



**Fingal East Meath Flood Risk Assessment & Management Study
(FEM FRAMS)**

Strategic Environmental Assessment Statement

July 2014



FEMFRAM STUDY – STRATEGIC ENVIRONMENTAL STATEMENT

**Fingal County Council, Meath County Council, Office of Public Works
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SECTION 1 – Introduction

1.1 - Purpose of Report

This is the Strategic Environmental Assessment (SEA) Statement for the FEMFRAM Study. The main purpose of the SEA Statement is to indicate how environmental considerations, views of consultees, and recommendations of the SEA Environmental Report were incorporated into the decision making process in the formulation of the study.

1.2 - Legislative Context

The requirement to carry out a Strategic Environmental Assessment stems from the Strategic Environmental Assessment Directive (2001/42/EC) which states:

‘The objective of this Directive is to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development, by ensuring that, in accordance with this Directive, an environmental assessment is carried out of certain plans and programmes which are likely to have significant effects on the environment.’

The SEA Directive was transposed into Irish Law through the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (Statutory Instrument Number (SI No. 435 of 2004) and the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (SI No. 436 of 2004). Both sets of Regulations became operational on 21 July 2004. The Regulations have been amended by the European Communities (Environmental Assessment of Certain Plans and Programmes) (Amendment) Regulations 2011 (SI No. 200 of 2011) and the Planning and Development (Strategic Environmental Assessment) (Amendment) Regulations 2011 (SI No. 201 of 2011).

The SEA Directive and the instruments transposing it into Irish Law require that after the making of a plan or programme, the plan or programme making authority is required to make a Statement available to the public and Article 9 of the SEA Directive (2001/42/EC) provides that the environmental authorities and the public must be provided with an SEA Statement as soon as is practical after a plan is adopted.

The SEA Statement is required to include information summarising:

- a) How environmental considerations have been integrated into the plan,
- b) How the environmental report, submissions and observations made on the Draft Plan and Environmental Report, and any transboundary consultations have been taken into account during the preparation of the plan.
- c) The reasons for choosing the plan, as adopted, in the light of the other reasonable alternatives and
- d) The measures selected to monitor the significant environmental effects of implementation of the plan.

1.3 - Implications of the SEA on the Plan-Making Process

Through all stages of the process, the environmental assessment of the FEMFRAM study was fully integrated into the decision making process including the formulation of policies, objectives, development of flood mitigation options and alternatives. The key stages in preparing the study included draft flood map public consultation and information days, including public display, Draft Flood Risk Management Plan public consultation and information days including public display. Parallel and integrated into these stages were the SEA Screening, SEA Scoping, SEA Environmental Report, Appropriate Assessment and the SEA Statement.

A programme of external communication activities was developed to ensure that stakeholders and the general public were involved, consulted and/or informed throughout the development of the study. This ensured that a wide range of knowledge, experience and views were taken into account. This study has been produced following consultation and participation of the stakeholders.

Progress with the study was actively communicated to interested stakeholders and the general public through the issue of quarterly newsletters, news articles in the locally circulated newspapers (e.g. Community Matters and Fingal News) and via the project website www.fingaleastmeathframs.ie. Comments and feedback could be submitted either directly through the website or by e mail to the following address: femframs@fingalcoco.ie.

Consultation with the environmental authorities was undertaken at the early stages of the study (prior to the SEA Scoping report) to determine the key environmental issues within the study area relating to flood risk and its management and to identify any additional data sources. Comments and feedback received during and following these consultations has informed the study.

Public consultation also involved information days during the option assessment process and following the publication of the draft FRMP to seek the views of the general public. Comments were also invited on the Environmental Scoping Report, SEA Environmental Report, Draft Flood Risk Management Plan, and Draft Flood Maps when published.

Submissions on the above listed reports were evaluated at each stage of the process in order to ascertain any further environmental consequences to those already identified.

On the completion of the FEMFRAM Study, this SEA Statement was prepared.

1.4 - Production of the SEA

The Strategic Environmental Assessment of the FEMFRAM study was undertaken by the Consultants for the FEMFRAM study, HalcrowBarry, who liaised with the Project Team.

SECTION 2 - How Environmental Considerations were integrated into the Study

2.1 - Introduction

Environmental considerations were integrated into the FEMFRAM study process at a number of stages in the SEA i.e. the Scoping stage, at the Environmental Report stage and

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following the submissions and observations from the Environmental Authorities and the public.

In addition, the environmental sensitivities of the study area were, where known, communicated to the Consultants to identify and integrate appropriate mitigation measures into the study area if required.

The FEMFRAM Study was also subject to Appropriate Assessment Screening under Article 6(3) of the EU Habitats Directive Habitats Directive (92/43/EEC) at both the draft and amendment stage.

2.2 - Scoping Report

The scoping exercise was undertaken in May 2009 and updated in December 2009

The scoping exercise began with an introductory letter and questionnaire being issued to all stakeholders in January 2009, to introduce the study, identify whether they wished to be involved and to request any information relevant to the study including environmental information useful to the SEA and their experiences of flooding.

A Scoping Stakeholder Workshop was held on 10 February 2009, with 19 primary stakeholders comprising of environmental authorities, key environmental stakeholders and local authorities, with the objective of

- determining the key environmental issues within the study area relating to flood risk and its management
- identify and consult on the environmental objectives, which will be used to ensure the integration of the environment into the preparation of the FEMFRAM study, which will also be used to identify the likely significant effects on the environment;
- identify data sources,
- identify the baseline information and any data gaps
- identify reasonable alternative strategies for achieving the strategic goals of the study

The SEA topics that set the agenda for the workshop were

Geology and soils	Land use
Air and Climate	Population and Health
Water	Development regeneration
Landscape	Material assets
Biodiversity and nature conservation	Tourism recreation
Fisheries	Archaeology and cultural heritage

Issues identified by the primary stakeholders at the workshop or through other means of communications during the scoping stage are shown below.

Geology and Soils

- Contaminated sites (mapping/risk assessments)
- Contaminated land – preliminary Section 22 register in place (FCC). Held until verified – all local authority historic landfills – can see raised areas of land in aerial photographs. Environmental Protection Agency holds information on legally closed landfills.
- The environmental impacts of flooding of waste / landfill sites and permitted areas needs to be considered i.e. how to deal with these and how to manage the flood risk to them – cumulative impacts in some areas.

Water

- Morphology: a survey was carried out on the River Delvin by Fingal County Council. The water quality was considered to be good (biologically & chemically), however the habitat

was degraded and the watercourse is heavily modified in places. Bats/otters not present now.

- There is a need to recognise the morphological constraints to the study – a lot of damage is caused by drainage works (affects habitats, building of banks etc)
- Need to consider the cumulative effects of small projects (e.g. infilling, banking etc)
- The WFD and RBMP/Programme of Measures should be considered as they are an important framework
- Water quality, fisheries, habitats, pollution sources
- Drinking water, attenuation, storage, SUDS
- Other strategies for Dublin that require consideration include drinking water, transport, drainage, energy and land use.
- The WFD has just launched a new website with a public consultation plan and availability of spatial data.
- Flood storage was not considered a technically viable option on the Tolka River Flood Study
- Water quality is detailed in the Eastern River Basin District (ERBD) RBMP, which sets out the objectives and programme of measures: This is considered a critical input to FEM FRAMS study
- Traditional philosophy has been to get the water down the catchment as efficiently as possible. This FRMP has an opportunity to make a change.
- There is a study being developed by Dublin City Council to provide a new water supply to Dublin
- Harnessing of water for a source of energy
- Separation of foul and surface water drainage if there is an opportunity to do so. The RBD will address this.
- Volume of foul discharge to surface water is very low – low level of old historic development
- Lack of gauging stations
- Lack of attenuation for surface water drainage at Dublin airport – Mayne River (small paved catchment) – airport pumping water into the streams
- Changes in rainfall pattern due to climate change.
- Increase in demand for water due to increasing urbanisation.
- The Dublin Airport Authority (DAA) has information regarding the layout of ditches and streams that originate and cross the site of Dublin Airport, which discharge into rivers systems within the proposed study area. The DAA has historical monitoring results from grab samples taken on the watercourses which drain the airport lands. The DAA has recently installed water monitoring equipment on the outlets of the streams to log the flow and quality characteristics of the streams.

Landscape

- Need to consider landscape character and visual amenity
- Gabion baskets on the River Tolka were 10 -15m high and didn't become naturalised. These are now a target for vandalism
- Seek soft engineering solutions with amenity, recreation and landscape considered e.g. reed beds and willow planting
- Provide adaptive measures for climate change e.g. green roofs, habitat creation & links to SUDS
- There are good European examples of FRM actions with multiple benefits e.g. Valencia in Spain
- Historic landscape –studies being carried out in Fingal at present:
- Low impact designs should be sought
- Opportunities should be sought for amenity, tourism and education
- A landscape character assessment is available in the County Development Plans.

Biodiversity and nature conservation

- The study area supports a large diversity of protected habitats (e.g. coastal flora at Mornington dunes, eelgrass beds along the coast and estuaries) and species. Protected species include kingfisher, dipper (a good indicator of the health of a river), curlew and invertebrates.
- There is a fine balance between freshwater and saline habitat (good quality saltmarsh is present in the Baldoyle Estuary).
- There is an opportunity to map intertidal habitat to determine its condition and to reinstate habitats
- The Broadmeadow River supports a large range of protected species.
- Monitoring recommendations
- Priority habitats/species
- Impacts on European or Natura 2000 sites (SPAs, SACs and Ramsar sites) will need to be considered during the development of the FRMP through Appropriate Assessment, where necessary.
- Impacts on other designated conservation sites (e.g. NHAs) are important
- Consideration should be given to undesignated nature conservation (e.g. hedgerows and their protection) and loss of habitat in the footprint of flood risk management options.
- Opportunities exist for wetland habitat creation though this can lead to problems such as waterborne diseases (e.g. Malahide mosquito)
- Opportunities for improvements to water quality with associated beneficial impacts on aquatic species
- Information on species in the study area is available through a project carried out on the M1 over the Broadmeadow Estuary

Fisheries

- Opportunities exist for improvements to fisheries e.g. provision of fish passes (and opportunities to restore as salmonid river ~ and fish shelters, removal of weirs, increase light (e.g. by removal of structures casting shadows) and channel obstructions
- Presence of salmonid fisheries and lamprey
- Shellfish designations
- Shellfisheries in Fingal is a contentious issues due to dredging
- The habitat requirements of fish vary between species, life stage etc salmonids require clean a silt free gravel bed to breed, well developed pool/glide/riffle areas for nursery and growth and good variation in a stable riparian zone. Flood management must protect and enhance the fisheries status of these catchments. The environmental objectives should protect water quantity and quality. Standards should maintain and improve water quality and support the achievement of "good ecological status" in line with EU Water Framework Directive. The Plan should maintain and improve biodiversity, enhance the natural functioning of the floodplain and leave it free from development. The Plan must maintain and improve angling potential and facilities.

Land use

- Land use plans
- Transport – roads and bridges, rail
- Buffer zones
- Changes in land ownership/use
- Changes in land use (diversification) e.g. tourism, rambling, fishing, cycling, horticulture, glass houses and allotments
- Sustainable Urban Drainage Systems (SUDS)
- Wells – no datasets in rural areas. John Daly is putting together a borehole register
- Bog of the Ring: only one aquifer there – extracting water into the supply system for drinking water

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- Coillte – National development plan for forestry – planting on harvested raised bogs – relevant here?
- Future of farming in Fingal – aging population – what will change? Land to lie unused, will farms change – will affect land alongside river, which is least productive; less than 12 full time farmers left in Fingal.
- Green Infrastructure conference (FCC) – delivers green river corridors proposed – links to FRM
- Horticulture – traditionally in eastern part – now intensive under glass
- Land use datasets – Irish Farmers Association/Teagasc
- Car parks with large housing estates – policy in London – manage surface run off – SUDS
- Development plans/Transportation plans may hold useful information. SUDS apply to motorway schemes; swales at side of road.
- Access requirements & buffer zone in policies under Greater Dublin Strategic Drainage Study (SDS) & OPW relief schemes – policy developments to avoid building along river corridors
- Opportunities to create towpaths
- Increased urbanisation - more impermeable surfaces.
- Important to ensure that when we identify flood risk options, that we incorporate other opportunities into the plan such as beneficial changes in land use e.g. biodiversity enhancements (wetland habitat creation), SUDS, change in agricultural use.

Population and health

- Health – psychological effects e.g. fear of drowning, flood damage to houses and stress, children and youths are attracted to flooded areas, worry about risks
- Health – physical problems e.g. pollution risks/wells, flooding of sewers/overloading, the elderly are at particular risk, waterborne diseases e.g. Weil's disease, mosquitoes
- Community – restricted movement, pressure on community facilities, access to food and services, financial/insurance problems, break up of communities through allowing areas to flood
- Planning policy – relocation of communities; where do future populations go?
- Sustainability

Development and regeneration

- Need to review planning policies
- Need to protect existing and future development
- The Development Plan review is starting on 1st May 2009, therefore avoid duplication and ensure consistency
- The Regional Planning Guidelines are under review.

Material assets

- Infrastructure
- Flood threshold levels – need an absolute level for development planning
- Appropriate developments
- Agriculture plans
- Any design should take floodplain into account and should have a maintenance plan

Tourism and recreation

- Sustainable development
- Opportunity for tourism – linear parks; develop wetlands
- Potential damage to existing recreational facilities through flooding e.g. football fields

Air and Climate

- Noise and vibration issues (e.g. for the structural integrity of buildings) would require consideration at detailed design stage of a scheme
- The EDS study covers climate change predictions in detail
- Useful documents or gurus on climate change include 'Ireland in a Warmer Climate', IPCSS Coastal Protection Strategy, Prof John Sweeney and Prof. Lynch
- The study should be adaptable to climate change
- The study area is likely to experience an increased intensity of flooding/more flashy floods
- Rising sea levels will have impacts on estuaries and coastal areas

Archaeology and cultural heritage

- High archaeological potential in the study area and can be significantly impacted by development
- Chris Taine (FCC) and Gill Chadwick (MCC) are good contacts
- Buffer zones around monuments
- Need to understand the importance of non-scheduled archaeology, below ground and underwater archaeology
- It would be useful if the FRMP shows archaeological assets at flood-risk and those sites that are vulnerable. The FRMP should be clear where and how archaeology will be impacted.
- Need to recognise that overriding objectives encompass designated, non-scheduled archaeology and underwater assets.
- Need to recognise the constraints and limitations that archaeology can pose to the study e.g. raised listed structures to increase channel flow
- There is an opportunity to identify new archaeological sites through survey work at scheme level
- Margaret Gowen Archaeologists has carried out a study on historic landscapes
- Need to consider architecture such as bridges, weirs that are listed, railway viaduct, harbour walls in Balbriggan and the remnants of tidal mills in Rogerstown.
- Coastal helicopter imagery is available
- Both development plans list the protected structures in the relevant counties.

Comments and feedback received during and after this workshop have informed the SEA process, thus minimising the potential for significant negative environmental effects arising from implementation of the study.

2.3 - Environmental Report

The Environmental Report identified, described and evaluated the likely significant effects of implementing the Fingal East Meath Flood Risk Management Plan on the receiving environment. The report also ensures that identified adverse effects are mitigated, communicated and monitored, and opportunities for public involvement are provided.

Overall, the preparation of the Environmental Report influenced the formulation of the Fingal East Meath Flood Risk Management Plan as follows;

1. Identified the environmental characteristics, issues, constraints and opportunities of the study area that could influence the risk of flooding; and constrain or provide opportunities for the implementation of flood risk management options.
2. Provided a brief overview of the relevant environmental characteristics of the study area, including any specific environmental problems, and identified the environmental features located within the floodplain, or with the potential to be affected by proposed flood risk management options based on the flood mapping undertaken as part of the plan-making process
3. Describes the future evolution of these environmental conditions in the absence of the Fingal East Meath Flood Risk Management Plan.

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4. It raised the awareness of the existing level of environmental information in the study area, the sensitive nature of the EU Designated Sites which are located within and adjoining the study area and also the EU and National legislation governing the environment.
5. It emphasised the need to provide suitable habitats for both native and visiting species to the area.
6. It emphasised the necessity of maintaining and improving the quality of surface water
7. Identified environmentally unacceptable flood risk management measures to be screened out from further consideration at an early stage
8. Assessed flood risk management options for, and to avoid potential environmental impacts where possible.
9. Identified the effects of the draft Fingal East Meath Flood Risk Management Plan making recommendations to address these during the implementation of the Plan.

The detail of these influences is expanded on below.

2.3.1 - Baseline

The Environmental Report contains a range of baseline information on key environmental headings such as:

1. Geology, soils and land use
2. Water, morphology, fluvial and coastal processes
3. Climate
4. Biodiversity, flora and fauna
5. Fisheries
6. Landscape and visual amenity
7. Population and health
8. Infrastructure and material assets
9. Tourism and recreation
10. Archaeology and cultural heritage

Baseline information was gathered through a combination of Stakeholder workshops, existing reports and surveys, site visits and new monitoring to inform the environmental report.

2.3.2 - Key Environmental Issues Identified

The key environmental issues in this study area were identified and outlined in the Environmental Report, and shown in summary in Table 2.3.2-1.

The SEA has concluded that the proposed flood risk management options could give rise to a number of significant permanent positive environmental effects with no significant negative effects. Some significant and minor negative environmental effects could arise with no alternative option solution apparent. However, for all these negative effects, mitigation measures in the form of appropriate design should avoid or reduce the predicted effects.

The above statement is consistent with the Appropriate Assessment.

Table 2.3.2-1

APSR - Location	Identified significant residual effects	Mitigation requirements
Duleek area – raising existing defence embankment (to be considered in longer term)	✓✓ Significant positive effects as a result of the reduction in flood risk to four residential properties and transport infrastructure (a 50m stretch of regional road)	None required
	X Minor negative effects as a result of permanent changes in landscape and visual amenity in a medium sensitivity landscape setting (significance reduced from moderate assuming that proposed mitigation measures are effective)	Appropriate design to minimise visual intrusion
Ratoath area – replacing a bridge and culvert (at two separate locations) to improve channel conveyance	✓✓ Significant positive effects as a result of the reduction in flood risk to nine residential properties, transport infrastructure (i.e. 90m of regional road) and 2ha of agricultural land	None required
Rowlestown East area – constructing new flood embankments	✓✓ Significant positive effects as a result of the reduction in flood risk to two residential properties and transport infrastructure (i.e. 80m of regional road)	None required
	X Minor negative effects as a result of permanent changes in landscape and visual amenity in a medium sensitivity landscape setting (significance reduced from moderate assuming that proposed mitigation measures are effective)	Appropriate design to minimise visual intrusion
Balgriffin – removing old bridge structure to improve conveyance and constructing new flood embankments and walls	✓✓ Significant positive effects as a result of the reduction in flood risk to 19 residential and two non-residential properties (i.e. positive community effects) and transport infrastructure (i.e. up to 600m of regional road)	None required
	X Minor negative effects on designated habitats and bird species resulting from a potential change in the pattern of freshwater input received by Baldoyle Bay pNHA/cSAC/SPA 1.5km downstream (significance reduced from moderate assuming that proposed mitigation measures are effective)	Optimise scheme design to reduce changes in water flows/levels
Strand Road, Portmarnock – rehabilitating and raising existing coastal defences and constructing new embankment	✓✓ Significant positive effects as a result of the reduction in flood risk to 17 residential properties and one non-residential property (i.e. positive community effects) and transport infrastructure (i.e. up to 650m of regional road)	None required
	X Minor negative effects as a result of potential damage to intertidal saltmarsh habitat and disturbance to designated bird species within Baldoyle Bay cSAC/SPA/pNHA; and reduction in saline inputs to transitional features of the Sluice River Marsh pNHA (significance reduced from moderate assuming that proposed mitigation measures are effective)	Appropriate design to avoid damage to the saltmarsh zone or, if necessary, create replacement habitat. Avoid sensitive periods for birds and reduce noise by appropriate construction methods. Ensure occasional saline incursions into Sluice River Marsh to maintain transitional habitats and species
	X Minor negative effects as a result of permanent changes in landscape and visual amenity within an area designated as an 'Important View' (significance reduced from moderate assuming that proposed mitigation measures are effective)	Appropriate design to minimise visual intrusion
Malahide town centre – constructing new embankments and demountable defences	✓✓ Significant positive effects as a result of the reduction in flood risk to up to 22 residential and 15 non-residential properties (i.e. positive community effects) and transport infrastructure (i.e. up to 350m of regional road)	None required
Aspen, Swords area – channel widening to improve conveyance	✓✓ Significant positive effects as a result of the reduction in flood risk to 9 residential properties and transport infrastructure (i.e. short stretch of local roads)	None required
Rush area – channel widening to improve conveyance	✓✓ Significant positive effects as a result of the reduction in flood risk to 25 residential properties and transport infrastructure (i.e. up to 600m of local roads)	None required
Skerries area – enlarging culverts and widening channel to improve conveyance	✓✓ Significant positive effects as a result of the reduction in flood risk to 49 residential properties; transport infrastructure (i.e. >1.5km of local roads); up to 4ha of agricultural land; and one cultural heritage site	None required
Laytown area – constructing new embankments	✓✓ Significant positive effects as a result of the reduction in flood risk to 10 residential properties and transport infrastructure (i.e. up to 0.45km of regional road)	None required
	X Minor negative effects due to potential disturbance to birds designated as part of the River Nanny Estuary and Shore SPA and permanent loss of habitat which support these birds (significance reduced from moderate assuming that proposed mitigation measures are effective)	Appropriate design to set back defence from intertidal, or create replacement habitat. Plan to avoid sensitive months for birds. Apply best practice construction measures to minimise disturbance
	X Minor negative effects on landscape character and visual amenity in a highly sensitive setting (significance reduced from moderate assuming that proposed mitigation measures are effective)	Appropriate design to minimise visual intrusion

2.3.3 - Strategic Environmental Objectives (SEO's)

The SEA objectives provide the means by which the environmental acceptability of proposed flood mitigation options can be tested. An initial suite of objectives was identified during the scoping process that were based on an understanding of the issues, constraints and opportunities relating to flood risk management in the Fingal East Meath study area. These have been subsequently refined, through consultation, on the identification of flood risk management objectives, for use as appraisal criteria both within the option assessment process and the subsequent SEA evaluation of the component elements of the Flood Risk Management Plan.

The SEA objectives used for the assessment of the Fingal East Meath Flood Risk Management Plan comprise 12 of the 16 flood risk management objectives used during the option assessment process to determine the preferred flood risk management strategy. The SEA objectives comprise three of the economic objectives and all three social and six environmental objectives.

The objectives address issues relating to all of the SEA topics required for consideration under the SEA Directive, except where particular topics have been identified as not relevant to the study through the scoping process such as air and climate. Specific consideration of air quality impacts were not considered relevant to the Fingal East Meath Flood Risk Management Plan due to the specific and localised nature of any potential impacts. Climatic factors have been taken into account in the development of options, and have been incorporated within a technical objective (one of the 16 flood risk management objectives, but not one of the SEA objectives) which assesses the potential ability of options to be adapted to allow for future increases in flood risk.

The SEA objectives for the Fingal East Meath Flood Risk Management Plan, and their associated sub-objectives, indicators and targets are presented in the table 2.3.3-1.

Table 2.3.3-1 – SEA objectives, sub-objectives, indicators and targets

Core criteria	Objective	Sub-objective	Indicator	Minimum requirement	Aspirational target
Economic	Minimise risk to transport infrastructure	-	Number of transport routes (road, rail, navigation) at risk from flooding (0.1% AEP)	No increase in number of transport routes at risk	Number of transport routes at risk reduced to 0
	Minimise risk to utility infrastructure	-	Number of utility infrastructure assets (power stations, WWTWs, WTPs, telecom exchanges etc) at risk from flooding (0.1% AEP)	No increase in number of utility infrastructure assets at risk	Number of utility infrastructure assets at risk reduced to 0
	Manage risk to agricultural land	-	Area of agricultural land at risk of flooding [based on Corine land use classes] not benefitting from flood risk management measures	No increase in agricultural land at risk of flooding not benefitting from flood risk management measures	Risk to agricultural land at risk of flooding not benefitting from flood risk management measures reduced to 0
Social	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)	No increase in number of properties at risk	Number of properties at risk reduced to 0
		Minimise risk to high vulnerability buildings	Number of high vulnerability properties at risk from flooding (0.1% AEP)	No increase in number of high vulnerability properties at risk	Number of high vulnerability properties at risk reduced to 0
	Minimise risk to community	Minimise risk to social infrastructure	Number of high-value social infrastructural assets at risk from flooding (0.1% AEP)	No increase in number of assets at risk	Number of assets at risk reduced to 0
		Minimise risk to employment	Number of non-residential properties at risk from flooding (0.1% AEP)	No increase in number of non-residential properties at risk	Number of non-residential properties at risk reduced to 0
	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)	No increase in number of sites at risk	Number of sites at risk reduced to 0
Environmental	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
	Minimise risk of environmental pollution	Minimise risk to potential sources of pollution	Numbers of potential pollution sources at risk from flooding (including those licensed under Directives 96/61/EC and 92/271/EEC)	No increase in risk to potential pollution sources as a result of flood risk management measures	Reduction in risk to potential pollution sources as a result of flood risk management measures
	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
	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	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
	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 study area	Compliance with landscape character objectives, including those of designated highly sensitive landscapes, relevant to flood risk management measures	No adverse impacts on 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 study area	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
	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

2.3.4 - Environmental Assessment

Policies and objectives of the FEMFRAM Study were formulated and informed by the SEA, AA and FRA processes in addition to the feedback from the environmental agencies, the general public and key stakeholders. In addition, the collaboration across different departments within the Local Authorities and the OPW ensured that the study was informed with the environmental priorities of each department. The policies and objectives were assessed against the SEOs at a number of stages during the process that allowed for early identification and mitigation of environmental conflicts. This allowed amendments, where necessary, to existing objectives, the addition of environmentally beneficial objectives and the removal of objectives with significant negative effects.

An assessment was also made on long term/permanent positive impacts, short term positive impacts, long term/permanent negative impacts, short term negative impacts, potential for both positive and negative impacts in the long and short term, insignificant impact and no relationship as required under the SEA Directive.

Table 2.3.3-1 represents a summary of the evaluation of the objectives within the Plan under each of the SEOs

2.3.5 - Mitigation

Mitigation measures are recommended where the proposed flood risk management options are predicted to have negative effects. Mitigation measures are detailed in the SEA Environmental Report. The principal recommendation is that the predicted negative effects should be considered further during the next stage of option development, when details of each option (e.g. visual appearance, alignment of flood defences) can be optimised through detailed feasibility studies and design in order to limit identified impacts on sensitive receptors.

Where it is anticipated that mitigation is likely be effective, and in particular where effects are temporary, this can result in a reduction in the significance of the identified negative environmental effects. This is anticipated to be effective for effects on landscape and visual amenity at the following locations: Duleek, Rowlestown East, Strand Road Portmarnock and Laytown as it is anticipated that effective and appropriate design can incorporate the structures within the existing landscape settings. The proposed mitigation measures identified for effects on flora and fauna is anticipated to be effective at the following locations: Balgriffin; Strand Road, Portmarnock; and Laytown; and include the appropriate timing of works, protection and avoidance of intertidal habitats, reduction of noise and visual disturbance and creation of replacement habitat where necessary.

Table 2.2.5-1 summarises the significant (i.e. major or moderate) environmental effects, assuming that proposed mitigation is taken into account, identified for the proposed flood risk management schemes that form the basis of the draft Plan. There are no significant negative effects identified, although Table 2.2.5-1 highlights the permanent negative effects considered to be potentially significant, prior to the consideration of potential mitigation measures, for which it is assumed that mitigation could reduce their significance to minor.

None of the remaining components of the flood risk management strategy (i.e. proposals at a study area and AU scales) are predicted to give rise to significant negative or positive effects, although a number of minor negative and positive effects are also identified. These conclusions are consistent with those of the Appropriate Assessment process.

Table 2.2.5-1 – Summary of the residual effects of the FEM FRMP components and the associated mitigation recommendations

APSR - Location	Identified significant residual effects	Mitigation recommendations
Duleek area – raising existing defence embankment (included in the FRMP as a medium to low priority term element)	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to four residential properties and transport infrastructure (a 50m stretch of regional road)
	X	Minor negative effects as a result of permanent changes in landscape and visual amenity in a medium sensitivity landscape setting (<i>significance reduced from moderate assuming that proposed mitigation measures are effective</i>)
Ratoath area – replacing a bridge and culvert (at two separate locations) to improve channel conveyance	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to nine residential properties, transport infrastructure (i.e. 90m of regional road) and 2ha of agricultural land
	X	Minor negative effects as a result of permanent changes in landscape and visual amenity in a medium sensitivity landscape setting (<i>significance reduced from moderate assuming that proposed mitigation measures are effective</i>)
Rowlestown East area – constructing new flood embankments	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to two residential properties and transport infrastructure (i.e. 80m of regional road)
	X	Minor negative effects as a result of permanent changes in landscape and visual amenity in a medium sensitivity landscape setting (<i>significance reduced from moderate assuming that proposed mitigation measures are effective</i>)
Balgriffin – removing old bridge structure to improve conveyance and constructing new flood embankments and walls	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to 19 residential and two non-residential properties (i.e. positive community effects) and transport infrastructure (i.e. up to 600m of regional road)
	X	Minor negative effects on designated habitats and bird species resulting from a potential change in the pattern of freshwater input received by Baldoyle Bay pNHA/cSAC/SPA 1.5km downstream (<i>significance reduced from moderate assuming that proposed mitigation measures are effective</i>)
Strand Road, Portmarnock – rehabilitating and raising existing coastal defences and constructing new embankment	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to 17 residential properties and one non-residential property (i.e. positive community effects) and transport infrastructure (i.e. up to 650m of regional road)
	X	Minor negative effects as a result of potential damage to intertidal saltmarsh habitat and disturbance to designated bird species within Baldoyle Bay cSAC/SPA/pNHA and reduction in saline inputs to transitional features of the Sluice

APSR - Location	Identified significant residual effects	Mitigation recommendations
		River Marsh pNHA (<i>significance reduced from moderate assuming that proposed mitigation measures are effective</i>) methods. Ensure occasional saline incursions into the Sluice River Marsh to maintain transitional habitats and species.
	X	Minor negative effects as a result of permanent changes in landscape and visual amenity within an area designated as an 'Important View' (<i>significance reduced from moderate assuming that proposed mitigation measures are effective</i>) Appropriate design to minimise visual intrusion
Malahide town centre – constructing new embankments and demountable defences	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to up to 22 residential and 15 non-residential properties (i.e. positive community effects) and transport infrastructure (i.e. up to 350m of regional road) None required
Aspen, Swords area – channel widening to improve conveyance	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to 9 residential properties and transport infrastructure (i.e. short stretch of local roads) None required
Rush area – channel widening to improve conveyance	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to 25 residential properties and transport infrastructure (i.e. up to 600m of local roads) None required
Skerries area – enlarging culverts and widening channel to improve conveyance	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to 49 residential properties; transport infrastructure (i.e. >1.5km of local roads); up to 4ha of agricultural land; and one cultural heritage site None required
Laytown area – constructing new embankments	✓✓	<u>Significant positive effects</u> as a result of the reduction in flood risk to 10 residential properties and transport infrastructure (i.e. up to 0.45km of regional road) None required
	X	Minor negative effects due to potential disturbance to birds designated as part of the River Nanny Estuary and Shore SPA and permanent loss of habitat which support these birds (<i>significance reduced from moderate assuming that proposed mitigation measures are effective</i>) Appropriate design to set back defence from intertidal, or create replacement habitat. Plan to avoid sensitive months for birds. Apply best practice construction measures to minimise disturbance
	X	Minor negative effects on landscape character and visual amenity in a high sensitivity landscape (<i>significance reduced from moderate assuming that proposed mitigation measures are effective</i>) Appropriate design to minimise visual intrusion

SECTION 3 - Environmental Report and Submissions & Observations

3.1 - Introduction

The following section details the issues which were raised prior to, during and after the preparation of the SEA Environmental Report and how these were incorporated into the Plan.

The submissions from the initial scoping responses on the environmental issues have been described in section 2.2, with all submissions informing the production of the SEA Environmental Report and the Flood Risk Management Plan.

Public consultation to seek the views of the general public involved information days during the option assessment process, following the publication of the draft Flood Risk Management Plan and Draft Flood Maps.

Submissions on the above listed reports were evaluated at each stage of the process in order to ascertain the environmental consequences.

3.2 - Submissions and Observations on the Draft Documents

Public consultation days were held to seek the views of the general public at four locations throughout the Fingal East Meath Catchment, at the start of the formal consultation on the Draft Flood risk Management Plan, the SEA Environmental Report and the Flood Maps. The purpose of the consultation process was to provide the public and interested stakeholders with a forum to inspect the Plan and the Maps, and comment on issues of interest to them.

As part of the formal consultation members of the public, stakeholders and government organisations were invited to make submissions. A number of formal submissions were received during the public consultation period, as summarised below:

- Thomas Fitzsimons, - Flooding in Aspen Drive, Kinsealy Court.
- Liam Sweeney, - Flooding of Aspen Drive and the Gaybrook Stream.
- IFI, Letter to FCC – Omission of flooding from farmland.
- Brendan Ryan TD - Requesting information
- Maria Rochford, DHP consultants, Lord Mayors Public House, Church Road, Swords
- Nick Smith, Waterman Moylan, - Amy O'Connor property, Spout Road, Rush
- Patrick Opdebeck, Waterman Moylan, - Sneem Properties, Mill Stream, Skerries
- Kevin Sturgon, DBFL, -Comments on Mayne River
- Derek Jones Consulting on behalf of Residents of Channel Road Lower, Rush.

The Submissions received did not raise any issues that require an amendment to the Flood Risk Management Plan, the SEA Environmental Report or the Draft Flood Maps. Some minor issues were raised that should be assessed under the next cycle of the CFRAM study.

3.3 - Submissions and Observations on the Environmental Report

In accordance with Circular Letter PSSP 6/2011 Further Transposition of EU Directive 2001/42/EC on the Strategic Environmental Assessment (SEA) consultation took place with the Designated Environmental Authorities. Submissions were received from the EPA on the SEA Environmental Report, the Draft Flood Risk

Management Plan, and the Draft Final report. The issues contained within the submission were discussed with the EPA and responses agreed.

The submissions that made specific reference to the SEA are summarised below.

Environmental Protection Agency (EPA)

The SEA for the Draft Plan sets out the SEA methodology, key conclusions and recommendations/ mitigation measures in a clear and systematic manner. In other aspects, however, the assessment appears to be more generic in nature and should be reviewed and where necessary and appropriate updated.

Response: All projects and flood mitigation works completed, including construction operation and maintenance, shall complete where required a project specific SEA environmental report and appropriate assessment.

The inclusion of Table 7.3, which brings together spatially both the WFD and Flood Directives, is in particular welcomed. Section 9.2.3 and Table 9-3 relating to the summary of identified residual effects are also noted. While it is noted that the proposed mitigation measures, if carried out at project level have been determined to have a positive effect, consideration should be given to providing a stronger commitment to requiring that the mitigation measures be fully implemented, as appropriate and relevant, to the different projects which may arise in implementing the Plan.

Response: Mitigation recommendations has been changed to Mitigation Requirements in the text of the reports that make up the Fingal East Meath Flood Risk Assessment and Management Study

It is also noted in paragraph 3 Section 9.2.4 Cumulative / In-combination effects, that each construction project is small in scale relative to the SPAs. While the inclusion of Table 9-4 Potential for in-combination effects with other development-related Plans is acknowledged.

Response: NOTED

Notwithstanding the relatively small scale of works referred to, the focus of the consideration of potential “in- combination effects” in the Habitats Directive should also consider the likely effects of multiple small scale works and additional/combined effects of other relevant plans, programmes and projects on the Integrity of Natura 2000 sites.

Response: All projects completed based on the recommendations from this study will undergo, where required, an EIA/EIS/Appropriate Assessment and will be reviewed on an individual basis and or consider the effects of multiple small scale works to mitigate against cumulative/in-combination effects.

In Section 9.5 Habitats Directives Assessment, it appears that all the mitigation measures listed address issues arising during the construction phase. Clarification should be given on the extent to which post construction (i.e. operation/maintenance) mitigation measures have also been considered.

Response: All projects and flood mitigation works carried out based on the recommendations from this study, including construction, operation and maintenance, must comply with all current Environmental Legislation (e.g. Habitats Directive, SEA directive, Birds and Natural Habitats Regulations etc.) and undergo, where required, an Environmental Impact Assessment, an Environmental Impact Statement, and an Appropriate Assessment to ensure the protection of water quality, biodiversity, landscape character, natural and cultural heritage, infrastructure and habitats with mitigation measures set and monitored on a project basis.

The phased development of both structural and non-structural elements of the Plan presented in Appendix A is acknowledged. Additionally Appendix C provides useful summary descriptions outlining the potential risks to human health, environment, cultural heritage and critical infrastructure with each APSR considered. There may be merits in including a link to any potentially inappropriately zoned land uses, such as residential in areas at risk of significant flooding under the human health section. You are referred to DECLG's spatial planning / land use zoning website www.myplan.ie which may be a significant resource in this regard.

Response: All land use plans, Local area plans, county development plans, landscape character plans, assessment of future land zoning, and planning applications for all developments must take account of the recommendations of and be informed by the FEMFRAM study and shall implement The Planning System and Flood risk Management Guidelines for Planning Authorities including the appendices as appropriate.

Chapter 3 - "The Fingal East Meath Flood Risk Management Plan"

There would be merits in this section to including a list of relevant environmental objectives set by other relevant Plans and Programmes. Consideration should be given to summarising the policies/objectives in key influential Plans/Programmes responsible for protecting environmental vulnerabilities/sensitivities other than flooding, such as biodiversity, water quality to be taken into account to ensure these aspects in particular are accounted for in any planned flood relief works proposed in implementing the Plan during its lifetime.

Response: All projects completed based on the recommendations from this study will undergo, where required, an EIA/EIS/Appropriate Assessment and will be reviewed on an individual basis and or consider the effects of policies/objectives in key influential Plans/Programmes responsible for protecting environmental vulnerabilities/sensitivities other than flooding, such as biodiversity, water quality to be taken into account to ensure these aspects in particular are accounted for in any planned flood relief works proposed in implementing the Plan during its lifetime.

Links with Other Plans and Programmes

Chapter 5 - Relationship with other plans lists a number of other influential Plans / Programmes and is noted. Clarification should, be given regarding the status of the GSDSDS in the context of potential influence on the Plan. The objectives of the Eastern RBMP and in particular the measures proposed for the Water Management Units falling into the Plan area should be described here

Response: The status of the GSDSDS in the context of potential influence on the plan is dealt with in Table 5.2 SEA Environmental Report.

Specific information relating to the requirements of the Eastern RBMP within the Fingal East Meath study area is provided in Section 5.3, 7.3 of the SEA Environmental Report.

The inclusion of Table 5.1 – Summary of the spatial planning and development plans relevant to the draft FEM FRMP is acknowledged. With regard to the reference to the Eastern River Basin District River Basin Management Plan (ERBDMP), consideration should be given to including a specific reference to Article 4.7 of the Water Framework Directive. This is relevance in the context of the requirements to ensure compliance with the overall objectives of the WFD is not compromised by any developments proposed in the Plan.

Response: All proposed flood mitigation works, revisions to the current study or measures associated with the Plan must comply with the requirements of the Water Framework Directive (WFD) including Article 4.7.

Consideration should be given to the Malahide and Balbriggan/Skerries Shellfish Growing Areas Pollution Reduction Programmes, which should be protected in implementing the Plan and taken into account for potential effects in any structural flood alleviation works considered.

Response: All projects and flood mitigation works completed, including construction operation and maintenance, and future iteration of the study must consider the Malahide and Balbriggan/Skerries Shellfish Growing Areas Pollution Reduction Programmes, with the areas protected and taken into account for potential effects in any structural flood alleviation works considered.

Section 11 - Conclusions and Recommendations of the SEA ER sets out the predicted likely significant effects and proposed SEA/AA mitigation measures and is acknowledged. Consideration should be given to assigning coded reference to specific mitigation measures. This will assist in the on-going monitoring of the implementation of the Plan and any associated effects. In Section 11.4 - Links to other external plans, consideration should be given to making specific reference to the Draft Meath County Development Plan 2013-19.

Response: Consideration will be given to assigning a coded reference to the specific mitigation measures during the 6 year review of the East CFRAM study.

Reference to both Fingal and Meath county Development Plan is included in Section 11.4.

Mitigation and monitoring

In addition, the following plans and programmes should also be considered:

- Water Supply Project – Dublin Region Draft Plan and where relevant ;
- The Dublin Bay Water Quality Management Plan

Any measures in these Plans, which could influence flood risk management measures proposed in the Plan, should be considered and assessed in the context of potential cumulative / in-combination effects.

Response: All plans, studies or projects with relevance to the study or that effect the study area, in existence at the time of completion of the study, were considered.

All land use plans, local area plans, County Development Plans in the Fingal East Meath area, the Water Supply Project – Dublin Region Draft Plan and The Dublin Bay Water Quality Management Plan should be informed by the findings of this FRAMS study.

Approach to the Strategic Environmental Assessment

Section 6.4 Data gaps and technical deficiencies and Appendix E describe the specific datasets used; however there would be merits in describing datasets that are missing or incomplete so that during the implementation of the Plan and in future reviews these can be addressed.

Response: The 6 year review, or any other mid-term review, for the FRAM study shall re-assess the data gaps and technical deficiencies for new information which could be used, with an assessment of the SEA ER and the Appropriate Assessment of the effects of any new data sets that become available.

Environmental Baseline

In Chapter 7 Key Characteristics of the Fingal East Meath Study Area, consideration should be given in Section 7.5 Existing Conditions to update the reference to the draft National Biodiversity Plan (2010-15) to reflect the finalised Plan (2011-16). Consideration should also

be given to including a reference to and commitment to integrate the Birds and Natural Habitats Regulations 2011 into the Plan (and any projects arising out of the Plan) as relevant and appropriate.

Response: The reference to the draft National Biodiversity Plan (2010-2015) has been updated to reflect the finalised plan (2011-2016). The integration of the *Birds and Natural Habitats Regulations 2011* into the Plan (and any projects arising out of the Plan) as relevant and appropriate will be reviewed during the 6 year review of the CFRAM study.

In relation to landscape and visual amenity, as described in Section 7.7, you are referred to the Draft Meath County Development Plan 2013-19, and the associated Landscape Character Assessment and Green Infrastructure Strategy, and also the Fingal County Green Infrastructure Strategy, which should be referenced and incorporated as appropriate into the Plan. Where Green Infrastructure provides flood alleviation, this should be highlighted and acknowledged.

Response: All projects and flood mitigation works completed, including construction operation and maintenance, future iterations or reviews of the study, including environmental reports, based on the recommendations from this study shall take account of the policies and objective set out in the appropriate County Development Plans, Green infrastructure Strategies, Landscape Character Plans, land use plans including cumulative environmental sensitivity/vulnerability maps, and Brú na Boinne World Heritage Plan, National Biodiversity Plans, or any other relevant environmental plans

The environmental baseline, as described in Section 7 - Key characteristics of the Fingal East Meath Study Area is noted. In the context of clarifying the decision making process in relation to describing reasons for not selecting future flood warning systems for certain areas, consideration should be given to including hydrograph information / flow duration curve information as appropriate.

Response: Hydraulic and hydrology studies and reports have been completed as part of the FRAM study.

For groundwater related aspects, consideration should be given to including an aquifer classification map. It is recommended that the issue of rejected recharge be acknowledged in the context of the unproductive aquifers. These aquifers have low permeability, storage and transmissivity which may contribute to greater surface runoff during storm events.

Response: Groundwater related aspects have been dealt with in the Hydraulics Report and a Groundwater Floodwater Hazard technical note.

In relation to aspects pertaining to soil, where relevant and appropriate that the permeability of the soils be summarised, given that from a flood risk perspective this is potentially of greater relevance than soil type. Consideration should also be given, where relevant, to using sub divisions of the CORINE 2006, for agricultural lands in particular, as some agricultural land types may be more impacted than others by flooding. Consideration should be given to incorporating/referring to CORINE 2006 data rather than CORINE 2000 as referenced within the Plan/SEA.

Response: CORINE 2006 was used as part of the Study. Consideration will be given, where relevant, to using sub divisions of the CORINE 2006, for agricultural lands in particular, in the 6 year CFRAM review.

Objectives, Targets and Indicators

Consideration should be given to including an Environmental Objective for Climate Change in SEA Objectives, Targets and Indicators (Section 8).

Response: The specific objectives of the FRAM study includes for Climate Change.

Assessment of Environmental Effects

In Chapter 9 Assessment of the FEM FRMP recommendations, the summary of residual effects as provided in Section 9.2.3 and Table 9.-3 is noted. While it is acknowledged that the proposed mitigation measures, if carried out at project level have been determined to have a positive effect, consideration should be given to providing a stronger commitment to requiring that the mitigation measures be fully implemented, as appropriate and relevant, to the different projects which may arise in implementing the Plan. Consideration should be given to assigning coded reference to specific mitigation measures. This will assist in the on-going monitoring of the implementation of the Plan and any associated effects.

Response: Mitigation recommendations have been changed in the Final Report to Mitigation Requirements. *Consideration will be given to assigning coded reference to specific mitigation measures in the 6 year CFRAM review.*

Prior to commencement of works and in in undertaking project level EIAs and AAs, consideration should be given to taking into account Local Authority land use plans, including cumulative environmental sensitivity / vulnerability maps where available, which may have been drawn up as part of SEA of particular land use plans This approach would assist in the determination of likely potential for significant effects to be considered when planning certain works associated with the alleviation of flood risk.

Response: All projects and flood mitigation works completed, including construction operation and maintenance, future iterations or reviews of the study, including environmental reports, based on the recommendations from this study shall take account of the policies and objective set out in the appropriate County Development Plans, Green infrastructure Strategies, Landscape Character Plans, land use plans including cumulative environmental sensitivity/vulnerability maps, and Brú na Boinne World Heritage Plan, National Biodiversity Plans, or any other relevant environmental plans.

Clarification should be provided on the extent to which the significant flood events of 2009 and 2011 have been taken into account in the modelling, assessment of effects and associated mitigation measures and proposed flood relief works.

Response: The flood events of 2009 and 2011 were not used as part of calibration process for the study

In Chapter 10 – Alternatives considered, the assessment of the alternatives considered within this Chapter, taking into account the location, options considered, other viable alternatives and rationale for selection of options is acknowledged.

Response: Noted

Water Quality / WFD River Basin Management Plan

Reference should be made to the environmental quality standards used to determine water status in the WFD, including those for chemical status in the Environmental Objectives (Surface Water) Regulations (S.I. No. 272 of 2009). These Regulations provide for the establishment of legally binding quality objectives for all surface waters and environmental quality standards for ecological and chemical status and address the requirements of the Water Framework, Dangerous Substances and Priority Substances Directives. These Regulations also repeal the Phosphorus and Dangerous Substances Regulations.

Response: All proposed flood mitigation works, revisions to the current study or measures associated with the Plan must comply with the requirements of the Water Framework Directive (WFD)

Relevant cross-reference should be made between the components of the Programme of Measures of the ERBD RBMP and the Plan to avoid conflicting objectives and to maximise mutual benefits. Any constraints the RBMP might set on the Draft Plan should be highlighted.

Response: The Eastern River Basin District River Basin Management Plan (December 2009) the requirements of this plan have been fully integrated through the inclusion of a SEA objective requiring the achievement of relevant Water Framework Directive objectives and measures.

Mitigation Measures

Chapter 11 – Conclusions and Recommendations sets out, the proposed mitigation measures to address any potential for likely significant adverse effects. In particular, the proposed mitigation measures for the Strand Road Portmarnock APSR, (the provision of regular saline incursions into the Sluice River Marsh to maintain transitional species and habitats) are noted. This provides an example of how the SEA/AA has been taken into account in particular. It should be ensured, that this proposal is accompanied by appropriate monitoring to ensure the periods of managed saline incursion are adequate to maintain the habitat and also that consultation should be carried out with the NPWS and other stakeholders in this regard.

Response: The study proposes that at Strand Road, Portmarnock there will be works to rehabilitate and raise the existing coastal defences and to construct a new embankment with a minor negative effect on the intertidal salt marsh. The mitigation measures proposed will be re-appraised prior to any construction activities to ensure the mitigation recommendations are appropriate with all works monitored to ensure the proposals are implemented as outlined in this chapter.

NPWS will be contacted prior to any works in sensitive areas such as Strand Road Portmarnock.

Consideration should also be given to describing the relationship of the Plan to the other relevant CFRAMS studies proposed for the East of Ireland, namely the Eastern CFRAMS and the Dodder CFRAMS and describing any potential influence on the Plan.

Response: The eastern CFRAM study will undertake a review of the FEM FRAM Study, the Dodder Study and the Tolka Study and the available material for Unit of Management HA08, incorporating the findings, recommendations and proposed measures into the overall Eastern CFRAM Study Flood Risk Management Plan.

Monitoring Measures

The proposed monitoring programme should be sufficiently robust to assess the effects on the receiving environment during implementation of the Plan. This monitoring should be linked where relevant and appropriate of the implementation of the CFRMP implementation related monitoring. It should also be specified who is responsible for monitoring, review and evaluation of the Plan.

Response: This FEMFRAM study will be reviewed on a six-yearly cycle, by the OPW and the relevant Local Authorities, as part of the Eastern River Basin District CFRAM Study. For the review to be effective, systems will be set up to provide data with which to assess performance in relation to the original Plan content and the information on which it is based.

Review and monitoring will be an on-going exercise and lessons learnt will be taken account of in the national CFRAMS/FRMP programme. Lessons learnt will be acted on once they are confirmed and not held back until the six-yearly review.

Consultation

It should be clarified whether Met Eireann were consulted, given their importance in weather/climate forecasting. The role played by Met Eireann should also be described in this regard.

Response: Meteorological data was used as referenced in The hydrology report and the inception report.

Data Gaps and Technical Difficulties

Section 6.4 (and related Appendix E) could be expanded to more explicitly identify key relevant data gaps and consider how these gaps may be addressed in future revisions of the Plan.

Response: The 6 year review, or any other mid-term review, of the FRAM studies or any flood mitigation works, existing defence remediation works completed on the basis of the recommendations from the FRAM study shall re-assess the data gaps and technical deficiencies for new information which could be used, with an assessment of the SEA ER and the Appropriate assessment of the effects of any new data sets that become available, if required.

Clarification should also be given as to why end of century scenarios were only used, when mid-century scenarios (2050) might be more relevant given the typical lifespan of flood defence structures.

Response: While the drivers for changes to the hydrological regime were calculated for a 100-year horizon, the future scenario mapping can be viewed as a means of assessing potential change in the flooding regime on a “what-if” or precautionary basis for much shorter timescales. This is aided by the assessment of two levels of change, the mid-range future scenario (MRFS) and the high-end future scenario (HEFS). The six-yearly review required by the ‘Floods’ Directive will allow for a review of the impacts of climate change and the appropriateness of the chosen values on a cyclical basis.

SECTION 4 - Alternatives and the Plan

4.1 - Introduction

The development of the draft Fingal East Meath Flood Risk Management Plan included the consideration of a range of flood risk management measures and options at different spatial scales within the study. These potential measures and options provide alternatives to the elements of the flood risk management strategy recommended within the draft Flood Risk Management Plan. The results of the option assessment process for the alternative options considered are described below

4.2 - Description of the Alternatives Considered

4.2.1 – Flood Risk Management Measures and options

Potential flood risk management measures and options were considered at four discrete but over-lapping spatial scales during the development of the Flood Risk Management Plan:

- *Study area*: the entire study area, including all 23 rivers and streams, three estuaries and the coastline;
- *Analysis Units (AU)*: five areas of adjoining river catchments and the coastal zone;
- *Areas of Potentially Significant Risk (APSR)*: 35 urban areas (see Table 1-1 and Figure 1-1 of the SEA Environmental Report) considered to be potentially at risk from flooding at the outset of the study; and
- *Individual risk receptors (IRR)*: individual critical infrastructure assets identified as being at significant risk, such as transport and utilities infrastructure.

4.2.2 - Types of flood risk management measures and options

Prior to the initial evaluation of measures, the “Do Nothing” (i.e. maintain all existing flood risk management actions but undertake no additional activities) or “Baseline” for all areas was established.

For the “Do Minimum” or “Do Something” scenarios, a full suite of flood risk management measures listed in Table 3-3 of the SEA Environmental Report, comprising both structural and non-structural measures, were then considered for each of the four spatial scales within the study area during the initial evaluation stage of the option assessment process. The measures identified for each geographic unit were screened and scored using the following high-level criteria: applicability; technical feasibility; economic feasibility; social acceptability; and environmental acceptability. This identified a short-list of potential measures (see Table 10-1 of the SEA Environmental Report for details) for each AU and APSR, which were developed into the flood risk management options considered during the detailed multi-criteria option assessment. This comprehensive approach ensured that all possible types of flood risk management options were considered for implementation across all spatial scales. A description of the alternative types of flood risk

management options considered during the option assessment process, compared to the preferred options recommended within the Fingal East Meath Flood Risk Management Plan, is provided in Table 10-2 and described in Section 10.3 of the SEA Environmental Report.

4.3 - Assessment of Alternatives

This section summarises the assessment of the Alternative Scenarios considered and provides a description of the assessment

The “Do Nothing” scenario (i.e. maintain all existing flood risk management actions) was considered as the baseline against which all subsequent “Do Minimum” and “Do Something” measures were assessed.

During the initial screening of “Do Minimum” or “Do Something” flood risk management measures (Step 3, Stage 1 as described in SEA Environmental Report), the potential application of 21 flood risk management measures was considered for each the five AUs and 14 APSRs throughout the study area.

This process has enabled all potential flood risk management solutions to be considered equally across potential geographic scales – ranging from non structural measures that could be applied across the entire study area (e.g. a public awareness and preparedness campaign) and would raise awareness amongst the entire population of the study area, with some benefits to those at risk of flooding; to localised measures (e.g. construction of new flood defence structures) that would significantly reduce flood risk to an affected community.

Of the 21 measures assessed, the following ten measures were not carried forward for any of the Assessment Units considered for either technical or economic reasons. For example, the low level of existing flood risk resulted in large and complex measures (such as breakwaters and tidal barriers) receiving a benefit cost ratio (BCR) significantly less than 1 which ruled these measures out on economic grounds. The Preliminary Options report has further details on the assessment of the following ten measures not carried forward.

- *Sediment management;*
- *Land management;*
- *Retrospective application of Sustainable Urban Drainage Systems (SUDS);*
- *Use of overland floodways;*
- *Beach recharge/sand dunes;*
- *Groynes;*
- *Breakwaters;*
- *Managed realignment; and*
- *Tidal barrier/barrage.*

A number of measures were consistently selected across the various assessment units and were carried forward from the assessment process. These can all be applied at the AU scale and provide a reduction in flood risk to all properties in the study area. These include:

- *Proactive maintenance – development (MCC) and enhancement (FCC) of a regime targeting potential culvert blockage locations;*
- *Targeted public awareness and education campaign; and*
- *Individual property flood proofing.*

Other measures carried forward which could reduce flood risk to large parts of the study area included:

- *Development of fluvial and tidal flood forecasting and warning system (FFWS) for a number of rivers and for the Fingal and Meath coastline; and*
- *Proactive maintenance – regular inspection and maintenance of coastal defences including walls embankments and flap valves.*

Table 4.3-1 provides details of the flood risk management measures considered applicable for each assessment unit within the study area and identifies those measures selected to be taken forward for option development and assessment.

Table 4.3-2 describes the alternatives considered and the rationale for the selection of the plan component.

Table 4.3-1 – Details of the flood risk management measures considered and assessed

Flood risk management measures considered					
1	Reduce existing activities	8	Sustainable Urban Drainage Systems (SUDS)	15	Flood storage reservoirs
2	Proactive maintenance	9	Rehabilitation, improvement of existing defences	16	Beach recharge/sand dunes
3	Develop a flood forecasting system	10	Improvement in channel conveyance	17	Groynes
4	Targeted public awareness and education campaign	11	Permanent flood walls/embankments	18	Breakwaters
5	Individual property flood-proofing	12	Demountable flood defences	19	Managed realignment
6	Sediment management	13	Use of overland floodways	20	Tidal barrier/tidal barrage
7	Land management	14	Flow diversion	21	Relocation of at risk assets
<p>Key: Grey box = measure considered applicable at that location White box = measure not considered applicable at that location ✓ = measure carried forward to the next stage – option development and assessment</p>					

Note: * These APSRs contain more than one location where different measures were considered. The conclusions presented here indicate where a measure has been considered applicable or taken forward at a minimum of one location within an APSR. There may be specific locations within these APSRs where particular measures have not been taken forward as indicated.

Table 4.3-2 – Description of the alternatives considered and the rationale for the selection of the plan components

Location	Preferred option	Alternatives considered and rationale for selection of options
Study area		
Study area	Development (Meath County Council) and enhancement (Fingal County Council) of a proactive maintenance regime targeting potential culvert blockage locations	<p>There were no potential alternative options available or considered that would provide flood risk management benefits at a study area scale.</p> <p>Additional structural and non-structural options to manage fluvial and tidal flood risk are identified within the study area at specific locations at AU, APSR and IRR levels.</p>
	Targeted public awareness and education campaign and individual property flood proofing	
Analysis Units		
Nanny Delvin AU	Develop a fluvial flood forecasting and warning system (FFWS) for the Nanny River	<p>There were no potential alternative options providing flood risk management benefits at a sub-catchment scale in the Nanny Delvin AU; although the AU will also benefit from the options proposed at the study area scale.</p> <p>The proposed flood risk management option relates only to the Nanny river catchment where significant risks from flooding have been identified. There are no significant risks from flooding within the Delvin river catchment and therefore no flood risk management options needed to be considered.</p> <p>Structural and non-structural options to manage fluvial risk were also considered for APSRs at significant risk from flooding within the Nanny Delvin AU – proposals for the Duleek area are included within the FRMP.</p>
Broadmeadow and Ward AU	Develop a fluvial flood forecasting and warning system (FFWS) for the Broadmeadow River	<p>There were no potential alternative options providing flood risk management benefits at a sub-catchment scale in the Broadmeadow and Ward AU; although the AU will also benefit from the options proposed at the study area scale.</p> <p>The proposed flood risk management option relates only to the Broadmeadow river catchment where significant risks from flooding have been identified. There are no significant risks from flooding within the Ward river catchment and therefore no flood risk management options needed to be considered.</p> <p>Structural and non-structural options to manage fluvial risk were considered for APSRs at significant risk from flooding within the Broadmeadow and Ward AU – proposals for the Ratoath and Rowlestown East areas are included within the FRMP.</p>
Mayne and Sluice AU	Develop a fluvial flood forecasting and warning system (FFWS) for the Mayne River	<p>There were no potential alternative options providing flood risk management benefits at a sub-catchment scale in the Mayne and Sluice AU; although the AU will also benefit from the options proposed at the study area scale.</p> <p>The proposed flood risk management option relates only to the Mayne river catchment where significant risks from flooding have been identified. There are no significant risks from flooding within the Sluice river catchment and therefore no flood risk</p>

Location	Preferred option	Alternatives considered and rationale for selection of options
		<p>management options needed to be considered.</p> <p>Structural and non-structural options to manage fluvial risk were considered for APSRs at significant risk from flooding within the Mayne and Sluice AU – proposals for the Balgriffin area (within the St Margaret's, Dublin Airport, Belcamp and Balgriffin areas APSR) are included within the FRMP.</p>
Coastal AU	Develop a combined fluvial and tidal FFWS	<p>One alternative option was considered for the Coastal AU: <i>Option 2 – Regular inspection and maintenance of coastal defences including walls, embankments and flap valves</i>. During a more detailed review of this option as part of the stage 3 assessment a benefit-cost ratio (BCR) of significantly less than 1 was identified. As all options need to be economically viable (i.e. have a BCR >1) it was not considered any further.</p> <p>The preferred option was selected as it provides some flood risk management benefits at this scale in the Coastal AU with no significant negative environment impacts (see Table 9.2).</p> <p>Structural and non-structural options to manage fluvial risk were considered for APSRs at significant risk from flooding within the Coastal AU – proposals for the Portmarnock & Malahide areas; the Laytown, Bettystown and Coastal areas; the Swords area; the Rush area and the Skerries area are included within the FRMP.</p>
APSRs		
Duleek area	Raising existing defence embankment to a higher standard of protection (to protect up to 0.1% AEP) <i>(recommended within the FRMP for potential longer term implementation)</i>	<p>One alternative option was considered for the Duleek area APSR: <i>option 1a – improving existing defences to protect all properties in the Millrace Estate from the 1% AEP event</i>. The alternative option was considered as a variation to option 1 (the preferred option) to check if a viable scheme exists to prevent bypassing existing defences on the Paramadden tributary and flooding of properties in the Millrace Estate for the 1% AEP event. However, analysis indicated that the BCR for this option was significantly less than 1 so further assessment was not carried out.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Duleek area APSR; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9.2.</p>
Ratoath area	Improving channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ratoath Road, and replacing a culvert along a tributary of the Broadmeadow River with a larger capacity culvert	<p>This option was the only feasible option to address the identified flood risk in the Ratoath area. Therefore, no alternative options were considered for this APSR.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Ratoath area APSR; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9.2.</p>
Rowlestown East area	Construction of flood defence embankments along left bank of Broadmeadow River tributaries upstream of R125	<p>This option was the only feasible option to address the identified flood risk in the Rowlestown East area. Therefore, no alternative options were considered for this APSR.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Rowlestown East area APSR; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9-2.</p>

Location	Preferred option	Alternatives considered and rationale for selection of options
St.Margaret's, Dublin Airport, Belcamp & Balgriffin areas	Balgriffin: Improving channel conveyance by removing old bridge structure combined with construction of flood defence embankments and walls upstream of R123 and along left bank of Mayne River	<p>One alternative option was considered for the Balgriffin area: <i>construction of flood defence embankments and walls</i>. This option was the same as the preferred option, except that it did not include the removal of the old bridge structure. This option was not selected as it had a lower BCR than the preferred option, although the overall MCA scores were the same for both options.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Balgriffin area; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9-2.</p>
Portmarnock & Malahide areas	Portmarnock: Rehabilitating and raising existing coastal defences at Strand Road (including rehabilitation of flapped outfall) and construction of flood defence embankment	<p>One alternative option was considered for the Portmarnock area: <i>replacement of flapped outfall on Sluice River and construction of flood defence embankments and walls to protect at risk properties at Strand Road</i>. This option was not selected as it had a lower MCA score than the preferred option, including potential significant adverse effects on the adjacent European site.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Portmarnock area; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9-2.</p>
	Malahide town centre: Construction of demountable flood defences at underpass along with embankments to protect at risk properties in Malahide town centre	<p>Three alternative options were considered for the Malahide town centre area. During a more detailed review of the following two options during the stage 3 assessment a BCR of significantly less than 1 was identified for both options. As all options need to be economically viable these were not considered any further:</p> <ul style="list-style-type: none"> • <i>Construction of flood defence embankments and walls to protect at risk properties in Malahide town centre.</i> • <i>Construction of flood defence walls and embankments along with rehabilitating and raising of existing coastal defences in Malahide town centre.</i> <p>A third option – <i>construction of demountable flood defences along with embankments to protect at risk properties in Malahide town centre</i> – was considered. This option was not selected as the costs were significantly greater than the preferred option, although the MCA score was the same. There were also technical concerns relating to the manpower and time required to construct this length of demountable defences.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Malahide town centre area; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9-2.</p>
Laytown, Bettystown & coastal area	Construction of flood defence embankments to protect properties at risk along the coast and from the Nanny River	<p>An alternative option was considered for the Laytown area – <i>construction of demountable flood defences to protect at risk properties along the coast and from the Nanny River</i>. During a more detailed review of this option as part of the stage 3 assessment a BCR of significantly less than 1 was identified. As all options need to be economically viable it was not considered any further.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Laytown area; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9-2.</p>

Location	Preferred option	Alternatives considered and rationale for selection of options
Swords area	Improve channel conveyance by widening and deepening of the Gaybrook Stream to reduce fluvial flood risk to properties at Aspen near Kinsaley	<p>An alternative option was considered for the Swords area – <i>construction of flood defence walls to protect properties at risk from tidal flooding in Swords town centre</i>. During a more detailed review of this option as part of the stage 3 assessment a BCR of significantly less than 1 was identified. As all options need to be economically viable it was not considered any further.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Aspen area; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9-2.</p>
Rush area	Improve conveyance by constructing secondary culvert along Channel Road to protect properties at risk from fluvial flooding along the West Rush stream	<p>One alternative option was considered for the Rush area – <i>construction of flood defence embankments and walls and replacing culvert along Channel Road to protect at risk properties along the coast and from Rush West stream</i>. During a more detailed review of this option as part of the stage 3 assessment a BCR of significantly less than 1 was identified. As all options need to be economically viable it was not considered any further.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Rush area; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9-2.</p>
Skerries area	Improve channel conveyance by 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	<p>Five alternative options were considered for the Skerries area. During a more detailed review of the following two options as part of the stage 3 assessment, a BCR of significantly less than 1 was identified. As all options need to be economically viable these were not considered any further.</p> <ul style="list-style-type: none"> • <i>rehabilitating and raising existing coastal defences at Harbour Road to reduce tidal flood risk</i> • <i>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</i> <p>Hydraulic modelling of a third option – <i>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</i> – indicates that this is not a viable option. Lowering road levels along Miller Lane and Sherlock Park creates new flow paths and results in flood risk to other areas of Skerries. Therefore, this option was not considered any further.</p> <p>A fourth option – <i>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</i> – was not selected as its MCA score was lower than that of the preferred option.</p> <p>Hydraulic modelling of a fifth option – <i>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</i> – considered whether there was justification for the inclusion of larger capacity culverts under the railway embankment in combination with the storage reservoir to reduce the height of the required embankments. This combined option was discounted as there were no additional</p>

Location	Preferred option	Alternatives considered and rationale for selection of options
		<p>benefits in doing so as the embankments were a maximum of 1.5m high.</p> <p>The preferred option was selected as it reduces flood risk to properties at risk in the Rush area; although the APSR will also benefit from the options proposed at the study area and AU scales. The predicted effects of this option are identified in Table 9-2.</p>

Table 4.30-3 – Description of the rationale for the selection of the likely flood risk management options for individual risk receptors and the alternatives considered

Risk receptor	Location	Likely FRM option	Alternatives considered	Reasons for selection of likely FRM option
Utility asset at Stamullen	Stamullen area APSR	Construction of localised flood defence embankments or IPFP	Construction of flood diversion channel	<p>Preferred option provides protection to the utility.</p> <p>The alternative option is more expensive and the presence of existing infrastructure (road) and properties provides a constraint to constructing a diversion channel (i.e. there is a need for the inclusion of a new culvert).</p>
WWTW at Ballyboghil	Ballyboghil area APSR	Construction of localised flood defence embankments	Construction of flood diversion channel	<p>Preferred option provides protection to the WWTW.</p> <p>The alternative option is more expensive and could alter water levels downstream.</p>
M1 at Staffordstown	Ballyboghil and Lusk AU	Construction of localised flood defence embankments	Construction of flood diversion channel	<p>Preferred option provides protection to the M1 at Staffordstown and increases floodplain storage to the west of the M1 motorway.</p> <p>The alternative option is more expensive and is likely to alter existing overland flood routes between the Ballyboghil River and Turvey River to the south. It may also alter flows in the main channel with potential to impact on habitats/species downstream, including Rogerstown Estuary cSAC/SPA/Ramsar site/pNHA.</p>
Wastewater pumping station in Ashbourne	Ashbourne area APSR	Construction of localised flood defence embankments	No alternatives considered	Preferred option provides protection to the wastewater pumping station.
WWTWs at Toberburr	Owens Bridge area APSR	Construction of localised flood defence	No alternatives considered	Preferred option provides protection to the WWTWs.

Risk receptor	Location	Likely FRM option	Alternatives considered	Reasons for selection of likely FRM option
		embankments		
N32 at Clonsburgh	St Margaret's, Dublin Airport, Belcamp & Balgriffin areas APSR	Construction of localised flood defence embankments	No alternatives considered	Preferred option provides protection to the N32.
WWTWs at Julianstown	Julianstown area APSR	Construction of localised flood defence embankments	No alternatives considered	Preferred option provides protection to the WWTWs.

4.4 - Reasons for choosing preferred options over alternatives considered

The selection of the preferred option for each geographical area was based on the performance of options during the multi-criteria assessment process and the overall MCA score. All flood risk management options with positive MCA scores were carried forward to the final stage of the process

This process has ensured that the environmental considerations required under the SEA process were considered and embedded within the overall decision and plan-making process. Given the different weightings of the flood risk management objectives, the preferred options were not necessarily the options with the highest SEA score. However, the preferred options were only selected following a comparison of the relative performance of the option in terms of its potential environmental impacts with the alternative options considered.

4.5 - Summary of Influence of the SEA Procedure on the Plan

Overall, the influence of the SEA process on Fingal East Meath Flood Risk and Assessment Study has been positive. The early identification of the important environmental issues within the Plan area, and refinement of those issues during the scoping process and production of the SEA Environmental Report allowed for adoption of environmental protection measures into the study. Assessment of submissions and observations from the public and stakeholders were also included in the study to the benefit of the environment in the study area.

SECTION 5 - Monitoring Measures

5.1 - Introduction

The SEA Directive requires that the significant environmental effects of the implementation of plans and programmes are monitored. This SEA Statement identifies the proposals for monitoring the study and the works proposed as part of the study.

Regular monitoring enables, at an early stage, the identification of unforeseen adverse effects and the undertaking of appropriate remedial action. In addition to this, monitoring can also play an important role in assessing whether the Plan is achieving its environmental

objectives and targets, whether these need to be re-examined and whether the proposed mitigation measures are being implemented.

A monitoring framework has been proposed. The purpose of this monitoring is twofold; to monitor the predicted negative effects of the Plan; and to monitor the baseline environmental conditions for all SEA objectives and inform the six yearly update of the Plan, once adopted, required to meet the requirements of the EU Floods Directive.

5.2 - Monitoring Framework

Following the assessment of residual significance, a monitoring framework will enable: the monitoring of the predicted significant (moderate to major negative) or minor residual effects of the Flood Risk Management Plan; the identification of unforeseen effects, requirements under the SEA Directive, and updating of the baseline in order to inform the six yearly review cycle of the Flood Risk Management Plan. The criteria and parameters proposed are based on the SEA objectives, indicators and targets shown in Table 2.3.3-1. The monitoring framework also sets out the likely frequency of updates required to enable meaningful data to be obtained for each specific indicator.

Undertaking the recommended monitoring during the implementation of the Flood Risk Management Plan will help to identify any unforeseen effects during its implementation, and ensure that where these effects are adverse, action can be taken to reduce or offset them. The proposed monitoring framework will commence as soon as the Flood Risk Management Plan is implemented and can be revised periodically to take into account new methods/data and increased understanding of the environmental baseline, for example, as individual scheme elements are constructed over time and more detailed environmental assessments are undertaken.

Given the nature of the Flood Risk Management Plan as a collection of stand-alone flood risk management schemes at APSRs, it is also recommended that each specific scheme is monitored at a project-level to determine whether each scheme has been designed (and mitigated) to avoid the potential negative effects identified through this SEA. The results of this project-level monitoring could be aggregated across the study area to determine whether, for example, there are any opportunities to strategically offset negative effects on a specific receptor with a positive contribution to that receptor at another location. This would feed into the review process on a six yearly basis.

5.3 - Indicators and Targets

Monitoring is based around the indicators which were chosen earlier in the process. These indicators allow quantitative measures of trends and progress over time relating to the Strategic Environmental Objectives used in the evaluation. Focus has been given to indicators which are relevant to the likely significant environmental effects of implementing the Plan.

The Monitoring Programme may be updated to deal with specific environmental issues – including unforeseen effects - as they arise. Such issues may be identified by the Local Authorities/OPW or identified to the Local Authorities/OPW by other agencies.

Table 5-1 shows the indicators, targets and information sources which have been selected with regard to the monitoring of the Plan.

5.4 - Sources

Measurements for indicators generally come from existing monitoring sources. Existing monitoring sources include those maintained by the Local Authorities and the relevant authorities e.g. the OPW, the Environmental Protection Agency, the National Parks and Wildlife Service and the Central Statistics Office. Based on this most of the indicator

information required is already being actively collected and reported at a level sufficient to meet the needs of this Plan.

5.5 - Responsibility

The Local Authorities and the OPW are responsible for the ongoing review of indicators and targets, collating existing relevant monitored data, the preparation of monitoring evaluation report(s), the publication of these reports and, if necessary, the carrying out of corrective action.

5.6 - Reporting

The OPW will carry out a 6 year review of performance against SEA Objectives. This will use the most recent information from the EPA State of the Environment Report, updated environmental data available on the EPA website as well as data collated as part of the SEA Scoping for the Plan. Reporting on the monitoring of the Plan will be made to the EPA SEA Section.

Table 5-1 – The proposed monitoring framework

Core criteria	Objective	Sub-objective	Target (Minimum requirement)	Indicator	Datasets and source	Responsibility	Frequency of updating
Economic	Minimise risk to transport infrastructure	-	No increase in number of transport routes at risk	Number of nationally or regionally important transport routes (road, rail, navigation) at risk from flooding (0.1% AEP)	Road network, rail, railway, ports, tunnels – periodic assessment of flood risk	Fingal and Meath County Councils	Minimum every 6 years – FRMP review cycle**
	Minimise risk to utility infrastructure	-	No increase in number of utility infrastructure assets at risk	Number of nationally or regionally important utility infrastructure assets (power stations, electrical substations, WWTWs, WTPs, telecom exchanges) at risk from flooding (0.1% AEP)	An Post GeoDirectory; EPA registers; Fingal and Meath County Councils inventories – periodic assessment of flood risk	Fingal and Meath County Councils	Minimum every 6 years – FRMP review cycle*
	Manage risk to agricultural land	-	No increase in agricultural land at risk of flooding not benefitting from flood risk management measures	Area of high grade agricultural land at risk of flooding [based on CORINE land use classes] not benefitting from flood risk management measures	EPA CORINE land cover map – periodic assessment of flood risk	Fingal and Meath County Councils	Minimum every 6 years – FRMP review cycle
Social	Minimise risk to human health and life	Minimise risk to human health and life	No increase in number of properties at risk	Number of residential properties at risk from flooding (0.1% AEP)	An Post GeoDirectory; Fingal and Meath County Councils – periodic assessment of flood risk	Fingal and Meath County Councils	Minimum every 6 years – FRMP review cycle*
		Minimise risk to high vulnerability buildings	No increase in number of high vulnerability properties at risk	Number of high vulnerability properties at risk from flooding (0.1% AEP)	Residential property classification of high vulnerability properties in the An Post Geo Directory; HSE data (nursing homes, hospitals, health centres and GP clinics) – periodic assessment of flood risk	Fingal and Meath County Councils	Minimum every 6 years – FRMP review cycle*
	Minimise risk to community	Minimise risk to social infrastructure	No increase in number of assets at risk	Number of high-value (based on national FRA indicators classification) social infrastructural assets at risk from flooding (0.1% AEP)	An Post GeoDirectory (schools, colleges, universities nurseries, Garda stations, fire stations, military barracks and prisons classification) – periodic assessment of flood risk	Fingal and Meath County Councils	Minimum every 6 years – FRMP review cycle*
		Minimise risk to employment	No increase in number of non-residential properties at risk	Number of non-residential properties at risk from flooding (0.1% AEP)	Commercial property classification in the An Post GeoDirectory – periodic assessment of flood risk	Fingal and Meath County Councils	Minimum every 6 years – FRMP review cycle*
	Minimise risk to, or enhance, social amenity	Minimise risk to flood-sensitive social amenity sites	No increase in number of sites at risk	Number of flood-sensitive amenity sites at risk from flooding (0.1% AEP)	Sports grounds, parks (5000 scale raster maps) – periodic assessment of flood risk	Fingal and Meath County Councils	Minimum every 6 years – FRMP review cycle*
Environmental	Support the objectives of the WFD	Prevent deterioration, and where possible improve, ecological status/potential of water bodies	Provide no constraint associated with flood management measures to the achievement of good ecological status/potential	Ecological status/potential of water bodies	Eastern River Basin District – River Basin Management Plan and associated programme of measures and monitoring programme – assessment of water body status	Eastern River Basin District – lead authority for RBMP implementation	WFD review cycle
		Prevent deterioration, and where possible improve, chemical status/potential of water bodies	Provide no constraint associated with flood management measures to the achievement of good chemical status/potential	Chemical status of water bodies	Eastern River Basin District – River Basin Management Plan and associated programme of measures and monitoring programme – assessment of water body status	Eastern River Basin District – lead authority for RBMP implementation	WFD review cycle
	Minimise risk of environmental pollution	Minimise risk to potential sources of pollution	No increase in risk to potential pollution sources as a result of flood risk management measures	Numbers of potential pollution sources of specified types at risk from flooding (including those licensed under Directives 96/61/EC and 92/271/EEC)	EPA registers: IPPC licensed sites, landfills, hazardous waste sites, WWTWs, Seveso Sites – periodic assessment of flood risk Fingal and Meath County Council registers: areas of contaminated land, waste management permit sites – periodic assessment of flood risk	Fingal and Meath County Councils Environmental Protection Agency	Minimum every 6 years – FRMP review cycle*
	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	No deterioration in the conservation status of designated sites as a result of flood risk management measures	Reported conservation status of designated sites relating to flood risk management	EU Habitats and Birds Directive reporting on conservation status – and associated monitoring programmes Natural Heritage Areas – associated monitoring programmes and status assessments	National Parks & Wildlife Service	Habitats Directive review cycle Minimum every 6 years – FRMP review cycle*
		Avoid damage to or loss of, and where possible enhance, habitats supporting legally protected species and other known species and habitats of conservation concern	No loss of extent or deterioration in quality of suitable habitat supporting target species	Presence of and/or extent and quality of suitable habitat supporting legally protected species and other known species of conservation concern ('target species')	Aquatic, wetland and riparian habitat and species inventories (specific species and habitats to be identified) – assessment of habitat/population changes linked to flooding and flood risk management	Fingal and Meath County Councils National Parks & Wildlife Service	Minimum every 6 years – FRMP review cycle*

Fingal East Meath Flood Risk Assessment and Management Study

SEA Statement

Core criteria	Objective	Sub-objective	Target (Minimum requirement)	Indicator	Datasets and source
		Avoid damage to or loss of existing riverine, wetland and coastal habitats, and where possible create new habitat, to maintain a naturally functioning system	No net loss of or permanent damage to existing riverine, wetland and coastal habitats as a result of flood risk management measures	Area and quality of riverine, wetland and coastal habitat maintained or created/restored as a result of flood risk management measures	Aquatic, wetland and riparian species inventories – assessment in extent linked to flooding management
	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	No net loss of suitable habitat for fisheries and provide no new upstream barriers to fish passage	Area and quality of suitable habitat supporting salmonid and other fisheries and number of upstream barriers to fish passage	Fisheries habitat and assessments – assessment in extent linked to flooding management Salmonid Waters and presence Eastern River Basin District Monitoring and associated programme of monitoring programme – Protected Area/water body status Barriers – Fingal and Meath river channel inspection regime
		Ensure no adverse effects on designated Shellfish Waters	No deterioration in existing classification	Classification status of Shellfish Waters	EU Shellfish Waters Directive programme and reporting status
	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 study area	No adverse impacts on high value/sensitivity landscape character as a result of flood risk management measures	Compliance with landscape character objectives, including those of designated highly sensitive landscapes, relevant to flood risk management measures	Landscape character assessment association with County Development assessment of changes, linked to flood risk management
		Protect, and where possible enhance, important views within the study area	No adverse changes in visual amenity at Important View sites as a result of flood risk management measures	Quality of visual amenity at Important Views relevant to flood risk management measures	Assessment of quality of view with County Development Plan of changes linked to flooding management
	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	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	Numbers and types of internationally, nationally and locally designated areas, buildings, structures and features at risk from flooding	Local (Fingal and Meath County) national (DEHLG) registers National Monuments Register Monuments and Places (RMP) Monuments Records (SMR) Protected Structures (RPS) and Conservation Areas (ACA) registers to confirm sites assessment of changes linked to flood risk management