	**Superseded**	**Category**	**Name of data item**	**Data available from**	**Data available from**	**Type of data**	**Hard / Digital**	**File format**	**File name / Drawing No.**	**File location**	**File Location**	**Requested by**	**Date requested**	**Request sent to**	**Received by**	**Date received**	**Original / copy**	**Quality Check to be carried out by**	**Quality Checked**	**Quality Check carried out by**
25	Y	Mapping	Corine Land Cover Data for Meath	Patrick Marshall (JBB)	JBB	GIS Data	Digital		025.Corine Land Cover Data for Meath.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 1\Corine_LandCover	Corine Land Use	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08				
26	Y	GIS	Geo Directory for Meath	Patrick Marshall (JBB)	JBB	GIS Data	Digital		026.Geo Directory.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 1\GeoDirectory	Geo Directory	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		MCC	Y	MCC
27	N	GIS	Record of Protected Structures in Meath	Patrick Marshall (JBB)	JBB	GIS Data	Digital		027.Record of Protected Structures in Meath.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 1\RPS	RPA	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		MCC	Y	MCC
28	N	GIS	ERBD Data For Meath	Patrick Marshall (JBB)	JBB	GIS Data	Digital		028.ERBD Data For Meath.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 1\ERBD	ERBD DATA	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		ERBD	Y	ERBD
29	N	GIS	Lake infromation for Meath	Patrick Marshall (JBB)	JBB	GIS Data	Digital		029.Lake infromation for Meath.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 1\Lakes	Lakes in Meath	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		MCC	Y	MCC
30	N	GIS	OPW Data for Meath - Benefit Scheme shape file, Bridge file, Channel File, Channel Drainage District, Channel Scheme, Channel District, Embankment Drainage District, Extension Scheme Shapefile	Patrick Marshall (JBB)	JBB	GIS Data	Digital		030.OPW Data for Meath .PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 1\OPW	OPW Data	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		Keshav Bhattarai	?	?
31	N	GIS	Orthographical mapping of Meath (CD 2,6,7, 8,9,10,11,12,13,14,15)	Patrick Marshall (JBB)	JBB	GIS Data	Digital		031.Orthographical mapping of Meath (CD 2,6,7,8,9,10,11,12,13, 14,15).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted	Available on request	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		Patrick Marshall	Y	Patrick Marshall
32	N	GIS	Planning Data for Meath	Patrick Marshall (JBB)	JBB	GIS Data	Digital		032.Planning Data for Meath.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 3\Planning_Data	Planning Data for Meath	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		MCC	Y	MCC
33	N	GIS	DTM 50M for Meath	Patrick Marshall (JBB)	JBB	GIS Data	Digital		033.DTM 50M for Meath.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 3	DTM 50	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		Keshav Bhattarai		
34	N	GIS	OSI Mapping v1000, v5000 for Meath	Patrick Marshall (JBB)	JBB	GIS Data	Digital		034.OSI Mapping v1000, v5000 for Meath.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 4	Available on request	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		Patrick Marshall		
35	N	GIS	V2500 R50,000 for Meath	Patrick Marshall (JBB)	JBB	GIS Data	Digital		035.V2500 R50,000 for Meath.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 5	Available on request	Scott Baigent	23/05/08	Amanda O'Brien (MCC)	Patrick Marshall	04/06/08		Patrick Marshall		
36	N	GIS	Flood photo's from 2002 (Fingal Co Co)	Patrick Marshall (JBB)	JBB	Photos	Digital	.jpg	036.Flood photo's from 2002 (Fingal Co Co).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\2002 Flood Photos		Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		FCC	Y	FCC
37	Y	GIS	Corine from Fingal Co Co	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	037.Corine from Fingal Co Co.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Corine	Corine Land Use	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		FCC	Y	FCC
38	N	GIS	Drainage Network from Fingal Co Co	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	038.Drainage Network for Fingal Co Co.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Drainage network	Drainage Network	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		FCC	Y	FCC
39	N	GIS	Fingal DTM	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	039.Fingal DTM.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\DTM	DTM	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		Patrick Marshall		
40	N	GIS	GDSDS Storm Reports (Fingal Co Co)	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	040.GDSDS Storm Reports (Fingal Co Co).PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\GDSDS Storm Reports		Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		FCC	Y	FCC
41	Superseded	GIS	Geo Directory for Fingal	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	041.Geo Directory for Fingal.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Geodirectory	Geodirectory	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		Patrick Marshall	Y	Patrick Marshall
42	N	GIS	LAPS for Fingal	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	042.LAPS for Fingal.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\LAPs	LAP's for Fingal	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		Keshav Bhattarai		
43	Superseded	Mapping	Orthographical mapping of Finglas	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	043.Orthographical mapping of Finglas.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Orthos	Available on request	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08		Keshav Bhattarai		
44	N	GIS	Protected Structures in Finglas	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	044.Protected Structures in Finglas.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Protected Structures		Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08				
45	N	GIS	Rivers in Finglas	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	045.Rivers in Finglas.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Rivers		Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08				
46	N	GIS	WWTP in Finglas	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	046.WWTP in Finglas.PM	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\WWTP	WWTP Locations	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08				

Register of all incoming documents and drawings

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Sort by Data_ID before entering a new data item	Has data been superseded?		Description	Enter person (if available)	Enter Organisation (if available)	Drawing / Document / Photo / GIS etc.		Software / File extension	Can be a range of drawings if in digital format	Server location / Cabinet & file number	Online Location/Sharepoint Location if Applicable - Hyperlink	Halcrow Barry person		OPW / other organisation/ person	Halcrow person that data is sent to		Change to copy if you have copied the original and returned it			
Data_ID	Superseded	Category	Name of data item	Data available from	Data available from	Type of data	Hard / Digital	File format	File name / Drawing No.	File location	File Location	Requested by	Date requested	Request sent to	Received by	Date received	Original / copy	Quality Check to be carried out by	Quality Checked	Quality Check carried out by
47	N	GIS	Mapinfo Files extracted from FEM FRAMS Tender	Scott Baigent (JBB)	JBB	GIS Data	Digital	tab	FEMFRAM_Tender_Files_MapInfo.zip	Sharepoint\04-Mapping data\FEM FRAM Tender Drawings\		Not Applicable	Not Applicable	Not Applicable	Scott Baigent	01/03/08		Scott Baigent	Y	Scott Baigent
48	N	GIS	Shapefiles extracted from FEM FRAMS Tender	Scott Baigent (JBB)	JBB	GIS Data	Digital	tab	FEMFRAM_Tender_Files_Shapefile.zip	Sharepoint\04-Mapping data\FEM FRAM Tender Drawings\		Not Applicable	Not Applicable	Not Applicable	Scott Baigent	01/03/08		Scott Baigent	Y	Scott Baigent
49	N	Mapping	Underground Structures	Patrick Marshall (JBB)	JBB	Drawing	Digital	tab	Map of Underground Structures in Study Area.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\Map of Underground Structures	Under Ground Information	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	25/06/08		MCC		
50	N	Flood Risk	Underground Structures	Patrick Marshall (JBB)	JBB	MS Excel	Digital	xls	Map of Underground Structures in Study Area.xls	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\Map of Underground Structures	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	25/06/08		Keshav Bhattarai		
51	N	Hydrology	River DWF's	Patrick Marshall (JBB)	JBB	MS Excel	Digital	xls	River DWF's.xls	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\River DWF's	River DWF's	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
52	N	Hydrology	Matt River Catchment Study	Patrick Marshall (JBB)	JBB	PDF	Digital	pdf	Matt River Catchment Study.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC\Matt River\Matt River	Matt River Report	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
53	N	Flood Risk	IPPC Discharges from Fingal County Council	Patrick Marshall (JBB)	JBB	MS Excel	Digital	xls	IPPC Discharges from Fingal County Council.XLS	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\IPPC DISCHARGES FROM FCC	IPPC Discharges from FCC	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
54	N	Hydrology	SeaDefenceConverted	Patrick Marshall (JBB)	JBB	MDB FILE	Digital	mdb	SeaDefenceConverted.MDB	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
55	N	Hydrology	GDSDS S1001 Mayne	Patrick Marshall (JBB)	JBB	Drawing/Document/GIS data	Digital	tab/pdf	GDSDS S1001 Mayne.zip	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\GDSDS S1001 Mayne.zip	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
56	N	GIS	PS - FCC	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	PS.TAB	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Extra	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	04/06/08				
57	N	Flood Risk	Flooding Problem at Entrance to Balleally Landfill Final Report	Patrick Marshall (JBB)	JBB	PDF Document	Digital	pdf	Flooding Problem at Entrance to Balleally Landfill Final Report.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC\Belleally Landfill	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
58	N	Sampling Report	Balleally	Patrick Marshall (JBB)	JBB	PDF Document	Digital	pdf	Balleally.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC\Belleally Landfill	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
59	N	GIS DATA	Discovery Series for Fingal	Patrick Marshall (JBB)	JBB	GIS Data	Digital	tab	Discovery.zip	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-CAD\Discovery Series	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	30/05/08		Keshav Bhattarai		
60	N	Flood Risk	15158 Phase 5E Drainage	Patrick Marshall (JBB)	JBB	PDF Document	Digital	pdf	15158 Phase 5E Drainage.zip	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
61	N	Flood Risk	14988 Phase 6 Drainage Strategy	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	14988 Phase 6 Drainage Strategy.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
62	N	Flood Risk	Portmarnock Rezoning-Flood Assessment for the River Sluice	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Portmarnock Rezoning-Flood Assessment for the River Sluice.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Matt River	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
63	N	Hydrology	Matt River Catchement Study	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Matt River Catchement Study.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC\Matt River	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Matt River	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
64	N	Hydrology	Matt River Regional Attenuation Facility Consultation Document	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Matt River Regional Attenuation Facility Consultation Document.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Reports\Incoming FCC\Matt River	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	29/05/08		Keshav Bhattarai		
65	N	Flood Risk	Map of Underground Structures in Study Area	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Map of Underground Structures in Study Area.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\Map of Underground Structures	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Uploaded Files	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	27/06/08		Keshav Bhattarai		
66	N	Flood Risk	Map of Underground Structures in Study Area	Patrick Marshall (JBB)	JBB	excel	Digital	excel	Map of Underground Structures in Study Area.xls	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\Map of Underground Structures	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Uploaded Files	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	27/06/08		Keshav Bhattarai		
67	N	Sewerage Scheme Info	Stamullin Gormanston Mosney sewerage scheme	Patrick Marshall (JBB)	JBB	excel/Word	Digital	excel/word	Stamullin Gormanston Mosney sewerage scheme	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Uploaded Files	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		

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Data_ID	**Superseded**	**Category**	**Name of data item**	**Data available from**	**Data available from**	**Type of data**	**Hard / Digital**	**File format**	**File name / Drawing No.**	**File location**	**File Location**	**Requested by**	**Date requested**	**Request sent to**	**Received by**	**Date received**	**Original / copy**	**Quality Check to be carried out by**	**Quality Checked**	**Quality Check carried out by**
68	N	National Urban Wastewater Study	Trim Catchment Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Trim Catchment Report.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\National urban waste water study	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
69	N	National Urban Wastewater Study	Slane Catchment Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Slane Catchment Report.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\National urban waste water study	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
70	N	National Urban Wastewater Study	Navan Catchment Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Navan Catchment Report .pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\National urban waste water study	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
71	N	National Urban Wastewater Study	Meath Catchment Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Meath Catchment Report.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\National urban waste water study	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
72	N	National Urban Wastewater Study	Laytown Catchment Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Laytown Catchment Report.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\National urban waste water study	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
73	N	National Urban Wastewater Study	Kells Catchment Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Kells Catchment Report.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\National urban waste water study	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
74	N	National Urban Wastewater Study	Dunshauglin Catchment Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Dunshauglin Catchment Report.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\National urban waste water study	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
75	N	National Urban Wastewater Study	Duleek Catchment Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Duleek Catchment Report.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\National urban waste water study	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
76	N	National Urban Wastewater Study	Athboy Catchment Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Athboy Catchment Report.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\National urban waste water study	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
77	N	Flood Alleviation	Mornington district surface water and flood alleviation scheme - Final Preliminary Report	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf	Mornington district surface water and flood alleviation scheme.pdf	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\Mornington district surface water and flood alleviation scheme	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
78	N	Flood Alleviation	Mornington district surface water and flood alleviation scheme - Drawings	Patrick Marshall (JBB)	JBB	.dwg	Digital	.dwg	5295-00-01.dwg, 5295-00-02.dwg, 5295-00-03.dwg, 5295-00-04.dwg, 5295-00-05.dwg, 5295-00-06.dwg, 5295-00-07.dwg, 5295-00-08.dwg, 5295-00-09.dwg, 5295-00-10.dwg, 5295-00-11.dwg, 5295-00-12.dwg, 5295-00-13.dwg,5295-00-14.dwg,5295-00-15-17.dwg,5295-00-18.dwg,5295-00-19.dwg,5295-00-20.dwg,	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\Mornington district surface water and flood alleviation scheme	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files >National urban waste water study	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15/07/08		Keshav Bhattarai		
79	N	Flood Risk	Fingal East Meath_ Flood Risk _ Rateable Valuations	Patrick Marshall (JBB)	JBB	xls	Digital	xls	Fingal East Meath_ Flood Risk _ Rateable Valuations.xls	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15.07.08		Keshav Bhattarai		
80	N	Sewerage Scheme Info	Dunshaughlin sewerage scheme,1-network,2-trunk main,3-WWTW	Patrick Marshall (JBB)	JBB	xls	Digital	xls	SUB1202.DOC,NETWORK.DWG, TRUNK.DWG,WWTW.DWG	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\Dunshaughlin sewerage scheme,1-network,2-trunk main,3-WWTW	Fingal and East Meath Flood Risk Assessment and Management Study >Shared Documents > 02 - Information Holding Area > Meath Co Council - Upoaded Files	Scott Baigent	23/05/08	Ruth Woods (FCC)	Patrick Marshall	15.07.08		Keshav Bhattarai		
81	N	Mapping	Dunshaughlin Area Development Plan	Patrick Marshall (JBB)	JBB	drawing	Hard	pdf		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted	MCC website			downloaded from MCC website	Patrick Marshall			Keshav Bhattarai		
82	N	GIS/Mapping	DAFF - NE coastal flood outlines	Keshav Bhattarai (JBB)	JBB	GIS Data	Digital	GIS		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Dept of Marine_DAFF\DAFF data_16.07.08		Keshav Bhattarai		Jim Casey (DAFF)	Anne Marie Conibear	08.07.2008		DAFF	Y	DAFF
83	N	Hydrology	Hydrometric data of the EPA stations at the FEM FRAM and neighbouring catchments	Keshav Bhattarai (JBB)	JBB	xls	Digital	xls		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Hydrometric Data\EPA\		Keshav Bhattarai	28.07.2008	Rebecca Quinn (EPA)	Keshav Bhattarai	06.08.2008		Keshav Bhattarai		
84	N	Hydrology	Description of hydrometric data of OPW stations	Keshav Bhattarai (JBB)	JBB	xls	Digital	xls		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Hydrometric Data\OPW\ Email_080719CFRAMData		Keshav Bhattarai	19.07.2008	Peter Newport (OPW)	Keshav Bhattarai	08.08.2008		Keshav Bhattarai		
85	N	Hydrology	Hydrometric data of the OPW stations at the FEM FRAM and neighbouring catchments	Keshav Bhattarai (JBB)	JBB	xls	Digital	xls		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Hydrometric Data\OPW\OPW Irst Data		Keshav Bhattarai	19.07.2008	Kenneth Freehill (OPW)	Keshav Bhattarai	12.08.2008		Keshav Bhattarai		
86	N	Flood Risk	Ballyboughal Flooding Archival Photographs	Keshav Bhattarai (JBB)	JBB	jpeg	Digital	jpeg		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\BrendanPLynch		Anne Marie Conibear		BrendanPLynch	Anne Marie Conibear	20.08.2008		Keshav Bhattarai		
87	N	Hydrology	Rainfall data at the stations within the FEM FRAMS area and at neighbouring catchments	Keshav Bhattarai (JBB)	JBB	xlx	Digital	xls		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Rainfall Data		Keshav Bhattarai	28.07.08	Ann-Marie Hickey (MetEireann)	Keshav Bhattarai	21.08.2008		Keshav Bhattarai		

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Data_ID	**Superseded**	**Category**	**Name of data item**	**Data available from**	**Data available from**	**Type of data**	**Hard / Digital**	**File format**	**File name / Drawing No.**	**File location**	**File Location**	**Requested by**	**Date requested**	**Request sent to**	**Received by**	**Date received**	**Original / copy**	**Quality Check to be carried out by**	**Quality Checked**	**Quality Check carried out by**
88	N	Flood Risk	August 08 Flooding	Patrick Marshall (JBB)	JBB	pdf	Digital	pdf		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council Information submitted		Patrick Marshall		Joe Mc Garvey	Patrick Marshall	16.09.2008		Keshav Bhattarai		
89	N	Hydrology	AMS data of station 8011 - River Nanny at Duleek	Keshav Bhattarai (JBB)	JBB	xls	Digital	xls		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Hydrometric Data\OPW\AMS_OPW website		Keshav Bhattarai		www.opw.ie/hydro	Keshav Bhattarai	25.09.2008		Keshav Bhattarai		
90	N	Flood Risk	Flooding at Townland of Ballough, Ballystrane and Baldrumman, Lusk, Co. Dublin from 1982 to date.	Keshav Bhattarai (JBB)	OPW	Unbound report/letter	Hard			P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Review of Historic Floods\Flood Reports		Keshav Bhattarai		OPW / other organisation/ person	Keshav Bhattarai	26.09.2008		Keshav Bhattarai		
91	N	Soil and Subsoil data	The soil and sub-soil GIS data layers	Keshav Bhattarai (JBB)	EPA	Document/CD	Digital	various		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Environmental Protection Agency\EPA Soil Maps		Scott Baigent		EPA		06.10.2008		Keshav Bhattarai		
92	N	GIS/Mapping	NPWS area (NHA & SAC area)	Patrick Marshall (JBB)	JBB	GIS Data	Digital	GIS		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\NPWS_Areas\NPWS Areas	NPWS AREAS	Anne Marie Conibear		Gavin Poole (OPW)	Anne Marie Conibear	06.10.2008		NPWS	Y	NPWS
93	N	Hydrology	AMS data of Griffin River at Lucan (Stn 9002)	Keshav Bhattarai (JBB)	JBB	xls	Digital	xls		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Hydrometric Data\EPA		Keshav Bhattarai		Rebecca Quinn (EPA)	Keshav Bhattarai	06.10.2008		Keshav Bhattarai		
94	N	Report	Local Government Reform Practice 2007	Anne Marie Conibear (JBB)	JBB	Report	Digital	word		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\SEA		Anne Marie Conibear		Denise Treacy (FCC)	Anne Marie Conibear	09.10.2008		Keshav Bhattarai		
95	N	Drawing/report	Basement Information FCC	Patrick Marshall (JBB)	JBB	Doc/drawing	Digital	pdf		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Basement Information FCC		Patrick Marshall		Denise Treacy (FCC)	Patrick Marshall	13.11.2008		Keshav Bhattarai		
96	N	Hydrology	Estimation of Point Rainfall Frequency - Technical Note 61	Keshav Bhattarai (JBB)	JBB	pdf	Digital	pdf		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works		Keshav Bhattarai		Met Eireann website www.met.ie	Keshav Bhattarai	13.11.2008		Keshav Bhattarai		
97	N	Hydrology	FSU DDF Curve	Keshav Bhattarai (JBB)	JBB	GIS/xls	Digital	GIS/xls		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works		Keshav Bhattarai		John Martin	Keshav Bhattarai	13.11.2008		Keshav Bhattarai		
98	N	Hydrology	Hydrometric data of the Cuckoo River	Keshav Bhattarai (JBB)	JBB	xlx	Digital	xls		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Hydrometric Data\Dublin Airport_FCC		Keshav Bhattarai		Denise Treacy (FCC)	Keshav Bhattarai	17.11.2008		Keshav Bhattarai		
99	N	GIS/Mapping	DAFF - NE coastal flood outlines and NE coastal erosion risk maps	Keshav Bhattarai (JBB)	JBB	GIS Data	Digital	GIS		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Dept of Marine_DAFF\DAFF data_27.11.2008		Keshav Bhattarai		Jim Casey (DAFF)	Keshav Bhattarai	27.11.2008		DAFF	Y	DAFF
100	N	Hydrometric Station	Report on Fingal Hydrometric Station - 6th August 2008	Keshav Bhattarai (JBB)	JBB	Report/GIS map	Digital	Report/GIS		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Fingal Hydrometric Stations		Keshav Bhattarai		Denise Treacy (FCC)	Keshav Bhattarai	27.11.2008				
101	N	SEA/Pre-Screening	SEA Pre-Screening Statement / SEA Pre-Screening Design Tree	Anne Marie Conibear (JBB)	JBB	Report	Digital	Report		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\SEA\OPW Data		Anne Marie Conibear		Gavin Poole (OPW)	Anne Marie Conibear	09.12.2008				
102	N	Flood Study	Hydrological study for town centre_Kinsealy	Keshav Bhattarai (JBB)	JBB	Report	Digital	Report		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Flood Study_Sluice River		Keshav Bhattarai		Denise Treacy (FCC)	Keshav Bhattarai	18.12.2008		Keshav Bhattarai		
103	N	Mapping	Six Inch Map of the Fingal Area	Patrick Marshall (JBB)	JBB	GIS/maps	Digital	GIS/scanned maps		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Six Inch Maps - FCC		Keshav Bhattarai		FCC/MCC	Patrick Marshall	22.12.2008				
104	N	Mapping	Six Inch Map of the Meath Area	Patrick Marshall (JBB)	JBB	GIS/maps	Digital	GIS/maps		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council\Six Inch Maps - MCC		Keshav Bhattarai		FCC/MCC	Patrick Marshall	07.01.2009				
105	N	GIS	Regional Primary Schools Meath	Patrick Marshall (JBB)	JBB	Shape file	Digital	Map Info Table		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 1		Patrick Marshall		FCC/MCC	Patrick Marshall	15/07/08		ERBD	?	?
106	N	GIS	Small Stream Risk Score	Patrick Marshall (JBB)	JBB	Shape File	Digital	Map Info Table		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\CD 1		Patrick Marshall		FCC/MCC	Patrick Marshall	15/07/08		?	?	?
107	N	GIS/HYDROLOGY	Study Area Floods	Patrick Marshall (JBB)	JBB	Shape file	Digital	Map Info Table		\\ETRAMFS01\projects\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Floodmaps_29Jan08_Sent by_Gavin Poole	Study Area Floods	Keshav Bhattarai		OPW	Keshav Bhattarai	29/01/09		OPW	Y	OPW
108	N	Hyrology	EIA of Mornington Stream	Keshav Bhattarai (JBB)	JBB	Report	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Table of Content of EIA of Mornington River Scheme.pdf	EIA on Mornington Stream	Keshav Bhattarai		OPW	Keshav Bhattarai	03/02/09		OPW	Y	OPW
109	N	SEA	Point Pressure Shapefiles for National Abstractions	Corinna Simpson	Halcrow	Shape file	Digital	Map Info Table		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\SEA	National Abstractions	Corinna Simpson	30/01/09	Dublin City Council	Corinna Simpson	05/02/09		DCC	Y	DCC
110	N	Hydrology	Climate Change in Ireland: Refining the Impacts for Ireland; STRIVE Report Series No. 12	Keshav Bhattarai (JBB)	JBB	Report	Hard			Climate Change in Ireland: Refining the Impact for Ireland_STRIVE Report Series No. 12	Climate Change in Ireland_STRIVE Report 12_2008	Keshav Bhattarai		EPA/NUI Maynooth		03/03/09		NA	?	
111	N	GIS	Development Boundary MCC	Patrick Marshall (JBB)	JBB	Shape file	Digital	Map Info Table		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\Development Boundary MCC	Development Boundary	Patrick Marshall		MCC	Patrick Marshall	09/02/09		MCC		

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Data_ID	Superseded	Category	Name of data item	Data available from	Data available from	Type of data	Hard / Digital	File format	File name / Drawing No.	File location	File Location	Requested by	Date requested	Request sent to	Received by	Date received	Original / copy	Quality Check to be carried out by	Quality Checked	Quality Check carried out by
112	N	GIS	Development Boundary FCC	Patrick Marshall (JBB)	JBB	Shape file	Digital	Map Info Table		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Development Boundary FCC	Development Boundary	Patrick Marshall		FCC	Patrick Marshall	09/02/09		FCC		
113	Superseded	GIS	Geo Directory of Meath	Patrick Marshall (JBB)	JBB	JBB	Digital	Map Info Table	GDir_08_Q4	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\Geo-Directory - March 09	Meath Geo-Directory	Patrick Marshall		Colin Murtagh(D3D)	Pttrick Marshall	13/03/2009		HB		Sergio Herbon
114	N	Survey	Ward River Channel survey	Patrick Marshall (JBB)	JBB	JBB	Digital	AutoCad/Ascii File/Photos/ Key Plan	Multiple	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Channel Survey Data\Ward River	Ward River	Patrick Marshall		Amber O Brien(MCC)	Patrick Marshall	13/03/2009		Meath County Council//An Post		
115	Superseded	GIS	Geo Directory of Fingal	Patrick Marshall (JBB)	JBB	JBB	Digital	DBF FILE		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council	Fingal Geo-Directory	Patrick Marshall		Denise Treacy (FCC)	Patrick Marshall	26/03/09				
116	N	Report	Irish Coastal Protection Strategy Study Phase II: Dalkey Island to Omeath, Aug 2008	Keshav Bhattarai (JBB)	JBB	Report	Digital	Report		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Dept of Marine_DAFF\ICPSS Report Aug 08	Temporarily uploaded to the SharePoint and deleted	Keshav Bhattarai	22/04/08	Jim Casey (DAFF)	Keshav Bhattarai	24/04/08		NA		
117	N	GIS	River catchments + River sub Basins	Keshav Bhattarai (JBB)	JBB	Data	Digital	CD	GIS	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Environmental Protection Agency\Cachment_Subcatchment Boundaries_12May09		Keshav Bhattarai	06/05/09	EPA	Keshav Bhattarai	12/05/09		NA		
118	N	Mapping	Dublin Airport Environs Surface Water System	Keshav Bhattarai (JBB)	JBB	Data	Hard	Drawubg		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Dublin Airport Drainage Arrangement		Keshav Bhattarai	22/04/09	Denise Treacy (FCC)	Keshav Bhattarai	15/05/09		NA		
119	N	Data	Tidal Data at Dublin Port	Keshav Bhattarai (JBB)	JBB	Data	Digital	Data		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Tidal Data		Keshav Bhattarai	28/04/09	Gavin Poole (OPW)	Keshav Bhattarai	27/05/09				
120	N	Data	Tidal Data at Clogherhead	Keshav Bhattarai (JBB)	JBB	Data	Digital	Data		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Tidal Data		Keshav Bhattarai	28/04/09	Gavin Poole (OPW)	Keshav Bhattarai	09/06/09				
121	N	Report	Broadmeadow Estuary and Malahide Survey Report	Keshav Bhattarai (JBB)	JBB	Data	Digital	Report/drawing		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Malahide Estuary Survey Report_16Jun09	https://halcrowbarry.securespsites.com/femframs/Shared%20Documents/02%20-%20Information%20holding%20area/Malahide%20Estuary%20Survey%20Report_16Jun09.rar	Keshav Bhattarai	09/06/09	Denise Treacy	Keshav Bhattarai	16/09/09		NA		
122	N	Data	DAFF LiDAR Data extract at the three esturies of FEM FRAMS (Portmarnock, Malahide & Rogerstown)	Keshav Bhattarai (JBB)	JBB	Data	Digital	CD	GIS	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\LiDAR DATA at Estuaries	https://halcrowbarry.securespsites.com/femframs/Shared%20Documents/02%20-%20Information%20holding%20area/LiDAR%20DATA%20at%20Estuaries.rar	Keshav Bhattarai	09/06/09	Gavin Poole (OPW)	Keshav Bhattarai	29/06/09		NA		
123	N	Report	Mornington Preliminary Report 2004 & Mornington FSR Addendum 2007	Keshav Bhattarai (JBB)	JBB	Report	Digital	Report		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Mornington Scheme		Keshav Bhattarai		Gavin Poole (OPW)	Keshav Bhattarai	29/06/09		NA		
124	N	Data	FSU DDF Curve (GIS layers)	Keshav Bhattarai (JBB)	JBB	Data	Digital	Data	GIS	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works		Keshav Bhattarai		Gavin Poole (OPW)	Keshav Bhattarai	06/07/09		NA		
125	N	Report	Mayne River Drainage Aera	Keshav Bhattarai (JBB)	JBB	Report	Digital	Report		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Mayne River Drainage Area_13Jul09		Keshav Bhattarai		Denise Treacy	Keshav Bhattarai	13/07/09		NA		
126	N	Data	FSU-SAAR Curve (GIS Layer)	Keshav Bhattarai (JBB)	JBB	Data	Digital	GIS	GIS	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works		Keshav Bhattarai	14/07/09	Gavin Poole (OPW)	Keshav Bhattarai	28/07/09				
127	N	Report	Mornington EIS Report	Keshav Bhattarai (JBB)	JBB	Report	Digital			P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Mornington Scheme		Keshav Bhattarai		Gavin Poole (OPW)	Keshav Bhattarai	16/09/09		NA		
128	N	Drawign	Mornington Drawing	Keshav Bhattarai (JBB)	JBB	Drawiong	Digital			P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Mornington Scheme		Keshav Bhattarai		Gavin Poole (OPW)	Keshav Bhattarai	29/09/09		NA		
129	N	Data	LiDAR DTM at Brookside Stream (additional data) - 3 files	Keshav Bhattarai (JBB)	JBB	Data	Digital	GIS	GIS	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\LIDAR\LiDAR_Brookside Stream		Keshav Bhattarai		Gavin Poole (OPW)	Keshav Bhattarai	22/10/09				
130	N	Data	Fingal Coastal Data from the OPW	Patrick Marshall (JBB)	JBB	Data	Digital	GIS		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal Coastal DAS		Anne Marie Conibear		Aidan Harney (OPW)	Anne Marie Conibear	10/11/09				
131	N	Data	Complete set of Channel Survey Data from D3D	Patrick Marshall (JBB)	JBB	Data	**Digital**	Autocad,Photos and Txt Files	Various	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Channel Survey Data\D3D Delivered Data\Channel Survey		Anne Marie Conibear		Colin Murtagh(D3D)	Patrick Marshall	25/11/09		Yes	Yes	Various (Modelling Team)
132	N	Data	Defence Asset Survey	Patrick Marshall (JBB)	JBB	Data	**Digital**	Autocad	Various	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Channel Survey Data\D3D Delivered Data\DAS Survey		Anne Marie Conibear		Colin Murtagh(D3D)	Patrick Marshall	25/11/09		Yes	Yes	Rebecca Allen
133	N	Data	Estuary Survey	Patrick Marshall (JBB)	JBB	Data	**Digital**	Autocad	Various	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Channel Survey Data\D3D Delivered Data\Estuary Survey		Anne Marie Conibear		Colin Murtagh(D3D)	Patrick Marshall	25/11/09		Yes	Yes	Sergio Herbon (Halcrow BA)
134	N	Data	Query - COPY of list attached to query	Patrick Marshall (JBB)	JBB	Data	**Digital**	XLS	Query - COPY of list attached to query.xls	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Information		Anne Marie Conibear		Aidan Harney (OPW)	Anne Marie Conibear	27/11/09		No		AMC
135	N	Drawing/Data	Duleek Flood Alleviation Scheme (4 drawings, one data set)	Keshav Bhattarai (JBB)	JBB	Drawing/Data	**Digital**	PDF	Various	P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Duleek Flood Alleviation Scheme		Keshav Bhattarai		Shane Hayes (OPW)	Keshav Bhattarai	14/01/10		No		

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Data_ID	**Superseded**	**Category**	**Name of data item**	**Data available from**	**Data available from**	**Type of data**	**Hard / Digital**	**File format**	**File name / Drawing No.**	**File location**	**File Location**	**Requested by**	**Date requested**	**Request sent to**	**Received by**	**Date received**	**Original / copy**	**Quality Check to be carried out by**	**Quality Checked**	**Quality Check carried out by**
136	N	Report	Duleek Floo Relief Shceme, Preliminary Report, August 1996	Keshav Bhattarai (JBB)	JBB	Report	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Duleek Flood Alleviation Scheme		Keshav Bhattarai		Shane Hayes (OPW)	Keshav Bhattarai	18/01/10		No		
137	N	Report	Nanny River Duleek Certified Drainage Scheme Performance Report 2001	Keshav Bhattarai (JBB)	JBB	Report	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\Duleek Flood Alleviation Scheme		Keshav Bhattarai		Shane Hayes (OPW)	Keshav Bhattarai	18/01/10		No		
138	N	Report	Dublin Coastal Flooding Protection Project, Volume 1 - Main Report, April 2005 and Appendices	Keshav Bhattarai (JBB)	JBB	Report	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\DCFPP_Dublin Coastal Flooding Protection Project		Keshav Bhattarai	19.01.2010	Main report downloaded from the www.floodmaps.ie, Appendices received from FCC	Keshav Bhattarai	25/01/10		No		
139	N	Report	100127 Bealleally Stream Lusk Queries from Fingal	Patrick Marshall (JBB)	JBB	Report and drawings	Digital	PDF and .Doc		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Channel Survey Data\Query for the Council		Patrick Marshall	14.01.2010	Denise Treacy(FCC	Patrick Marshall	27.01.2010		no		
140	N	Drawings	Bracken River Culvert	Patrick Marshall (JBB)	JBB	Drawings	Hard			Y8122/Box File		Patrick Marshall	08.02.2010	Denise Treacy(FCC	Patrick Marshall	10.02.2010		No		
141	N	Report	ICPSS NE WP 2_3_4a	Anne Marie Conibear (JBB)	JBB	Reports/Drawings	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Dept of Marine_DAFF\ICPSS NE Coast_19Feb10		Keshav Bhattarai		Gavin Poole (OPW)	Anne Marie Conibear	19.02.2010				
142	N	Drawings	Feb 02 flood outline at Dublin Coastal Area	Keshav Bhattarai (JBB)	JBB	Drawing/PDF	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Dublin City Council\Feb02 Flood Extent		Keshav Bhattarai	08.03.2010	Tony Maguire, DCC	Keshav Bhattarai	10.03.2010		No	NA	NA
143	N	Report	Ballyboghill flood study for a private developer	Keshav Bhattarai (JBB)	JBB	Report Extract	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Flood Study_Ballyboghill River		Keshav Bhattarai	15.03.2010	Denise Treacy, FCC	Keshav Bhattarai	15.03.2010		No		
144	N	VDO CDs	Nov 2002 flooding aerial photography (2 VCDs)	Keshav Bhattarai (JBB)	JBB	CDs	Digital	CDs		Y8122/Box File		Anne Marie Conibear		A Harney, OPW	Anne Marie Conibear	23.03.10		No		
145	N	Photographs/Drawing	Sluice River at rear of St. Annes Park	Patrick Marshall (JBB)	JBB	PDF	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Sluice River		Keshav Bhattarai	30.03.2010	Denise Treacy	Patrick Marshal	11.05.2010		No	NA	NA
146	N	Drawings	Gaybrook Stream - SW drawings and flood study report on Gaybrook Stream - Development at Bnavinstown East, Drinan	Anne Marie Conibear (JBB)	JBB	drawing/report	Hard			Y8122/Box File		Anne Marie Conibear	30/04/10	Denise Treacy	Anne Marie Conibear	17.05.2010		No		
147	N	Data Files	GIS shape file of the Nursing Homes, Hospitals , Health Centers and clinics in the Fingal/Meath area	Patrick Marshall (JBB)	JBB	XLS	Digital					Patrick Marshall	24/02/10	Carmel Cudden		26/04/10		No		
148	N	Data Files	Salmanoid Waters	Patrick Marshall (JBB)	JBB	Shape file	Digital	SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\ERBD Data\salmonid_waters		Patrick Marshall	24/02/10	Gracjan Fil(CDM)/ Desmond Boghan(DCC)	Patrick Marshall	25/02/10		No		
149	N	Data Files	Waterbody classifications	Patrick Marshall (JBB)	JBB	Shape file	Digital	SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\ERBD Data\WB_Classifications		Patrick Marshall	24/02/10	Gracjan Fil(CDM)/ Desmond Boghan(DCC)	Patrick Marshall	25/02/10		No		
150	N	Data Files	Shell Fish areas in the Project Catchment	Patrick Marshall (JBB)	JBB	Shape file	Digital	SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\ERBD Data\Shellfish Areas		Patrick Marshall	16/06/10	Gracjan Fil(CDM)/ Desmond Boghan(DCC)	Patrick Marshall	16/06/10		No		
151	N	Report	Irish Coastal Protection Strategy Study Phase III: Dalkey Island to Omeath, August 2008	Patrick Marshall (JBB)	JBB	PDF	Digital	.pdf		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Dept of Marine_DAFF\Irish Coastal Protection Strategy Study Phase III Dalkey Island to Omeath, August 2008 Also in Box File		Kevin Daly		DAFF	Kevin Daly	11/02/10		No		
152	N	Data Files	Fish Barrier to Fish movement as i.e. sluice gates, weirs, dams etc. in the Fingal/Meath area	Patrick Marshall (JBB)	JBB	Shape file	Digital	SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\ERFB\Fish Barriers		Patrick Marshall	23/03/10	Brian Beckett(ERFB)	Patrick Marshall	31/03/10		No		
153	N	Data Files	Road Network Fingal	Patrick Marshall (JBB)	JBB	Shape file	Digital	SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\153 Road Network\OSI_Data_Update.zip		Patrick Marshall		Claire McIntyre	Patrick Marshall	14/05/10		No		
154	N	Data Files	Corine Land Cover Ireland 2006	Patrick Marshall (JBB)	JBB	Shape file	Digital	Metafiles		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Environmental Protection Agency\154 Corine Land Cover 2006 Also in Box File		Kevin Daly		Aisling McElwain(EPA)	Kevin Daly	19/04/10		No		
155	N	Data Files	Fingal County Geo-Directory	Patrick Marshall (JBB)	JBB	Database	Digital	MBD		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\155 2010 GeoDirectory		Patrick Marshall	25/02/10	Claire McIntyre	Patrick Marshall	25/02/10		No		
156	N	Data Files	Section 4 Discharge Licences	Patrick Marshall (JBB)	JBB	Shapefile	Digital	SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Section 4 AND 16 Licences Discharges GIS Layer\156 S4 Discharges		Patrick Marshall	11/06/10	Claire McIntyre	Patrick Marshall	02/07/10		No		
157	N	Data Files	Section 16 Discharge Licences	Patrick Marshall (JBB)	JBB	Shapefile	Digital	SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\Section 4 AND 16 Licences Discharges GIS Layer\157 Section 16 Discharges		Patrick Marshall	11/06/10	Claire McIntyre	Kevin Daly	02/07/10		No		
158	N	Data Files	Drinking Water Areas and WTWs	Patrick Marshall (JBB)	JBB	Database	Digital	gdbtable		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\158 Drinking Water Areas		Patrick Marshall	11/06/10	Denise Treacy	Patrick Marshall	02/07/10		No		
159	N	Data Files	Bathing Waters	Patrick Marshall (JBB)	JBB	Layer Data	Digital	.LYR		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\159 Bathing Waters		Patrick Marshall	12/06/10	Denise Treacy	Patrick Marshall	07/07/10		No		
160	N	Drawing/Data	1_1000 Mapping Additional from DCC	Patrick Marshall (JBB)	JBB	Drawing	Digital	.DWG		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\160 1_1000 Mapping Additional from DCC		Patrick Marshall	29/01/10	Claire McIntyre/Denise Treacy	Patrick Marshall	08/07/10		No		

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Data_ID	**Superseded**	**Category**	**Name of data item**	**Data available from**	**Data available from**	**Type of data**	**Hard / Digital**	**File format**	**File name / Drawing No.**	**File location**	**File Location**	**Requested by**	**Date requested**	**Request sent to**	**Received by**	**Date received**	**Original / copy**	**Quality Check to be carried out by**	**Quality Checked**	**Quality Check carried out by**
161	N	GIS DATA	Development Area within FEMFRAMS_Region	Patrick Marshall (JBB)	JBB	GIS	Digital	SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council information submitted\161 Development Areas within FEMFRAMS region		Paul Dunne	11/08/10	Denise Treacy/ Stephen Kavanagh	Paul Dunne	11/08/10				
162	N	Report	Arterial Drainage Cost Benefit Info	Patrick Marshall (JBB)	JBB	Document	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Office of Public Works\162 OPW Arterial Drainage Benifit Cost Info		Paul Dunne	unknown	Aidan Harney (OPW)	Paul Dunne	28/07/10				
163	N	GIS/Mapping	Ortho Mapping for Fingal	Patrick Marshall (JBB)	JBB	GIS	Digital	PDF		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council\163 Ortho Mapping 2010		Patrick Marshall		Denise Treacy	Patrick Marshall	15/09/10				
164	N	CAD data	Survey data of the FEM FRAMS original scope (in two Discs)	Keshav Bhattarai (JBB)	JBB	CAD	Digital	Discs		Box File		Keshav Bhattarai		D3D	Keshav Bhattarai	07/05/10		Patrick Marshall		
165	N	CAD data	Survey data of the Matt River Additional Stream near Balbriggan	Keshav Bhattarai (JBB)	JBB	CAD	Digital			P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Channel Survey Data\D3D Delivered Data\Channel Survey\Matt Stream_Additional Stream		Keshav Bhattarai		D3D	Keshav Bhattarai	04/11/10		Halcrow_BA		
166	N	GIS DATA	Record Protected Structures, RPS & RMP	AM Conibear (JBB)	JBB	GIS		SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council/Protected Structures and RMP/Feb 2009		Corinna Morgan	24/02/09	FCC - Stephen Gaughran	Corinna Morgan	27/02/09		Corinna Morgan		
167	N	GIS DATA	Sensitive Landscape, Landscape Charater Assessment	AM Conibear (JBB)	JBB	GIS		SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council/Sensitive Landscape		Corinna Morgan	24/02/09	FCC - Stephen Gaughran	Corinna Morgan	27/02/09		Corinna Morgan		
168	N	GIS DATA	Sensitive Landscape, Landscape Charater Assessment	AM Conibear (JBB)	JBB	GIS		SHP		P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council/Landscape		Corinna Morgan	24/02/09	MCC - Steven Kavanagh	Corinna Morgan	22/04/09		Corinna Morgan		
169	N	GIS DATA	Archaeology, SMR	AM Conibear (JBB)	JBB	GIS				P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Meath County Council/SMR		Corinna Morgan	18/02/09	MCC - Amanda O'Brien	Corinna Morgan	19/02/09		Corinna Morgan		
170	N	SEA	EPA SEA Scoping Submission & EPA Supplementary Scoping Submission	Corinna Morgan	Halcrow Barry	Pdf files		PDF		swin-fs-04:\consulting\we\Environmental_Assessment\Projects\WB FFRM Fingal East Meath\Incoming Documents		Corinna Morgan		Denise Tracey (FCC)	Corinna Morgan	03/07/09		Corinna Morgan		
171	N	SEA	GPZ/NVZ Definitions Document	Corinna Morgan	Halcrow Barry	Pdf files		PDF		swin-fs-04:\consulting\we\Environmental_Assessment\Projects\WB FFRM Fingal East Meath\Incoming Documents		Corinna Morgan		Michael Owens, EPA	Corinna Morgan	23/03/09		Corinna Morgan		
172	N	SEA	ERBD Water Management Units	Corinna Morgan	Halcrow Barry	Jpeg		JPEG		swin-fs-04:\consulting\we\Environmental_Assessment\Projects\WB FFRM Fingal East Meath\Incoming Documents		Corinna Morgan	26/02/09	Ray Earle & Desmond Boyhan	Corinna Morgan	13/03/09		Corinna Morgan		
173	N	CAD data	Re-issue of survey data of the Matt River Additional Stream near Balbriggan	Keshav Bhattarai (JBB)	JBB	CAD	Digital			P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Channel Survey Data\D3D Delivered Data\Channel Survey\Matt Stream_Additional Stream		Keshav Bhattarai		D3D	Keshav Bhattarai	10/12/10		Halcrow_BA		
174	N	CAD data	D3D response to queries on re-issued survey data of the Matt River Additional Stream	Keshav Bhattarai (JBB)	JBB	xls	Digital			P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Channel Survey Data\D3D Delivered Data\Channel Survey\Matt Stream_Additional Stream		Keshav Bhattarai	14/12/10	D3D	Keshav Bhattarai	15/12/10		Halcrow_BA		
175	N	Floodmap	SAFER Coastal maps - Dublin Coastal area	Keshav Bhattarai (JBB)	JBB		Digital			P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council		Anne Marie Conibear	Jan 2011	FCC	Anne Marie Conibear	21/01/11		NA		
176	N	Report	Extract from SAFER report & options map	AM Conibear (JBB)	JBB	adobe	Digital			P:\Y8 Projects\Y8122 - Fingal-East Meath Flood Risk Assessment and Management Study\Civil-Eng\Fingal County Council		Anne Marie Conibear	Jan 2011	FCC	Anne Marie Conibear	18/01/11		NA		
177	N	Drawings	Drawings for culvert at Moylaragh, Balbriggan	Keshav Bhattarai (JBB)	JBB			hard copy		Box File		Patrick Marshall		FCC	Patrick Marshall	22/10/09		N/A		
178	N																			
179	N																			
180	N																			
181	N																			
182	N																			
183	N																			
184	N																			
185	N																			

Appendix B. Stage 1 Summary Results

B1 Ballyboghill and Lusk

B2 Broadmeadow and Ward

B3 Coastal

B4 Mayne and Sluice

B5 Nanny and Delvin

B1 Ballyboghill and Lusk

Summary of measures carried forward to Stage 2 for Ballyboghill and Lusk AU

Key Measure not carried forward

	Measures	Assessment units		
		Ballyboghill and Lusk AU	IRR (WWTW in Ballyboghill area APSR)	IRR (M1 at Staffordstown)
	Baseline – Do nothing (assuming any current maintenance and management regime continues)	**Carried forward as baseline**		
	Do minimum			
1	Reduce existing activities			
2	**Proactive maintenance**	**Regular inspection of channels and structures and removal of blockages where necessary.**		
	Non-structural / minor & localised modifications			
3	Develop a flood forecasting and warning system (FFWS)			
4	**Targeted public awareness and education campaign**	**Provision of information to the public on flood risk**		
5	**Individual property flood proofing (IPFP)**	**Installation of off the shelf commercially available products**		
6	Sediment management			
7	Land management			
	Structural measures			
8	Sustainable Urban Drainage Systems (SUDS)			
9	Rehabilitation, improvement of existing defences			
10	**Improvement in channel conveyance**			
11	**Provision of permanent flood walls/embankments/rock armour/revetments**		**Construction of flood defence embankments**	**Construction of flood defence embankments**
12	Provision of demountable flood defences			
13	Use of overland floodways (e.g. allowing flooding of roads in a controlled manner)			
14	**Flow diversion (full diversion / bypass channel, flood relief channel, etc.)**		**Construction of flow diversion channels to increase capacity in the river system and divert flood water**	**Construction of flow diversion channels to increase capacity in the river system and divert flood water**
15	Flood storage reservoirs			
16	Beach Recharge/sand dunes			
17	Groynes			
18	Breakwater			
19	Managed realignment			
20	Tidal barrier/Tidal barrage			
21	**Relocation of existing assets**			

B2 Broadmeadow and Ward

Summary of measures carried forward to Stage 2 for Broadmeadow and Ward AU

Key Measure not carried forward

	Measures	Assessment units		
		Broadmeadow Ward AU	Ratoath area APSR	IRRs (Waste Water Pumping Station in Ashbourne and WWTW at Owens Bridge)
Baseline – Do nothing (assuming any current maintenance and management regime continues)		**Carried forward as baseline**		
Do minimum				
1	Reduce existing activities			
2	**Proactive maintenance**	**Regular inspection of channels and structures and removal of blockages where necessary.**	**Regular maintenance of flood embankment in Ratoath.**	**Regular inspection of channels and structures and removal of blockages where necessary.**
Non-structural / minor & localised modifications				
3	**Develop a flood forecasting and warning system (FFWS)**	**Develop a FFWS for the Broadmeadow River**		**Develop a FFWS for the Broadmeadow River (pumping station in Ashbourne area APSR)**
4	**Targeted public awareness and education campaign**	**Provision of information to the public on flood risk**		
5	**Individual property flood proofing (IPFP)**	**Installation of off the shelf commercially available products**		
6	Sediment management			
7	Land management			
Structural measures				
8	Sustainable Urban Drainage Systems (SUDS)			
9	Rehabilitation, improvement of existing defences			
10	**Improvement in channel conveyance**		**Improving channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road**	
11	**Provision of permanent flood walls/embankments/rock armour/revetments**	**Construction of flood defence embankments to provide protection to clusters of residential properties at Rowelstown East area APSR and at Newtown**	**Construction of flood defence embankments to protect two at risk properties**	**Construction of flood defence embankments to protect the IRR.**
12	Provision of demountable flood defences			
13	Use of overland floodways (e.g. allowing flooding of roads in a controlled manner)			
14	Flow diversion (full diversion / bypass channel, flood relief channel, etc.)			
15	Flood storage reservoirs			
16	Beach Recharge/sand dunes			
17	Groynes			
18	Breakwater			
19	Managed realignment			
20	Tidal barrier/Tidal barrage			
21	Relocation of existing assets			

B3 Coastal

Summary of measures carried forward to Stage 2 for the Coastal AU

Key Measure not carried forward

	Measures	Assessment units						
		Coastal AU	Portmarnock and Malahide areas APSR	Swords area APSR	Rush area APSR	Skerries area APSR	Laytown, Bettystown and Coastal area APSR	IRR (WWTW) Julianstown area APSR
	Baseline – Do nothing (assuming any current maintenance and management regime continues)	**Carried forward as baseline**						
	Do minimum							
1	Reduce existing activities							
2	**Proactive maintenance**	**Regular inspection and maintenance of river channels and structures including culverts and bridges and removal of blockages where necessary. Regular inspection and maintenance of coastal defences including walls embankments and flap valves .**						
	Non-structural / minor & localised modifications							
3	**Develop a flood forecasting and warning system (FFWS)**	**Develop a combined tidal and fluvial FFWS**						
4	**Targeted public awareness and education campaign**	**Provision of information to the public on flood risk**						
5	**Individual property flood proofing (IPFP)**	**Installation of off the shelf commercially available products**						
6	Sediment management							
7	Land management							
	Structural measures							
8	Sustainable Urban Drainage Systems (SUDS)							
9	**Rehabilitation, improvement of existing defences**		**Rehabilitating and raising existing coastal defences at Strand Road (including rehabilitation of flapped outfall) and Malahide town centre**			**Rehabilitating and raising existing coastal defences at Harbour Road to reduce tidal flood risk**		
10	**Improvement in channel conveyance**			**Widening and deepening of the Gaybrook Stream to reduce fluvial flood risk to properties on housing development at Aspen near Kinsaley.**	**Replacing culvert on West Rush Stream along Shore Road with a larger capacity culvert**	**A) Replacing culverts under roads and railway with larger capacity culverts to and widening channel through park to reduce fluvial flood risk to properties at Miller lane and Sherlock Park. B) Culverting the watercourse along the alignment of Miller Lane and Sherlock Park.**		
11	**Provision of permanent flood walls/embankments/rock armour/revetments**	**Construction of flood defence embankments to provide protection to cluster of residential properties at The Burrows**	**Construction of flood defence embankments and walls to protect at risk properties in Malahide town centre and Strand Road.**	**Construction of flood defence embankments and walls to protect properties at risk from tidal flooding in Swords town centre**	**Construction of flood defence embankments and walls to protect at risk properties along the coast and from West Rush stream**		**Construction of flood defence embankments to protect properties at risk from fluvial and tidal flooding**	**Construction of flood defence embankments to protect the IRR.**
12	**Provision of demountable flood defences**		**Construction of demountable flood defences to protect at risk properties in Malahide town centre**				**Construction of demountable flood defences to protect at risk properties along the coast and from the Nanny River**	
13	**Use of overland floodways (e.g. allowing flooding of roads in a controlled manner)**					**Lowering road levels and raising kerb levels along Miller lane and Sherlock Park to allow controlled flooding and reduce fluvial flood risk to properties.**		
14	Flow diversion (full diversion / bypass channel, flood relief channel, etc.)							
15	**Flood storage reservoirs**					**Construction of storage reservoir to the west of railway embankment to provide flood storage upstream of Skerries Area APSR to reduce fluvial flood risk to properties**		
16	Beach Recharge/sand dunes							
17	Groynes							
18	Breakwater							
19	Managed realignment							
20	Tidal barrier/Tidal barrage							
21	**Relocation of existing assets**	**Relocation of 1 isolated rural residential property to the east of the Sluice River estuary.**						

B4 Mayne and Sluice

Summary of measures carried forward to Stage 2 for the Mayne and Sluice AU

Key Measure not carried forward

	Measures	Assessment units		
		Mayne and Sluice AU	St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR	IRR. Approximately 100m of N32 at risk near Bewleys Airport Hotel in Clonshaugh.
Baseline – Do nothing (assuming any current maintenance and management regime continues)		**Carried forward as baseline**		
Do minimum				
1	Reduce existing activities			
2	**Proactive maintenance**	**Regular inspection of channels and structures and removal of blockages where necessary.**		
Non-structural / minor & localised modifications				
3	**Develop a flood forecasting and warning system (FFWS)**		**FFWS along the Mayne River to provide advance flood warning**	
4	**Targeted public awareness and education campaign**	**Provision of information to the public on flood risk**		
5	**Individual property flood proofing (IPFP)**		**Installation of off the shelf commercially available IPFP**	
6	Sediment management			
7	Land management			
Structural measures				
8	Sustainable Urban Drainage Systems (SUDS)			
9	Rehabilitation, improvement of existing defences			
10	**Improvement in channel conveyance**	**Improving the capacity of culverts at 2 locations; Balgriffin and Streamstown**		
11	**Provision of permanent flood walls/embankments/rock armour/revetments**	**Construction of flood defence embankments at Balgriffin, Streamstown and the IRRs.**		
12	Provision of demountable flood defences			
13	Use of overland floodways (e.g. allowing flooding of roads in a controlled manner)			
14	Flow diversion (full diversion / bypass channel, flood relief channel, etc.)			
15	Flood storage reservoirs			
16	Beach Recharge/sand dunes			
17	Groynes			
18	Breakwater			
19	Managed realignment			
20	Tidal barrier/Tidal barrage			
21	Relocation of existing assets			

B5 Nanny and Delvin

Summary of measures carried forward to Stage 2 for the Nanny and Delvin AU

Key Measure not carried forward

	Measures	Assessment units	
		Nanny and Delvin AU	IRR (Utility asset)
	Baseline – Do nothing (assuming any current maintenance and management regime continues)	**Carried forward as baseline**	
	Do minimum		
1	Reduce existing activities		
2	**Proactive maintenance**	**Regular inspection of channels and structures and removal of blockages where necessary.**	
	Non-structural / minor & localised modifications		
3	**Develop a flood forecasting and warning system (FFWS)**	**Develop a FFWS for the Nanny River**	
4	**Targeted public awareness and education campaign**	**Provision of information to the public on flood risk**	
5	**Individual property flood proofing (IPFP)**	**Installation of off the shelf commercially available IPFP products**	**Installation of off the shelf commercially available IPFP products**
6	Sediment management		
7	Land management		
	Structural measures		
8	Sustainable Urban Drainage Systems (SUDS)		
9	**Rehabilitation, improvement of existing defences**	**Raising existing defence embankment in Duleek area APSR to a higher standard of protection.**	
10	**Improvement in channel conveyance**		
11	**Provision of permanent flood walls/embankments/rock armour/revetments**	**Construction of flood defence embankments to provide protection to clusters of residential properties at Beaumont Bridge**	**Construction of flood defence embankments to protect the IRR.**
12	Provision of demountable flood defences		
13	Use of overland floodways (e.g. allowing flooding of roads in a controlled manner)		
14	**Flow diversion (full diversion / bypass channel, flood relief channel, etc.)**		**Construction of flood diversion channel to protect the IRR.**
15	Flood storage reservoirs		
16	Beach Recharge/sand dunes		
17	Groynes		
18	Breakwater		
19	Managed realignment		
20	Tidal barrier/Tidal barrage		
21	**Relocation of existing assets**	**Relocate 2 isolated residential properties away from flood risk area; 1 at Athcarne and 1 near Julianstown**	

Appendix C. Stage 2 Summary Results

Stage 2 - Development of Options

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Assessment Units

Catchment Scale

FEM FRAM Study area

Development (Meath County Council (MCC)) and enhancement (Fingal County Council (FCC)) of a proactive maintenance regime targeting potential culvert blockage locations

Targeted public awareness and education campaign and **individual property flood proofing**

Analysis Unit Scale

Nanny and Delvin	Ballyboghil and Lusk	Broadmeadow and Ward	Mayne and Sluice	Coastal
Develop a fluvial **FFWS** for the **Nanny River**		Develop a fluvial **FFWS** for the **Broadmeadow River**	Develop a fluvial **FFWS** for the **Mayne River.**	Develop a combined fluvial and tidal **FFWS.** FFWS would be required for the **Irish Sea** along the Meath and Fingal coastline and for the following rivers: **Mill Stream, Rush West Stream, Ward River, Gaybrook Stream and Sluice River** (consideration has been given to the proposed FFWS in other analysis units e.g. Nanny-Delvin AU). Regular inspection and **maintenance of coastal defences** along the **coast** including walls embankments and flap valves .

APSR \ Localised Scale

Duleek Area APSR	Beaumont Bridge*	Athcarne and Julianstown*	Glebe South*	Ratoath area APSR	Rowelstown East area APSR	Newtown*	St Margaret's, Dublin Airport, Belcamp and Balgriffin areas	Streamstown*	Portmarnock and Malahide areas APSR	Swords area APSR	Rush area APSR	Skerries area APSR	Laytown, Bettystown and Coastal area APSR	The Burrows*	Sluice River estuary*
Raising existing defence embankment to a higher standard of protection.	Construction of **flood defence embankments** to provide protection to clusters of residential properties.	**Relocate** 2 residential properties (1 in Athcarne and 1 in Julianstown) away from flood risk area.	**Relocate** one property away from flood risk zone*	**Improving channel conveyance** by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road, replacing a culvert along a tributary of the Broadmeadow with a larger capacity culvert and construction of flood defence **embankments**	Construction of flood defence **embankments**	Construction of flood defence **embankments**	**Improving channel conveyance** by replacing existing culverts with larger capacity culverts together with construction of flood defence **embankments** (Balgriffin).	**Improving channel conveyance** by replacing existing culverts with larger capacity culverts together with construction of flood defence **walls**.	**Rehabilitating and raising** existing coastal defences at **Strand Road** (including rehabilitation of flapped outfall) and construction of flood defence **embankment.** Construction of flood defence **embankments** and **walls** to protect at risk properties at **Strand Road.** Construction of flood defence **embankments** and **walls** to protect at risk properties in **Malahide town centre.** Construction of flood defence **walls** and **embankments** along with **rehabilitating and raising** ofexisting coastal defences in **Malahide town centre.** Construction of **demountable** flood defences along with **embankments** to protect at risk properties in **Malahide town centre.**	**Widening and deepening** of the Gaybrook Stream to reduce fluvial flood risk to properties at **Aspen near Kinsaley.** Construction of flood defence **walls** to protect properties at risk from tidal flooding in **Swords town centre.**	Construction of flood defence **embankments** and **walls** and replacing **culvert** along **Shore Road** to protect at risk properties along the coast and from West Rush stream.	**Rehabilitating and raising** existing coastal defences at **Harbour Road** to reduce tidal flood risk. **Replacing culverts** under roads and railway with larger capacity culverts and **widening and deepening** channels through park to reduce fluvial flood risk to properties at **Miller Lane and Sherlock Park.** Constructing a **flow diversion channel** to run in a culvert under the railway and roads at Miller lane and Sherlock Park to reduce fluvial flood risk to properties at **Miller Lane and Sherlock Park.** **Lowering road levels** and raising kerb levels along **Miller Lane and Sherlock Park** to allow controlled flooding along this road and reduce fluvial flood risk to properties. Construction of **storage reservoir** to the west of railway embankment to provide flood storage upstream of Skerries Area APSR to reduce fluvial flood risk to properties along **Miller Lane and Sherlock Park.** Construction of **storage reservoir** to the west of railway embankment to provide flood storage upstream of Skerries Area APSR along with **replacing culverts** under roads and railway with larger capacity culverts to reduce fluvial flood risk to properties along **Miller Lane and Sherlock Park.**	Construction of flood defence **embankments** to protect properties at risk along the coast and from the Nanny River. Construction of **demountable defences** together with **flood walls** and **embankments** to protect at risk properties along the coast and from the Nanny River.	Construction of flood defence **embankments** to provide protection to cluster of residential properties.	**Relocation** of 1 residential properties to the east of the **Sluice River estuary.**

IRRs

Stamullin area APSR	Ballyboghil area APSR	Ashbourne area APSR	Owens Bridge area APSR	N32 at Clonsaugh	WWTW Julianstown area APSR
Construction of flood defence **embankment** to protect **utility asset.** Construction of flood **diversion channel** to protect **utility asset.**	Construction of flood defence **embankment** to protect **WWTW.** Construction of flood **diversion channel** to protect **WWTW.**	Construction of flood defence **embankments** to protect **Waste Water Pumping Station.**	Construction of flood defence **embankments** to protect **WWTW.**	Construction of flood defence **embankments** to protect the **N32** at Clonshaugh.	Construction of flood defence **embankments**

*** Localised flood risk management options for properties at risk outside of an APSR**

Appendix D. Stage 3 Guidance

D1 Local Weightings Guidance

D2 Stage 3 Scoring Guidance

D1 Local Weightings Guidance

Stage 3 - Local Weighting

Core criteria		Objective		Sub-objective	Local weighting criteria
1	Technical	a	Ensure flood risk management options are operationally robust		Local weighting of 5 applied
		b	Minimise health and safety risk of flood risk management options	Reduce and where possible eliminate health and safety risks associated with the construction of flood risk management options	Local weighting of 5 applied
				Reduce and where possible eliminate health and safety risks associated with operation of flood risk management options	Local weighting of 5 applied
		c	Ensure flood risk managed effectively and sustainable into the future	Ensure flood risk management options are adaptable to future flood risk	Local weighting of 5 applied
2	Economic	a	Minimise economic risk	Minimise economic risk	5 = where annual average damages exceed €5 million 4 = where annual average damages are between €1 million and €4.99 million 3 = where annual average damages are between €0.5 million and €0.99 million 2 = where annual average damages are between €0.1 million and €0.49 million 1 = where annual average damages are less than €0.1 million 0 = where there are no annual average damages
		b	Minimise risk to infrastructure	Minimise risk to transport infrastructure	5 = where major transport infrastructure at risk, e.g. motorway, national rail route, national airport. 4 = where significant transport routes are at risk, e.g. National roadways. 3 = where regionally important infrastructure routes are at risk, Regional road network, regional airports. 2 = Where minor/local transport routes are at risk, e.g. secondary road network 1 = Where flood risk is likely to result in negligible impact, e.g. tertiary road network. 0 = No transport infrastructure at risk.
				Minimise risk to utility infrastructure	5 = where major utility infrastructure assets at risk, e.g. large power station, WWTW and WTP serving population equivalent (p.e) greater than 0.5 million. 4 = Where significant infrastructure assets at risk, e.g. WWTW and WTP serving a p.e greater than 100,000. 3 = Where medium infrastructure assets at risk, e.g. WWTW and WTP serving a population equivalent greater than 5000 2 = Where locally important infrastructure assets at risk, e.g. WWTW and WTP with p.e greater than 500 1 = Where minor infrastructure assets at risk, e.g. WWTW and WTP with p.e less than 500 0 = No infrastructure assets at risk.
		c	Manage risk to agricultural land		5 = where the area of agricultural land (not benefiting from FRM measures) at risk is greater than 500 hectares 4 = where the area of agricultural land (not benefiting from FRM measures) at risk is between 100 and 500 hectares 3 = where the area of agricultural land (not benefiting from FRM measures) at risk is between 50 and 99 hectares 2 = where the area of agricultural land (not benefiting from FRM measures) at risk is between 5 and 49 hectares 1 = where the area of agricultural land (not benefiting from FRM measures) at risk is less than 5 hectares 0 =where no agricultural land is at risk
3	Social	a	Minimise risk to human health and life	Minimise risk to human health and life	5 = Where the number of residential properties at risk of flooding is greater than 500 4 = Where the number of residential properties at risk of flooding is between 250 and 499 3 = Where the number of residential properties at risk of flooding is between 100 and 249 2 = Where the number of residential properties at risk of flooding is between 10 and 49 1 = Where the number of residential properties at risk of flooding is less than 10 0 = Where no residential properties are at risk of flooding
				Minimse risk to high vulnerability properties	5 = Where the number of high vulnerability properties at risk of flooding is greater than 25 4 = Where the number of high vulnerability properties at risk of flooding is between 11 and 24 3 = Where the number of high vulnerability properties at risk of flooding is between 6 and 10 2 = Where the number of high vulnerability properties at risk of flooding is between 2 and 5 7 = Where the number of high vulnerability properties at risk of flooding is equal to 1 0 = Where no high vulnerability properties are at risk of flooding
		b	Minimise risk to community	Minimise risk to social infrastructure	5 = where the number of high value social infrastructure assets (hospitals, schools, universities, fire stations, etc.) at risk of flooding is greater than 25 or where social infrastructure assets of major importance is at risk (i.e. National hospital) 4 = Where the number of high value social infrastructure assets at risk of flooding is between 11 and 25 or where social infrastructure asset of significant importance is at risk (i.e. regional hospital) 3 = Where the number of high value social infrastructure assets at risk of flooding is between 6 and 10 or where social infrastructure asset of medium importance is at risk (i.e. local hospital) 2 = where the number of high value social infrastructure assets at risk of flooding is between 2 and 5 or where social infrastructure asset of minor/local importance is at risk (i.e. local Garda station) 1 = Where the number of high value social infrastructure assets at risk of flooding is equal to 1

Stage 3 - Local Weighting

Core criteria		Objective		Sub-objective	Local weighting criteria
					0 = Where no social infrastructure assets are at risk.
				Minimise risk to employment	5 = where the number of commercial buildings at risk of flooding is greater than 500 4 = where the number of commercial buildings at risk is between 100 and 500 3 = where the number of commercial buildings at risk is between 50 and 99 2 = where the number of commercial buildings at risk is between 10 and 49 1 = where the number of commercial buildings at risk is less than 10 0 = Where no commercial buildings are at risk
		c	Minimise risk to, or enhance, social amenity	Minimise risk to flood-sensitive social amenity sites	5 = where the number of social amenity sites is greater than 25 4 = where the number of social amenity sites is between 11 and 25 3 = where the number of social amenity sites is between 6 and 10 2 = where the number of social amenity sites is between 2 and 5 1 = where the number of social amenity sites is equal to 1 0 = where no social amenity sites are at risk.
4	**Environmental**	a	Support the objectives of the WFD	Prevent deterioration, and where possible improve, ecological status / potential of water-bodies	5 = where the Water Framework Directive applies to waterbodies within the AU
				Prevent deterioration, and where possible improve, chemical status / potential of water-bodies	0 = where no waterbodies within the AU are identified under the Water Framework Directive
		b	Minimise risk of environmental pollution	Minimise risk to potential sources of pollution	5 = where there are licensed sites with high pollution potential at risk 0 = where there are no licensed sites with pollution potential at risk
		c	Avoid damage to, and where possible enhance, the flora and fauna of the study area	Avoid damage to, and where possible enhance, internationally and nationally designated sites of nature conservation importance	5 = where an internationally important site (e.g. SAC/SPA/Ramsar) is present and potentially affected 4 = where a nationally important site (NHA) is present and potentially affected 3 = where legally protected species/species of conservation concern are present/likely to be present and potentially affected 2 = where a site of local importance is present and potentially
				Avoid damage to or loss of, and where possible enhance, habitats supporting legally protected species and other known species and habitats of conservation concern	1 = where there are no designated sites or known records of legally protected species/species of conservation concern, but habitats are present that could be affected
				Avoid damage to or loss of existing riverine, wetland and coastal habitats and where possible create new habitat, to maintain a naturally functioning system	0 = no sites, habitats or species present that could be affected
		d	Avoid damage to, and where possible enhance, fisheries within the study area	Maintain existing, and where possible create new, habitat supporting fisheries and maintain upstream access	5 = where there are designated waters (e.g. under EU Shellfish Waters Directive; EU Freshwater Fish Directive) 4 = waterbody supports substantial salmonid fisheries/shellfisheries and is of national value for fishing/angling 3 = waterbody supports substantial fisheries/shellfisheries and is of regional value for fishing/angling 2 = waterbody supports fisheries/shellfisheries and is of local value for fishing/angling
				Ensure no adverse effects on designated Shellfish Waters	1 = fisheries could be present but unlikely given the modified nature of the channel/presence of barriers to movement; no known angling/fishing activities 0 = no fisheries or angling areas present
		e	Protect, and where possible enhance, landscape character and visual amenity within the study area	Protect, and where possible enhance, landscape character, including designated highly sensitive landscapes, within the catchment	5 = landscape designated as a internationally/nationally important landscape and potentially affected 4 = landscape character type designated at a county level as highly sensitive and/or exceptional/high value and potentially affected 3 = landscape character type designated at a county level as moderate sensitivity and/or medium value; protected views present that could be affected 2 = landscape character type designated at a county level as low sensitivity and/or low value and potentially affected 1 = no specific landscape sensitivity/value, but landscape features/views are important at a local level and potentially affected
				Protect, and where possible enhance, important views within the catchment	0 = no specific landscape designation, and no landscape value/sensitivity
		f	Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	Avoid damage to or loss of known buildings, structures and areas of cultural heritage importance, including their setting and heritage value, within the study area	5 = internationally important feature(s) (i.e. World Heritage Site) present and potentially affected 4 = nationally important feature(s) (e.g. National Monuments) present and potentially affected 3 = 5 or more sites/features listed on the RMP/RPS/SMR are present and potentially affected 2 = less than 5 sites/features listed on the RMP/RPS/SMR are present and potentially affected 1 = where no sites/features are at risk from flooding, but may be indirectly affected by the proposed works (e.g. setting) 0 = no sites/features at risk

D2 Stage 3 Scoring Guidance

Stage 3 - Scoring

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Objective		Score	Description							
Technical										
1a	Level of operational risk of option i.e. mechanical or human intervention required (e.g. lengths/numbers of demountables, pumps etc)	5	No mechanical or human intervention	or	accessible most of the time	or	Not reliant of telemetry or forecasting	or	No future maintenance requirements over life of option (say 50yrs)
		3	Limited mechanical or human intervention (say 25% reliant)	or	Inaccessible in flood conditions	or	Reliant on simple mechanical controls	or	Limited future maintenance requirements over life of option
		1	Medium mechanical or human intervention (say 50% reliant)	or	Restricted tidal access	or	Reliant on real time telemetry, not forecasted or modelled	or	Medium future maintenance requirements over life of option
		0	Significant mechanical or human intervention (say 75% reliant)	or	Difficult or long access (journey length > 2 hours)	or	Reliant on flood forecast certainty	or	Regular future maintenance required (say every 5 years)
		-1	All mechanical or human intervention	or	Inaccessible most of the time without new infrastructure	or	Reliant on flood forecast certainty yet certainty not available	or	Significant maintenance requirements
1b	Health and safety risk of FRM options	5	No health and safety risk to construction workers	or	No health and safety risk to operators of FRM options	or	No construction works carried out		
		3	Limited health and safety risk to construction workers	or	Limited health and safety risk to operators of FRM options	or	Minor works to flood defence infrastructure away from river channel, and minimal manual handling needed		
		1	Medium health and safety risk to construction workers	or	Medium health and safety risk to operators of FRM options	or	Works away from river channel, and avoiding trafficked areas with all heavy items able to be lifted mechanically		
		0	Significant health and safety risk to construction workers	or	Significant health and safety risk to operators of FRM options	or	Working in proximity to river channels, or near heavily trafficked routes, near services requiring diversion, large amounts of items		
		-1	Very significant health and safety risk to construction workers	or	Very significant health and safety risk to operators of FRM options	or	Extensive in channel working, requiring heavy plant, diving, BA confined space entry ,hot works, extensive service clashes		
1c	Level of adaptability of FRM option to future flood risk	5	Already meeting requirements of HEFS						
		3	Exceeds requirements of MRFS and adaptable to HEFS						
		1	Meets requirements of MRFS and adaptable to HEFS						
		0	Meets current requirements and adaptable to MRFS						
		-1	Only meets requirements of current risk and not adaptable						
Economic										
2a	Minimise economic risk	5	All economic damages removed						
		3	Significant reduction in economic damages						
		1	Limited reduction in economic damages						
		0	No increase in economic damages						
		-1	Potential for limited increase in economic damages						
		-3	Potential for increase in economic damages						
		-5	Potential significant increase in economic damages						
2b	Minimise risk to transport infrastructure	5	All transport routes (road, rail, navigation) protected from the risk of flooding.						
		3	Flood risk reduced to a significant number of transport routes						
		1	Flood risk reduced to a limited number of transport routes						
		0	No increase in the number of transport routes at risk of flooding.						
		-1	Potential for impacts on a limited number of transport routes (either directly or indirectly).						
		-3	Potential for impacts on a number of transport routes (either directly or indirectly).						
		-5	Potential for impacts on a significant number of transport routes (either directly or indirectly).						
2c	Minimise risk to utility infrastructure	5	All utility infrastructure assets (power stations, WWTWs, WTWs, telecom exchanges etc) protected from the risk of flooding.						
		3	Flood risk reduced to a significant number of utility infrastructure assets.						
		1	Flood risk reduced to a limited number of utility infrastructure assets.						
		0	No increase in the number of utility infrastructure assets at risk of flooding.						
		-1	Potential for impacts on a limited number of utility infrastructure assets (either directly or indirectly).						
		-3	Potential for impacts on a number of utility infrastructure assets (either directly or indirectly).						
		-5	Potential for impacts on a significant number of utility infrastructure assets (either directly or indirectly).						
2c	Manage risk to agricultural land not benefiting from FRM measures	5	All agricultural land not benefiting from FRM measures (non-irrigated arable land, pastures, land with complex cultivation and land principally occupied by areas of natural vegetation) protected from the risk of flooding.						
		3	Flood risk reduced to a significant area of agricultural land not benefiting from FRM measures.						
		1	Flood risk reduced to a limited area of agricultural land not benefiting from FRM measures.						
		0	No increase in the area of agricultural land at risk of flooding not benefiting from FRM measures.						
		-1	Potential for impacts on a limited area of agricultural land not benefiting from FRM measures (either directly or indirectly).						
		-3	Potential for impacts on an area of agricultural land not benefiting from FRM measures (either directly or indirectly).						
		-5	Potential for impacts on a significant area of agricultural land not benefiting from FRM measures (either directly or indirectly).						
Social										
3a	Minimise risk to human health and life	5	All residential properties protected from the risk of flooding. All high vulnerability properties protected from risk of flooding.						
		3	Flood risk reduced to a significant number of residential properties and to high vulnerability properties						
		1	Flood risk reduced to a limited number of residential properties and high vulnerability properties						
		0	No increase in the number of residential properties at risk of flooding and hih vulnerability properties						
		-1	Potential for impacts on a limited number of residential properties (either directly or indirectly) and high vulnerability properties						
		-3	Potential for impacts on a number of residential properties (either directly or indirectly) and high vulnerability properties.						
		-5	Potential for impacts on a significant number of residential properties (either directly or indirectly) and high vulnerability properties.						
3b	Minimise risk to community	5	All high-value social infrastructural assets, commercial businesses and industrial premises protected from the risk of flooding.						
		3	Flood risk reduced to a significant number of high-value social infrastructural assets, commercial businesses and industrial premises.						
		1	Flood risk reduced to a limited number of high-value social infrastructural assets, commercial businesses and industrial premises.						
		0	No increase in the number of high-value social infrastructural assets, commercial businesses and industrial premises at risk of flooding.						
		-1	Potential for impacts on a limited number of high-value social infrastructural assets, commercial businesses and industrial premises (either directly or indirectly).						
		-3	Potential for impacts on a number of high-value social infrastructural assets, commercial businesses and industrial premises (either directly or indirectly).						
		-5	Potential for impacts on a significant number of high-value social infrastructural assets, commercial businesses and industrial premises (either directly or indirectly).						
3c	Minimise risk to, or enhance, social amenity	5	All flood sensitive social amenity sites protected from the risk of flooding.						
		3	Flood risk reduced to a significant number of flood sensitive social amenity sites.						
		1	Flood risk reduced to a limited number of flood sensitive social amenity sites.						
		0	No increase in the number of flood sensitive social amenity sites at risk of flooding.						
		-1	Potential for impacts on a limited number of flood sensitive social amenity sites (either directly or indirectly).						
		-3	Potential for impacts on a number of flood sensitive social amenity sites (either directly or indirectly).						
		-5	Potential for impacts on a significant number of flood sensitive social amenity sites (either directly or indirectly).						

Objective		Score	Description
			Environmental
4a	Support the objectives of the WFD	5	Significant contribution of flood risk management measures to the achievement of good ecological status/potential by 2015.
		3	Contribution of flood risk management measures to the achievement of good ecological status/potential by 2015.
		1	Potential to provide opportunities to aid the achievement of good ecological status/potential by 2015.
		0	Provide no constraint associated with flood management measures to the achievement of good ecological status/potential by 2015.
		-1	Potential constraint to the achievement of good ecological status as proposed works over short stretches of river/estuary.
		-3	Potential constraint to the achievement of good ecological status as proposed works over longer stretches of river/estuary.
		-5	Significant constraint to the achievement of good ecological status.
4b	Minimise risk of environmental pollution	5	Potentially polluting sites protected from flooding
		3	Potential for a moderate reduction in flood risk to potentially polluting sites.
		1	Potential for a minor reduction in flood risk to potentially polluting sites.
		0	No positive or negative change in risk to potentially polluting sites.
		-1	Potential for a minor increase in flood risk to potentially polluting sites.
		-3	Potential for a moderate increase in flood risk to potentially polluting sites.
		-5	Potential for a significant increase in flood risk to potentially polluting sites.
4c	Avoid damage to, and where possible enhance, the flora and fauna of the study area	5	Improvement in conservation status of designated sites; increase in population sizes and/or extent of suitable habitat supporting target species; and/or, increase in extent of riverine, wetland and coastal habitats.
		3	Potential for habitat enhancement within designated sites.
		1	Potential for localised habitat enhancement.
		0	No deterioration in the conservation status of designated sites; no net decrease in population sizes of and/or loss of extent of suitable habitat supporting target species; and/or, no net loss of or permanent damage to existing riverine, wetland and coastal habitats.
		-1	Potential for impacts on designated sites and their features, and/or damage to and/or loss of existing riverine, wetland and coastal habitats and associated species, although limited by the already modified nature of the channel/shoreline or by the localised nature of the option.
		-3	Potential for impacts on designated sites and their features, and/or damage to and/or loss of existing riverine, wetland and coastal habitats and associated species.
		-5	Potential for a significant affect on designated sites which may lead to deterioration of the conservation status; significant loss of habitats and associated species.
4d	Avoid damage to, and where possible enhance, fisheries within the catchment	5	Increase extent of suitable habitat for fisheries and improve existing upstream access; increase length of waterside accessible for fishing; and/or, improve classification of shellfish waters.
		3	Potential for enhancement of recreational fishing areas and fisheries habitat.
		1	Potential for enhancement of recreational fishing areas.
		0	No net loss of suitable habitats for fisheries and provide no new upstream barriers to fish movement; maintain existing length of waterside accessible for fishing; and/or no deterioration in classification for shellfish waters.
		-1	Potential loss of/disturbance to riverine/estuarine habitat and dependent fisheries.
		-3	Localised loss and widespread disturbance to riverine/estuarine habitat and associated fisheries.
		-5	Significant loss of suitable habitat for fisheries; potential for deterioration in classification for shellfish waters, significant loss of waterside accessible for fishing.
4e	Protect, and where possible enhance, landscape character and visual amenity within the catchment	5	Contribute to existing or new areas of attractive, vibrant, accessible and safe waterway corridors within urban areas; and/or, improvement to visual amenity into/from designated areas.
		3	Opportunities identified to enhance visual amenity and landscape character in the wider area.
		1	Opportunities identified to enhance visual amenity and landscape character in the local area.
		0	No adverse impacts on landscape character; and/or, no deterioration in quality of views into/from designated areas.
		-1	Adverse change in local landscape character, although severity of impact reduced by use of demountables or low height of defences, impact is temporary, the fact that existing defences already exist in this area or landscape is designated as being of low sensitivity.
		-3	Adverse change in local landscape character within a landscape designated as being of medium to high sensitivity.
		-5	Significant adverse change in landscape character across a wide area; significant change in views into/from landscapes designated as being of medium to high sensitivity.
4f	Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the catchment	5	Enhance the physical context and structure of water-based heritage features; reduce flood risk to features sensitive to the impacts of flooding; and/or, contribute to the understanding of context of water-based features listed on the RMP.
		3	Risk to a number of heritage features reduced.
		1	Risk to a limited number of heritage features reduced.
		0	No impact on heritage features; and/or, no increase in flood risk to features sensitive to the impacts of flooding.
		-1	Potential for impacts on a limited number of heritage features (either directly or indirectly).
		-3	Potential for impacts on a number of heritage features (either directly or indirectly).
		-5	Potential for impacts on a significant number of heritage features (either directly or indirectly).

Appendix E. Stage 3 Summary Results

E1 Broadmeadow and Ward

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Broadmeadow & Ward AU Option 1**							
				-	**Develop a fluvial FFWS for the Broadmeadow River**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning systems (FFWS) involve the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities.* *A FFWS for the Broadmeadow River would provide advance flood warning to residential and commercial properties in Ratoath area APSR (9), Ashbourne area APSR (3), Rowelstown east area APSR (2), properties in rural areas along the watercourse (3) and the IRR in Ashbourne.*							
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	**5**	**5**	n/a	Some mechanical and human intervention required for the fluvial flood forecasting & warning system. Computer models and rainfall/flow gauges would require regular maintenance. Option reliant on certainty of flood warning system, therefore just meets minimum target.	0	0			0			0
	B) Minimise Health and Safety risk of flood risk management options.	**5**	**5**	n/a	Limited health and safety risk to construction workers involved with the installation of the gauges (2 flow and 5 TBR) for the flood forecasting & warning system as only limited work adjacent to river channels .	3	75			0			0
	C) Ensure flood risk managed effectively and sustainable into future.	**5**	**5**	n/a	FFWS Models are continuously improved and become more robust over time as more information becomes available from flood events. Option will continue to be operational in MRFS/HEFS conditions, therefore meets aspirational target.	5	125			0			0
	Technical Total Score/ Weighted Score					8	200		0	0		0	0
Economic	**A) Minimise economic risk**	**25**	**1**	**Average annual damages of €45,114**	This option is likely to result in a limited reduction in damages (~20%), thus partly exceeding the minimum target and scoring 1.	1	25			0			0
	B) Minimise risk to transport infrastructure	**5**	**3**	Approximately **0.5km of Regional (R)** roads at risk for the 1% AEP fluvial event. (approx. 90m of R roads at risk in Ratoath area APSR and 80m of R roads at risk in Rowelstown East area APSR)	Option would have no impact on the transport infrastructure at risk. Meeting minimum target as no increase in risk to transport infrastructure.	0	0			0			0
	C) Minimise risk to utility infrastructure	**10**	**2**	1 **Waste Water Pumping Station** (Castle Street Pumping Station in Ashbourne area APSR) at risk **1 Waste Water Treatment Works** in Owens Bridge APSR at risk. Risk assessed for the 0.1% AEP fluvial event.	Option would have no impact on the number of utility infrastructure assets at risk. Meeting minimum target as no increase in risk to utility infrastructure.	0	0						
	D) Minimise risk to agricultural land.	**5**	**4**	**150 hectares of agriculture land** not benefitting from flood defences at risk of flooding (1% AEP fluvial event). This represents approximately 1% of the total agricultural land in the AU.	Option would have no impact on the agricultural land at risk. Meeting minimum target as no increase in risk to agricultural land.	0	0			0			0
	Economic Total Score/ Weighted Score					1	25		0	0		0	0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Broadmeadow & Ward AU Option 1**							
				-	**Develop a fluvial FFWS for the Broadmeadow River**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning systems (FFWS) involve the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities.* *A FFWS for the Broadmeadow River would provide advance flood warning to residential and commercial properties in Ratoath area APSR (9), Ashbourne area APSR (3), Rowelstown east area APSR (2), properties in rural areas along the watercourse (3) and the IRR in Ashbourne.*							
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Social	**A) Minimise risk to human health and life.**	**30**	**2**	**18 residential properties at risk** with 9 at risk in Ratoath area APSR, 3 at risk in Ashbourne area APSR, 2 at risk in Rowelstown East area APSR and 1 at risk in Owens Bridge area APSR (1% AEP fluvial event). No **high vulnerability properties** at risk from flooding.	Option would not reduce flood risk to residential properties. Number of properties located in at risk areas would remain the same. Therefore, just meeting minimum target.	0	0			0			0
	B) Minimise risk to community.	**10**	**0**	No **non-residential building** at risk (1% AEP fluvial event). No large commercial business parks at risk. No **high-value social infrastructural assets** at risk	N/A	0	0			0			0
	C) Minimise risk to, or enhance, social amenity.	**5**	**2**	The following flood sensitive social amenity sites are at risk for the 1% AEP fluvial event: **1 sports club house** at Swords AFC **3 golf courses** at Ashbourne, Owens Bridge and Corrstown	Option would have no impact on the number of social amenity sites at risk. Meeting minimum target as no increase in risk to social amenity sites.	0	0			0			0
	Social Total Score/ Weighted Score					0	0		0	0		0	0
Environmental	**A) Support the objectives of the WFD.**	**5**	**5**	AU contains 25 river water bodies (27 in WMU): 4 = high status; 1 = good status; (i.e. no deterioration allowed); 5 = moderate status; 12 = poor status; 3 = bad status (i.e. improvements in status required). The RBMP reports that problems constraining achievement of good status include high nutrients, low ecological rating and dredging; with the principal causes identified as agriculture (diffuse pollution) and wastewater and industrial discharges (septic tank pollution). The measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc) and to ensure compliance with OPW Environmental Drainage Maintenance Guidance Notes	No contribution nor constraint to the achievement of WFD objectives as there will be no physical works within or modification to the river channels or adjacent land. Meeting minimum target.	0	0			0			0
	B) Minimise risk of environmental pollution	**15**	**5**	The following are at risk for the 1% AEP fluvial event: **1 Waste Water Pumping Station** (Castle Street Pumping Station in Ashbourne area APSR); **1 Waste Water Treatment Works** in Owens Bridge APSR; **8 waste management permit sites** at risk; 3 along the Broad Meadow River and 5 along the Ward River. The following are present in the AU: **4 Section 4 licences**	No positive or negative change in flood risk to potentially polluting sites within the AU as no intervention involved. Meeting minimum target.	0	0			0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	**10**	**5**	There are no internationally or nationally **designated nature conservation sites** within the AU. Approximately 1km downstream of the AU boundary are the Malahide Estuary SAC/pNHA and the Broadmeadow-Swords Estuary SPA/Ramsar site. This area comprises intertidal sandflats, mudflats, saltmarshes, and sand dunes, which support internationally important wintering populations of Brent geese as well as nationally important populations of a further 12 waterfowl species. Changes in the catchment, which alter the flooding regime and freshwater input into the estuary could potentially affect the nature, extent and character of intertidal habitat for which the site is designated, with impacts on associated designated waterbird populations. There are 31 sites listed on Meath County Council's Wetland Inventory within the AU, including a significant stretch of both the Broadmeadow and Ward rivers. Within the AU, the Broadmeadow and Ward rivers primarily run through rural areas and, although modified in stretches, are likely to be of biodiversity interest. All rivers and their floodplains in the AU support or have the potential to support legally species or other species of conservation conc (e.g. otter, kingfisher, bats, Atlantic salmon), a detailed distribution information is not availab	No impacts on potentially sensitive riverine habitats, flora and fauna (located within or outside designated nature conservation sites) as there will be there will be no physical works within or modification to the river channels or adjacent land. Meeting minimum target.	0	0			0			0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Broadmeadow & Ward AU Option 1**							
				-	**Develop a fluvial FFWS for the Broadmeadow River**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning systems (FFWS) involve the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities.* *A FFWS for the Broadmeadow River would provide advance flood warning to residential and commercial properties in Ratoath area APSR (9), Ashbourne area APSR (3), Rowelstown east area APSR (2), properties in rural areas along the watercourse (3) and the IRR in Ashbourne.*							
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Environment	**D) Avoid damage to, and where possible enhance, fisheries within the study area**	**5**	**3**	The Broadmeadow and Ward rivers and other streams within the AU support or are capable of supporting salmonid species and are likely to provide salmonid spawning or nursery areas. These watercourses are also likely to support brook, river and/or sea lamprey. There are no fisheries designations within the AU (e.g. Salmonid Waters). There are known areas of angling activity along both rivers, although the location of popular angling areas are not known. **1 weir** on the Ward River near Owens Bridge presents a barrier to fish movement (migratory salmon).	No impacts on fisheries or angling activity as there will be no physical works within or modification to the river channels. Meeting minimum target.	0	0			0			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	**5**	**4**	The Meath area of the AU falls within **The Ward Lowlands** landscape character type, classified as being of high sensitivity. For the Fingal area of the AU comprises the **Low lying Agricultural** and **Rolling Hills** landscape character types, both of which are classified as being of modest value and medium sensitivity). In the east of the AU, the R125 (approx 2.8km) and R108 (approx 1.5km) are designated **'Important Views'** (Fingal County Council designation).	No change in landscape character and visual amenity as there will be there will be no physical works within or modification to the river channels. Meeting minimum target.	0	0			0			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	**5**	**3**	Within the AU, **13 sites on the SMR/RPS/RMP are at risk.** Four sites on the RPS, including Owens Bridge and Rowelstown Bridge, and two unknown sites. Two sites unique to RMP (graveyard and an unclassified site). One site unique to SMR, a Crannog north of Dunshaughlin The remaining six sites are within the SMR/RPS/RMP datasets and includes three bridges (Roganstown Bridge, Knocksedan Bridge and a bridge at Balheary Demesne/Lissenhall Great). There is one ACA present in the AU, Rowelstown ACA, of which approximately 0.8ha is at risk of flooding (representing approximately 10% of the total ACA).	There will be no positive or negative change in risk to, or impacts on, SMR/RPS/RMP features (through either direct impacts or impacts on setting) and the ACA as there will be there will be no physical works as a result of this option. Meeting minimum target.	0	0			0			0
	Environmental Total Score/ Weighted Score					0	0		0	0		0	0
Total Score/ Total Weighted Score						**9**	**225**		**0**	**0**		**0**	**0**

Objectives		Global Weighting	Local Weighting	Options			
				Baseline	**Ratoath area APSR Option 1**		
				-	**Improving channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road and replacing a culvert on a tributary of the Broadmeadow River.**		
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves replacing 2 structures where the existing capacity of the structures is insufficient to convey large flows and results in surcharging and spilling of flood waters. The option is slightly amended from the option proposed at Stage 2 following the modelling of this option. The modelling indicates that the proposed embankments identified at stage 2 are not required.* *Modelling results indicate that a rectangular concrete culvert of 2m high by 4m wide would be sufficient to reduce flood risk at the R125 crossing. This culvert can convey a flow of 17m3/s which equates to the 1% AEP MRFS 95%ile flow without surcharging. The replacement culvert on the Broadmeadow River tributary is also designed to convey the 1% AEP MRFS 95%ile flow without surcharging. The dimensions for this culvert are 0.5m high by 1m wide by 109m in length and has a capacity of 0.6m3/s. Due to the sizing of the culverts the 0.1% AEP flood extent will be significantly reduced.* *The BCR for this option is 0.9 based on this option providing protection up to the 1% AEP fluvial event. The BCR for the 0.1% AEP event is 0.94. Modelling results indicate that this option will have negligible impact on water levels upstream and downstream of the proposed location for this option. Changes in water levels are localised (i.e. along a 0.4km stretch of the river) to the location of the proposed option. Option results in a decrease in water levels. The maximum decrease in water levels is 0.7m on the Broadmeadow River (cross section 4Ba19221U - directly upstream of the R125 crossing) and 0.9m on the Broadmeadow tributary (cross section 4Bax322In).* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths (northwards across the R125 and southwards from the tributary) are as a result of capacity problems at existing structure and lead to the flooding of properties at Ratoath. The option prevents these overland flow paths through increasing the capacity of the structures.* *The capacity of the existing culvert on the Broadmeadow tributary results in surcharging of the culvert and attenuation of floodwater on surrounding farm land. The increased culvert capacity as part of this option will prevent flooding of surrounding land and remove this flood plain attenuation.*		
				Comments	**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	**5**	**5**	n/a	Increased channel conveyance provided for by replacing existing structures with larger capacity culverts. The option is not dependent on human/mechanical intervention to operate. However, limited future maintenance will be required to ensure culverts are kept free from blockage.	3	75
	B) Minimise Health and Safety risk of flood risk management options.	**5**	**5**	n/a	Significant amount of construction works involved in this option with demolishing of existing structures and installation of new culverts in the watercourse. Therefore significant health and safety risk to construction workers. However, limited health and safety risk to operators once construction complete. Therefore overall just exceeding minimum target.	1	25
	C) Ensure flood risk managed effectively and sustainable into future.	**5**	**5**	n/a	New culverts to be designed to the 1% AEP MRFS 95%ile flow. MRFS 1% AEP 95%ile flow is greater than HEFS 1% AEP flow therefore, culverts meet requirements of HEFS. Therefore, achieving aspirational target.	5	125
	Technical Total Score/ Weighted Score					9	225
	A) Minimise economic risk	**25**	**1**	**Average annual damages of €26,047**	Option will reduce damages resulting from a 1% AEP event to 0 and will also reduce some damages occurring from a 0.1% AEP event.	3	75

Objectives		Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score
Technical	**A) Ensure Flood Risk Management options are operationally robust.**			0			0			0
	B) Minimise Health and Safety risk of flood risk management options.			0			0			0
	C) Ensure flood risk managed effectively and sustainable into future.			0			0			0
	Technical Total Score/ Weighted Score		0	0		0	0		0	0
	A) Minimise economic risk			0			0			0

Objectives		Global Weighting	Local Weighting	Options			
				Baseline	**Ratoath area APSR Option 1**		
				-	**Improving channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road and replacing a culvert on a tributary of the Broadmeadow River.**		
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves replacing 2 structures where the existing capacity of the structures is insufficient to convey large flows and results in surcharging and spilling of flood waters. The option is slightly amended from the option proposed at Stage 2 following the modelling of this option. The modelling indicates that the proposed embankments identified at stage 2 are not required.* *Modelling results indicate that a rectangular concrete culvert of 2m high by 4m wide would be sufficient to reduce flood risk at the R125 crossing. This culvert can convey a flow of 17m3/s which equates to the 1% AEP MRFS 95%ile flow without surcharging. The replacement culvert on the Broadmeadow River tributary is also designed to convey the 1% AEP MRFS 95%ile flow without surcharging. The dimensions for this culvert are 0.5m high by 1m wide by 109m in length and has a capacity of 0.6m3/s. Due to the sizing of the culverts the 0.1% AEP flood extent will be significantly reduced.* *The BCR for this option is 0.9 based on this option providing protection up to the 1% AEP fluvial event. The BCR for the 0.1% AEP event is 0.94. Modelling results indicate that this option will have negligible impact on water levels upstream and downstream of the proposed location for this option. Changes in water levels are localised (i.e. along a 0.4km stretch of the river) to the location of the proposed option. Option results in a decrease in water levels. The maximum decrease in water levels is 0.7m on the Broadmeadow River (cross section 4Ba19221U - directly upstream of the R125 crossing) and 0.9m on the Broadmeadow tributary (cross section 4Bax322In).* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths (northwards across the R125 and southwards from the tributary) are as a result of capacity problems at existing structure and lead to the flooding of properties at Ratoath. The option prevents these overland flow paths through increasing the capacity of the structures.* *The capacity of the existing culvert on the Broadmeadow tributary results in surcharging of the culvert and attenuation of floodwater on surrounding farm land. The increased culvert capacity as part of this option will prevent flooding of surrounding land and remove this flood plain attenuation.*		
				Comments	**Comments**	**Score**	**Weighted Score**
Economic	**B) Minimise risk to transport infrastructure**	**5**	**3**	Approximately **90m of Regional roads** at risk in Ratoath area APSR.	The 90m of regional road at risk in Ratoath is protected by this option up to the 1% AEP event. There is likely to be some residual flooding for the 0.1%AEP although the extent of flooding will be reduced due to the increased capacity of the culverts. Partly achieving aspirational target.	3	45
	C) Minimise risk to utility infrastructure	**10**	**0**	No utility assets at risk	N/A	0	0
	D) Minimise risk to agricultural land.	**5**	**1**	**2.7 hectares of agriculture land** not benefiting from flood defences at risk of flooding (1% AEP fluvial event).	This option results in a reduction in flood risk to agricultural land due to the increased flow through the culverts. Approximately 2ha of agricultural land (>70% of at risk land) will be protected from the 1% AEP event. There will also be some reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	15
	Economic Total Score/ Weighted Score					9	135
	A) Minimise risk to human health and life.	**30**	**1**	**9 residential properties** at risk in Ratoath area APSR No **high vulnerability properties** at risk from flooding.	This option fully protects properties at risk up to the 1% AEP event and provides reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	90

Objectives		Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score
Economic	**B) Minimise risk to transport infrastructure**			0			0			0
	C) Minimise risk to utility infrastructure			0			0			0
	D) Minimise risk to agricultural land.			0			0			0
	Economic Total Score/ Weighted Score		0	0		0	0		0	0
	A) Minimise risk to human health and life.			0			0			0

Objectives	Global Weighting	Local Weighting	Options			
			Baseline	**Ratoath area APSR Option 1**		
			-	**Improving channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road and replacing a culvert on a tributary of the Broadmeadow River.**		
			Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves replacing 2 structures where the existing capacity of the structures is insufficient to convey large flows and results in surcharging and spilling of flood waters. The option is slightly amended from the option proposed at Stage 2 following the modelling of this option. The modelling indicates that the proposed embankments identified at stage 2 are not required.* *Modelling results indicate that a rectangular concrete culvert of 2m high by 4m wide would be sufficient to reduce flood risk at the R125 crossing. This culvert can convey a flow of 17m3/s which equates to the 1% AEP MRFS 95%ile flow without surcharging. The replacement culvert on the Broadmeadow River tributary is also designed to convey the 1% AEP MRFS 95%ile flow without surcharging. The dimensions for this culvert are 0.5m high by 1m wide by 109m in length and has a capacity of 0.6m3/s. Due to the sizing of the culverts the 0.1% AEP flood extent will be significantly reduced.* *The BCR for this option is 0.9 based on this option providing protection up to the 1% AEP fluvial event. The BCR for the 0.1% AEP event is 0.94. Modelling results indicate that this option will have negligible impact on water levels upstream and downstream of the proposed location for this option. Changes in water levels are localised (i.e. along a 0.4km stretch of the river) to the location of the proposed option. Option results in a decrease in water levels. The maximum decrease in water levels is 0.7m on the Broadmeadow River (cross section 4Ba19221U - directly upstream of the R125 crossing) and 0.9m on the Broadmeadow tributary (cross section 4Bax322In).* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths (northwards across the R125 and southwards from the tributary) are as a result of capacity problems at existing structure and lead to the flooding of properties at Ratoath. The option prevents these overland flow paths through increasing the capacity of the structures.* *The capacity of the existing culvert on the Broadmeadow tributary results in surcharging of the culvert and attenuation of floodwater on surrounding farm land. The increased culvert capacity as part of this option will prevent flooding of surrounding land and remove this flood plain attenuation.*		

					Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score
Social	**B) Minimise risk to community.**	**10**	**0**	No **non-residential building** at risk (1% AEP fluvial event). No large commercial business parks at risk. No **high-value social infrastructural assets** at risk	N/A	0	0			0			0
	C) Minimise risk to, or enhance, social amenity.	**5**	**0**	No **flood sensitive social amenity sites** at risk	N/A	0	0			0			0
	Social Total Score/ Weighted Score					3	90		0	0		0	0
	A) Support the objectives of the WFD.	**5**	**5**	The APSR contains three river water bodies: 1 = good status; (i.e. no deterioration allowed); 2 = bad status (i.e. improvements in status required). The RBMP reports that problems constraining achievement of good status include high nutrients, low ecological rating and dredging; with the principal causes identified as agriculture (diffuse pollution) and wastewater and industrial discharges (septic tank pollution). The measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc) and to ensure compliance with OPW Environmental Drainage Maintenance Guidance Notes	Improved channel conveyance will be achieved by replacing the existing hard structures with new replacement hard structures within the channel. This has potential for both opportunities and constraints to improving the status of the river water bodies. Overall, meeting minimum target.	0	0			0			0
	B) Minimise risk of environmental pollution	**15**	**0**	There are no potentially polluting sites at risk within the APSR (1% AEP fluvial event). There are also no waste management permit sites at risk. There are no Section 4 or Section 16 licenses present in the APSR.	N/A	0	0			0			0

Objectives		Global Weighting	Local Weighting	Options			
				Baseline	**Ratoath area APSR Option 1**		
				-	**Improving channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road and replacing a culvert on a tributary of the Broadmeadow River.**		
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves replacing 2 structures where the existing capacity of the structures is insufficient to convey large flows and results in surcharging and spilling of flood waters. The option is slightly amended from the option proposed at Stage 2 following the modelling of this option. The modelling indicates that the proposed embankments identified at stage 2 are not required.* *Modelling results indicate that a rectangular concrete culvert of 2m high by 4m wide would be sufficient to reduce flood risk at the R125 crossing. This culvert can convey a flow of 17m3/s which equates to the 1% AEP MRFS 95%ile flow without surcharging. The replacement culvert on the Broadmeadow River tributary is also designed to convey the 1% AEP MRFS 95%ile flow without surcharging. The dimensions for this culvert are 0.5m high by 1m wide by 109m in length and has a capacity of 0.6m3/s. Due to the sizing of the culverts the 0.1% AEP flood extent will be significantly reduced.* *The BCR for this option is 0.9 based on this option providing protection up to the 1% AEP fluvial event. The BCR for the 0.1% AEP event is 0.94. Modelling results indicate that this option will have negligible impact on water levels upstream and downstream of the proposed location for this option. Changes in water levels are localised (i.e. along a 0.4km stretch of the river) to the location of the proposed option. Option results in a decrease in water levels. The maximum decrease in water levels is 0.7m on the Broadmeadow River (cross section 4Ba19221U - directly upstream of the R125 crossing) and 0.9m on the Broadmeadow tributary (cross section 4Bax322In).* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths (northwards across the R125 and southwards from the tributary) are as a result of capacity problems at existing structure and lead to the flooding of properties at Ratoath. The option prevents these overland flow paths through increasing the capacity of the structures.* *The capacity of the existing culvert on the Broadmeadow tributary results in surcharging of the culvert and attenuation of floodwater on surrounding farm land. The increased culvert capacity as part of this option will prevent flooding of surrounding land and remove this flood plain attenuation.*		
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Environmental	**C) Avoid damage to, and where possible enhance, the flora and fauna of the study area**	**10**	**3**	There are **no designated nature conservation sites** within the APSR. Approximately 20km downstream are the Malahide Estuary SAC/pNHA and the Broadmeadow-Swords Estuary SPA/Ramsar site. The stretch of the Broadmeadow River flowing through the APSR is listed on Meath County Council's Wetland Inventory. 26 hectares of a Potential Top Wetland Site (large bog complexes) are at risk of flooding to the east of Dunshaughlin area APSR. Within the APSR, the river primarily runs through rural areas and, although modified along short stretches, is likely to be of biodiversity interest. The river and other channels within the APSR, and their floodplain, support or have the potential to support legally protected species or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available.	Localised loss of/disturbance to terrestrial and riverine habitats and species beneath and potentially adjacent to, the footprint of the new structures Any changes in flow regime and water levels of the river will be localised and are therefore unlikely to affect designated nature conservation sites approximately 20km downstream. There is potential for increased flow to promote pool formation with increased habitat diversity for aquatic flora and fauna. Just failing minimum target.	-1	-30			0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	**5**	**3**	The Broadmeadow river and other streams within the APSR support or are capable of supporting salmonid species and are likely provide salmonid spawning or nursery areas. These watercourses are also likely to support brook, river and/or sea lamprey. There are no fisheries designations within the APSR (e.g. Salmonid Waters). There are known areas of angling activity along the Broadmeadow River, which potentially fall within the APSR. There are no known barriers to fish movement on the watercourses within the APSR.	Potential loss of/disturbance to fish habitat and potential disruption to angling activity in the vicinity of the two new structures during the construction period. Changes in flow speeds have the potential to affect local fish habitat, but the increased flow and water levels are likely to be dissipated before reaching areas of sensitivity downstream (20km downstream). There may be some improvements to fisheries as a result of improved channel conveyance, however, overall, there may be a net loss of habitat in the footprint or adjacent to the structures. Just failing minimum target.	-1	-15			0			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	**5**	**4**	The primary landscape character area of this APSR is The Ward Lowlands (high sensitivity), though there are also small areas which fall within the **South East Lowlands (sensitivity unknown)** and **Central Lowlands** (medium sensitivity) character areas. There are no designated 'Important Views' in this APSR.	Potential for temporary change in landscape character and visual amenity during the construction works, though any impacts would be localised. It is assumed that any above-ground structures would be designed appropriately with the surrounding landscape. Just failing minimum target.	-1	-20			0			0

Objectives	Global Weighting	Local Weighting	Options			
			Baseline	**Ratoath area APSR Option 1**		
			-	**Improving channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road and replacing a culvert on a tributary of the Broadmeadow River.**		
			Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves replacing 2 structures where the existing capacity of the structures is insufficient to convey large flows and results in surcharging and spilling of flood waters. The option is slightly amended from the option proposed at Stage 2 following the modelling of this option. The modelling indicates that the proposed embankments identified at stage 2 are not required.* *Modelling results indicate that a rectangular concrete culvert of 2m high by 4m wide would be sufficient to reduce flood risk at the R125 crossing. This culvert can convey a flow of 17m3/s which equates to the 1% AEP MRFS 95%ile flow without surcharging. The replacement culvert on the Broadmeadow River tributary is also designed to convey the 1% AEP MRFS 95%ile flow without surcharging. The dimensions for this culvert are 0.5m high by 1m wide by 109m in length and has a capacity of 0.6m3/s. Due to the sizing of the culverts the 0.1% AEP flood extent will be significantly reduced.* *The BCR for this option is 0.9 based on this option providing protection up to the 1% AEP fluvial event. The BCR for the 0.1% AEP event is 0.94. Modelling results indicate that this option will have negligible impact on water levels upstream and downstream of the proposed location for this option. Changes in water levels are localised (i.e. along a 0.4km stretch of the river) to the location of the proposed option. Option results in a decrease in water levels. The maximum decrease in water levels is 0.7m on the Broadmeadow River (cross section 4Ba19221U - directly upstream of the R125 crossing) and 0.9m on the Broadmeadow tributary (cross section 4Bax322In).* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths (northwards across the R125 and southwards from the tributary) are as a result of capacity problems at existing structure and lead to the flooding of properties at Ratoath. The option prevents these overland flow paths through increasing the capacity of the structures.* *The capacity of the existing culvert on the Broadmeadow tributary results in surcharging of the culvert and attenuation of floodwater on surrounding farm land. The increased culvert capacity as part of this option will prevent flooding of surrounding land and remove this flood plain attenuation.*		
			Comments	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	**5**	**0**	No sites on SMR/RPS/RMP at risk. No ACA designated within APSR.	N/A	0	0		0			0
	Environmental Total Score/ Weighted Score					-3	-65		0	0		0	0
Total Score/ Total Weighted Score						**18**	**385**		**0**	**0**		**0**	**0**
Total Score/ Total Weighted Score less Environmental						**21**	**450.0**		**0.0**	**0**		**0.0**	**0**

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Rowelstown East area APSR Option 1**							
				-	**Construction of flood defence embankments at Rowelstown East area APSR.**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the construction of a flood defence embankment along the left bank of the Broadmeadow tributary in Rowelstown. Out of bank flows along the left bank results in flooding of 2 properties.* *A total of 170m of embankment is required with an average height of 0.85m above ground level including a 0.5m freeboard.* *The BCR for this option is 2.2 based on this option providing protection up to the 1% AEP fluvial event.* *Modelling results indicate that this option will have negligible impact on water levels upstream and downstream of the location of the proposed option. Changes in water levels are localised to the vicinity of the proposed option (within 120m upstream and 240m downstream of the embankment). The option results in an increase in water levels with a maximum increase of 0.32m (cross section 4Bap205U).* *The results of the modelling indicate that an existing overland flood flow path is modified with this option. An existing overland flow path (northwards across agricultural land and joining the Broadmeadow River upstream of the confluence of the tributary) exists and results in the flooding of properties in this location. The option prevents this overland flow path by creating a barrier to out of bank flows, however it does not cause the diversion of overland flows into other areas.There are no areas of significant natural floodplain storage affected by this option.*							
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	5	5	n/a	No human or mechanical intervention is required for operation of this option. Some future maintenance will be required to ensure the embankments retain their flood defence function as designed. Partly achieving aspirational target.	3	75			0			0
	B) Minimise Health and Safety risk of flood risk management options.	5	5	n/a	Construction works are located close to the river channel and close to the R125, therefore significant health and safety risk to construction workers. Health and safety risk to operators/maintenance workers would be very limited. Overall, exceeding minimum target.	1	25			0			0
	C) Ensure flood risk managed effectively and sustainable into future.	5	5	n/a	Option is designed to protect up to the 1% AEP but can be adapted to the MRFS at additional cost by increasing height/length of embankments. Meeting minimum target.	0	0			0			0
	Technical Total Score/ Weighted Score					4	100		0	0		0	0
Economic	**A) Minimise economic risk**	25	1	**Average annual damages of €7,603**	This option protects the at risk properties up to the 1% AEP event. There will be residual flooding from the 0.1% AEP event but flood damages will be reduced. Partly achieving aspirational target.	3	75						0
	B) Minimise risk to transport infrastructure	5	3	Approximately **80m of Regional (R) roads** at risk in Rowelstown East area APSR	The R125 is protected by this option up to the 1% AEP. There will be some residual flooding for the 0.1%AEP although the extent of flooding will be reduced. Partly achieving aspirational target.	3	45			0			0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Rowelstown East area APSR Option 1**							
				-	**Construction of flood defence embankments at Rowelstown East area APSR.**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the construction of a flood defence embankment along the left bank of the Broadmeadow tributary in Rowelstown. Out of bank flows along the left bank results in flooding of 2 properties.* *A total of 170m of embankment is required with an average height of 0.85m above ground level including a 0.5m freeboard.* *The BCR for this option is 2.2 based on this option providing protection up to the 1% AEP fluvial event.* *Modelling results indicate that this option will have negligible impact on water levels upstream and downstream of the location of the proposed option. Changes in water levels are localised to the vicinity of the proposed option (within 120m upstream and 240m downstream of the embankment). The option results in an increase in water levels with a maximum increase of 0.32m (cross section 4Bap205U).* *The results of the modelling indicate that an existing overland flood flow path is modified with this option. An existing overland flow path (northwards across agricultural land and joining the Broadmeadow River upstream of the confluence of the tributary) exists and results in the flooding of properties in this location. The option prevents this overland flow path by creating a barrier to out of bank flows, however it does not cause the diversion of overland flows into other areas.There are no areas of significant natural floodplain storage affected by this option.*							
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Econ	**C) Minimise risk to utility infrastructure**	**10**	**0**	No **utility assets** at risk	N/A	0	0						
	D) Minimise risk to agricultural land.	**5**	**2**	**5.4 hectares of agriculture land** not benefiting from flood defences at risk of flooding (1% AEP fluvial event).	This option results in a reduction in flood risk to agricultural land due to the proposed embankments. Approximately 2.4ha of agricultural land (<50% of at the risk land) will be protected from the 1% AEP event. There will also be some reduction in risk from the 0.1% AEP event. Therefore, exceeding minimum target.	1	10			0			0
	Economic Total Score/ Weighted Score					7	130		0	0		0	0
Social	**A) Minimise risk to human health and life.**	**30**	**1**	**2 residential properties** at risk in Rowelstown East area APSR No **high vulnerability properties** at risk from flooding.	This option fully protects properties at risk up to the 1% AEP event and provides reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	90			0			0
	B) Minimise risk to community.	**10**	**0**	No **non-residential building** at risk (1% AEP fluvial event). No large commercial business parks at risk. No **high-value social infrastructural assets** at risk	N/A	0	0			0			0
	C) Minimise risk to, or enhance, social amenity.	**5**	**0**	No **flood sensitive social amenity sites** at risk	N/A	0	0			0			0
	Social Total Score/ Weighted Score					3	90		0	0		0	0

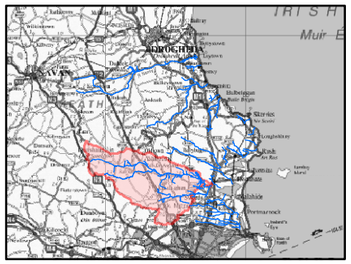
Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Rowelstown East area APSR Option 1**							
				-	**Construction of flood defence embankments at Rowelstown East area APSR.**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the construction of a flood defence embankment along the left bank of the Broadmeadow tributary in Rowelstown. Out of bank flows along the left bank results in flooding of 2 properties.* *A total of 170m of embankment is required with an average height of 0.85m above ground level including a 0.5m freeboard.* *The BCR for this option is 2.2 based on this option providing protection up to the 1% AEP fluvial event.* *Modelling results indicate that this option will have negligible impact on water levels upstream and downstream of the location of the proposed option. Changes in water levels are localised to the vicinity of the proposed option (within 120m upstream and 240m downstream of the embankment). The option results in an increase in water levels with a maximum increase of 0.32m (cross section 4Bap205U).* *The results of the modelling indicate that an existing overland flood flow path is modified with this option. An existing overland flow path (northwards across agricultural land and joining the Broadmeadow River upstream of the confluence of the tributary) exists and results in the flooding of properties in this location. The option prevents this overland flow path by creating a barrier to out of bank flows, however it does not cause the diversion of overland flows into other areas.There are no areas of significant natural floodplain storage affected by this option.*							
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Environmental	**A) Support the objectives of the WFD.**	**5**	**5**	The APSR contains three river water bodies, all of which are classified as being of poor status. The RBMP reports that problems constraining achievement of good status include high nutrients, low ecological rating and dredging; with the principal causes identified as agriculture (diffuse pollution) and wastewater and industrial discharges (septic tank pollution). The measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc) and to ensure compliance with OPW Environmental Drainage Maintenance Guidance Notes	Potential to constrain the achievement of WFD objectives as introduction of a flood defence embankment along the Broadmeadow River on an unmodified section of the river could present a hydromorphological pressure. However, the length of the embankment (170m) in relation to the length of the river is considered to be short. Just failing minimum target.	-1	-25			0			0
	B) Minimise risk of environmental pollution	**15**	**5**	There are no potentially polluting sites at risk within the APSR (1% AEP fluvial event). There are **two waste management permit sites** at risk along the Broadmeadow River within the APSR. There are no Section 4 or Section 16 licenses present in the APSR.	No positive or negative change in flood risk to potentially polluting sites within the APSR as options involves works downstream of the sites. Meeting minimum target.	0	0			0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	**10**	**5**	There are no internationally or nationally **designated nature conservation sites** within the APSR. Approximately 6km downstream are the Malahide Estuary SAC/pNHA and the Broadmeadow-Swords Estuary SPA/Ramsar site. Within the APSR, the river primarily runs through rural areas and, although modified along short stretches, is likely to be of biodiversity interest. The river and other channels within the APSR, and their floodplain, support or have the potential to support legally protected species or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available.	Potential for impacts on designated nature conservation sites downstream (e.g. potential changes in frequency and duration of flooding). However, given that the embankment provides protection during a 1% AEP flood event (1 in 100 chance in any given year) and the distance of the conservation sites from the proposed works, the frequency of any impact is anticipated to be low. Will require further consideration during the Appropriate Assessment. Localised loss of/disturbance to terrestrial habitats and species beneath, and potentially adjacent to, the footprint of the flood defence embankment. Impact on riverine/marginal habitats/species.	-1	-50			0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	**5**	**3**	The Broadmeadow river and other streams within the APSR support or are capable of supporting salmonid species and are likely provide salmonid spawning or nursery areas. These watercourses are also likely to support brook, river and/or sea lamprey. There are no fisheries designations within the APSR (e.g. Salmonid Waters). There are known areas of angling activity along the Broadmeadow River, which potentially fall within the APSR. There are no known barriers to fish movement on the watercourses within the APSR.	Potential disturbance to riverine habitat, dependent fisheries and potential disturbance to angling activity during construction period, although no works would be required directly within the watercourse. The construction of new flood defence embankments may constrain angling access if present within the vicinity of the works, although they could present opportunities for enhancement. Overall, just failing minimum target.	-1	-15			0			0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Rowelstown East area APSR Option 1**							
				-	**Construction of flood defence embankments at Rowelstown East area APSR.**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the construction of a flood defence embankment along the left bank of the Broadmeadow tributary in Rowelstown. Out of bank flows along the left bank results in flooding of 2 properties.* *A total of 170m of embankment is required with an average height of 0.85m above ground level including a 0.5m freeboard.* *The BCR for this option is 2.2 based on this option providing protection up to the 1% AEP fluvial event.* *Modelling results indicate that this option will have negligible impact on water levels upstream and downstream of the location of the proposed option. Changes in water levels are localised to the vicinity of the proposed option (within 120m upstream and 240m downstream of the embankment). The option results in an increase in water levels with a maximum increase of 0.32m (cross section 4Bap205U).* *The results of the modelling indicate that an existing overland flood flow path is modified with this option. An existing overland flow path (northwards across agricultural land and joining the Broadmeadow River upstream of the confluence of the tributary) exists and results in the flooding of properties in this location. The option prevents this overland flow path by creating a barrier to out of bank flows, however it does not cause the diversion of overland flows into other areas.There are no areas of significant natural floodplain storage affected by this option.*							
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	**5**	**3**	The landscape character of this APSR is classified as **Rolling Hills with Tree Belts,** classified as being of medium sensitivity. There are no designated 'Important Views' in this APSR.	Likely change in local landscape character and visual amenity, resulting from the introduction of a new flood defence embankment to a height of 0.85m (170m length). As the surrounding landscape is classified as being of medium sensitivity, the changes will result in the option just failing the minimum target.	-1	-15			0			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	**5**	**2**	Within the APSR, a **single site unique to RPS** (description unknown) and **two sites unique to RMP** (graveyard and an unclassified site) are known to be at risk of flooding. 0.8ha of an **ACA at risk** at Rowelstown representing approximately 10% of the total ACA.	All three sites could potentially experience a reduction in flood risk on completion of the new flood defence embankment. Further, the historical setting of each of the sites would be unlikely to be affected by the option, due to the nature and scale of the embankment. The embankment would be located outside of the designated ACA so its setting would not be affected. Exceeding minimum target.	1	10			0			0
	Environmental Total Score/ Weighted Score					-3	-95		0	0		0	0
Total Score/ Total Weighted Score						**11**	**225**		**0**	**0**		**0**	**0**
Total Score/ Total Weighted Score less Environmental						14	320		0.0	0		0.0	0

N

2 1 0 2 Km

Location Plan :



FRM OPTIONS MAP

Legend

- FFWS along Broadmeadow River
- Modelled river centreline

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites

USER NOTE :

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Clients:

Fingal County Council
OPW

Project :
FEM FRAMS

Map :
Broadmeadow and Ward AU - Option 1

Figure By :	Kevin Daly	Date :	06 Oct 2010
Checked By :	Clare Dewar	Date :	06 Oct 2010
Approved By :	Anne-Marie Conibear	Date :	06 Oct 2010

Figure No. : BroadmeadowWardAU/CURS/001
Revision : 0

Drawing Scale : 1:65,000
Plot Scale : 1:1 @ A3

N

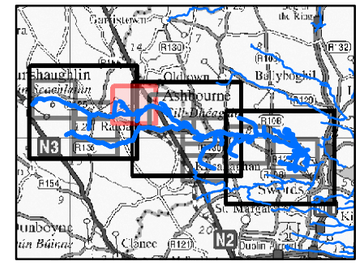
Culvert length (m): 109
Culvert height (m): 0.5
Culvert width (m): 1.0
Design flow rate (m^3/s): 0.55

Broadmeadow River

Culvert length (m): 12
Culvert height (m): 2.0
Culvert width (m): 4.0
Design flow rate (m^3/s): 17.00

100 50 0 100 m

Location Plan :



FRM OPTIONS MAP

Legend

- Area defended by option
- Improve channel capacity

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

USER NOTE :

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Clients:

Fingal County Council

OPW

Project :
FEM FRAMS

Map :
Ratoath area APSR

Figure By :	Kevin Daly	Date : 07 Oct 2010
Checked By :	Clare Dewar	Date : 07 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 07 Oct 2010

Figure No. : Ratoath/CURS/001

Revision 0

Drawing Scale : 1:2,500 Plot Scale : 1:1 @ A3

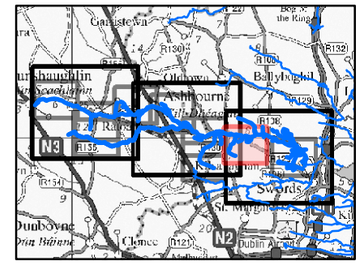
N

Broadmeadow River

Length (m): 170
Average height (m): 0.85

100 50 0 100
m

Location Plan :



FRM OPTIONS MAP

Legend

- Area defended by option
- Embankments

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

USER NOTE :

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Clients:

Project :
FEM FRAMS

Map :
Rowelstown East area APSR

Figure By :	Kevin Daly	Date : 07 Oct 2010
Checked By :	Clare Dewar	Date : 07 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 07 Oct 2010

Figure No. :
Rowelstown/CURS/001

Revision
0

Drawing Scale : 1:2,500 Plot Scale : 1:1 @ A3

E2 Coastal

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Coastal AU Option 1**			**Coastal AU Option 2**				
				-	**Develop a combined fluvial and tidal FFWS. FFWS would be required for the Irish Sea along the Meath and Fingal coastline and for the following rivers: Mill Stream, Rush West Stream, Ward River, Gaybrook Stream and Sluice River (consideration has been given to a fluvial FFWS on the Nanny River and Mayne River as part of the Nanny and Delvin AU and the Mayne and Sluice AU respectively) .**			**Regular inspection and maintenance of coastal defences including walls, embankments and flap valves.**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning involves the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities. Assuming that a FFWS is implemented on the Nanny River and Mayne river as part of other AU options, the BCR for this option is approximately 2.* *Through the Irish Coastal Protection Strategy Study (ICPSS), low-resolution tidal-surge forecasting capability has been developed around the Irish Coast. The system is a purely tidal-surge forecasting model and as part of this option would be developed to generate a combined fluvial and tidal FFWS. The installation of new tidal tidal gauges may be required to improve the accuracy of the forecasting system.*			*The BCR for this option is 0.4 for the 0.5% AEP tidal event. Given the low BCR, this option is not considered any further.*				
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	**5**	**5**	n/a	Some mechanical and human intervention required for the fluvial and tidal flood forecasting & warning system. Computer models and rainfall/flow/tidal gauges would require regular maintenance. Option reliant on certainty of flood warning system, therefore just meets minimum target.	0	0			0			0
	B) Minimise Health and Safety risk of flood risk management options.	**5**	**5**	n/a	Medium health and safety risk to construction workers involved with the installation of the gauges (6 flow and 18 TBR) for the flood forecasting & warning system as majority of work away from river channels .	1	25			0			0
	C) Ensure flood risk managed effectively and sustainable into future.	**5**	**5**	n/a	Option will continue to be operational in MRFS/HEFS conditions, therefore meets aspirational target.	5	125			0			0
	Technical Total Score/ Weighted Score					6	150		0	0		0	0
Economic	**A) Minimise economic risk**	**25**	**3**	**Average annual damages of €546,213**	This option is likely to result in a limited reduction in damages, thus partly exceeding the minimum target and scoring 1.	1	75			0			0
	B) Minimise risk to transport infrastructure	**5**	**3**	**No rail** at risk Approximately **2.5km of Regional (R) roads** at risk (approx. 350m at risk in Laytown Bettystown and coastal area APSR, 50m at risk in Julianstown area APSR, 170m in Skerries area APSR, 120m in Swords area APSR and 1km in Portmarnock and Malahide areas APSR)	Option would have no impact on the transport infrastructure at risk. Meeting minimum target as no increase in risk to transport infrastructure.	0	0			0			0
	C) Minimise risk to utility infrastructure	**10**	**2**	**1 WWTW at risk** in Julianstown area APSR	Option would have no impact on the number of utility infrastructure assets at risk. Meeting minimum target as no increase in risk to utility infrastructure.	0	0			0			0
	D) Minimise risk to agricultural land.	**5**	**4**	Approximately **320 hectares of agriculture land** not benefitting from flood defences at risk of flooding. This represents approximately 7% of the total agricultural land in the AU.	Option would have no impact on the agricultural land at risk. Meeting minimum target as no increase in risk to agricultural land.	0	0			0			0
	Economic Total Score/ Weighted Score					1	75		0	0		0	0
Social	**A) Minimise risk to human health and life.**	**30**	**3**	**182 residential properties at risk** (10 at risk in Laytown Bettystown and Coastal area APSR, 1 at risk in Balbriggan area APSR, 73 in Skerries area APSR, 29 in Rush area APSR, 22 in Swords area APSR and 46 in Portmarnock and Malahide areas APSR). **0 high vulnerability** properties at risk	Option would not reduce flood risk to residential properties. Number of properties located in at risk areas would remain the same. Therefore, just meeting minimum target.	0	0			0			0
	B) Minimise risk to community.	**10**	**5**	**53 non-residential buildings** at risk including 1 at risk in Laytown Bettystown and coastal area APSR, 5 at risk in Balbriggan area APSR, 6 in Skerries area APSR, 1 in Rush area APSR, 14 in Swords area APSR and 16 in Portmarnock and Malahide areas APSR). 1 retail park at risk (Airside Retail Park) in Swords area APSR. **1 high-value social infrastructural asset** at risk, a fire station in Swords	Option would not reduce flood risk to non-residential buildings. Number of properties located in at risk areas would remain the same. Therefore, just meeting minimum target.	0	0			0			0
	C) Minimise risk to, or enhance, social amenity.	**5**	**5**	**4 golfcourses at risk**: 1 golfcourse at Beaverstown, Donabate; 1 golfcourse at Malahide Point and 2 golfcourses in Portmarnock (1 at Beechmount and 1 at Portmarnock Strand) **3 holiday home (mobile home park)** ar risk: 1 near Donabate, 1 near Burrow Beach and 1 in Rush.	Option would have no impact on the number of social amenity sites at risk. Meeting minimum target as no increase in risk to social amenity sites.	0	0			0			0
	Social Total Score/ Weighted Score					0	0		0	0		0	0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Coastal AU Option 1**			**Coastal AU Option 2**				
				-	**Develop a combined fluvial and tidal FFWS. FFWS would be required for the Irish Sea along the Meath and Fingal coastline and for the following rivers: Mill Stream, Rush West Stream, Ward River, Gaybrook Stream and Sluice River (consideration has been given to a fluvial FFWS on the Nanny River and Mayne River as part of the Nanny and Delvin AU and the Mayne and Sluice AU respectively) .**			**Regular inspection and maintenance of coastal defences including walls, embankments and flap valves.**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning involves the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities. Assuming that a FFWS is implemented on the Nanny River and Mayne river as part of other AU options, the BCR for this option is approximately 2.* *Through the Irish Coastal Protection Strategy Study (ICPSS), low-resolution tidal-surge forecasting capability has been developed around the Irish Coast. The system is a purely tidal-surge forecasting model and as part of this option would be developed to generate a combined fluvial and tidal FFWS. The installation of new tidal tidal gauges may be required to improve the accuracy of the forecasting system.*			*The BCR for this option is 0.4 for the 0.5% AEP tidal event. Given the low BCR, this option is not considered any further.*				
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Environmental	**A) Support the objectives of the WFD.**	**5**	**5**	The AU contains **8 river waterbodies**: 1 = high status; 2 = good status; (no deterioration required); 1 = moderate status; 3 = poor status; 1 = bad status (improvements required). The RBMP reports that problems constraining achievement of good status include high nutrients (phosphorus), low oxygen saturation, low ecological rating and dredging; with the principal causes identified as agriculture and wastewater. The AU contains **4 transitional (i.e. estuarine) waterbodies**: Nanny Estuary, Rogerstown Estuary, Broadmeadow Water, Mayne Estuary; all are of moderate status/potential (i.e. improvements required). To the north, the AU borders the Boyne Estuary transitional waterbody; also of moderate status/potential. The RBMP reports that the problems constraining achievement of good status or potential relate to pollution pressures.from agriculture, dangerous substances, and wastewater and industrial discharges. The Broadmeadow Water waterbody is designated as a heavily modified water body (HMWB) because of the presence of the causeway for the Dublin-Belfast railway line, but risks have been identified relating to physical modifications and morphology for all waterbodies. The basic measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) for all waterbodies relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc). Additional measures have been identified for the Rogerstown Estuary, the Mayne Estuary and the Broadmeadow Water (as a HMWB) relating to further investigate the risks resulting from the physical modification of these waterbodies. The AU contains 4 coastal waterbodies: Boyne Estuary Plume Zone and Northwestern Irish Sea (HA08) = high status (i.e. no deterioration llowed); and Malahide Bay and Irish Sea Dublin (HA09) = moderate status (i.e. improvements required). None of these waterbodies have been identified as heavily modified and the RBMP reports that the problems constraining achievement of good status primarily relate to pollution pressures (although risks from physical modifications have been identified for all waterbodies). No specific issues have been identified relating to physical modifications and morphology. The only measures directly relevant to the FEM FRAMS (physical modifications - morphologic relate to the need for compliance with legal requirements (EIA, Planning & Development Regul	No contribution nor constraint to the achievement of WFD objectives as there will be no physical works within or modification to the river channels, estuaries or coastline. Meeting minimum target.	0	0			0			0
	B) Minimise risk of environmental pollution	**15**	**5**	The following are at risk in the AU: **1 Waste Water Treatment Works** in Julianstown **13 Waste Management Permit Sites** based on issued licences: 1 along the Delvin River, 1 along the Bracken river, 3 along Balleally Stream, 1 along the Lissenhall Stream, 1 along Jone's Stream and 6 in coastal areas. The following are present in the AU: **6 Section 4 and 15 Section 16 licences**.	No positive or negative change in flood risk to potentially polluting sites within the study area as there will be no physical works within or modification to the river channels, estuaries or coastline, beyond standard maintenance activities. Meeting minimum target.	0	0			0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	**10**	**5**	The Coastal AU contains numerous designated nature conservation sites including: Boyne Coast and Estuary SAC/pNHA; Boyne Estuary SPA; River Nanny Estuary and Shore SPA; Laytown Dunes and Nanny Estuary pNHA (Laytown dunes at risk from flooding); Loughskinny Coast pNHA; Rogerstown Estuary SAC/SPA/Ramsar site/pNHA; Malahide Estuary SAC/pNHA; Broadmeadow-Swords Estuary SPA/Ramsar site; Baldoyle Bay SAC/SPA/Ramsar site/pNHA; Sluice River Marsh pNHA (100% at risk). Also, Skerries Islands SPA and Ireland's Eye SAC/SPA are located offshore, just outside the Coastal AU boundary. Howth Head SAC and Howth Head Coast SPA are located adjacent to the southern end of the AU boundary. There are 21 sites listed on Meath County Council's Wetland Inventory, and 92 sites listed on the Coastal Inventory present within the AU. Rivers, estuaries and coast are also important for European protected species (e.g. Atlantic salmon, otter). All rivers/estuaries within the AU, together with their floodplains, support or have the potential to support legally protected species or other species o distribution information is not available.	No impacts on potentially sensitive riverine, estuarine and coastal habitats or species (located within or outside designated nature conservation sites) as there will be no physical works or modifications within or adjacent to the river channels, estuaries or coastline. Meeting minimum target	0	0			0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	**5**	**5**	All rivers and streams within the AU support or are capable of supporting salmonid species such as salmon, brown trout and sea trout, and are likely to provide salmonid spawning or nursery areas. Some watercourses within the AU area are also likely to support brook, river and/or sea lamprey. In the AU, estuaries provide spawning, nursery and feeding habitats for a range of fish species, particularly bass, sand goby, grey mullet, flounder and sprat. In addition, important migratory fish species, namely salmon, sea trout, eels and lampreys, pass through on their way to or from their spawning grounds. A tidal flex on the Mayne River and a weir on the Sluice River present a **potential barrier to upstream fish movement** (salmonids). Many of the rivers in the AU are popular with anglers, who enjoy both game and coarse fishing. Along the coast, recreational sea fishing is also very popular; key locations are Portmarnock, the Malahide Estuary, the Rogerstown Estuary, Skerries and Balbriggan. Just south of the AU boundary, Howth Harbour is the biggest commercial fishing harbour o There are **Shellfish Waters** at Malahide and Balbriggan/Skerries, designated under the EU Shellfish Waters Directive.	No impacts on fisheries/shellfisheries (including designated areas) or angling activity as there will be there will be no physical works within or modification to the river channels, estuaries or coastline. Meeting minimum target.	0	0			0			0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Coastal AU Option 1**			**Coastal AU Option 2**				
				-	**Develop a combined fluvial and tidal FFWS. FFWS would be required for the Irish Sea along the Meath and Fingal coastline and for the following rivers: Mill Stream, Rush West Stream, Ward River, Gaybrook Stream and Sluice River (consideration has been given to a fluvial FFWS on the Nanny River and Mayne River as part of the Nanny and Delvin AU and the Mayne and Sluice AU respectively) .**			**Regular inspection and maintenance of coastal defences including walls, embankments and flap valves.**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning involves the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities. Assuming that a FFWS is implemented on the Nanny River and Mayne river as part of other AU options, the BCR for this option is approximately 2.* *Through the Irish Coastal Protection Strategy Study (ICPSS), low-resolution tidal-surge forecasting capability has been developed around the Irish Coast. The system is a purely tidal-surge forecasting model and as part of this option would be developed to generate a combined fluvial and tidal FFWS. The installation of new tidal tidal gauges may be required to improve the accuracy of the forecasting system.*			*The BCR for this option is 0.4 for the 0.5% AEP tidal event. Given the low BCR, this option is not considered any further.*				
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	5	4	The Meath area of the AU comprises two landscape characters types: **Coastal Plains** and **Nanny Valley;** both of which are of regional importance and are classified as being of high sensitivity. The Fingal area of the AU comprises five landscape character types: **Coastal**, **Estuary** (both classified as being of exceptional value and high sensitivity), **High Lying Agricultural** (high value, high sensitivity), **Low Lying Agricultural** (modest value, low sensitivity), and Rolling Hills (modest value, medium sensitivity). Fingal County Council also designates **'Important Views'**; these are distributed throughout the AU, both on the coast and inland.	No change in landscape character or visual amenity as there will be no physical works within or modification to the river channels, estuaries or coastline. Meeting minimum target.	0	0			0			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	5	3	**29 sites** on SMR/RPS/RMP at risk. 20 sites on RPS including: Knocknagin Viaduct, Gormanstown; a converted mill building, Julianstown; a former mill house, Julianstown; a lime kiln, Julianstown; a cast-iron railway bridge, Laytown; a motte, Laytown; a single-storey former house, Laytown; a three-storey hotel, Laytown; 12 other sites (no details available). 2 sites on SMR, a Tidemill at Lissenhall Great and a Ritual Site - Holy Well at Rush. 2 sites on RMP: the remains of a castle at Stephenstown; and an unknown feature near Donabate. The remaining 5 sites are on the SMR/RPS/RMP datasets and include: 2 Tide Mills (in Ballymadrough and Kilcrea); a Ritual Site - Holy Well (In Burrow); and 2 bridges (Lissenhall Great and Mill Bridge in Swords). Parts of 5 ACAs at risk: <0.5ha of Julianstown ACA at risk (c.22% of the total ACA). 0.1ha of Skerries ACA at risk (<1% of the total ACA). 0.5ha of Portraine ACA at risk (< 1% of the total ACA). 0.1ha of Bawn & St Sylvesters Villas ACA at risk (<1% of the total ACA) and <0.1ha of Malahide Castle Demesne ACA at risk (<1% of the total ACA).	There will be no positive or negative change in risk to or impacts on SMR/RPS/RMP features (through either direct impacts or impacts on setting) and ACAs as there will be there will be no physical works within or modification to the river channels, estuaries or coastline, . Meeting minimum target.	0	0			0			0
	Environmental Total Score/ Weighted Score					0	0		0	0		0	0
Total Score/ Total Weighted Score						**7**	**225**		**0**	**0**		**0**	**0**

Objectives		Global Weighting	Local Weighting (second column for flood cells within APSR if local weighting would be different to overal APSR weighting)		Baseline	Portmarnock and Malahide areas APSR: Strand Road Option 1			Portmarnock and Malahide areas APSR: Strand Road Option 2			Portmarnock and Malahide areas APSR: Malahide Town Centre Option 3			Portmarnock and Malahide areas APSR: Malahide Town Centre Option 4			Portmarnock and Malahide areas APSR: Malahide Town Centre Option 5			Portmarnock and Malahide areas APSR: Malahide Town Centre Option 5a		
					Options																		
					-	Rehabilitating and raising existing coastal defences at Strand Road (including rehabilitation walls and flapped outfall) and construction of flood defence embankment.			Replacement of flapped outfall on Sluice River and construction of flood defence embankments and walls to protect at risk properties at Strand Road.			Construction of flood defence embankments and walls to protect at risk properties in Malahide town centre.			Construction of flood defence walls and embankments along with rehabilitating and raising of existing coastal defences in Malahide town centre.			Construction of permemant and demountable flood defences along with rehabilitating defences in Malahide to protect at risk properties in Malahide town centre.			Construction of permemant and demountable flood defences along with rehabilitating defences in Malahide to protect at risk properties in Malahide town centre.		
					Baseline option assumes continuation of any existing maintenance regime in the study area	This option involves rehabilitating (i.e. strengthening and raising) 0.5km of existing walls which run along side the R106 at Strand Road. Option also involves rehabilitating of the flapped gates on the Sluice River at Portmarnock Bridge and the construction of a flood embankment on the left bank of the Sluice River upstream of Portmarnock Bridge. The BCR for this option is 1 for the 1% AEP fluvial event and 0.5% AEP tidal event. Need to include details of condition of existing defences where available. The existing flood walls and their foundations would be strengthened using structural engineering works to allow walls to provide sufficient flood defence function up to the 0.5% AEP tidal event. The flapped gates on the Sluice River at Portmarnock Bridge prevent the propagation of high tides upstream of this bridge. These gates would be replaced with new flapped gates as part of this option. 120m of flood embankments are required upstream of Portmarnock Bridge. The average height of these embankments is 0.6m and provides protection up to the 1% AEP fluvial event and 0.5% AEP tidal event. Hydraulic modelling indicates that there is no impact on water levels upstream or downstream of Strand Road. The results of the modelling indicate that an existing overland flood flow path is modified with this option. The construction of the flood embankment along the left bank of the Sluice River prevents an existing overland flow path (westwards through Hazel Grove and across the R106). There are no areas of significant natural floodplain storage affected by this option.			This option involves the construction of approximately 0.6km of flood embankments along the R106 at Strand Road and on the left bank of the Sluice River upstream of Portmarnock Bridge. Option also involves replacing the flapped gates on the Sluice River at Portmarnock Bridge. The BCR for this option is 2.7 for the 1% AEP fluvial event and 0.5% AEP tidal event. The flapped gates on the Sluice River prevent the propagation of high tides upstream of Portmarnock Bridge. Theses gates would be replaced with new flapped gates as part of this option. Approximately 500m of flood embankments are required along the R106 to protect up to the 0.5% AEP event. The average height of these embankments is 0.8m on the left bank downstream of Portmarnock Bridge and 1.4m on the right bank downstream of Portmarnock Bridge. Upstream of Portmarnock Bridge, approximately 120m of flood embankment are required with an average height of 0.6m. These would provide protection up to the 1% AEP fluvial event and 0.5% AEP tidal event. Hydraulic modelling indicates that there is no impact on water levels upstream or downstream of Strand Road with this option. The results of the modelling indicate that an existing overland flood flow path is modified with this option. The construction of the flood embankment along the left bank of the Sluice River prevents an existing overland flow path (westwards through Hazel Grove and across the R106). There are no areas of significant natural floodplain storage affected by this option.			The BCR for this option is 0.7 for the 0.5% AEP tidal event. Given the low BCR, this option is not considered any further.			The BCR for this option is 0.7 for the 0.5% AEP tidal event. Given the low BCR, this option is not considered any further.			This option involves the construction of approximately 0.5km of demountable defences along the coast road to the west of the railway line and 60m of of flood walls in Malahide town centre. The option involves raising a short section of flood wall (approximately 10m) in Malahide. The option provides protection against tidal flooding up to the 0.5% AEP event. If the costs of a tidal FFWS are included along with this option, the BCR is 0.6. Assuming that a fluvial and tidal fluvial FFWS is implemented at the Coastal AU scale this option receives a BCR of 1.0 and the assessment proceeds on this basis. The demountable defences to the west of the railway line prevent flooding of a number of properties along this coast road and cut off the flow path of flood water under the railway underpass and into Malahide town centre. The demountable flood defences would be mounted to a permanent flood defence structure. The average height of demountable defences above ground level would be 1.2m mounted to a permanent wall 0.3m in height. Some localised road raising would be required at the western extremity of the defences to ensure flooding does not propagate along the coast road behind the defences. There would be no impact on water levels in the Broadmeadow estuary with this option. The construction of the flood embankment and revetments along the coast road prevents flooding along the coast road, under the railway underpass and into Malahide town centre. There are no areas of significant natural floodplain storage affected by this option.			This option involves the construction of 60m of of flood walls and raising of a short section of flood wall (approximately 10m) in Malahide town centre. It also includes the construction of a demountable flood defence across the railway underpass to prevent the propagation of flood waters along the coast road eastwards into Malahide town centre. The option provides protection against tidal flooding up to the 0.5% AEP tidal event. If the costs of a tidal FFWS are included along with this option, the BCR is 1.3. Assuming that a fluvial and tidal fluvial FFWS is implemented at the Coastal AU scale this option received a BCR of 6.8 and the assessment proceeds on this basis. A demountable defence across the railway underpass on the coast road would cut off the flow path of flood water under the railway underpass and into Malahide town centre. This option would limit the movement of people and traffic prior to and during a flood event. Additional investigations would be required to determine if the railway embankment would prevent the ingress of water eastwards into Malahide town centre. This option does not prevent flood risk to properties along the coast road. There would be no impact on water levels in the Broadmeadow estuary with this option. The use of a demountable flood defence at the railway underpass prevents flooding under the railway underpass and into Malahide town centre. There are no areas of significant natural floodplain storage affected by this option.		
						Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score
Technical	A) Ensure Flood Risk Management options are operationally robust.	5	5	-	n/a	No human and some mechanical intervention (operation of flapped gates) is required for operation of this option. Some future maintenance will be required to ensure the defences retain their flood defence function as designed and flapped gates continue to operate as required. Access to flapped gate will be restricted by tidal cycle. Overall exceeding minimum target.	1	25	No human and some mechanical intervention (operation of flapped gates) is required for operation of this option. Some future maintenance will be required to ensure the embankments retain their flood defence function as designed and flapped gates continue to operate as required. Access to flapped gate will be restricted by tidal cycle. Overall exceeding minimum target.	1	25			0			0	A significant proportion of proposed option requires human intervention for erection of demountable defence. Option also reliant on flood forecast certainty to ensure defences erected in time. Some future maintenance will be required to ensure walls/embankments retain their flood defence function as designed. Meeting minimum target.	0	0	A significant proportion of proposed option requires human intervention for erection of demountable defence. Option also reliant on flood forecast certainty to ensure defences erected in time. Some future maintenance will be required to ensure walls/embankments retain their flood defence function as designed. Meeting minimum target.	0	0
	B) Minimise Health and Safety risk of flood risk management options.	5	5	-	n/a	Rehabilitation works are located close to the Sluice river channel and estuary and along the R106, therefore significant health and safety risk to construction workers. Health and safety risk to maintenance workers of embankments would be limited, maintenance of flapped gates would require workers to be in Sluice river estuary at low tide. Overall, meeting minimum target.	0	0	Construction works are located close to the Sluice river channel and estuary and along the R106, therefore significant health and safety risk to construction workers. Health and safety risk to maintenance workers of embankments would be limited, maintenance of flapped gates would require workers to be in Sluice river estuary at low tide. Overall, meeting minimum target.	0	0			0			0	Construction works are located along the coast and near busy roads in Malahide town centre, therefore significant health and safety risk to construction workers. Also, significant health and safety risk to operators responsible for maintenance and erection of demountable defences along the coast and in the town centre. Overall, meeting minimum target.	0	0	Construction works are located along the coast and near busy roads in Malahide town centre, therefore significant health and safety risk to construction workers. Also, significant health and safety risk to operators responsible for maintenance and erection of demountable defences along the coast and in the town centre. Overall, meeting minimum target.	0	0
	C) Ensure flood risk managed effectively and sustainable into future.	5	5	-	n/a	Option is designed to protect up to the 0.5% AEP but can be adapted to the MRFS at additional cost by further improving the existing defences. Flapped gates would operate for MRFS and HEFS conditions but only a small element of overall option. Meeting minimum target.	0	0	Option is designed to protect up to the 0.5% AEP but can be adapted to the MRFS at additional cost by increasing height/length of embankments. Flapped gates would operate for MRFS and HEFS conditions but only a small element of overall option. Meeting minimum target.	0	0			0			0	Option is design to protect up to the 0.5% AEP but can be adapted to the MRFS at additional cost by increasing height/length of walls/embankments and demountable defences. Meeting minimum target.	0	0	Option is design to protect up to the 0.5% AEP but can be adapted to the MRFS at additional cost by increasing height/length of walls/embankments and demountable defences. Meeting minimum target.	0	0
	Technical Total Score/ Weighted Score						1	25		1	25		0	0		0	0		0	0		0	0
Economic	A) Minimise economic risk	25	2	1	**Average annual damages of €151,339**. AAD at Strand road is€34,797 and the AAD at Malahide is €110,311	This option protects the at risk properties on Strand Road up to the 0.5% AEP event. There will be residual flooding from the 0.1% AEP event but flood damages in the Portmarnock flood cell will be significantly reduced. Partialy achieving aspirational target.	3	75	This option protects the at risk properties on Strand Road up to the 0.5% AEP event. There will be residual flooding from the 0.1% AEP event but flood damages in the Portmarnock flood cell will be significantly reduced. Partialy achieving aspirational target.	3	75			0			0	This option protects the at risk properties in Malahide town centre up to the 0.5% AEP event. There will be residual flooding from the 0.1% AEP event but flood damages will be significantly reduced in the Malahide town centre flood cell. Partly achieving aspirational target.	3	150	This option protects the at risk properties in Malahide town centre up to the 0.5% AEP event. There will be residual flooding from the 0.1% AEP event but flood damages will be significantly reduced in the Malahide town centre flood cell. Partly achieving aspirational target.	3	150
	B) Minimise risk to transport infrastructure	5	3	2	**No rail** at risk Approximately**1km of roads** at risk (0.65 km of the R106 at Strand Road and 0.35km of secondary roads in Malahide)	The R106 is protected by this option up to the 1% AEP. There will be some residual flooding for the 0.1%AEP although the extent of flooding will be reduced. Partly achieving aspirational target.	3	45	The R106 is protected by this option up to the 1% AEP. There will be some residual flooding for the 0.1%AEP although the extent of flooding will be reduced. Partly achieving aspirational target.	3	45			0			0	This option will protect the secondary roads at risk in Malahide town centre up to the 0.5% AEP event and will reduce flood risk from the 0.1% AEP event. Partly achieving aspirational target.	3	30	This option will protect the secondary roads at risk in Malahide town centre up to the 0.5% AEP event and will reduce flood risk from the 0.1% AEP event. Partly achieving aspirational target.	3	30
	C) Minimise risk to utility infrastructure	10	0	-	No **utility assets** at risk	N/A	0	0	N/A	0	0			0			0	N/A	0	0	N/A	0	0
	D) Minimise risk to agricultural land.	5	2	-	Approximately**38 hectares of agriculture land** not benefiting from flood defences at risk of flooding	This option reduces the flood risk to approximately 0.2ha of agricultural land (<1% of total area). As benefit is to such a tiny percentage of land assume meeting minimum target.	0	0	This option reduces the flood risk to approximately 0.2ha of agricultural land (<1% of total area). As benefit is to such a tiny percentage of land assume meeting minimum target.	0	0			0			0	This option has no impact on agricultural land	0	0	This option has no impact on agricultural land	0	0
	Economic Total Score/ Weighted Score						6	120		6	120		0	0		0	0		6	180		6	180
Social	A) Minimise risk to human health and life.	30	2	-	**46 residential properties** at risk in Portmarnock and Malahide areas APSR (17 at risk at Strand Road, Portmarnock and 22 at risk in Malahide town centre) . **No high vulnerability properties** at risk from flooding.	This option fully protects properties on Strand Road at risk up to the 0.5% AEP event and provides reduction in risk from the 0.1% AEP eventin the Portmarnock flood cell. Therefore, partly achieving aspirational target.	3	180	This option fully protects properties on Strand Road at risk up to the 0.5% AEP event and provides reduction in risk from the 0.1% AEP eventin the Portmarnock flood cell. Therefore, partly achieving aspirational target.	1	60			0			0	This option fully protects properties in Malahide town centre at risk up to the 0.5% AEP event and provides a significant reduction in risk from the 0.1% AEP event in the Malahide town centre flood cell. Therefore, exceeding minimum target.	3	180	This option fully protects properties in Malahide town centre at risk up to the 0.5% AEP event and provides a significant reduction in risk from the 0.1% AEP event in the Malahide town centre flood cell. Therefore, exceeding minimum target.	3	180
	B) Minimise risk to community.	10	2	1	**16 non residential buildings at risk** (1 at risk at Strand Road - Strand centre and 15 at risk in Malahide). **No high-value social infrastructural assets** at risk	This option fully protects 1 non-residential property on Strand Road at risk up to the 0.5% AEP event and provides reduction in risk from the 0.1% AEP event in the Portmarnock flood cell. Therefore, partly achieving aspirational target.	3	30	This option fully protects 1 non-residential property on Strand Road at risk up to the 0.5% AEP event and provides reduction in risk from the 0.1% AEP event in the Portmarnock flood cell. Therefore, partly achieving aspirational target.	3	30			0			0	This option fully protects the 15 non-residential properties in Malahide town centre at risk up to the 0.5% AEP event and provides significant reduction in risk from the 0.1% AEP event in the Malahide town centre flood cell. Therefore, partly achieving aspirational target.	3	60	This option fully protects the 15 non-residential properties in Malahide town centre at risk up to the 0.5% AEP event and provides significant reduction in risk from the 0.1% AEP event in the Malahide town centre flood cell. Therefore, partly achieving aspirational target.	3	60
	C) Minimise risk to, or enhance, social amenity.	5	0	-	**No flood sensitive social amenity sites** at risk	N/A	0	0	N/A	0	0			0			0	N/A	0	0	N/A	0	0
	Social Total Score/ Weighted Score						6	210		4	90		0	0		0	0		6	240		6	240
	A) Support the objectives of the WFD.	5	5		The APSR contains **two river waterbodies** , one of which is classified as being of high status (to be maintained); the other is classified as being of poor status (improvement required). The RBMP reports that problems constraining achievement of good status include high nutrients (phosphorus), low oxygen saturation, low ecological rating and dredging; with the principal causes identified as agriculture and wastewater. Along the eastern and southern boundaries of the APSR are Broadmeadow Water and Mayne Estuary respectfully; both **aretransitional (i.e. estuarine) waterbodies** , and both are classified as being of moderate status/potential. Broadmeadow Water is also designated as a heavily modified water body (HMWB). The RBMP reports that the problems constraining achievement of good status/potential relate to pollution pressures.from agriculture, dangerous substances and wastewater and industrial discharges. The basic measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) for all waterbodies relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc). Additional measures have been identified for the Mayne Estuary and the Broadmeadow Water (as a HMWB) relating to further investigate the risks resulting from the physical modification of these waterbodies. The APSR is adjacent to two coastal waterbodies: Malahide Bay and Irish Sea Dublin (HA09) = moderate status (i.e. improvements required). The RBMP reports that the problems constraining achievement of good status primarily relate to pollution pressures (although risks from phycial modifications have been identified for both waterbodies). The only measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc).	Potential constraint to the achievement of WFD objectives as the new embankement would create a new morphological pressure. It is also assumed that raising the wall will require the footprint of the defence to be increased, potentially presenting an additional hydromorpholocial pressure through advancing the line. This option has been assessed as just failing minimum target.	-1	-25	Potential constraint to the achievement of WFD objectives as the proposed embankments could create a new morphological pressure, and will, by their nature, create a new barrier between the river and its floodplain. This option is considered to be just failing minimum target.	-1	-25			0			0	New structures situated along an already modified stretch of coastline. Therefore, no contribution nor constraint to the achievement of WFD objectives. Meeting minimum target.	0	0	New structures situated along an already modified stretch of coastline. Therefore, no contribution nor constraint to the achievement of WFD objectives. Meeting minimum target.	0	0
	B) Minimise risk of environmental pollution	15	5		**No WMP sites** at risk in the APSR. **Three Section 16 licenses** are present in the APSR (one at Strand Road and two in Malahide) There are no Section 4 licenses present.	No change in risk anticipated to result from implementation of this option. Meeting minimum target.	0	0	No change in risk anticipated to result from implementation of this option. Meeting minimum target.	0	0			0			0	No change in risk anticipated to result from implementation of this option. Meeting minimum target.	0	0	No change in risk anticipated to result from implementation of this option. Meeting minimum target.	0	0

Objectives	Global Weighting	Local Weighting (second column for flood cells within APSR if local weighting would be different to overall APSR weighting)		Options																	
				Baseline		Portmarnock and Malahide areas APSR: Strand Road Option 1			Portmarnock and Malahide areas APSR: Strand Road Option 2			Portmarnock and Malahide areas APSR: Malahide Town Centre Option 3			Portmarnock and Malahide areas APSR: Malahide Town Centre Option 4			Portmarnock and Malahide areas APSR: Malahide Town Centre Option 5			Portmarnock and Malahide areas APSR: Malahide Town Centre Option 5a		
				-		Rehabilitating and raising existing coastal defences at Strand Road (including rehabilitation walls and flapped outfall) and construction of flood defence embankment.			Replacement of flapped outfall on Sluice River and construction of flood defence embankments and walls to protect at risk properties at Strand Road.			Construction of flood defence embankments and walls to protect at risk properties in Malahide town centre.			Construction of flood defence walls and embankments along with rehabilitating and raising of existing coastal defences in Malahide town centre.			Construction of permemant and demountable flood defences along with rehabilitating defences in Malahide to protect at risk properties in Malahide town centre.			Construction of permemant and demountable flood defences along with rehabilitating defences in Malahide to protect at risk properties in Malahide town centre.		
				Baseline option assumes continuation of any existing maintenance regime in the study area		*This option involves rehabilitating (i.e. strengthening and raising) 0.5km of existing walls which run along side the R106 at Strand Road. Option also involves rehabilitating of the flapped gates on the Sluice River at Portmarnock Bridge and the construction of a flood embankment on the left bank of the Sluice River upstream of Portmarnock Bridge. The BCR for this option is 1 for the 1% AEP fluvial event and 0.5% AEP tidal event.* *Need to include details of condition of existing defences where available. The existing flood walls and their foundations would be strengthened using structural engineering works to allow walls to provide sufficient flood defence function up to the 0.5% AEP tidal event.* *The flapped gates on the Sluice River at Portmarnock Bridge prevent the propagation of high tides upstream of this bridge. These gates would be replaced with new flapped gates as part of this option. 120m of flood embankments are required upstream of Portmarnock Bridge. The average height of these embankments is 0.6m and provides protection up to the 1% AEP fluvial event and 0.5% AEP tidal event.* *Hydraulic modelling indicates that there is no impact on water levels upstream or downstream of Strand Road.* *The results of the modelling indicate that an existing overland flood flow path is modified with this option. The construction of the flood embankment along the left bank of the Sluice River prevents an existing overland flow path (westwards through Hazel Grove and across the R106). There are no areas of significant natural floodplain storage affected by this option.*			*This option involves the construction of approximately 0.6km of flood embankments along the R106 at Strand Road and on the left bank of the Sluice River upstream of Portmarnock Bridge. Option also involves replacing the flapped gates on the Sluice River at Portmarnock Bridge. The BCR for this option is 2.7 for the 1% AEP fluvial event and 0.5% AEP tidal event.* *The flapped gates on the Sluice River prevent the propagation of high tides upstream of Portmarnock Bridge. Theses gates would be replaced with new flapped gates as part of this option.* *Approximately 500m of flood embankments are required along the R106 to protect up to the 0.5% AEP event. The average height of these embankments is 0.8m on the left bank downstream of Portmarnock Bridge and 1.4m on the right bank downstream of Portmarnock Bridge. Upstream of Portmarnock Bridge, approximately 120m of flood embankment are required with an average height of 0.6m. These would provide protection up to the 1% AEP fluvial event and 0.5% AEP tidal event.* *Hydraulic modelling indicates that there is no impact on water levels upstream or downstream of Strand Road with this option.* *The results of the modelling indicate that an existing overland flood flow path is modified with this option. The construction of the flood embankment along the left bank of the Sluice River prevents an existing overland flow path (westwards through Hazel Grove and across the R106). There are no areas of significant natural floodplain storage affected by this option.*			*The BCR for this option is 0.7 for the 0.5% AEP tidal event. Given the low BCR, this option is not considered any further.*			*The BCR for this option is 0.7 for the 0.5% AEP tidal event. Given the low BCR, this option is not considered any further.*			*This option involves the construction of approximately 0.5km of demountable defences along the coast road to the west of the railway line and 60m of of flood walls in Malahide town centre. The option involves raising a short section of flood wall (approximately 10m) in Malahide. The option provides protection against tidal flooding up to the 0.5% AEP event. If the costs of a tidal FFWS are included along with this option, the BCR is 0.6. Assuming that a fluvial and tidal fluvial FFWS is implemented at the Coastal AU scale this option receives a BCR of 1.0 and the assessment proceeds on this basis.* *The demountable defences to the west of the railway line prevent flooding of a number of properties along this coast road and cut off the flow path of flood water under the railway underpass and into Malahide town centre. The demountable flood defences would be mounted to a permanent flood defence structure.* *The average height of demountable defences above ground level would be 1.2m mounted to a permanent wall 0.3m in height. Some localised road raising would be required at the western extremity of the defences to ensure flooding does not propagate along the coast road behind the defences.* *There would be no impact on water levels in the Broadmeadow estuary with this option.* *The construction of the flood embankment and revetments along the coast road prevents flooding along the coast road, under the railway underpass and into Malahide town centre. There are no areas of significant natural floodplain storage affected by this option.*			*This option involves the construction of 60m of of flood walls and raising of a short section of flood wall (approximately 10m) in Malahide town centre. It also includes the construction of a demountable flood defence across the railway underpass to prevent the propagation of flood waters along the coast road eastwards into Malahide town centre. The option provides protection against tidal flooding up to the 0.5% AEP tidal event. If the costs of a tidal FFWS are included along with this option, the BCR is 1.3. Assuming that a fluvial and tidal fluvial FFWS is implemented at the Coastal AU scale this option received a BCR of 6.8 and the assessment proceeds on this basis.* *A demountable defence across the railway underpass on the coast road would cut off the flow path of flood water under the railway underpass and into Malahide town centre.* *This option would limit the movement of people and traffic prior to and during a flood event. Additional investigations would be required to determine if the railway embankment would prevent the ingress of water eastwards into Malahide town centre. This option does not prevent flood risk to properties along the coast road* *There would be no impact on water levels in the Broadmeadow estuary with this option. The use of a demountable flood defence at the railway underpass prevents flooding under the railway underpass and into Malahide town centre. There are no areas of significant natural floodplain storage affected by this option.*		
						Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score
Environmental	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	10	5	**Baldoyle Bay SAC/SPA/pNHA** is located at the southern extent of the APSR. The bay contains large areas of sandflats, mudflats, and saltmarshes, and supports internationally important wintering populations of Brent geese as well as nationally important populations of a further seven waterfowl species. Changes in the catchment, which alter the flooding regime and freshwater input into the estuary could potentially affect the nature, extent and character of intertidal habitat for which the site is designated, with associated impacts on designated waterbird populations. In addition, the**Broadmeadow-Swords Estuary SPA/Ramsar site** and **Malahide Estuary SAC/pNHA** border the APSR along its northern edge. This area comprises a range of intertidal sandflats, mudflats, and saltmarshes, and sand dunes, and supports internationally important wintering populations of Brent geese as well as nationally important populations of a further 12 waterfowl species. This site has similar sensitivities to Baldoyle Bay SAC/SPA/pNHA. Sluice River Marsh pNHA, situated in the APSR, has been proposed as it provides a good example of a relatively intact freshwater marsh. Habitats associated with the rivers, and their floodplains, and Baldoyle Bay have the potential to support legally protected species or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available. This assessment will be revisited following completion of the Appropriate Assessment.	The existing wall to be raised is located on the boundary of Baldoyle Bay SAC/SPA/pNHA. Assuming that raising the wall will require an increased footprint of the defence, there is potential for loss of qualifying habitats beneath the increased footprint should it encroach into the designated site. There will also be temporary disturbance (e.g. noise, line of sight etc) to qualifying habitats and species (i.e. birds) during the construction period; the degree of disturbance will depend on the timing and methodology of the construction works. During a 0.5% AEP flood event, freshwater that previously flooded the area upstream of Portmarnock Bridge will enter the estuary directly, thus resulting in a temporary change to the pattern of freshwater input into the estuary. However, this will not affect the regular pattern of freshwater inflow. Repairs to the flapgate will prevent saline water entering the river, thereby leading to a gradual change in conditions i.e. a freshening of the river. Whilst this is considered to be a positive impact on the river, the repaired flapgate will effectively restrict the extent of the estuary to downstream of the bridge. Localised loss of/disturbance to terrestrial and riverine habitats and species beneath, and potentially adjacent to, the areas of works. Located approximately 500m from the works area, no impacts on Sluice River Marsh pNHA are anticipated. Overall, partly failing minimum target.	-3	-150	The existing wall to be raised is located within Baldoyle Bay SAC/SPA/pNHA. Permanent direct loss of qualifying habitat in footprint of works, with potential associated indirect impacts on birds during construction period. During a 0.5% AEP flood event, freshwater that previously flooded the area upstream of Portmarnock Bridge will enter the estuary directly, thus resulting in a temporary change to the pattern of freshwater input into the estuary. However, this will not affect the regular pattern of freshwater inflow. Replacement of the flapgate will prevent saline water entering the river, thereby leading to a gradual change in conditions i.e. a freshening of the river and loss of transitional habitat Whilst this is considered to be a positive impact on the river, the repaired flapgate will effectively restrict the extent of the estuary downstream of the bridge. ocalised loss of/disturbance to terrestrial and riverine habitats andassociated species, and potentially adjacent to, the areas of works. Located approximately 500m from the works area, no impacts to Sluice River Marsh pNHA are anticipated. Overall, partly failing minimum target.	-3	-150			0			0	Despite being located within the Malahide Estuary SAC/pNHA boundary, the new embankment/demountable defences are not anticipated to have any direct impact on SAC interest features, though there is the potential for disturbance to SPA bird species during the construction period. There is also potential for localised (temporary) disturbance to other habitats/species during the construction period. Just failing minimum target.	-1	-50	Despite being located within the Malahide Estuary SAC/pNHA boundary, the new embankment/demountable defences are not anticipated to have any direct impact on SAC interest features, though there is the potential for disturbance to SPA bird species during the construction period. There is also potential for localised (temporary) disturbance to other habitats/species during the construction period. Just failing minimum target.	-1	-50
	D) Avoid damage to, and where possible enhance, fisheries within the study area	5	5	All rivers and streams within the APSR support or are capable of supporting salmonid species such as salmon, brown trout and sea trout, and are likely to provide salmonid spawning or nursery areas. Some watercourses within the AU area are also likely to support brook, river and/or sea lamprey. The estuaries provide spawning, nursery and feeding habitats for a range of fish species, particularly bass, sand goby, grey mullet, flounder and sprat. In addition, important migratory fish species, namely salmon, sea trout, eels and lampreys, pass through on their way to or from their spawning grounds. There is a known barriers to fish movement (migratory salmon) on the Sluice River due to the presence of an impassable weir; however, it's exact location is unknown. Portmarnock is a key location for recreational sea fishing. Also, there are known areas of angling along the Sluice River in the APSR, though the exact locations of popular angling areas are unknown. There are **Shellfish Waters** at Malahide, off the coastline of this APSR, designated under the EU Shellfish Waters Directive.	Potential for negative impacts on fisheries during in-channel works (e.g. replacement of flap gates) due to loss of habitat and potential disturbance associated with changes in turbidity etc. Also potential for localised disruption to angling access. Just failing minimum target.	-1	-25	Potential for negative impacts on fisheries during in-channel works (e.g. replacement of flap gates) due to loss of habitat and potential disturbance associated with changes in turbidity etc. Also potential for localised disruption to angling access. Just failing minimum target.	-1	-25			0			0	Loss of / disturbance to estuarine habitat and associated fisheries is unlikely during construction of the embankment/demountable defences as there will be no works within the water itself. No disruption to angling anticipated. Meeting minimum target.	0	0	Loss of / disturbance to estuarine habitat and associated fisheries is unlikely during construction of the embankment/demountable defences as there will be no works within the water itself. No disruption to angling anticipated. Meeting minimum target.	0	0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	5	4	The APSR falls within three landscape character areas:**Coastal**, **Estuary** (both classified as being of high sensitivity and exceptional value), and**Low Lying Agricultural** (classified as being of low sensitivity and modest value). The R106 along the eastern and northern boundaries of the APSR, fronting the Portmarnock Point (approx. 2km) and the Malahide Estuary (approx. 4.5km) respectively, is designated an 'Important View' (Fingal County Council designation).	Although flood defence structures already exist in this area, raising of the defences in this highly sensitive landscape, alongside a road which is designated as an 'Important View', is likely to cause a deterioration in landscape character and permanent adverse change in visual amenity. Partly failing minimum target.	-3	-60	Although flood defence structures already exist in this area, the introduction of additional structures in a highly sensitive landscape, alongside a road which a designated 'Important View', is anticipated to result in a deterioration in landscape character and permanent adverse change in visual amenity. Partly failing minimum target.	-3	-60			0			0	Localised change in visual amenity in an area which is designated an 'Important View', and potential deterioration in local landscape character, due to the introduction of new flood defence structures. However, due to the the short length of defences and use of demountables, option considered to be just failing minimum target.	-1	-20	Localised change in visual amenity in an area which is designated an 'Important View', and potential deterioration in local landscape character, due to the introduction of new flood defence structures. However, due to the the short length of defences and use of demountables, option considered to be just failing minimum target.	-1	-20
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	5	2	**1 Site on RPS** at risk (nature of site unknown) Less than **0.1 hectares of Malahide Castle Demesne ACA** at risk, which represents less than 1% of the total ACA.	This option will not reduce the level of flood risk at this site. Also, due to the nature of the works and their location in relation to the historical site the option will not affect the historical setting of the site. Meeting minimum target.	0	0	Option will not reduce the level of flood risk at this site. Nor, due to the nature of the works and their location in relation to the historical site, will the option affect the historical setting of the site. Meeting minimum target.	0	0			0			0	Option will not reduce the level of flood risk at this site. Nor, due to the nature of the works and their location in relation to the historical site, will the option affect the historical setting of the site. Meeting minimum target.	0	0	Option will not reduce the level of flood risk at this site. Nor, due to the nature of the works and their location in relation to the historical site, will the option affect the historical setting of the site. Meeting minimum target.	0	0
	Environmental Total Score/ Weighted Score						-8	-260		-8	-260		0	0		0	0		-2	-70		-2	-70
Total Score/ Total Weighted Score							**5**	**95**		**3**	**-25**		**0**	**0**		**0**	**0**		**10**	**350**		**10**	**350**

Objectives		Global Weighting	Local Weighting (second column for flood cells within APSR if local weighting would be different to overal APSR weighting)		Options								
					Baseline	**Swords area APSR: Aspen Option 1**			**Swords area APSR: Town Centre Option 2**				
					-	**Widening the Gaybrook Stream to reduce fluvial flood risk to properties at Aspen near Kinsaley.**			**Construction of flood defence walls to protect properties at risk from tidal flooding in Swords town centre.**				
					Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves increasing the channel capacity by widening the Gaybrook stream along a 200m length at Aspen. This option has a BCR of 3.6 for the 1% AEP fluvial event. Hydraulic modelling indicates that the top width of the channel would need to be widened by an average of 2m while the bottom width of the channel would need to be widened by an average of 1m between surveyed cross sections 3Ga2306 and 3Ga2128. These channel modifications contain the 1% AEP fluvial event in bank with a 0.3m freeboard (i.e. 1% AEP water levels are 0.3m below top of bank).* *The results of the hydraulic modelling show that this option modifies water levels locally with an average decrease in water levels of 0.3m along the 200m length of widened channel. Downstream of the channel widening, there is a negligible increase in water levels. The results of the modelling indicate that no existing overland flood flow path is modified with this option and that there are no areas of significant natural floodplain storage affected by this option.*			*This option involves the construction of flood walls on the right bank of the Ward River upstream of Mill Bridge in Swords town centre. The BCR for this option is 0.3 for the1% AEP fluvial event. Given the low BCR, this option is not considered any further.*				
						Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	5	5	-	n/a	Increased channel conveyance provided for by widening and deeping the river channel. The option is not dependent on human/mechanical intervention to operate. However, limited future maintenance will be required to the channel capacity is retained. Exceeding minimum target.	3	75			0			0
	B) Minimise Health and Safety risk of flood risk management options.	5	5	-	n/a	Works will be required in the river channel, therefore significant health and safety risk to construction workers. However, limited health and safety risk to operators once construction complete. Therefore overall just exceeding minimum target.	1	25			0			0
	C) Ensure flood risk managed effectively and sustainable into future.	5	5	-	n/a	The increased channel capacity will convey the MRFS flow, therefore partly achieving aspirational target.	1	25			0			0
	Technical Total Score/ Weighted Score						5	125		0	0		0	0
Economic	**A) Minimise economic risk**	25	1	-	**Average annual damages of €67,136**. AAD at Aspen is €4,305 and the AAD in Swords town centre is €52,606. The remaining damages occur in other localised areas within Swords APSR.	Option will reduce damages to properties in Aspen resulting from a 1% AEP event to 0 and will also reduce damages occurring from a 0.1% AEP event in the Aspen flood cell. Therefore, partly achieving aspirational target.	3	75			0			0
	B) Minimise risk to transport infrastructure	5	3	1	**No rail** at risk Approximately **120m of roads** at risk, including approximately 20m of the R125 and short lengths of secondary and tertiary roads.	This option prevents flood risk to the local roads in the Aspen flood cell for the 1% AEP and reduces flood risk from the 0.1% AEP event. Therefore exceeding minimum target.	3	15			0			0
	C) Minimise risk to utility infrastructure	10	0	-	No **utility assets** at risk	N/A	0	0						
	D) Minimise risk to agricultural land.	5	2	-	Approximately **12 hectares of agriculture land** not benefiting from flood defences at risk of flooding.	This option has no impact on the risk to agricultural land. Therefore, meeting minimum target.	0	0			0			0
	Economic Total Score/ Weighted Score						6	90		0	0		0	0
Social	**A) Minimise risk to human health and life.**	30	2	1	**13 residential properties** at risk including 9 at Aspen and 0 in Swords town centre. The remaining 4 residential properties at risk are in isolated areas around Swords APSR **No high vulnerability properties** at risk from flooding.	This option fully protects properties at risk in Aspen up to the 1% AEP event and the 0.1% AEP event (contained within the larger channel but with reduced freeboard). It has no impact on the other at risk residential properties in the APSR. Therefore, partly achieving aspirational target.	3	90			0			0
	B) Minimise risk to community.	10	2	0	**14 non residential properties** at risk in Swords area APSR including 0 at Aspen and 6 in Swords town centre. 4 non-residential properties in **1 retail park** at risk (Airside Retail Park) in Swords area APSR. **1 high-value social infrastructural asset** at risk, a fire station in Swords.	This option has no impact on any of the properties at risk.	0	0			0			0

Objectives		Global Weighting	Local Weighting (second column for flood cells within APSR if local weighting would be different to overal APSR weighting)		Options								
					Baseline	**Swords area APSR: Aspen Option 1**			**Swords area APSR: Town Centre Option 2**				
					-	**Widening the Gaybrook Stream to reduce fluvial flood risk to properties at Aspen near Kinsaley.**			**Construction of flood defence walls to protect properties at risk from tidal flooding in Swords town centre.**				
					Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves increasing the channel capacity by widening the Gaybrook stream along a 200m length at Aspen. This option has a BCR of 3.6 for the 1% AEP fluvial event. Hydraulic modelling indicates that the top width of the channel would need to be widened by an average of 2m while the bottom width of the channel would need to be widened by an average of 1m between surveyed cross sections 3Ga2306 and 3Ga2128. These channel modifications contain the 1% AEP fluvial event in bank with a 0.3m freeboard (i.e. 1% AEP water levels are 0.3m below top of bank).* *The results of the hydraulic modelling show that this option modifies water levels locally with an average decrease in water levels of 0.3m along the 200m length of widened channel. Downstream of the channel widening, there is a negligible increase in water levels. The results of the modelling indicate that no existing overland flood flow path is modified with this option and that there are no areas of significant natural floodplain storage affected by this option.*			*This option involves the construction of flood walls on the right bank of the Ward River upstream of Mill Bridge in Swords town centre. The BCR for this option is 0.3 for the1% AEP fluvial event. Given the low BCR, this option is not considered any further.*				
						Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
	C) Minimise risk to, or enhance, social amenity.	5	0	-	**No flood sensitive social amenity sites** at risk	N/A	0	0			0			0
	Social Total Score/ Weighted Score						3	90		0	0		0	0
Environmental	**A) Support the objectives of the WFD.**	5	5		The APSR contains four river waterbodies: one = high status (to be maintained), two = moderate status, one = poor status (improvement required). The RBMP reports that problems constraining achievement of good status include high nutrients (phosphorus), low oxygen saturation, low ecological rating and dredging; with the principal causes identified as agriculture and wastewater. At the eastern extent of the APSR, is the Broadmeadow Water, a transitional (i.e. estuarine) and heavily modified water body (HMWB) classified as moderate potential The RBMP reports that the problems constraining achievement of good potential relate to pollution pressures from agriculture, dangerous substances and wastewater and industrial discharges. The basic measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) for all waterbodies relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc). Additional measures have been identified for the Broadmeadow Water (as a HMWB) relating to further investigate the risks resulti	Through changing the morphology of the channel, this option has the potential to constrain to the achievement of WFD objectives. Due to uncertainty, the precautionary principle has been applied, and option has been assessed as just failing minimum target.	-1	-25			0			0
	B) Minimise risk of environmental pollution	15	0		**No WMP sites** at risk. **7 Section 16 licenses** present (6 of which are located along the Ward and Broadmeadow Rivers in Swords town and 1 on the Gaybrook Stream). **2 Section 4 licenses** present (located in Swords town along the Ward and Broadmeadow Rivers).	No change in risk anticipated to result from implementation of this option. All Section 4 and Section 16 licenses are held in locations outside of the area anticipated to experience a change in water level. Thus, no risk to water quality anticipated. Meeting minimum target.	0	0			0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	10	5		The Broadmeadow River flows into the Broadmeadow-Swords Estuary SPA/Ramsar site and Malahide Estuary SAC/pNHA at the eastern extent of this APSR. This area comprises intertidal sandflats, mudflats, saltmarshes, and sand dunes, which support internationally important wintering populations of Brent geese as well as nationally important populations of a further 12 waterfowl species. Changes in the catchment, which alter the flooding regime and freshwater input into the estuary could potentially affect the nature, extent and character of intertidal habitat for which the site is designated, with impacts on associated designated waterbird populations. The rivers and their floodplain within the AU support or have the potential to support legally protected species or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available. This assessment will be revisited following completion of the Appropriate Assessment.	The area of works is located approximately 2km upstream of Broadmeadow - Swords Esuary SPA/Ramsar site and Malahide Estuary SAC/pNHA. Due to the nature and location of works, no impact on these designated sites is anticipated to arise as a result of the works. Widening of the channel will result in a direct loss of riverine and marginal habitats along this stretch, and species which these support. However, the widened channel would be expected to re-colonise with riverine vegetation and fauna, although the composition of this is unknown. Due to uncertainty, the precautionary principle has been applied, and option has been assessed as just failing minimum target.	-1	-50			0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	5	3		All rivers and streams within the APSR support or are capable of supporting salmonid species such as salmon, brown trout and sea trout, and are likely to provide salmonid spawning or nursery areas. Some watercourses within the APSR area are also likely to support brook, river and/or sea lamprey. There is the potential for angling activity along the Gaybrook Stream in the APSR. There are no fisheries designations within the APSR (e.g. Salmonid Waters), nor are there any known barriers to fish movement.	Likely loss of/or disturbance to riverine habitat and dependent fisheries during the widening of the Gaybrook Stream. The works will result in a temporary loss of angling access along this stretch, if there is any in the vicinity, although they could present opportunities for enhancement. Just failing minimum target.	-1	-15			0			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	5	4		The APSR falls within the following three landscape character areas; **Estuary** (classified as being of exceptional value and high sensitivity), **Low Lying Agricultural** (modest value and low sensitivity) and **Rolling Hills** (modest value and medium sensitivity). Fingal County Council also designates 'Important Views'. Within the APSR, short stretches fronting onto the Ward River are designated 'Important Views'.	The proposed works are located within an area of low sensitivity. Potential for temporary change in landscape character and visual amenity during the construction works, although in the long term, no change to visual amenity or local landscape character anticipated, assuming that there will be no loss of significant landscape elements (i.e mature trees) where widening is proposed. Just failing minimum target.	-1	-20			0			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	5	2		**3 Sites on RPS/RMP** at risk. Two sites on RPS (nature of sites unknown). The remaining site, a Mill site at Mill Bridge in Swords, is in both the RPS/RMP datasets. **No ACA** at risk.	The option will not reduce the level of flood risk at any of these sites or affect their historical setting. Meeting minimum target.	0	0			0			0
	Environmental Total Score/ Weighted Score						-4	-110		0	0		0	0
Total Score/ Total Weighted Score							**10**	**195**		**0**	**0**		**0**	**0**

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	Rush area APSR Option 1			Rush area APSR Option 1a				
				-	Construction of flood defence embankments and walls and replacing culvert along Shore Road to protect at risk properties along the coast and from West Rush stream.			Construction of secondary culvert along Shore Road to protect properties at risk from fluvial flooding along the West Rush stream.				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*BCR for this option is 0.6 for the 1% AEP fluvial event and 0.5% AEP tidal event. Due to the low BCR, this option is not considered any further.*			*This option would involve constructing a secondary culvert along side the existing culvert on the downstream end of the Rush West Stream. The capacity of the existing structure is insufficient to convey large flows and results in surcharging and spilling of flood waters and flooding of properties. The BCR for this option is 0.7 for the 1% AEP event and 0.9 for the 0.1% AEP event. As the culvert is sized for the 1% MRFS 95%ile flow it can pass the 0.1% AEP fluvial flow without causing any flood damage to property.* *Modelling results indicate that a new circular culvert with a diameter of 0.5m when combined with the capacity of the existing structure would be sufficient to reduce fluvial flood risk in Rush. The combined culverts can convey a flow of 1.2 m3/s which equates to the 1% AEP MRFS 95%ile flow without surcharging.* *Modelling results indicate that this option will have some impact on water levels upstream and no impact downstream of the proposed location for this option. Changes in water levels are localised along a 0.3km stretch of the river upstream of the culvert inlet. Option results in an average decrease of 0.36m in water levels upstream of the culvert inlet. The maximum decrease in water levels is 1.0m at the culvert inlet.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths are as a result of capacity problems at the entrance to the existing culvert and lead to the flooding of properties in Rush. The option prevents these overland flow paths through increasing the capacity of the culvert. There are no areas of significant natural floodplain storage affected by this option.*				
					Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score
Technical	A) Ensure Flood Risk Management options are operationally robust.	5	5	n/a			0	Increased channel conveyance provided for by replacing the existing culvert with a larger capacity culvert. The option is not dependent on human/mechanical intervention to operate. However, limited future maintenance will be required to ensure culverts are kept free from blockage.	3	75			0
	B) Minimise Health and Safety risk of flood risk management options.	5	5	n/a			0	Significant amount of construction works involved in this option with demolishing of existing structures and installation of new culverts in the watercourse. Therefore significant health and safety risk to construction workers. However, limited health and safety risk to operators once construction complete. Therefore overall just exceeding minimum target.	1	25			0
	C) Ensure flood risk managed effectively and sustainable into future.	5	5	n/a			0	New culverts to be designed to the 1% AEP MRFS 95%ile flow. MRFS 1% AEP 95%ile flow is greater than HEFS 1% AEP flow therefore, culverts meet requirements of HEFS.	5	125			0
	Technical Total Score/ Weighted Score					0.0	0		9	225		0	0
Economic	A) Minimise economic risk	25	1	**Average annual damages of €32,257**.			0	Option will reduce damages resulting from a 1% AEP fluvial event to 0 and will also significantly reduce some damages occurring from a 0.1% fluvial AEP event. However, the option will not protect properties from the the 0.5% or 0.1% EP tidal events. Therefore exceeding minimum target.	1	25			0
	B) Minimise risk to transport infrastructure	5	2	**No rail** at risk Approximately **0.6km** of secondary and tertiary **roads** at risk			0	Option will reduce the risk of flooding to the transport infrastructure from a 1% AEP fluvial event to 0 and will also significantly reduce the risk from a 0.1% fluvial AEP event. However, the option will not protect the roads at risk (including the Coast Road) from the the 0.5% or 0.1% AEP tidal events. Therefore exceeding minimum target.	1	10			0
	C) Minimise risk to utility infrastructure	10	0	No **utility assets** at risk			0	N/A	0	0			0
	D) Minimise risk to agricultural land.	5	1	Approximately **4 hectares of agriculture land** not benefiting from flood defences at risk of flooding.			0	This option has no impact on the flood risk to agricltural land	0	0			0
	Economic Total Score/ Weighted Score					0.0	0		2	35		0	0
Social	A) Minimise risk to human health and life.	30	2	**25 residential properties** at risk **No high vulnerability properties** at risk from flooding			0	This option fully protects properties at risk up to the 1% AEP event and provides a very significant reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	180			0
	B) Minimise risk to community.	10	1	**1 non residential** building at risk **No high-value social infrastructural assets** at risk			0	The non-residential building is at risk from tidal flooding and therefore is not protected by this option. Meeting minimum target.	0	0			0
	C) Minimise risk to, or enhance, social amenity.	5	1	**1 mobile holiday home park** at risk			0	The mobile home park at risk is located to the north of Rush adjacent to the Rush Town Stream and is not impacted on by this option.	0	0			0
	Social Total Score/ Weighted Score					0.0	0		3	180		0	0
	A) Support the objectives of the WFD.	5	5	This APSR contains one **river waterbody** (poor status i.e. improvement required). The RBMP reports that problems constraining achievement of good status of this river waterbody include high nutrients (phosphorus), low oxygen saturation, low ecological rating and dredging; with the principal causes identified as agriculture and wastewater. Also, Rogerstown Estuary, at the southern extent of the APSR, is a **transitional (estuarine) waterbody**, identified as being of moderate status. The RBMP reports that problems constraining achievement of good status include high nutrients (phosphorus), low oxygen saturation, low ecological rating and dredging; with the principal causes identified as agriculture and wastewater. The APSR is also adjacent to the Northwestern Irish Sea (HA08) **coastal waterbody, which is of** moderate status (i.e. improvements required). The RBMP reports that the problems constraining achievement of good status primarily relate to pollution pressures (although risks from phyical modifications have been identified for all waterbodies). The only measures directly re (physical modifications - morphological pres relate to the need for compliance with legal requirements (EIA, Planning & Developmen				0	No contribution nor constraint to the achievement of WFD objectives as works will be within an already modified stretch of the channel. Meeting minimum target.	0	0			0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Rush area APSR Option 1**			**Rush area APSR Option 1a**				
				-	**Construction of flood defence embankments and walls and replacing culvert along Shore Road to protect at risk properties along the coast and from West Rush stream.**			**Construction of secondary culvert along Shore Road to protect properties at risk from fluvial flooding along the West Rush stream.**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*BCR for this option is 0.6 for the 1% AEP fluvial event and 0.5% AEP tidal event. Due to the low BCR, this option is not considered any further.*			*This option would involve constructing a secondary culvert along side the existing culvert on the downstream end of the Rush West Stream. The capacity of the existing structure is insufficient to convey large flows and results in surcharging and spilling of flood waters and flooding of properties. The BCR for this option is 0.7 for the 1% AEP event and 0.9 for the 0.1% AEP event. As the culvert is sized for the 1% MRFS 95%ile flow it can pass the 0.1% AEP fluvial flow without causing any flood damage to property.* *Modelling results indicate that a new circular culvert with a diameter of 0.5m when combined with the capacity of the existing structure would be sufficient to reduce fluvial flood risk in Rush. The combined culverts can convey a flow of 1.2 m3/s which equates to the 1% AEP MRFS 95%ile flow without surcharging.* *Modelling results indicate that this option will have some impact on water levels upstream and no impact downstream of the proposed location for this option. Changes in water levels are localised along a 0.3km stretch of the river upstream of the culvert inlet. Option results in an average decrease of 0.36m in water levels upstream of the culvert inlet. The maximum decrease in water levels is 1.0m at the culvert inlet.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths are as a result of capacity problems at the entrance to the existing culvert and lead to the flooding of properties in Rush. The option prevents these overland flow paths through increasing the capacity of the culvert. There are no areas of significant natural floodplain storage affected by this option.*				
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Environmental	**B) Minimise risk of environmental pollution**	**15**	**5**	Within the APSR, there is **one WMP site at risk**, adjacent to Spout Road at the eastern extent of the town. There are also two **Section 16 licenses** present within the APSR, in the centre of Rush.			0	The level of flood risk at the WMP site will not change as a result of the works. Both Section 16 licenses are held in locations outside of the area anticipated to experience a change in water level. Thus, no risk to water quality anticipated. Meeting minimum target.	0	0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	**10**	**5**	The Rogerstown Estuary SPA/SAC/pNHA is located along the southern boundary of this APSR. This area comprises intertidal sandflats, mudflats, saltmarshes, and sand dunes, which support internationally important wintering populations of Brent geese as well as nationally important populations of a further 16 waterfowl species. Changes in the catchment, which alter the flooding regime and freshwater input into the estuary could potentially affect the nature, extent and character of intertidal habitat for which the site is designated, with impacts on associated designated waterbird populations. The rivers and their floodplains, and Rogerstown Estuary and its adjacent habitats have the potential to support legally protected species or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available. This assessment will be revisited following completion of the Appropriate Assessment.			0	This option involves no works within or on the boundary of the Rogerstown Estuary SPA/SAC/pNHA (works are approximately 100m upstream of designated sites). During a 1% AEP flood event, freshwater that previously left the channel upstream of the existing culvert will remain in-channel and thus enter the estuary directly, resulting in a temporary change to the pattern of freshwater input into the estuary. However, this will not affect the regular pattern of freshwater inflow. Works to install new culvert will be within a modified section of the channel so disturbance to flora and fauna will be negligible. Meeting minimum target.	0	0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	**5**	**2**	All rivers and streams within the APSR support or are capable of supporting salmonid species such as salmon, brown trout and sea trout, and are likely to provide salmonid spawning or nursery areas. Some watercourses within the APSR area are also likely to support brook, river and/or sea lamprey. The estuary provides spawning, nursery and feeding habitats for a range of fish species, particularly bass, sand goby, grey mullet, flounder and sprat. In addition, important migratory fish species, namely salmon, sea trout, eels and lampreys, pass through on their way to or from their spawning grounds. Rivers and streams in the APSR have a potential recreational use for anglers, though popular angling locations are unknown. There are no fisheries designations within the APSR (e.g. Salmonid Waters), nor are there any known barriers to fish movement.			0	Potential loss of/disturbance to riverine habitat and dependent fisheries during the installation of the new culvert, although works will be within an already modified stretch of the watercourse. No disruption to angling or angling access anticipated. Just failing minimum target.	-1	-10			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	**5**	**4**	The APSR falls primarily within the **Coastal** landscape character area; the southwestern boundary of the APSR, adjacent to Rogerstown Estuary, falls within the **Estuary** landscape character area. Both landscape character areas are classified as being of high sensitivity and of exceptional value. Along the south-eastern boundary of the APSR, approximately 1km of the coastal frontage is designated an 'Important View' by Fingal County Council. Other locations receiving the same designation are: 300m and 1.2km of the R128, to the south-west and north of the APSR respectively.			0	Temporary change to landscape character and visual amenity during works period only. In the long term, no impacts anticipated as no change to above ground structures will result from the works. Meeting minimum target.	0	0			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	**5**	**2**	**Two sites on SMR/RPS** at risk. One site on the SMR is a Ritual Site - Holy Well and there is one site on the RPS (nature of site unknown). **No ACA** at risk.			0	The option will not reduce the level of flood risk or affect the historical setting at either of these sites. Meeting minimum target.	0	0			0
	Environmental Total Score/ Weighted Score					0	0		-1	-10		0	0
Total Score/ Total Weighted Score						**0**	**0**		**13**	**430**		**0**	**0**

Objectives		Global Weighting	Local Weighting (second column for flood cells within a APSR if local weighting would be different to overal APSR weighting)		Options																	
					Baseline	Skerries area APSR: Harbour Rd Option 1			Skerries area APSR: Miller Lane & Sherlock Park Option 2			Skerries area APSR: Miller Lane & Sherlock Park Option 3			Skerries area APSR: Miller Lane & Sherlock Park Option 4			Skerries area APSR: Miller Lane & Sherlock Park Option 5			Skerries area APSR: Miller Lane & Sherlock Park Option 6		
					-	Rehabilitating and raising existing coastal defences at Harbour Road to reduce tidal flood risk.			Replacing culverts under roads and railway with larger capacity culverts and widening channel through park to reduce fluvial flood risk to properties at Miller Lane and Sherlock Park.			Constructing a flow diversion channel to run in a culvert under the railway and roads at Miller lane and Sherlock Park to reduce fluvial flood risk to properties at Miller Lane and Sherlock Park.			Lowering road levels and raising kerb levels along Miller Lane and Sherlock Park to allow controlled flooding along this road and reduce fluvial flood risk to properties.			Construction of storage reservoir to the west of railway embankment to provide flood storage upstream of Skerries Area APSR to reduce fluvial flood risk to properties along Miller Lane and Sherlock Park.			Construction of storage reservoir to the west of railway embankment to provide flood storage upstream of Skerries Area APSR along with replacing culverts under roads and railway with larger capacity culverts to reduce fluvial flood risk to properties along Millar Lane and Sherlock Park		
					Baseline option assumes continuation of any existing maintenance regime in the study area	*BCR for this option is 0.3 for the 1% AEP fluvial event and 0.5% AEP tidal event. Due to the low BCR, this option is not considered any further.*			*This option would involve replacing the existing culverts under the Dublin to Belfast railway line with new larger capacity culverts. The capacity of the existing culverts is insufficient to convey large flows and results in flood waters ponding on land to the west of the railway embankment and surcharging of existing culverts. This surcharging results in spilling of flood waters along the R127 and floods properties at Millar Lane and Sherlock Park. Hydraulic modelling indicates that it is not necessary to widen and deepen the channels in the park. The BCR for this option is 1.3 for the 1% AEP fluvial event and 0.5% AEP tidal event.* *The existing culverts under the railway would be replaced with three larger capacity culverts. Hydraulic modelling indicates that the following culverts would be required to convey the 1% AEP MRFS 95%ile flow without surcharging:* *- Culvert under the railway on main channel - Box section culvert: Length 27m. Width 1.5m. Height 0.72m* *- Culvert under the railway on 15Maa tributary - Box section culvert: Length 27m. Width 1.3m. Height 0.91m* *- Culvert under the roadway into the park - Circular culvert: Length 80m. Diameter 1.50m.* *Modelling results indicate that this option will have an impact on water levels upstream and downstream of the proposed new culverts. Upstream of the culverts (i.e. to the west of the railway embankment), flood risk to agricultural land is reduced with water levels in the Mill Stream lowered by an average of 0.56m along a 650m length of channel. Along the Mill Stream tributary (west of the railway embankment) water levels are reduced by an average of 0.35m along the modelled reach (i.e. 200m).* *Downstream of the railway, the increased conveyance capacity of the culverts results in a rise in water levels along the Mill Stream. Water levels are raised by an average of 0.21m along 1.1km of river channel. The maximum increase in water levels occurs at cross section 15Ma1123CD where water levels are raised by 0.44m.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths are as a result of capacity problems at the entrance to the existing culverts which results in flood water spilling along the R127 and secondary roads at Millar Lane and Sherlock Park. The option prevents these overland flow paths through increasing the capacity of the culverts. This option also reduces flood plain storage on lands to the west of the railway embankment. Replacing the existing culverts increases the capacity in the channel system, draining the land flooded to the west of the railway embankment.*			*The BCR for this option is 0.8 for the 1% AEP fluvial event. Given the low BCR, this option is not considered any further.*			*Hydraulic modelling indicates that this is not a viable option. Lowering road levels along Millar Lane and Sherlock Park creates new flow paths and results in flood risk in other areas of Skerries.*			*This option would involve the construction of flood storage reservoirs upstream of the railway embankment to store flood water upstream of the railway embankment and control discharges during a flood event. The controlled discharge does not exceed the capacity of the existing culverts under the road and railway. The BCR for this option is 2.7.* *2 storage reservoir embankments would be required as follows:* *• Storage embankment 1 would be located to the Mill Stream tributary and run alongside the R127. The embankment would tie into the existing railway embankment. A 100m embankment with an average height of 1.4m would be required.* *• Storage embankment 2 would be located to the Mill Stream and run alongside a secondary road which joins the R127 near the railway underpass. The embankment would tie into the existing railway embankment. A 60m embankment with an average height of 0.9m would be required.* *Both options assume that the railway embankment can be used to impound water. Additional investigations would be required to determine if the railway embankment would prevent the ingress of water westwards into Skerries. The outflow from both reservoirs would be regulated to the current maximum capacity of the existing culverts which run under the railway and road.* *Modelling results indicate that this option will have an impact on water levels upstream and downstream of the proposed storage reservoirs. Upstream of the reservoir embankments, flood risk to agricultural land is increased with water levels in the Mill Stream rising by an average of 0.34m along a 690m length of channel.* *Along the Mill Stream tributary (west of the railway embankment) water levels rise by an average of 0.65m along the modelled reach (i.e. 200m). Downstream of the railway, the increased storage upstream results in reduced water levels along the Mill Stream. Water levels are lowered by an average of 0.24m along 1.1km of river channel. The maximum decrease in water levels is 0.38m.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths are as a result of capacity problems at the entrance to the existing culverts which results in flood water spilling along the R127 and secondary roads at Millar Lane and Sherlock Park. The option prevents these overland flow paths by storing the water upstream of the railway embankment. This option also increases flood plain storage on lands to the west of the railway embankment.*			*Based on hydraulic modelling results, the proposed storage embankments are not significantly high to justify constructing the embankments in combination with larger capacity culverts under the railway embankment. A combined option would have been considered if the required storage embankments were significantly high.Option not considered any further.*		
						Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score
Technical	A) Ensure Flood Risk Management options are operationally robust.	5	5	-	n/a			0	Increased channel conveyance provided for by replacing existing structures with larger capacity culverts. The option is not dependent on human/mechanical intervention to operate. However, limited future maintenance will be required to ensure culverts are kept free from blockage.	3	75			0			0	Storage reservoirs to be designed to operate automatically (e.g. using hydrobrakes to control flow), therefore no human/mechanical intervention for operation. The flood storage reservoirs would require limited maintenance over lifetime of option. Partially achieving aspirational target.	3	75			0
	B) Minimise Health and Safety risk of flood risk management options.	5	5	-	n/a			0	Significant amount of construction works involved in this option with demolishing of existing structures and installation of new culverts in the watercourse. Therefore significant health and safety risk to construction workers. However, limited health and safety risk to operators once construction complete. Therefore overall just exceeding minimum target.	1	25			0			0	Significnat health and safety risk to construction workers due to proximity of embankments to watercourses and the railway line. Contractors involved in the construction of the reservoirs and the staff involved with the operation of the site would need to work within the relevant health and safety guidelines for working close to railway lines. Storage reservoirs would be constructed to operate automatically, therefore no risk to operators of FRM options. Meeting minimum target.	1	25			0
	C) Ensure flood risk managed effectively and sustainable into future.	5	5	-	n/a			0	New culverts to be designed to the 1% AEP MRFS 95%ile flow. MRFS 1% AEP 95%ile flow is greater than HEFS 1% AEP flow therefore, culverts meet requirements of HEFS. Therefore, achieving aspirational target.	5	125			0			0	Option is sustainable and adaptable to future risk. The flood storage reservoirs are capable of additional capacity to meet future flood risk needs. Meeting minimum target target.	0	0			0
	Technical Total Score/ Weighted Score						0	0		9	225		0	0		0	0		4	100		0	0
Economic	A) Minimise economic risk	25	1	-	**Average annual damages (AAD) of €59,598**. AAD at Harbour Road €8,857. AAD at Sherlock Park and Millar Lane €27038.			0	Option would reduce damages from the 1%/0.5% AEP to 0 in the Sherlock Park/Miller Lane flood cell by protecting properties on Sherlock Park and Miller Lane. There would still be damages incurred from the 0.1% AEP event but they would be significantly reduced. Overall, partly achieving aspirational target.	3	75			0			0	Option would reduce damages from the 1%/0.5% AEP to 0 in the Sherlock Park/Miller Lane flood cell by protecting properties on Sherlock Park and Miller Lane. There would still be damages incurred from the 0.1% AEP event. Overall, partly achieving aspirational target.	3	75			0
	B) Minimise risk to transport infrastructure	5	3	2	**No rail** at risk Approximately **0.2km of Regional (R)** roads at risk (R127). Approximately **1.5km of secondary and tertiary roads** at risk.			0	Option would protect the majority of at risk roads in the Sherlock Park/Miller Lane flood cell , including the regional roads at risk. There would still be residual risk from the 0.1% event though the risk would be reduced. Therefore, partly achieving aspirational target.	3	45			0			0	Option would protect the majority of at risk roads in the Sherlock Park/Miller Lane flood cell including the regional roads. There would still be residual risk from the 0.1% event though the risk would be reduced. Therefore, partly achieving aspirational target.	3	45			0
	C) Minimise risk to utility infrastructure	10	0	-	**No utility assets** at risk			0	N/A	0	0			0			0	N/A	0	0			0
	D) Minimise risk to agricultural land.	5	1	0	Approximately **4 hectares of agriculture land** not benefiting from flood defences at risk of flooding			0	This option results in a reduction in flood risk to agricultural land due to the increased flow through the culverts. The majority of agricultural land will benefit from a reduction in risk as a result of this option. There will also be some reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	15			0			0	This option increases the flood risk to the agricultural land to the west of the railway embankment by increasing the water levels. Therefore this option results in potential impacts to a significant area of agricultural land in the APSR and falls minimum target.	-5	-25			0
	Economic Total Score/ Weighted Score						0	0		9	135		0	0		0	0		1	95		0	0
Social	A) Minimise risk to human health and life.	30	3	2	**59 residential properties** at risk (including 10 at Harbour Rd and 49 in Sherlock Park/Millar Lane) **No high vulnerability properties** at risk from flooding			0	This option fully protects properties at risk on Sherlock Park and Miller Lane up to the 1% AEP event and provides reduction in risk from the 0.1% AEP event. The option will also result in a reduction in risk from the 0.1% AEP. Therefore, partly achieving aspirational target.	3	180			0			0	This option fully protects properties at risk on Sherlock Park and Miller Lane up to the 1% AEP event and provides reduction in risk from the 0.1% AEP event. The option pwil result in a reduction in risk from the 0.1% AEP. Therefore, partly achieving aspirational target.	3	180			0
	B) Minimise risk to community.	10	1	0	**2 non residential properties** at risk at Harbour Rd **No high-value social infrastructural assets** at risk			0	This option has no impact on non-residential properties in Skerries.	0	0			0			0	This option has no impact on non-residential properties in Skerries.	0	0			0
	C) Minimise risk to, or enhance, social amenity.	5	0	-	**No flood sensitive social amenity sites** at risk			0	N/A	0	0			0			0	N/A	0	0			0
	Social Total Score/ Weighted Score						0	0		3	180		0	0		0	0		3	180		0	0
	A) Support the objectives of the WFD.	5	5		This APSR contains one **river waterbody** (good status). The APSR is also adjacent to the Northwestern Irish Sea (HA09) **coastal waterbody** of moderate status (i.e. improvements required). The RBMP reports that the problems constraining achievement of good status primarily relate to pollution pressures (although risks from physical modifications have been identified for all waterbodies). The only measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc).			0	No contribution nor constraint to the achievement of WFD objectives as works will be within an already modified stretch of the channel. Meeting minimum target.	0	0			0			0	Potential constraint to the achievement of WFD objectives as the proposed embankments could create a new morphological pressure, and will, by their nature, create a new barrier between the river and its floodplain. Just failing minimum target.	-1	-25			0
	B) Minimise risk of environmental pollution	15	0		**No potential sources of pollution** at risk or present in this APSR			0	N/A	0	0			0			0	N/A	0	0			0

Objectives		Global Weighting	Local Weighting (second column for flood cells within APSR if local weighting would be different to overal APSR weighting)		Options																	
					Baseline	Skerries area APSR: Harbour Rd Option 1			Skerries area APSR: Miller Lane & Sherlock Park Option 2			Skerries area APSR: Miller Lane & Sherlock Park Option 3			Skerries area APSR: Miller Lane & Sherlock Park Option 4			Skerries area APSR: Miller Lane & Sherlock Park Option 5			Skerries area APSR: Miller Lane & Sherlock Park Option 6		
					-	Rehabilitating and raising existing coastal defences at Harbour Road to reduce tidal flood risk.			Replacing culverts under roads and railway with larger capacity culverts and widening channel through park to reduce fluvial flood risk to properties at Miller Lane and Sherlock Park.			Constructing a flow diversion channel to run in a culvert under the railway and roads at Miller lane and Sherlock Park to reduce fluvial flood risk to properties at Miller Lane and Sherlock Park.			Lowering road levels and raising kerb levels along Miller Lane and Sherlock Park to allow controlled flooding along this road and reduce fluvial flood risk to properties.			Construction of storage reservoir to the west of railway embankment to provide flood storage upstream of Skerries Area APSR to reduce fluvial flood risk to properties along Miller Lane and Sherlock Park.			Construction of storage reservoir to the west of railway embankment to provide flood storage upstream of Skerries Area APSR along with replacing culverts under roads and railway with larger capacity culverts to reduce fluvial flood risk to properties along Millar Lane and Sherlock Park		
					Baseline option assumes continuation of any existing maintenance regime in the study area	*BCR for this option is 0.3 for the 1% AEP fluvial event and 0.5% AEP tidal event. Due to the low BCR, this option is not considered any further.*			*This option would involve replacing the existing culverts under the Dublin to Belfast railway line with new larger capacity culverts. The capacity of the existing culverts is insufficient to convey large flows and results in flood waters ponding on land to the west of the railway embankment and surcharging of existing culverts. This surcharging results in spilling of flood waters along the R127 and floods properties at Millar Lane and Sherlock Park. Hydraulic modelling indicates that it is not necessary to widen and deepen the channels in the park. The BCR for this option is 1.3 for the 1% AEP fluvial event and 0.5% AEP tidal event.* *The existing culverts under the railway would be replaced with three larger capacity culverts. Hydraulic modelling indicates that the following culverts would be required to convey the 1% AEP MRFS 95%ile flow without surcharging:* *- Culvert under the railway on main channel - Box section culvert: Length 27m. Width 1.5m. Height 0.72m* *- Culvert under the railway on 15Maa tributary - Box section culvert: Length 27m. Width 1.3m. Height 0.91m* *- Culvert under the roadway into the park - Circular culvert: Length 80m. Diameter 1.50m.* *Modelling results indicate that this option will have an impact on water levels upstream and downstream of the proposed new culverts. Upstream of the culverts (i.e. to the west of the railway embankment), flood risk to agricultural land is reduced with water levels in the Mill Stream lowered by an average of 0.56m along a 650m length of channel. Along the Mill Stream tributary (west of the railway embankment) water levels are reduced by an average of 0.35m along the modelled reach (i.e. 200m).* *Downstream of the railway, the increased conveyance capacity of the culverts results in a rise in water levels along the Mill Stream. Water levels are raised by an average of 0.21m along 1.1km of river channel. The maximum increase in water levels occurs at cross section 15Ma1123CD where water levels are raised by 0.44m.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths are as a result of capacity problems at the entrance to the existing culverts which results in flood water spilling along the R127 and secondary roads at Millar Lane and Sherlock Park. The option prevents these overland flow paths through increasing the capacity of the culverts. This option also reduces flood plain storage on lands to the west of the railway embankment. Replacing the existing culverts increases the capacity in the channel system, draining the land flooded to the west of the railway embankment.*			*The BCR for this option is 0.8 for the 1% AEP fluvial event. Given the low BCR, this option is not considered any further.*			*Hydraulic modelling indicates that this is not a viable option. Lowering road levels along Millar Lane and Sherlock Park creates new flow paths and results in flood risk in other areas of Skerries.*			*This option would involve the construction of flood storage reservoirs upstream of the railway embankment to store flood water upstream of the railway embankment and control discharges during a flood event. The controlled discharge does not exceed the capacity of the existing culverts under the road and railway. The BCR for this option is 2.7.* *2 storage reservoir embankments would be required as follows:* *• Storage embankment 1 would be located to the Mill Stream tributary and run alongside the R127. 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Upstream of the reservoir embankments, flood risk to agricultural land is increased with water levels in the Mill Stream rising by an average of 0.34m along a 690m length of channel.* *Along the Mill Stream tributary (west of the railway embankment) water levels rise by an average of 0.65m along the modelled reach (i.e. 200m). Downstream of the railway, the increased storage upstream results in reduced water levels along the Mill Stream. Water levels are lowered by an average of 0.24m along 1.1km of river channel. The maximum decrease in water levels is 0.38m.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths are as a result of capacity problems at the entrance to the existing culverts which results in flood water spilling along the R127 and secondary roads at Millar Lane and Sherlock Park. The option prevents these overland flow paths by storing the water upstream of the railway embankment. This option also increases flood plain storage on lands to the west of the railway embankment.*			*Based on hydraulic modelling results, the proposed storage embankments are not significantly high to justify constructing the embankments in combination with larger capacity culverts under the railway embankment. A combined option would have been considered if the required storage embankments were significantly high.Option not considered any further.*		
						Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score
Environmental	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	10	5		Skerries Islands SPA comprises three small, uninhabited islands located between 0.5km and 1.5km off the coast of this APSR. There are no other internationally or nationally designated sites within or adjacent to the APSR. The coastal habitats within the APSR support or have the potential to support legally protected species or other species of conservation concern, although detailed distribution information is not available. This assessment will be revisited following completion of the Appropriate Assessment.			0	No impact on the Skerries Islands SPA due to nature and location of works. Culverts will be installed within an already modified section of the channel so disturbance to flora and fauna will be negligible. Meeting minimum target.	0	0			0			0	Due to the nature and location of this option, no impact on the Skerries Islands SPA will result from its implementation. However, this option will result in the permanent loss of terrestrial habitats beneath the footprint of the embankments, and the species which these support. The operation of these sites as storage reservoirs will result in temporary loss of habitat, with effects on farmland species as a result. Over time, given the predicted frequency of use of this area as a storage reservoir, there is the potential for the area beneath its footprint to experience gradual change in terms of habitat and species which it can support. Overall, due to the nature of habitats to be lost and the potential for localised habitat enhancement, just exceeding minimum target.	1	50			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	5	5		The rocky coastline and islands support or are capable of supporting a variery of sea fish and shellfish species. Balbriggan and Skerries, off the coast of this APSR, are key locations for recreational sea fishing along the east coast of Ireland. Also, rivers and streams in the APSR have a potential recreational use for anglers, though popular angling locations are unknown. There are **Shellfish Waters** at Balbriggan/Skerries, designated under the EU Shellfish Waters Directive.			0	Potential for temporary impacts on fisheries and angling during the construction period, although the works will be undertaken within an already modified section of the watercourse. Just failing minimum target.	-1	-25			0			0	Potential loss/disturbance to riverine habitat and dependent fisheries during construction of riverside embankments, the dam for the storage reservoir and the reservoir iself. Construction may constrain angling access if there is any in the vicinity, although it could present opportunities for enhancement. Just failing minimum target.	-1	-25			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	5	4		The APSR falls within the **Coastal** landscape character area (of exceptional value), parts of which are at risk from flooding. This landscape type is classified as being of high sensitivity. Stretches of the coastal road in the APSR are designated 'Important Views' by Fingal County Council: approx. 500m of the R128 in the south; approx. 500m of the R127 in the north; a 400m stretch fronting the eastern beach; and a 350m stretch fronting the western beach.			0	Temporary adverse change in visual amenity, and potential deterioration in local landscape character, during construction period. However, on completion of works, there will be no long term impacts as there will be no change to above ground structures. Just failing minimum target.	-1	-20			0			0	Permanent adverse change in visual amenity resulting from the introduction of new flood defence structures, and potentially an adverse change to local landscape character (when storage reservoirs in use), within a highly sensitive landscape setting. Partly failing minimum target.	-3	-60			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	5	2		**One site on RPS** at risk (nature of site unknown). **0.1 hectares of Skerries ACA** at risk which represents less than 1% of the total ACA.			0	Option could potentially reduce the level of flood risk to this site. Due to its distance from the works, the historical setting of the site would not be affected. Exceeding minimum target.	1	10			0			0	Option could potentially reduce the level of flood risk to this site. Due to its distance from the works, the historical setting of the site would not be affected. Exceeding minimum target.	1	10			0
	Environmental Total Score/ Weighted Score						0	0		-1	-35		0	0		0	0		-3	-50		0	0
Total Score/ Total Weighted Score							**0**	**0**		**20**	**505**		**0**	**0**		**0**	**0**		**5**	**325**		**0**	**0**

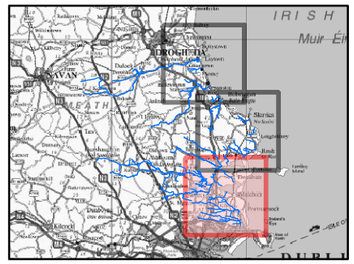
Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Laytown, Bettystown and Coastal areas APSR Option 1**			**Laytown, Bettystown and Coastal areas APSR Option 2**				
				-	**Construction of flood defence embankments to protect properties at risk along the coast and from the Nanny River.**			**Construction of demountable flood defences to protect at risk properties along the coast and from the Nanny River.**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the construction of approximately 0.2km of flood embankments and 0.2km of flood defence walls on the left bank of the River Nanny along the R150 southwest of Laytown. The BCR for this option is 1.2 for the 1% AEP fluvial event and 0.5% AEP tidal event.* *Approximately 210m of flood defence walls are required along the left bank of the Nanny River. Where space is available, the flood walls have been set back from the river bank. Along the R150, there is limited space to set the walls back from the river bank and these walls are constructed to the river bed level.* *The average height of these walls is 1.0m above the top of bank. Immediately downstream of the railway bridge, approximately 240m of flood embankments is required along the left bank of the Nanny River. This embankment is set back from the channel and has an average height of 1.0m. Hydraulic modelling indicates that there is no impact on water levels upstream or downstream of Laytown with this option.* *The results of the hydraulic modelling indicate that an existing overland flood flow path is modified with this option. The construction of the flood defence wall along the left bank of the River Nanny prevents an existing overland flow path (eastwards along the R150 which continues under the railway bridge and into Laytown). There are no areas of significant natural floodplain storage affected by this option.*			*The BCR for this option is 0.7 for the 1% AEP fluvial event and 0.5% AEP tidal event. Given the low BCR, this option is not considered any further.*				
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	5	5	n/a	No human or mechanical intervention is required for operation of this option. Some future maintenance will be required to ensure the embankments retain their flood defence function as designed. Partly achieving aspirational target.	3	75			0			0
	B) Minimise Health and Safety risk of flood risk management options.	5	5	n/a	Construction works are located close to the river channel and close to the R150, therefore significant health and safety risk to construction workers. Health and safety risk to operators/maintenance workers would be very limited. Overall, exceeding minimum target.	1	25			0			0
	C) Ensure flood risk managed effectively and sustainable into future.	5	5	n/a	Option is designed to protect up to the 0.5% AEP but can be adapted to the MRFS at additional cost by increasing height/length of embankments. Meeting minimum target.	0	0			0			0
	Technical Total Score/ Weighted Score					4	100		0	0		0	0
Economic	**A) Minimise economic risk**	25	1	**Average annual damages (AAD) of €47,205**.	This option protects the at risk properties up to the 0.5% AEP event. There will be residual flooding from the 0.1% AEP event but flood damages will be reduced. Partly achieving aspirational target.	3	75			0			0
	B) Minimise risk to transport infrastructure	5	3	**No rail** at risk Approximately **0.45km of Regional (R) roads** at risk (R150).	The R150 is protected by this option up to the 1% AEP. There will be some residual flooding for the 0.1%AEP although the extent of flooding will be reduced. Partly achieving aspirational target.	3	45			0			0
	C) Minimise risk to utility infrastructure	10	0	**No utility assets** at risk	N/A	0	0			0			0
	D) Minimise risk to agricultural land.	5	2	Approximately **11 hectares of agriculture land** not benefitting from flood defences at risk of flooding.	This option has no impact on flood risk to agricuiltural land. Meeting minimum target.	0	0			0			0
	Economic Total Score/ Weighted Score					6	120		0	0		0	0
Social	**A) Minimise risk to human health and life.**	30	2	**10 residential properties** at risk **No high vulnerability properties** at risk from flooding.	This option fully protects properties at risk up to the 1% AEP event and provides reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	180			0			0
	B) Minimise risk to community.	10	1	**1 non residential building** at risk **No high-value social infrastructural assets** at risk	N/A	0	0			0			0
	C) Minimise risk to, or enhance, social amenity.	5	0	**No flood sensitive social amenity sites** at risk	N/A	0	0			0			0
	Social Total Score/ Weighted Score					3	180		0	0		0	0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Laytown, Bettystown and Coastal areas APSR Option 1**			**Laytown, Bettystown and Coastal areas APSR Option 2**				
				-	**Construction of flood defence embankments to protect properties at risk along the coast and from the Nanny River.**			**Construction of demountable flood defences to protect at risk properties along the coast and from the Nanny River.**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the construction of approximately 0.2km of flood embankments and 0.2km of flood defence walls on the left bank of the River Nanny along the R150 southwest of Laytown. The BCR for this option is 1.2 for the 1% AEP fluvial event and 0.5% AEP tidal event.* *Approximately 210m of flood defence walls are required along the left bank of the Nanny River. Where space is available, the flood walls have been set back from the river bank. Along the R150, there is limited space to set the walls back from the river bank and these walls are constructed to the river bed level.* *The average height of these walls is 1.0m above the top of bank. Immediately downstream of the railway bridge, approximately 240m of flood embankments is required along the left bank of the Nanny River. This embankment is set back from the channel and has an average height of 1.0m. Hydraulic modelling indicates that there is no impact on water levels upstream or downstream of Laytown with this option.* *The results of the hydraulic modelling indicate that an existing overland flood flow path is modified with this option. The construction of the flood defence wall along the left bank of the River Nanny prevents an existing overland flow path (eastwards along the R150 which continues under the railway bridge and into Laytown). There are no areas of significant natural floodplain storage affected by this option.*			*The BCR for this option is 0.7 for the 1% AEP fluvial event and 0.5% AEP tidal event. Given the low BCR, this option is not considered any further.*				
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Environmental	**A) Support the objectives of the WFD.**	**5**	**5**	The APSR borders **two transitional (estuarine) waterbodies**: the Boyne Estuary to the north, and Nanny Estuary to the south. Both are classified as being of moderate status. The RBMP reports that the problems constraining achievement of good status relate to pollution pressures from agriculture, dangerous substances and wastewater and industrial discharges. The basic measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) for all waterbodies relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc). The APSR also borders **two coastal waterbodies**: Boyne Estuary Plume Zone and Northwestern Irish Sea (HA08) = high status (i.e. no deterioration allowed).	Potential constraint to the achievement of WFD objectives as the proposed embankments could create a new morphological pressure. Just failing minimum target.	-1	-25			0			0
	B) Minimise risk of environmental pollution	**15**	**0**	**No potential sources of pollution** at risk or present in this APSR	N/A	0	0			0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	**10**	**5**	The Boyne Coast and Estuary SAC/pNHA and the Boyne Estuary SPA is located alongside the northern boundary of the APSR, approximately 2km and 4km respectively from the mouth of the Nanny River. The Nanny River itself is designated as an SPA and in part, a pNHA. The River Nanny Estuary & Shore SPA covers the entire estuary and approximately 3km of shoreline to the north and south of the estuary. It is designated for seven non-breeding waterbird species, five of which occur in nationally important numbers. 7 sites listed on Meath County Council's Wetland Inventory, and 37 sites listed on the Coastal Inventory are present within the APSR. The rivers and their floodplain within the AU support or have the potential to support legally protected species or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available. This assessment will be revisited following completion of the Appropriate Assessment.	Situated approximately 2km from the Boyne Coast & Estuary The new embankments will be situated within 50m of the SPA boundary, but set back at least 75m from the shore. As such, depending on the timing of the construction works, there is the potential for disturbance to roosting birds, which are designated interest features of the SPA. The new walls will be within the SPA boundary, and in places in the estuarine channel itself. As such, there will be permanent loss of estuarine habitat and disturbance to species beneath the footprint of the walls. In addition, there is potential for disturbance to the birds which are designated interest features of the SPA. Partly failing minimum target.	-3	-150			0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	**5**	**5**	All rivers and streams within the APSR support or are capable of supporting salmonid species such as salmon, brown trout and sea trout, and are likely to provide salmonid spawning or nursery areas. Some watercourses within the APSR area are also likely to support brook, river and/or sea lamprey. The estuaries provide spawning, nursery and feeding habitats for a range of fish species, particularly bass, sand goby, grey mullet, flounder and sprat. In addition, important migratory fish species, namely salmon, sea trout, eels and lampreys, pass through on their way to or from their spawning grounds. There are no known barriers to fish movement within the APSR. There are **Shellfish Waters** at Balbriggan/Skerries, off the coastline of this APSR, designated under the EU Shellfish Waters Directive.	Potential for loss/disturbance to estuarine habitat and associated fisheries during the construction of the new flood defence structures within the river bed. Just failing minimum target.	-1	-25			0			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	**5**	**4**	The APSR falls within the **Coastal Plains** and **Nanny Valley** landscape character areas (of regional importance). Both of these landscape types are classified as being of high sensitivity.	Adverse change in visual amenity, and potentially local landscape character, resulting from introduction of new flood defence structures within a highly sensitive landscape setting. Partly failing minimum target.	-3	-60			0			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	**5**	**2**	**2 moderate vulnerability sites on RPS at risk**. These comprise: a detached double-pile four-bay single-storey former house, built c.1870, now in use as an office; and, a detached five-bay three-storey hotel, built c.1847, with return to rear. **No ACAs** at risk.	Both sites will experience a reduced level of flood risk following implementation of this option. However, being situated wthin 100m of a new embankment (1m high), there may be some change to their historical setting. Given the reduction in flood risk, and scale of the new defences, this option is considered to be meeting the minimum target.	0	0			0			0
	Environmental Total Score/ Weighted Score					-8	-260		0	0		0	0
Total Score/ Total Weighted Score						**5**	**140**		**0**	**0**		**0**	**0**

N

2 1 0 2 Km

Location Plan :



FRM OPTIONS MAP

Legend

- FFWS along selected rivers
- Modelled river centreline

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites

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Clients:

Fingal County Council · OPW

Project : FEM FRAMS

Map : Coastal - Option 1

Figure By :	Kevin Daly	Date : 12 Oct 2010
Checked By :	Clare Dewar	Date : 12 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 12 Oct 2010

Figure No. : Coastal/CURS/001/1

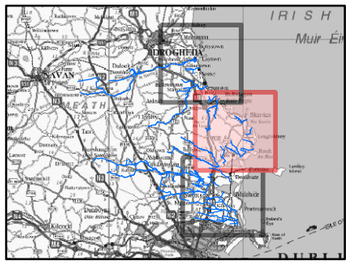
Revision 0

Drawing Scale : 1:54,000 Plot Scale : 1:1 @ A3

N

2 1 0 2 Km

Location Plan :



FRM OPTIONS MAP

Legend

- FFWS along selected rivers
- Modelled river centreline

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites

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Project :
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Map :
Coastal - Option 1

Figure By :	Kevin Daly	Date : 12 Oct 2010
Checked By :	Clare Dewar	Date : 12 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 12 Oct 2010

Figure No. : Coastal/CURS/001/2 — Revision 0

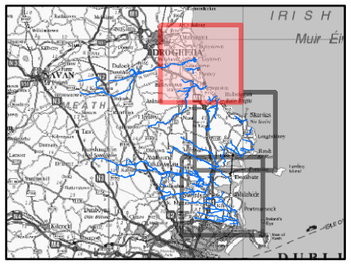
Drawing Scale : 1:54,000 — Plot Scale : 1:1 @ A3

N

2 1 0 2 Km

IRISH SEA

Location Plan :



FRM OPTIONS MAP

Legend

- FFWS along selected rivers
- Modelled river centreline

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
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Risk to Cultural Heritage

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Clients: Fingal County Council, OPW

Project :
FEM FRAMS

Map :
Coastal - Option 1

Figure By :	Kevin Daly	Date : 12 Oct 2010
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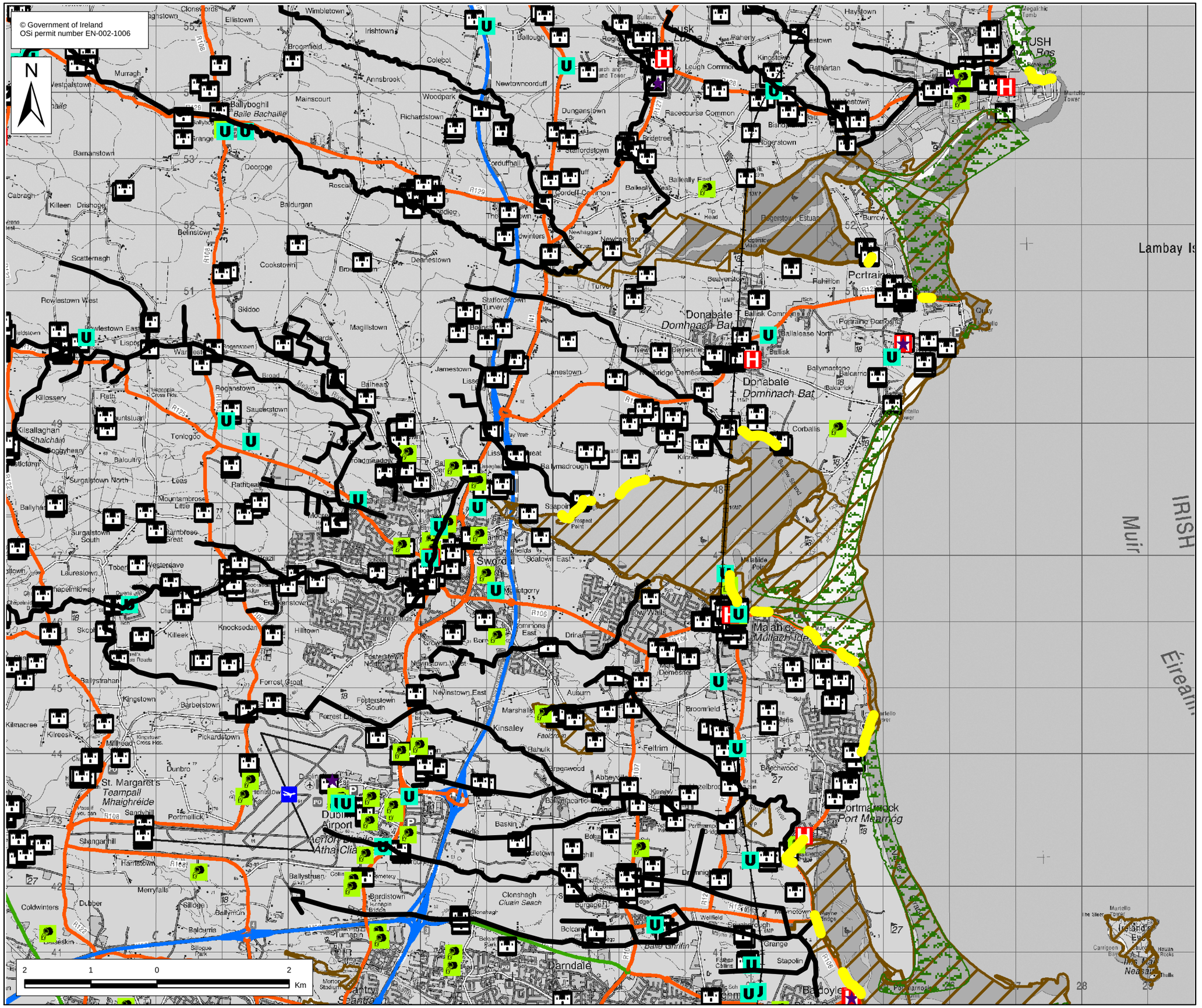
Approved By :	Anne-Marie Conibear	Date : 12 Oct 2010

Figure No. : Coastal/CURS/001/3

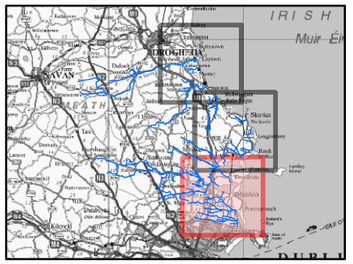
Revision 0

Drawing Scale : 1:54,000

Plot Scale : 1:1 @ A3



Location Plan :



FRM OPTIONS MAP

Legend

- Existing defences to be maintained
- Modelled river centreline

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites

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Fingal County Council
OPW

Project :
FEM FRAMS

Map :
Coastal - Option 2

Figure By :	Kevin Daly	Date : 12 Oct 2010
Checked By :	Clare Dewar	Date : 12 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 12 Oct 2010

Figure No. : Coastal/CURS/002/1

Revision 0

Drawing Scale : 1:54,000

Plot Scale : 1:1 @ A3

N

BALBRIGGAN
Baile Brigin

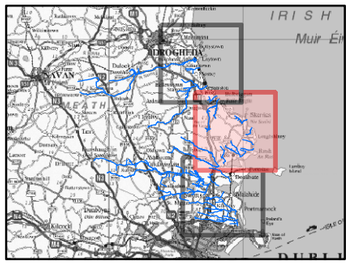
SKERRIES
Na Sceirí

RUSH
Ros

Lambay Island

Km
2 1 0 2

Location Plan :



FRM OPTIONS MAP

Legend

- Existing defences to be maintained
- Modelled river centreline

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
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Risk to Cultural Heritage

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Project :
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Map :
Coastal - Option 2

Figure By :	Kevin Daly	Date : 12 Oct 2010
Checked By :	Clare Dewar	Date : 12 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 12 Oct 2010

Figure No. : Coastal/CURS/002/2
Revision 0

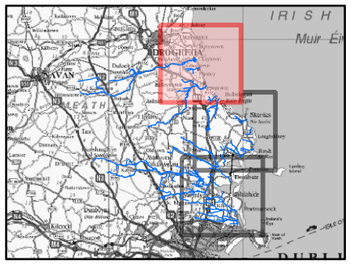
Drawing Scale : 1:54,000
Plot Scale : 1:1 @ A3

N

2 1 0 2 Km

IRISH SEA

Location Plan :



FRM OPTIONS MAP

Legend

- Existing defences to be maintained
- Modelled river centreline

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
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Risk to Cultural Heritage

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Coastal - Option 2

Figure By :	Kevin Daly	Date :	12 Oct 2010
Checked By :	Clare Dewar	Date :	12 Oct 2010
Approved By :	Anne-Marie Conibear	Date :	12 Oct 2010

Figure No. : Coastal/CURS/002/3

Revision 0

Drawing Scale : 1:54,000 Plot Scale : 1:1 @ A3

N

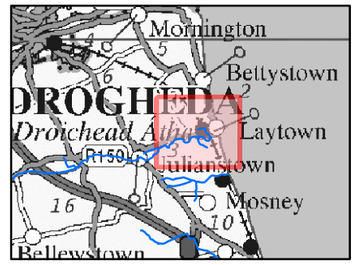
Length (m): 211
Average height above ground level (m): 0.9

Length (m): 239
Average height (m): 1.0

Nanny River

100 50 0 100 m

Location Plan :



FRM OPTIONS MAP

Legend

- Embankments
- Floodwalls
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Fingal County Council
OPW

Project :
FEM FRAMS

Map :
Laytown - option 1

Figure By :	Kevin Daly	Date : 14 Oct 2010
Checked By :	Clare Dewar	Date : 14 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 14 Oct 2010

Figure No. : Laytown/CURS/T/001

Revision 0

Drawing Scale : 1:2,000 Plot Scale : 1:1 @ A3

N

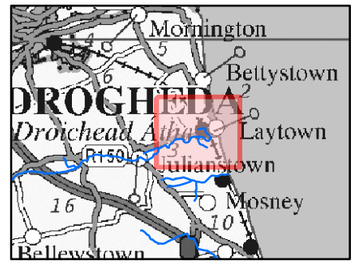
Length (m): 211
Average height above ground level (m): 0.9

Length (m): 239
Average height (m): 0.8

Nanny River

100 50 0 100 m

Location Plan :



FRM OPTIONS MAP

Legend

- Demountable_walls
- Floodwalls
- Def_areas_Laytown_clip

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Fingal County Council

OPW

Project :
FEM FRAMS

Map :
Laytown - Option 2

Figure By :	Kevin Daly	Date : 04 Oct 2010
Checked By :	Clare Dewar	Date : 04 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 04 Oct 2010

Figure No. : Laytown/CURS/T/002

Revision 0

Drawing Scale : 1:2,000 Plot Scale : 1:1 @ A3

N

Malahide estuary

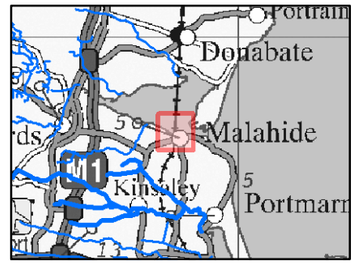
Length (m): 547
Average height (m): 0.6

Length (m): 20

Length (m): 60
Average height (m): 0.9

100 50 0 100 m

Location Plan :



FRM OPTIONS MAP

Legend

- Demountable walls
- Floodwalls
- Improve existing defences
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

USER NOTE :

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Clients:

Project :
FEM FRAMS

Map :
Portmarnock and Malahide areas APSR
Option 5 - Malahide town centre

Figure By :	Kevin Daly	Date : 04 Apr 2011
Checked By :	Clare Dewar	Date : 04 Apr 2011
Approved By :	Anne-Marie Conibear	Date : 04 Apr 2011

Figure No. : Malahide/CURS/T/005

Revision 1

Drawing Scale : 1:3,000

Plot Scale : 1:1 @ A3

N

Malahide estuary

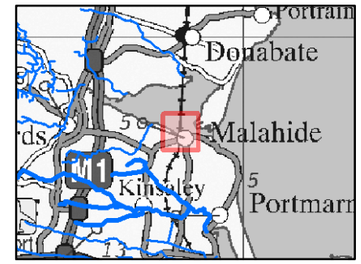
Length (m): 15
Average height (m): 0.5

Length (m): 20

Length (m): 60
Average height (m): 0.9

100 50 0 100 m

Location Plan :



FRM OPTIONS MAP

Legend

- Area defended by option
- Demountable walls
- Floodwalls_Mal_5
- Improve existing defences

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Project :
FEM FRAMS

Map :
Portmarnock and Malahide areas APSR
Option 5a - Malahide town centre

Figure By :	Kevin Daly	Date : 04 Apr 2011
Checked By :	Clare Dewar	Date : 04 Apr 2011
Approved By :	Anne-Marie Conibear	Date : 04 Apr 2011

Figure No. : Malahide/CURS/T/005a

Revision 1

Drawing Scale : 1:3,000

Plot Scale : 1:1 @ A3

N

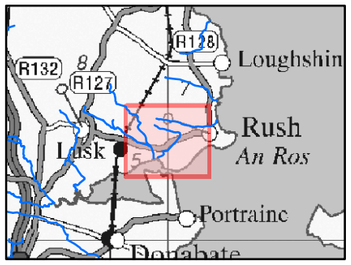
West Rush Stream

Existing Culvert
Length (m): 244
Diameter (m): 0.5
New parallel culvert
Length (m): 244
Diameter (m): 0.5
Combined design flow rate (m^3/s): 1.2

Rogerstown Estuary

100 50 0 100 m

Location Plan :



FRM OPTIONS MAP

Legend

- Improve channel capacity
- Area defended by option

Risk to Critical Infrastructure
- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health
- High vulnerablity sites

Risk to the Environment
- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage
- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Project :
FEM FRAMS

Map :
Rush West - Option 2

Figure By :	Kevin Daly	Date : 20 Oct 2010
Checked By :	Clare Dewar	Date : 20 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 20 Oct 2010

Figure No. : Rushwest/CURS/002
Revision 0

Drawing Scale : 1:2,000 Plot Scale : 1:1 @ A3

N

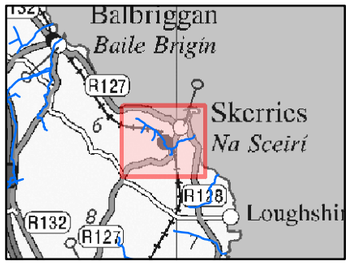
Irish Sea

Mill Stream

120 60 0 120 m

Culvert 1
Length (under railway on main channel) (m): 27
Culvert 1 height (m): 0.72
Culvert 1 width (m): 1.50
Design flow rate (m^3/s): 2.7
Culvert 2
Length (under railway on tributary) (m): 27
Culvert 2 height (m): 0.91
Culvert 2 width (m): 1.30
Design flow rate (m^3/s): 3.45
Culvert 3
Length (under roadway into park): 80
Culvert 3 diameter (m): 1.50
Design flow rate (m^3/s): 5.92

Location Plan :



FRM OPTIONS MAP

Legend

- Improve channel capacity
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Fingal County Council
OPW

Project :
FEM FRAMS

Map :
Skerries APSR - Option 2

Figure By :	Kevin Daly	Date : 20 Oct 2010
Checked By :	Clare Dewar	Date : 20 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 20 Oct 2010

Figure No. :
SkerriesAPSR/CURS/002

Revision
0

Drawing Scale : 1:3,500 Plot Scale : 1:1 @ A3

N

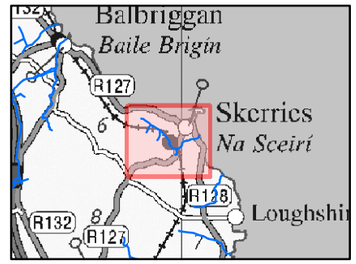
Length (m): 60
Average height (m): 0.7
Maximum storage water level (mAOD): 12.3

Length (m): 110
Average height (m): 1.4
Maximum storage water level (mAOD): 12.64

Mill Stream

100 50 0 100 m

Location Plan :



FRM OPTIONS MAP

Legend

- Storage reservoir embankment
- Flood storage reservoir
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Fingal County Council
OPW

Project :
FEM FRAMS

Map :
Skerries APSR - Option 5

Figure By :	Kevin Daly	Date : 20 Oct 2010
Checked By :	Clare Dewar	Date : 20 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 20 Oct 2010

Figure No. : SkerriesAPSR/CURS/5

Revision 0

Drawing Scale : 1:3,500 Plot Scale : 1:1 @ A3

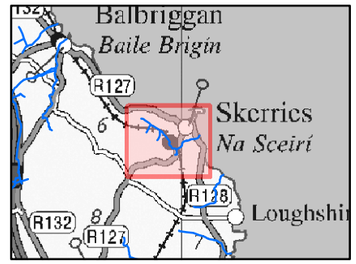
N

Irish Sea

Length (m): 398
Average height raised (m): 0.3

100 50 0 100
m

Location Plan :



FRM OPTIONS MAP

Legend

- Improve existing defences
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Fingal County Council
OPW

Project :
FEM FRAMS

Map :
Skerries APSR - Option 1

Figure By :	Kevin Daly	Date : 18 Oct 2010
Checked By :	Clare Dewar	Date : 18 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 18 Oct 2010

Figure No. : SkerriesAPSR/CURS/T/001

Revision 0

Drawing Scale : 1:3,500 Plot Scale : 1:1 @ A3

N

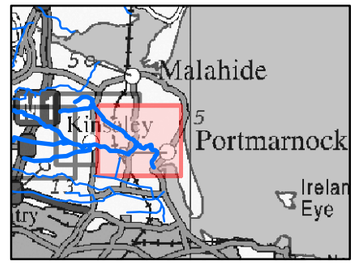
Sluice River

Length (m): 121
Average height (m): 0.6

Length (m): 472

100 50 0 100
m

Location Plan :



FRM OPTIONS MAP

Legend

- Embankments
- Improve existing defences
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Project :
FEM FRAMS

Map :
Portmarnock and Malahide areas APSR
Strand Road - Option 1

Figure By :	Kevin Daly	Date : 17 Jan 2011
Checked By :	Clare Dewar	Date : 17 Jan 2011
Approved By :	Anne-Marie Conibear	Date : 17 Jan 2011

Figure No. :
StrandRd/CURS/T/001

Revision
0

Drawing Scale : 1:2,500 Plot Scale : 1:1 @ A3

N

Sluice River

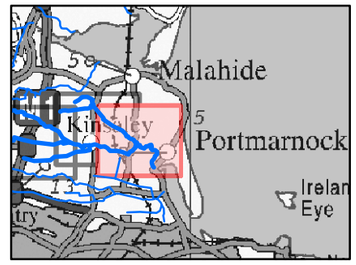
Length (m): 121
Average height (m): 0.6

Length (m): 432

Length (m): 61
Average height (m): 1.4

100 50 0 100
m

Location Plan :



FRM OPTIONS MAP

Legend

- Embankments
- Replacement of flapped gate
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Fingal County Council

OPW

Project :
FEM FRAMS

Map :
Portmarnock and Malahide areas APSR
Strand Road - Option 2

Figure By :	Kevin Daly	Date : 17 Jan 2011
Checked By :	Clare Dewar	Date : 17 Jan 2011
Approved By :	Anne-Marie Conibear	Date : 17 Jan 2011

Figure No. :
StrandRd/CURS/T/002

Revision
0

Drawing Scale : 1:2,500 Plot Scale : 1:1 @ A3

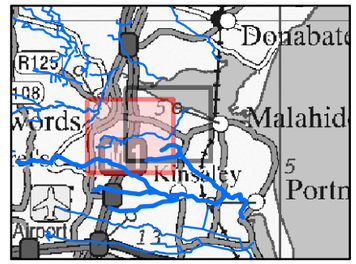
N

Length (m): 178
Average top width widening (m): 2.17
Average bottom width sidening (m): 1.08

Gaybrook Stream

50 25 0 50
m

Location Plan :



FRM OPTIONS MAP

Legend

- Area defended by option
- Improve channel capacity

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Fingal County Council
OPW

Project :
FEM FRAMS

Map :
Swords area APSR - Aspen

Figure By :	Kevin Daly	Date : 14 Oct 2010
Checked By :	Clare Dewar	Date : 14 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 14 Oct 2010

Figure No. :
Swords/Aspen/CURS/001

Revision
0

Drawing Scale : 1:1,500

Plot Scale : 1:1 @ A3

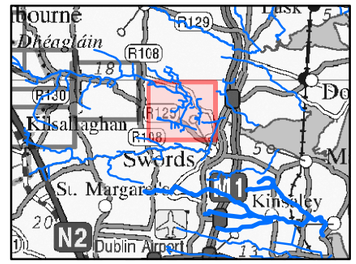
N

Broadmeadow river

Length (m): 153
Average height (m): 2.77

50 25 0 50 m

Location Plan :



FRM OPTIONS MAP

Legend

- Area defended by option
- Floodwalls

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

USER NOTE :

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32 Dartry Road
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Clients:

Project :
FEM FRAMS

Map :
Swords area APSR - Town centre

Figure By :	Kevin Daly	Date : 07 Oct 2010
Checked By :	Clare Dewar	Date : 07 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 07 Oct 2010

Figure No. :
Swords/town/CURS/001

Revision
0

Drawing Scale : 1:1,500

Plot Scale : 1:1 @ A3

E3 Mayne and Sluice

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Mayne & Sluice AU Option 1**							
				-	**Develop a fluvial FFWS for the Mayne River**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning involves the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities.* *A FFWS for the Mayne River would provide advance flood warning to properties at risk along the Mayne River in St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR.*							
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	5	5	n/a	Some mechanical and human intervention required for the fluvial forecasting & warning system. Computer models and rainfall/flow gauges would require regular maintenance. Option reliant on certainty of flood warning system, therefore just meets minimum target.	0	0			0			0
	B) Minimise Health and Safety risk of flood risk management options.	5	5	n/a	Limited health and safety risk to construction workers involved with the installation of the gauges (2 flow and 5 TBR) for the flood forecasting & warning system as only limited work adjacent to river channels .	3	75			0			0
	C) Ensure flood risk managed effectively and sustainable into future.	5	5	n/a	Option will continue to be operational in MRFS/HEFS conditions, therefore meets aspirational target.	5	125			0			0
	Technical Total Score/ Weighted Score					8.0	200		0	0		0	0
Economic	**A) Minimise economic risk**	25	1	**Average annual damages of €47,028**	This option is likely to result in a limited reduction in damages (~20%), thus partly exceeding the minimum target and scoring 1.	1	25			0			0
	B) Minimise risk to transport infrastructure	5	4	Approximately **0.1km of National Primary (NP)** roads and 0.6km of Regional (R) roads at risk	Option would have no impact on the transport infrastructure at risk. Meeting minimum target as no increase in risk to transport infrastructure.	0	0			0			0
	C) Minimise risk to utility infrastructure	10	0	**0 utility infrastructure assets** at risk	N/A	0	0			0			0
	D) Minimise risk to agricultural land.	5	2	Approximately **31 hectares of agriculture** land not benefiting from flood defences at risk of flooding. This represents approximately 1.5% of the total agricultural land in the AU.	Option would have no impact on the agricultural land at risk. Meeting minimum target as no increase in risk to agricultural land.	0	0			0			0
	Economic Total Score/ Weighted Score					1.0	25		0	0		0	0
Social	**A) Minimise risk to human health and life.**	30	2	**28 residential properties** including 1 in Kinsaley Lane area APSR and 19 in St Margarets, Dublin Airport, Belcamp, Balgriffin APSR at risk. **0 high vulnerability properties** at risk	Option would not reduce flood risk to residential properties. Number of properties located in at risk areas would remain the same. Therefore, just meeting minimum target.	0	0			0			0
	B) Minimise risk to community.	10	2	**3 non-residential properties** at risk including 1 in Kinsaley Lane area APSR and 2 in St Margarets, Dublin Airport, Belcamp, Balgriffin APSR. **0 high-value social infrastructural assets** at risk from flooding	Option would not reduce flood risk to non-residential buildings. Number of properties located in at risk areas would remain the same. Therefore, just meeting minimum target.	0	0			0			0
	C) Minimise risk to, or enhance, social amenity.	5	2	**1 Golf course** at risk at Forrest Little **Sports pitches** at ALSAA sports complex near Dublin Airport	Option would have no impact on the number of social amenity sites at risk. Meeting minimum target as no increase in risk to social amenity sites.	0	0			0			0
	Social Total Score/ Weighted Score					0.0	0		0	0		0	0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Mayne & Sluice AU Option 1**							
				-	**Develop a fluvial FFWS for the Mayne River**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning involves the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities.* *A FFWS for the Mayne River would provide advance flood warning to properties at risk along the Mayne River in St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR.*							
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Environmental	**A) Support the objectives of the WFD.**	**5**	**5**	The Sluice River is classified as a "High" status river water body, which means that this highly senstive and valuable status should be maintained and no deterioration allowed. The Mayne River is classified as a "Poor" status river water body, which means that measures are required to achieve "Good" status by 2027. The RBMP reports that problems constraining achievement of good status include high nutrients (phosphorus), oxygen demand, low ecological rating and inferior habitat, with the principal pressure within the WMU (which also includes the Santry River to the south of the study area/AU), wastewater and industrial discharges and diffuse pollution. The measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc) and to ensure compliance with OPW Environmental Drainage Maintenance Guidance Notes	No contribution nor constraint to the achievement of WFD objectives as there will be no physical works within or modification to the river channels and adjacent land. Meeting minimum target.	0	0			0			0
	B) Minimise risk of environmental pollution	**15**	**5**	Within the AU, there are **6 Waste Management Permit Sites** at risk (1% AEP fluvial event), all of which are located along the Sluice River (note that the 6 sites refer to 6 separate licence numbers issued for one WMP site). The following are present in the AU: **4 Section 4 licences** and **18 Section 16 licences.**	No positive or negative change in flood risk to potentially polluting sites within the AU as no intervention involved. Meeting minimum target.	0	0			0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	**10**	**5**	Within the AU boundary, **Feltrim Hill pNHA** (thought to be a geological site) is at risk from flooding. 16 hectares are at risk (1% AEP fluvial event) which represents 40% of the overall area of this pNHA. Approximately 1.5km downstream of the AU is the **Baldoyle Bay SAC/SPA/Ramsar site**/pNHA. The bay contains large areas of sandflats, mudflats and saltmarshes, and supports internationally important wintering populations of Brent geese as well as nationally important populations of a further seven waterfowl species. Changes in the catchment, which alter the flooding regime and freshwater input into the estuary could potentially affect the nature, extent and character of intertidal habitat for which the site is designated, with associated impacts on designated waterbird populations. The rivers and their floodplain within the AU support or have the potential to support legally protected species or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available. This assessment will be revisited following completion of the Appropriate Assessment.	No impacts are anticipated on potentially sensitive riverine habitats or associated fauna (located within or outside the designated nature conservation sites) as there will be no physical works within channels or modification to the river channels or adjacent land. Meeting minimum target.	0	0			0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	**5**	**3**	The Mayne and Sluice rivers and other streams within the AU are capable of supporting salmonid species and potentially provide salmonid spawning or nursery areas. There is also the potential that these watercourses may support brook, river and or sea lamprey. There are no fisheries designations within the AU (e.g. Salmonid Waters). There are known areas of angling activity along rivers in the AU, though the exact locations of popular angling areas are unknown. A sluice gate on the Sluice River provides a barrier to fish movement (migratory salmon).	No impacts on fisheries or angling activity as there will be no physical works within or modification to the river channels. Meeting minimum target.	0	0			0			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	**5**	**3**	The AU falls within the **Low Lying Agricultural** landscape character area, classified as being of modest value and medium sensitivity. Fingal County Council also designates 'Important Views'; though none are present within the AU.	No change in landscape character and visual amenity as there will be no physical works or modifications within or adjacent to the river channels in the Mayne sub-catchment. Meeting minimum target.	0	0			0			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	**5**	**3**	**6 Sites on SMR/RMP** at risk (1% AEP fluvial event). 4 sites unique to RMP (a habitation site, a possible castle site and dwelling at Balgriffin Park and a MOND). The remaining 2 sites are unique to the SMR: a Ringfort - cashel at Feltrim and a building at Balgriffin Park. There is one ACA present in the AU; **Abbeyville ACA, of which 5.4ha is at risk**, representing approximately 15% of the total ACA.	There will be no positive or negative change in risk to 6 sites on the SMR/RPS/RMP (through either direct impacts or impacts on setting) as there will be no physical works as a result of this option. Meeting minimum target.	0	0			0			0
	Environmental Total Score/ Weighted Score					0	0		0	0		0	0
Total Score/ Total Weighted Score						**9**	**225**		**0**	**0**		**0**	**0**

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR Option 1			St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR Option 1a				
				-	Improving channel conveyance by replacing existing culverts together with construction of flood defence embankments (Balgriffin).			Improving channel conveyance by replacing existing culverts together with construction of flood defence embankments (Balgriffin).				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the construction of a flood defence embankment north of the R123 on the Mayne River tributary and the construction of embankments and walls along the left bank of the Mayne River and tributary at Balgriffin. Hydraulic modelling indicates that replacing existing culverts is not necessary as part of this option. The BCR for this option is 1.2* *Modelling results indicate that the existing culverts under the R123 and the new development at Balgriffin are sufficient to accommodate the 1% AEP event without surcharging. An under capacity channel north of the R123 results in flood water to spilling southwards across the R123 and flooding the housing development at Balgriffin. A 280m embankment with an average height of 0.7m running east west along the R123 prevents flood water spilling south across the R123.* *Further downstream, a 200m long embankment with an average height of 0.7m is required on the left bank of the Mayne River and its tributary to prevent out of bank flooding downstream. This embankment is linked to a flood wall on the Mayne River, 50m in length, with an average height of 2.4m (due to space constraints, wall constructed to the bed of the channel). Average height of this wall above ground level is approximately 0.6m.* *Modelling results indicate that this option will have some localised impact on water levels upstream and downstream of the proposed location for this option. Upstream of the R123, water levels on the Mayne River tributary are raised by an average of 0.2m along a 250m stretch of the channel. Downstream of the R123, water levels on the Mayne River and its tributary are raised by an average of 0.15m along 430m of river channel. Downstream of the bridge at The Hollow, there are no changes in water levels.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths from the Mayne River tributary (southwards across the R123) are as a result of capacity problems at existing old stone bridge structure and lead to the flooding of properties at Balgriffin. The option prevents these overland flow paths through increasing the capacity of the structures. There are no areas of significant natural floodplain storage affected by this option.*			*This option involves the construction of a flood defence embankment north of the R123 on the Mayne River tributary and the construction of embankments and walls along the left bank of the Mayne River and tributary at Balgriffin. The option also involves removing an unused bridge structure north of the R123. Hydraulic modelling indicates that this unused bridge increases water levels locally. By removing this bridge structure, the extent and height of embankments to the north of the R123 will be reduced. Hydraulic modelling also indicates that replacing existing culverts at the R123 and housing development at Balgriffin is not necessary as part of this option as they are sufficient to accommodate the 1% AEP event without surcharging. The BCR for this option is 1.3.* *A 280m embankment with an average height of 0.5m running east west along the R123 is required to prevent flood water spilling south across the R123. Further downstream, a 200m long embankment with an average height of 0.7m is required on the left bank of the Mayne River and its tributary to prevent out of bank flooding downstream. This embankment is linked to a flood wall on the Mayne River, 50m in length, with an average height of 2.4m (due to space constraints, wall constructed to the bed of the channel). The average height of this wall above ground level is approximately 0.6m.* *Modelling results indicate that this option will have some localised impact on water levels upstream and downstream of the proposed location for this option. Upstream of the R123, water levels on the Mayne River tributary are lowered by an average of 0.12m along a 120m stretch of the channel. Downstream of the R123, water levels on the Mayne River and its tributary are raised by an average of 0.16m along 430m of river channel. Downstream of the bridge at The Hollow, there are no changes in water levels.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths from the Mayne River tributary (southwards across the R123) are as a result of capacity problems at existing old stone bridge structure and lead to the flooding of properties at Balgriffin. The option prevents these overland flow paths through increasing the capacity of the structures. There are no areas of significant natural floodplain storage affected by this option.*				
					Comments	Score	Weighted Score	Comments	Score	Weighted Score	Comments	Score	Weighted Score
Technical	A) Ensure Flood Risk Management options are operationally robust.	5	5	n/a	No human or mechanical intervention is required for operation of this option. Some future maintenance will be required to ensure the embankments and walls retain their flood defence function as designed. Partly achieving aspirational target.	3	75	No human or mechanical intervention is required for operation of this option. Some future maintenance will be required to ensure the embankments and walls retain their flood defence function as designed. Partly achieving aspirational target.	3	75			0
	B) Minimise Health and Safety risk of flood risk management options.	5	5	n/a	Construction works are located close to the river channel and close to the R123, therefore significant health and safety risk to construction workers. Health and safety risk to operators/maintenance workers would be very limited. Overall, exceeding minimum target.	1	25	Demolition and construction works are located close to the river channel and close to the R123, therefore significant health and safety risk to construction workers. Health and safety risk to operators/maintenance workers would be very limited. Overall, exceeding minimum target.	1	25			0
	C) Ensure flood risk managed effectively and sustainable into future.	5	5	n/a	Option is designed to protect up to the 1% AEP but can be adapted to the MRFS at additional cost by increasing height/length of embankments and walls. Meeting minimum target.	0	0	Option is designed to protect up to the 1% AEP but can be adapted to the MRFS at additional cost by increasing height/length of embankments and walls. Meeting minimum target.	0	0			0
	Technical Total Score/ Weighted Score					4	100		4	100		0	0
Economic	A) Minimise economic risk	25	1	**Average annual damages (AAD) of €25,176**. AAD at Balgriffin is €24866.	This option protects the at risk properties up to the 1% AEP event. There will be residual flooding from the 0.1% AEP event but flood damages will be reduced. Partly achieving aspirational target.	3	75	This option protects the at risk properties up to the 1% AEP event. There will be residual flooding from the 0.1% AEP event but flood damages will be reduced. Partly achieving aspirational target.	3	75			0
	B) Minimise risk to transport infrastructure	5	4	Approximately **0.1km of National Primary** roads and **0.6km of Regional** roads at risk.	The R123 is protected by this option up to the 1% AEP. There will be some residual flooding for the 0.1%AEP although the extent of flooding will be reduced. Partly achieving aspirational target.	3	60	The R123 is protected by this option up to the 1% AEP. There will be some residual flooding for the 0.1%AEP although the extent of flooding will be reduced. Partly achieving aspirational target.	3	60			0
	C) Minimise risk to utility infrastructure	10	0	**0 utility infrastructure assets** at risk	N/A	0	0	N/A	0	0			
	D) Minimise risk to agricultural land.	5	1	Approximately **5 hectares of agriculture land** not benefiting from flood defences at risk of flooding.	This option results in a small increase in flood risk to agricultural land upstream of the R123 due to the construction of the embankment. Therefore, just failing minimum target.	-1	-5	This option results in an small increase in flood risk to agricultural land upstream of the R123 due to the construction of the embankment. Therefore, just failing minimum target.	-1	-5			0
	Economic Total Score/ Weighted Score					5	130		5	130		0	0
Social	A) Minimise risk to human health and life.	30	2	**19 residential properties** at risk. **0 high vulnerability properties** at risk	This option fully protects properties at risk up to the 1% AEP event and provides reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	180	This option fully protects properties at risk up to the 1% AEP event and provides reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	180			0
	B) Minimise risk to community.	10	1	**2 non-residential properties** at risk **0 high-value social infrastructural assets** at risk from flooding	This option fully protects the non-residential properties at risk up to the 1% AEP event and provides reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	30	This option fully protects the non-residential properties at risk up to the 1% AEP event and provides reduction in risk from the 0.1% AEP event. Therefore, partly achieving aspirational target.	3	30			0
	C) Minimise risk to, or enhance, social amenity.	5	1	**Sports pitches** at ALSAA sports complex near Dublin Airport	Option would have no impact on sports pitches. Meeting minimum target.	0	0	Option would have no impact on sports pitches. Meeting minimum target.	0	0			0
	Social Total Score/ Weighted Score					6	210		6	210		0	0
	A) Support the objectives of the WFD.	5	5	The APSR contains areas of three river waterbodies: 1 = high status; 2 = poor status. The RBMP reports that problems constraining achievement of good status include high nutrients (phosphorus), oxygen demand, low ecological rating and inferior habitat, with the principal pressure within the WMU (which also includes the Santry River to the south of the study area/AU) are wastewater and industrial discharges and diffuse pollution.	Potential constraint to the achievement of WFD objectives as the proposed floodwalls could create a new morphological pressure. Just failing minimum target.	-1	-25	Potential constraint to the achievement of WFD objectives as the proposed floodwalls could create a new morphological pressure. Just failing minimum target.	-1	-25			0
	B) Minimise risk of environmental pollution	15	0	**No Waste Management Permit Sites** at risk. **Six Section 4** and **17 Section 16 licenses** granted in the APSR - these sites are not at risk of flooding	No sites at risk; no change anticipated. All Section 4 and Section 16 licenses are held in locations outside of the area anticipated to experience a change in water level. Thus, no risk to water quality anticipated. Meeting minimum target.	0	0	No sites at risk; no change anticipated. All Section 4 and Section 16 licenses are held in locations outside of the area anticipated to experience a change in water level. Thus, no risk to water quality anticipated. Meeting minimum target.	0	0			0

	Objectives	Global Weighting	Local Weighting	Baseline	Comments	Score	Weighted Score	St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR Option 1	Comments	Score	Weighted Score	St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR Option 1a	Comments	Score	Weighted Score
				-				Improving channel conveyance by replacing existing culverts together with construction of flood defence embankments (Balgriffin).				Improving channel conveyance by replacing existing culverts together with construction of flood defence embankments (Balgriffin).			
				Baseline option assumes continuation of any existing maintenance regime in the study area				*This option involves the construction of a flood defence embankment north of the R123 on the Mayne River tributary and the construction of embankments and walls along the left bank of the Mayne River and tributary at Balgriffin. Hydraulic modelling indicates that replacing existing culverts is not necessary as part of this option. The BCR for this option is 1.2* *Modelling results indicate that the existing culverts under the R123 and the new development at Balgriffin are sufficient to accommodate the 1% AEP event without surcharging. An under capacity channel north of the R123 results in flood water to spilling southwards across the R123 and flooding the housing development at Balgriffin. A 280m embankment with an average height of 0.7m running east west along the R123 prevents flood water spilling south across the R123.* *Further downstream, a 200m long embankment with an average height of 0.7m is required on the left bank of the Mayne River and its tributary to prevent out of bank flooding downstream. This embankment is linked to a flood wall on the Mayne River, 50m in length, with an average height of 2.4m (due to space constraints, wall constructed to the bed of the channel). Average height of this wall above ground level is approximately 0.6m.* *Modelling results indicate that this option will have some localised impact on water levels upstream and downstream of the proposed location for this option. Upstream of the R123, water levels on the Mayne River tributary are raised by an average of 0.2m along a 250m stretch of the channel. Downstream of the R123, water levels on the Mayne River and its tributary are raised by an average of 0.15m along 430m of river channel. Downstream of the bridge at The Hollow, there are no changes in water levels.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths from the Mayne River tributary (southwards across the R123) are as a result of capacity problems at existing old stone bridge structure and lead to the flooding of properties at Balgriffin. The option prevents these overland flow paths through increasing the capacity of the structures. There are no areas of significant natural floodplain storage affected by this option.*			*This option involves the construction of a flood defence embankment north of the R123 on the Mayne River tributary and the construction of embankments and walls along the left bank of the Mayne River and tributary at Balgriffin. The option also involves removing an unused bridge structure north of the R123. Hydraulic modelling indicates that this unused bridge increases water levels locally. By removing this bridge structure, the extent and height of embankments to the north of the R123 will be reduced. Hydraulic modelling also indicates that replacing existing culverts at the R123 and housing development at Balgriffin is not necessary as part of this option as they are sufficient to accommodate the 1% AEP event without surcharging. The BCR for this option is 1.3.* *A 280m embankment with an average height of 0.5m running east west along the R123 is required to prevent flood water spilling south across the R123. Further downstream, a 200m long embankment with an average height of 0.7m is required on the left bank of the Mayne River and its tributary to prevent out of bank flooding downstream. This embankment is linked to a flood wall on the Mayne River, 50m in length, with an average height of 2.4m (due to space constraints, wall constructed to the bed of the channel). The average height of this wall above ground level is approximately 0.6m.* *Modelling results indicate that this option will have some localised impact on water levels upstream and downstream of the proposed location for this option. Upstream of the R123, water levels on the Mayne River tributary are lowered by an average of 0.12m along a 120m stretch of the channel. Downstream of the R123, water levels on the Mayne River and its tributary are raised by an average of 0.16m along 430m of river channel. Downstream of the bridge at The Hollow, there are no changes in water levels.* *The results of the modelling indicate that existing overland flood flow paths are modified with this option. These existing overland flow paths from the Mayne River tributary (southwards across the R123) are as a result of capacity problems at existing old stone bridge structure and lead to the flooding of properties at Balgriffin. The option prevents these overland flow paths through increasing the capacity of the structures. There are no areas of significant natural floodplain storage affected by this option.*					
Environmental	**C) Avoid damage to, and where possible enhance, the flora and fauna of the study area**	10	5	There are **no internationally or nationally designated nature conservation sites** within the APSR. However, approximately 1.5km downstream is the Baldoyle Bay SAC/SPA/Ramsar site/pNHA. This bay contains large areas of sandflats, mudflats and saltmarshes, and supports internationally important wintering populations of Brent geese as well as nationally important populations of a further seven waterfowl species. Changes in the catchment, which alter the flooding regime and freshwater input into the estuary could potentially affect the nature, extent and character of intertidal habitat for which the site is designated, with associated impacts on designated waterbird populations. The river primarily runs through rural areas in this APSR, and, although modified along short stretches, is likely to be of biodiversity interest. The river and other channels within the APSR, and their floodplain, support or have the **potential to support legally protected species** or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available. This assessment will be revisited following completion of the Appropriate Assessment.			Increased conveyance through this channel and the introduction of new flood embankments and a floodwall is likely to change the pattern of flow downstream of the APSR during a 1% AEP flood event (1 in 100 chance in any given year), and possibly during a 10% AEP flood event (1 in 10 chance). In particular, for Baldoyle Bay pNHA and Baldoyle Bay SAC/SPA (approx 1.5km downstream and 2km downstream of proposed works respectively), there is the potential for these sites to be affected by a change in freshwater input during flood events. However, any effects on these designated sites are expected to be localised. This assessment will be updated on completion of the Appropriate Assessment. Undertaking works within the channel is anticipated to result in disturbance to and potential loss of riverine and terrestrial habitats and species, albeit localised, particularly given that these sections of the channel appear to be un-modified. Overall, option considered to be partly failing minimum target.	-1	-50	Increased conveyance through this channel and the introduction of new flood embankments and a floodwall is likely to change the pattern of flow downstream of the APSR during a 1% AEP flood event (1 in 100 chance in any given year), and possibly during a 10% AEP flood event (1 in 10 chance). In particular, for Baldoyle Bay pNHA and Baldoyle Bay SAC/SPA (approx 1.5km downstream and 2km downstream of proposed works respectfully), there is the potential for these sites to be affected by a change in the pattern of freshwater input. However, any effects on these designated sites are expected to be localised. Undertaking works within the channel is anticipated to result in disturbance to and potential loss of riverine and terrestrial habitats and species, albeit localised, particularly given that these sections of the channel appear to be un-modified. Overall, option considered to be partly failing minimum target.	-1	-50			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	5	2	The Mayne river is capable of supporting salmonid species and potentially provide salmonid spawning or nursery areas. There is also the potential that these watercourses may support brook, river and or sea lamprey. There are no fisheries designations within the APSR (e.g. Salmonid Waters). There are known areas of angling activity along rivers in the APSR, though the exact locations of popular angling areas are unknown. **A sluice gate** on the Sluice River provides a barrier to fish movement (migratory salmon).			Potential loss of/disturbance to riverine habitat and dependent fisheries during the construction of the flood embankments and flood walls to the channel floor. Having reviewed aerial photographs of the works area, no impacts on angling activity are anticipated. Just failing minimum target.	-1	-10	Potential loss of/disturbance to riverine habitat and dependent fisheries during the construction of the flood embankments and flood walls to the channel floor, and also during removal of the bridge. Having reviewed aerial photographs of the works area, no impacts on angling activity are anticipated. Just failing minimum target.	-1	-10			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	5	3	The APSR falls within the **Low Lying Agricultural** landscape character area, classified as being of modest value and medium sensitivity. Fingal County Council also designates 'Important Views'; though none are present within the APSR.			Adverse change in visual amenity (though there are no Important Views present), and potentially local landscape character, resulting from introduction of new flood defence structures within a sensitive landscape setting [medium sensitivity]. Just failing minimum target.	-1	-15	Adverse change in visual amenity (though there are no Important Views present), and potentially local landscape character, resulting from introduction of new flood defence structures within a sensitive landscape setting [medium sensitivity]. Removal of old bridge may also result in a change to local landscape character. Just failing minimum target.	-1	-15			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	5	2	**4 Sites on SMR/RMP at risk** (1% AEP fluvial event). 3 sites unique to RMP (a possible castle site and dwelling at Balgriffin Park, and classcode MOND). The remaining site, a building at Balgriffin Park, is unique to the SMR. No ACAs present.			Balgriffin Park is located approximately 350m from the proposed works. Due to the height of the proposed embankments/wall under 1m and the intervening vegetation and buildings, no effects on the historical setting of these features are anticipated. Flood risk to these features will not change as a result of the proposed works. Meeting minimum target.	0	0	Balgriffin Park is located approximately 350m from the proposed works. Due to the height of the proposed embankments/wall under 1m and the intervening vegetation and buildings, no effects on the historical setting of these features are anticipated. Flood risk to these features will not change as a result of the proposed works. Meeting minimum target.	0	0			0
	Environmental Total Score/ Weighted Score									-4	-100			-4	-100			0	0
Total Score/ Total Weighted Score										**11**	**340**			**11**	**340**			**0**	**0**

N

Length (m): 284
Average height (m): 0.7

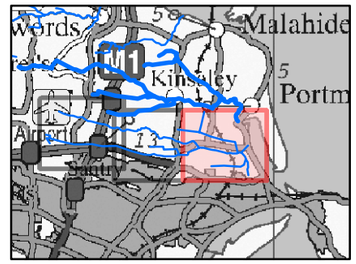
Length (m): 200
Average height (m): 0.7

Length (m): 49
Average height above ground level (m): 0.6

Mayne River

100 50 0 100 m

Location Plan :



FRM OPTIONS MAP

Legend

- Embankments
- Floodwalls
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

USER NOTE :

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE

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Clients:

Fingal County Council

OPW

Project :
FEM FRAMS

Map :
Balgriffin - Option 1

Figure By :	Kevin Daly	Date : 07 Oct 2010
Checked By :	Clare Dewar	Date : 07 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 07 Oct 2010

Figure No. :
Balgriffin/CURS/001

Revision
0

Drawing Scale : 1:2,000 Plot Scale : 1:1 @ A3

N

Length (m): 284
Average height (m): 0.5

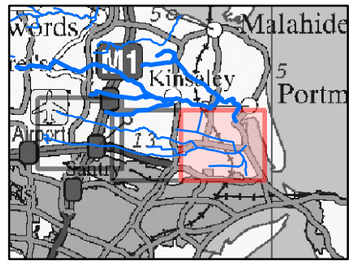
Length (m): 200
Average height (m): 0.7

Length (m): 49
Average height above ground level (m): 0.6

Mayne River

100 50 0 100 m

Location Plan :



FRM OPTIONS MAP

Legend

- Embankments
- Removal of old bridge constricting flow
- Floodwalls
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients: Fingal County Council; OPW

Project : FEM FRAMS

Map : Balgriffin - Option 1a

Figure By :	Kevin Daly	Date : 17 Jan 2011
Checked By :	Clare Dewar	Date : 17 Jan 2011
Approved By :	Anne-Marie Conibear	Date : 17 Jan 2011

Figure No. : Balgriffin/CURS/001a

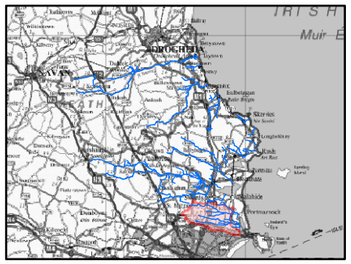
Revision 0

Drawing Scale : 1:2,000 Plot Scale : 1:1 @ A3

N

0.8 0.4 0 0.8 Km

Location Plan :



FRM OPTIONS MAP

Legend

- FFWS along Mayne River
- Modelled river centreline

Risk to Critical Infrastructure

- U — Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- H — High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites

USER NOTE :

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Project :
FEM FRAMS

Map :
Mayne and Sluice - Option 1

Figure By :	Kevin Daly	Date : 04 Oct 2010
Checked By :	Clare Dewar	Date : 04 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 04 Oct 2010

Figure No. : MayneSluiceAU/CURS/001
Revision 0

Drawing Scale : 1:30,000
Plot Scale : 1:1 @ A3

E4 Nanny and Delvin

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Nanny and Delvin AU Option 1**							
				-	**Develop a fluvial FFWS for the Nanny River**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning involves the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities.* *A FFWS for the Nanny River would provide advance flood warning to properties at risk along the Nanny River including properties in Duleek area APSR and properties in rural areas along the watercourse.*							
					Comments	**Score**	**Weighted Score**				**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	**5**	**5**	n/a	Some mechanical and human intervention required for the fluvial forecasting & warning system. Computer models and rainfall/flow gauges would require regular maintenance. Option reliant on certainty of flood warning system, therefore just meets minimum target.	0	0			0			0
	B) Minimise Health and Safety risk of flood risk management options.	**5**	**5**	n/a	Limited health and safety risk to construction workers involved with the installation of the gauges (2 flow and 5 TBR) for the flood forecasting & warning system as only limited work adjacent to river channels .	3	75			0			0
	C) Ensure flood risk managed effectively and sustainable into future.	**5**	**5**	n/a	Option will continue to be operational in MRFS/HEFS conditions, therefore meets aspirational target.	5	125			0			0
	Technical Total Score/ Weighted Score					8	200			0		0	0
Economic	**A) Minimise economic risk**	**25**	**1**	**Average annual damages** of €95,311	This option is likely to result in a limited reduction in damages (~20%), thus partly exceeding the minimum target and scoring 1.	1	25			0			0
	B) Minimise risk to transport infrastructure	**5**	**3**	Approximately **1.5km of Regional (R.)** roads at risk for the 1% AEP fluvial event (50m of R roads at risk in Duleek area APSR)	Option would have no impact on the transport infrastructure at risk. Meeting minimum target as no increase in risk to transport infrastructure.	0	0			0			0
	C) Minimise risk to utility infrastructure	**10**	**2**	**1 utilities** (ESB, GAS and EIRCOM utilities) at risk in Stamullen area APSR. Risk id for the 1% AEP fluvial event.	Option would have no impact on the number of utility infrastructure assets at risk. Meeting minimum target as no increase in risk to utility infrastructure.	0	0			0			0
	D) Minimise risk to agricultural land.	**5**	**4**	**485 hectares of agriculture l**and not benefiting from flood defences at risk of flooding (1% AEP fluvial event). This represents approximately 1.5% of the total agricultural land in the AU.	Option would have no impact on the agricultural land at risk. Meeting minimum target as no increase in risk to agricultural land.	0	0			0			0
	Economic Total Score/ Weighted Score					1	25			0		0	0
Social	**A) Minimise risk to human health and life.**	**30**	**2**	**15 residential properties at risk** with 5 at risk in Duleek area APSR (1% AEP fluvial event)	Option would not reduce flood risk to residential properties. Number of properties located in at risk areas would remain the same. Therefore, just meeting minimum target.	0	0			0			0
	B) Minimise risk to community.	**10**	**2**	**5 non-residential buildings** at risk (1% AEP fluvial event).	Option would not reduce flood risk to non-residential buildings. Number of properties located in at risk areas would remain the same. Therefore, just meeting minimum target.	0	0			0			0

	Objectives	Global Weighting	Local Weighting	Options								
				Baseline	**Nanny and Delvin AU Option 1**							
				-	**Develop a fluvial FFWS for the Nanny River**							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning involves the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities.* *A FFWS for the Nanny River would provide advance flood warning to properties at risk along the Nanny River including properties in Duleek area APSR and properties in rural areas along the watercourse.*							
					Comments	**Score**	**Weighted Score**				**Comments**	**Score**	**Weighted Score**
	C) Minimise risk to, or enhance, social amenity.	**5**	**0**	No social amenity sites at risk	N/A	0	0			0			0
	Social Total Score/ Weighted Score					0	0			0		0	0
Environmental	**A) Support the objectives of the WFD.**	**5**	**5**	AU contains the Nanny WMU and the Delvin AMU. The 13 river waterbodies within the **Nanny WMU** are of moderate (7) and poor (6) status which means that improvements in status are required. The RBMP reports that problems constraining achievement of good status include high nutrients (phosphorus), low oxygen saturation, low ecological rating and dredging; with the principal causes identified as agriculture, wastewater and industrial discharges and septic tanks. The 3 river waterbodies within the Delvin WMU are of moderate (1) and poor (2) status, which means that improvements in status are required. The RBMP reports that problems constraining achievement of good status include high nutrient concentration (phosphorus, ammonia), oxygen levels and low ecological rating; with the principal causes identified as agriculture and wastewater and industrial discharges. The RBMP also identifies a morphological risk from the dredging regime for flood risk management for both WMUs and the measures directly relevant to the FEM FRAMS (physical modifications - morphological pressur relate to the need for compliance with legal requirements (EIA, Planning and Development	No contribution nor constraint to the achievement of WFD objectives as there will be no physical works within or modifications to the Nanny River and its sub-catchment. Meeting minimum target.	0	0			0			0
	B) Minimise risk of environmental pollution	**15**	**5**	**2 Waste Management Permit Sites** along the Delvin River at Westown. **4 Section 4** licenses present in AU	No positive or negative change in flood risk to potentially polluting sites within the AU as no intervention involved. Meeting minimum target.	0	0			0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	**10**	**5**	There are **four proposed NHAs** within the AU boundary: **Duleek Commons** (calcareous marsh and fen system), **Thomastown Bog** (raised bog surrounded by wet woodland and wet grassland), **Balrath Woods** (mature woodland) and **Cromwell's Bush Fen** (wetland with fen communities in pastoral/arable setting). Of these pNHAs, only approximately 5.4 hectares of **Duleek Commons** may be subject to flooding (1% AEP fluvial event), which represents approximately 15% of the overall area of this pNHA. Given the nature of the predominantly wet habitats in this pNHA the risk of flooding is not considered a concern and may be beneficial to the site. Immediately outside of the AU boundary, to the east, the River Nanny flows into the **River Nanny Estuary & Shore SPA**, and the **Laytown Dunes/Nanny Estuary proposed NHA**. This area is important for its (non breeding) bird populations, including five species in nationally important numbers. Changes in the catchment, which alter the flooding regime and/or freshwater input into the estuary may affect the habitats upon which these populations rely. 71 sites listed on Meath County Council's Wetland Inventory are present within the AU. The rivers and their floodplain within the AU support or have the **potential to support legally protected species** or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available. This assessment will require updating upon completion of the Appropriate Assessment.	No impacts on potentially sensitive riverine habitats and associated fauna (located within or outside designated nature conservation sites) as there will be there will be no physical works within or modification to the river channels or adjacent land within the Nanny sub-catchment. Meeting minimum target.	0	0			0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	**5**	**3**	The Nanny and Delvin rivers and other streams within the AU support or are capable of supporting salmonid species, which are sensitive to changes in physical and chemical conditions. They are also likely to provide salmonid spawning or nursery areas. These watercourses are also likely to support brook, river and/or sea lamprey. There is angling activity along rivers in the AU, though the exact locations of popular angling areas are unknown. There are no fisheries designations within the AU (e.g. Salmonid Waters) and no known barriers to fish movement.	No impacts on fisheries or angling activity as there will be no physical works or modification within or adjacent to the river channels in the Nanny sub-catchment. Meeting minimum target.	0	0			0			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	**5**	**5**	The Meath area of the AU comprises the following five landscape characters types: **Central Lowlands, Bellewstown Hills, Coastal Plains, Nanny Valley (all of regional importance), and Tara-Skryne Hills (international importance).** To the south of the AU, land inside the Fingal County boundary falls within the High Lying Agricultural landscape character area (classified as being of high sensitivity). Fingal County Council also designates **'Important Views'**, which in the AU are concentrated around Garristown and along the R130 and R122.	No change in landscape character and visual amenity as there will be no physical works or modifications within or adjacent to the river channels in the Nanny sub-catchment. Meeting minimum target.	0	0			0			0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	Nanny and Delvin AU Option 1							
				-	Develop a fluvial FFWS for the Nanny River							
				Baseline option assumes continuation of any existing maintenance regime in the study area	*Flood forecasting and warning involves the use of mathematical computer models to predict flood water levels and tools to disseminate flood hazard data to people at risk. Further information on the viability of various flood forecasting options are reported on in the Preliminary Options Report. Flood forecasts would be disseminated through a dedicated website and messaging service to provide advance warning to communities.* *A FFWS for the Nanny River would provide advance flood warning to properties at risk along the Nanny River including properties in Duleek area APSR and properties in rural areas along the watercourse.*							
					Comments	Score	Weighted Score				Comments	Score	Weighted Score
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	5	3	Within the AU, **11 Sites on RPS/RMP/SMR at risk** (1% AEP fluvial event). 3 sites on RPS including a two Arch Bridge at Arcarne, a Wayside Cross at Gaulstown and a Bridge - Old Mill Bridge. 1 site on RMP (class code WAMI) at Garristown. 1 site on SMR - a Ritual Site - Holy Well at Naul. The remaining 6 sites are within the SMR/RPS/RMP datasets and include 4 bridges (2 bridges at Prioryland; Beaumont Bridge at Beaumont and Naul Bridge, Naul), an Enclosure at Prioryland and a Ring Barrow at Abbeyland. Three ACAs are present in the AU: Naul ACA, Blascadden ACA, and Garristown ACA. Of these, only the **Naul ACA is at risk** of flooding; approximately 0.1ha is at risk, representing approximately 1% of the total ACA.	There will be no positive or negative change in risk to, or impacts on SMR/RPS/RMP features (through either direct impacts or impacts on setting) and the ACA as there will be there will be no physical works as a result of this option. Meeting minimum target.	0	0			0			
	Environmental Total Score/ Weighted Score					0	0		0	0		0	0
Total Score/ Total Weighted Score						**9**	**225**		**0**	**0**		**0**	**0**

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Duleek area APSR Option 1**			**Duleek area APSR Option 1a**				
				-	**Raising existing defence embankment to a higher standard of protection**			**Improving existing defences to protect all properties up to the 1% AEP**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves raising existing flood defence embankments and walls in Duleek to provide protection up to the 0.1% AEP event. Hydraulic modelling indicates that new defences would also be required as part of this option. The BCR for this option is 1.1 for the 0.1% AEP event.* *The existing flood defences at Duleek include embankments, walls, a pumping station and channel maintenance works. Hydraulic modelling indicates that these defences provide protection to the majority of properties in Duleek up to 1% AEP event. The results from the hydraulic modelling indicate that the existing flood embankments would need to be raised by an average of 1.4m and that the existing flood walls would need to be raised by an average of 1.4m. This option assumes that existing flood defences are structurally sound to allow them to be raised to a higher standard of protection.* *Upstream of the bridge on the main street through Duleek, approximately 40m of new flood embankments are required along the left bank and 20m along the right bank of the Parmadan River. The average height of the embankments on the left bank is 1.2m and the average height of embankments on the right bank is 1m.* *Hydraulic modelling indicates that there is a negligible impact on water levels along the Nanny River with this option. Along the Parmadan tributary, the construction of new defences and raising of existing defences has an impact on water levels. Water levels are raised by an average of 0.8m along a 0.5km stretch of the river channel. The maximum increase in water levels is 0.93m. This option has no impact on overland flow paths or significant natural flood plain storage as it involves modifying an existing flood defence scheme.*			*This option involves improving the existing defences to protect all propertis up to the 1% AEP. The BCR for this option is 0.3, therefore it was not considered any further.*				
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	**5**	**5**	n/a	Option is not reliant on human or mechanical intervention to operate. Limited maintenance will be required to ensure defences maintain their standard of protection. Overall exceeding minimum target.	3	75			0			0
	B) Minimise Health and Safety risk of flood risk management options.	**5**	**5**	n/a	Medium health and safety risk to construction workers due to location of defences adjacent to the watercourses. Limited health and safety risk to maintenance workers. Overall meeting minimum target.	1	25			0			0
	C) Ensure flood risk managed effectively and sustainable into future.	**5**	**5**	n/a	Option meets the requirements of the MRFS and HEFS as the 0.1% AEP current scenario water level is higher than the 1% AEP MRFS and HEFS water levels. Meets aspirational target.	5	125			0			0
	Technical Total Score/ Weighted Score					9	225		0	0		0	0
Economic	**A) Minimise economic risk**	**25**	**1**	**Average annual damages (AAD) of €4915** *Average annual damages (AAD) of €155296 for the 0.1% AEP event*	Option will reduce the 0.1% damages to 0, therefore meeting aspirational target	5	125			0			0
	B) Minimise risk to transport infrastructure	**5**	**3**	Approximately **50m of R roads** at risk (R152)	Option provides protection to the roads at risk up to the 0.1% AEP. Meeting aspirational target.	5	75			0			0
	C) Minimise risk to utility infrastructure	**10**	**0**	**No utility assets** at risk	N/A	0	0						
	D) Minimise risk to agricultural land.	**5**	**2**	Approximately **26 hectares of agriculture land** not benefiting from flood defences at risk of flooding.	Option has not impact on agricultural land not benefiting from flood risk management measures	0	0			0			0
	Economic Total Score/ Weighted Score					10	200		0	0		0	0
Social	**A) Minimise risk to human health and life.**	**30**	**1**	**5 residential properties** at risk **No high vulnerability properties** at risk from flooding.	Option provides protection to 4 of the 5 residential properties at risk of flooding up to the 0.1% AEP. Partly achieving aspirational target.	3	90			0			0
	B) Minimise risk to community.	**10**	**0**	**No non residential building** at risk **No high-value social infrastructural assets** at risk	N/A	0	0			0			0
	C) Minimise risk to, or enhance, social amenity.	**5**	**0**	**No social amenity** sites at risk	N/A	0	0			0			0
	Social Total Score/ Weighted Score					3	90		0	0		0	0
	A) Support the objectives of the WFD.	**5**	**5**	The APSR contains two river waterbodies, both of which are classified as being of poor status meaning that improvement in status is required. The RBMP reports that problems constraining achievement of good status include high nutrients (phosphorus), low oxygen saturation, low ecological rating and dredging; with the principal causes identified as agriculture, wastewater and industrial discharges and septic tanks.	Potential constraint to the achievement of WFD objectives as the new flood defence structures, together with the raised existing structures, could create a new morphological pressure. Just failing minimum target.	-1	-25			0			0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Duleek area APSR Option 1**			**Duleek area APSR Option 1a**				
				-	**Raising existing defence embankment to a higher standard of protection**			**Improving existing defences to protect all properties up to the 1% AEP**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves raising existing flood defence embankments and walls in Duleek to provide protection up to the 0.1% AEP event. Hydraulic modelling indicates that new defences would also be required as part of this option. The BCR for this option is 1.1 for the 0.1% AEP event.* *The existing flood defences at Duleek include embankments, walls, a pumping station and channel maintenance works. Hydraulic modelling indicates that these defences provide protection to the majority of properties in Duleek up to 1% AEP event. The results from the hydraulic modelling indicate that the existing flood embankments would need to be raised by an average of 1.4m and that the existing flood walls would need to be raised by an average of 1.4m. This option assumes that existing flood defences are structurally sound to allow them to be raised to a higher standard of protection.* *Upstream of the bridge on the main street through Duleek, approximately 40m of new flood embankments are required along the left bank and 20m along the right bank of the Parmadan River. The average height of the embankments on the left bank is 1.2m and the average height of embankments on the right bank is 1m.* *Hydraulic modelling indicates that there is a negligible impact on water levels along the Nanny River with this option. Along the Parmadan tributary, the construction of new defences and raising of existing defences has an impact on water levels. Water levels are raised by an average of 0.8m along a 0.5km stretch of the river channel. The maximum increase in water levels is 0.93m. This option has no impact on overland flow paths or significant natural flood plain storage as it involves modifying an existing flood defence scheme.*			*This option involves improving the existing defences to protect all propertis up to the 1% AEP. The BCR for this option is 0.3, therefore it was not considered any further.*				
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Environmental	**B) Minimise risk of environmental pollution**	**15**	**0**	**No potential sources of pollution** at risk or present in this APSR	N/A	0	0			0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	**10**	**4**	Within the APSR, Duleek Commons pNHA is designated for its calcareous marsh and fen system. Approximately 5.4 hectares is at risk fo flooding, which represents 15% of the overall area of this pNHA. Given the wet nature of the habitats in this site, the risk of flooding is not considered a concern and may be beneficial to the site. The River Nanny Estuary & Shore SPA, important for its (non breeding) bird populations, including five species in nationally important numbers, and Laytown Dunes/Nanny Estuary pNHA are approximately 9km downstream of the APSR. 26 sites listed on Meath County Council's Wetland Inventory are present within the APSR. Within the APSR, the river primarily runs through rural areas and, although modified along short stretches, is likely to be of biodiversity interest. The river and other channels within the APSR, and their floodplain, support or have the potential to support legally protected species or other species of conservation concern (e.g. otter, kingfisher, bats, Atlantic salmon), although detailed distribution information is not available. This assessment will require updating upon completion of the Appropriate Assessment.	Provision of new embankments and raising of the existing embankments/walls, would only make a significant difference to the volume of water in the river during a 0.1% AEP flood event. This, combined with the distance of the works from the River Nanny Estuary & Shore SPA (approximately 9km) indicates that a significant effect on the SPA is unlikely. Potential for localised loss/disturbance of terrestrial habitat and species in the footprint of the new embankments or the construction works. Also, potential for loss of marginal habitats and associated supporting species on the Parmadan River. Just failing minimum target.	-1	-40			0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	**5**	**3**	The Nanny river and other streams within the APSR support or are capable of supporting salmonid species and are likely to provide salmonid spawning or nursery areas. These watercourses may also potentially support brook, river and/or sea lamprey. There is known angling activity along the River Nanny, though the exact locations of popular angling areas are unknown. There are no fisheries designations within the APSR (e.g. Salmonid Waters) and no known barriers to fish movement.	Potential for localised loss of or disturbance to riverine habitat and dependent fisheries during construction of new flood defences, and potential for changes in turbidity and sediment dispersion/deposition. Ecological impacts associated with the raising of existing defences (depending on the increased base of defence required) are considered unlikely, assuming appropriate working practices are implemented. Potential for works to disrupt access for anglers during construction, although there is a potential for enhancement of facilities. Just failing minimum target.	-1	-15			0			0
	E) Protect, and where possible enhance, landscape character and visual amenity within the study area	**5**	**3**	The APSR falls within the **Central Lowlands** landscape character area (of regional importance). This landscape type is classified as being of medium sensitivity	Adverse change in visual amenity, and potentially a deterioration in local landscape character, resulting from the introduction of new flood defence structures (60m) and raising of existing defences by an average of 1.4m, within a sensitive landscape setting. Partly failing minimum target.	-3	-45			0			0
	F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	**5**	**3**	**Four features on SMR/RPS at risk:** three sites on SMR (two bridges at Prioryland and an enclosure at Prioryland), and one site on the RPS at risk (Ring Barrow at Abbeyland). Additional sites (not at risk) within immediate vicinity. **No ACAs** present.	There would be no change in flood risk to the four sites, although the introduction of new flood defence structures within their immediate vicinity would be expected to affect their historical setting. Further, a small number of additional heritage sites not identified as being at risk, would also experience a change in their historical setting. Just failing minimum target.	-1	-15			0			0
	Environmental Total Score/ Weighted Score					-7	-140		0	0		0	0
Total Score/ Total Weighted Score						**15**	**375**		**0**	**0**		**0**	**0**

N

Flood embankment
Length (m): 80
Average height (m): 1.1

Embankment
Length (m): 29
Average height (m): 1.2

Flood wall
Length (m): 39
Average height raised (m): 1.3

Flood wall
Length (m): 243
Average height raised (m): 1.3

Flood wall
Length (m): 39
Average height raised (m): 1.6

Flood embankment
Length (m): 377
Average height raised (m): 0.5

Flood wall
Length (m): 39
Average height raised (m): 1.3

Flood embankment
Length (m): 212
Average height raised (m): 1.3

River Nanny

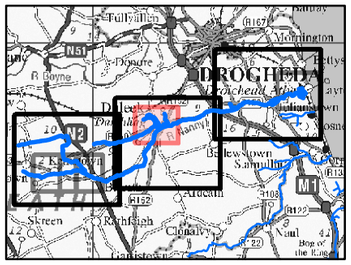
Flood embankment
Length (m): 70
Average height (m): 0.8

Flood embankment
Length (m): 154
Average height raised (m): 0.8

Flood wall
Length (m): 111
Average height raised (m): 0.6

100 50 0 100
m

Location Plan :



FRM OPTIONS MAP

Legend

- Area defended by option
- Improve existing defences

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Project :
FEM FRAMS

Map :
Duleek area APSR - Option 1

Figure By :	Kevin Daly	Date :	15 Oct 2010
Checked By :	Clare Dewar	Date :	15 Oct 2010
Approved By :	Anne-Marie Conibear	Date :	15 Oct 2010

Figure No. : Duleek/CURS/001

Revision 0

Drawing Scale : 1:2,500 Plot Scale : 1:1 @ A3

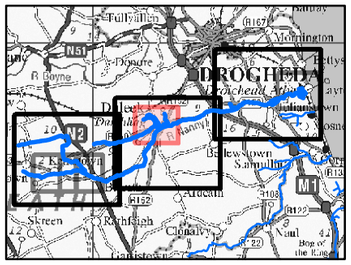
N

Flood wall
Length (m): 243
Average height raised (m): 0.3

River Nanny

100 50 0 100
m

Location Plan :



FRM OPTIONS MAP

Legend

- Area defended by option
- Improve existing defences

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Fingal County Council
OPW

Project :
FEM FRAMS

Map :
Duleek area APSR - Option 1a

Figure By :	Kevin Daly	Date :	15 Oct 2010
Checked By :	Clare Dewar	Date :	15 Oct 2010
Approved By :	Anne-Marie Conibear	Date :	15 Oct 2010

Figure No. : Duleek/CURS/001a

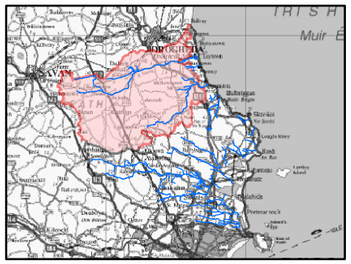
Revision 0

Drawing Scale : 1:2,500 Plot Scale : 1:1 @ A3

N

2 1 0 2 Km

Location Plan :



FRM OPTIONS MAP

Legend

- FFWS along River Nanny
- Modelled river centreline

Risk to Critical Infrastructure

- U — Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- H — High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites

USER NOTE :

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Project :
FEM FRAMS

Map :
Nanny and Delvin - Option 1

Figure By :	Kevin Daly	Date : 04 Oct 2010
Checked By :	Clare Dewar	Date : 04 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 04 Oct 2010

Figure No. : NannyDelvinAU/CURS/001 — Revision 0

Drawing Scale : 1:65,000 — Plot Scale : 1:1 @ A3

E5 FEM FRAM Study area

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Study Area Option 1**			**Study Area Option 2**				
					Development (Meath Co Co) and enhancement (Fingal Co. Co.) of a proactive maintenance regime targeting potential culvert blockage locations			**Targeted public awareness and education campaign and individual property flood proofing**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the development (Meath County Council (MCC)) and enhancement (Fingal County Council (FCC)) of a proactive maintenance regime targeting potential culvert blockage locations along the watercourses in the study area. FCC currently carries out maintenance at approximately 20 locations at risk of flooding in Fingal. This involves the cleaning of screens on a two to three week basis, with the frequency increased when heavy rain is forecast. A limited maintenance regime is carried out by MCC. This option would involve including additional culverts as part of FCC proactive maintenance regime and setting out a proactive maintenance regime for culverts in MCC. Proactive maintenance would involve removal of debris (vegetation, silt, rubbish) at the entrance and exit of culverts on a regular basis (i.e. monthly) and in advance of a flood event. Option would also involve monitoring of culverts prone to blockages during a flood event.* *FCC currently uses weather forecast information to identify when a flood is likely. There is an opportunity to link this option to the FFWS identified for the following Analysis Units (Broadmeadow and Ward, Nanny and Delvin, Mayne and Sluice and Coastal).* *Hydraulic modelling indicates that properties in the following locations are at risk due to culvert blockages (based on a comparison of flood maps for the 1% AEP fluvial event against the 70% culvert blockage flood maps for the 1% AEP event): Swords, Dardistown, Balgriffin, Portmarnock Bridge, Warbelstown, Ashbourne, Ratoath, Ballyboghil, Skerries and Bettystown.* *The BCR for this option is 0.9 and is based on an assumed 10% reduction in economic risk. Based on a review of flood maps for the with and without culvert blockages scenarios, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.*			*The public awareness and education campaign is necessary to educate the public of the risk of flooding to their properties and the protection methods available to them to reduce potential damage from flood events (i.e. individual property flood proofing IPFP measures). Information would be disseminated through the distribution of information leaflets, FEM FRAMS website and provision of public information days.* *IPFP involves the use of 'off the shelf' flood defence products to provide individual flood protection to residential and commercial properties. Such products include flood gates, flood barriers, air vent blocks and the installation of non return valves to service pipes. The level of protection afforded by individual property protection is dependant on a number of factors including the uptake, advance warning of flood risk and depth of flooding. It is assumed that this measure is only applicable when the depth of flooding at a property is less than 0.6m.* *The BCR for this option is 0.85 and is based on an assumed 20% reduction in economic risk. The benefits of this option would be significantly greater if the option was provided with a FFWS. Details of the FFWS are detailed in the following Analysis Units (Broadmeadow and Ward, Nanny and Delvin, Mayne and Sluice and Coastal). The BCR for this option when combined with a FFWS is 3.* *This option will not alter existing overland flood routes or impact on areas of significant natural flood plain storage.*				
				Comments	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Technical	**A) Ensure Flood Risk Management options are operationally robust.**	**5**	**5**	n/a	Option is fully reliant on human intervention to be effective and therefore scores a -1 as it fails the minimum target of requiring no human/mechanical intervention.	-1	-25	A targeted public awareness campaign would require human intervention on a 5 yearly basis. The process of individual property protection would also require human intervention in making the necessary adjustment to properties and in erecting defences prior to a flood event. Option 100% reliant on human intervention to be effective.	-1	-25			0
	B) Minimise Health and Safety risk of flood risk management options.	**5**	**5**	n/a	Option requires opertaors/maintenance workers to clear debris etc from culvert entrances and river channels. Therefore, majority of work carried out in proximity to river channels. This results in a significant health and safety risk to workers and therfore this options scores 0	0	0	A targeted public awareness campaign would have no health and safety risk to construction worke or operators. Individual property protection would have limited health and safety risk (especially n installation of protection equipment) and potentially in the erection of protection in flood event.	3	75			0
	C) Ensure flood risk managed effectively and sustainable into future.	**5**	**5**	n/a	Option meets the current flood risk requirements but is adaptable to meeting future risk as the proactive maintenance regime can be improved to accommodate additional culverts at risk due to the MRFS	0	0	Option is sustainable and adaptable to future risk at no cost for properties protected for current risk and where MRFS flood depth below 0.6m. Number of properties with flood depth < 0.6m for the 1%/0.5% AEP MRFS is 1071 compared to 302 for 1%/0.5% AEP current scenario. Therefore this option does not fully meet the requirements of the MRFS but it is adaptable as additional IPFP equipment could be pruchased and increased coverage would be required for the targeted public awareness and education campaign. Overall meeting minimum target.	0	0			0
	Technical Total Score/ Weighted Score					-1	-25		2	50		0	0
Economic	**A) Minimise economic risk**	**25**	**3**	Total **average annual damages of €760,253** within study area (1% AEP fluvial/0.5% AEP tidal event event).	This option will result in in at least a limited reduction in average annual damages, thus exceeding the minimum target and scoring 1. The option will also prevent additional damages from occurring as a result of reducing the risk of blockage of culverts.	1	75	Based on the current scenario, 93% of properties in the 1% AEP fluvial flood zone and 0.5% AEP tidal flood zone have a flood depth of <0.6m (75% in a 0.1% AEP). Option could prevent up to €0.6 million worth of PV damages (1% AEP fluvial/0.5% AEP tidal) if IPFP was 100% successfull at all properties whose flood depth is less than 0.6m. But assume only 10% of defences in place in time as no flood warning included in option. Targeted public awareness and education could reduce damages by ~5%. Therefore, limited reduction in damages and exceeding minimum target.	1	75			0
	B) Minimise risk to transport infrastructure	**5**	**4**	Total of **6.3km of Regional (R)** roads, **0.1km of National Primary (NP)** at risk within the study area (1% AEP fluvial/0.5% AEP tidal event).	This option will result in in at least a limited reduction in baseline risk to the transport infrastructure at risk flooding, thus exceeding the minimum target and scoring 1. There would be a significant reduction in potential risk due to structure blockage, however this is not considered in the scoring.	1	20	Option would have no impact on transport infrastructure at risk. Meeting minimum target as option would not result in an increase in transport infrastructure at risk.	0	0			0
	C) Minimise risk to utility infrastructure	**10**	**5**	**3 WWTW** (Ballyboghil area APSR, Owens Bridge APSR and Julianstown area APSR ,**1 Waste Water Pumping Station** (Castle Street Pumping Station in Ashbourne area APSR) and **1 utilities asset** (ESB, GAS and EIRCOM utilities) at risk within the study area (1% AEP fluvial/0.5% AEP tidal event event).	This option will result in in at least a limited reduction in risk to the utility infrastructure at risk of flooding, thus exceeding the minimum target and scoring 1. There would be a significant reduction in potential risk due to structure blockage, however this is not considered in the scoring.	1	50	Option would have no impact on the number of utility infrastructure assets at risk. Meeting minimum target as option would not result in an increase in utility infrastructure assets at risk.	0	0			0
	D) Minimise risk to agricultural land.	**5**	**5**	**1316 hectares of agriculture land** not benefiting from flood defences at risk of flooding within the Study area. This represents approximately 13% of the total agricultural land in th study area (1% AEP fluvial/0.5% AEP tidal event event).	This option will be focussed on preventing culvert blockages in locations where signifcant economic damage or significant disruption to utilities could occur. Therefore, it is unlikely there would be any reduction in risk to agricultural land. However, there will be no increase in risk to agricultural land. Therefore, option scores 0 as meets the minimum target.	0	0	Option would have no impact on the area of agricultural land at risk. Meeting minimum target as option would not result in an increase in area of agricultural land at risk	0	0			0
	Economic Total Score/ Weighted Score					3	145		1	75		0	0
Social	**A) Minimise risk to human health and life.**	**30**	**4**	Total of **248 residential properties at risk** within the study area (1% AEP fluvial/0.5% AEP tidal event event). 5 at risk in Ballyboghil area APSR, 9 at risk in Rathoath area APSR 2 at risk in Rowelstown East area APSR , 3 at risk in Ashbourne area APSR, 1 at risk in Owens Bridge area APSR, 1 in Kinsaley Lane area APSR , 19 in St Margarets, Dublin Airport, Belcamp, Balgriffin APSR, 5 at risk in Duleek area APSR, 10 at risk in Laytown Bettystown and coastal area APSR, 1 at risk in Balbriggan area APSR, 68 in Skerries area APSR, 25 in Rush area APSR, 13 in Swords area APSR and 46 in Portmarnock and Malahide areas APSR. Remaining properties at risk are in rural areas outside of the APSR. **0 high vulnerability properties** at risk	This option will result in in at least a limited reduction in risk to the residential properties at risk of flooding, thus exceeding the minimum target and scoring 1. The option will also prevent additional residential properties from flooding as a result of minimising the risk of blockage of culverts.	1	120	Option would reduce the flood damage to the residential properties targeted as part of the individual property protection. The targeted public awareness campaign would increase knowledge of flooding but not necessarily reduce flood risk. The number of properties located in the flood risk area would remain the same. Meeting minimum target.	0	0			0
	B) Minimise risk to community.	**10**	**3**	Total of **65 non-residential buildings at risk** within the study area (1% AEP fluvial/0.5% AEP tidal event event) including 1 in Kinsaley Lane area APSR, 19 in St Margarets, Dublin Airport, Belcamp, Balgriffin APSR, 1 in Laytown, Bettystown and coastal areas APSR, 5 in Balbriggan area APSR, 6 in Skerries area APSR, 1 in Rush area APSR, 14 in Swords area APSR and 16 in Portmarnock and Malahide areas APSR. 1 retail park at risk (Airside Reta Park) in Swords area APSR. Remaining properties at risk are in rural areas outside of the APSR. **1 flood sensitive social infrastructure site** at risk, a firestation in Swords area ASPR.	This option will result in at least a limited reduction in risk to the non-residential buildings at risk of flooding, thus exceeding the minimum target and scoring 1.	1	30	Option would reduce the flood damage to the non-residential properties targeted as part of the individual property protection. The targeted public awareness campaign would increase knowledge of flooding but not necessarily reduce flood risk. The number of properties located in the flood risk area would remain the same. Meeting minimum target.	0	0			0

Objectives		Global Weighting	Local Weighting	Options								
				Baseline	**Study Area Option 1**			**Study Area Option 2**				
					Development (Meath Co Co) and enhancement (Fingal Co. Co.) of a proactive maintenance regime targeting potential culvert blockage locations			**Targeted public awareness and education campaign and individual property flood proofing**				
				Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the development (Meath County Council (MCC)) and enhancement (Fingal County Council (FCC)) of a proactive maintenance regime targeting potential culvert blockage locations along the watercourses in the study area. FCC currently carries out maintenance at approximately 20 locations at risk of flooding in Fingal. This involves the cleaning of screens on a two to three week basis, with the frequency increased when heavy rain is forecast. A limited maintenance regime is carried out by MCC. This option would involve including additional culverts as part of FCC proactive maintenance regime and setting out a proactive maintenance regime for culverts in MCC. Proactive maintenance would involve removal of debris (vegetation, silt, rubbish) at the entrance and exit of culverts on a regular basis (i.e. monthly) and in advance of a flood event. Option would also involve monitoring of culverts prone to blockages during a flood event.* *FCC currently uses weather forecast information to identify when a flood is likely. There is an opportunity to link this option to the FFWS identified for the following Analysis Units (Broadmeadow and Ward, Nanny and Delvin, Mayne and Sluice and Coastal).* *Hydraulic modelling indicates that properties in the following locations are at risk due to culvert blockages (based on a comparison of flood maps for the 1% AEP fluvial event against the 70% culvert blockage flood maps for the 1% AEP event): Swords, Dardistown, Balgriffin, Portmarnock Bridge, Warbelstown, Ashbourne, Ratoath, Ballyboghil, Skerries and Bettystown.* *The BCR for this option is 0.9 and is based on an assumed 10% reduction in economic risk. Based on a review of flood maps for the with and without culvert blockages scenarios, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.*			*The public awareness and education campaign is necessary to educate the public of the risk of flooding to their properties and the protection methods available to them to reduce potential damage from flood events (i.e. individual property flood proofing IPFP measures). Information would be disseminated through the distribution of information leaflets, FEM FRAMS website and provision of public information days.* *IPFP involves the use of 'off the shelf' flood defence products to provide individual flood protection to residential and commercial properties. Such products include flood gates, flood barriers, air vent blocks and the installation of non return valves to service pipes. The level of protection afforded by individual property protection is dependant on a number of factors including the uptake, advance warning of flood risk and depth of flooding. It is assumed that this measure is only applicable when the depth of flooding at a property is less than 0.6m.* *The BCR for this option is 0.85 and is based on an assumed 20% reduction in economic risk. The benefits of this option would be significantly greater if the option was provided with a FFWS. Details of the FFWS are detailed in the following Analysis Units (Broadmeadow and Ward, Nanny and Delvin, Mayne and Sluice and Coastal). The BCR for this option when combined with a FFWS is 3.* *This option will not alter existing overland flood routes or impact on areas of significant natural flood plain storage.*				
					Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
Environmental	C) Minimise risk to, or enhance, social amenity.	5	5	The following social amenity sites are at risk from flooding (1% AEP fluvial/0.5% AEP tidal event event):**8 golf courses** (Beechmount, Portmarnock Strand, Forrest Little, Roberstown near Ashbourne, Owens Bridge, Corrstown, Beaverstown near Donabate and Malahide Point), **1 pitch and putt course** (Ring Commons), **1 sports pitche** (ALSAA sports complex. , **3 holiday home/mobile home parks** (Donabate, Rush and The Burrows).	This option will be focussed on preventing culvert blockages in locations where signifcant economic damage or significant disruption to utilities could occur. Therefore, it is unlikely there would be any reduction in risk to the social amenity sites at risk in this study area. However, there will be no increase risk to these social amenity sites. Therefore, option scores 0 as meets the minimum target.	0	0	Option would have no impact on social amenity sites at risk. Meeting minimum target as option would not result in an increase to the number of social amenity sites at risk.	0	0			0
	Social Total Score/ Weighted Score					2	150		0	0		0	0
	A) Support the objectives of the WFD.	5	5	The study area contains**51 river waterbodies** : 9 = high status; 3 = good status; (no deterioration required); 14 = moderate status; 23 = poor status; 3 = bad status (improvements required). The study area contains**4 transitional (i.e. estuarine) waterbodies**, all of which have been classified as being of moderate status. The study are contains **4 coastal waterbodies**: 2 = high status; 2 = moderate status. The RBMP reports that the problems constraining achievement of good status relate to pollution pressures.from agriculture, dangerous substances and wastewater and industrial discharges. The Broadmeadow Water waterbody is designated as a heavily modified water body (HMWB) beacuse of the presence of the causeway for the Dublin, but risks have been identified relating to physical modifications and morphology for all waterbodies. The basic measures directly relevant to the FEM FRAMS (physical modifications - morphological pressures) for all waterbodies relate to the need for compliance with legal requirements (EIA, Planning & Development Regulations etc). Additional measures have been identified Rogerstown Estuary, the Mayne Estuary and the Broadmeadow Water (as a HMWB) relating to further investigate the risks resulting from the physical modification of these waterbodies.	No contribution nor constraint to the achievement of WFD objectives as maintenance works will be confined to the existing drainage infrastructure within the river channels, estuaries and coastal waters and will be of limited extent and scale. Meeting minimum target.	0	0	No contribution nor constraint to the achievement of WFD objectives as there will be no physica works within or modification to the river channels, estuaries or coastline. The only physical measures will be the installation of flood protection measures for individual properties located beyond the waterbodies. Meeting minimum target.	0	0			0
	B) Minimise risk of environmental pollution	15	5	The following sites are at risk from flooding for the 1% AEP fluvial/0.5% AEP tidal events**4 WWTW** (Ballyboghill area APSR, Owens Bridge APSR, Julianstown area APSR and Naul area APSR), **1 Waste Water Pumping Station** (Castle Street Pumping Station in Ashbourne area APSR) and**35 Waste Management Permit Sites** (2 along the Ballyboghill River, 1 along the Corduff River and 3 on the Bracken River, 3 along the Broad Meadow River and 5 along the Ward River, 6 along the Sluice River, 3 along the Delvin River, 1 along the Bracken River, 3 along Baleally Stream, 1 along the Lissenhall stream, 1 along Jone's Stream and 6 in coastal areas). There are a total of**22 Section 4 licences and 34 Section 16 licences** in the study area.	No positive or negative change in flood risk to potentially polluting sites as a result of the proposed maintenance works. Meeting minimum target. There is the potential for this option to result in at least a limited reduction in risk to the potentially polluting sites currently at risk of flooding, thus just exceeding the minimum target.	1	75	No positive or negative change in flood risk to potentially polluting sites within the study area as there will be no physical works within or modification to the river channels, estuaries or coastline. Meeting minimum target.	0	0			0
	C) Avoid damage to, and where possible enhance, the flora and fauna of the study area	10	5	There are **13 internationally designated sites** (SAC, cSAC, SPA, pSPA and Ramsar sites), including two sites offshore, and **17 nationally designated sites** (NHA, pNHA) within the study area. Sites located within the floodplain (1% AEP fluvial event/0.5% AEP tidal event) include: Bog of the Ring pNHA (22.8 hectares at risk - 45% of overall area); Knock Lake pNHA; part of Rogerstown Estuary pNHA/SAC/SPA; Feltrim Hill pNHA at risk from flooding (16 hectares at risk - 40% of overall area); Balrath Woods pNHA; Thomastow Woods pNHA; Duleek Commons pNHA at risk from flooding (5.4ha at risk - 15% of overall area); Cromwells Bush Fen pNHA; Boyne Coast and Estuary pNHA/SAC; Laytown Dunes and Nanny Estuary pNHA (at risk from flooding); Loughskinny Coast pNHA; Rogerstown Estuary pNHA/SPA/SAC; Malahide Estuary pNHA/SAC; Baldoyle Bay pNHA/SPA; Sluice River Marsh pNHA (100% of site at risk) Outside the designated sites, there are areas of valuable habitat; indicated through their inclusion of Meath County Council's Wetland and Coastal Inventory, and Fingal County Council's Ecological Network. The rivers, estuaries and coastal waters within the study area support or have the potential to support legally protected species or other species of conservation concern. Aquatic species of particular nature conservation interest within the study area include the freshwater pearl mussel, grey seals, otters, the river lamprey, and roosting bats; all of which are legally protected. The study area also contains a diverse range of birds, including dippers, curlew and kingfishers, invertebrates and flora (including eel grass beds in some of the estuaries).	Maintenance works within the river channels, estuaries and to regularly unblock culverts would have limited adverse impacts on the potentially sensitive riverine and estuarine habitats, flora and fauna at these locations due to their temporary nature and localised scale. No changes to the current flooding a tidal regime and hydrology are anticipated, except when the volume and speed of flows are temporarily increased following the removal of blockages. . Meeting minimum target.	0	0	No impacts on potentially sensitive riverine, estuarine and coastal habitats or species (located wit or outside designated nature conservation sites) as there will be no physical works or modifications within or adjacent to the river channels, estuaries or coastline. The only physical measures will be the installation of flood protection measures for individual properties located beyond the waterbod and it is assumed that these will be installed in already modified areas. Meeting minimum target.	0	0			0
	D) Avoid damage to, and where possible enhance, fisheries within the study area	5	4	The primary rivers (Nanny, Delvin, Broadmeadow, Ward, Ballyboghill, Brides, Bracken, Mayne, and Sluice), and other rivers and streams within the AU support or are capable of supporting salmonid species, which are sensitive to changes in physical and chemical conditions. They are also likely to provide salmonid spawning or nursery areas. These watercourses are also likely to support brook, river and/or sea lamprey. Many of the rivers in the study area are popular with anglers, who enjoy both game and coarse fishing. Along the coast, recreational sea fishing is also very popular; key locations for this being Portmarnock, the Malahide Estuary, the Rogerstown Estuary, Skerries and Balbriggan. Just south of the study area boundary, Howth Harbour is the biggest commercial fishing harbour on the east coast, and the fifth largest in the country. The following is present in the study area:**3 weirs** (1 weir on the Ballyboghill river, 1 weir on the Ward River near Owens Bridge, 1 impassable weir on the Sluice River), 1 culvert (1 motorway culvert on the Corduff River),**1 sluic**	Maintenance works within the river channels, estuaries and to regularly unblock culverts would have limited adverse impacts on potentially sensitive fisheries/shellfisheries at these locations due to their temporary nature and localised scale. No changes to the current flooding and tidal regime and hydrology are anticipated, except when the volume and speed of flows are temporarily increased following the removal of blockages, which could reduce any slower water areas that may have built up that fish can rest in. There would be no impact on angling activity as works would be limited to the locations of exist flow control structures. Meeting minimum target.	0	0	No impacts on fisheries/shellfisheries (including designated areas) or angling activity as there will there will be no physical works or modifications within or adjacent to the river channels, estuaries or coastline. The only physical measures will be the installation of flood protection measures for individual properties located beyond the waterbodies which will have no impact on fisheries. Meeting minimum target.	0	0			0

Objectives	Global Weighting	Local Weighting	Options								
			Baseline	**Study Area Option 1**			**Study Area Option 2**				
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			Baseline option assumes continuation of any existing maintenance regime in the study area	*This option involves the development (Meath County Council (MCC)) and enhancement (Fingal County Council (FCC)) of a proactive maintenance regime targeting potential culvert blockage locations along the watercourses in the study area. FCC currently carries out maintenance at approximately 20 locations at risk of flooding in Fingal. This involves the cleaning of screens on a two to three week basis, with the frequency increased when heavy rain is forecast. A limited maintenance regime is carried out by MCC. This option would involve including additional culverts as part of FCC proactive maintenance regime and setting out a proactive maintenance regime for culverts in MCC. Proactive maintenance would involve removal of debris (vegetation, silt, rubbish) at the entrance and exit of culverts on a regular basis (i.e. monthly) and in advance of a flood event. Option would also involve monitoring of culverts prone to blockages during a flood event.* *FCC currently uses weather forecast information to identify when a flood is likely. There is an opportunity to link this option to the FFWS identified for the following Analysis Units (Broadmeadow and Ward, Nanny and Delvin, Mayne and Sluice and Coastal).* *Hydraulic modelling indicates that properties in the following locations are at risk due to culvert blockages (based on a comparison of flood maps for the 1% AEP fluvial event against the 70% culvert blockage flood maps for the 1% AEP event): Swords, Dardistown, Balgriffin, Portmarnock Bridge, Warbelstown, Ashbourne, Ratoath, Ballyboghil, Skerries and Bettystown.* *The BCR for this option is 0.9 and is based on an assumed 10% reduction in economic risk. Based on a review of flood maps for the with and without culvert blockages scenarios, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.*			*The public awareness and education campaign is necessary to educate the public of the risk of flooding to their properties and the protection methods available to them to reduce potential damage from flood events (i.e. individual property flood proofing IPFP measures). Information would be disseminated through the distribution of information leaflets, FEM FRAMS website and provision of public information days.* *IPFP involves the use of 'off the shelf' flood defence products to provide individual flood protection to residential and commercial properties. Such products include flood gates, flood barriers, air vent blocks and the installation of non return valves to service pipes. The level of protection afforded by individual property protection is dependant on a number of factors including the uptake, advance warning of flood risk and depth of flooding. It is assumed that this measure is only applicable when the depth of flooding at a property is less than 0.6m.* *The BCR for this option is 0.85 and is based on an assumed 20% reduction in economic risk. The benefits of this option would be significantly greater if the option was provided with a FFWS. Details of the FFWS are detailed in the following Analysis Units (Broadmeadow and Ward, Nanny and Delvin, Mayne and Sluice and Coastal). The BCR for this option when combined with a FFWS is 3.* *This option will not alter existing overland flood routes or impact on areas of significant natural flood plain storage.*				
				Comments	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**	**Comments**	**Score**	**Weighted Score**
E) Protect, and where possible enhance, landscape character and visual amenity within the study area	**5**	**5**	The Meath area of the AU comprises the following seven landscape character areas: **Central Lowlands, Bellewstown Hills, Coastal Plains, Nanny Valley, South East Lowlands, and The Ward Lowlands** (all of regional importance), and **Tara-Skryne Hills** (international importance). The Fingal area of the AU comprises the following five landscape character types: Coastal, Estuary, High Lying Agricultural, Low Lying Agricultural, and Rolling Hills with Tree Belts The Meath area of the AU contains landscapes classified as being of primarily high but also some medium sensitivity. Fingal contains landscapes classified as being of high sensitivity along the coast and estuary corridors, and also to the north of the county; central and southern areas of the county are classified as being low to medium sensitivity. Fingal County Council also designates 'Important Views'; these are concentrated in the northern half of the county, both on the coast and inland.	No changes in landscape character and visual amenity are anticipated as maintenance works will be limited to existing drainage infrastructure and channel and no new structural changes will be made. Meeting minimum target.	0	0	No change in landscape character and visual amenity as there will be there will be no physical wo within or modification to the river channels, estuaries or coastline. The only physical measures will be the installation of flood protection measures for individual properties located beyond the waterbodies which will have no impact on landscape character or visual amenity. Meeting minimum target.	0	0			0
F) Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	**5**	**3**	**57 sites on SMR/RPS/RMP at risk** (1% AEP fluvial event and 0.5% AEP tidal event). **Parts of 4 ACAs at risk**- a total of 26.7ha at risk (1% AEP fluvial event and 0.5% AEP tida event). **Ballyboghill and Lusk** - 2 sites at risk (a bridge on the Ballyboghill River and an unclassified Ring Ditch at Gibbonsmoor). 24ha of Newbridge Demense ACA at risk (16% o total area). **Broadmeadow and Ward** - 9 sites at risk. 3 on RPS: Owens Bridge and 2 unknowns. One site is unique to the RMP (classcode GRAV). The remaining 5 sites are within the SMR/RPS/RMP datasets: 4 Bridges (Rowletown Bridge, Roganstown Bridge, Knocksedan Bridge and a bridge at Balheary Demesne/Lissenhall Great) and 1 Crannog north of Dunshaughlin). 0.8ha of 1 ACA at risk at Rowlestown (c.10% of total). **Mayne and Sluice** - 6 sites at risk. 4 sites on RMP (Habitation Site, a possible castle site, a dwelling and classcode MOND). 2 sites on SMR: a ringfort - cashel at Feltrim and a building at Balgriffin Park. **Nanny and Delvin** - 11 sites at risk. 3 sites on RPS: a 2 Arch Bridge at Arcarne, a Wayside Cross at Gaulstown and 1 Bridge - Old Mill Bridge. 1 unclassified site on RMP (classcode V **Coastal** - 29 sites at risk. 20 sites on RPS: Knocknagin Viaduct, Gormanston; converted m The remaining 5 sites are on the SMR/RPS/RMP datasets: 2 Tide Mills (in Ballymadrough	Maintenance works within the river channels, estuaries and to regularly unblock culverts would result in no positive or negative change in risk to, or impacts on setting of known SMR/RPS/RMP features(through either direct impacts or impacts on setting) or ACAs. Meeting minimum target.	0	0	There will be no positive or negative change in risk to or impacts on, SMR/RPS/RMP features through either direct impacts or impacts on setting) and ACAs as there will be there will be no physical works within or modification to the river channels, estuaries or coastline. The only physical measures will be the installation of flood protection measures for individual properties located beyond the waterbodies which will have no impact on cultural heritage. Meeting minimum target.	0	0			0
Environmental Total Score/ Weighted Score					1	75		0	0		0	0
Total Score/ Total Weighted Score					**5**	**345**		**3**	**125**		**0**	**0**

Appendix F. BCR Summary

BCR of proposed options

			Catchment scale		Nanny and Delvin AU			Broadmeadow and Ward AU			Mayne and Sluice AU							
		Option details	**Catchment scale Option 1 -** Development (Meath Co Co) and enhancement (Fingal Co. Co.) of a proactive maintenance regime targeting potential culvert blockage locations	**Catchment scale Option 2 -** Targeted public awareness and education campaign and individual property protection and flood proofing	**Nanny and Delvin AU scale Option 1 -** Develop a fluvial FFWS for the Nanny River	**Duleek Area APSR Option 1 -** Raising existing defence embankment to a higher standard of protection.	**Duleek Area APSR - Option 1a -** Raising existing defence embankment to a higher standard of protection.	**Broadmeadow and Ward AU Option 1-**Develop a fluvial FFWS for the Broadmeadow River .	**Ratoath area APSR Options 1 -** Improve channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road and a culvert on a tributary of the river.	**Rowelstown East area APSR** Construction of flood defence embankments	**Mayne and Sluice AU Option 1 -** Develop a fluvial FFWS for the Mayne River only.	**St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR Option 1 -** Improving channel conveyance by replacing existing culverts together with construction of flood defence embankments (Balgriffin).	**St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR Option 1a -** Improving channel conveyance by removing an existing unused bridge together with construction of flood defence embankments (Balgriffin).	**Coastal AU Option 1 -**Develop a combined fluvial and tidal FFWS. FFWS would be required for the Irish Sea along the Meath and Fingal coastline and for the following rivers: Mill Stream, Rush West Stream, Ward River, Gaybrook Stream and Sluice River (consideration has been given to the proposed FFWS in other analysis units e.g. Nanny-Delvin AU).	**Coastal AU Option 2-**Regular inspection and maintenance of coastal defences along the coast including walls embankments and flap valves	**Portmarnock and Malahide areas APSR option 1** Rehabilitating and raising existing coastal defences at Strand Road (including rehabilitation of flapped outfall) and construction of flood defence embankment.	**Portmarnock and Malahide areas APSR option 2** Rehabilitating flapped outfall and construction of flood defence embankments and walls to protect at risk properties at Strand Road.	**Portmarnock and Malahide areas APSR option 3** Construction of flood defence embankments and walls to protect at risk properties in Malahide town centre.
		Design standard	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial*	*0.1% AEP fluvial*	*1% AEP fluvial*	*1% AEP fluvial*	*1% AEP fluvial*	*1% AEP fluvial*	*1% AEP fluvial*	*1% AEP fluvial*	*1% AEP fluvial*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*
Basali te		Do nothing (assuming any current maintenance and management regime continues)																
Do minimum	1	Reduce existing activities																
	2	Proactive maintenance	1,686,164												1,493,620			
Non-structural measures	3a	Develop a fluvial flood forecasting system			450,803			450,803			450,803							
	3b	Develop a fluvial and tidal flood forecasting system												1,761,918				
	4	Targeted public awareness and education campaign		111,739														
	5	Individual property flood-proofing		4,015,341														
	6	Sediment management																
	7	Land management																
Structural measures	8	Sustainable Urban Drainage Systems (SUDS)																
	9	Rehabilitation, improvement of existing defences				1,123,541	282,271									623,804	43,000	
	10	Improvement in channel conveyance							462,534									
	11	Provision of permanent flood walls/embankments/rock armour/revetments								50,236		326,617	301,030			19,907	178,469	1,736,573
	12	Provision of demountable flood defences																
	13	Use of overland floodways (e.g. allowing flooding of roads in a controlled manner)																
	14	Flow diversion (full diversion / bypass channel, flood relief channel, etc.)																
	15	Flood storage reservoirs																
	16	Beach Recharge/sand dunes																
	17	Groynes																
	18	Breakwater																
	19	Managed realignment																
	20	Tidal barrier/Tidal barrage																
	21	Relocation of existing assets																
Basic costs (Euro)			1,686,164	4,127,080	450,803	1,123,541	282,271	450,803	462,534	50,236	450,803	326,617	301,030	1,761,918	1,493,620	643,711	221,469	1,736,573
Additional Costs	1	Basic Construction Cost — C				1,123,541	282,271		462,534	50,236		326,617	301,030		1,330,687	643,711	221,469	1,736,573
	2	Contingency — 20% of C				224,708	56,454		92,507	10,047		65,323	60,206		266,137	128,742	44,294	347,315
	3	Design Team Fees & Expenses																
	3.1a	Engineering Consultants[1]																
		Cost of works <€126, 973.81 — 10% of C																
		C from to €126,973.81 to €380,921.42 — €2,539.48 + 8% of C																
		C from to €380,921.42 to €634,869.02 — €6,348.69 + 7% of C																
		C from to €634,869.02 to €1, 269,738.10 — €12,697.38 + 7% of C																
		C from to €1,269,738.10 to €3,174,345.20 — €19,046.07 + 5.5% of C																
		C from to €3,174,345.20 to €6,348,690.40 — €34,917.80 + 5% of C																
		C from to €6,348690.40 to €12,697,381.00 — €66,661.25 + 4.5% of C																
		C from to €12,697,381.00 to €25,394,762.00 — €98,404.70 + 4.5% of C																
		Over €25,394,762 — €161,891.16 + 4% of C																
	3.1b	For Reinforced Concrete Portion of Works[2]																
		Cost of RC Portion under€634,869.02 — 3% of C_{RC}																
		RC Portion from€634,869.02 to €2,539,476.20 — €6,348.69 + 2.5% of C_{RC}																
		RC Portion from€2,539,476.20 to to €5,078,952.30 — €19,046.07 + 2% of C_{RC}																
		RC Portion over€5,078,952.30 — €44,440.83 + 1.5% of C_{RC}																
	3.1c	Alternative Method (instead of 3.1a & 3.1b) — 6% of C				67,412	16,936		27,752	3,014		19,597	18,062		79,841	38,623	13,288	104,194
	3	Environmental Consultants — 5% of C				56,177	14,114		23,127	2,512		16,331	15,051		66,534	32,186	11,073	86,829
	3	Economic Consultants — 0.5% of C				5,618	1,411		2,313	251		1,633	1,505		6,653	3,219	1,107	8,683
	3	Specialist Consultants — 2.5% of C				280,885	70,568		115,633	12,559		81,654	75,257		332,672	160,928	55,367	434,143
	4	Site Supervision — Based on time cost estimate Clerk of works / Annum =€120,000 Resident Engineer / Annum =€130,000				120,000 130,000	20,000 21,667		30,000 32,500	20,000 21,667		40,000 43,333	40,000 43,333		30,000 32,500	60,000 65,000	40,000 43,333	60,000 65,000
	5	Allowance for Archaeology — 15% of C				168,531	42,341		69,380	7,535		48,993	45,154		199,603	96,557	33,220	260,486
	6	Allowance for Environmental Mitigating Measures — 6% of C				67,412	16,936		27,752	3,014		19,597	18,062		79,841	38,623	13,288	104,194
	7	Allowance for Compensation and Land Acquisition — 10% to 12.5% of C				112,354	28,227		46,253	5,024		32,662	30,103		133,069	64,371	22,147	173,657
	8	Allowance for Art[3] Construction cost upto €2,550,000 — 1% of C Construction Cost€2,550,000 to €6,300,000 — 1% of C, Max€38,000.00 Construction Cost€6,300,00 to €12,700,000 — Max€51,000.00 Construction Cost in excess of€12,700,000 — Max€64,000.00				11,235	2,823		4,625	502		3,266	3,010		13,307	6,437	2,215	17,366
	9	NPV Maintenance — C x 1.5% x 22.48				378,858	95,182		155,966	16,940		110,135	101,507		503,649	217,059	74,679	585,572
		Present value cost (€)	**1,686,164**	**4,127,080**	**450,803**	**2,746,732**	**668,928**	**450,803**	**1,090,342**	**153,301**	**450,803**	**809,141**	**752,281**	**1,761,918**	**3,074,494**	**1,555,454**	**575,481**	**3,984,012**

1 Source = Department of Finance Circular Ref:- 11/87

2 Source = Section 4.2 (page 21) of "Public Art : Per Cent for Art Scheme, General National Guidelines 2004

Total PV costs for option	Euro	1,686,164	4,127,080	450,803	2,746,732	668,928	450,803	1,090,342	153,301	450,803	809,141	752,281	1,761,918	3,237,426	1,555,454	575,481	3,984,012
Total PV damages to 1% AEP fluvial/0.5% AEP tidal		14,825,219	17,458,978	2,785,357	See Option 1a	166,637	1,814,768	978,175	341,628	926,524	955,548	955,548	18,345,856	6,344,811	1,553,725	1,553,725	2,730,081
Total benefits resulting from option	Euro	1,482,522	3,491,796	557,071	See Option 1a	166,637	362,954	978,175	341,628	185,305	955,548	955,548	3,669,171	1,268,962	1,553,725	1,553,725	2,730,081
Benefit cost ratio		**0.88**	**0.85**	**1.24**	See Option 1a	**0.25**	**0.81**	**0.90**	**2.23**	**0.41**	**1.18**	**1.27**	**2.08**	**0.39**	**1.00**	**2.70**	**0.69**
Carry forward to MCA assessment (BCR> 0.85)		**TRUE**	**TRUE**	**TRUE**	See Option 1a	**FALSE**	**FALSE**	**TRUE**	**TRUE**	**FALSE**	**TRUE**	**TRUE**	**TRUE**	**FALSE**	**TRUE**	**TRUE**	**FALSE**
Benefit cost ratio considering: **Incorporating benefits from options from other spatial assessment units, and** **Including the benefits of protecting for different AEP events other tha the 1%/0.5% AEP fluvial and tidal event**			**2.96**	**4.94**	1.07		**3.22**	0.94		**1.64**			**7.29**				
Carry forward to MCA assessment (BCR> 0.85)			**TRUE**	**TRUE**	**TRUE**		**TRUE**	**TRUE**		**TRUE**			**TRUE**				

BCR of proposed options

			Coastal AU													
		Option details	**Portmarnock and Malahide areas APSR option 4** Construction of flood defence walls and embankments along with rehabilitating and raising of existing coastal defences in Malahide town centre.	**Portmarnock and Malahide areas APSR option 5** Construction of demountable flood defences along the coast road with permenant flood walls and improvement to defences in Malahide town centre.	**Portmarnock and Malahide areas APSR option 5a** Construction of demountable flood defences at the railway underpass with permenant flood walls and improvement to defences in Malahide town centre.	**Swords area APSR option 1** Widening and deepening of the Gaybrook Stream to reduce fluvial flood risk to properties at Aspen near Kinsaley.	**Swords area APSR option 2** Construction of flood defence walls to protect properties at risk from tidal flooding in Swords town centre.	**Rush Area APSR Option 1** Construction of flood defence embankments and walls and replacing culvert along Channe Road to protect at risk properties along the coast and from West Rush stream..	**Rush Area APSR Option 1a** Replacing culvert along Channe Road to protect properties at risk from fluvial flooding along the West Rush stream.	**Skerries APSR option 1** Rehabilitating and raising existing coastal defences at Harbour Road to reduce tidal flood risk.	**Skerries APSR option 2** Replacing culverts under roads and railway with larger capacity culverts and widening channel through park to reduce fluvial flood risk to properties at Miller Lane and Sherlock Park.	**Skerries APSR option 3** Constructing a flow diversion channel to run in a culvert under the railway and roads at Miller lane and Sherlock Park to reduce fluvial flood risk to properties at Miller Lane and Sherlock Park.	**Skerries APSR option 4** Lowering road levels and raising kerb levels along Miller Lane and Sherlock Park to allow controlled flooding along this road and reduce fluvial flood risk to properties.	**Skerries APSR option 5** Construction of storage reservoir to the west of railway embankment to provide flood storage upstream of Skerries Area APSR to reduce fluvial flood risk to properties along Miller Lane and Sherlock Park.	**Skerries APSR option 6** Construction of storage reservoir to the west of railway embankment to provide flood storage upstream of Skerries Area APSR along with replacing culverts under roads and railway with larger capacity culverts to reduce fluvial flood risk to properties along Miller Lane and Sherlock Park.	**Laytown, Bettystown and Coastal area APSR option 1** Construction of flood defence embankments and walls to protect properties at risk along the coast and from the Nanny River
		Design standard	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*	*1% AEP fluvial/0.5% AEP tidal*
Baseline		Do nothing (assuming any current maintenance and management regime continues)														
Do minimum	1	Reduce existing activities														
	2	Proactive maintenance														
Non-structural measures	3a	Develop a fluvial flood forecasting system														
	3b	Develop a fluvial and tidal flood forecasting system														
	4	Targeted public awareness and education campaign														
	5	Individual property flood-proofing														
	6	Sediment management														
	7	Land management														
Structural measures	8	Sustainable Urban Drainage Systems (SUDS)														
	9	Rehabilitation, improvement of existing defences	116,161	11,616	11,616					511,107						
	10	Improvement in channel conveyance				15,000		244,073	244,073		635,795	1,027,518				
	11	Provision of permanent flood walls/embankments/rock armour/revetments	1,644,950	82,804	82,804		698,686	656,043								616,872
	12	Provision of demountable flood defences		1,213,856	38,095											
	13	Use of overland floodways (e.g. allowing flooding of roads in a controlled manner)														
	14	Flow diversion (full diversion / bypass channel, flood relief channel, etc.)														
	15	Flood storage reservoirs												279,300		
	16	Beach Recharge/sand dunes														
	17	Groynes														
	18	Breakwater														
	19	Managed realignment														
	20	Tidal barrier/Tidal barrage														
	21	Relocation of existing assets														
Basic costs (Euro)			1,761,111	1,308,276	132,515	15,000	698,686	900,116	244,073	511,107	635,795	1,027,518		279,300		616,872
Additional Costs	1	Basic Construction Cost — C	1,761,111	848,903	115,121	15,000	698,686	900,116	244,073	511,107	635,795	1,027,518		279,300		616,872
	2	Contingency — 20% of C	352,222	169,781	23,024	3,000	139,737	180,023	48,815	102,221	127,159	205,504		55,860		123,374
	3	Design Team Fees & Expenses														
	3.1a	Engineering Consultants[1] Cost of works =€126, 973.81 — 10% of C C from to €126,973.81 to €380,921.42 — €2,539.48 + 8% of C C from to €380,921.42 to €634,869.02 — €6,348.69 + 7% of C C from to €634,869.02 to €1, 269,738.10 — €12,697.38 + 7% of C C from to €1,269,738.10 to €3,174,345.20 — €19,046.07 + 5.5% of C C from to €3,174,345.20 to €6,348,690.40 — €34,917.80 + 5% of C C from to €6,348690.40 to €12,697,381.00 — €66,661.25 + 4.5% of C C from to €12,697,381.00 to €25,394,762.00 — €98,404.70 + 4.5% of C Over €25,394,762 — €161,891.16 + 4% of C														
	3.1b	For Reinforced Concrete Portion of Works[2] Cost of RC Portion under €634,869.02 — 3% of C_{RC} RC Portion from €634,869.02 to €2,539,476.20 — €6,348.69 + 2.5% of C_{RC} RC Portion from €2,539,476.20 to to €5,078,952.30 — €19,046.07 + 2% of C_{RC} RC Portion over €5,078,952.30 — €44,440.83 + 1.5% of C_{RC}														
	3.1c	Alternative Method (instead of 3.1a & 3.1b) — 6% of C	105,667	50,934	6,907	900	41,921	54,007	14,644	30,666	38,148	61,651		16,758		37,012
	3	Environmental Consultants — 5% of C	88,056	42,445	5,756	750	34,934	45,006	12,204	25,555	31,790	51,376		13,965		30,844
	3	Economic Consultants — 0.5% of C	8,806	4,245	576	75	3,493	4,501	1,220	2,556	3,179	5,138		1,397		3,084
	3	Specialist Consultants — 2.5% of C	440,278	212,226	28,780	3,750	174,672	225,029	61,018	127,777	158,949	256,879		69,825		154,218
	4	Site Supervision — Based on time cost estimate Clerk of works / Annum =€120,000 Resident Engineer / Annum =€130,000	120,000 130,000	120,000 130,000	60,000 65,000	10,000 10,833	30,000 32,500	60,000 65,000	20,000 21,667	40,000 43,333	40,000 43,333	40,000 43,333		40,000 43,333		20,000 21,667
	5	Allowance for Archaeology — 15% of C	264,167	127,335	17,268	2,250	104,803	135,017	36,611	76,666	95,369	154,128		41,895		92,531
	6	Allowance for Environmental Mitigating Measures — 6% of C	105,667	50,934	6,907	900	41,921	54,007	14,644	30,666	38,148	61,651		16,758		37,012
	7	Allowance for Compensation and Land Acquisition — 10% to 12.5% of C	176,111	84,890	11,512	1,500	69,869	90,012	24,407	51,111	63,580	102,752		27,930		61,687
	8	Allowance for Art[3] Construction cost upto €2.550,000 — 1% of C Construction Cost €2,550,000 to €6,300,000 — 1% of C, Max €38,000.00 Construction Cost €6,300,00 to €12,700,000 — Max €51,000.00 Construction Cost in excess of €12,700,000 — Max €64,000.00	17,611	8,489	1,151	150	6,987	9,001	2,441	5,111	6,358	10,275		2,793		6,169
	9	NPV Maintenance — C x 1.5% x 22.48	593,847	441,151	44,684	5,058	235,597	303,519	82,301	172,345	214,390	346,479		94,180		208,009
Present value cost (€)			**4,163,541**	**2,291,333**	**386,687**	**54,166**	**1,615,121**	**2,125,238**	**584,046**	**1,219,116**	**1,496,198**	**2,366,683**		**703,994**		**1,412,480**

1 Source = Department of Finance Circular Ref:- 11/87

2 Source = Section 4.2 (page 21) of "Public Art : Per Cent for Art Scheme, General National Guidelines 2004

Total PV costs for option	Euro	4,163,541	4,512,624	2,165,999	54,166	1,615,121	2,125,238	584,046	1,219,116	1,496,198	2,366,683		703,994		1,412,480
Total PV damages to 1% AEP fluvial/0.5% AEP tidal		2,730,081	2,730,081	2,730,081	193,440	580,097	1,304,292	432,280	356,311	1,876,254	1,876,255		1,876,257		1,704,694
Total benefits resulting from option	Euro	2,730,081	2,730,081	2,730,081	193,440	580,097	1,304,292	432,280	356,311	1,876,254	1,876,255		1,876,257		1,704,694
Benefit cost ratio		**0.66**	**0.60**	**1.26**	**3.57**	**0.36**	**0.61**	**0.74**	**0.29**	**1.25**	**0.79**		**2.67**		**1.21**
Carry forward to MCA assessment (BCR> 0.85)		**FALSE**	**FALSE**	**TRUE**	**TRUE**	**FALSE**	**FALSE**	**FALSE**	**FALSE**	**TRUE**	**FALSE**		**TRUE**		**TRUE**
Benefit cost ratio considering: **Incorporating benefits from options from other spatial assessment units, and** **Including the benefits of protecting for different AEP events other tha the 1%/0.5% AEP fluvial and tidal event**			0.99	6.76				0.88			0.82				
Carry forward to MCA assessment (BCR> 0.85)			**TRUE**	**TRUE**				**TRUE**			**FALSE**				

Appendix G. IRR Assessment Results

Individual Risk Receptor (IRR)	Assessment Unit	Ownership	Description of flood risk	Flood Risk Management options (from Stage 2)	Option details Description
All	Catchment	Various	Various	Development (Meath County Council (MCC)) and enhancement (Fingal County Council (FCC)) of a proactive maintenance regime targeting potential culvert blockage locations	This option involves the development (Meath County Council (MCC)) and enhancement (Fingal County Council (FCC)) of a proactive maintenance regime targeting potential culvert blockage locations along the watercourses in the study area. FCC currently carries out maintenance at approximately 20 locations at risk of flooding in Fingal. This involves the cleaning of screens on a two to three week basis, with the frequency increased when heavy rain is forecast. A limited maintenance regime is carried out by MCC. This option would involve including additional culverts as part of FCC's proactive maintenance regime and setting out a proactive maintenance regime for culverts in MCC. Proactive maintenance would involve removal of debris (vegetation, silt, rubbish) at the entrance and exit of culverts on a regular basis (i.e. monthly) and in advance of a flood event. Option would also involve monitoring of culverts prone to blockages during a flood event. FCC currently uses weather forecast information to identify when a flood is likely. Hydraulic modelling indicates the following locations are at risk due to culvert blockages (based on a comparison of flood maps for the 1% AEP fluvial event against the 70% culvert blockage flood maps for the 1% AEP event): Swords, Dardistown, Balgriffin, Portmarnock Bridge, Warbelstown, Ashbourne, Ratoath, Ballyboghil, Skerries and Bettystown. IRRs in Ashbourne and Ballyboghil would benefit from this measure. This option would cost approximately €0.45 million over 50 years if the option focussed on maintenance of culverts in the vicinity of the IRRs. Based on a review of flood maps for the with and without culvert blockages scenarios, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.
				Construction of flood defence embankments	This option would involve the construction of flood embankments to protect the IRR. An embankment 0.5m in average height and 30m in length would be required to protect the IRR for the 1% AEP event. This embankment would surround the IRR and cost approximately €0.01 million. The embankment would provide protection up to and including the 1% AEP event. The extent of the proposed defences is minimal and is not likely to impact on surrounding water levels. Based on a review of flood maps, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.

Individual Risk Receptor (IRR)	Assessment Unit	Ownership	Description of flood risk	Flood Risk Management options (from Stage 2)	Option details
					Description
Utility asset in Stamullin	Stamullin area APSR	Unknown	Flooding occurs where the existing culvert and channel capacity results in out of bank flows and inundation of surrounding land during a flood event. Flooding from an under capacity culvert at Stadalt Cross results in inundation of land on the left flood plain of the channel. The utility asset is located approximately 80m downstream of Stadalt Cross on the left flood plain of the channel.	Construction of flood diversion channel	This option would involve the construction of a flow diversion channel to increase capacity in the river system and divert flood water away from the IRR. The topography of the land at the location of the IRR means that this option is technically feasible. A 150m long diversion channel running to the north of the existing channel would cost approximately €0.87 million including the construction of one culvert at the access road to Mountain View housing estate. This would provide protection for the 1% AEP event. Based on a review of flood maps, this option is not likely to overland flood routes or impact on areas of significant natural flood plain storage.
				Individual property flood proofing (IPFP)	This option would involve the installation of off the shelf commercially available products such as door guards, non-return valves, etc. to protect the IRR. Based on aerial photographs, the nature of this IRR, (i.e. small localised structure) would lends itself to the use of IPFP. The cost of providing this option is €11,000 and would provide protection for the 1% AEP event assuming that IPFP was permanently in place. Based on a review of flood maps, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.
			Flooding occurs where the existing channel and structure capacity results in out of bank flows and	Construction of flood defence embankments	This option would involve the construction of flood embankments to protect the IRR. An embankment 210m in length, with an average height of 1.3m would be required to protect the IRR for the 1% AEP event. This option would cost approximately €0.26 million and provide protection up to and including the 1% AEP event. Based on a review of flood maps, this option is likely to alter overland flood routes. The embankment is will block an overland flood route along the right bank of the channel. This option will not impact on areas of significant natural flood plain storage.

Individual Risk Receptor (IRR)	Assessment Unit	Ownership	Description of flood risk	Flood Risk Management options (from Stage 2)	Option details Description
WWTWs at Ballyboghil	Ballyboghil area APSR	Local Authority	structure capacity results in out of bank flows and inundation of surrounding land during a flood event. The WWTW is located on the right bank of the Ballyboghil River at Ballyboghil.	Construction of flood diversion channel	This option would involve the construction of a flow diversion channel to increase the capacity in the river system and divert flood water away from the IRR. The topography of the land at the location of the IRR means that this option is technically feasible. A 240m long diversion channel running to the north of the existing channel would cost approximately €1.1 million and would help increase capacity in the system and divert flood water away from the WWTWs during a flood event. The costs also include for the construction of one culvert at the access road to the WWTWs. This option would provide protection for the 1% AEP event. Based on a review of flood maps, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.
M1 at Staffordstown	Ballyboghil and Lusk AU	NRA	Flooding occurs where the existing channel capacity results in out of bank flows and inundation of surrounding land during a flood event. Flooding along the Turvey River is impacted on by the interaction with flood flows from the Ballyboghil River to the north. This interaction in flood flows increases the flows in the Turvey River resulting in surcharging of the Turvey River culvert under the M1 motorway. The surcharging of this culvert causes the flood water levels to rise and flood the northbound lane of the M1.	Construction of flood defence embankments	This option would involve the construction of flood embankments to protect the IRR. An embankment approximately 2m in average height and 230m in length would be required to protect the IRR. This option would cost approximately €0.55 million and would provide protection up to and including the 1% AEP event. Based on a review of flood maps, this option is not likely to alter overland flood routes. The flood plain storage to the west of the M1 motorway will be increased with this option.
				Construction of flood diversion channel	This option would involve the construction of a flow diversion channel to increase capacity in the Ballyboghil River and limit the volume of water which naturally diverts to the Turvey River. By diverting water through the existing Ballyboghil River culverts under the M1, the issues with the capacity problems at the Turvey culverts under the M1 would be reduced and hence the risk to the M1 would also be reduced. The topography of the land between the Ballyboghil and Turvey River means that this option is technically feasible. A 1.5km long diversion channel running to the south of the existing Ballyboghil River, linking back to the Ballyboghil upstream of the M1 would cost approximately €0.9 million and would provide protection up to and including the 1% AEP event. Based on a review of flood maps, this option is likely to alter existing overland flood routes between the Ballyboghil River and Turvey River to the south. The option is not likely to impact on areas of significant natural flood plain storage.

Individual Risk Receptor (IRR)	Assessment Unit	Ownership	Description of flood risk	Flood Risk Management options (from Stage 2)	Option details
					Description
Waste water pumping station in Ashbourne	Ashbourne area APSR	Local Authority	Flooding occurs where the existing channel capacity results in out of bank flows and inundation of surrounding land during a flood event. The WW pumping station is located on the left bank of the Broadmeadow River at Ashbourne	Construction of flood defence embankments	This option would involve the construction of flood embankments to protect the IRR. An embankment with an average height of 0.9m and 100m in length would be required to protect the IRR. This option would cost approximately €0.06 million and would provide protection up to and including the 1% AEP event. Based on a review of flood maps, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.
WWTWs at Owens Bridge	Owens Bridge area APSR	Local Authority	Flooding occurs where the existing channel capacity results in out of bank flows and inundation of surrounding land during a flood event. The WWTW is located on the right bank of the Ward River at Owens Bridge. The flood maps indicate that this WWTW is at risk for the 0.1% AEP event only.	Construction of flood defence embankments	This option would involve the construction of flood embankments to protect the IRR. An embankment 0.6m in average height and 100m in length would be required to protect the IRR. This option would cost approximately €0.03 million and would provide protection up to and including the 1% AEP event. Based on a review of flood maps, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.
N32 at Clonshaugh	St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR	Local Authority	Flooding occurs due to surcharging of the culvert under the N32 at Clonshaugh. Surcharging at the inlet to the culvert results in flooding along the N32 during a flood event.	Construction of flood defence embankments	This option would involve the construction of a flood embankment to protect the IRR. An embankment with an average height of 1.5m and 80m in length would be required to protect the IRR. This option would cost approximately €0.12 million and provides protection up to and including the 1% AEP event. Based on a review of flood maps, this option is not likely to alter overland flood routes or impact on areas of significant natural flood plain storage.

Individual Risk Receptor (IRR)	Assessment Unit	Ownership	Description of flood risk	Flood Risk Management options (from Stage 2)	Option details
					Description
WWTWs at Julianstown	Julianstown area APSR	Local Authority	Flooding occurs where the existing channel capacity results in out of bank flows and inundation of surrounding land during a flood event. The WWTWs is located on the left flood plain of the Nanny River at Julianstown.	Construction of flood defence embankments	This option would involve the construction of flood embankments to protect the IRR. An embankment with an average height of 2.2m and 330m in length would be required to protect the IRR. This option would cost approximately €0.72 million and provide protection up to and including the 1% AEP event. Based on a review of flood maps, this option is likely to alter overland flood routes. The embankment is will block an overland flood route along the left bank of the Nanny River channel. This option will not impact on areas of significant natural flood plain storage.

Appendix H. Information for non APSRs

BCR of potential options for clusters of at risk properties outside of APSRs

			Option details	Beaumont Bridge - Construction of flood defence embankments to provide protection to clusters of residential properties.	Newtown Construction of flood defence embankments	Streamstown Option 1 - Improving channel conveyance by replacing existing culverts together with construction of flood defence embankments.	The Burrows Option 1 Construction of flood defence embankments to provide protection to cluster of residential properties.
			Design standard	*1% AEP fluvial*	*1% AEP fluvial*	*1% AEP fluvial*	*1% AEP fluvial/0.5% AEP tidal*
Baseline		Do nothing (assuming any current maintenance and management regime continues)					
Do minimum	1	Reduce existing activities					
	2	Proactive maintenance					
Non-structural measures	3a	Develop a fluvial flood forecasting system					
	3b	Develop a fluvial and tidal flood forecasting system					
	4	Targeted public awareness and education campaign					
	5	Individual property flood-proofing					
	6	Sediment management					
	7	Land management					
Structural measures	8	Sustainable Urban Drainage Systems (SUDS)					
	9	Rehabilitation, improvement of existing defences					
	10	Improvement in channel conveyance				917,534	
	11	Provision of permanent flood walls/embankments/rock armour/revetments		130,444	77,977		106,134
	12	Provision of demountable flood defences					
	13	Use of overland floodways (e.g. allowing flooding of roads in a controlled manner)					
	14	Flow diversion (full diversion / bypass channel, flood relief channel, etc.)					
	15	Flood storage reservoirs					
	16	Beach Recharge/sand dunes					
	17	Groynes					
	18	Breakwater					
	19	Managed realignment					
	20	Tidal barrier/Tidal barrage					
	21	Relocation of existing assets					
basic costs (Euro)				130,444	77,977	917,534	106,134
Additional Costs	1	Basic Construction Cost	C	130,444	77,977	917,534	106,134
	2	Contingency	20% of C	26,089	15,595	183,507	21,227
	3	Design Team Fees & Expenses					
	3.1a	Engineering Consultants[1]					
		Cost of works <€126, 973.81	10% of C				
		C from to €126,973.81 to €380,921.42	€2,539.48 + 8% of C				
		C from to €380,921.42 to €634,869.02	€6,348.69 + 7% of C				
		C from to €634,869.02 to €1, 269,738.10	€12,697.38 + 7% of C				
		C from to €1,269,738.10 to €3,174,345.20	€19,046.07 + 5.5% of C				
		C from to €3,174,345.20 to €6,348,690.40	€34,917.80 + 5% of C				
		C from to €6,348690.40 to €12,697,381.00	€66,661.25 + 4.5% of C				
		C from to €12,697,381.00 to €25,394,762.00	€98,404.70 + 4.5% of C				
		Over €25,394,762	€161,891.16 + 4% of C				
	3.1b	For Reinforced Concrete Portion of Works[1]					
		Cost of RC Portion under €634,869.02	3% of C_{RC}				
		RC Portion from €634,869.02 to €2,539,476.20	€6,348.69 + 2.5% of C_{RC}				
		RC Portion from €2,539,476.20 to to €5,078,952.30	€19,046.07 + 2% of C_{RC}				
		RC Portion over €5,078,952.30	€44,440.83 + 1.5% of C_{RC}				
	3.1c	Alternative Method (instead of 3.1a & 3.1b)	6% of C	7,827	4,679	55,052	6,368
	3	Environmental Consultants	5% of C	6,522	3,899	45,877	5,307
	3	Economic Consultants	0.5% of C	652	390	4,588	531
	3	Specialist Consultants	2.5% of C	32,611	19,494	229,384	26,534
	4	Site Supervision	Based on time cost estimate				
			Clerk of works / Annum = €120,000	20,000	20,000	30,000	20,000
			Resident Engineer / Annum = €130,000	21,667	21,667	32,500	21,667
	5	Allowance for Archaeology	15% of C	19,567	11,697	137,630	15,920
	6	Allowance for Environmental Mitigating Measures	6% of C	7,827	4,679	55,052	6,368
	7	Allowance for Compensation and Land Acquisition	10% to 12.5% of C	13,044	7,798	91,753	10,613
	8	Allowance for Art[2]					
		Construction cost upto €2,550,000	1% of C	1,304	780	9,175	1,061
		Construction Cost €2,550,000 to €6,300,000	1% of C, Max €38,000.00				
		Construction Cost €6,300,00 to €12,700,000	Max €51,000.00				
		Construction Cost in excess of €12,700,000	Max €64,000.00				
	9	NPV Maintenance	C x 1.5% x 22.48	43,986	26,294	309,392	35,788
		Present value cost (€)		**331,538**	**214,948**	**2,101,444**	**277,518**

1 Source – Department of Finance Circular Ref:- 11/87

2 Source – Section 4.2 (page 21) of "Public Art : Per Cent for Art Scheme, General National Guidelines 2004

Total PV costs for option	Euro	331,538	214,948	2,101,444	277,518
Total PV damages to 1% AEP fluvial/0.5% AEP tidal		280,921	298,660	917,813	1,811,168
Total benefits resulting from option	Euro	280,921	298,660	917,813	1,811,168
Benefit cost ratio		**0.85**	**1.39**	**0.44**	**6.53**
Carry forward to MCA assessment (BCR> 0.85)		**TRUE**	**TRUE**	**FALSE**	**TRUE**
Benefit cost ratio considering: **Incorporating benefits from options from other spatial assessment units, and** **Including the benefits of protecting for different AEP events other than the 1%/0.5% AEP fluvial and tidal event**					
Carry forward to MCA assessment (BCR> 0.85)					

N

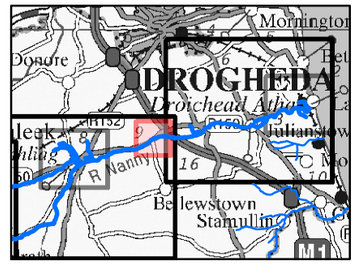
Length (m): 159
Average height (m): 0.9

Length (m): 231
Average height (m): 0.9

River Nanny

110 55 0 110
m

Location Plan :



FRM OPTIONS MAP

Legend

- Area defended by option
- Embankments

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

USER NOTE :

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Clients:

Fingal County Council
OPW

Project :
FEM FRAMS

Map :
Beaumount Bridge

Figure By :	Kevin Daly	Date : 15 Oct 2010
Checked By :	Clare Dewar	Date : 15 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 15 Oct 2010

Figure No. : BeaumountBridge/CURS/001

Revision 0

Drawing Scale : 1:2,500 Plot Scale : 1:1 @ A3

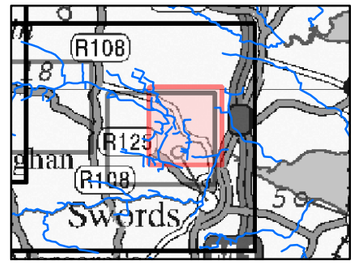
N

Length (m): 120
Average height (m): 1.30

Broadmeadow River

100 50 0 100
m

Location Plan :



FRM OPTIONS MAP

Legend

- Area defended by option
- Embankments

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Project :
FEM FRAMS

Map :
Newtown

Figure By :	Kevin Daly	Date : 07 Oct 2010
Checked By :	Clare Dewar	Date : 07 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 07 Oct 2010

Figure No. : Newtown/CURS/001

Revision 0

Drawing Scale : 1:2,500 Plot Scale : 1:1 @ A3

N

Sluice tributary

Culvert length (m): 457
Inlet diameter (m): 0.6
Outlet diameter (m): 0.7

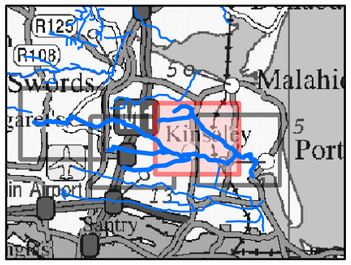
Culvert length (m): 181
Diameter (m): 1.1

Culvert length (m): 146
Diameter (m): 1.1

Sluice tributary

100 50 0 100
m

Location Plan :



FRM OPTIONS MAP

Legend

- Improve channel capacity
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Fingal County Council

OPW

Project :
FEM FRAMS

Map :
Streamstown - Option 1

Figure By :	Kevin Daly	Date : 07 Oct 2010
Checked By :	Clare Dewar	Date : 07 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 07 Oct 2010

Figure No. :
Streamstown/CURS/001

Revision
0

Drawing Scale : 1:3,000 Plot Scale : 1:1 @ A3

N

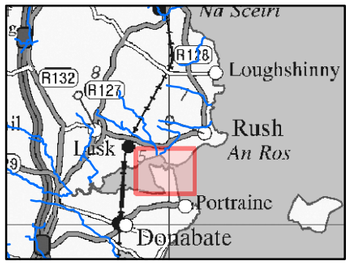
Length (m): 378
Average height: 0.5m for 260m
0.9m for 118m

Rogerstown Estuary

Length (m): 183
Average height: 0.5m for 149m
0.7m for 34m

100 50 0 100
m

Location Plan :



FRM OPTIONS MAP

Legend

- Embankments
- Area defended by option

Risk to Critical Infrastructure

- Utilities
- Emergency response/governance
- Airport
- Railway line
- Motorway
- National
- Regional

Risk to Human Health

- High vulnerablity sites

Risk to the Environment

- Potential pollution sources
- Protected areas
- cSAC, SAC, SPA, NHA and pNHA sites

Risk to Cultural Heritage

- Cultural heritage sites
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Modelled River Centreline

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Clients:

Fingal County Council
OPW

Project :
FEM FRAMS

Map :
The Burrows

Figure By :	Kevin Daly	Date : 07 Oct 2010
Checked By :	Clare Dewar	Date : 07 Oct 2010
Approved By :	Anne-Marie Conibear	Date : 07 Oct 2010

Figure No. : TheBurrows/CURS/T/001
Revision 0

Drawing Scale : 1:2,000
Plot Scale : 1:1 @ A3

Appendix I. FEM Objectives, sub-objectives and targets

Core criteria		Objective		Sub-objective	Indicator	Minimum requirement	Aspirational target
1	Technical	a	Ensure flood risk management options are operationally robust		Level of operational risk of option i.e. mechanical or human intervention required (e.g. lengths/numbers of demountables, pumps etc	Manageable level of mechanical or human intervention.	No mechanical or human intervention.
		b	Minimise health and safety risk of flood risk management options	Reduce and where possible eliminate health and safety risks associated with the construction and operation of flood risk management options	Health and safety risk to construction workers and operators of flood risk management (FRM) options	Manageable level of health and safety risk.	No health and safety risk.
		c	Ensure flood risk managed effectively and sustainable into the future	Ensure flood risk management options are adaptable to future flood risk	Level of adaptability of FRM option to future flood	Option to be adaptable to the MRFS.	Option to be adaptable to the HEFS at negligible cost.
2	Economic	a	Minimise economic risk	Minimise economic risk	Average Annual Damage (AAD) (€)	No increase in economic risk	Economic risk reduced to zero
		b	Minimise risk to transport infrastructure	Minimise risk to transport infrastructure	Number of transport routes (road, rail, navigation) at risk from flooding (0.1% AEP Event)	No increase in number of transport routes at risk	Number of transport routes at risk reduced to 0
		c	Minimise risk to utility infrastructure	Minimise risk to utility infrastructure	Number of utility infrastructure assets (power stations, WWTWs, WTWs, telecom exchanges etc) at risk from flooding (0.1% AEP Event)	No increase in number of utility infrastructure assets at risk	Number of utility infrastructure assets at risk reduced to 0
		d	Manage risk to agricultural land		Area of agricultural land at risk of flooding [based on Corine land use classes] not benefiting from flood risk management measures	No increase in agricultural land at risk of flooding not benefiting from flood risk management measures	Risk to agricultural land at risk of flooding not benefiting from flood risk management measures reduced to 0
3	Social	a	Minimise risk to human health and life	Minimise risk to human health and life	Number of residential properties at risk from flooding (0.1% AEP Event)	No increase in number of properties	Number of properties reduced to 0
				Minimise risk to high vulnerability properties	Number of high vulnerability properties at risk from flooding (0.1% AEP event)	No increase in number of vulnerable properties	Number of properties reduced to 0
		b	Minimise risk to community	Minimise risk to social infrastructure	Number of high-value social infrastructural assets at risk from flooding (0.1% AEP Event)	No increase in number of assets	Number of assets reduced to 0

Core criteria		Objective		Sub-objective	Indicator	Minimum requirement	Aspirational target
				Minimise risk to employment	Number non-residential properties at risk from flooding (0.1% AEP Event)	No increase in non-residential properties at risk	Number of non-residential properties at risk reduced to 0
		c	Minimise risk to, or enhance, social amenity	Minimise risk to flood-sensitive social amenity sites	Number of flood-sensitive amenity sites at risk from flooding (0.1% AEP Event)	No increase in number of sites	Number of sites reduced to 0
4	**Environmental**	a	Support the objectives of the WFD	Prevent deterioration, and where possible improve, ecological status / potential of water-bodies	Ecological status of water-bodies	Provide no constraint associated with flood management measures to the achievement of good ecological status/potential	Significant contribution of flood risk management measures to the achievement of good ecological status/potential
				Prevent deterioration, and where possible improve, chemical status / potential of water-bodies	Chemical status of water-bodies	Provide no constraint associated with flood management measures to the achievement of good chemical status/potential	Significant contribution of flood risk management measures to the achievement of good chemical status/potential
		b	Minimise risk of environmental pollution	Minimise risk to potential sources of pollution	Number of potential pollution sources at risk from flooding (including those licensed under Directives 96/61/EC and 92/271/EC)	No increase in risk to potential pollution sources as a result of flood risk management measures	Reduction in risk potential pollution sources as a result of flood risk management measures
		c	Avoid damage to, and where possible enhance, the flora and fauna of the study area	Avoid damage to, and where possible enhance, internationally and nationally designated sites of nature conservation importance	Reported conservation status of designated sites relating to flood risk management	No deterioration in the conservation status of designated sites as a result of flood risk management measures	Improvement in the conservation status of designated sites as a result of flood risk management measures
				Avoid damage to or loss of, and where possible enhance, habitats supporting legally protected species and other known species and habitats of conservation concern	Presence of and/or extent and quality of suitable habitat supporting legally protected species and other known species of conservation concern (‘target species’)	No loss of extent or deterioration in quality of suitable habitat supporting target species	Increase in extent or improvement in quality of suitable habitat supporting target species as a result of flood risk management measures
				Avoid damage to or loss of existing riverine, wetland and coastal habitats and where possible create new habitat, to maintain a naturally functioning system	Area and quality of riverine, wetland and coastal habitat maintained or created/ restored as a result of flood risk management measures	No net loss of or permanent damage to existing riverine, wetland and coastal habitats as a result of flood risk management measures	Increase in extent of riverine, wetland and coastal habitats as a result of flood risk management measures
		d	Avoid damage to, and where possible enhance, fisheries within the catchment	Maintain existing, and where possible create new, habitat supporting fisheries and maintain upstream access	Area and quality of suitable habitat supporting salmonid and other fisheries and number of upstream barriers to fish passage	No net loss of suitable habitat for fisheries and provide no new upstream barriers to fish passage	Increase extent of suitable habitat for fisheries and improve existing upstream access for fish passage
				Ensure no adverse effects on designated Shellfish Waters	Classification status of shellfish waters	No deterioration in existing classification	Improve existing classification

Core criteria		Objective		Sub-objective	Indicator	Minimum requirement	Aspirational target
		e	Protect, and where possible enhance, landscape character and visual amenity within the catchment	Protect, and where possible enhance, landscape character, including designated highly sensitive landscapes, within the catchment	Compliance with landscape character objectives, including those of designated highly sensitive landscapes, relevant to flood risk management measures	No adverse changes in landscape character as a result of flood risk management measures	Improvements to landscape character as a result of flood risk management measures
				Protect, and where possible enhance, important views within the catchment	Quality of visual amenity at important views relevant to flood risk management measures	No adverse changes in visual amenity as a result of flood risk management measures	Improvements to visual amenity as a result of flood risk management measures
		f	Avoid damage to or loss of features of cultural heritage importance, their setting and heritage value within the study area	Avoid damage to or loss of known buildings, structures and areas of cultural heritage importance, including their setting and heritage value, within the study area	Numbers and types of internationally, nationally and locally designated areas, buildings, structures and features at risk from flooding	No damage to or loss of buildings, structures and features listed on the National Monuments Register, RMP, SMR, RPS and within ACAs, including their setting and heritage value, as a result of flood risk management measures; and/or No increase in flood risk for features sensitive to the impacts of flooding	Enhance the physical context and structure of water-based heritage features; and/or Reduction in flood risk for features sensitive to the impacts of flooding

Appendix J. Cost database

Costs database - all values in Euro (December 2009)

Do minimum

Proactive maintenance	Unit	Cost Rate (Euro)	Source					
Channel maintenance large river (i.e River Lee, Cork)	per metre	75	OPW					
Channel maintenance small river (i.e Ward River, Fingal and Meath)	per metre	15	OPW					
Regular inspection and maintenance of 20 culverts	per year	50,000	Fingal					
Flood event duty	per team of 2 per day	1,000	Halcrow					
Annual mainteneace of flood embankments	per meter	15	OPW					
Defence Asset Survey	per day	1,000	Halcrow					

Non- structural Measures

Fluvial flood forecasting	Unit	Cost Rate (Euro)	Source	Comment				
Gauging station	Per station	50,000	JBBarry	Based on information from JBBarry				
Level-to-level correlations	Per model	50,700	Halcrow	Halcow costs (from previous project work in Wales 2006)				
PDM rainfall-runoff models only	Per model	118,300	Halcrow	Halcow costs (from previous project work in Wales 2006)				
Upstream PDM rainfall-runoff model (with routing model)	Per model	115,227	Halcrow	Halcow costs (from previous project work in Wales 2006)				
Downstream PDM rainfall-runoff model (with routing model)	Per model	104,472	Halcrow	Halcow costs (from previous project work in Wales 2006)				
Upstream PDM rainfall-runoff model (with hybrid model)	Per model	133,663	Halcrow	Halcow costs (from previous project work in Wales 2006)				
Downstream PDM rainfall-runoff model (with hybrid model)	Per model	124,445	Halcrow	Halcow costs (from previous project work in Wales 2006)				
Installation/upgrading rain guages	per gauge	1,536	Halcrow/JBB					
Tidal flood forecasting	**Unit**	**Cost Rate (Euro)**	**Source**	**Comment**				
Development of computer models	Per model	120,000	MarCon Computations					
Annual Operational costs	Annual op costs	30,000	MarCon Computations					

Targeted public awareness and education campaign	Unit	Cost Rate (Euro)	Source	Comment				
Catchment/AU scale	per AU (based on 3 towns in an AU	8,500	Halcrow	Costs based on Lee CFRAMS. Costs for preparing and advertising for Public Information Days				
APSR	per town	4,500	Halcrow	Costs based on Lee CFRAMS. Costs for preparing and advertising for Public Information Days				

Individual property flood proofing	Unit	Cost Rate (Euro)	Source	Comment				
Cost for protecting Individual property	Per residential/ small commercial	8,000	Halcrow	Cost includes 2 flood gates, air vent blocks and fitting of non return valves				
	Large commercial	20,000	Halcrow	Costs based on raising IPP residential costs to include for additional costs for protecting large commercial units				

Structural Measures

SuDS	Unit	Cost Rate (Euro)	Source	Comment				
	m3	45	JBBarry	Attenuations ponds: assuming circa €45-50/m3 for excavation, connections, backfill, disposal excess material, reinstatement.				

Flood Walls	Unit	Unit Cost Rate (€) based on height band				Source	Comment	
		< 1.2m	*1.2 - 2.1m*	*2.1 - 5.3m*	*> 5.3m*			
Retaining	m	2,358	2638	3444		EA Unit Cost Database - 2007		
Retaining and cut off	m	1,380	3996	4567		EA Unit Cost Database - 2007	To be considered where defences > 5.0m	
Retaining and piled	m		4609	4024	13739	EA Unit Cost Database - 2007	To be considered where defences < 5.0m	
Wall raising foundations	m	1,162	1957			EA Unit Cost Database - 2007		
Wave	m	2,170	1850			EA Unit Cost Database - 2007		

Embankments	Unit	Unit Cost Rate (€) based on volume						
Earth embankments		*500-5,000*	*5,000 - 15,000*	*>15,000*				
	m3	98	69	36		EA Unit Cost Database - 2007		

Sheet Piling	Unit	Unit Cost Rate (€) based on length and location of piling						
	m	*Urban - <100m length*	*Urban - >100m length*	*Rural*		EA Unit Cost Database - 2007	To be considered as an alternative to Retaining and Piled where defences > 5.0m	

Demountable	Unit	Cost Rate (€)	Source	Comment				
Based on EA costs for Ironbride floods 2004								
Pallet Barrier demountable flood defence cost	per m	771	Halcrow (2004)	(based on a 25 year life)When considering demountable defences, you need to consider the return per meter period which they will need to be installed. Demountables should be installed on a retaining structure with cutt off. The retaining structure should be no more than 0.5 - 1.0m above ground level to allow for ease of installation of demountables. There are health and safety implications which should be considered when using demountables particularly as it requires people operating close to water.				
Operational costs	per m erection including plant, labour and materials	69	Halcrow (2004)					
Storage costs	per annum	16,057	Halcrow (2004)					

Flood Storage Reservoir	Unit	Volume	Cost Rate (€)	Source	Comment			
	m3	<20000	300.00	Costs based on previous Halcrow project work (White Cart Water flood prevention scheme - Jan '07)				
	m3	20000 - 50000	200.00					
	m3	50000 - 75000	100.00					
	m3	>75000	75.00					

Culverts	Unit	Cost rate (€) per unit length and width				Source	Comment
		Length	Width				
	m		1.2	2.1	4	6		
	m	10	140116	162715	195861	219967	EA Unit Cost Database - 2007	
	m	20	170249	198874	238047	266672	EA Unit Cost Database - 2007	
	m	50	219967	257633	308858	346524	EA Unit Cost Database - 2007	
	m	100	266672	313378	376656	421855	EA Unit Cost Database - 2007	
	m	200	325431	381176	458014	513759	EA Unit Cost Database - 2007	
	m	500	421855	494173	592103	664421	EA Unit Cost Database - 2007	
	m	1,000	513759	601143	721673	809057	EA Unit Cost Database - 2007	

Flow Diversion Channel	Unit	Length	Cost Rate (€) per m					
			Earth	Hard				
	m	50	10848	7081				
	m	250	1959	1808				
	m	500	904	1055				
	m	1,000	452	603				
	m	1,500	301	452				
	m	2,000	301	301				
	m	2,500	151	301				

Installation of sluice gate	Unit	Cost Rate (€)	Source	Comment				
	per sluice gate	21,500	Spons	Based on 3m x 3m sluice gate				
New Bridge	**Unit**	**Cost Rate (€)**	**Source**	**Comment**				
	m	564,984	Spons	Based on 30m span bridge replacement				
	m	1,129,968	Spons	Based on 60m span bridge replacement				
Use of road as overland floodway	**Unit**	**Cost Rate (€)**	**Source**	**Comment**				
	m3	39	NRA Roadworks Unit Rate Datab	Excavation of material				
	m2	11	NRA Roadworks Unit Rate Datab	Road base				
	m2	8	NRA Roadworks Unit Rate Datab	Wearing course				
		50,00	Halcrow	Moving of services (cost may vary)				
Coastal	**Unit**	**Unit Cost Rate (€) per meter of defence**	**Source**					
Beach recharge and breakwater	m	7,532	EA Unit Cost Database - 2007					*50000 m2*
Beach recharge and Groynes	m	4,949	EA Unit Cost Database - 2007					19
Rock Armour	m	4,779	EA Unit Cost Database - 2007					
Revetment and wall	m	4,580	EA Unit Cost Database - 2007					
Breakwater	m	4,571	EA Unit Cost Database - 2007					
Beach recharge	m	3,666	EA Unit Cost Database - 2007					
Revetment	m	2,615	EA Unit Cost Database - 2007					
Sea Wall	m	2,293	EA Unit Cost Database - 2007					
	m3	4,057	Halcrow	Upper limit				
Tidal barrier/barrage	m3	1,379	Halcorw	Lower Limit				
Sand Dune	m	53	EA Unit Cost Database - 2007					

Appendix K. List of Stakeholders

List of Stakeholders

Category	Sub-grouping	Organisation
Decision makers	TDs and Senators	• Dublin North constituency • Dublin West constituency • Dublin North East constituency • Meath East constituency • Louth constituency
	Councillors	• Fingal Electoral Areas – Balbriggan – Malahide – Swords – Howth • Meath Electoral Areas – Dunshaughlin – Slane – Navan Area • Balbriggan Town Council • Louth Electoral Areas – Drogheda East – Drogheda West
Primary stakeholders	Local stakeholders	• Fingal County Council (FCC)* • Meath County Council (MCC)* • Office of Public Works* • DAFF* • Dublin Airport Authority • Dublin Airport Authority Stakeholders Forum • Iarnród Éireann • National Roads Authority • Meath County Development Board • Chambers of Commerce – Fingal • Chambers of Commerce – Meath • Irish Farmers Association
	Environmental organisations	• National Parks & Wildlife Service • Eastern Regional Fisheries Board • Eastern River Basin District Project
	SEA Environmental Authorities	• Environmental Protection Agency • Department of Environment, Heritage and Local Government (DEHLG) • Department of Communications, Energy and Natural Resources (DCENR)
Secondary stakeholders	Government Departments/Councils	• Department of Community, Rural and Gaeltacht Affairs • Department of Transport • Dublin City Council
	Community organisations	• FCC Community Forum (through the relevant Strategic Policy Committees) • Fingal Development Board • Meath Forum
	National organisations	• Fáilte Ireland • Electricity Supply Board • Marine Institute

Category	Sub-grouping	Organisation
		• Forest Service • Coillte Teoranta • Geological Survey of Ireland • Teagasc • An Garda Siochána
	Local business organisations	• Construction Industry Federation (CIF) • Meath County Enterprise Board • Fingal County Enterprise Board • Fingal Tourism • Meath Tourism • Dublin Airport Stakeholders Forum
	Environmental organisations	• Irish Wildlife Trust • Central Fisheries Board • Heritage Council • An Taisce • Birdwatch Ireland • Marine Institute • Landscape Alliance Ireland

* Member of project team / Steering Group

Appendix L. List of culverts for proactive maintenance by the Local Authorities

List of culverts for proactive maintenance by the Local Authorities

The following is a list of culverts/bridges that were identified during the topographic survey and/or hydraulic modelling as being subject to blockage and, if blocked, could affect nearby property. This list was also reviewed at the workshops and structures were added/deleted based on the knowledge of local area engineers. The culverts/bridges in bold text were used in the risk of blockage of structures and the results were reported on in the hydraulics report.

This is a preliminary list and a review of this list to confirm the risk of blockage should be carried out on a regular basis. In addition, the Local Authority should include any additional culverts/bridges that they encounter that are subject to blocking. It should be noted that the OPW currently maintain the culverts/bridges in Duleek as part of the OPW flood relief scheme.

River Name	No	Blockage Locations
Broadmeadow (BRO)	5	• **Warblestown Bridge 4Ba5770** • **Ashbourne Bridge @ Bridge Street 4Ba15420** • **Robertstown Br 4Ba12867** • **Moulden Bridge 4Ba19220** • **Tributary in Ashbourne 4Bau2326**
Ward (WAR)	2	• **Balheary Road Bridge 4Wa102 & 4Wa 953** • Swords Town Centre u/s or d/s 4Wa1296
Lissenhall (LIS)	0	None – high ground
Turvey (TUR)	3	• R127 & R126 Turvey Avenue (just d/s M1) 6Ta4353 • M1 crossing 6Ta4822 • d/s 6Ta3920
Rush Road Stream (RUR)	1	• Tomastown Long culvert 14Pa1830
Nanny (NAN)	4	• Kentstown Bridge R153 • Duleek - Kingsgate Br (Parmadden trib) • **Duleek – Main St Br (Parmadden trib)** • R152 at Duleek
Mosney (MOS)	3	• **Mosney St Bridge 19Maa548** • Near Woodland Ave 19Ma742 • 19Ma1191
Delvin (DEL)	3	Three potential locations in Stamullen
Brookside Stream (BSS)	1	• **Laytown Road Bridge**
Corduff (COR)	2	• **N1 Corduff Bridge 8Ca1129** • R127 Dublin Road Bridge 2Ca611
Ballyboghill (BAL)	2	• R122 Wyanstown Road Culvert 7Ba10,000 • **Ballyboghill Bridge R108**

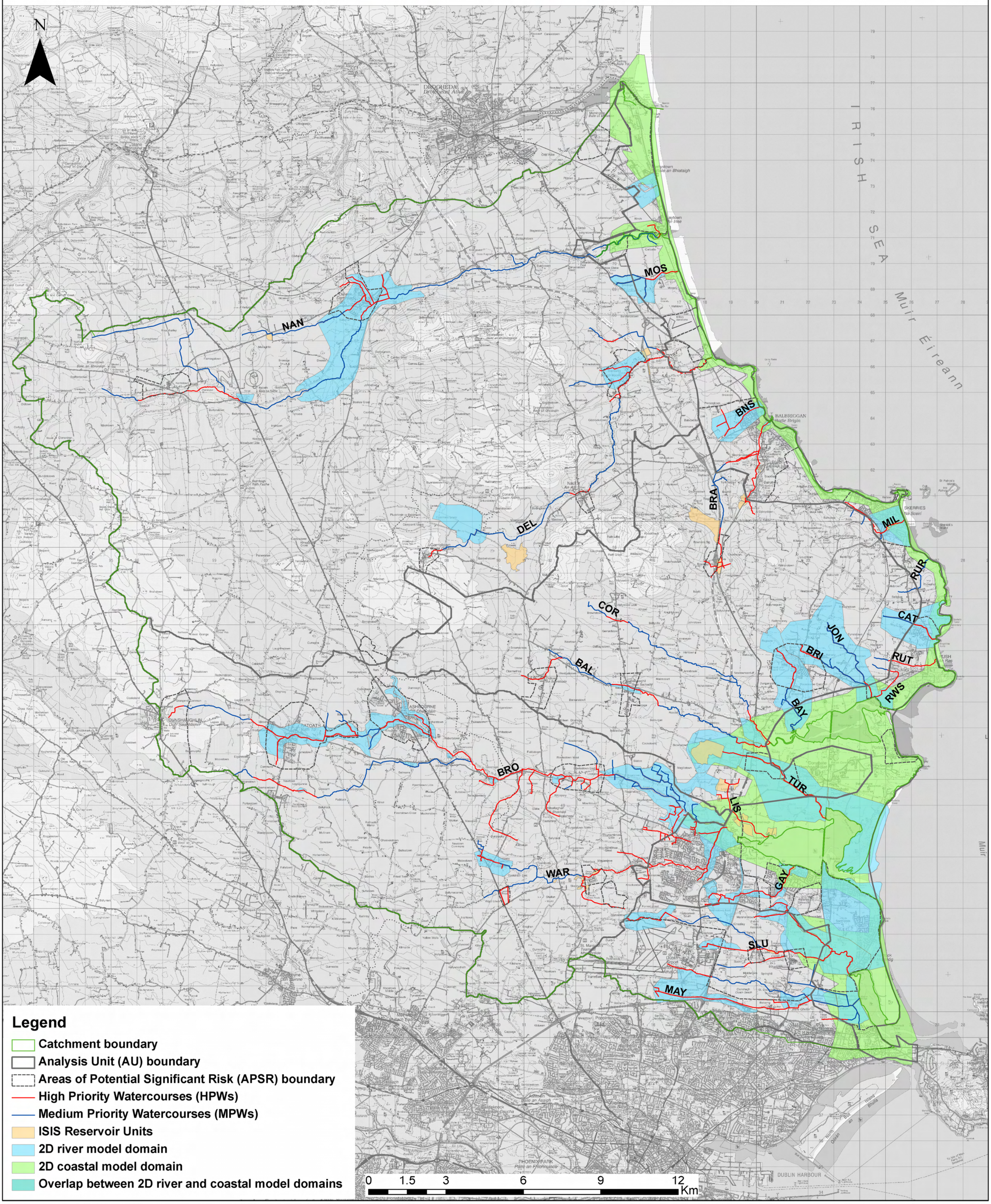
River Name	No	Blockage Locations
Balbriggan Urban (BNS)	0	Mainly culverted
Mill stream (MIL)	1	• **Holmpatrick road bridge 15Ma222**
St. Catherine's Stream (CAT)	1	• CAT – R128 roadbridge
Rush West (RSW)	1	• **RWS – Channel Road culvert (11Wa267)**
Rush Town Stream (RUT)	2	• Skerries Road Br (R128) • Farran's Lane - Screen at 12Ra1448U
Balleally Stream (BAY)	2	Two locations in Lusk 9Ba3905 & **9Ba3030**
Bracken River (BRA)	4	• Rowans Little Area 16Mae33 • **Decoy Bridge 16Ma5361** • **Bridge Street, Balbriggan town ctr 16Ma244U** • R132 16Mab2430
Bride Stream (BRI)	1	• Small access bridge 10La3409 (north Lusk)
Jones Stream (JON)	0	None – mainly rural area
Gaybrook (GAY)	2	• Holywell estate 3Ga3779 • Double box culvert 3GAc899
Mayne (MAY)	3	• N32 culvert 1Ma6020 • **Mayne River at Swords Road (R132) 1Ma7268** • **Cuckoo stream at Wellfield Bridge (R123) 1Mac258**
Sluice (SLU)	6	• Kilsealey Lane Bridge 2Sa3626 • **Portmarnock trotting track 2Sa2300** • Portmarnock trotting track 2Sa2187 • Railway culvert at Hazlebrook 2Saa259 • Back Road short culvert 2Saa2012 & • Back road long culvert 2Saa2373
Nr Locations identified	**49**	

Figure 1 Hydraulic model schematisation showing 2D model domains and ISIS Reservoir Units

Fingal County Council
Comhairle Contae Fhine Gall

OPW
The Office of Public Works
Oifig na nOibreacha Poibli

HalcrowBarry



Appendix M. Executive Summary of the Hydrology Report

Executive Summary

Fingal County Council (FCC), in conjunction with Meath County Council (MCC) and the Office of Public Works (OPW), are undertaking a flood risk assessment and management study in Fingal and East Meath – the Fingal East Meath Flood Risk Assessment and Management Study (FEM FRAMS). Halcrow Barry (HB) was commissioned to carry out the work on behalf of FCC/MCC/OPW. The main report from this study – a Flood Risk Management Plan – will identify a programme of prioritised studies, actions and works to manage flood risk in the Fingal and East Meath (FEM) study area.

This Hydrology Report, together with the Preliminary Hydrology Report published in February 2009, details the hydrological assessment that has been undertaken for this study with the objective of determining hydrological inputs for the 23 rivers and streams in the study area that are to be modelled, for specific design events and future scenarios. The hydrology is based on a review and analysis of historic flood information and use of meteorological and hydrometric records. The Flood Studies Report (FSR), Flood Estimation Handbook (FEH) and the Irish Flood Studies Update (FSU) methodologies have been used to enable the determination of design hydrological inputs which also consider potential future catchment changes likely to influence flood risk.

The analysis presented in this report is concerned with the estimation of extreme flows, which will form the basis for subsequent flood level and mapping stages of FEM FRAMS. To distribute these flows along the river reach, the HPWs (High Priority Watercourses) and MPWs (Medium Priority Watercourses) sections of the 23 rivers and streams that are to be modelled, have been further sub-divided into a total of 270 sub-catchments. Catchment characteristics of these sub-catchments have been extracted using GIS automation tools aided by manual checking. Design inflows at these sub-catchments are calculated using the catchment characteristics, FSU-based rainfall inputs and applying the FSSR 16 and IOH 124 unit hydrograph methods. The total routed inflows from all the upstream sub-catchments at the gauging stations will be reconciled with the statistical method estimated design floods at the gauging stations using iterative simulations in the river hydraulic models.

Hydraulic model calibration and verification events have been identified by reviewing the information on historic floods in the study area including photographs of flood events or their aftermaths. It should also be noted that most of the hydrometric stations in the study area were inoperational between 1995 and 2001 and thus the recent flooding events do not have corresponding hydrometric information. This meant that calibration of only three river hydraulic models out of the total 23 river and stream models was possible. To assist in the future model calibration and flood forecasting in the rivers, Halcrow Barry has developed a priority list of hydrometric gauging stations that should be installed or re-activated in the catchment.

The FEM FRAM study will identify both the existing risk and potential future risk of flooding in the study area. There are a number of drivers that can influence future flood risk in the study area, the main drivers have been identified as being climate change and increasing urbanisation. These drivers have been extensively investigated and two future flood risk management scenarios have been proposed, a Mid Range Future Scenario and a High End Future Scenario. The outputs from this hydrological assessment will inform the subsequent stages of this study and, in particular, the hydraulic modelling and flood mapping stages. Knowledge of the hydrological processes and historic flooding gained from this work will support the decision making process for the flood risk management options.