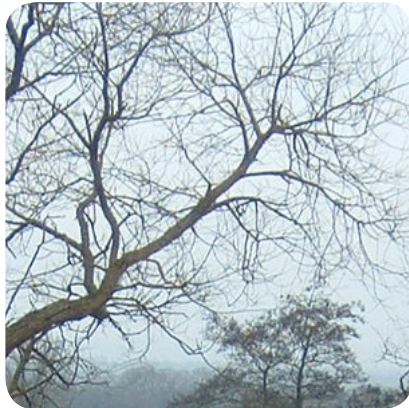
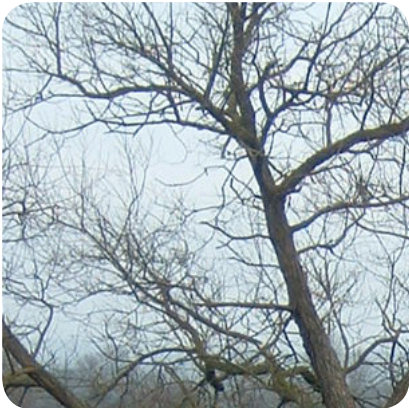


Dunkellin River and Aggard Stream Flood Relief Scheme

Environmental Impact Statement (EIS)

Volume I Non-Technical Summary

October 2014



MGE0260

Dunkellin River and Aggard Stream Flood Relief Scheme

Environmental Impact Statement **DOCUMENT CONTROL SHEET**

Client:	Galway County Council					
Project Title:	Dunkellin River and Aggard Stream Flood Relief Scheme					
Document Title:	Environmental Impact Statement - Volume 1 – Non-Technical Summary					
Document No:	MGE0260RP0005					
This Document Comprises:	DCS	TOC	Text	No. of Appendices	List of Figures	List of Tables
	1	1	24	-	1	1

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
F01	Client Review	Various	G. McElhinney	W. Madden	Galway	15/09/14
			<i>G. McElhinney</i>	<i>W. Madden</i>		

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1 INTRODUCTION

RPS has been commissioned by Galway County Council to prepare an Environmental Impact Statement (EIS) for the Dunkellin River and Aggard Stream Flood Relief Scheme in south County Galway. The Dunkellin River and the Aggard Stream form part of the Dunkellin Drainage District which was constructed in or around 1857 and Galway County Council has a statutory maintenance responsibility for these works.

In 2010 a study on the Dunkellin River and the Aggard Stream (from Craughwell Village to Kilcolgan) was commissioned as a result of flooding that occurred in the area in November 2009. Galway County Council is now progressing the Flood Relief Scheme to design stage and propose to submit the Scheme for planning approval to An Bord Pleanála (ABP) in line with Section 175 of the Planning and Development Act 2000, as amended.

From this point forward the Dunkellin River and Aggard Stream Flood Relief Scheme will be referred to as “the scheme”.

The scheme includes for flood relief works to be completed along the main channel of the Dunkellin River from Craughwell to Kilcolgan (over 11km) and along the Aggard Stream which runs from the townland of Cregaclare (near Ardrahan) to its outfall at the confluence of the Dunkellin and Craughwell Rivers (over 7.5km).

A combination of river widening, deepening, culvert upgrade and replacement, bridge improvement and replacement and general channel maintenance make up the proposed measures for this scheme.

The intention of the scheme is to provide optimum flood relief with minimal environmental impact whilst also controlling the overall capital investment required.

An EIS is required for the scheme to comply with the Environmental Impact Assessment Directive (2011/92/EU) at EU level and with the Planning and Development Regulations 2011, as amended at a national level.

Figure 1.1 shows the extent of the area proposed for the scheme.

The following should be noted:

Note 1: In addition to the completion of an EIA, an Appropriate Assessment has also been completed for this project in order to fulfil the requirements of the Habitats Directive (92/43/EEC). The Appropriate Assessment forms a separate part of this application.

Note 2: In order to facilitate the detailed design of the scheme a series of site investigations will take place in the study area to determine the ground conditions along the route of the proposed channel works (bank works downstream of the Rahasane Turlough and in channel works upstream of the Turlough at Craughwell Village) and in the vicinity of the proposed bridge underpinning and replacement works. These investigation works do not form part of this scheme and so are not considered in the scope of this EIS. The site investigation works are subject to the appropriate assessment process in line with the Habitats Directive.

Note 3: It is a legal requirement that Galway County Council carry out general maintenance works on the upper Aggard Stream. This work is separate to the scheme which is the subject of this EIS and will be carried out over the coming weeks. This work was also subject to the appropriate assessment process in line with the Habitats Directive.

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Figure 1.1 Extent of the Study Area

This Non-Technical Summary forms Volume 1 of 3 in the Environmental Impact Statement. Volume 2 forms the main report and Volume 3 forms the technical appendix.

This Non-Technical Summary is divided into chapters which correspond to the main Environmental Impact Statement (EIS) Volume 2 as follows:

Chapters 1 - 7: Summarises the following in non-technical language:

- Introduction;
- Environmental Impact Assessment (EIA) process;
- Planning, policy and legislative context;
- Consultations;
- Site description;
- Proposed project; and
- Need for the proposed scheme and alternative considered.

Chapter 8 - 17: Summarises in non-technical language the findings of the baseline assessments (existing environment) and impact assessment of the proposed scheme on the following elements of the environment:

- Hydrology (surface water) and drainage;
- Soils, geology and hydrogeology (groundwater);
- Terrestrial (land based) ecology;
- Aquatic (water) ecology and fisheries assessment;
- Air quality and climate;
- Noise and vibration;
- Archaeology, architectural and cultural heritage;
- Landscape and visuals;
- Human beings and material assets; and
- Traffic.

Chapter 18 - 20: Summarises the following in non-technical language:

- Interaction of impacts;
- Cumulative impacts;
- Summary of any significant impacts identified; and
- Conclusions of the EIS.

2 ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Impact Assessment (EIA) can be described as “*the process for anticipating the effects on the environment caused by a development. An Environmental Impact Statement (EIS) is the document produced as a result of that process*” (EPA, 2002).

The purpose of an Environmental Impact Statement (EIS) is to identify the environmental impacts of a proposed project and examine how these impacts can be avoided or reduced during the construction, operation and decommissioning stages of the project.

This EIS is prepared having regard to all relevant EU Directives and national legislation.

The main purpose of the EIA process is to identify the likely significant impacts on the human environment, the natural environment and on cultural heritage associated with the proposed scheme and to determine how to eliminate or minimise these impacts. The EIS summarises the environmental information collated during the impact assessment of the scheme.

Several interacting steps typify the early stages of the EIA process and include:

- Screening;
- Scoping;
- Assessing Alternatives; and
- Assessing and Evaluating.

Environmental aspects considered include:

- Hydrology (surface water) and drainage;
- Soils geology and hydrogeology (groundwater);

- Terrestrial (land based) ecology;
- Aquatic (water) ecology and fisheries;
- Air quality and climate;
- Noise and vibration;
- Archaeology, architectural & cultural heritage;
- Landscape and visual environment;
- Human beings and material assets; and
- Traffic.

This EIS has been prepared by RPS on behalf of Galway County Council. Input was obtained from specialists who contributed to the EIS. Specialists who contributed to this EIS are outlined in **Table 2.1**.

Table 2.1 EIS Study Team

Chapter	Topic	Specialists
	Non-Technical Summary	RPS
1	Introduction	RPS
2	Environmental Impact Assessment	RPS
3	Policy, Planning and Legislation	RPS
4	Consultation	RPS
5	Alternatives	RPS
6	Site Description	Tobin
7	Project Description	Tobin
8	Terrestrial Ecology	RPS
10	Aquatic Ecology and Water Quality	Aquatic Services Unit (ASU)
11	Hydrology and Drainage	Tobin
12	Soils, Geology and Hydrogeology	RPS
13	Air Quality And Climate	RPS
14	Noise and Vibration	RPS
15	Archaeology, Architectural and Cultural Heritage	Irish Archaeological Consultancy Services Ltd.
16	Landscape and Visuals	RPS
17	Human Beings and Material Assets	RPS
18	Traffic	RPS
19	Spoil Management	RPS
20	Indirect, Cumulative and Impact Interactions	RPS
21	Summary of Impacts and Mitigation Measures	RPS

3 POLICY PLANNING AND LEGISLATION

Chapter 3 of the main EIS document sets out current international, EU, national, regional and local policy, planning and legislative issues relating to flood management and to the proposed scheme. The policies and plans relevant to the scheme are listed below.

- Directive 2007/60/EC on the Assessment and Management of Flood Risks;
- Flood Policy Review Group in 2004 - Flood Policy Review- Final Report;
- The National Development Plan (NDP) 2007-2013;
- Planning System and Flood Risk Management – Guidelines for Local Authorities, 2009;
- European Communities (Assessment and Management of Flood Risks) Regulations 2010 (S.I. No. 122 of 2010);

- Catchment Flood Risk Assessment and Management (CFRAM) Programme;
- Regional Planning Guidelines for the West 2012-2022;
- Draft Regional Flood Risk Appraisal;
- The Galway County Development Plan 2009-2015; and
- The Draft Galway County Development Plan 2015-2021.

These policies and plans have been reviewed relative to the proposed Scheme.

4 CONSULTATION

Consultation with all relevant stakeholders (parties who have some form of an interest or stake in the project) regarding the scheme was carried out through a number of channels. These are set out in the following sections.

4.1 WRITTEN CONSULTATION

In March 2011, when the environmental assessment work was being commenced, a letter was issued to twenty-nine statutory and non-statutory stakeholders informing them of the commencement of the environmental assessment of the scheme. The correspondence invited stakeholders for comment on what should be included in the scope of this environmental work.

4.2 PUBLIC CONSULTATION

Two public information evenings were held during the course of preparing the environmental reports for the scheme. The first public information evening was held on the 17th May 2011 and the second was held on the 15th July 2014. Both events were held at St. Michael's Community Centre in Craughwell. The purpose of these events was to inform stakeholders and the general public of the progress and details of the scheme and to provide an opportunity to offer their views.

The concerns and recommendations set out in the comments sheets completed by the attendees have been taken into consideration in the production of this EIS.

4.3 OTHER CONSULTATION

A number of other meetings took place with Galway County Council, the Office of Public Works (OPW), the design engineers, the environmental consultants and various statutory bodies and interested parties throughout the process.

4.4 STATUTORY CONSULTATION

The scheme has been submitted by Galway County Council to An Bord Pleanála for planning permission under the Planning and Development Act 2001, as amended. Under this piece of legislation Galway County Council has responsibilities in terms of public notice and display as follows:

- Has published a notice in a newspaper circulating in the region of the scheme (i.e. Galway) that it intends to apply to the Board for permission to develop the scheme and that the application is accompanied by an EIS;

- Has made the application and EIS available for a period of six weeks at the offices of Galway County Council and the public are invited to make submissions to the Board in relation to the EIS; and
- Has forwarded a copy of the application and EIS to the prescribed bodies.

5 STUDY AREA

The Dunkellin River has a total catchment area of 373 km² with a high density of tributaries streams in the east, forming a main channel east of Craughwell Village. It flows west for approximately 11km from Craughwell and discharges to Dunbulcaun Bay at Roevehagh just north of Kilcolgan Village. The Aggard Stream and the Monksfield River flow from the south for approximately 7km where they join the Dunkellin River 1km west of Craughwell Village.

Whilst the Dunkellin River drains a significant area of lands to the east, northeast and south of Craughwell village (>200km²), the particular reaches of river considered in this project are:

- Approximately 11km of the Dunkellin River which runs in a westerly direction from 200m upstream of Craughwell Village to the sea at Kilcolgan. This area has been further divided into three separate zones which are further detailed in the Tobin Report "*Dunkellin River and Aggard Stream Flood Relief Scheme – Description of the Proposed Works* which forms a separate document in this application.
- Approximately 7.5km of the Aggard Stream which runs from the townland of Cregaclare (near Ardrahan) to its outfall at the confluence of the Dunkellin and Craughwell Rivers, approximately 1km south of Craughwell Village.

Figure 1.1 shows the extent of the study area.

6 PROJECT DESCRIPTION

It is proposed to undertake flood relief works along the Dunkellin in three reaches of the river:

- a) in the vicinity of Craughwell Village,
- b) locally at Rinn Bridge, and
- c) from a location just upstream of the Dunkellin Bridge to the N18 at Kilcolgan.

The works consist of channel deepening (not widening) in Craughwell village to the confluence of the Aggard Stream, local channel widening at Rinn Bridge, non-intrusive channel maintenance downstream of the Rahasane Turlough to Rinn Bridge and channel widening from the Dunkellin Bridge to the N18.

It is not proposed to undertake any significant arterial drainage works along the Aggard Stream. The proposed works associated with the Aggard Stream will be limited to the replacement of field wall crossings which are blocked or have collapsed, together with maintenance works, including the non-invasive trimming of bank-side vegetation and the removal of areas of accumulated silt along the full length of the channel.

It is not proposed to undertake works within or adjacent to the Rahasane Turlough cSAC, NHA and SPA or within the Galway Bay Complex SAC.

Table 6.1 sets out the scheme measures.

Table 6.1 Proposed Scheme Measures

Location	Proposed Scheme
Main Channel (Craughwell Village)	The main channel shall in general be deepened by 0.6m with a localised maximum excavation of 1.0m.
Bridge Works in Craughwell	Both existing road bridges will require engineering works on each abutment to facilitate proposed channel deepening. Similarly the railway will also require foundation works for the same purposes.
Bypass Channel (Craughwell Village)	The bypass channel is to be cleaned and excavated to alleviate flooding in Craughwell Village.
Rahasane Turlough	It is not proposed to complete any works within or adjacent to the main body of the Rahasane Turlough cSAC.
Channel works between the Rahasane Turlough and Rinn Bridge and works at Rinn	Out-of-channel maintenance downstream of the Rahasane Turlough to Rinn Bridge (i.e. limited to trimming back of terrestrial vegetation such as tress and low hanging branches and removal of encroaching vegetation such as brambles and scrub) with provision of new flood relief eyes to be constructed on one bank of the river in association with two-stage channel widening 50m upstream and 50m downstream of the existing Rinn Bridge.
Channel works beginning upstream of Dunkellin Bridge	Works will commence approximately 175m upstream of the Dunkellin bridge and consist of the construction of a high level channel typically 20m in width along the left bank (as one looks downstream) of the river.
Channel works from Dunkellin Bridge to Kilcolgan Bridge	Out-of-channel maintenance (limited to trimming back of bank side terrestrial vegetation to 1.0m to 1.5m above high flood levels) in association with the higher level "Two-stage channel works" will continue from Dunkellin Bridge to Kilcolgan Bridge with a typical additional channel width of up to 20m.
Works at Dunkellin Bridge	In conjunction with localised channel widening, the existing flood eyes shall be replaced with two new box culverts each measuring 13m wide x 2.3m deep. Existing stone from the bridge will be reused to match the retained main stone arch.
Works at Killeely Beg Bridge	In conjunction with channel widening a new bridge shall be provided with an 18m span.
Salmon Counter	The salmon counter will be relocated to a position upstream of Killeely Beg bridge as part of the river enhancement works.

In addition to the proposed measures the following elements also form part of the scheme:

Environmental River Enhancement Programme: Proposed by Inland Fisheries Ireland (IFI) in conjunction with the project team, this enhancement programme has been designed to ensure measures are being incorporated into the design of the scheme that will protect and further enhance the fish population of the Dunkellin River.

Salinity Modelling: The shellfish industry voiced concern during the consultation process that there could be potential for impacts on shellfish populations (specifically oysters) located downstream of the Dunkellin River in the marine environment. Their concern was that the proposed scheme could cause decreases in salinity in the receiving shellfish waters that would prove detrimental to the shellfish population in times of flood such as the 2009 event. A detailed technical study was carried out (refer to Volume 3 of this EIS) and concluded that the salinity levels at the shellfish beds would experience minimal effects due to the proposed Scheme.

Spoil Management and Construction: It is anticipated that approximately 70,000m³ of overburden, rock and riverbed will be removed from the river and its surroundings as a result of channel deepening and widening as part of the scheme. It will be reused as side slope protection, creation of flood embankments, creation of bankside spoil embankments and the creation of spoil heaps. Initial treatment will require removal of topsoil, spreading of excavated material and reinstatement of the topsoil, undertaken with a view to minimising the transport of material off-site.

Construction Programme: A construction works programme has also been devised for the scheme. The programme was devised to respect the environmental sensitivities of the receiving environment and the recommendations of the consultation process. The programme takes account of details on ancillary works including the number and location of site compounds as well as the provision of emergency plans and health and safety during construction.

Operational Stage: When fully implemented, the scheme will provide a defence against the 1 in 100 year flood event with allowance also made for future drainage works upstream of Craughwell and climate change. The Dunkellin River channel and Aggard Stream will also require regular maintenance to prevent vegetation becoming overgrown thus increasing the risk of future flooding. Galway County Council proposes to undertake maintenance over a five (5) year maintenance programme.

6.1 OTHER PROJECTS CONSIDERED

Work on the construction of the new motorway between Gort and Tuam in Co Galway is expected to begin in late 2014/early 2015. The new 57km motorway will consist of a four lane carriageway from Gort in the south to Tuam in the north. With regard to the proposed Dunkellin and Aggard Flood Relief Scheme the proposed motorway will cross the Dunkellin River at a point approximately 600m upstream of the Dunkellin Bridge and 400m upstream of where the proposed flood relief scheme will commence.

This environmental specialists who have completed assessments as part of this EIS have had regard for the potential in combination effects of this project.

7 NEED FOR THE PROPOSED SCHEME AND ALTERNATIVES CONSIDERED

The Dunkellin River and the Aggard Stream form part of the Dunkellin Drainage District, which was constructed in or around 1857, for which Galway County Council have a statutory maintenance responsibility. Following on from Arterial Drainage Works completed along the Dunkellin River in the mid 1850s and later in the early 1920s, the Office of Public Works prepared an Arterial Drainage Design for the Dunkellin/Lavally Catchments in the mid 1900s (circa 1950). This Arterial Drainage Scheme, as detailed on the original design drawings, included for alterations to the channel widths, channel regrading (bed level) and deepening of a number of the bridges/structures.

During this time there have been a number of flood events on this system and historically a number of studies have taken place detailing the response of Rahasane Turlough to high rainfall events. Most recently the flood events of January 2005 and November 2009 caused widespread flooding of this system and the surrounding lands. The resulting impacts of this flooding prompted the need to develop a flood relief scheme for the Dunkellin River and Aggard Stream system.

It is proposed that if the flooding of lands and property which occurred in the January 2005 and November 2009 events is to be avoided in the future, there is a need to implement a flood relief scheme for this water system.

Alternatives must be considered as part of the EIA process in accordance with the Planning and Development Regulations 2001, as amended which states that the following needs to be considered:

“An outline of the main alternatives studied by the developer and indication of the main reasons for his or her choice, taking into account the effects on the environment”.

Furthermore the EPA Publication *“Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)”* suggests that when assessing alternatives they should be described where relevant in three main ways: alternative locations, design and processes.

This section sets out how alternatives have been considered for the proposed Scheme through the following headings:

- ‘Do nothing’ scenario,
- Alternative Locations,
- Alternative Approaches
- Alternative site design,
- Alternative processes, and

The findings of this section are further summarised in **Table 7.1**.

It should be noted that in the course of arriving at the final preferred scheme there were 11 no. variations to the scheme made. The final preferred scheme emerged suitable, taking into consideration the environmental and engineering constraints of the system.

Table 7.1 Summary of Alternatives Considered

Type of Alternative	Alternatives Considered	Conclusion
Do Nothing	Do not implement the proposed Scheme measures	<ul style="list-style-type: none"> The possibility of future flood events, similar to those that occurred in January 2005 and November 2009, will continue to persist and possibly increase with climate change predictions.
Alternative Locations	The flood relief scheme must take place on the Dunkellin River and Aggard Stream	<ul style="list-style-type: none"> Alternative location is not an option.
Alternative Approaches	Non Structural Approaches <ul style="list-style-type: none"> Relocation and/or reconstruction of affected properties Flow retention, diversion, retention Flood defences 	<ul style="list-style-type: none"> Not considered further due to lack of practicality, high costs, lands not available, time delays, lack of alternative flow paths etc.
	Structural Approaches <ul style="list-style-type: none"> Widening, deepening, bridge alteration etc. 	<ul style="list-style-type: none"> Emerging preferred/suitable approach to flood alleviation given land take, area of scheme, nature of flooding, water course and existing structures.
Alternative Structural Measures	Upstream of Rahasane Turlough: <ul style="list-style-type: none"> Pump water, demolish bridge, widen channel, by-pass culverts Downstream of Rahasane Turlough: <ul style="list-style-type: none"> Channel deepening. 	<ul style="list-style-type: none"> Not considered further – unsuitable for river makeup, land take, surface water etc.
	Upstream of Rahasane Turlough: <ul style="list-style-type: none"> Channel deepening. Downstream of Rahasane Turlough: <ul style="list-style-type: none"> Widen channel, alter and/or demolish structures 	<ul style="list-style-type: none"> Considered further – due to suitability of river makeup, land take, surface water etc.

Type of Alternative	Alternatives Considered	Conclusion
	Rahasane Turlough: <ul style="list-style-type: none">• Do Nothing (cSAC)	

8 HYDROLOGY (SURFACE WATER) AND DRAINAGE

This section summarizes the assessment undertaken by Tobin Consulting Engineers to assess the potential impacts of the proposed Scheme on the existing hydrological (surface water) and drainage environment in the study area.

This chapter assesses the potential impacts of the proposed Scheme on the existing hydrological (surface water) and drainage environment in the study area.

A detailed flood model was developed for the system which has taken into consideration flood relief design standards, climate change and future flow scenarios and sets out the flood modelling methods used for the scheme and assesses the potential impact of the proposed scheme on the existing surface water environment of the Dunkellin River and Aggard Stream.

Potential for impacts on the surface water features were further explored by the scheme design consultants – Tobin Consulting Engineers in terms of potential impact on the surface water profile, changes to flow velocities (speeds) and volumes as a result of the proposed works. The following conclusions have been made:

- When the works have been completed in times of normal flow the water will be contained within the river channel along the Dunkellin River downstream of Rinn Bridge.
- there are no changes expected in the water surface profile through the Rahasane Turlough for any magnitude of flood,
- Expected changes in flow velocities will be minimal, and
- It is expected that implementation of the proposed Scheme will result in a marginal increase (less than 1%) in the rate at which water is discharged to Galway Bay during a flood event

Mitigation measures have been recommended to minimise any impacts where necessary.

9 SOILS, GEOLOGY AND HYDROGEOLOGY

This section of the EIS examines the baseline environment in terms of soils, geology and hydrogeology or groundwater and assesses the potential impact of the proposed works associated with the flood relief works on the Dunkellin and Aggard rivers on these on these environmental attributes. Mitigation measures are recommended to minimise any adverse impacts.

The proposed Scheme will be completed in a karstified limestone bedrock environment which constitutes a regionally important aquifer (an underground layer of water-bearing permeable rock sometimes used for the abstraction of water) . In addition, the works will be conducted directly up and down stream of Rahasane Turlough which is the largest turlough in the country and has been defined as a Special Area of Conservation (SAC).

The flood alleviation measures have been designed to minimize the impacts on the geology and hydrogeology (groundwater) of the area.

Outputs from the flood modelling have shown there will be no perceptible change in the overall flooding regime in the Rahasane turlough. Other aspects of the proposed work including channel widening, channel regrading, spoil deposition and channel maintenance have been assessed to determine their potential impact on the soils, geology and hydrogeology (groundwater).

There are slight to imperceptible impacts expected on the soils, geology and hydrogeology (groundwater) as a result of the proposed works.

There will be a reduction in the amount of surface water flood waters that currently supply the Dunkellin turlough and the turlough at Castlegar/Killeely Beg as a result of the proposed development. However this is not considered to impact the groundwater of the features i.e. the groundwater flow into and out of the turloughs.

Mitigation measures have been recommended in relation to aquifer dewatering for in-channel works, exclusion zones for spoil deposition surrounding karst features and groundwater and surface water monitoring in Rahasane Turlough.

10 TERRESTRIAL ECOLOGY

This section of the EIS assesses the terrestrial ecological value of the study area, assesses the potential impacts on the terrestrial ecology of the surrounding area and recommends mitigation measures in order to alleviate these impacts.

The methodology comprises the following elements: Desk Study, Consultation and Field Assessments. These elements are used to identify, describe and map areas of known or potential ecological value in the study area.

There is a number of flood alleviation measures proposed on the Dunkellin River from Craughwell to the N18 Bridge at Kilcolgan and on the Aggard Stream. The most significant direct measure when considering terrestrial ecology will be the widening of the main Dunkellin River channel to create a second stage channel and landspreading of spoil on adjacent lands.

The proposed river channel widening will result in the direct loss of bankside habitat¹, which includes treelines, hedgerows, marsh, wet grassland, marsh, turlough and dry calcareous grassland. The proposed landspreading of material removed from the river bank and construction of embankment will result in the direct loss of wet grassland and dry calcareous grassland.

The expected reduction in floodplain area has the potential to degrade the water dependant terrestrial habitats, such as Turloughs, although these habitats are likely to be mostly groundwater dependent.

Species potentially affected include otter, birds (breeding and wintering) and bats.

Robust and effective mitigation measures have been proposed for the avoidance of any impacts affecting water quality within the Dunkellin River which runs through or feeds into Rahasane Turlough cSAC/pNHA/SPA, Galway Bay Complex cSAC and Inner Galway Bay SPA. Specific mitigation measures have been proposed for the prevention of impacts to species. Likewise, precautions will be taken in relation to non-native invasive species during the construction phase.

11 AQUATIC ECOLOGY AND WATER QUALITY

An aquatic ecology and fisheries assessment was completed as part of the EIS. The receiving aquatic environment is described and potential impacts on downstream watercourses are assessed. Mitigation measures required to avoid or minimise impacts on aquatic ecology and fisheries are outlined. The main objectives of the assessment were as follows;

- To undertake, through desk top study and consultation, to determine existing water quality, aquatic ecological and fisheries values of affected areas.

¹ Place where an [organism](#) or a biological [population](#) normally lives or occurs, <http://www.biology-online.org/dictionary>

- To conduct walk over surveys in order to produce broad habitat maps of the affected rivers and streams and establish primary habitat types along affected stretches.
- To assess the main habitat types along the affected reaches with a focus on fisheries and invertebrates, including white clawed crayfish.
- To undertake baseline biological water quality surveys at three sites, one on each of the Dunkellin and Craughwell Rivers and the Aggard Stream.
- To carry out standard and presence/absence crayfish surveys (manual searching) on Dunkellin and Craughwell Rivers and the Aggard Stream.
- To predict potential direct, indirect and cumulative impacts of the scheme on aquatic ecology and fisheries, and
- To recommend mitigation measures in relation to the design and construction of the scheme.

Killeely Beg Bridge replacement, flood eye insertion at Dunkellin and Rinn Bridges, bypass channel deepening in Craughwell village and culvert replacements on the Aggard Stream all have potential for between slight and significant impacts during construction phase, but with careful mitigation the likelihood of significant impacts is low and the residual impact of these works will be slightly negative or imperceptible and neutral.

The removal of the existing and rebuilding of a new salmon counter on the lower Dunkellin River provides an opportunity to ensure that the structure is fully passable by all three lamprey species and eels. This would, potentially, be a significant positive impact compared to the current situation. It is recommended that mitigatory measures to include review of literature in the area and consideration for the Water Framework Directive be considered.

Channel widening on the Dunkellin River downstream of Rahasane Turlough, on account of its extensive scale, has potential for at least moderate negative construction phase impacts. However, the impact can be reduced to a temporary slight negative, overall, if the correct approach and mitigations are employed, primarily in the area of controlling and avoiding sediment loss.

Operationally, additional planting of the right bank corridor is recommended to offset the long-term loss of cover and the ecological function it currently provides on the left bank of the channel.

As long as careful mitigation is applied and works are kept to a minimum, as intended, then the minimalist maintenance proposed on the Aggard Stream will most likely result in slight-to-moderate negative impacts in the short-term.

Channel deepening and underpinning of bridges on the Craughwell River have the potential for significant negative construction, operation and residual impacts on fish and white clawed crayfish. No in-stream works should occur between October 1st and July 31st, which takes into account the sensitive periods for salmonid and lamprey spawning and crayfish brooding. The extent to which residual habitat in the Craughwell River is conducive to recolonisation by crayfish and fish will depend on final detail and design of the deepening measure, specifically the extent to which habitat reinstatement and EREP is: (i) feasible, (ii) integrated in the design of works, and; (iii) implemented with regard to fish and crayfish habitat requirements.

Fisheries monitoring within selected reaches of the Craughwell and Dunkellin Rivers is recommended, to gauge the effectiveness of construction phase mitigations, habitat reinstatement and EREP. Pre-works (baseline) and post-works (Year 1 and 3) surveys should be included. Crayfish presence/absence surveys (with broad abundance scale) should also be carried out in selected reaches.

Hydrological models predict virtually no post-works changes to the hydrological (surface water) regime of the Rahasane Turlough, hence the likelihood of significant impacts on the fully aquatic elements of turlough ecology is low. A comprehensive and feasible remediation strategy must be set

out at the detailed design stage to address how the hydrological function of Rahasane Turlough would be restored in the future in the event that hydrological and/or biological changes are found to have occurred.

If all mitigation is implemented at upstream construction sites and works are sequenced appropriately, negative impacts on the Rahasane Turlough arising from export of suspended solids are likely to be imperceptible-to-slight and short term. Suspended solids are likely to settle within glide sections of the Dunkellin River upstream of the turlough and within the turlough drainage channel itself where the impact on the existing habitat will be imperceptible.

12 AIR QUALITY AND CLIMATE

This section of the EIS assesses the impacts on air quality and climate from the proposed Scheme. The assessment identifies the existing ambient air quality and climate in the region and further assesses potential changes to this aspect of the environment as a result of the proposed Scheme. Particular attention was focused on potential sensitive receptors, such as residential areas in close proximity to the proposed flood relief works. A desktop assessment was carried out to determine the potential impacts. In addition to this a calculation was made to determine the amount of carbon that would potentially be released into the air as a result of the movement of soil.

In terms of the existing air quality in the study area the main potential source of air pollution would be emissions from vehicles using this road network. However as the traffic is relatively free flowing the potential for traffic congestion and elevated levels of pollution is not considered high. The location of the study area is in close proximity to the western coastline and the nature of the prevailing winds, the area is expected to experience clean Atlantic air with only background levels of pollutants. There are no major sources of air pollution in the area, apart from agricultural activities and road traffic.

The plant and machinery to be used for the proposed flood alleviation works was identified as having potential to produce emissions to the air at a local level. Traffic associated with employees working at on site during the proposed works will also be potential sources of emissions. However given the size of the site, the low populated nature of the majority of the study area and the implementation of mitigation measures, it is not considered that this aspect of the proposal will have a negative impact on air quality or climate.

The total estimated greenhouse gas emissions associated with the proposed flood relief scheme was calculated and is considered to be negligible.

Mitigation measures will be implemented during all stages of the proposed flood relief scheme where necessary, in order to ensure that the existing air quality and climate are not negatively impacted upon by the proposed flood alleviation works.

13 NOISE AND VIBRATION

This section of the EIS describes the potential impacts to the noise environment and more particularly to noise sensitive receptors resulting from the proposed Scheme.

The existing noise environment in the rural region of the study area is typical of a sparsely populated rural area and all relevant potential noise sensitive receptors were also identified. In the area in the immediate vicinity of the villages of Craughwell and Kilcolgan the noise environment is expected to be dominated by traffic noise from passing vehicles and would be typical of the noise levels experienced in a medium sized Irish settlement.

There are no existing point sources of noise in the locality.

The plant and machinery to be used for the proposed flood alleviation works were identified as having potential to make noise emissions which may be perceptible to the noise sensitive receptors identified. However, considering the size and nature of the study area, the density and location of the nearest

sensitive receptors, the duration of proposed works and the implementation of mitigation measures it is not considered that the proposed flood relief scheme measures will have a negative impact on the noise sensitive receptors identified.

14 ARCHAEOLOGY, ARCHITECTURE AND CULTURAL HERITAGE

The study area of the proposed Scheme was assessed in terms of its archaeological, architectural and cultural heritage.

Research has been undertaken in two phases. The first phase comprised a paper survey of all available archaeological, architectural, historical and cartographic sources. The second phase involved a field inspection of the proposed development area.

The proposed Scheme will involve the excavation of the Dunkellin River bank and deepening of the river bed, along with the construction of an embankment and spreading spoil. It is possible that these works may result in a significant negative impact on a number of recorded archaeological sites including a recorded medieval settlement at Dunkellin, a recorded *fulacht fiadh* located at Killeely Beg, remains associated with weirs and the site of a corn mill.

It is also possible that the excavation will have a significant negative impact on archaeological deposits or artefacts that may remain within the river bed at these locations.

To ensure these impacts are reduced and eliminated it is recommended that archaeological testing be carried out to the north of both sites within the footprint of the river channel excavation area and embankment location. This should be carried out by an archaeologist licenced to the Department of Arts, Heritage and Gaeltacht (DoAHG). It is also recommended that a full underwater archaeological survey is carried out at these locations.

The work proposed on the Craugwell Bridge and the Dunkellin Bridge will also result in a significant negative impact on these bridges, which are both recorded as possessing regional significance and are proposed protected structure. It is recommended that a full conservation assessment be carried out on these bridges prior to the proposed Scheme going ahead. This should be carried out by a historic buildings expert or conservation architect.

It is also recommended that a full conservation assessment be carried out on Killeely Bridge and Craughwell Railway Bridge prior to works commencing.

It is not anticipated that works associated with the Aggard Stream will impact negatively on the cultural heritage resource. As such, no mitigation measures will be required.

15 LANDSCAPE AND VISUAL ASSESSMENT

The proposed Dunkellin River and Aggard Stream Flood Relief Scheme is located in a landscape that has been divided into two landscape character areas that of Area No. 4 “Southeast Galway (Clarinbridge to Gort)” and Area No. 13 “East Galway Bay (Oranmore to Kinvara Bay and inland to N18 Road)”. The value afforded Area 4 is low and Area 13 is high.

The landscape sensitivity varies from low around the Aggard Stream, Craughwell Village and for part of the Dunkellin Channel to high downstream of Kilcolgan Bridge. Part of the Dunkellin River Channel runs through a landscape of moderate sensitivity – this relates to the Rahasane Turlough.

A review of the visual environment found that the main visual receptors in the study area included road users, farmers and occupiers of residential properties. No focal points/views” which identify areas of scenic amenity value and interest are located within the study area.

No proposed flood alleviation measures are proposed to take place with Rahasane Turlough (moderate landscape sensitivity) or downstream of the N18 bridge at Kilcolgan (high sensitivity).

An assessment of the construction stage impacts on landscape concluded that there will be slight negative impacts due to the limited influence of this staged activities. Visually when viewed from within the wider landscape the overall visual impacts during the site preparation and construction stage will be slight due to the limited viewer exposure. Mitigation measure including keeping the site compounds and access points clean and tidy will mitigate further any potential negative impacts in this regard.

The proposed flood relief scheme during the operational stage was identified as having the potential to impact on landscape. Firstly the removal and spreading of excavated material during channel widening was identified as having the potential to impact the existing landscape.

In order to lessen or remove the potential impact resulting from channel widening and landspreading of the material on adjacent lands it is proposed to replace topsoil in areas where topsoil will be stripped to spread spoil and replace topsoil. Where it is possible existing bank side vegetation will be retained where it is not possible to retain existing vegetation reinstatement of same may be considered (where it does not interfere with the flood alleviation measures) when the construction stage is complete.

16 HUMAN BEINGS AND MATERIAL ASSETS

This chapter of the EIS assess the potential impacts of the proposed Scheme on human beings in the vicinity of the site or study area. The principal concern is that human beings within the study area experience no significant unacceptable diminution in aspects of “*quality of life*” as a consequence of the Scheme.

Relevant components of this aspect of the environment that were considered include; land use, population, employment, economy, amenity/community aspects (residents, working and visiting communities) and services/utilities.

This chapter also describes the potential impacts on material assets as a result of the proposed wind farm including traffic including; Economic Assets of Natural and Human Origin, and Cultural Assets of a Physical and Social Type.

The assessment found that the area is rural in nature with two main urban centres - Craughwell and Kilcolgan. The main land use in the region is residential and agricultural and while the main area of employment is Galway City and the urban centres, there are also important industries in the region relating to angling on the river and the shellfish industry in the receiving bay.

The proposed Scheme will have significant positive impacts for the local human environment in terms of alleviation of significant flooding in the area as occurred in November 2009 and provision of employment during the construction phase.

It is anticipated that there may be some minor temporary disturbances to local road users and noise sensitive receptors during scheme implementation. However if proposed mitigation measures are put in place as recommended these impacts should remain minor or insignificant in nature. There will be a permanent loss of agricultural land owing to the proposed river widening and while this cannot be mitigated for directly, the benefits of flood alleviation for these lands in future outweighs the continued threat of flooded agricultural lands in the study area.

The mitigation put in place for the shellfish industry will minimise any possible impacts during construction. Under normal operating conditions there will be no discernible changes. In extreme flood

events (such as the 2009 flood), the increased flow from the Dunkellin River as a result of the works would have a minor affect on salinity in the receiving waters, this effect has been modelled. As the water quality of the flood water is likely to be improved as a result of the works, this minor change in itself is highly unlikely to cause any impact.

17 TRAFFIC

A review of the existing transport network, both public and internally in the proposed study area, was completed as part of this assessment. The potential for impact on traffic and transport was considered at all stages of the proposed measures implementation: site preparation, measures implementation, and maintenance. Some potential impacts including temporary inconvenience to road users when machinery is delivered or where road traffic restrictions, closures and diversions were identified.

It is noted that details of public road traffic management, closures and diversions at the time of flood relief measures implementation will need to be discussed further at the appropriate time with the Roads Department of Galway County Council.

It is concluded that if proposed mitigation measures are fully implemented and if the relevant public road traffic management issues are fully considered by Galway County Council at the appropriate times over the lifespan of the proposed flood relief scheme measures implementation, then traffic and transport will not be significantly impacted upon as a result of this scheme.

18 IMPACT INTERACTIONS

The potential impacts of the proposed Scheme have been discussed in detail with respect to all aspects of the environment. This section summarises these likely significant effects together with their consequent interaction. The Planning and Development Regulations 2001, as amended requires consideration of the interactions between the various environmental factors.

The environmental factors of the proposed Scheme have been assessed individually and mitigation measures recommended where required. It is also important to analyse any interactions that could result in impacts having a knock on effect on other elements of the environment.

Table 18.1 illustrates the interactive impacts that could result as identified in the EIS if no mitigation measures are put in place for any impacts identified. It demonstrates that impacts resulting from one aspect of the environment can have a direct effect on other elements of the environment. The table demonstrates that the interactions identified are mainly between aquatic ecology, soils, archaeology and the human environment.

However, as suitable mitigation measures will eliminate and or reduce the possibility of these effects during the life time of the proposed Scheme, the above interactions will be avoided or significantly reduced.

Table 18.1 Summary of Potential Interactions Resulting from the Proposed Dunkellin River and Aggard Stream Flood Relief Scheme

Potential Impact on	Interacting with
Terrestrial Ecology	<ul style="list-style-type: none"> • Aquatic Ecology and Water Quality • Hydrology and Drainage • Soils, Hydrogeology & Geology

Potential Impact on	Interacting with
Aquatic Ecology and Water Quality	<ul style="list-style-type: none"> • Terrestrial Ecology • Hydrology and Drainage • Soils, Hydrogeology & Geology • Human Beings and Material Assets
Avifauna	<ul style="list-style-type: none"> • Terrestrial Ecology
Hydrology and Drainage	<ul style="list-style-type: none"> • Terrestrial Ecology • Aquatic Ecology and Water Quality • Soils, Hydrogeology & Geology • Human Beings and Material Assets
Soils, Hydrogeology & Geology	<ul style="list-style-type: none"> • Terrestrial Ecology • Aquatic Ecology and Water Quality • Soils, Hydrogeology & Geology • Human Beings and Material Assets
Air Quality and Climate	<ul style="list-style-type: none"> • Terrestrial Ecology • Human Beings and Material Assets
Noise and Vibration	<ul style="list-style-type: none"> • Terrestrial Ecology • Human Beings and Material Assets
Archaeology, Architectural and Cultural Heritage	<ul style="list-style-type: none"> • Human Beings and Material Assets
Landscape and Visuals	<ul style="list-style-type: none"> • Human Beings and Material Assets • Archaeology, Architectural and Cultural Heritage
Shadow Flicker	<ul style="list-style-type: none"> • Human Beings and Material Assets
Telecommunications	<ul style="list-style-type: none"> • Human Beings and Material Assets
Human Beings and Material Assets	<ul style="list-style-type: none"> • Potential for impacts on human beings have interactions with all other elements of the environment
Traffic	<ul style="list-style-type: none"> • Human Beings and Material Assets

19 CUMULATIVE IMPACTS

A cumulative impact can be considered as an impact on the environment that results from incremental changes to environmental parameters when added to changes brought about by other past, present or reasonably foreseeable actions (European Commission, 1999). Cumulative impacts can result from individually minor but collectively significant actions taking place over the same period of time or/and within the same geographical area. Cumulative impacts therefore can cover all aspects of the environment.

While a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or insignificant) in the same geographical area, and occurring at the same time, result in a cumulative impact that is collectively significant. This impact is known as a synergistic cumulative impact.

It was assumed that current day-to-day activities within the area would continue into the future. On examination of current activities and land-uses and the continuation of these activities it was deemed that they would not contribute significantly to compound an impact so were not considered further in this cumulative impact assessment.

To address the cumulative impacts for the proposed Scheme, an understanding and knowledge of historical, existing, and reasonably foreseeable future activities are essential. The main significant development planned in the vicinity of the proposed scheme is the construction of the N18 Oranmore to Gort Road Scheme.

This road scheme it is proposed will cross the study area approximately 600 metres upstream of the existing Dunkellin Bridge and it is proposed will cross the Dunkellin River by construction a clear span bridge. Refer to **Figure 18.1** for the proposed location of this structure relative to the study area.

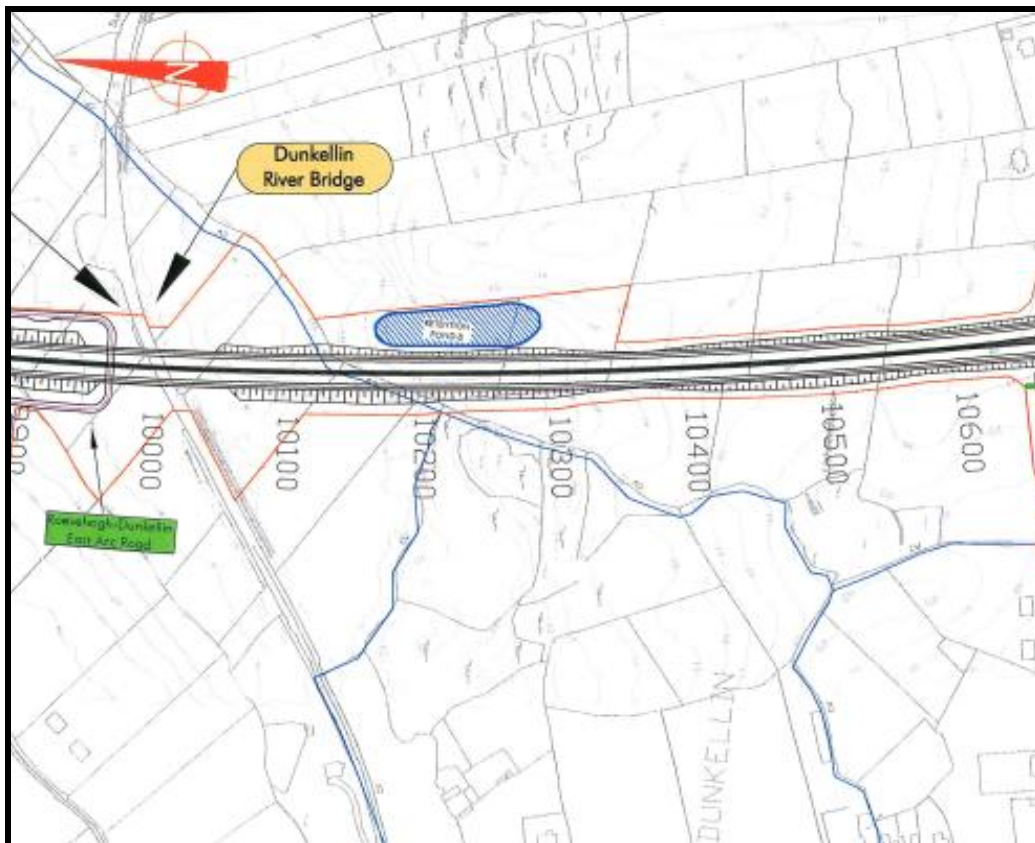


Figure 18.1 Location of Proposed N18 Road Scheme in the Study Area
 (Source: N18 Oranmore to Gort Road Scheme, EIS Volume 3, Galway County Council)

Taking this into account the main consideration in this particular instance is the construction and operation of the N18 crossing the Dunkellin at this point.

Table 18.2 summaries the potentially significant cumulative impacts resulting from the progression the scheme with the proposed N18 road scheme.

Table 18.2 Summary of the Findings of Significant Cumulative Impacts

Environmental Receptor	Significant Cumulative Impacts
Hydrology and Drainage	No significant cumulative impact is anticipated.
Soils, Hydrogeology &	No significant cumulative impact is anticipated.

Environmental Receptor	Significant Cumulative Impacts
Geology	
Terrestrial Ecology	No significant cumulative impact is anticipated.
Aquatic Ecology and Water Quality	No significant cumulative impacts provided pollution control measures are strictly adhered to during construction of both schemes.
Air Quality and Climate	No significant cumulative impact is anticipated.
Noise and Vibration	No significant cumulative impact is anticipated.
Archaeology, Architectural and Cultural Heritage	No significant cumulative impact is anticipated.
Landscape and Visuals	No significant cumulative impact is anticipated.
Human Beings and Material Assets	No significant cumulative impact is anticipated.
Traffic	Potential increase in construction traffic in the region if both schemes progress at this location at one time.

Further detail on this project is set out in **Appendix A, Works Description, Section 3.6.2.**

20 SUMMARY OF SIGNIFICANT IMPACTS

Table 19.1 summarises those potentially significant impacts that have been identified as part of this EIS process for the proposed Dunkellin River and Aggard Stream Flood Relief Scheme.

Table 19.1 Potentially Significant Impacts

Potential Environmental Impact	Quality/Significance and Duration of Impact	Mitigation Proposed	Residual Impact (After Mitigation Measures have been implemented)
<p>Proposed scheme (excavation of river bank bed and work to bridges) may result in a significant negative impact on archaeology and architectural heritage</p>	<p>Significant Negative Permanent</p>	<ul style="list-style-type: none"> • It is recommended that archaeological testing be carried out at specific detailed locations (refer to Section 14) by a suitably qualified archaeologist. • It is recommended that archaeological monitoring be undertaken at specific locations (refer to Section 14) by a suitably qualified archaeologist. • It is recommended that a full underwater archaeological survey is carried out at specific locations (refer to Section 14) by a suitably qualified archaeologist. • It is recommended that a full conservation assessment be carried out on bridges at prior to the development going ahead. 	<p>There will be no residual negative impact on the archaeological resource.</p> <p>A residual negative impact on Craughwell Bridge and Dunkellin Bridge will remain. This will be due to the change in appearance of both the structures in order to alleviate flooding.</p>

21 CONCLUSIONS

An EIS has been completed for the proposed Dunkellin River and Aggard Stream Flood Relief Scheme in south County Galway.

The scheme includes for flood relief works to be completed along the main channel of the Dunkellin River from Craughwell to Kilcolgan (over 11km) and along the Aggard Stream which runs from the townland of Cregaclare (near Ardrahan) to its outfall at the confluence of the Dunkellin and Craughwell Rivers (over 7.5km).

A combination of river widening, deepening, culvert upgrade and replacement, bridge improvement and replacement and general channel maintenance make up the proposed measures for this scheme.

The intention of the scheme is to provide optimum flood relief with minimal environmental impact whilst also controlling the overall capital investment required.

Having completed the EIS in line with all required legislation and relevant guidelines pertaining to the nature of the proposal the EIA process concludes the following:

- Potential impacts on both the natural and socio-economic environments have been identified.
- Where necessary suitable mitigation measures to reduce negative impacts have been recommended including a comprehensive river enhancement programme. These will ensure elimination and reduction of any significant environmental risks.
- The proposed flood relief scheme has the potential to have an affect on aspects of the environment particularly during the construction stage. These include potential for pollutants to enter water courses, disturbance to aquatic and terrestrial flora and fauna, disturbance to archaeological and cultural heritage along the river bank, the removal of bridges of cultural heritage value and temporary traffic disruptions for local road users. Detailed mitigation measures have been recommended in order to lessen and/or eliminate such impacts where possible.
- The mitigation put in place for the shellfish industry will minimise any possible impacts during construction. Under normal operating conditions there will be no discernible changes to the receiving shellfish waters. In extreme flood events (such as the 2009 flood), the increased flow from the Dunkellin River as a result of the works would have a minor affect on salinity in the receiving waters, this effect has been modelled as part of this EIS.
- Once construction has been completed the proposed scheme will aim to reduce the impact of extreme flood events similar to that which occurred in November 2009.