Dunkellin River and Aggard Stream Flood Relief Scheme

Response to Clarinbridge Oyster Co-op/ Michael Kelly Shellfish

Document Control Sheet

Client:	Galway County Council
Project Title:	Dunkellin River and Aggard Stream Flood Relief Scheme
Document Title:	Response to Clarinbridge Oyster Co-op/Michael Kelly Shellfish
Document No:	MGE0260RP0018

Text Pages:	13	Appendices:	0

Rev.	Status	Date	Author(s)	Reviewed By		Approved By	
F01	Final	9th July 2015	RPS	PK		GMcE	

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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 Clarinbridge Oyster Co-op/ Michael Kelly Shellfish in their submission.

1 ITEM 1 – DESIGNATIONS AND LICENSING

1.1 No reference was made to any of these designations (Shellfish, SAC/SPA) in the application. On the contrary, where shellfish production maps were presented, they omitted the Oyster Fishery Orders (OFO) which are the dominant form of licensing of shellfish production in the area.

Within the application all relevant SAC and SPA sites were considered within the Environmental Impact Statement (EIS) and the Natura Impact Statement (NIS). Within the application a numerical modelling report was included as part of the assessment, which examined the extent and magnitude of the potential change in salinity due to the proposed works and shows the variation in salinity at the seabed and within the water column (in excess of 10 PSU). Presenting modelling results for the entire bay allowed changes in salinity to be identified for all relevant features including sensitive receptors and designated protected and licenced areas. During the most critical phase of the modelled event (i.e. when the salinity is the lowest) the proposed scheme was shown to result in short-term change in salinity of less than 0.5PSU.

2 ITEM 2 – WILD FISHERIES

2.1 The applicant makes no reference to the sustainable managed wild clam fishery in the outer bay or the wild fisheries in the areas (winkles, mussels etc.).

Reference to the shellfish industries in Dunbalcan Bay is made in the EIS Volume 2 Chapter 16 Human Beings and Material Assets, Section 16.3.2, p. 310, as follows;

'Aquaculture in the vicinity of the Dunkellin and Clarin rivers within Dunbalcan Bay is predominately oysters (both native and pacific) and mussels with some licences for other shellfish such as clams. Many of the members of the shellfisheries licensed areas and co-operatives in the Dunbalcan Bay operate other businesses (farming etc) as well as aquaculture licences. For some of the operators, this is a full time business and their sole source of income; it is a substantial part of the annual income of all the operators. Figure 16.1 shows the Clarinbridge / Kilcolgan Designated Shellfish waters and licensed shellfish areas.'

The industry is also referred to in EIS Volume 2, Section 16.3.4, p.313:

*"Downstream of the study area Clarinbridge and Kinvara Bay shellfish waters contain commercial aquaculture activity which forms a significant economic element of the region (Refer to **Figure 16.1**).*

*The water quality and morphology of the river channels and associated bays downstream have the potential to be influenced by the scheme works. Native and Pacific oysters and mussels are the most important shellfish species harvested within the designated shellfish area. Average production of native oysters for the period 2000 to 2003 was seven tonnes per annum. Production of Pacific oysters between 2001 and 2004 averaged approximately 175 tonnes per annum. Mussel production for the period from 2000 to 2004 averaged 155 tonnes per annum. A single licence fishery for sea urchins for the Japanese and Asian markets is also present in the Clarinbridge / Kilcolgan Shellfish Waters (**Figure 16.1**). There are no fin fisheries in the area. This particular oyster fishery is well known. The fishery has a significant export market second only to Irish Harvest located in Donegal. Due to the history of this activity the aquaculture in the region also have cultural significance, for example, the Clarinbridge Oyster festival."*

3 ITEM 3 - IMPACTS OF THE PROPOSED WORKS ON THE RECEIVING BAY.

3.1 The authors of the application only addressed the effects of the works and resultant freshwater inputs on the salinity in the receiving bay. Unfortunately the information submitted falls way short of standards, not only in terms of the information submitted, but also in terms of what is omitted or not included in support of the application. It compares future effects with the extreme flood event of 2009 but fails to factor in the fact that works were already undertake[n] on Rahasane turlough in 1992 and these work already seriously impact the ecology and environment of Dunbulcaun bay. In order to preserve clarity, we shall address these shortcomings in the following order:

1) Salinity model: lack of modelling information inadequate inputs and failure to validate

In relation to this comment, the model simulations for the flow regime within Galway Bay were completed using a 3-dimensional MIKE3 HD flexible mesh flow model which extended to Black Head in the west. The model was based on a flexible mesh approach allowing the representation of the area as a combination of triangular and quadrangular cells. The use of flexible mesh technology enables the resolution of the model to be varied spatially over the model domain thus allowing very fine grid resolution to be incorporated as necessary. The use of the MIKE 3 flexible mesh model permits the incorporation of three dimensional effects i.e. density dominated plume behaviour and stratification. For this study the model was deployed with the vertical water column split into three layers, equally distributed over the full water depth. The boundary conditions used for this study were water levels applied at the entrance to Galway Bay and four significant sources of fresh water were included. The only parameter to be varied between the two modelled scenarios was the discharge rate from the Kilcolgan River, which allowed the impact of the flood alleviation scheme to be determined.

The model used was sufficiently detailed to recreate tidal and stratified conditions within the Bay and to distinguish the changes due to the revised inflow at Kilcolgan. Having compared the 'before' and 'after' scenarios and seen that the changes were identified as minor, no further modelling was therefore required or undertaken. Should the modelling have indicated a greater impact then a much more wide-ranging study would have been undertaken requiring the establishment the full baseline conditions. Due to the minor nature of the changes, the model provided suitable information to conduct impact assessment. The validity of this modelling approach was agreed under auditing by NUI Galway.

In relation to the details in Comment 1), these items relate to a further technical assessment and submission made by Clarinbridge Oyster Co-op and Michael Kelly Shellfish Ltd in relation to a report conducted by Numerics Warehouse (DFRS_EIS_NIS_0013).

The technical issues highlighted by Numerics Workshop in their review of the numerical model (commissioned by Clarinbridge Oyster Co-op and Michael Kelly Shellfish Ltd) have been responded to fully in the following accompanying response report; Response to Numerics Warehouse (on behalf of Michael Kelly Shellfish Ltd) RPS Reference: MGE0260RP0019.

2) The present condition of the native oyster fishery

The report was, in part, focussed on 1) examining the extent and magnitude of the potential change in salinity due to the proposed works and 2) an assessment of whether these change would adversely impact sensitive receptors within the zone of influence.

Numerical modelling of the 2009 flood event "before" and "after" implementation of the proposed scheme indicated only minor alteration to river hydrograph which in turn resulted in inconsequential impacts on the receiving seabed and waters of the bay. In short, the model indicated that in the unlikely event of an extreme flood event similar to the one that occurred in 2009, the proposed works would result in a less than 1% increase in peak flow rate with associated minor changes salinity that would be short-lived and would not exceed 1PSU. In normal operating conditions, no changes were identified.

Given these minor potential changes it was concluded that even under the worst case scenario (i.e. the 2009 flood event) the scheme would not worsen conditions for shellfish in the bay. Therefore, there were no significant impacts anticipated to the native oyster fishery receptor, and therefore it was not considered further.

It was further proposed that the scheme may improve water quality in the bay by effectively confining flood water to the river and reducing the interaction of overland waters with diffuse contamination sources thus potentially decreasing E. coli levels in the receiving waters of Galway Bay.

3) Previous works at Rahasane and Clarin River Impacts on shellfish stocks, impacts on flow and salinity

The selection of the 2009 flood event was specifically made to take into consideration the previous impacts on shellfish stocks, impacts on flow and salinity which were apparent during and immediately after this extreme flood event. The 2009 event is identified as the 'worst case scenario' for the model because - as well as the extra volumes of water - the peak discharge rate was observed during low water and when a flooding tide was acting to reduce this significant volume of fresh water from leaving the bay. These factors meant that the shellfish community were at their most vulnerable.

In comparison to the works undertaken in 1992, the proposed works in the application are much smaller in scale and are, for the most part, maintenance related and will have a much smaller impact. In addition, the application identifies construction methods and mitigation to further reduce the risk of any potential impact (e.g. NIS Section 9.2.2 (Mitigation Measures for the control of Waterborne Pollutants during Construction Activities)). The modelling compares the impact of the new proposals to that of the existing state and indicated only minor alteration to river hydrograph which in turn resulted in minor changes to peak flow rate and change salinity regime and inconsequential impacts on the receiving waters of the bay and shellfish stocks.

4) Water quality: present situation and preventing declassification to C class

Shellfish water classification is undertaken on the basis of water quality and E Coli levels. The purpose of the flood relief scheme is to maintain in-channel flow and convey flood water more efficiently to the receiving Bay. The proposal will reduce overland flow in flood events and has the potential to improve, rather than reduce, water quality.

4 ITEM 4 - PREVIOUS WORK ON THE DUNKELLIN CATCHMENT

4.1 Drainage works carried out on the Dunkellin River upstream of Rinn Bridge in summer 1992 which caused significant short and long term damage to shellfish stocks in the receiving bay. The short term impacts were high levels of silt and organic loading which, when combined with increased flows and lowered salinity levels, led to the complete destruction of shellfish including the wild native oyster fishery in Dunbulcaun Bay (See Clarinbridge Oyster Co-operative section). Drainage works were also carried out on the Clarin River in 2010 which also has significant impacts on the shellfish populations. Drainage works south of Loughrea were also undertaken recently which had the effect of severe canalisation of the river leading to extreme flood & drought events. During the works similar to those proposed, significant oyster mortalities occurred. There is no plan to prevent a similar occurrence during the proposed works.

The long term impacts of these drainage work [Dunkellin river upstream of Rinn bridge 1992] [sic falls] caused alteration in the flow regime and, resulting from this, changes in the speed and pathways transfer.

[The submission goes on to detail the changes in flow regime pre- and post- 1992 drainage works and the resulting effect on hydrological pathways, discharge rates, estuarine salinity regime, siltation rates and the ensuing ecological impacts to shellfish bed. The submission also attributes increased bacterial loading of shellfish beds to increased water flow rates. Increased bacterial loading in shellfish have caused the Clarinbridge/Kinvara Shellfish production area to be demoted from a Class production are to a B Class, negatively impacting the economic viability of the shellfish industry in the area.]

As stated in Section 10.5 (Conclusions) of the NIS: *The timing and sequencing of upstream flood relief scheme measures coupled with mitigation applied with respect to each measure will reduce the potential for silt generation at source and stem the potential for losses.*

Table 9.2.1 of Section 9 (Mitigation Measures) of the NIS shows extensive mitigation measures for each flood alleviation area. Furthermore, as outlined in Section 9.2.2 (Mitigation Measures for the control of Waterborne Pollutants during Construction Activities) of the NIS: *"a detailed design and method statement should be drawn up by the contractor indicating what standard measures will be taken to avoid (i) sediment or soil loss and (ii) cement and hydrocarbon release, associated with all aspects of the construction phase."* Therefore, a detailed construction management plan (CMP) addressing details of construction methods and all recommendations for mitigation presented in the EIS and the NIS will be presented to statutory bodes for consideration prior to commencement of works.

Section 4.5 of the NIS describes the Hydraulic Impact of the Scheme based on modelling of the alteration to flow volumes and velocities. As stated: *"Examination of the channel velocities in the mathematical model (HEC-RAS) for the existing channel and Preferred Scheme scenario shows that expected changes in flow velocities is minimal.* Furthermore: *the time to peak (Tp) is estimated to be reduced from 95 hours to 93 hours. It is expected that implementation of the Preferred Scheme will*

result in a marginal increase (less than 1%) in the rate at which water is discharged to Galway Bay during a similar November 2009 flood event and on balance the volume of flood water passing Killeely Beg Bridge will not change significantly." The potential Impact on Flow Velocities is discussed in full in Appendix A, Section 4.3 of the NIS and the potential impact on Flow Volumes is discussed in full in Appendix A, Section 4.4, of the NIS.

As stated in the Section 4.3.3 (Salinity Modelling) of the NIS: *A comparative study was carried out to examine the impact if any of the scheme on shellfish in the receiving marine waters. The objective of completing this modelling was to conclude if the 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. The modelling demonstrated that, for this event, the salinity levels at the shellfish beds would experience minimal effects due to the scheme.*

The hydraulic modelling demonstrated that even during times of extreme flood (e.g. the 2009 flood 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 pollution 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.

5 ITEM 5 - COMPLIANCE WITH NATIONAL AND EU LEGISLATION

5.1 This deterioration in shellfish quality is at odds with the aims of the Shellfish Waters Directive (EUROPEAN COMMUNITIES (QUALITY OF SHELLFISH WATERS) REGULATIONS 2006) which is to protect or improve shellfish water in order to support life and growth. It is designed to protect the aquatic habitats of bivalve and gastropods molluscs, which include oysters, mussels, cockles, scallops and clams. The Directive requires Member States to designate waters that need protection in order to support shellfish life and growth by setting physical, chemical and microbiological requirement that designated shellfish waters must either comply with or endeavours to improve.

Given that we already have a deterioration in the quality of our shellfish waters, any further deterioration as a results of these works would lead to significant and ongoing fines from the EU.

Section 4.5 of the NIS describes the Hydraulic Impact of the Scheme based on modelling of the alteration to flow volumes and velocities. The hydraulic modelling demonstrated that even during times of extreme flood (e.g. the 2009 flood 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 pollution 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.

5.2 In addition to the shellfish waters directive, the proposed works are in contradiction of the objectives of the Water Framework Directive and the Marine Strategy Framework Directive.

The EU Water Framework Directive (2000/60/EC) requires governments to take a new holistic approach to managing their waters. It applies to river, lakes, groundwater, estuaries and coastal waters. Member States must aim to achieve good status in all waters by 2015 and must ensure that status does not deteriorate in any waters.

The Marine Strategy Framework Directive has similar aims to the WFD except for it refers to the marine environment and the timeframe for achieving the objective is 2020. It is unlikely that this project is compatible with the aim of any of these directives.

The scheme was designed using a holistic approach to managing the river waters, with review of the soils, geology and hydrogeology and consideration to the coastal interaction of the predicted output. The scheme is not expected to significantly deteriorate any waters nor impede on the aims of the EU Water Framework Directive or the Marine Strategy Framework Directive.

6 ITEM 6 – PREVIOUS WORKS IMPACTS

6.1 This [Clarinbridge shellfish] industry has already been seriously impacted by previous works on the Dunkellin and Clarin River. These impacts are:

1) Decreased salinity in the estuary
2) Increased siltation on oyster beds
3) Increased microbial pollutant transfer

1) As stated in the Section 4.3.3 (Salinity Modelling) of the NIS: "*A comparative study was carried out to examine the impact if any of the scheme on shellfish in the receiving marine waters. The objective of completing this modelling was to conclude if the 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. The modelling demonstrated that, for this event, the salinity levels at the shellfish beds would experience minimal effects due to the scheme.*"

2) As stated in Section 10.5 (Conclusions) of the NIS: "*The timing and sequencing of upstream flood relief scheme measures coupled with mitigation applied with respect to each measure will reduce the potential for silt generation at source and stem the potential for losses.*"

Table 9.2.1 of Section 9 (Mitigation Measures) of the NIS shows extensive mitigation measures for each flood alleviation area. Furthermore, as outlined in Section 9.2.2 (Mitigation Measures for the control of Waterborne Pollutants during Construction Activities) of the NIS: "*a detailed design and method statement should be drawn up by the contractor indicating what standard measures will be taken to avoid (i) sediment or soil loss and (ii) cement and hydrocarbon release, associated with all aspects of the construction phase.*" Therefore, a detailed construction management plan (CMP) addressing details of construction methods and all recommendations for mitigation presented in the EIS and the NIS will be presented to statutory bodes for consideration prior to commencement of works.

3) Section 4.5 of the NIS describes the Hydraulic Impact of the Scheme based on modelling of the alteration to flow volumes and velocities. As stated: *Examination of the channel velocities in the mathematical model (HEC-RAS) for the existing channel and Preferred Scheme scenario shows that expected changes in flow velocities is minimal.* Furthermore: *the time to peak (Tp) is estimated to be reduced from 95 hours to 93 hours. It is expected that implementation of the Preferred Scheme will result in a marginal increase (less than 1%) in the rate at which water is discharged to Galway Bay during a similar November 2009 flood event and on balance the volume of flood water passing Killeely Beg Bridge will not change significantly.* The potential Impact on Flow Velocities is discussed in full in Appendix A, Section 4.3 of the NIS and the potential impact on Flow Volumes is discussed in full in Appendix A, Section 4.4, of the NIS. The hydraulic modelling demonstrated that even during times of extreme flood (e.g. the 2009 flood 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 pollution 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.

7 ITEM 7 – SALINITY MODEL

7.1 The submission accompanying the application (salinity model) was deficient in terms of its content, accuracy and scope.

Comment 7.1 in part relates to a further technical assessment and submission made by Clarinbridge Oyster Co-op and Michael Kelly Shellfish Ltd in relation to a report conducted by Numerics Warehouse (refer to RPS response reference: MGE0260RP0019 included with the An Bord Pleanala RFI submission) .

The model simulations for the flow regime within Galway Bay were completed using a 3-dimensional MIKE3 HD flexible mesh flow model which extended to Black Head in the west. The model was based on a flexible mesh approach allowing the representation of the area as a combination of triangular and quadrangular cells. The use of flexible mesh technology enables the resolution of the model to be varied spatially over the model domain thus allowing very fine grid resolution to be incorporated as necessary. The use of the MIKE 3 flexible mesh model permits the incorporation of three dimensional effects i.e. density dominated plume behaviour and stratification. For this study the model was deployed with the vertical water column split into three layers, equally distributed over the full water depth. The boundary conditions used for this study were water levels applied at the entrance to Galway Bay and four significant sources of fresh water were included. The only parameter to be varied between the two modelled scenarios was the discharge rate from the Kilcolgan River, which allowed the impact of the flood alleviation scheme to be determined. The validity of this modelling approach was agreed under auditing by NUI Galway.

The technical issues highlighted by Numerics Workshop in their review of the numerical model (commissioned by Clarinbridge Oyster Co-op and Michael Kelly Shellfish Ltd) have been responded to fully in the following accompanying response report; Response to Numerics Warehouse (on behalf of Michael Kelly Shellfish Ltd) RPS submission Reference: MGE0260RP0019.

8 ITEM 8 - COSTS

8.1 The proposed works will exacerbate the already poor condition of the estuarine environment with significant costs in term of

1) ***Shellfish mortalities***
2) ***Shellfish closures***
3) ***Depuration and relaying costs***

Following the reasoning outlined in response to Item 1, Item 4 and Item 8 in relation to flow characteristics, siltation, salinity, and pollutant transfer, there are no significant impacts predicted on shellfish in the estuarine environment. It is theefore not expected to incur significant costs in term of shellfish mortalities, shellfish closures and depuration and relaying.

9 ITEM 9 – THE CLARINBRIDGE BRAND

9.1 The potential to grow the Clarinbridge brand in both shellfish and tourism [sic (i.e.] will be detrimentally affected by any deterioration in the shellfish ecosystem.

Following the reasoning outlined in response to Item 1, Item 4 and Item 8 in relation to flow characteristics, siltation, salinity, and pollutant transfer, there are no significant impacts predicted on shellfish.

10 ITEM 10 – DIRECTIVE COMPLIANCE

10.1 The proposed works are not compliant with the objectives of:

1) *The Shellfish Water Directive*
2) *The Water Framework Directive*
3) *The Marine Strategy Framework Directive*
4) *The EU Habitats Directive*

The scheme was designed using a holistic approach to managing the river waters, with review of the soils, geology and hydrogeology and consideration to the coastal interaction of the predicted output. The scheme is not expected to significantly deteriorate any waters nor impede on the aims of the listed Directives.