Dunkellin River and Aggard Stream Flood Relief Scheme

Response to Inland Fisheries Ireland

Document Control Sheet

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INTRODUCTION

RPS was commissioned by Galway County Council in 2011 to prepare an Environmental Impact Statement (EIS) for the Dunkellin River and Aggard Stream Flood Relief Scheme, hereafter called the "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.

The scheme was submitted to An Bord Pleanála (ABP) in October 2014 for planning approval in line with Section 175 of the Planning and Development Act 2000, as amended. In February 2015, the Board, in accordance with Section 175(5)(a) of the Planning and Development Act, 2000, as amended, requested further information in relation to the proposed development.

Item 7 of the Board's letter stated that, "*The applicant is invited to respond in detail to the written submissions made by parties including local residents, prescribed bodies and others.*"

The purpose of this document is to provide a response to the issues raised by the Inland Fisheries Ireland in their submission.

1 ITEM 1 – IMPACT ON FISH AND SHELLFISH

1.1 IFI's primary concern, regarding the proposed flood relief scheme, relates to the possibility of interference with Atlantic Salmon, sea trout and eel movement, as well as deterioration of water quality within the catchment and the receiving shellfish waters of estuary during the works...It is imperative that any proposed works will have no detrimental impact on the salmonid/lamprey/eel or shellfish population.

There will be no interference with Atlantic Salmon, sea trout and eel movement during the construction or operational phases of the scheme. There are no in-stream works proposed for the Dunkellin River or Rahasane Turlough Drainage Channel. Passage for all fish species will be ensured during the construction phases in the Craughwell River, upstream of Rahasane Turlough, through the use of sequenced cofferdam construction techniques and river diversion through the existing Craughwell flood water bypass. There will be no in-stream works at all during the restricted salmonid period October 1st to April 30th. There will, therefore, be no changes to existing patterns of fish movement within the system.

With all mitigations in place with regards to water quality protection, as outlined in detail within the EIS and particularly with regard to sediment loss control measures and salmonid spawning period restrictions on works (October 1st to April 30th), there will be no negative impacts on water quality that would give rise to negative impacts on existing fisheries values of the Dunkellin system.

2 ITEM 2 – WFD STATUS

2.1 The WFD status of the marine waters within which the shellfish area is situated is "good" and therefore satisfactory for the coastal waters and "moderate" and therefore unsatisfactory for the transitional waters. However, these status classifications were extrapolated from similar water body types and do not reflect monitoring data from these particular waters.

2.2 Status classifications presented in the application are based on national WFD monitoring and assessments conducted by the EPA in accordance with the Water Framework Directive and guidance provided by Common Implementation Strategy. Based on this guidance a representative number of water bodies within a catchment that are considered to represent of the range of types and status of water bodies present. Assessments within these representative waterbodies are then used to inform status assessments for all transitional and coastal waters within the catchment area. The results of the WFD monitoring programme indicate that there are water quality issues within the watercourse catchments discharging in the vicinity of this shellfish area. The waters of Dunbulcaun Bay have shown intermittent levels of E. Coli indicative of pollution over the past number of years which have unfortunately resulted in the shellfish within the Clarin River Estuary being recently downgraded from Class B to Class C produce. Harvesting oysters for the market is allowed in Class C areas.

Hydraulic modelling for the proposed scheme (presented in the EIS, Volume 3, Appendix A) demonstrated that even during times of extreme flood (i.e. the 2009 event) water would be effectively restricted to the main river channel. This in effect would reduce the risk of contamination of waters by land based diffuse sources of contamination including septic tanks. Reducing interaction of waters with diffuse contamination sources has the potential to decrease E. coli levels in the receiving waters of Galway Bay and thereby improve water quality.

3 ITEM 3 – IN-STREAM WORKS

3.1 No in-stream works should occur between October 1st and April 30th - this is necessary to protect spawning salmonids, their ova and fry. The contractor should ensure that dredging and placement of material is undertaken in a single operation over the shortest period possible within weather constraints.

The seasonal restrictions that will be applied during construction works are detailed in Table 11.11 of the EIS and Figure 5-1 of the Works Description Report (Appendix A to the Main EIS) outlines the proposed construction programme. No in-stream works are to be undertaken between October 1st and April 30th.The IFI will be consulted prior to in-stream works.

Dredging and placement of material in a single operation shall be specified as a contract requirement.

4 ITEM 4 – INVASIVE SPECIES

4.1 The Plan should include policies to ensure that the proposed works do not lead to the spread of invasive species.

An example of a proactive policy…would be to prohibit invasive species from inclusion in landscape design proposals etc. should require the use of native species from local stock.

The issue of the control of invasive species is discussed in the EIS, Volume 2, Section 10.6.3.2 (Pollution of Watercourses), pg. 131, as follows:

'All access scaffolding used within watercourses and all footwear/ waders, etc. used within watercourses must be steam cleaned prior to arrival on site to prevent the spread of invasive aquatic or terrestrial species such as Zebra Mussel or Japanese knotweed in accordance with OPW Environmental SOPs. A sign off sheet must be maintained to confirm cleaning.'

It will be specified in the contract documents that the contractor must put control measures into place to prevent the spread of invasive species.

As stated in Section 10.7.1 (page 142) of the EIS, Improved Agricultural Grassland Habitats (GA1) removed during land spreading will be returned to existing use by reseeding land spread ground using an agricultural grass seed mix: "*It is proposed that this habitat be returned to the existing use therefore an agricultural grass seed mix will be used to revegetate land spread grounds on these habitats*."

Furthermore, Section 10.6.4.3 of the EIS outlines measures largely aimed at minimising damage to habitats and improving habitat quality through the construction of river features. These measures are particularly beneficial to birds, especially during the breeding season, when most birds are constrained to nesting areas. Specific landscape design proposals considered include "*Marginal planting on berms with wildflower mix, or Willow / Salix sp. (the latter on higher berms), would further improve habitat diversity for wildlife, especially birds. Wildflower seed mixes used will be of native local provenance.*"

5 ITEM 5 – CLEAR SPAN STRUCTURES

5.1 IFI recommends the use of clear span structures where possible on fisheries waters and that IFI should be consulted on any such proposed developments.

Refer to Drawings 6408-2210-2211 for Dunkellin Bridges and Drawings 6408-2221-2222 for the Aggard Stream. The new bridges and culverts over the main channel are proposed as clear span structures.

6 ITEM 6 – FISH DE-STOCKING

6.1 IFI notes that the plan proposes to divert 350m of the Craughwell River through a bypass channel. Immediately before any excavation or diversion works take place, a fish de-stocking operation will be required. IFI requires advance notice of 2 weeks from the contractor to organise electrofishing operations. It is important to note that it is not always possible to carry out operations on a specific day as water and weather conditions have a direct bearing on electrofishing and fish removal efforts. In some circumstances IFI may require the pruning of shrub and vegetation from the banks prior to electrofishing operations commencing, where this is required IFI will advise the contractor accordingly. If IFI is required to remove/relocate fish, a charge may accrue.

The above items will be specified in the contract documents.

7 ITEM 7 - ANGLING FACILITIES

7.1 When instream works, or works adjacent or connecting to waters, have a disruptive effect on fisheries and angling activities, then controls should be put in place to minimise the impact on the fisheries habitat and angling. It is also important that access to waters is maintained for Fisheries inspection purposes.

Out of channel maintenance is proposed as part of the scheme. Refer to Table 3-1 of the works description contained in Appendix A to the EIS. This maintenance will facilitate access to the river for Fisheries inspection purposes.

Section 3.7 of the Works Description reports discusses the proposed Environmental River Enhancement Programme (EREP).

The IFI will be consulted at the post-consent, pre-construction stage. A meeting can be held to address this Item as well as matters raised under **IFI Item 8**, below.

8 ITEM 8 – FISH COUNTER RELOCATION

8.1 It is noted that there are proposals to relocate the IFI fish counter to a location upstream of Killeely Beg Bridge. IFI Galway will need to be fully consulted in this regard.

As included in the OPW Environmental Management Protocols shown in Appendix B3 of the EIS, it is standard practise that once a scheme has been included in the EREP (capital works programme) that "*IFI EREP team will coordinate all the scientific monitoring works, provide the enhancement design details and guidance to OPW Management Staff and maintain a reasonable level of site supervision, proportional to the complexity of the works and the experience of the OPW Staff involved*."

Baseline and post-work fisheries surveys (Year 1 & 3) within selected reaches of the Craughwell and Dunkellin River will be undertaken. These surveys will be agreed either as part of the IFI EREP standard operating procedures, or commissioned by Galway County Council at the post-consent, pre-construction stage.

As stated in the EIS Section 10.6.1 (p128) a detailed method statement will be drawn up at the post-consent stage and will be strictly adhered to by Galway County Council staff and contractors involved in the works. It will be overseen by Galway County Council's site representative/foreman. Galway County Council's Environmental Management Protocols and Standard Operating Procedures in addition to the Office of Public Works Standard Operating Procedures for Arterial Drainage Maintenance (OPW, 2011) will form the backbone of the method statement, supplemented by specific additional measures detailed at great length within Sections 10.6.3 and 11.5 of the EIS. The method statement will detail how these mitigation measures will be monitored for effectiveness by Galway County Council and independently through water quality monitoring. A mechanism for reporting of pollution incidents will be agreed in advance between the contractor(s) and the IFI.

A meeting will, therefore, be arranged with IFI at the post-consent, pre-construction stage to review: 1) Pollution mitigation measures; 2) Pollution incident reporting mechanisms & Emergency Response Plan, and; 3) Water quality monitoring programme.

Details of all mitigation measures are found in the EIS, Sections 10.6 and 11.6 (Water Quality).

9 ITEM 9 – FISHERIES ENHANCEMENT PROGRAMME

9.1 The works description identified two sections of the Dunkellin River with high potential for fisheries enhancement under the OPW's Environment River Enhancement Programme (EREP), namely: 1) The Channel stretching from the N18 at Kilcolgan to Rahasane Turlough. 2) The channel reach stretching from Rahasane Turlough to the Railway Bridge and upstream to the R446 road bridge in Craughwell Village.

IFI's Senior Research Officer, Dr Martin O'Grady, has drafted a Proposed River Enhancement Works Plan for the aforementioned sections of the Dunkellin River. The final design and location of said enhancement works are to be confirmed at the Detailed Design Stage of the project. IFI would also request the implement action of the proposal to undertake baseline and post-work fisheries surveys (Year 1 & 3) within selected reaches of the Craughwell and Dunkellin River to gauge the effectiveness of construction phase mitigations, habitat reinstatement and EREP works.

During the NIS consultation phase (see NIS, Section 1.2, p.4) Inland Fisheries Ireland (IFI) identified use of the OPW's Environment River Enhancement Programme (EREP) methods in which the natural features of the riparian and instream environment would be protected as far as possible. As outlined in Section 4.3.2 (Environmental River Enhancement Programme) of the NIS (p. 23) the initial proposed River Enhancement Programme proposed by the IFI was included in the NIS [see Appendix A, Appendix No. 3 (first section)]. This programme was based on general good practice recommendations having knowledge of the study area concerned and was subject to a detailed design stage. Further to this a detailed river enhancement programme was proposed by the IFI which took into consideration the detailed design measures being proposed as part of the scheme. Details on these enhancement measures and how they are to be incorporated into the proposed flood relief scheme are set out in the NIS [see Appendix A, Appendix No. 3 (second section)]. The final design and location of works will be confirmed following after further consultation with the IFI.

10 ITEM 10 - METHOD STATEMENTS & POLLUTION MITIGATION PROGRAMMES

IFI would request a meeting with the contractor(s) prior to the commencement of works to review:

1) Pollution mitigation measures.

2) Pollution incident reporting mechanisms & Emergency Response Plan.

3) Water quality monitoring programme.

The review of these items prior to commencing works will be included in the contract.

APPENDIX A

DUNKELLIN RIVER & AGGARD STREAM FLOOD RELIEF SCHEME - DRAFT CONSTRUCTION MANAGEMENT PLAN

Galway County Council

Dunkellin River & Aggard Stream Flood Relief Scheme

Draft Construction Management Plan for Planning Purposes

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Document Amendment Record

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Project:	**Dunkellin & Aggard Stream Flood Relief Scheme**
Title:	**Draft Construction Management Plan**

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TOBIN Consulting Engineers							

1 INTRODUCTION

This document is an initial draft Project Specific Construction Management Plan which has been prepared as part of Request for Further Information by An Bord Pleanala. This document has been prepared in advance of the Construction Stage of proposed *Dunkellin River and Aggard Stream Flood Relief Scheme* and the appointment of a competent Contractor to complete the Works.

The description of the proposed plan is subject to detailed design and finalisation by the appointed Contractor(s) and should not be taken as definitive but as a minimum requirement. It is not the purpose of this Plan to reproduce or replace arrangements and procedures that will be produced by a Contractor which will be appointed to the Construction Stage (as PSCS), and where appropriate this Plan shall be considered in that light and will updated or even replaced by a more detailed and further considered document used by the appointed Contractor to manage safety, health and the environment.

Note: the term Contractor in this Draft Plan refers to the appointed Contractor or Contractors and the term Site Representative (SR) is used throughout the Plan to represent the Contractor's person in charge of the project i.e. the Project Manager, Construction Manager, Site Manager, Site Agent or Environmental Officer as appointed by the Contractor.

Any safety and health component of this Plan has been prepared in accordance with the Safety, Health and Welfare At Work (Construction) Regulations. The headings used to cover safety and health matters correspond to those recommended by the Health and Safety Authority *Guidelines to the Construction Regulations 2006: Suggested Contents of the Safety and Health Plan.* **It is noted that the HSA are *"currently reviewing our publications to take account of the Safety, Health and Welfare at Work (Construction) Regulations 2013 which came into effect on the 1st August 2013."***

In addition to describing arrangements for the management of safety and health, this Plan also addresses requirements in relation to the protection of the environment and the avoidance of pollution; hence the title: **Construction Management Plan.**

The environmental and waste management components of this Plan are based on documentation which includes:

1. Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects as published by the Department of the Environment, Communications and Local Government (2006).
2. CIRIA Report No. 133 Waste Minimisation in Construction.
3. NRA Guidelines for the Management of Waste from National Road Construction Projects.
4. *OPW Standard Operating Procedures in particular the techniques and procedures set out in "The Office of Public Works Arterial Drainage Maintenance Environmental Management Protocols & Standard Operating Procedures" April 2011.*
5. CIRIA (Construction Industry Research and Information Association) guidance on '*Control of Water Pollution from Construction Sites' (CIRIA Report No C532, 2001); and*
6. CIRIA (Construction Industry Research and Information Association) guidance on '*Control of Water Pollution from Linear Construction Projects*' (CIRIA Report No. C648, 2006).

The Final Construction Management Plan will be submitted to Galway County Council for review and agreed prior to work commencing and shall include drawings detailing all proposed arrangements including, as a minimum, those listed as follows :

- Locations and layout of all site compounds including all environmental management and impact mitigation techniques.
- The location and details and durations of any proposed road and lane Closures/blockages.
- Provision for pedestrians and local access. Pedestrian facilities shall be provided in accordance with Chapter 8 of the Traffic Management Guidelines.
- The location and details of all temporary signage to be erected.
- Details of any arrangements for the delivery and storage of materials.
- Advance advertising in local press, local radio, advisory road signs and leaflet drops will be required to notify the general public of any changes to be implemented in the management of traffic in and around the sites.

In all aspects of the management of traffic the following parties will be liaised with;

- Galway County Council Roads Department.
- Garda Síochána, ambulance & fire services.
- Employer's Representative.

2 DESCRIPTION OF THE SCHEME AND EXISTING ENVIRONMENT

The extent of the overall study area for the proposed *Dunkellin River and Aggard Stream Flood Relief Scheme* has been divided into two distinct channels. These channels are:

1. the Dunkellin/Craughwell River from approximately 200m upstream of Craughwell Village to the sea at Kilcolgan just upstream of where the river enters Galway Bay.

2. the Aggard Stream and Monksfield River from the townland of Cregaclare (near Ardrahan), to its outfall at the confluence of the Dunkellin and Craughwell Rivers.

It is proposed to undertaken 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, out of channel maintenance downstream of the Rahasane Turlough to Rinn Bridge (i.e., limited to trimming back of terrestrial bank vegetation such as trees and low hanging branches and removal of encroaching vegetation such as brambles and scrub) 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.

The requirement for the proposed works are to relieve flooding generated from rainfall events similar to those that occurred in January 2005 and November 2009 which flooded properties in Craughwell Village and a number of townlands along the river including Rinn, Dunkellin and Killeely Beg. Table 1, extracted from the Technical Description of the proposed Works, as contained in the EIS, provides a summary of the proposed works.

Table 1 – Summary of the proposed Proposed Scheme

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 Work in Craughwell	Both existing road bridges will require engineering works on each abutment to facilitate proposed channel deepening. Similarly the railway bridge 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 trees 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 2 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

The extent of the overall study area, as shown in Figure 2.1, has been divided into areas contributing to two distinct channels. These channels are:

3. the Dunkellin/Craughwell River from approximately 200m upstream of Craughwell Village, through the Rahasane Turlough cSAC, NHA and SPA, to the sea at Kilcolgan just upstream of where the river enters the Galway Bay Complex SAC.

4. the Aggard Stream and Monksfield River from the townland of Cregaclare (near Ardrahan), to its outfall at the confluence of the Dunkellin and Craughwell Rivers.

Whilst the Dunkellin River drains a significant area of lands to the east, northeast and south of Craughwell village (>200km^2), the particular reaches of river considered in this project are:

1. approximately 11km of the Dunkellin River which runs in a westerly direction from Craughwell Village to the sea at Kilcolgan.
2. approximately 7.5km of the Aggard Stream which flows in a northerly direction from Ardrahan to Craughwell.

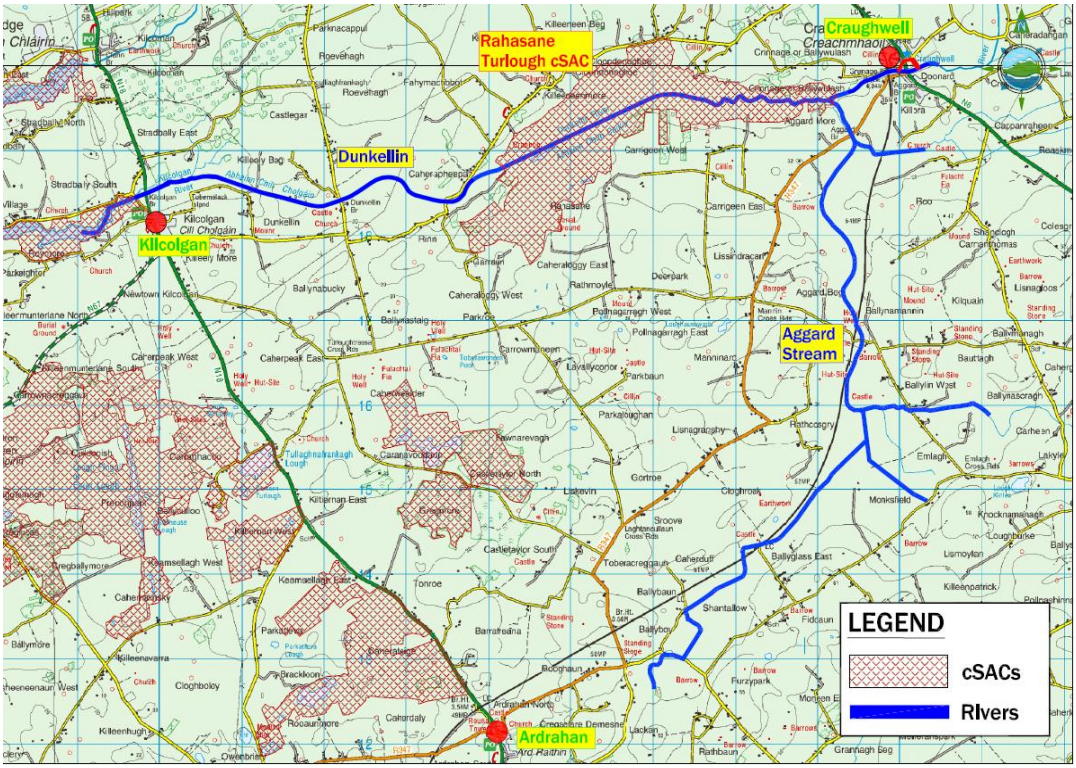


Figure 2.1 – Extent of the Study Area

The depth of the main Dunkellin River channel varies quite considerably throughout its course. Natural embankments formed from excavated spoil, significant rock cuts and large flat flood plains, are predominant physical features of this channel.

The bed profile of the Dunkellin River, from Craughwell to Kilcolgan ranges from a level of 22.29mOD (Malin Head) in Craughwell village, to 0.88mOD at Kilcolgan Bridge, and has three (3) zones along its length.

Zone 1 – Craughwell River, which has a relatively steep gradient in bed level at Craughwell Village.

Zone 2 – Rahasane Turlough cSAC, NHA and SPA, which has a gentle undulating bed level.

Zone 3 – Lower reach of the Dunkellin River, which has steep gradients in bed level from upstream of Rinn Bridge, to the sea at Kilcolgan.

These zones are described in more detail in the following sections and are used throughout this section to discuss the proposed flood relief measures.

2.1 ZONE 1 – CRAUGHWELL RIVER

This particular stretch of the Craughwell River in the village of Craughwell, consists of two distinct channels, namely,

a. the main channel and
b. the bypass or overflow channel.

During normal flow conditions, surface water flows are restricted to the main Craughwell River and pass under two bridge crossings namely; the main R446 Bridge (formerly N6) and the old multi-arched stone bridge.

However, when flow conditions dictate excess surface water flow is directed around the main bridge crossing via an overflow channel and a further bridge crossing of the R446.

The channel along this stretch of the Dunkellin River, is of the order of 1.4m to 2.0m deep and the bed level gradient varies considerably, with a change in bed level occurring within Craughwell Village at the three bridge crossings.

There are a number of hydraulic controls along this stretch of the river. These controls are shown in the following photography and are :

a. The overflow or bypass channel within Craughwell Village,
b. The two road bridges,
c. The old multi-arched stone bridge and
d. The railway bridge.

2.2 ZONE 2 – RAHASANE TURLOUGH

Water passing downstream of Craughwell Village, flows in a westerly direction for a distance of approximately 1km, where the Craughwell River and Aggard Stream combine to form the Dunkellin River.

During low flow conditions, surface water flows are restricted to the main Dunkellin River, which, following an Arterial Drainage Scheme in the 1850's, can be described as being "canalised" for a significant portion of its length. Along this particular stretch of the Dunkellin River, the gradient of the channel bed is relatively flat, approximately 1 in 3,000.

During low flows, the channel varies in width from 10m to 30m. However, during periods of high flow, the Dunkellin River overflows its banks and floods the adjoining lands to form the Rahasane Turlough cSAC. The Rahasane Turlough cSAC is considered to be one of the largest turloughs in Europe and is of particular significance in an ecological context in that it is "one of only two large turloughs which still function naturally" (Site 000322 – Site Synopsis). The Rahasane Turlough cSAC is a rare habitat type of major conservation importance. This habitat type (turloughs) is listed in Annex 1 of the Habitats Directive.

The Rahasane Turlough (circa 4km in length) lies in gently undulating land and consists of two basins which are connected at times of flood but separated as the waters decline (Drew & Daly, 1996). During flood conditions the width of the "Dunkellin River", or the flood plain, increases quite significantly.

In a number of locations along Rahasane Turlough cSAC, the flood plain can be greater than 1km wide and, at its highest levels, can extend to cover an area of over 300ha.

Typical bed levels of the channel within the Rahasane Turlough cSAC are of the order of 13.0mOD Malin Head (TOBIN Topographical Survey 2010) with other localised depressions, or sinkholes, having levels of 11.0m OD Malin Head (Drew 1986).

Downstream of the Rahasane Turlough cSAC, flow is westerly toward Rinn Bridge, through a well defined canalised channel, measuring up to 3.3m in depth, and 15 to 20m in width. This section of the channel is formed in a rock cut, for a significant portion of its length, and the gradient of the channel bed is typically 1 in 200.

2.3 ZONE 3 – RINN BRIDGE TO KILCOLGAN

The main channel exiting the Rahasane Turlough and the Rinn Bridge, which is located approximately 800m downstream of the turlough, are the main downstream features impacting on the hydraulic control of the river.

Downstream of the Rinn Bridge, and during low flow conditions, surface water flows are restricted to the main Dunkellin River, which again, following the Arterial Drainage Scheme completed in the 1850's, can be described as being "canalised" for a significant portion of its length. During these low flows, this particular stretch of the river varies in width from 10m to 15m and, the gradient of the channel bed is approximately 1 in 300.

During high flows, the Dunkellin River also overtops its banks approximately 750m downstream of the Rinn Bridge and flood waters enter the Dunkellin Turlough.

Downstream of the Dunkellin Bridge, the Dunkellin River continues for a further 2.5km to the sea via the Killeely Beg Bridge, the Kilcolgan Road (N18) Bridge and a local road bridge (stone arch). The lands and main channel within the vicinity of the Kilcolgan Road Bridge are tidal. Downstream of Dunkellin Bridge, the Dunkellin River continues to follow a well defined canalised channel, with gradients of between 1 in 300, and widths ranging from 10 to 30m, until it reaches the sea at Kilcolgan.

2.4 AGGARD STREAM

The Aggard Stream, discharges into the main Dunkellin channel at the confluence of the Craughwell and Dunkellin rivers approximately 1km downstream of Craughwell Village. The stream rises in the townland of Cregaclare, where water entering the channel, via surface contributions and ground water springs, flows in a northerly direction for a distance of approximately 4km in the townland of Monksfield. At this location, the channel discharges into the Monksfield River which, after a further 3.5km, enters the Aggard Stream. The channel flows almost parallel to the western railway corridor and crosses this railway at three locations.

Unlike the Dunkellin River, there are no designated sites (cSAC's, NHA's or SPA's) along the route of the Aggard Stream and Monksfield River.

Along this channel, the bed profile ranges from a level of 32.5mOD (Malin Head) in its upper reaches, in the townland of Cregaclare, to 16.6mOD at the confluence with the Dunkellin River approximately 1km downstream of Craughwell.

The base width and side slopes of the Monksfield River and Aggard Stream are quite variable throughout its length.

In its upper reaches, along the Cregaclare Channel, the width of the stream is relatively narrow with some sections being 2.0 to 2.5m wide where the water depth is also quite shallow and stagnant as a result of the very flat gradient in bed level.

Downstream of the Cregaclare Channel, in the townland of Ballyglass and Monksfield, the channel width becomes more pronounced and is typically 3.0 to 5.0m. The bed profile also steepens to a gradient of approximately 1 in 500. Along this stretch of the Monksfield River, the hydraulic control features are also more defined with concrete culverts and stone arch bridges used to traverse the railway line.

3 OUTLINE CONSTRUCTION METHODOLOGY AND PROGRAMME

The construction of the proposed scheme will require a variety of construction methodologies as described in the EIS and EIS Volume 3 Appendix A Section 3 of the Technical Description of the Proposed Works. It is envisaged that phasing of construction activities will be as follows:

1. Site Preparation
2. Establishing site offices, compounds and security
3. Minor Utility Diversions/Protection (watermains and telecommunication cables in Craughwell Village)
4. Excavation works within Craughwell which includes the provision of temporary cofferdams.
5. Bridge underpinning in Craughwell.
6. Railway Bridge protection and scour protection in Craughwell.
7. Channel Widening and Bridge construction at Rinn Bridge, Dunkellin Bridge and Killeely Beg Bridge.
8. Channel Maintenance along the Aggard Stream
9. Finishing/Rehabilitation works to all disturbed lands.

There are a number of constraints on the phasing and methods of construction works. The most significant constraint is that, in general, in-river work is only permitted between May and September each year.

This is a requirement resulting from the recommendations of a number of statutory bodies which were consulted during the early scoping stage of the planning stage. These include the Inland Fisheries Ireland, the NPWS and the timing restrictions are required to ensure that fish migration is not impeded during spawning seasons and that works do not impact on the crayfish populations who seek refuge within river banks during the winter months.

This programme is summarised in
of the Technical Description which accompanies the EIS (and is reproduced here) and it must be noted that this is an outline programme of works and may be subject to alterations subject to the timing of planning approvals, the final detailed design stage programme and following the appointment of a Works Contractor.

	No. of Employees	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
Advanced Works																						
Vegetation Clearance		Vegetation Clearance			No Vegetation Clearance Permitted March to Sept					Vegetation Clearance Permitted Sept to February						No Vegetation Clearance Permitted March to Sept						
Out Of River Works downstream of the Rahasane Turlough																						
River Works Crew No. 1 – Out of River Works or Channel Widening of the Dunkellin River from Kilcolgan Bridge to Killeely Beg Bridge.	6																					
Channel Widening of the Dunkellin River from Killeely Beg Bridge to Dunkellin Bridge.	6																					
River Works Crew No. 1 – Out of River Works or Channel Widening of the Dunkellin River from Dunkellin Bridge to Rinn Bridge.	6																					
River Works Crew No.2 - Out of River Works or Channel Widening of the Dunkellin River from Rinn	6																					
Bridge Works Crew A – Bridge Works at Killeely Beg Bridge.	8																					
Bridge Works Crew B – Out of River Bridge (Left Bank Works) /Culvert Works at Dunkellin Bridge.	8																					
Bridge Works Crew C – Out of River Bridge (Left Bank Works) /Culvert Works at Rinn Bridge.	8																					
In River Works upstream of the Rahasane Turlough																						
Bridge Works Crew D– In River Works or Channel Deepening downstream of the Railway Bridge (Rock Removal).	4																					
Bridge Works Crew E– In River Works or Channel Deepening in Craughwell.	4																					
Bridge Works Crew F – In River Works or Underpinning at the Railway Bridge in Craughwell.	4																					
Out Of River Works on the Bypass Channel followed by works on main R446 bridge & Multi-Arched Bridge																						
Works Crew No. 1 – Out of River Works or Channel deepening and underpinning along the bypass channel and retaining walls	4																					
Works Crew No. 2 – Out of River Works or Underpinning of the Old Stone Multi-arched bridge (Extended Programme to cater for variability in river flows)	4											Restrictions Apply to Works within this Time Period									
Works Crew No. 3 – Out of River Works or Underpinning of the main R446 bridge in Craughwell (Extended Programme to cater for variability in river flows).	4																					
Landscaping																						
Completion/Snagging and Handover																						

Estimated Max Number of Employees on Site	**44**

Figure 3.1 Outline Construction Programme (refer to Section 5 of the Technical Description)

4 ENVISAGED CONSTRUCTION METHODOLOGIES

The Description of the Proposed Works as contained in the EIS can be summarised across three zones as follows:

Zone 3 – Rinn Bridge to Kilcolgan:

Works to be undertaken downstream of Rahasane Turlough from the townland of Rinn to the N18 at Kilcolgan.

Zone 2 – Rahasane Turlough:

No works to be undertaken along/within Rahasane Turlough.

Zone 1 – Craughwell Village:

Works to be undertaken from Craughwell Village to the confluence of the Aggard Stream.

The following sections summarise the construction methodologies that have been envisaged and in addition to the engineering measures also describes additional works that will be undertaken within the river channel to aid the passage of fish up the river.

4.1.1 Aggard Stream

Referring to section 11.5 of the EIS, general mitigation associated with works along the Aggard Stream will involve implementation of the OPW's ten point environmental training programme (OPW, 2011) and Environmental Drainage Maintenance (EDM). Further measures set out under OPW's Environmental Management Protocols & Standard Operating Procedures (EMPs & SOPs) with respect to white-clawed crayfish and lamprey species, will be used, including the requirement to record and report presence of Annex II species (OPW, 2011) and rescue / return any removed fauna to the stream.

In the case that some localised silt and vegetation removal is essential, the general strategy will include:

- 'Minimalist' approach, i.e. remove major obstructions to main channel flow only.
- Work with natural fluvial geomorphic principles rather than against them, i.e. maintain the meander that the river has created through self-narrowing. Retain low flow channels within the stream cross-section.
- Retain low flow channels within the stream cross-section.
- Reprofile only to minimum low water line.
- Never remove hard substrates from below the water line.
- Maintain bankside vegetation and marginal, overhanging cover of Canary grass (*Phalaris arundinacea*) where possible. This is important for crayfish and for fisheries.
- Leave stretches with no apparent conveyance issues alone, especially stony riffles which often have the highest fisheries and crayfish value - these will act as restocking areas.
- Retain tree cover – cutting lower branches where obstruction is evident.
- Do not remove bank vegetation on working bank.
- Leave far bank untouched as natural refugia and restocking areas.
- Work in an upstream direction.
- Collect crayfish and lamprey from spoil and release them to suitable habitat upstream of works.

It is acknowledged that the degree of sediment deposition in flowing channels is a key factor for juvenile lamprey. Areas where sediment can accumulate and where juvenile lampreys are likely to accumulate are often targets for removal in channel maintenance and some of these will be left in situ along the river corridor.

Pre-works consultation between the IFI and OPW will be undertaken to confirm which stretches of the Aggard Stream should remain completely untouched, apart perhaps from bank-side terrestrial vegetation trimming. In other sections which require localised cleaning, the stretches and approaches will be agreed in detail between both bodies and follow the OPW's Standard Operating Procedures. An ecologist will be present on site to monitor the extent of lamprey and crayfish rescue work undertaken during in-stream maintenance on the lower Aggard.

The replacement of the culverts along the Aggard Stream shall be inserted only during summer low flows. The drains will be bypassed, piped around or pumped over, so that the culverts can be installed in the dry. Works shall occur before any vegetation is cleaned from the drains so that any silt arising from culvert insertion can be trapped in the vegetation in the sections of drainage channel between each Works area. Culverts will be inserted in an upstream to downstream sequence and no Works will take place during or after heavy rainfall.

4.1.2 Zone 3 - Channel and Bridge Works from Kilcolgan (N18 Bridge) to Rinn Bridge

The proposed works from upstream of the Kilcolgan Bridge at the N18 to the Dunkellin Bridge will consist of two-stage channel works whereby the top width of the channel will be increased from a typical top channel width of 13m to 14m to a proposed width of 34m to 37m. An embankment shall also be constructed on the left bank, from Killeely Beg Bridge with a maximum height of 3.0m above existing ground level.

This embankment shall be used to mitigate against or eliminate the need to transport excavated material from the site and to also minimise the need for importation of fill material to site.

The proposed works will not require excavation within the existing channel (in river works) and excavation equipment, for the purposes of channel widening, will not be allowed access to the existing river bed. This method of construction means that average annual flow can be contained within the existing channel and excavation can be undertaken along the bank (in dry conditions) with minimal interference to the water quality.

Maintenance works aimed at the removal of encroachment of terrestrial vegetation, removal of fallen trees and other obstacles will be undertaken along the river bank where flood relief works are not undertaken. Terrestrial vegetation along the river banks would be managed (i.e. trimming back to 1.0m to 1.5m above high flood levels) rather than being removed.

Engineering works in the townland of Killeely Beg will include the complete replacement of the existing stone arched bridge. The existing bridge is approximately 8.2m wide and is a hydraulic constraint causing flooding upstream of the existing bridge.

It is proposed to replace this existing structure with a new bridge with a clear span of up to 18m and the proposed indicative bridge works are illustrated on the following **Figure 4.1**.

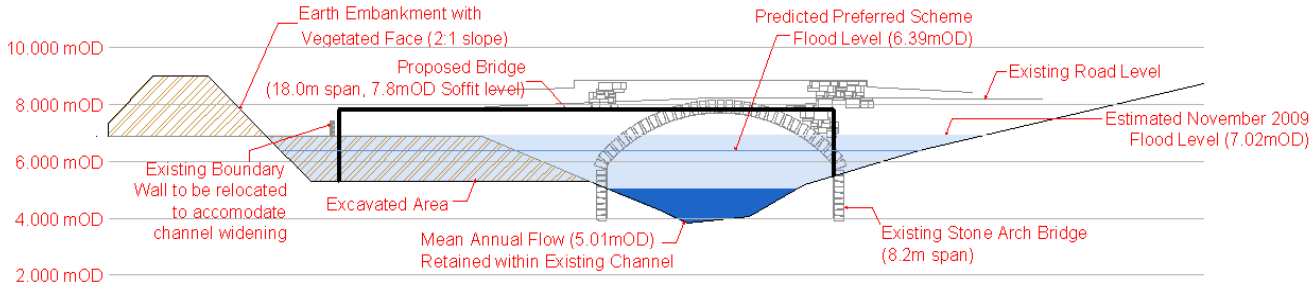


Figure 4.1 - Proposed Works at Killeely Beg Bridge

It is expected that the new bridge will be constructed from precast bridge beams resting on new concrete abutments on each river bank. It is also proposed to retain stone from the existing facades to construct the parapets of the proposed precast bridge.

The works at Rinn Bridge will require the closure of the existing access road which is utilised for land access only and traffic disruption will be minimal. The proposed channel widening and bridge works will also require the realignment of the existing access road where suitable excavated material from the channel works can be utilised as fill material.

Engineering works in the townland of Dunkellin will include the provision of bypass culverts to one side of the existing main stone arch. The existing structures at this location consist of a stone arched bridge spanning the main channel with five flood eyes located along the left bank of the channel. The existing flood eyes are insufficiently sized to cater for predicted flood flows and as such it is proposed to provide two new bridge structures each with a clear span of 13m and both located on the left bank. The construction of the proposed structures will require demolition of the existing flood eyes on the left bank and it is proposed to retain stone from the existing facades to construct the parapets of the proposed precast bridges as indicated in the following **Figure 4.2**.

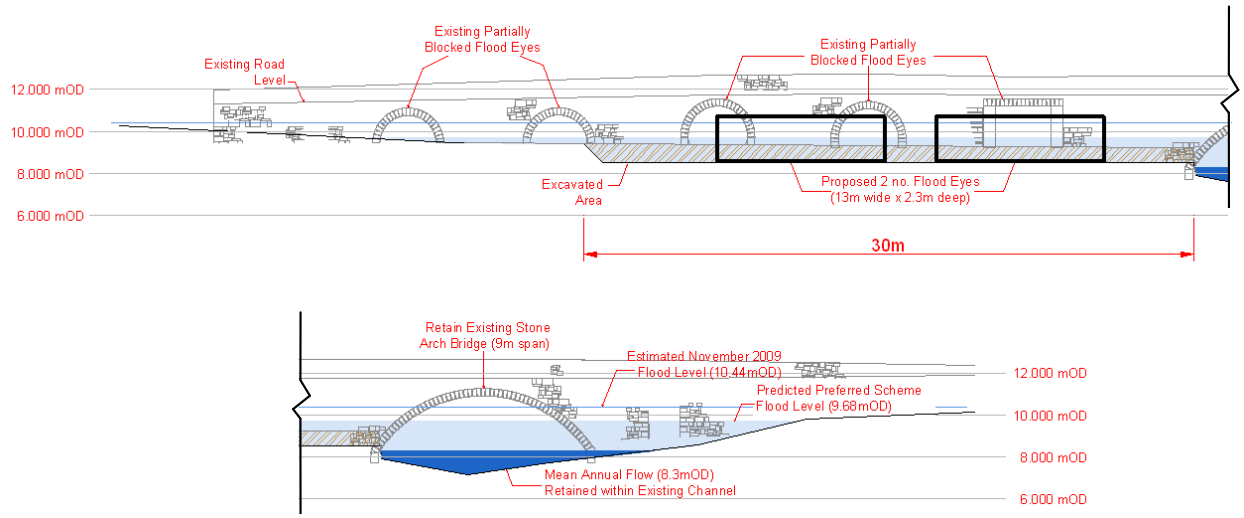


Figure 4.2 - Proposed Works at the Dunkellin Bridge

It is expected that the new bridge structures will be constructed from precast bridge beams resting on new concrete abutments.

The works will require the closure of the existing public road and therefore traffic disruption will be encountered. However road diversions can be put in place on the northern approaches at

Roveagh and along the southern approaches at Madden's Forge with local access, to the northern and southern sides of the river, being maintained throughout the works.

The proposed indicative bridge works at Rinn are illustrated in the following **Figure 4.3**.

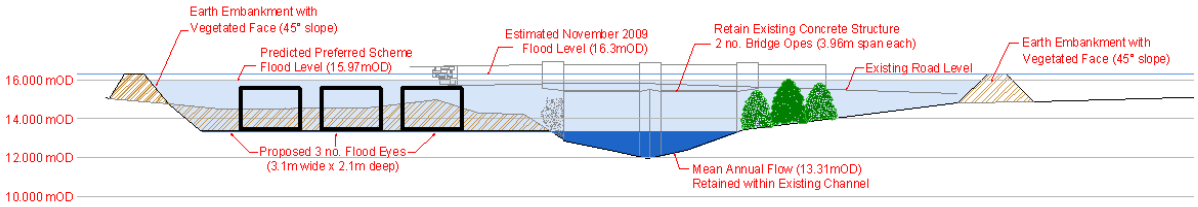


Figure 4.3 - Proposed Works at the Rinn Bridge

The construction of the proposed structures will require excavation of the existing road and will therefore require the closure of the existing public road and traffic disruption will be encountered.

However road diversions can be put in place on the northern approaches at Craughwell and along the southern approaches at Rinn and Madden's Forge with local access, to the northern and southern sides of the river, being maintained throughout the works.

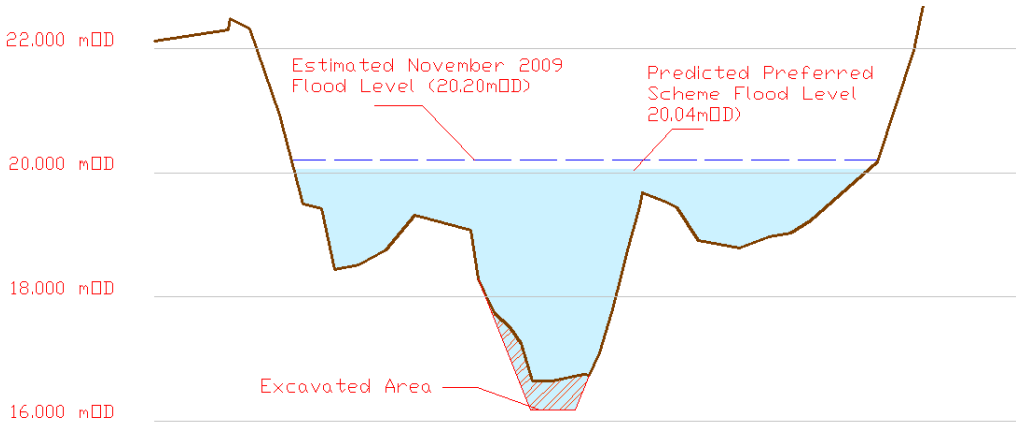
4.1.3 Zone 2 – Rahasane Turlough

No works to be undertaken along/within the Rahasane Turlough.

4.1.4 Zone 1 – Channel and Bridge Works from the Aggard Stream to Craughwell Village

The proposed works, from a location approximately 600 metres downstream of the Railway Bridge in Craughwell to a point 35m upstream of the R446 Road Bridge in Craughwell, will consist of channel regrading whereby the existing bed level will be lowered by 1.0 to 1.5 m over an approximate length of 950m. A summary of these works is given in **Error! Reference source not found.** of the Works Description.

It is envisaged that excavation of the channel in this location will be dependent on the phasing of works along the bypass channel, low flow conditions in the river and the extent to which flow in the river can be diverted or restricted to one half of the existing channel.



Cross-Section Ref: 9848 (Adjacent to DK10)
Location: 183m d/s of Railway Bridge
Proposed Works: Deepen Channel by approx. 0.6m

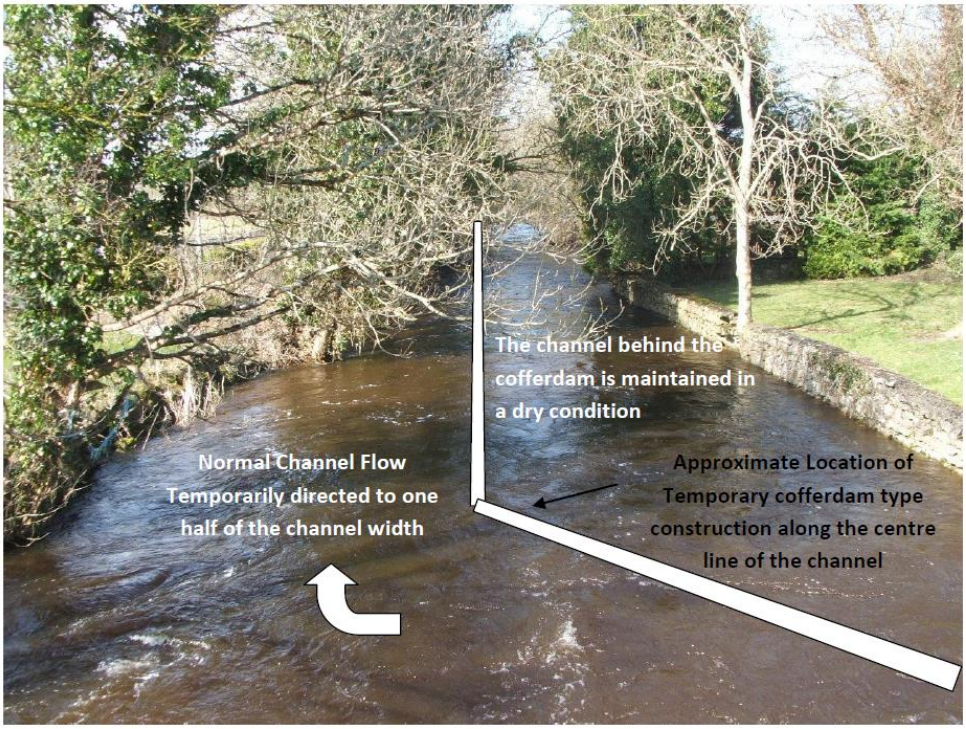


Figure 4.4 - Proposed Works Channel Works in the vicinity of Craughwell Village and sketch of cofferdam location

River enhancement works along this stretch of the river will aim to restore the natural morphological form (C type) of this channel at the new river bed level and develop a series of riffle, glide and pool structures. This process involves the reintroduction of some excavated material to create weirs or paired deflectors, excavation of pools and the introduction of salmonid spawning beds.

It is also proposed that the river enhancement works will be undertaken in tandem with the main excavations works within each cofferdam enclosure so that the short term ecological impact is minimised.

Regrading of the channel also requires the deepening of the bed level at the three main bridges in Craughwell, namely; the Railway Bridge, the old stone multi-arched pedestrian bridge and the bridge crossing on the R446. The required depths of underpinning will be as follows:

1) Up to 0.50m of underpinning or scour protection required at the Railway Bridge
2) Up to 0.70m of underpinning at the old stone multi-arched pedestrian bridge and
3) Up to 0.60m of underpinning at the bridge crossing on the R446.

Underpinning or scour protection involves one of two main techniques whereby:

a) material is excavated from beneath the foundations of the existing bridge and replaced with mass concrete. The sequence of work is such that that the stability of the existing structure is not compromised. The work tends to be labour intensive and is normally undertaken in partial but sequential excavations under the bridge abutment.
b) a secant or contiguous piled wall is constructed along the foundation of the existing bridge to allow the deepening or regrading to take place.

It is envisaged that the foundations of the existing R446 road bridge and the stone arched pedestrian bridge will be supported through the use of direct underpinning i.e., item (a) above, where all of the work can be undertaken in the dry when the existing bypass channel is deepened and temporarily used as the main river channel for the duration of the underpinning and channel deepening. The underpinning of these structures will be labour intensive as the works will be undertaken by hand because headroom beneath each bridge soffit is minimal and access for heavy plant is limited.

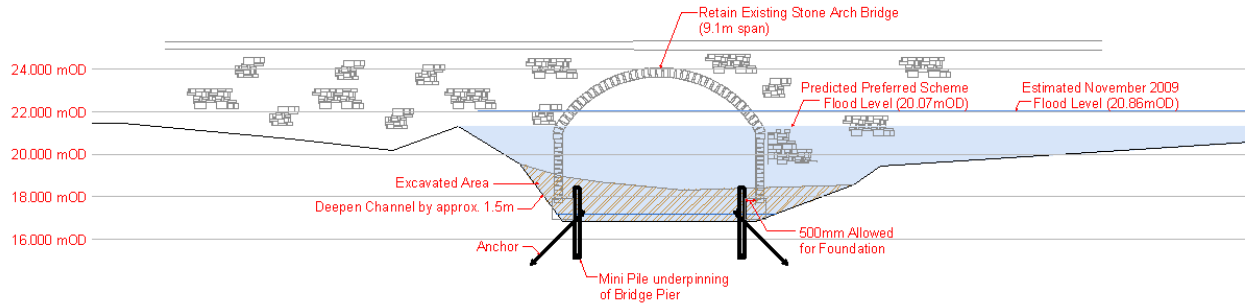


Figure 4.5 - Proposed Works at the Railway Bridge in Craughwell

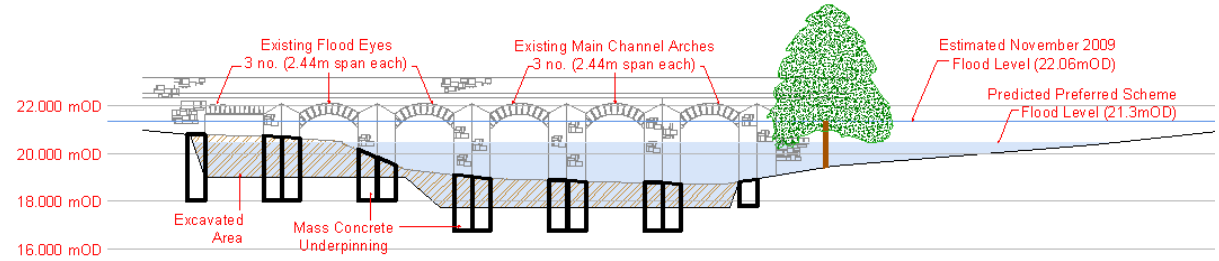


Figure 4.6 - Proposed Works at the Old Pedestrian Bridge in Craughwell

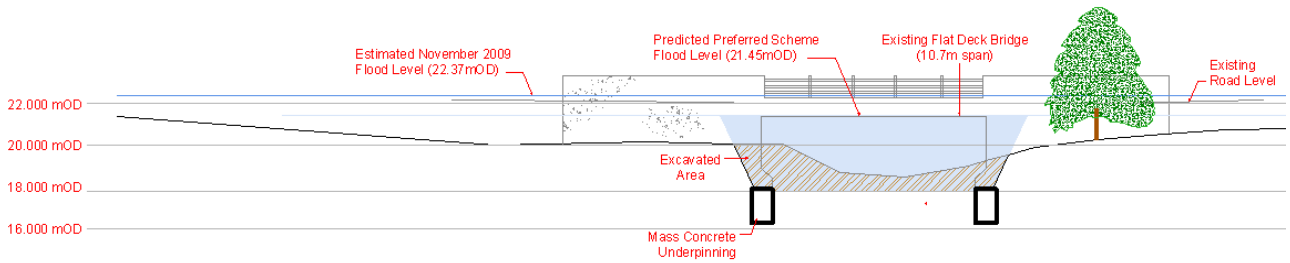


Figure 4.7 - Proposed Works at the R446 Road Bridge in Craughwell

It is also proposed to regrade the entire length of the bypass channel in Craughwell, from 18.5mOD upstream to 18.0mOD downstream. The regrading works will include a reduction in bed level of approximately 1.5m at the bypass bridge on the R446 road. This deepening will require underpinning of the existing bridge and it is envisaged that this will involve the excavation of material from beneath the foundations of the existing bridge and replacing this with mass concrete. The sequence of work is such that that the stability of the existing structure is not compromised. The work tends to be labour intensive and is normally undertaken in sequential excavations under the bridge abutment.

It is envisaged that this underpinning work can be undertaken in the dry as the bypass channel is normally only utilised when the main channel is in flood. The underpinning of this structure will again be labour intensive as the works will be undertaken by hand because headroom beneath the bridge soffit is minimal and access for heavy plant will be extremely limited.

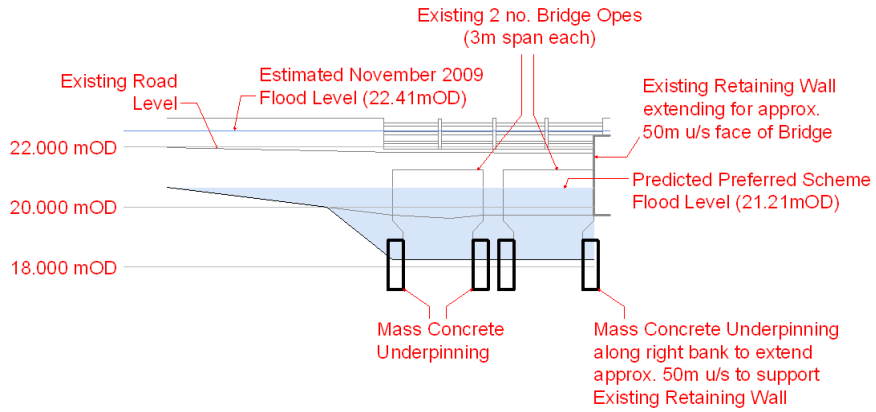


Figure 4.8 - Proposed Works at the By-Pass Channel Bridge in Craughwell

5 RESTRICTIONS PLACED ON CONSTRUCTION TECHNIQUES

The construction of the proposed scheme will require a variety of construction methodologies which will require careful consideration of the following restrictions described in the EIS and Technical Description of the Works.

5.1 WORKING HOURS AND SECURITY OF THE SITE

Normal working hours shall be 0800 and 1800 Monday to Friday and 0800 and 1300 on Saturdays. No work shall be executed outside normal working hours, on Sundays or Public Holidays without the prior written acceptance of the Employer's Representative. Such acceptance will be influenced by the time of sunset/sunrise, anticipated noise, odour and artificial light emissions from the Works, use of public roads and any other considerations that could cause disturbance to members of the public.

However in relation to sections of the works which impact on traffic working hours where lane closures are not required are 7am to 7pm Monday to Friday and 7am to 1pm on Saturdays. Working hours where short term lane closures are required (Rinn Bridge to construct the bypass culvert) are 8pm to 7am Monday to Thursday and 8pm Friday to 11am Saturday. However written approval for these works must be obtained from the Employer.

No machinery shall be left in the river overnight or outside of normal working hours.

With regard to security of the site, temporary fencing and gates to the working areas will be provided to ensure the protection of equipment, materials, operatives, as well as prevention of vandalism, public hazard and disturbance to adjacent land/ vegetation to be protected and retained. Temporary fencing and gates will be agreed with landowners and shall also be sufficient to meet obligations under the Contract and Health and Safety legislation.

All plant and equipment will be "parked-up" in designated areas outside of working hours and will be locked. Special machine parking areas (above flood level) will be designated and in the event of a flood, machinery will be moved to these areas and secured.

5.2 ACCESS POINTS/COMPOUNDS

Prior to the commencement of construction, a draft Construction Traffic Management Plan (CTMP), will be prepared by the Contractor and submitted to the local authority for approval.
The aim of a CTMP is to put in place procedures to manage construction traffic effectively. Any such plan will consider construction traffic accessing the site via the public road network as well as traffic circulation within the construction site. It will also outline measures to enhance the efficient transportation of construction materials and machinery whilst minimising delay and disruption to the general traffic. Mitigation measures relating to the minimisation of impacts on local road users are contained within the EIS for the project and these will be adhered to at a minimum. A typical Traffic Management Plan will:-

- Identify sensitive areas (e.g. schools and homes);
- Be aware of road restrictions, e.g., narrow roads, bridges with restrictions, etc.;
- Identify the location of suitable parking facilities for private cars and plant;
- Ensure there are designated vehicular routes in site with speed restrictions;
- Ensure safe access and egress from site;
- Gain permissions for any required road closures, diversions etc from the relevant bodies;
- Consult with An Garda Síochána and relevant local authorities;

- Schedule site deliveries outside of times of peak traffic volume; and
- Ensure erection of the required signage as per Chapter 8 of the Traffic Signs Manual.

Should a Construction Traffic Management Plan need to be prepared for the proposed development, this should take into account any planned intensive period of traffic volumes associated with the flood relief scheme. All relevant measures as set out in the EIS will be included. These will include the following:

- In order to minimise the level of construction traffic all materials where possible will be sourced locally;
- Machinery deliveries and construction vehicle movements to the site will be scheduled so as to spread the arrival and departures of construction vehicles over the day and avoid peak traffic on the local road network;
- During the construction of the access road, the delivery of material to the site will be restricted to non-peak hour traffic in order to minimise disturbance to local road users;
- Should the local authority require it, both the local authority and road users will be notified of the dates and times that material will be transported to the site; and
- Road conditions will be reviewed prior to construction and any necessary repairs carried out prior to transport.

The technical description of the proposed scheme provides an outline detail of the envisaged access points to the proposed Works Areas and these are summarised as follows and detailed on the relevant Drawings accompanying the EIS.

- Access Point No. 1 (Refer to Drawing No. 6408-2202) - Provision of an access point into the Dunkellin River downstream of Killeely Beg Bridge.

- Access Point No. 2 (Refer to Drawing No. 6408-2202) - Provision of an access point into the Dunkellin River for works downstream of Killeely Beg Bridge to Kilcolgan Bridge.

- Access Point No. 3 (Refer to Drawing No. 6408-2202) - Provision of an access point into the Dunkellin River for works upstream of Killeely Beg Bridge to Dunkellin Bridge.

- Access Point No. 4 (Refer to Drawing No. 6408-2203) - Provision of an access point into the Dunkellin River for works downstream of the Dunkellin Beg Bridge to Killeely Beg Bridge.

- Access Point No. 5 (Refer to Drawing No. 6408-2203) - Provision of an access point into the Dunkellin River for works upstream of the Dunkellin Beg Bridge.

- Access Points No. 6 and 7 (Refer to Drawing No. 6408-2204) - Provision of an access point into the Dunkellin River for works at Rinn Bridge.

- Access Point No. 8 (Refer to Drawing No. 6408-2208) - Provision of an access point into the Dunkellin River for works downstream of the Railway Bridge at Craughwell Village.

- Access Point No. 9 (Refer to Drawing No. 6408-2208) - Provision of an access point into the Dunkellin River for works upstream of the Railway Bridge in Craughwell Village.

- Access Point No. 10 (Refer to Drawing No. 6408-2208) - Provision of an access point into the Dunkellin River for works upstream of the R446 at Craughwell Village.

It is envisaged that there will be four main site compounds, varying in size to reflect the extent of works being undertaken at each location, which include short term staff welfare facilities and

plant & materials storage for the proposed works. The final location of these compounds is unknown at the present time and will be confirmed by the Works Contractor following direct Contractor liaison with each relevant landowner. It is envisaged that these compounds will be located a minimum of 50m to 100m from the Dunkellin River. This can be seen in **Figure 5.1.**

1. Site compound at Killeely Beg Bridge. It is envisaged that this compound will be located on lands to the north of the channel and adjacent to Killeely Beg Bridge. These lands are coloured green on Drawing No. 6408-2203 Rev G at cross section “DK33”. This area is noted, in Chapter 10 of the EIS, as being “improved agricultural grassland”.
2. Site compound at Dunkellin Bridge. It is envisaged that this compound will be located on lands adjacent to Dunkellin Bridge. These lands are coloured green on Drawing No. 6408-2203 Rev G at cross section “DK30”. This area is noted, in Chapter 10 of the EIS, as being “improved agricultural grassland”.
3. Site compound at Rinn Bridge. It is envisaged that this compound will be located on lands to the east of Rinn Bridge. These lands are coloured green on Drawing No. 6408-2204 Rev G at cross section “DK25”. This area is noted, in Chapter 10 of the EIS, as being “improved agricultural grassland”.
4. Site compound at Craughwell Village. It is envisaged that this compound may be placed at a number of locations in the village of Craughwell. A number of the possible locations are shown as a red circle in the following aerial view of the village. These are noted, in Chapter 10 of the EIS, as being “improved agricultural grassland”, “scrub” and “Buildings and Artificial Surfaces”.

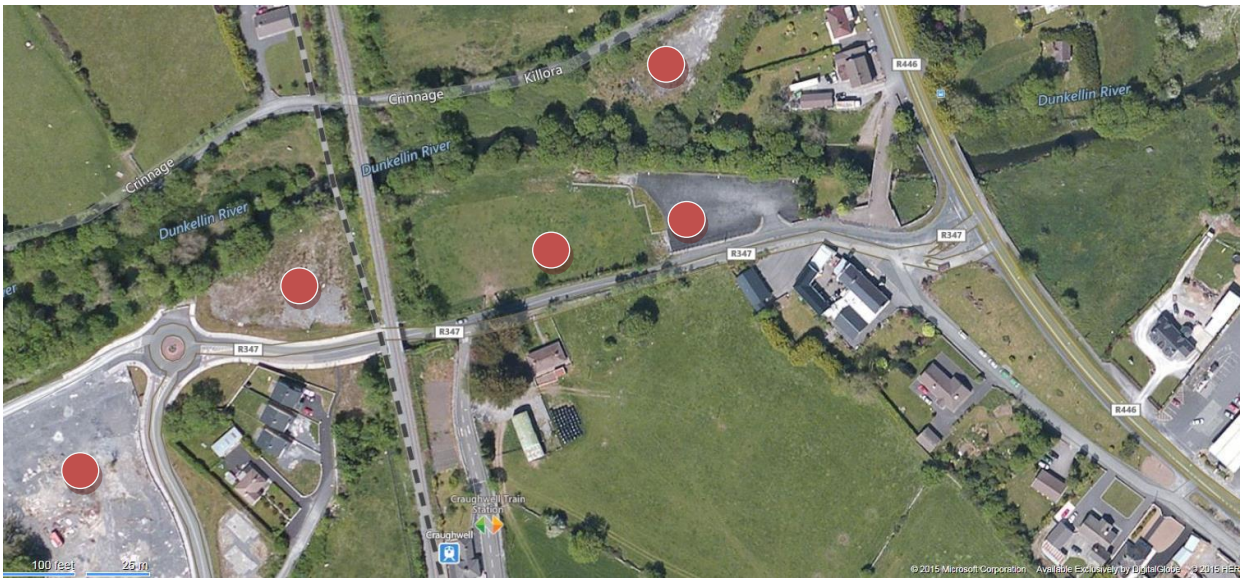


Figure 5.1 – Locations for Site Compounds Storage

Any surface topsoil within the proposed site compounds will be removed and temporarily stored for reinstatement of all lands once work is completed. Following clearing of topsoil from the compound area it is envisaged that the working surface will be formed from imported clean stone laid on a temporary geomembrane.

Any surface topsoil along the route of the proposed works will be removed and temporarily stored for reinstatement of all lands after work is completed. Following the clearing of topsoil from the works area it is envisaged that the working surface will be formed from stone excavated from the proposed works and will be constructed ahead of the excavation plant as work progresses. Imported construction materials will be stored at the compounds and delivered to the particular section of works as required.

The following public roads will be directly affected by the works:

- R446 (formerly known as the N6 at Craughwell)
- R347 Ardrahan Road
- Grenage Local Road
- Kilcolgan to Craughwell (via the Rinn and Dunkellin Bridges) Local Road
- N18 at Kilcolgan
- Local access roads particularly at the townland of Killeely Beg

The following measures shall be undertaken in relation to construction access and haul routes:

1. Advance warning signage of construction access points shall be signed on the local road i.e. construction vehicle access ahead.
2. Public roads outside the site shall be regularly inspected for cleanliness, and cleaned as necessary.

Other measures that will be adhered to when developing access tracks along the Dunkellin River and Aggard Stream banks include:

a) all access tracks will be situated near aquatic zones, therefore care should be taken to control sediment run-off and visual impacts;
b) under no circumstances are machines permitted to enter the wet portion of the river channel (access restricted to access platforms/pontoons or dry areas only);
c) refuelling, maintenance and storage areas will be located at least 50 metres from the nearest aquatic zone;
d) construction of access tracks will only be carried out during the months when river bank works and in-river works are permitted during the period of May to September.

5.3 WORKING IN DRY CONDITIONS ALONG THE RIVER CHANNEL

The proposed works along the **length of channel from Rinn Bridge to Kilcolgan** will not require excavation within the existing channel (in river works) and excavation equipment, for the purposes of channel widening, will not be allowed access to the existing river bed. This method of construction means that average annual flow can be contained within the existing channel and excavation can be undertaken along the bank (in dry conditions) with minimal interference to the water quality.

It is envisaged that excavation of the **channel in the vicinity of Craughwell Village** will be dependent on the phasing of works along the bypass channel, low flow conditions in the river and the extent to which flow in the river can be diverted or restricted to one half of the existing channel. In addition it is also proposed to retain existing bankside trees (if healthy and suitable for retention) provided that their retention does not pose a concern with regard to the safe construction of the works, safe recreational use of the channel and safe maintenance of the channel. A qualified arborist will be retained at the detailed design stage to examine and determine the most appropriate trees that can be retained or if necessary make recommendations with regard to the replacement of trees that require removal.

Works associated with **channel deepening in the vicinity of the old stone bridge and the bridge crossings of the R446** can be undertaken in dry conditions whereby the bypass channel can be utilised a diversion route once the proposed channel works and underpinning on the bypass channel are complete.

The remaining **channel works downstream of the proposed confluence of the bypass channel and the Dunkellin River** will be undertaken along the length of the channel in segmented sections using cofferdam type temporary works construction. It is envisaged that temporary cofferdam type construction or temporary sheet pile walls (with a length of 50 to 100m depending on the depth of water and ground conditions) will be used. This process allows river water to be directed to one half of the channel width allowing the civil engineering works to be undertaken, in relatively dry conditions, on the other side of the channel. Once this half of the proposed channel works is excavated, within the confines of the cofferdam, it is expected that river water will be directed to the new section allowing the adjacent excavations to be completed. This sequence of construction is expected to commence at the lower downstream point of the works and continue upstream in this "*leap-frog*" type construction method. This method of construction reduces the risk of construction debris and silt entering the river.

It is envisaged that the **foundations of the existing railway bridge** will require scour protection through the use of a secant or contiguous piled wall along each side of the bridge piers or abutments. However, this work will require the use of either a floating barge or construction of a temporary cofferdam to facilitate access to the bridge piers. The use of temporary cofferdams allows the works to be undertaken, under dry conditions, in two phases, whereby flow can be restricted to one half of the channel width allowing the civil engineering works to be undertaken in the dry conditions which exist within the other half of the channel.

It is also proposed to store excavated material, such as the natural gravels, boulders and cobbles found on the existing river bed, so that such material can be reused in the development of the river enhancement works. The design of the river enhancement works together with the associated construction works method statements will be the subject of detailed design between Galway County Council, the OPW and Inland Fisheries Ireland upon conclusion of the planning process.

5.4 FLOODING OF THE WORKS

Due to the nature of the proposed project the risk of flooding to the Works Area during construction needs to be considered. To ensure flood protection and mitigation is available the Contractor will be required to have procedures in place, and agreed with the Employer before any works can take place, to ensure availability of critical personnel 24hrs a day and any day for the duration of the Works. The likelihood of a flood event occurring during construction is the same as in any other year. Although existing drainage channel will not be removed restrictions on existing structures may result in a short term localised increased risk of flooding. The Contractor will be required to put emergency procedures in place to minimise flooding of the works if required by the onset of a flood emergency.

It is envisaged that an "Advanced Weather Warning System" (based on short term forecasts published by Met Éireann) will be in operation for the duration the Works. Such a system shall require the Site Agent/Manager to review, on a daily basis, the current 3 to five day forecasts to ensure that an adequate response time for flash floods or similar adverse conditions can be prepared thus reducing impacts that may pose health and safety risks to those carrying out these works, as well as risks to the working environs and to the public in general.

It is envisaged that the Weather Monitoring Procedure will contain:

1. Weather forecasts from Met Eireann to be logged daily 1 week ahead of time.
2. Atmospheric pressure forecasts monitored 1 week ahead of time.
3. Wind direction to be monitored 1 week ahead of time.
4. Tide levels at Kilcolgan and Water Levels within the Turlough to be monitored weekly.
5. The person(s) responsible for the Weather Monitoring.

6. A rota system will be drawn up to ensure that the monitoring procedure is in operation at all times during holidays.

5.5 LIAISON WITH STATUTORY BODIES

The following table lists the statutory bodies that the Contractor will be required to liaise with in relation to the works.

	Description	Authority
1.	Traffic and Roads	Galway County Council, Gardai
2.	Water Supply	Irish Water and Galway Co Co as Agents to Irish Water
3.	Foul Sewers	Irish Water and Galway Co Co as Agents to Irish Water
4.	Electricity	Electricity Supply Board
5.	Telecoms	Eircom, UPC, BT, etc
6.	Gas Supply	Bord Gais
7.	Works in and in the vicinity of a Water Course , Water Quality, Fish, etc	Inland Fisheries Ireland
8.	Works in Vicinity of Railway Bridge	Iarnrod Eireann
9	Works in Vicinity of Road Bridges	Galway County Council, Gardai
10	Aquatic Ecology	Inland Fisheries Ireland
11	Terrestrial Ecology	National Parks & Wildlife Service
12	Archaeology	National Monuments Service
13	Public Transport	Bus Eireann , Iarnrod Eireann

5.6 SEQUENCING OF THE WORKS

There are a number of constraints on the phasing and methods of construction works. The most significant constraint is that in general in-river work is only permitted between May and September each year. Construction works must commence from the upstream end of the works and progress the works towards the downstream end.

The Works are divided into two distinct areas (Craughwell Village and works downstream of the Rahasane Turlough) and the works must be completed in one area insofar as is practical prior to commencing works in the next area.

The extent to which the works must be completed prior to moving to the next area will be agreed on a case by case basis with the Employer's Representative, Galway County Council, NPWS and Inland Fisheries Ireland.

5.7 MITIGATION MEASURES AND ECOLOGICAL CONSTRAINTS

Potential construction stage impacts are outlined in Sections 9 to 19 of the EIS and in Section 8.2 of the Natura Impact Statement, which accompanies the EIS.

It is considered that the main construction phase effects will involve the potential release of pollutants to the Dunkellin River which could impact qualifying habitats and species and disturbance which could lead to impacts on qualifying species of Rahasane Turlough SAC/SPA, Galway Bay Complex SAC and Inner Galway Bay SPA.

The main potential disturbances can be summarised as follows:

1. Disturbance to adjacent lands and riparian zones (Soils).
2. Disturbance to terrestrial ecology.
3. Disturbance to aquatic ecology such as waterborne pollutants.
4. Air Quality and airborne pollutants.
5. Disturbance associated with Noise and Vibration.
6. Archaeological impacts.
7. Visual and Landscape Impacts.
8. Disturbance to Material Assets and Human Beings.
9. Traffic impacts

The potential impact of the individual engineering items to Geological and Hydrogeological features are summarised in **Table 9.6 of the EIS**.

The potential impacts to **adjacent lands and terrestrial ecology** as they relate to the proposed activities are summarised as follows:

a. There is a potential for **accidental soil and groundwater contamination** due to spills and leaks of oils and other contaminants during the construction stage of the proposed works. The potential for these impacts to occur is minimised by adhering to the relevant construction guidelines (CIRIA C532 and C648).
b. The proposed works include the **excavation of soil materials along the banks of the river**. The excavated material will be reused for side-slope protection, creation of bankside spoil embankments and the creation of extended spoil heaps. It is expected that where this material is spread on adjacent lands the material will be between 0 and 0.5 m thick. Initial treatment will require removal and storage of topsoil, spreading of excavated material and reinstatement of the topsoil. This will minimise the transport of material offsite and aim to return the soils to the pre-works quality. It is proposed to complete **in-channel works using cofferdam type construction** whereby flow can be

restricted allowing the civil engineering works to be undertaken in the dry conditions. It is proposed to use surface dewatering pumps to dewater the section of the channel under construction. It is possible that during such works significant groundwater inflows from the channel bed could occur where fractured limestone is exposed. Where groundwater inflows are significant water management controls will be required. This may involve aquifer dewatering to lower the water table below the base of the channel in the vicinity of the works. Dewatering would constitute a temporary, slight negative impact on the groundwater flow regime and potentially affect adjacent groundwater supplies if present. In-channel regrading works can lead to river sediment disturbance with subsequent siltation and deposition downstream of the location which is considered a slight impact on soils and geology.

All construction works will be completed in accordance with the following best practice guidelines to ensure the potential for accidental **soil and groundwater contamination is minimised:**

CIRIA (Construction Industry Research and Information Association) guidance on '*Control of Water Pollution from Construction Sites' (CIRIA Report No C532, 2001); and*

CIRIA (Construction Industry Research and Information Association) guidance on '*Control of Water Pollution from Linear Construction Projects*' (CIRIA Report No. C648, 2006).

Spreading of excavated materials will not be undertaken in the immediate vicinity of karst features. A large number of karst features have been documented in the region, however, the GSI karst database is incomplete and many field scale karst features are not included. This data has been supplemented by the use of a geophysical survey of deposition areas to minimise the impact on karst features.

The effective protection of **water quality** within the scheme during the construction and operation phases will minimise the risk to the qualifying interests of this site. Release of suspended solids to all surface waters will be controlled by interception and management of site run-off. Dewatering and surface water runoff discharges from the excavation and landspreading areas will be controlled, collected and routed via appropriate treatment measures. These measures will be in accordance with:

CIRIA publication C648, *'Control of Water from Linear Construction Project'* (CIRIA, 2006).

Silty water shall be treated using ponds and temporary interceptors and silt traps will be installed. An interceptor drain will be located at the edge of access tracks to intercept runoff. These facilities will be maintained on a daily basis and the maintenance record will be maintained and available for inspection by Galway County Council and other statutory organisations.

Standard pollution control and mitigation measures, will be employed when working in and near the watercourse affected by the scheme to prevent the transport of deleterious substances to the Dunkellin River and connected Natura 2000 sites and associated water-dependent habitats and species. All two-stage channel works are proposed to be carried out outside of the existing channel thereby retaining the average annual flow within the existing channel. Excavation is to be undertaken along the bank with minimal interference with water quality.

A detailed design and method statement will be drawn up by the Contractor indicating what standard measures will be taken to avoid items such as:

i. sediment or soil loss and
ii. cement and hydrocarbon release associated with all aspects of the construction phase,
iii. spillage of hydrocarbons,

and the following precautions will be put in place in this regard.

- Disposal of raw or uncured waste concrete must be controlled to ensure that the watercourse or karst features will not be impacted.
- Best practice in bulk-liquid concrete management addressing pouring and handling, secure shuttering / form-work, adequate curing times.
- Where shuttering is used, measures should be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils.
- Wash water from cleaning ready mix concrete lorries and mixers may be contaminated with cement and is therefore highly alkaline. Due to the size of the site and the proximity of sensitive watercourses, all lorries and mixers shall be washed out off site.
- Cement dust shall be controlled as it is alkaline and harmful to the surrounding ecological receptors. Activities which result in the creation of cement dust must be controlled by dampening down areas.
- The timing of the works shall be agreed with the IFI in relation to fish migration and spawning periods.
- The rock type underlying much of the site is karstified limestone. Where rock fill is required, such as at Rinn Bridge, it should be recovered and reused from any excavations within the site. The importation of foreign material should be limited, however if it is required it should be the same rock type as found on site.
- Fuel and hydraulic fluids should not be stored on site, but if absolutely necessary, they must be stored in a locked and bunded container. Refuelling should only take place in the site compounds. All stationary plant materials should be placed on drip trays to prevent leaking oils reaching the river or entering groundwater. No washings or waste materials of any kind can be directed into watercourses; i.e. the Dunkellin River or any channels or ditches supporting connectivity with the Dunkellin River. Any machinery on site must have pollution control kits on hand in the event of an emergency.

Materials that will be stored and used on site and which may pose a pollution risk are listed in the following tabulation.

Type of Polluting Material	How or Where it will be Stored
Cement	Within a dry container within the Secure Compound
Bentonite	Within a dry container within the Secure Compound
Diesel	Within a bunded tank in the Secure Compound
Petrol	Compound in marked containers (bunded containers)
Oil	Compound in marked containers (bunded containers)
Concrete repair products	Within a dry container within the Secure Compound

Similarly, the Contractor's Method statement shall contain measures for controlling **sediment transport.** Mitigation for the construction of the two stage channel will essentially be the same for each reach of the channel between the N18 and Rinn Bridge. As identified in Section 8 of the Ecological Impact Assessment, the principle risk will be from solids washout either directly from the edge of the bank or via drains traversing the new two-step channels. Control measures will include, for example, that excavations begin away from, and work towards the channel with a buffer zone left between the excavation area and the channel to prevent diffuse wash off. Flow paths to the river, in that case, can be more adequately protected with appropriate sediment control measures. If the water table rises to the level of the works area then all works should cease in the affected areas until it drops again. The advance warning of flood events is possible through the use of an "Advanced Weather Warning System" and the appointed contractor will be required to monitor both long and short term weather forecasts so that machinery and personnel can be prevented from entering the channel during periods of peak flow.

All construction borne water (**from dewatering techniques**) will be passed through settlement ponds which can be formed by constructing bunds and placing an appropriate geotextile liner on top. Details of typical techniques are contained in Section 9 of the EIS.

- Mitigation measures are proposed, in the EIS, to address the adverse effect, of **airborne pollutants**, on the ecological receptors identified within the zone of influence of the works. The contractor will prepare a Dust Minimisation Plan if required. This Plan may include and incorporate the following mitigation measures among others:-

    - Site roads shall be regularly cleaned and maintained as appropriate. Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only;

- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential);

- Bed of gravel at site exit points to remove caked on dirt from tyres and tracks;

- Speed restrictions should be put in place for any on-site vehicles in order to avoid increased agitation of dust particles;

- Public roads outside the site shall be regularly inspected for cleanliness, and cleaned as necessary;

- Prevention of on-site burning;

- Unsurfaced roads will be restricted to essential site traffic only;

- Use of wind breaks and barriers;

- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind;

- Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods. This may require the use of a Dust Suppression Bowser unit;

- Any accidental or observed increases in dust levels will be recorded and brought to the attention of the Site Manager and the Ecological Clerk of Works; and

- All complaints to be reported to the Site Manager and Project Manager, and also logged within an on-site register.

With regard to the minimisation of the impact of **construction related noise**, all works at the watercourse will make a 'short-start' to activities to allow salmon and other fish to move away before the full intensity of works begins. The following restrictions, as detailed in Table 11.11 of the EIS, will be put in place for the duration of the project.

Species	Period of no instream disturbance (inclusive)	Likelihood of presence in the affected areas and comments	Period instream works allowed (inclusive)
Salmon.	October to April - spawning, nursery (IFI).	Distributed throughout study area: Craughwell River instream deepening works – very sensitive - spawning, nursery, holding area. Dunkellin River – no instream works proposed/migration – less sensitive – limited spawning, but good nursery habitat. Aggard Stream – few salmon – no deep dredging works proposed.	May to September.
Brook and River Lamprey.	March to May - spawning / hatching (Igoe et al., 2004).	Distributed throughout study area, depending on localised habitat, i.e. spawning in riffles, nursery in silty deposits.	June to February.
Sea Lamprey.	Mid June to July - peak spawning period (Igoe *et al.*, 2004).	Presence confirmed on lower Dunkellin River at least. Spawning and juvenile nursery habitat abundant throughout the study area, depending on localised habitat, i.e. spawning in riffles, nursery in silty deposits.	August to April.
White clawed crayfish.	November to late June (breeding / berried females + hatching) (Peay, 2000).	Population abundant on Craughwell River and Aggard Stream upstream of Rahasane Turlough. Present / moderate abundance on Dunkellin River between Dunkellin Bridge and Rahasane Turlough, inconclusive evidence of presence downstream of Dunkellin Bridge.	July to October.
Trout.	October to May - spawning, nursery (IFI).	Distributed throughout study area.	June to September.
Combined/ overall timing restrictions.	No instream works allowed between October and July.		Instream works allowed August to September.

Work will be undertaken during daylight hours, starting no earlier than two hours after dawn and finishing no later than two hours before dusk, between March and October; and to start no earlier than one hour after dawn and finish one hour before dusk from November to February; and shall not continue for periods of more than 12 hours, to prevent disturbance to nocturnal species. Disturbance impacts can be avoided if construction works in proximity to the turlough (e.g., at Rinn Bridge) are carried out outside of the over-wintering bird season, i.e. outside the September - March season entirely. If for practical reasons, the works at Rinn Bridge have to be undertaken at this time, then it should be determined whether the areas at the western end of the turlough are key areas for birds at this time of the year in order to determine if any disturbance impacts are likely to occur.

The Contractor will employ the best practicable means to minimise noise emissions and will be obliged to comply with the general recommendations of BS 5228, 1997. To this end the Contractor will use “noise reduced” plant and/or will modify their construction methods so that noisy plant is unnecessary.

Archaeological testing will be undertaken in advance of the proposed works at a number of locations throughout the works area as detailed in Section 14.5 of the EIS, including:

1. North of GA103-12001 at Dunkellin and GA103-134 at Killeely Beg within the footprint of the river channel excavation area and embankment location.
2. At the sites of AAP 1, 2, 4, 5, 6, 7 during the excavation of the southern river bank.
3. At the site of AAP 8, during the excavation of the southern river bank.
4. At the site of AAP 9, during the excavation of the southern river bank.
5. A full underwater archaeological survey at Craughwell Bridge, Craughwell Railway Bridge, Rinn Bridge and Killeely Beg Bridge.
6. A full underwater archaeological survey along the 750m southern bank of the Dunkellin River within Killeely More.
7. All excavation works in Craughwell will be the subject of monitoring by a suitably qualified archaeologist.

6 COMMUNICATIONS AND HEALTH & SAFETY PLAN

The Contractor shall appoint a qualified *Project Manager, Construction Manager, Site Manager, Site Agent or Environmental Officer* to act as Liaison Officer between the Contractor and the Employer's Project Engineer, Representatives or Resident Engineering Staff and any other third parties affected by the works and/or statutory authorities.

The Site Agent will responsible for the management of safety, health and the environment on the project and for ensuring that arrangements are in place for such matters as risk assessment, induction, monitoring, consultation and accident investigation / reporting.

All members of the project management team have safety, health and environmental responsibilities and are charged with monitoring site safety, health and environmental performance on a daily basis.

Appointed members of the project management team will complete weekly site inspections using safety, health and environmental checklists.. The Site Agent is responsible for ensuring that these inspections take place and that matters requiring action following each inspection are closed out. All inspection forms will be retained on file for the duration of the project.

The Safety and Health Plan for the construction stage of this project shall contain:

1. Description of Project

- project description and programme details;
- details of client, Project Supervisor Design Process and Project Supervisor Construction Stage, designers,
  main contractor and other consultants;
- extent and location of existing records and plans;
- arrangements for communicating with Contractors, PSDP and others as appropriate.

2. Communication and Management of the Work

- management structure and responsibilities;
- safety and health goals for the project and arrangements for monitoring and review of safety and health performance;
- arrangements for:
  - ➢ regular liaison between parties on site;
  - ➢ consultation with the workforce;
  - ➢ the exchange of design information between the Client, Designers, Project Supervisor for the Design Process, Project Supervisor Construction Stage and Contractors on site;
  - ➢ handling design changes during the project;
  - ➢ the selection and control of contractors;
  - ➢ the exchange of safety and health information between contractors;
  - ➢ security, site induction, and on-site training;
  - ➢ welfare facilities and first aid;
  - ➢ the production and approval of risk assessments and method statements;

➢ the reporting and investigation of accidents and other incidents (including near misses);

d) site rules;

e) fire and emergency procedures

3. Arrangements for Controlling Significant Site Risks

a) safety risks

- services, including temporary electrical installations;
- preventing falls;
- work with or near fragile materials;
- control of lifting operations;
- dealing with services (water, electricity and gas);
- the maintenance of plant and equipment;
- poor ground conditions;
- traffic routes and segregation of vehicles and pedestrians;
- storage of hazardous materials;
- dealing with existing unstable structures;
- accommodating adjacent land use;
- other significant safety risks.

b) health risks:

- removal of asbestos;
- dealing with contaminated land;
- manual handling;
- use of hazardous substances;
- reducing noise and vibration; and
- other significant health risks.

In addition to the above requirements the Health & Safety Plan will contain the following emergency procedures:

- Early weather Warning and flood Alert Procedure
- Flood Alert Procedure
- Galway County Council and OPW Flood Alert Procedure
- Underground and Overground Power Strike Procedure (In Craughwell Village)
- Overhead Cable Strike emergency Procedure
- Rescue from Fall into water procedure
- Gas Main Strike Procedure (In Craughwell Village)
- Communication Cabling Strike Procedure (In Craughwell Village)
- Fire Emergency Procedure
- General Emergency Reporting Procedures
- Road Traffic Accident Procedure

END OF DRAFT DOCUMENT