
From: Kieran Doherty
Sent: Wednesday 1 March 2017 12:19
To: Lianna Slowey
Subject: FW: 7476 Galway Harbour Extension, Compensatory Measures Report V2.2 280217 .
Your Ref. 61.PA0033
Attachments: 7476 Aquafact Compensatory Report V2.2 280217.pdf

Lianna,

For surfbord please.

K

From: John P Kelly (Galway) [mailto:John.Kelly@tobin.ie]
Sent: Tuesday 28 February 2017 18:52
To: Kieran Doherty <K.Doherty@pleanala.ie>
Subject: 7476 Galway Harbour Extension, Compensatory Measures Report V2.2 280217 . Your Ref. 61.PA0033

Kieran,

Please find attached copy of the Compensatory Report V2.2. 280217.

This was discussed in draft at a meeting with NPWS (Ciaran O Keeffe and David Lyons) and Galway Harbour Design Team (Brendan O Connor and John Kelly) at the NPWS offices at Ely Place on 21/02/17.

It was agreed that the report, as now attached, would be polished and forwarded as the completed copy to NPWS and to ABP.

NPWS would need to have others to review it. Subject to such review, it was considered that V2.2 was working in the right direction.

Further biparty work / meeting may be appropriate to progress the Compensatory details qualitatively and quantitatively and how Longevity , Security and Ability to review and adjust the proposed management could be achieved.

We will be glad to obtain your feedback and that of your consultant on this document, and that it is moving in the right direction.

That will allow us continue the recording of the "tight cooperation" .

The requisite on site surveys can then be agreed and scheduled with the Applicant and the Landowners.

That will in turn allow progress to the stage of agreement of firm specific Compensatory Proposals with the respective parties which we then look forward to formally presenting to ABP accordingly.

Thank you.

John.

John P Kelly B.E. M.I.E.I.
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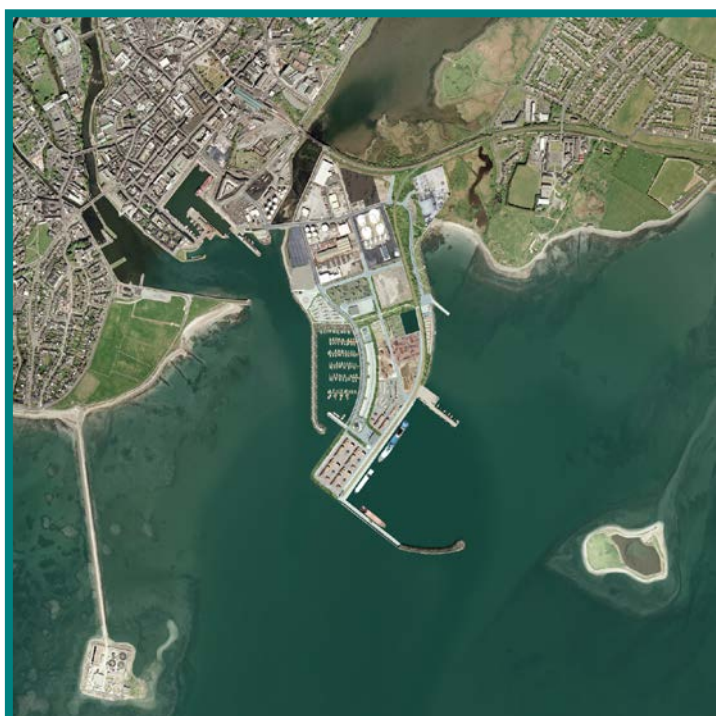
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Galway Harbour Company

Galway Harbour Extension



**Proposed Compensatory Measures (Version 2.2) in relation to the
proposed Galway Harbour Extension,**

An Bórd Pleanála (Ref: 61.PA 0033)

February 2017



DOCUMENT AMENDMENT RECORD

Client:	Galway Harbour Company
Project:	Galway Harbour Extension
Title:	Proposed Compensatory Measures (Version 2.2)

PROJECT NUMBER: 7476				DOCUMENT REF: Request for Further Information			
A	February 2017 Meeting	BOC	15.2.17	BOC	15.2.17	JPK	15.2.17
Revision	Description & Rationale	Originated	Date	Checked	Date	Authorised	Date
AQUAFAC International Services Ltd							

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Appendix 2 – EU Commission Opinion (copy) – Project Mainport Rotterdam, The Netherlands, 2003.

1 INTRODUCTION

1.1 BACKGROUND

This is the third report on proposed compensatory measures (V2.2) for habitat loss arising from both the Galway Harbour Extension (GHE) project and the Galway Harbour Enterprise Park (GHEP). It follows a request from An Bord Pleanála (ABP) dated 29/9/2015 for such a report (V1 which was submitted on 24/11/15) and the 15 page responding document from NPWS dated 27/5/2016 and minutes of the meeting between ABP and NPWS dated 3/08/2016 on that first report (V.1).

V2.1 was submitted on 9/12/16 and was discussed at a tripartite meeting with An Bord Pleanála (ABP), National Parks and Wildlife (NPWS) and Galway Harbour Commissioners personnel and its consultants on 13/12/16. The minutes of that meeting were issued by ABP on 31/1/17.

This February 2017 report V 2.2 sets out the proposed compensation plan.

The approach to the identification of compensatory measures involved firstly identifying potential replacement habitats for those lost, followed by the identification of measures which, together with the replacement designated habitats, are considered to constitute compensatory measures.

In the first report (AQUAFACT V1, 24/11/2015), the overall approach to the identification of compensatory measures considered the request from ABP together with the Board's Statement of Appropriate Assessment including the report of the Board's specialist marine ecological consultant, Dr. Bastreri of Thompson Unicmarine. The identification of compensatory measures was informed by the EU Guidance on Article 6(4) and a summary of the relevant provisions/criteria from this guidance document was presented in that (AQUAFACT, V.1, 2015) report.

Also, in that report (AQUAFACT, V.1, 2015), the habitat types and areas that were lost by the development of the GHEP and those that will be lost if the GHE project is given planning permission, were presented. That report also identified potential replacement habitats similar to those lost and options for the provision of such replacement habitats. These included the engineering of replacement habitats and alternatively, the identification of similar existing habitats to those lost for subsequent designation. Locations both within and outside Galway Bay cSAC were assessed in that same report.

The identification of compensatory measures follows the criteria set out in the EU document on Article 6 (4) and these criteria were applied to the 3 relevant habitat types *i.e.* intertidal habitats (mud and sand flats and reef), stony bank and saltmarsh.

1.2 AN BORD PLEANÁLA FURTHER INFORMATION REQUEST

The Board confirmed that it had completed an appropriate assessment of the proposed GHE project in accordance with Article 6(3) of the Habitats Directive and concluded that the approval of the proposed development could not be considered under Article 6 (3) given that a significant adverse impact on the integrity of the Galway Bay cSAC would occur.

The Board identified the impacts on the integrity of the European Site as follows:

- The direct and permanent loss of a complex of fucoid-dominated reef habitat [1170] and mud and sand flat habitat [1140] in Galway Bay cSAC that will result in the conservation objectives for these features not being met. The direct and permanent loss of a habitat, which is part of the conservation objectives of the site, is in general, a significant adverse effect on the integrity of the site.
- The loss of perennial vegetation of stony banks [1220] due to the sheltering effect of the harbour extension will also have significant adverse effect on the integrity of the cSAC.

During the development of the Galway Harbour Enterprise Park (GHEP), an area of salt marsh was lost as part of the works. For this reason Atlantic salt meadow (*Glauco-Puccinellietalia maritimae*) [1330] has been added to the above two habitats.

None of these 3 habitats are listed as Priority Habitats in the EU Habitats Directive (EU 1992).

Compensation areas for loss of qualifying interest (QI) habitats in the Galway Bay SAC due the proposed expansion of Galway Port and the development of the GHEP are as follows:

GHE/ GHEP

Intertidal habitats (mud and sand flat and reefs):14.51 ha

Stony bank: 0.63 ha

GHEP

Salt marsh: 7.39 ha.

ABP invited Galway Harbour Company to confirm that it wished to have the project considered for approval under Article 6 (4) of the Directive and this confirmation was issued to ABP on 1st October, 2015.

The letter of 29.09.2015 states that the Board proposes that the development of compensation measures be addressed in two phases:

Phase 1 – *“the proposals for compensatory measures should be set out by Galway Harbour Company for initial consideration. Galway Harbour Company was advised to liaise with the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht in this regard”*. As advised above, informal meetings were held in NPWS offices on 21/10/2016 and 30/11/2016. A further meeting is planned for 21/2/2017.

Phase 2 – *“pending the outcome of Phase 1, the applicant will be afforded further time to develop the compensatory measures in more detail leading to submission of a completed proposal for consideration by the Board”*.

ABP stipulated that there should be liaison with the NPWS to enable “close co-operation” between the Galway Harbour Company and the NPWS as encouraged in the Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC, published by the European Commission (DG Environment).

This present document has progressed the proposals on that basis and in light of NPWS (27/5/2016) and ABP (3/6/2016; 31//17) feedback and meetings referenced above and includes reference to 2 other IROPI decisions.

1.3 STATEMENT OF APPROPRIATE ASSESSMENT

In its Statement of Appropriate Assessment, ABP noted that it had regard to the documentation submitted by the applicant which included a comprehensive list of Natura 2000 sites potentially coming within the influence of the proposed port extension. ABP has also advised that it has agreed with the screening assessment and conclusion reached in the report of the

specialist ecological consultant (Dr. Bastreri of Thomson Unicomarine) appointed to assist the Board's Inspector) that the following sites:

- Galway Bay Complex c SAC (site code 000268),
- Inner Galway Bay SPA (site code 004031) and
- Lough Corrib c SAC (Site code 000297)

are the relevant European sites for which there is a likelihood of significant effects, requiring a 'Stage II' assessment¹ and that other sites can be discounted from further consideration, owing to the separation distances involved and lack any likelihood of significant effects arising.

1.4 PROFESSIONAL COMPETENCY OF THE AUTHOR

This latest report was prepared by Dr. Brendan O'Connor of AQUAFAC T who also prepared the previous reports. Dr. O'Connor has been working in Galway Bay since 1972 as a researcher in NUI Galway and following that since the foundation of AQUAFAC T in 1986. He is therefore very familiar with the different types of habitats that occur throughout inner Galway Bay. Dr. O'Connor and AQUAFAC T has been a member of the project team on the proposed Galway Harbour Extension since the inception of the project and has contributed to the project EIS, NIS and other application documents.

¹ Stage II requirement was addressed by NIS and accepted by ABP

2 EU GUIDANCE ON COMPENSATORY MEASURES

2.1 GUIDANCE CRITERIA

2.1.1

ABP in its request for Further Information of the 29th September, 2015 has referred the applicant to the guidance in relation to compensatory measures set out in the European Commission (DG Environment) Guidance Document entitled: “Guidance document on Article 6 (4) of the ‘Habitats Directive’ 92/43/EEC” (2007/2012), as may be updated.

2.1.2

This EU guidance notes on page 10, bullet 2, that “*compensation measures sensu stricto are independent of the project (including any associated mitigation measures). They are intended to offset the negative effects of the plan or project so that the overall ecological coherence of the Natura 2000 network is maintained*”.

2.1.3

It also states (page 11, line 2) that compensatory measures “*should be considered only after having ascertained a negative impact on the integrity of a Natura 2000 site*”. Compensation measures are aimed at offsetting the negative impact of a project and to provide compensation corresponding precisely to the negative effects on the species or habitats concerned (page 11, text box).

2.1.4

The EU document states (page 13, text box, para. 1) that “*in order to ensure the overall coherence of Natura 2000, the compensatory measures proposed for a project should therefore*

- a) *address, in comparable proportions, the habitats and species negatively affected;*
- b) *provide functions comparable to those which had justified the selection criteria of the original site, particularly regarding the adequate geographic distribution.”*

2.1.5

It also notes (page 13, text box, para. 2) that “*the distance between the original site and the place of the compensatory measures is not necessarily an obstacle as long as it does not affect the functionality of the site, its role in geographical distribution and the reasons for its initial selection.*”

2.1.6

On page 14, para. 2 of the document, it states that compensation “*could, similarly, consist of the recreation of a comparable habitat or the biological improvement of substandard habitat within an*

existing designated site, or even the addition to the Natura 2000 network of a new site of comparable quality to the original site” and this is reiterated on the same page, para.3, final bullet, where the Guidance Document notes that measures ... can consist of ...”proposing a new site under the Habitats and Birds Directive”.

2.1.7

Further on in the document (p.18, para. 3), it notes that “...locating compensation within or nearby the Natura 2000 site concerned in a location showing suitable conditions for the measures to be successful seems the most preferred option”.

2.2 GUIDING PRICIPALS

The criteria used to identify compensation measures for the GHE project follow the principles set out in the Commission’s Guidance on Article 6 (4) (see pages 15 – 20), which are:

2.2.1 Targeted Compensation

Having identified the habitats and extent of the damage that the project or plan will cause, the compensation measures must specifically address such effects so that the elements of integrity contributing to the overall coherence of the Natura 2000 network are preserved in the long term. Measures must clearly refer to the structural and functional aspects of the site integrity and the related types of habitat and species populations that are affected.

2.2.2 Effective Compensation

Compensation measures must be feasible and operational in reinstating the ecological conditions needed to ensure the overall coherence of the Natura 2000 network.

2.2.3 Technical Feasibility of the proposed compensation

To overcome intrinsic difficulties associated with reinstatement of ecological conditions, compensatory measures must be designed following scientific criteria and evaluation in accordance with best scientific knowledge and taking into account specific requirements of the ecological features to be reinstated.

2.2.4 Extent of Compensation

Compensation ratios are set on a case-by-case basis and take account of the areas that will be lost by the plan or project. At minimum, compensation should be based on the areas lost by the project.

The EU Guidance document on 6 (4) (p. 18) states...”*There is wide acknowledgement that ratios should be generally well above 1:1. Thus, compensation ratios of 1:1 or below should only be considered when it is demonstrated that with such an extent, the measures will be 100% effective*

in reinstating structure and functionality within a short period of time (e.g. without compromising the preservation of the habitats or the populations of key species likely to be affected by the plan or project)”.

2.2.5 Location of Compensatory Measures

The location of compensatory measure required to be as per paragraphs 2.1.5 – 2.1.7 above which are extracts of the EU Guidance Document on 6 (4) *i.e.* the distance between the original site and the place of compensatory measured is not necessarily an obstacle, a new site may be added to the Natura 2000 network or locating compensation within or nearby to the Natura site are all given as options.

2.2.6 Timing of Compensation

The EU Guidance on 6 (4) notes that a site must not be irreversibly affected *i.e. commencement of development works* before compensation is in place² and that the results of the compensation should be effective at the time damage occurs. If this cannot be achieved, then overcompensation would be required for the interim losses. Time lags might only be admissible when it is ascertained that they would not compromise the objective of “no net losses” to the overall coherence of the Natura 2000 network. Time lags are not permitted if they lead to population losses for any species protected in the site under Annex II of Directive 92/43/EEC or Annex I of Directive 79/409/EEC requiring particularly attention when it entails priority species.

The purpose and timing of the compensatory measures proposed is to ensure that all necessary provisions, technical, legal or financial, necessary to implement the compensatory measures must be completed before the plan or project implementation starts, so as to prevent any unforeseen delays that may hinder the effectiveness of the measures³.

2.2.7 Long-term Implementation

Compensatory measures being proposed must take into account a number of different aspects of what the Commission regards as long term implementation and these include:

- devising binding enforcement methods at the National level aimed to ensure the full implementation and effectiveness of compensation
- devising the necessary legal means in case land or rights purchase is deemed essential for the effective implementation of the compensation and
- establishing monitoring programmes for the life of the project, including objectives, responsible bodies and requirements on reporting to the Commission.

² See section 1.5.6 of the Guidance Document

³ As required under Section 1.5.6 of the Guidance Document.

3 IROPI PRECEDENTS

3.1 NIED TGV COMPENSATION, 2004 EU COMMISSION OPINION C (2004) 3460 (9/9/2004). SALT MEADOW RESERVE PRECEDENT

As part of the process in formulating a compensation package for the Galway Harbour Extension project, a review of previous successful compensatory plans throughout the EU was undertaken. To date, 20 such compensation plans in the EU (excluding examples from the U.K.) have been agreed and an example from Eastern France in relation to the construction of a section of railway track and another from the port of Rotterdam in relation to infilling of the sea are of relevance.

Regarding the French example, proposed compensatory measures for the loss of ca 3.75 ha of salt meadow and subhalophytic meadow (which are listed as a PRIORITY habitats in the EU Habitats Directive) in the Nied Valley in Eastern France that arose due to the construction of a new section of high speed rail (TGV) connecting France to Germany (EU, 2004) (see Appendix 1). There were three different approaches as follow (quoted verbatim from EU (2004)):

1. Preservation of remaining 31 ha of salt meadows near the line by means of a management agreement between the contracting authority and a nature protection body. The latter was to draw up individual agreements with each of the farmers concerned.
2. Restoration of the site and re-establishment of salt meadows. A restoration trial had been carried out in 2003 on 20 ha of land and involved preparation of the site, sowing of local seeds and implementation of scientific monitoring over 5 years focussing on salinity and vegetation. It was planned to fill in drainage ditches so as to better preserve the special character of these areas.
3. Preservation of Nied Valley salt meadows not adjacent to the TGV line but included in the Natura site. Mapping of the natural habitats in the area proposed for the Natura 2000 network in the Nied Valley carried out by the University of Metz and financed by the contracting authority (RFF) identified 6 halophytic sites in the valley. A site at Aubécourt, which was the most remarkable, had been selected for RFF to purchase 3.5 ha of land for heritage management via an agreement concluded with the specialised body already approached to manage and preserve the 31 ha.

3.2 PROJECT MAINPORT ROTTERDAM, 2003.EU COMMISSION OPINION C (2003) 1308 24/04/2003) MARINE RESERVE PRECEDENT.

Project Mainport Rotterdam is a plan to extend the port of Rotterdam consisting of a combination of

- better use of space available in the existing harbour area
- reclamation of 2500ha from the sea (Maasvlakte 2) and
- creation of a new area of 750ha as a nature reserve and recreation areas.

This westward extension into the North Sea is expected to significantly affect a priority habitat (Grey Dunes, area lost 19.5 ha), 2 non-priority habitats (White Dunes, area lost 23 ha and Sandbanks which are not covered by seawater at low tide, area lost 3,125 ha), one plant species (the fen orchid, *Liparis loeselii*) and two bird species (Slavonian grebe, *Podiceps auritus* and Scaup, *Aythya marila*).

The compensation for these losses included

- creation of a new area of Grey Dune, 100ha in size,
- creation of 23 ha of White Dune,
- creation of an intertidal marine reserve 31,250 ha in size in the SPA Voordelta. This will not involve creation of new habitat but will entail measures that reduce disturbance of the sea bed such as restrictions on fisheries allowing the creation of better conditions for foraging birds such as Slavonian grebe and Scaup and
- creation of 10 ha of humid dune slack for colonisation by the fen orchid.

The EU Commission held the view that *“this land reclamation project could be executed for reasons of overriding public interest on the condition that all necessary compensation measures to ensure the overall protection of the coherence of Natura 2000 be taken in due time.”* It went on to add that it *“presumes that the compensatory measures will be implemented and monitored as described by the Dutch Authorities”* and that *“the results of the accompanying monitoring programmes regarding Natura 2000 are taken into account in the sense that they may, if need be, lead to appropriate rectifications in project design or to additional compensation and mitigation measures”*.

These two examples of IROPI projects that included priority habitats and that were accepted by the Commission are of considerable relevance to developing a compensation plan for loss of non-priority habitats: in the Nied example, a simple management plan for remaining areas of the

priority habitat “salt meadow” proved acceptable to the Commission. In relation to the loss of intertidal habitat in the Rotterdam case, designation of an area as a marine reserve was accepted by the Commission.

4 PROPOSED COMPENSATION PLAN

4.1 GALWAY BAY DESIGNATED AREA STUDY

The proposed compensation plan for habitat loss in the Galway Bay cSAC follows closely along the lines of the 2 previously mentioned successful IROPI cases described above in Section 3. It must be noted that both these cases involved priority habitats whereas no priority habitats will be lost in the proposed Galway Harbour extension. The plan focusses on the Tawin headland in the eastern central part of the Galway Bay cSAC where all three habitat types *i.e.* stony bank, saltmarsh and intertidal muds, sand and reefs occur.

The NPWS advice on 27/5/2016 in the form of its submission to An Bord Pleanála was to study the area in the eastern part of inner Galway Bay at Renville and Tawin. A desk based study was undertaken to review existing literature (McCorry, 2007; McCorry and Ryle, 2009; NPWS, 2013) on the distribution of the 3 habitats requiring compensation in the Galway Bay area including the North shore of County Clare. The results of this desk based study showed that the eastern part of Galway Bay contains the largest areas of these habitats.

The field survey work undertaken by AQUAFAC commenced at Oranmore and extended southwards through Renville, Ardfry and terminating at the south eastern corner of Tawin. The survey effort comprised walking the shoreline to record stony banks and areas of salt marsh. The habitats were then mapped in general nature for future detailed study (see Figure 1 below).



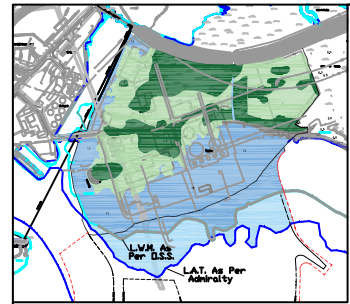
Figure 1 - Overall Study Area

Based on the findings of these initial field surveys, which showed that extensive areas of saltmarsh, stony bank and intertidal reef / mudflat / sandflat were present in Tawin (see Figure 2), this area was selected as the area for the proposed management plan based on literature on the NPWS website (NPWS, 2006; McCorry, 2007; McCorry and Ryle, 2009; NPWS, 2013), published papers and information held in-house in AQUAFAC (see Appendix 2 for more detailed mapping)

See Figure 2

Figure 2 Tawin peninsula showing locations and areas of different habitats including Stony Bank, Saltmarsh and Intertidal habitats.

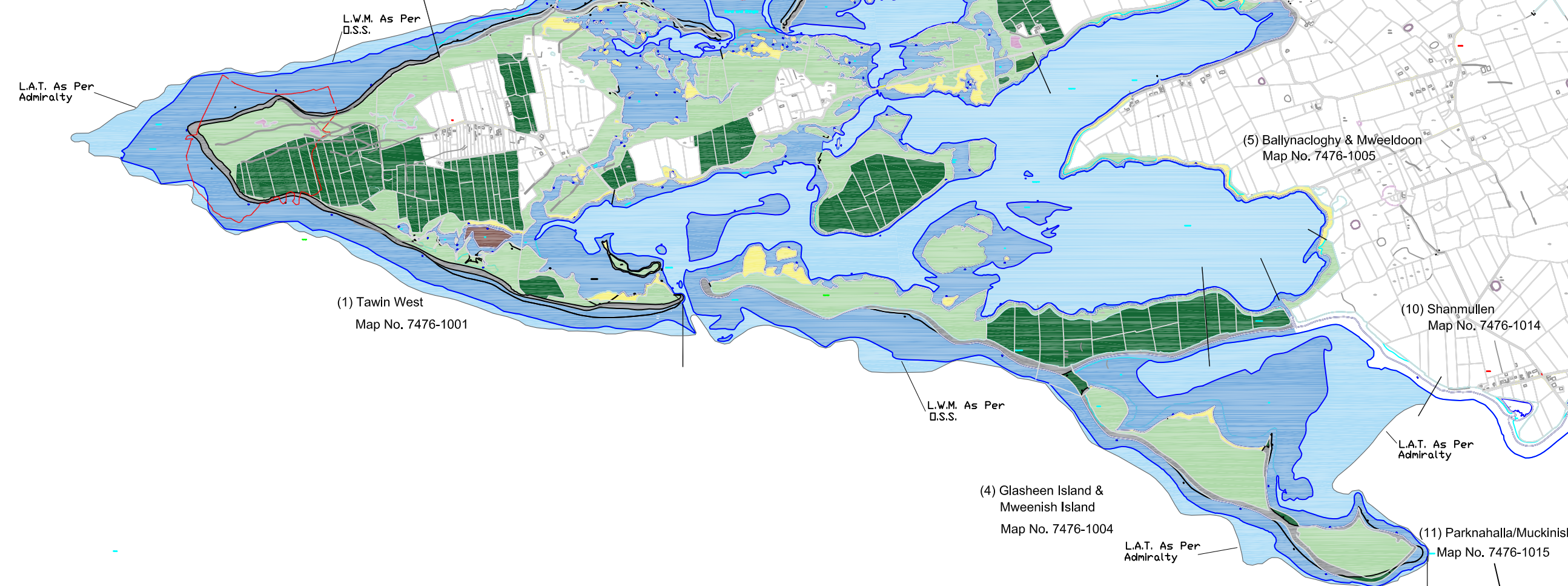
Proposed Harbour 1/20,000



Tawin, Glasheen and Mweenish

Gain		Loss	
Agricultural Land	0.97 ha	5.55 ha	
Lagoon	25.33 ha	0.63 ha	8.02 ha
Stony Bank/Beach	136.33 ha	7.39 ha	
Salt Marsh/Grassland Mosaic	1.27 ha	10.70 ha	14.51 ha
Intertidal Mud Flat	18.11 ha	3.81 ha	
Beach/Mud	212.29 ha		
Intertidal DS	279.23 ha		
Intertidal Admiralty			
Total = 673.53 ha		Total = 22.53 ha	

SCALE: 1/20,000



Rev	Date	Description	By	Chkd.
	20/02/17	Admiralty Added	MK	BH
A	07/12/16	Preliminary Design	MK	BR

Client:
GALWAY HARBOUR COMPANY

Project:
GALWAY HARBOUR EXTENSION

Title:
**Compensatory Lands
Tawin, Glasheen & Mweenish
Preliminary
Land Type Assessment**

Scale @ A1: 10,000 @ A3: 1:20,000

Prepared by:	Checked:	Date:
MK	BR	DEC 2016
Project Director: J.P. KELLY		
Drawing Status: Compensatory Proposals		

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4.2 TAWIN - EXISTING CONDITION

It is proposed to develop a management plan for parts of the Tawin area (see map above) of Inner Galway Bay (within the boundary of the cSAC) where stony bank, salt marsh and intertidal complexes of fucoid-dominated reef, sand and mud flat habitats occur to bring about the biological improvement of substandard areas of these habitats which in places have been described as being of “*unfavourable/inadequate*” status in a report commissioned by National Parks and Wildlife (NPWS Saltmarsh Monitoring Programme Project, 2006, Tawin Island; attached as Appendix 3). There are several references in this report to pressures on salt marsh and stony bank habitats arising from a variety of agriculture pressures such as grazing (p. 7, p. 8, p. 11, p. 12, p.17 and p. 19), poaching by cattle (p.9, p.11, p. 12, p. 19), grazing tracks (p.12), dumping (p. 13), excavation of stones and gravel (p. 14).

On p.14 of this report, the overall status of this area is described as “*unfavourable/inadequate*” while on p.17 under the heading *Habitat structure and function* for saltmarsh, this is also described as “*unfavourable/inadequate*” and on p.19 under the heading *Future prospects*, this too is described as “*unfavourable/inadequate*”.

On p.21 under the heading *Management Recommendations* at the end of this report, the authors state “*In some specific areas, the grazing intensity should be reduced*” and go on to note that “*Removing grazing as an impact from a small part of the site would also be beneficial as this would increase the sward diversity particularly in the middle and lower marsh areas, which are generally preferentially grazed and so are even affected at low stocking densities*”.

4.3 COMPENSATORY MEASURES - MANAGEMENT PROPOSALS

Ecological restoration as a form of compensation is specifically described in the EU (2007) Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC and is shown in 2.1.6 (p.6) above *i.e. “biological improvement of substandard habitat within an existing designated site”*.

4.3.1 *Stony Bank and Saltmarsh*

In relation to the proposed management plan for Tawin, this will include the following 17 components:

1. Manage the salt marsh and stony bank habitats that are subject to agreements / possible purchase in accordance with organic principles,
2. Control (in saltmarsh) and curtail (in stony bank) grazing levels by horses, cattle and sheep to give the level of seasonal grazing to best suit the plant species of the habitat and in saltmarsh to eliminate poaching,

3. Cease fertilizer and slurry spreading in areas of saltmarsh and eliminate dunging by animal fencing in stony bank habitats,
4. Prevention of the use of herbicides within or close to the three habitat types,
5. Livestock using the lands are to be outside of the withdrawal period for medicines and anthelmintics,
6. Prevent removal of cobbles,
7. Prevent the construction of any drainage channels,
8. Control of access by tractors to the three habitats,
9. Eliminate the use of round feeders/winter feeding and related poaching and rutting of lands at feeding and gate sites,
10. Prevent the construction of any further sea defence works or dumping of materials to act as a sea defence,
11. Cease repair of any sea defence works to allow for erosion/ingress by the sea,
12. Regular removal of flotsam and jetsam and other refuse,
13. Annual biological surveys of the habitats to document any changes in their extent and their characterising species,
14. In the light of the results of the annual biological surveys, adjust/modify the management plan,
15. Commission annual, independent audit of the progress of the management plan,
16. In the light of the results of this independent audit, adjust/modify the management plan and
17. Erection of signage including drawings at chosen vantage points demonstrating what the project comprises and what species are contained within each habitat.

Within the Tawin peninsula, a total of 25ha of stony bank habitat and a total of 136.33ha of saltmarsh mosaic has been mapped. In relation to areas of these habitats lost or that will be lost as part of the Galway Harbour Extension *i.e.* 0.63ha of stony bank and 7.39ha of saltmarsh, the relative ratios are high.

4.3.2 Intertidal sands, muds and furoid-dominated reef complex

This complex of three different habitat types are found throughout the Tawin peninsula and covers an area of *ca* 500ha. Both the historic loss and the future loss of this habitat totals to 14.51ha. As for the Rotterdam example, it is planned to establish a marine reserve that will include all the intertidal habitat areas of the Tawin peninsula.

A relevant case of the creation of a marine reserve is Flamborough Head in the U.K. In 2010, a portion of Flamborough Head marine protected area was designated as the first UK marine reserve in the North Sea. Collaborative efforts led by the local fishing community helped ensure

that this area is fully protected. The Flamborough Head region was designated as a Special Area of Conservation under European legislation due to its extensive coastal chalk cliffs and its rich subtidal biodiversity. Flamborough Head is one of the northernmost extensions of chalk coast in Britain and harbours a diverse set of marine species. Given that this is an area of conservation concern and an important region for numerous economic activities—including commercial and recreational fisheries, tourism, research, wind energy and shipping—a zoning scheme that includes both no-take and multi-use zones is critical to management in Flamborough Head.

Designing the Flamborough Head marine reserve was complex due to the diversity of economic uses occurring in the MPA. Through a collaborative process, fishermen, scientists and policy makers determined the size and location of the no-take zone by balancing the closed area with the other uses in the MPA. With help from the local fishing industry, scientific research and monitoring are now underway to assess the effects of protection on the diverse species and habitats at Flamborough Head.

The zoning of the Flamborough Head MPA is an example of marine spatial planning, which can be an effective way to integrate the ecological benefits of reserves and the value of commercial and recreational activities. The management of multiple uses in the Flamborough Head region aims to protect a healthy ecosystem inside the reserve while also providing adjacent areas for sustainable fishing and recreation.

4.3.3 Control of non-native species

An additional and separate part of the management plan relating to the complex of intertidal reef, mud flat and sand flat habitat is to develop a programme to eradicate the non-native tunicate taxon *Didemnum* at 2 aquaculture sites (Parknahalla, east side of Kinvarra Bay and Shanmullen Channel, Tawin South) within the Galway Bay cSAC.

Dr. Tasman Crowe of the Department of Zoology in T.C.D. directed a Ph.D. project on successfully controlling *Didemnum* in oyster farms in Westport Bay (which also is a cSAC) by regularly spraying the tunicate with vinegar. Dr. Crowe will act as a consultant in this part of the proposed range of management options.

4.3.4 Compliance with EU Guidance on 6(4).

This proposed suite of compensatory measures are in line with the range of options and recommendations contained in the EU Guidance document (EU 2007).

This suite of plans for the 3 **non-priority** habitats that require compensation due to impacts arising from the proposed expansion of the proposed Galway Harbour Expansion relative to the respective scales of the project, far outweighs those proposed by the developers for the TGV line and the infilling of marine habitats at Rotterdam for **priority** habitats and that were accepted by the Commission.

5 NEXT STEPS

For this package of management plans to be developed to the phase 2 stage as per ABP 29/9/2015, detailed surveys by agreed suitably qualified botanists and zoologists are required. These will include initial site surveys by the relevant specialist to qualitatively assess the Tawin area in terms of site suitability for the habitats in question.

This will then allow for the selection of the most suitable areas for quantitative survey work to be carried out at a suitable time of the year to document the plant and animal species present in each habitat. This will document the existing pressures and impacts from land and aquatic use, on lands where the owners will have agreed that the enhanced management plans proposed would be acceptable to them.

Confirmation in principal is required that the package of measures presented above forms an acceptable method to compensate for the loss of the 3 habitats in question arising on foot of the Galway Harbour Extension and Galway Harbour Enterprise Park developments. This will then allow the further qualitative and quantitative studies to progress as soon as possible.

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