Galway Harbour Company

Galway Harbour Extension

Compensatory Measures Report

An Bord Pleanála (Ref: 61.PA 0033)

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1 EXECUTIVE SUMMARY

1.1 GALWAY HARBOUR EXTENSION / IMPACT ON GALWAY BAY CSAC

The proposed Galway Harbour Extension (GHE) into deeper water to the south of the existing port will occupy a part of the Galway Bay Complex cSAC.

An Bord Pleanála concluded by letter dated 29.09.15 that the impacts on the integrity of the European site will cause the loss of an area of:-

i) 5.93 ha of Intertidal habitat [1170] Fucoid Dominated Reef habitat and [1140] Mud and Sand Flat habitat to suffer "Direct and Permanent Loss" and ,

ii) 0.35 ha of Stony Bank [1220] to suffer "the loss of perennial vegetation of Stony Banks due to the sheltering effect of the GHE".

These Intertidal and Stony Bank habitats are not listed as Priority habitats in the EU "Habitats" Directive.

The proposed GHE has been mitigated by design so that the alternative put forward for approval is the least damaging for habitats, for species and for the integrity of the Natura 2000 sites both during its construction and from its future existence and use. All possible alternatives were considered to avoid impact on the designated sites without dictation by economic cost constraint. The development proposed herein is the least damaging for habitats, for species and for the integrity of the Natura 2000 site, regardless of economic considerations, and no other feasible alternative exists that would not adversely affect the integrity of the site. There are Imperative Reasons of Overriding Public Interest (IROPI) including "*those of a social or economic nature*". This report proposes that all the compensatory measures, necessary to ensure that the overall coherence of Natura 2000 is protected will be taken, as stated herein.

1.2 ARTICLE 6(4) AND DEVELOPMENT OF COMPENSATORY MEASURES

Having completed an Appropriate Assessment, ABP concluded that approval of the proposed development could not be considered under Article 6(3) of the "Habitats" Directive, given that a significant adverse impact on the integrity of the Galway Bay Complex cSAC would occur. The Board invited Galway Harbour Company (GHC) to confirm that it wished the project to be considered for approval under Article 6(4) of the Directive. GHC confirmed it wished to proceed on that basis and commenced the preparation of proposals for Compensatory Measures to address the impacts on the integrity of the Galway Bay Complex cSAC.

The EU Guidance Document on Article 6 (EU, November 2018) was followed in the identification of and proposed implementation of Compensatory Measures particularly with regard to the concept of *"the biological improvement of substandard habitat within an existing designated site…"*. Precedence for this approach was approved at EU level in the New Port Granadilla (Tenerife), Nied TGV and Mainport Rotterdam projects and other projects as outlined herein.

Tight coordination and cooperation with the Natura Authorities was exercised in the search for the appropriate form of compensation and in the preparation of the Compensatory Measures now proposed.

Following an extensive review of published literature / aerial photography, terrestrial / marine studies, interaction with landowners / oyster farmers and consultations with the National Parks and Wildlife Services (NPWS) and ABP, an area of lands and shoreline at Mweeloon, Tawin containing Intertidal and Stony Bank habitats that lie within Galway Bay cSAC, was identified as an area for the development of Compensatory Measures.

1.3 GHE COMPENSATORY MEASURES PROPOSAL BASIS

Intertidal Management Plan
An Intertidal Management Plan to implement the compensatory measures for this habitat has been devised. This management plan will benefit from the adjacent Land Management Plan which will curtail terrestrial run off issues. It entails the ceasing of some aquaculture and the control of a marine invasive species known as *Didemnum vexillum*. A central part of this Intertidal Management Plan is the proposal by GHC to acquire the control of 3.27 ha of aquaculture licences and related foreshore licences and access areas so that these can be fallowed and be preserved free from aquaculture and its related tractor access impacts.

All of the Intertidal reserve area will be either cleared of or preserved free of aquaculture. Sampling / monitoring of the cleared aquaculture areas and virgin areas will track and reference relative recovery between those areas. Separate reference areas for the different elements of the compensatory Intertidal habitat will not therefore be required.

Stony Bank / Terrestrial Management Plans
A Land Management Plan to implement the Stony Bank Compensatory Measures comprising aspects such as managing grazing to curtail overgrazing / poaching, ceasing use of fertilizers and herbicides, controlling anthelmintic use, limiting tractor access, ceasing all construction / reclamation works and control of litter has been devised. Animals to be brought onto the lands will be treated in advance so that they will be outside of the recommended anthelmintic withdrawal periods which are generally 7 or 30 days. This will remove any potential for impact on coprophillic or coprophaegous species. A central part of the terrestrial management plan is the agreement by GHC to purchase two separate landholdings totalling 26.079 ha adjacent to and surrounding Mweeloon Lagoon which will ensure that all the measures can be fully implemented for the habitats on the lands. The Land Management Plans will also benefit the Intertidal habitats directly adjacent to those terrestrial areas in which the Land Management Plans will be implemented.

Terrestrial Reference Areas
Small parts of the terrestrial areas will be used as a reference areas, where the management plans will be implemented in all respects other than the restrictions of grazing and supplementary feeding. As a result slurry, fertilizer and herbicides will not be used on the reference lands. No reclamation of these lands will be undertaken. Use of anthelmintic and litter will be controlled. The difference will only be the stocking of the lands.

This will allow comparative assessment of the relative merit of the shorter Spring to Autumn grazing season and feeding controls on the management area against the longer grazing season in the Salt Marsh reference area. Some supplementary feeding will be permitted, only in the reference area, while there is some grass available there. Winter feeding in this area, when animals are entirely dependent on supplementary feed brought onto the lands, will not be permitted.

The Stony Bank reference area is presently ungrazed and rank. The Stony Bank managed area will have the benefit of the Spring to Autumn grazing management and feeding controls. The relative merit of the grazing management will be measurable by the comparative assessment between these Stony Bank areas.

The lighter grazing will allow species which can be choked by rank grasses on Stony Bank and the over grazed species in Salt Marsh to grow better so the species in each habitat can flower and come to seed.

1.4 GHE COMPENSATORY MEASURES IMPLEMENTATION

Habitats corresponding with those that require compensation have been discovered which are in sub-standard condition. These areas have potential for enhancement which will be local, generous

in extent and feasible. Control of the properties containing the areas to be enhanced have been legally contracted subject to planning *i.e.* Final Grant of Satisfactory Planning Permission (F.G.S.P.).

A range of annual monitoring surveys, and their independent auditing, has been devised to objectively document the recovery / improvement of the Intertidal and Stony Bank habitats and also to record additional benefits to other habitats, as further outlined below, which exist within the proposed compensatory area all of which is designated cSAC.

The area proposed for Compensatory Measures contains:
i) 27.239 ha of Intertidal habitat and
ii) 3.053 ha of Stony Bank.
Parts of those areas are to be allocated to implement the GHE compensatory measures for the 5.93 ha of Intertidal and 0.35 ha Stony Bank requiring compensation.
The GHE areas are described in Sections 1 to 14 herein, which comprise Part 1 of this report: GHE Compensatory Measures.

1.5 PREVIOUS DEVELOPMENT AT GALWAY HARBOUR

Previous development at Galway Harbour in the 1990's which developed the Galway Harbour Enterprise Park (GHEP) impacted at that time, on three qualifying interests of the Galway Bay cSAC causing the loss of:
i) 8.58 ha of Intertidal habitat, [1170] and [1140]
ii) 0.28 ha of Stony Bank [1220] and
iii) 7.39 ha of Salt Marsh [1330] and [1410].
The compensatory lands agreed to be purchased and/or of which control is being obtained by the GHC contain Intertidal and Stony Bank areas well in excess of those required to compensate for the losses arising solely from the GHE proposal and indeed the combined losses from the GHE proposal and GHEP legacy losses and impacts.

The compensatory lands contain 11.715 ha. of Salt Marsh. Some of these Salt Marsh habitats in the Tawin area have been described as being of *"unfavourable/inadequate"* status (in a NPWS Salt Marsh Monitoring Programme Project, 2006, Tawin Island) and as observed during recent qualitative and quantitative surveys of these lands.

To address the combined and historic losses of the GHE and GHEP, the Compensatory Measures proposed will in total provide:
i) 27.239 ha for 14.51 ha of Intertidal habitat losses,
ii) 3.053 ha for 0.63 ha of Stony Bank losses and impacts and
iii) 11.715 ha for 7.39 ha of Salt Marsh loss.

All three habitats have potential for enhanced management. The sum of these Intertidal marine and terrestrial Qualifying Interest habitats found at Tawin and proposed to be managed will comprise 42.007 ha as compensation for the 22.530 ha of Qualifying Interest habitat losses both proposed and historic at Renmore, as described herein in Sections 15 and 16 in Part 2 of this report: GHEP Compensatory Measures.

1.6 ADDITIONAL ENVIRONMENTAL BENEFITS / NATURE RESERVE

In addition to the areas of Stony Bank and Salt Marsh to be managed, the lands proposed as the area for compensatory measures also include a further area of some 11.381 ha. This contains other important habitats and species including Limestone Pavement. The total 26.079 ha of terrestrial lands to be purchased surrounds the Mweeloon Lagoon and partly fronts onto the Lackanaloy Lagoon. The important additional habitats and species are as follows:

- The Limestone Pavement is a Priority habitat. Some of it is in mosaic with Salt Marsh which is a rare occurrence. It also transitions to areas of calcareous grassland with sparser pavement outcrops, all of which will now be preserved.
- The site also includes *Salicornia* (Salt Marsh plant) and a rare plant species, Yellow Horned Poppy (Stony Bank).
- The very notable additional benefit, of the selection of the site at Mweeloon, is that it surrounds an extensive area 19.480 ha of the Mweeloon Lagoon. This too is a Priority habitat.

Neither of these two Priority habitats had been previously documented for the Mweeloon site. These Mweeloon elements of these priority habitats were therefore not previously documented for the Galway Bay cSAC. The additional habitats found at the Mweeloon site are further described in Section 17 of Part 3 of this report which are the Limestone Pavement and the Mweeloon and Lackanaloy Lagoons. These priority habitats and their associated rare species make all of the lands which GHC have contracted to acquire and/or control worthy of preservation.

1.7 NATURE RESERVE, PROTECTION OF GALWAY BAY CSAC INTEGRITY, COHERENCE AND CONSERVATION OBJECTIVES

In all therefore a total of 73.233 ha containing Intertidal, Stony Bank and Salt Marsh habitats, priority Lagoon habitat, priority Limestone Pavement habitat, *Salicornia* muds and ground containing rare plant species will be available for management and consequent biological improvement as part of the Compensatory Measures package now being proposed and to be managed as a nature reserve.

The proposed Compensatory Measures based on EU Guidance (EU, 2018) and IROPI precedents, will bring about biological restoration and preservation of substandard areas of Intertidal, Stony Bank, Salt Marsh and other habitat areas at Mweeloon Lagoon in Inner Galway Bay, within the boundary of the cSAC, through the development of targeted management plans for the Intertidal and terrestrial areas.

The Compensatory Measures for these habitats have been designed to bring about a significant improvement over time of each habitat and thereby improve the overall functioning of the cSAC as an ecosystem. The biological diversity proposed to be lost to the GHE and that has been lost by the previous GHEP development within the Galway Bay cSAC site will both be addressed by these measures.

The integrity, coherence and conservation objectives of the Galway Bay cSAC site will be protected by these compensatory measures now proposed for the present Galway Harbour Extension Development.

1.8 EXECUTIVE SUMMARY DRAWINGS

Figure 1: Shows the Galway Harbour site at Renmore and the Compensatory Site at Tawin.

Figure 2: Galway Bay cSAC 000268 and Inner Galway Bay SPA 004031, showing the locations at Renmore and Tawin.

Figure 3: Shows the GHE Intertidal and Stony Bank habitat proposed impacts at Renmore and Compensatory areas at Tawin.

Figure 4: Shows the GHE and GHEP Intertidal, Stony Bank and Salt Marsh habitat impacts at Renmore and the Compensatory Intertidal, Stony Bank and Salt Marsh areas at Tawin.

The compensatory areas at Tawin also include the newly documented Lagoon Priority Hhbitat and the lands containing the newly documented Priority Limestone Pavement and rare habitat mosaics and plant species.

1.9 SUMMARY

The GHE development will cause loss / impact including direct and indirect impacts to Intertidal and Stony Bank habitats within the Galway Bay cSAC designated site.

The GHE development proposed is the least damaging design alternative. No other feasible alternative exists that would not adversely affect the integrity of the designated site. There are Imperative Reasons of Overriding Public Interest including 'those of a social and economic nature' which require this development to proceed.

To provide all the necessary compensatory measures to ensure that the overall coherence of Natura 2000 is protected with regard to this proposed development, GHC has contracted the purchase of lands and the control of aquaculture licences at Mweeloon, Tawin, Co Galway. Tawin is within the same designated site. The GHC site and the compensatory site are inter-visible across the Inner Galway Bay cSAC at *c* 4.7 km (c2.5 nautical miles) due south, south east of the GHE site, 19 km by road.

The properties contracted for purchase, contain areas of substandard habitats which GHC will manage on a long term basis as part of the GHE development, to enhance and preserve the areas of habitats to be acquired as the compensatory measures for that development.

The targeted enhancement measures proposed are technically feasible and will be effective. They will provide a compensatory ratio of 3 : 1 for the GHE development and implementation of same will be commenced prior to the commencement of the development as follows:-

- Purchases of lands and of the control of aquaculture licences will be completed within 3 months of grant of a satisfactory permission, when the entire planning process will be deemed to be complete and final (F.G.S.P.).
- Implementation of the management plans will commence within a further 3 months or as the growing / grazing seasons allow for all of the habitats.
- Significant enhancement of Intertidal, Stony Bank and Salt Marsh habitats will be achieved within the first 6 months of management that is within 12 to 18 months of F.G.S.P.
- The second management season of 12 months will see the bulk of the enhancement achieved.
- Thereafter it will be a matter of maintaining and fine tuning that enhancement given the vagaries of different annual weather and storm conditions.

The Compensatory Measures site, contracted to be acquired or of which control will be acquired by the GHC (in relation to the Intertidal and marine areas), contains the habitats for which compensation is required. These habitats in that area require enhancement and lend themselves to enhancement. The contracts to purchase the lands and control of the licences, subject to the grant of this planning permission provide a temporary level of preservation from further development / reclamation to the habitats for the 3 years of the options agreed.

Part 1 of this document confirms that compensatory area will be provided at a rate of 3 : 1 for the loss / impact proposed by the GHE to Intertidal and Stony Bank habitat.

Part 2 confirms that losses, which previously arose due to the GHEP in the 1990's, will be compensated for at the following rates: Intertidal 1.101 : 1, Stony Bank 7.154 : 1 and Salt Marsh 1.585 : 1.

Part 3 confirms that the compensatory area contracted contains other habitats some of which are priority habitats. These will allow a multi habitat nature reserve of 73.233 ha to be generated. GHC will maintain, monitor, audit and publish a public annual report on the condition and maintenance of these habitats. The total reserve area will represent a ratio of 3.25 : 1 of preservation area for the sum of the GHE and GHEP area of losses / impacts.

The Compensatory Measures proposed herein along with the main development of the GHE and GHEP have been the subject of an Addendum to the Natura Impact Statement to include consideration of the Compensatory Measures. An Bord Pleanála has previously considered the project pursuant to Article 6(3) of the "Habitats" Directive as transposed into Irish law without regard to the Compensatory Measures as now proposed. ABP has determined that, if the application was to proceed, the procedure under Article 6(4) would need to be involved. The Compensatory Measures have been considered in this Addendum to the original NIS relating to the main development (together with the two previous addenda to same) and which Addendum to the Natura Impact Statement to include considerations of the Compensatory Measures is submitted along with this report.

1.10 CONCLUSION

The Addendum to the Nature Impact Statement to include consideration of the Compensatory Measures confirms that there are only minor short term (1 growing season) negative impacts of the proposed compensatory management plans on the Natura site. However, and of greater ecological and conservation significance, the Addendum to the Nature Impact Statement to include consideration of the Compensatory Measures has determined that there are significant positive, long term impacts arising from the proposed compensatory measures. These include the leaving fallow of parts of the Intertidal habitat that are currently being used to farm oysters and therefore, the removal of pressures associated with operating the farm *e.g.* tractor access, the control of a non-native, invasive species, *Didemnum vexillum* that has infested the farms and the recovery of Stony Bank and Salt Marsh vegetation by controlling grazing and the introduction of organic farming principals.

There are other ecologically significant aspects to the acquisition of the site at Mweeloon and these are that:

1. 2 priority habitats, Limestone Pavement and Lagoon that had previously not been known for that part of Galway Bay cSAC were recorded during biological survey work and
2. The rare Horned Poppy *(Glaucium flavum)* was recorded at the site.

The total area of the site of these various compensatory measures will be some 73.233 ha which will contain a unique combination of habitats including Intertidal, Lagoonal, Stony Bank, Salt Marsh, Limestone Pavement, Salt Marsh in mosaic with Limestone Pavement, Calcareous Grassland and *Salicornia* Muds including some rare habitat mosaics and plant types, which will be acquired by GHC and managed specifically for the benefit of the coherence of the designated cSAC Galway Bay site.

Finally, as GHC will own the lands, the long term protection of this part of Galway Bay cSAC into the future is assured and will compensate generously for the losses proposed to arise from the GHE and which formerly arose from the GHEP.

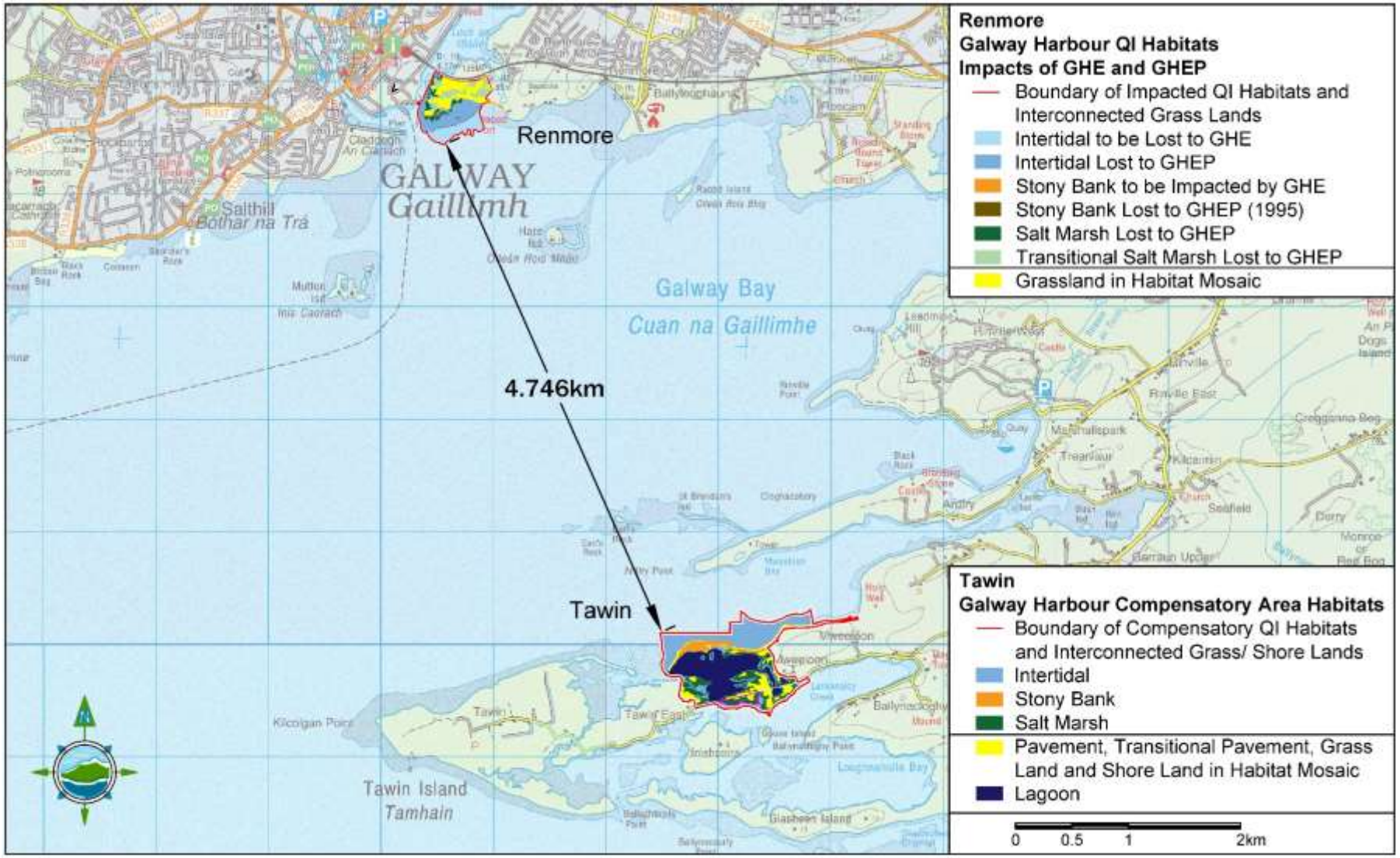

Figure No. 1 – Galway Harbour Site at Renmore and Compensatory Site at Tawin.

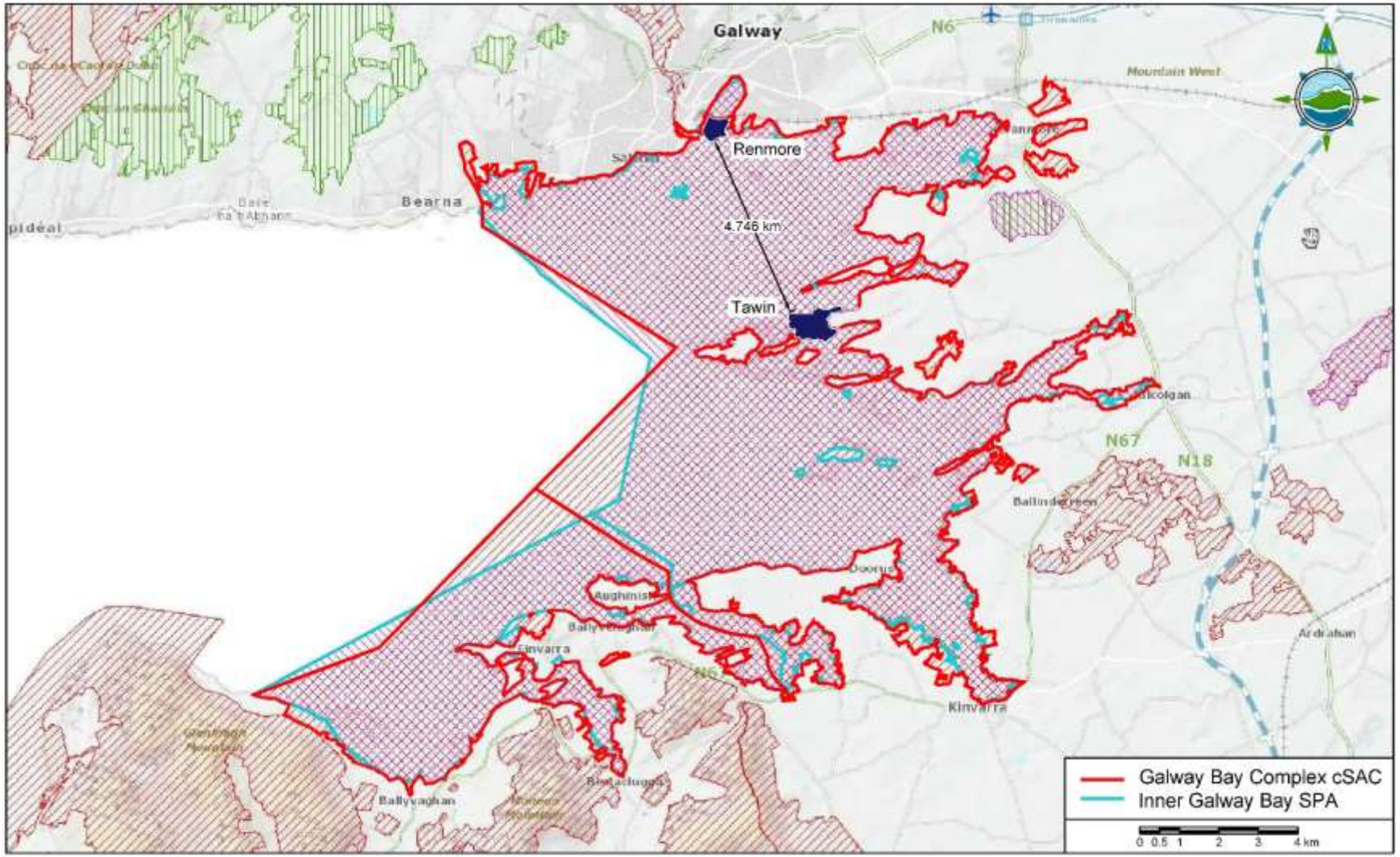

Figure No. 2 - Galway Bay Complex cSAC 000268 and Inner Galway Bay SPA 004031 showing the Harbour Site at Renmore and the Compensatory Site at Tawin.

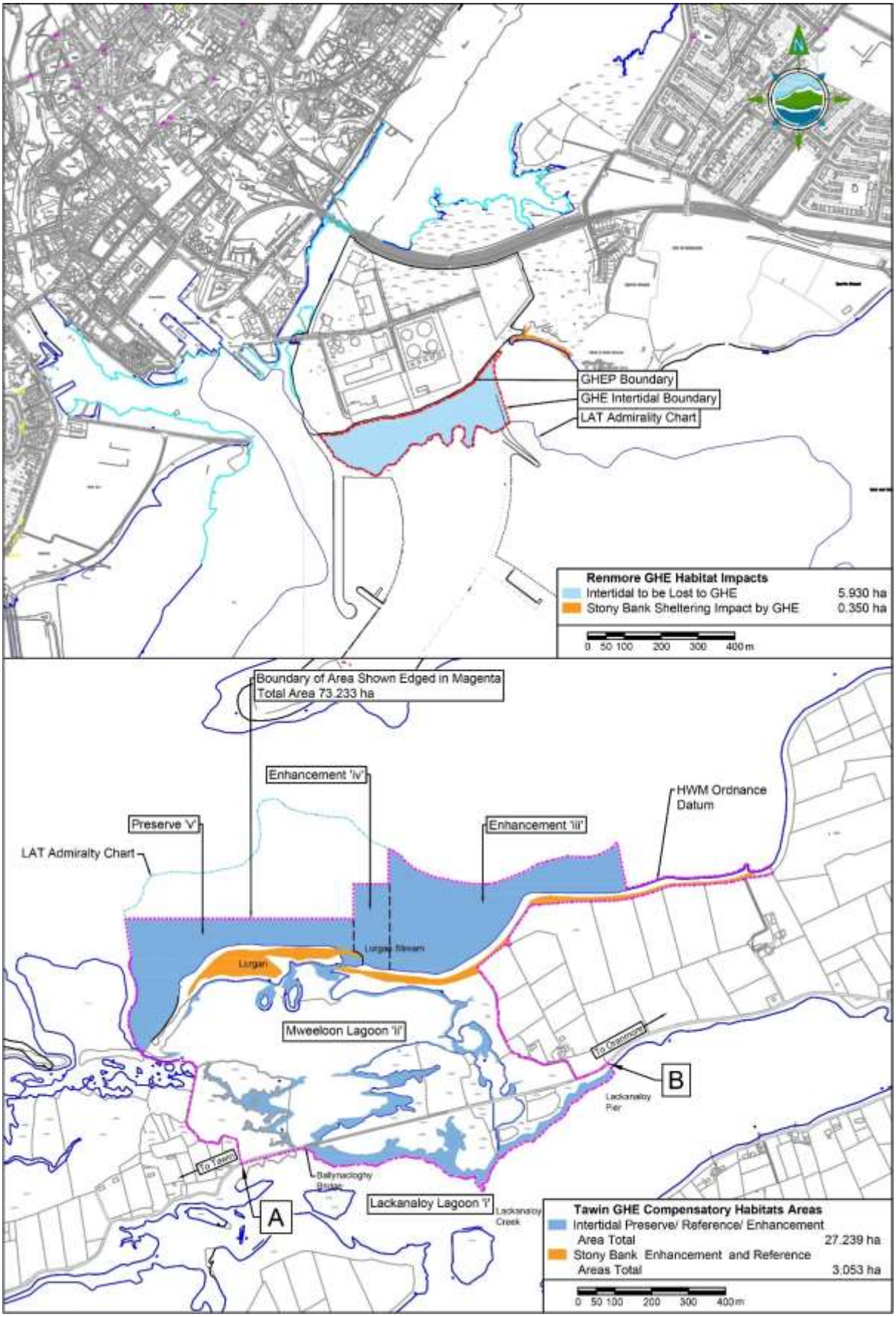

Figure No. 3 – GHE Intertidal and Stony Bank Habitat Proposed Impacts at Renmore and Compensatory Areas at Tawin.

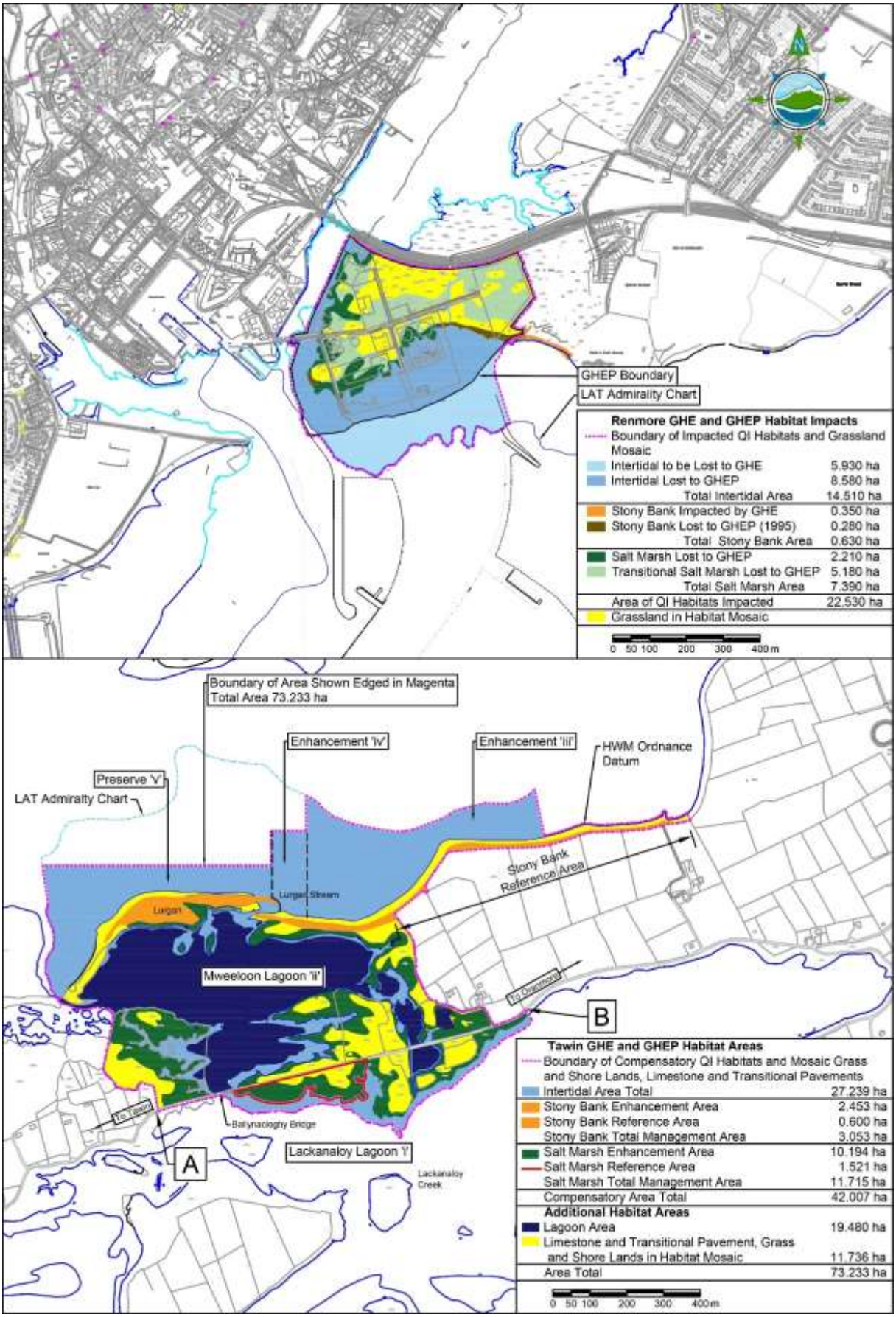

Figure No. 4 – GHE and GHEP Intertidal, Stony Bank and Salt Marsh Habitats at Renmore and Compensatory Areas at Tawin.

Part 1

Galway Harbour Extension Compensatory Measures

2 INTRODUCTION

2.1 PLANNING APPLICATION

The Planning Application for the development of the Galway Harbour Extension [GHE] was made on 10th January 2014 by the Galway Harbour Company [GHC] directly to An Bord Pleanála [ABP] under the Strategic Infrastructural Development (SID) process.

The Harbour site layout which is the subject of this application is shown at Figure No. 5, following. The total area proposed to be reclaimed from the sea is 23.89 ha. The total site area including, land previously reclaimed as part of the historic GHEP, land to be reclaimed as part of the GHE and marine areas to be dredged as part of the GHE is 85.39 ha.

ABP issued a request for further information [RFI] on 24th May 2014.
GHC responded to the RFI request on 16th October 2014.
ABP scheduled an oral hearing which took place over the period from 12th – 23rd January 2015.

2.2 APPROPRIATE ASSESSMENT OF THE GHE BY ABP

By a letter dated 29th September 2015, ABP advised that it had completed an Appropriate Assessment of the proposed Galway Harbour Extension in accordance with Article 6(3) of the "Habitats" Directive and had concluded that approval of the proposed development could not be considered under Article 6(3) of the "Habitats" Directive, given that a significant adverse impact on the integrity of the Galway Bay cSAC would occur.

In that letter it stated that:

> *"The impacts on the integrity of the European Site are as follows:-*
>
> - *The direct and permanent loss of fucoid-dominated reef habitat [1170] and mud and Sand flat habitat [1140] in Galway Bay Complex cSAC will result in the conservation objective for these features not being met. The direct and permanent loss of a habitat, which is part of the conservation objective 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 a significant adverse effect on the integrity of the cSAC".*

The areas of habitat that will be impacted arising from the proposed development of the Galway Harbour Extension project as set out in the planning application documents are:-

- 5.93 ha - Fucoid dominated reef habitat [1170] and Mud and Sand flat habitat [1140]
- 0.35 ha - perennial vegetation of Stony Bank [1220]

These are shown coloured blue and orange on Figure No. 6 following.

2.3 ALTERNATIVE SOLUTIONS

2.3.1 Introduction

A comprehensive Assessment of Alternative Solutions is set out in Chapter 3 of the Environmental Impact Report and Appendix RFI 1 of the Further Information Response of October 2014. This section of the Compensatory Measures report is a synopsis of the assessment and sets out the overall methodology applied in assessing alternatives, as well as other relevant considerations.

These include the fact that the GHE project is deemed to be of strategic importance to the state and the west region, as determined by An Bord Pleanála.

A significant consideration in the Assessment of Alternative Solutions is the fact that the GHE proposal is an extension of the existing harbour and related infrastructure and is not a new port on a greenfield site and this is expanded on further below.

The methodology involves firstly identifying the objectives for the project, in order to be in a position to determine whether there are alternative means of meeting these objectives.

2.3.2 Methodology

The assessment of alternatives examines a range of alternative ways of implementing the project that, where possible, minimises or avoids adverse environmental impacts. The objective in this regard is to determine whether the project, either alone or in combination with other projects or plans is the optimum method of meeting the project objectives, while at the same time achieving an acceptable environmental impact.

Possible alternative solutions could include the following:

- Locations
- Scale or size
- Means of meeting objectives (e.g. demand management)
- Methods of construction
- Operational methods
- Decommissioning methods at the end of the projects life
- Scheduling & timescale proposals (e.g. Seasonal working)

Demand management is not relevant in the context of the GHE project which is designed to cater for economically international trade serving the region.

A number of the further possible alternative solutions identified above, such as methods of construction operational methods decommissioning methods at the end of the project life and scheduling and timescale proposals do not in themselves meet the project objectives. However these alternatives have formed part of the assessment of alternatives in the form of mitigation measures as part of the proposed design/location.

The assessment of Alternative Solutions must include an assessment of the ‘do nothing’ alternative.

A crucial step in assessing whether alternative solutions exist is the identification of the objectives of the project concerned. From this starting point, it is possible to examine a range of alternative ways of achieving the objectives of the project and these alternatives can then be assessed against their likely impacts on the conservation objectives of the Natura 2000 site.

2.3.3 Objectives

The objectives for GHE are derived from both the National Ports Policy (NPP) and Galway Harbour Company’s business case. In designating Galway as a port of regional significance, the NPP has identified Galway Harbour’s role as a commercial port within the national context. The business case identifies commodities currently using Galway Port, together with potential commodities and opportunities, in addition to projections for future growth.

The primary objective of Galway Harbour Extension (GHE) is to provide new port facilities, building on existing port infrastructure, to upgrade and replace existing inadequate facilities, in line with

National Policy which is aimed at achieving balanced regional development and supporting the strategic role of Galway as the Gateway City within the west region. Galway City has an extensive maritime history and tradition and has served as the primary maritime access, between the west region and continental Europe since the 12th Century. The existing port serves a number of different functions/sectors. The predominant activity is freight, in particular bulk freight. The existing port also serves as a fishing port, international cruise tourism and a marina as well as servicing offshore exploration and offshore renewable energy generation. The proposed harbour extension is required so that Galway Harbour Company can continue to fulfil these roles as the principle maritime gateway to the west region.

Galway City is the primary population centre within the region, the designated Gateway City and strategic regional transport hub for both road and rail transport. Galway Harbour has significant established port related infrastructure including dedicated storage and distribution facilities for a range of bulk commodities.

The primary requirement for the extension arises from the severe constraints within the existing harbour. The objectives for the extension therefore is to provide a facility which will serve existing and future long term needs over a minimum 30-year period and will include the following:

- Sufficient quay length to accommodate freight, cruise and offshore servicing and operational requirements
- Sufficient draft for all tide access to each berth based on proposed use
- Sufficient capacity to accommodate 20,000 tonnes freight capacity vessel size
- Sufficient land to support the necessary land based facilities for a sustainable port
- Addressing existing SEVESO issues through the construction of petroleum and bitumen terminals and transfer pipelines to the existing tank farms, to replace current unloading operations within the existing harbour/city centre area

2.3.4 Existing Infrastructure

The proposal does not involve starting from a “greenfield” position in terms of meeting the requirement of the brief as laid down. It involves using existing infrastructure in the form of the existing inner harbour/port together with the harbour enterprise park. The existing harbour will continue to serve some fishing interests and a marina as well as servicing the off shore islands. The existing harbour enterprise park, which comprises a total area of approx 16ha, accommodates state of the art petroleum and bitumen terminals, a marine engineering facility, a fish processing plant, in addition to both enclosed and open storage. The objective therefore is to build on the existing infrastructure by providing a facility capable of accommodating viable vessel size. Without utilising and building on this existing infrastructure, the footprint, cost and sustainability of a similar facility to that proposed, starting on a “greenfield” site would be unsustainable.

2.3.5 Conclusion of Assessment of Alternatives

The assessment of alternatives considered the following scenarios:

- Do-nothing
- Improvements to existing Inner Harbour
- Alternative Scale/design
- Alternative locations in Inner Galway Bay
- Alternatives locations/ports beyond Galway Bay
- Alternative locations abroad

The following conclusions were drawn from this exercise:

- Project objectives cannot be met in a ‘do nothing’ scenario

- The outcome in the case of improvements to the existing Inner Harbour is similar to the 'do nothing' scenario
- The alternative scales/designs and alternative locations in Inner Galway Bay are more damaging to the Natura 2000 site
- Alternatives beyond Galway Bay do not meet the project objectives
- The project aims cannot be met by locating the facility abroad

The Assessment of Alternative Solutions concluded that GHE therefore represents the least damaging option environmentally in terms of meeting the project objectives, including compliance with national policy and the socio-economic wellbeing of the region.

2.4 THE EU GUIDANCE DOCUMENT ON ARTICLE 6 (EU, 2018) / IROPI

2.4.1 Introduction

ABP in its letter of the 29th of September 2015 also invited GHC to confirm if it wished the project to be considered for approval under Article 6(4) of the Directive and advised that it would be necessary to submit proposals for "*compensatory measures*" to address the impacts on the integrity of the Galway Bay Complex cSAC. The GHC confirmed to ABP its wish to proceed on that basis and this report now sets out in detail the proposal for "*compensatory measures*" for the Galway Harbour Extension project.

The GHE has been designed so that the development which is proposed is the least damaging of all alternatives considered for habitats, for species and for the integrity of the Natura 2000 sites and it in reality comprises the only feasible option that achieves the necessary objectives while limiting so far as possible environmental impacts. All possible alternatives were considered without dictation by economic cost constraints and none were assessed as achieving the objectives of the development without greater impacts on habitats, species and on the integrity of the Natura 2009 sites than those associated with the proposed development herein. Having fully considered all such alternatives it has been determined that the alternative put forward for approval (being the GHE development proposed) is the least damaging of habitats, for species and for the integrity of the Natura 2000 site in question comprising the Galway Bay cSAC, regardless of economic considerations, and that no other feasible alternative exists that would not adversely affect the integrity of the site or be capable of servicing the region.

2.4.2 IROPI Summary

There are Imperative Reasons of Overriding Public Interest (IROPI) including "*those of a social or economic nature*" for the development proposed herein as previously identified as follows:

- Galway Port is a long-established and crucial element in the transport infrastructure of the West Region. The port of Galway has been of importance since at least the Norman times, and the original raison d'etre of the city. The future continuation of a commercial port in Galway is vital to the region, and to the businesses that use it, who support some 8000 FTE jobs, plus many more through indirect and induced impacts. Galway is a bulk port primarily serving its own region and typically handles high volume-to-value cargos. These are basic economic commodities that are used throughout the economy of the region served by Galway.

- Environmental sustainability, as articulated in the EU's *Short Sea Shipping* policy and elsewhere, favours sea transport over road transport, due to the lower carbon footprint and lower congestion costs and the GHE development proposed herein is essential for the

development of same in the Ireland West region and Connacht in particular and is essential to allow and promote the import and export of goods by sea from the region.

- The proposed Harbour Extension will address severe constraints within the existing harbour, resulting from:-
    - severely restricted access,
    - tidal and gated harbour,
    - uneconomic vessel size capacity,
    - channel too shallow,
    - port draught and dimensions too limited,
    - inadequate quay length and limited berthage

- The proposed Harbour Extension will address these constraints and provide improved infrastructure to consolidate existing business, develop new business and services, provide for the international cruise liner business and facilitate the economic growth of the region.

- Failure to extend the harbour will have negative implications for economic activity in the region. The costs of transporting bulk goods by road, from alternative ports, would be higher and less sustainable environmentally and could result in enterprises relocating to be closer to the alternative ports. This would conflict with Government regional development policy which aims to support employment and thus retention of population in the west region and to prevent population migration from the west region to the eastern seaboard. Therefore the project has significant socio-economic benefits for Connacht and the west region.

- A failure to extend Galway Harbour would see traffic volumes/tonnages decline, would have major implications for the economic health of the region in terms of the number of jobs that would be put at risk, as well as the increased transport costs for industry, erosion of regional competitiveness and the further financial injection that would be lost because of the reduced number of cruise vessels that would visit Galway.

- It is clear, therefore, that a failure by the Port of Galway to cater for an increase in vessel size will impact its ability to provide operational efficiencies, to compete and to handle its customers' requirements. It also impacts the Port's ability to attract new trade and business. This will result in a loss of trade affecting not only the Port's viability but also the competitiveness of its customers who might be forced to seek and potentially relocate to other ports, thus adding to their transport costs or resulting in a loss of employment to the region serviced by Galway Port.

The proposed GHE represents the least damaging option environmentally in terms of meeting the project objectives, including compliance with national policy and supporting the socioeconomic wellbeing of the region.

All compensatory measures, necessary to ensure the protection of the overall coherence of the Natura 2000 network, have been identified as set out in this document, and will be undertaken should the development proposed be approved.

This report also proposes compensatory measures for habitats impacted arising from the construction of the GHEP in the 1990's.

Appendix No. 1 contains the ABP correspondence of the 29th September 2015 and 13th October 2017.

Appendix No. 2 contains the EU Guidance Document on Article 6 of the “Habitats” Directive.

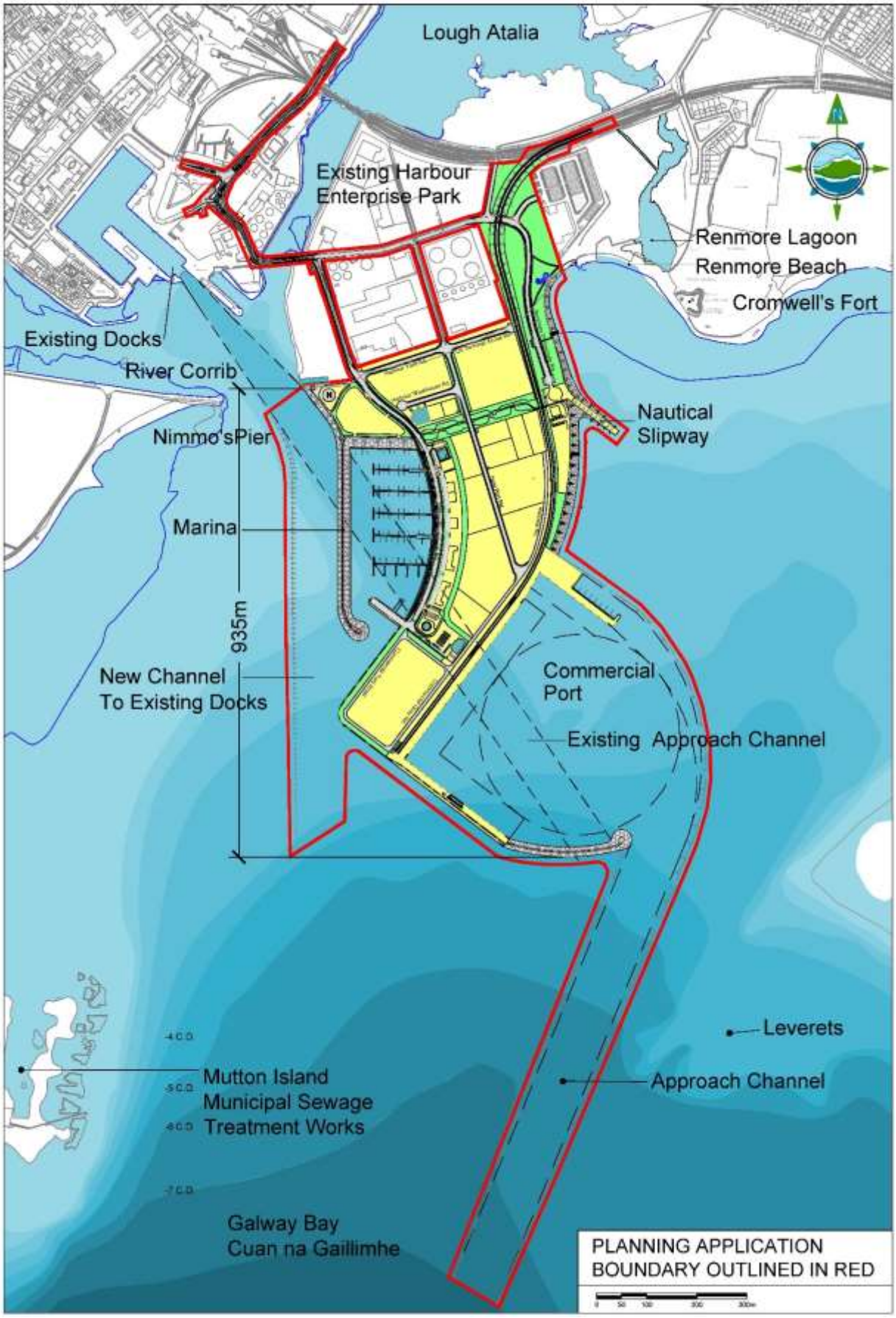

Figure No. 5 – Planning Application Site Layout.

Figure No. 6 – GHE Habitat Losses.

2.5 CONSERVATION OBJECTIVES FOR GALWAY BAY COMPLEX cSAC

Appendix No. 3 contains the Conservation Objectives published by National Parks and Wildlife (2013) for the relevant habitats:-

1140 Mudflats and Sandflats not covered by seawater at low tide
1170 Reefs
1220 Perennial vegetation of Stony Bank

2.6 DEVELOPMENT OF COMPENSATORY MEASURES / EU, 2018 GUIDANCE DOCUMENT ON ARTICLE 6 OF THE 'HABITATS' DIRECTIVE 93/43/EEC

The letter of 29th September 2015 from ABP requested that the Galway Harbour Company provide it with a report setting out details of proposed compensatory measures for habitat loss arising from the proposed Galway Harbour Extension (GHE) project, see Figure 6 and Appendix 1, and advised that the development of compensatory measures be addressed in two phases:

> ***Phase 1*** *– the proposals for compensatory measures should be set out by Galway Harbour Company for initial consideration. You are advised to liaise with the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht in this regard.*
>
> ***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".*

2.6.1 Phase 1

In the letter of 29th September 2015, ABP made reference to the guidance in relation to compensatory measures as set out in the European Commission [DG Environment] Guidance Document entitled "Managing Natura 2000 sites, The provisions of Article 6 of the 'Habitats' Directive 94/43/EEC" as may be updated. The current update is: Brussels, 21.11.2018 C(2018) 7621 final. See Appendix 2.

Following confirmation by GHC to ABP on 1st October 2015 that it wished the project to be considered for approval under Article 6(4) of the "Habitats" Directive, work commenced by Galway Harbour Company on the development of Phase 1 proposals for compensatory measures.

This work involved initial preliminary desk based assessment and mapping of potential areas in the greater Galway Bay area as well as the arrangement of various bilateral and tripartite meetings between ABP / NPWS / GHC.

Over the course of almost 2 years, the focus on identifying suitable compensatory measures moved to the eastern parts of Inner Galway Bay. This progress was presented by GHC to a tripartite meeting on 27th July 2017.

After that meeting a Report entitled Proposed Compensatory Measures [Version 2.3B] was submitted to ABP on 9th August 2017. This discussed the merits of three possible locations of interest on the Tawin Peninsula to allow enhancement of sub-standard habitats. It concluded that, on the basis of the qualitative studies that, the Mweeloon Site was the preferred site, on which it was proposed to concentrate the quantitative studies and consultations with property owners to assess if it would be possible to acquire the requisite control of such habitat areas.

Following a review of that Report by ABP, GHC was invited by letter dated 13th October 2017 to proceed to Phase 2 of the preparation of proposals for compensatory measures. See Appendix 1.

2.6.2 Phase 2

In its letter of 13th October 2017, refer Appendix 1, ABP advised:-

> *"the Harbour Board is now invited to proceed to Phase 2 of the preparation of "compensatory measures whereby a detailed proposal is to be prepared and submitted to An Bord Pleanála for consideration".*

GHC confirmed on 02.11.2017 that it wished to proceed to Phase 2 of the compensatory measures proposal.

A draft of the Mweeloon based compensatory measures report was submitted to ABP on 04.12.2017 and a tripartite meeting reviewed that draft on 11.12.2017.

On 22.02.18, the ABP minutes of the meeting of 11.12.17 issued.

Since 22.02.2018 GHC has proceeded to acquire options to purchase the rights required at Mweeloon, Tawin to be put forward as the compensatory measures under Article 6(4) of the "Habitats" Directive, as initially outlined in the report dated 04.12.17 and as now proposed in this compensatory measures submission.

The present report sets out details of the qualitative and quantitative surveys carried out on separate areas of habitat at Mweeloon on Tawin Island in Inner Galway Bay where it is proposed to bring about ecological restoration and improvement to areas of habitat types that are currently classified by NPWS as being in an "unfavourable / inadequate" status on a National scale (NPWS 2013b). These improvements will be achieved by implementing detailed "management plans" for each habitat type designed to remove / minimise the pressures that are giving rise to the "unfavourable / inadequate" status and they will also improve existing habitat that has favourable status.

3 ASSESSMENT OF HABITAT LOSS AT RENMORE LIKELY AS A RESULT OF THE PROPOSED GHE DEVELOPMENT

3.1 INTERTIDAL HABITAT

[Fucoid dominated reef [1170] and Mud and Sand Flat [1140] Complex]

The full findings of an assessment of the Intertidal habitat at Renmore carried out by AQUAFACT, are included in Appendix No. 4.

As can be seen from Appendix No. 4, the reef and shelly gravel habitats together make up *ca* 98.8% of the habitat type with Mud/Sand flat comprising only a little over 1%. There is a large area of Mud and Sand flat just to the east of the site at Ballyloughan Beach.

The main factor that has been historically impacting this part of Galway Bay is that it has been subject to organic enrichment over many, many decades. The Intertidal habitat at the Renmore area has been impacted by organic enrichment from loadings in the River Corrib which on an ebbing tide, flows over the western parts of the area. Before the Mutton Island treatment plant was commissioned in the early years of this century, untreated sewage effluent was disposed of to the sea either in the river itself or via a disposal pipe south of Nimmo's Pier also for many, many decades giving rise to sediments where the proposed Galway Harbour Expansion is to take place with low levels of oxygen, high levels of sedimentary hydrogen sulphide and therefore reduced numbers of infaunal invertebrates. The species that are encountered in this area are tolerant of such organically impacted sediments.

Besides the untreated effluent as a source of organic enrichment, the catchment of the Corrib particularly along the eastern area of Co. Galway and to a lesser extent, the western section, drains lands that are intensively farmed. These areas also have a number of towns, *e.g.* Tuam, Headford, Oughterard that only have secondary treatment works, the effluent of which is disposed of to rivers that eventually flow into Lough Corrib and then on to the River Corrib and enter the sea at Galway City. The fact that the water of the Corrib River has its own organic loading contributes to the impact that the Intertidal habitat at Renmore is experiencing. This effect is clearly shown when both the dendrogramme and the PCA plots are examined, see Appendix 4, Figures 3.5 and 3.6, with the two further western stations (Sts. 1 and 2) that are closest to the Corrib cluster together while the most easterly stations, furthest away from the Corrib, Stations 8, 9 and 10 group together.

The results of the AMBI analysis, see Appendix 4, Figure 3.8, showed that the area to the west of the survey location at Renmore is heavily disturbed with indictors of organic enrichment such as *Capitella capitata* being recorded. Other species that are tolerant of organic enrichment that were recorded there include the spionid polychaete, *Malacoceros fuliginosus* and the oligochaetes *Tubificoides benedii* and *T. pseudogaster.* Further to east of the survey area, the remainder of the site was classified by AMBI as being moderately or slightly disturbed. This suggests that the organic enrichment effect of the River Corrib reduces to the east.

In assessing the status of the Intertidal habitat and species at Renmore both are deemed inadequate due to the levels of organic enrichment that this habitat is exposed to. However, it should be noted that in time the excess organic loadings in the sediments will decrease giving rise to a greater diversity of infaunal invertebrates and a gradual recovery of this habitat. Notwithstanding the present condition of the Intertidal habitat at Renmore, GHC have sought to find a compensatory measure to generously compensate for the loss likely to arise from the development proposed and which previously occurred.

3.2 STONY BANK

The findings of a survey and assessment of Stony Bank habitat at Renmore carried out by Dr. John Conaghan are included at Appendix No. 5.

The condition of the Stony Bank habitat is assessed in accordance with the criteria outlined in Martin *et al.* (2017). The Stony Bank habitat at Renmore shows two fails when marked on the various habitat assessment criteria. This suggests that the area of the habitat is in an unfavourable/inadequate conservation condition. The main reasons for these fails is the relatively high occurrence and cover of negative indicator plant species and non-native species. Of particular note is the high cover of the alien plant species *Lactuca tatarica* which is locally sub-dominant in parts of the shingle bank.

It should be noted that the 0.35 hectare area of Stony Bank habitat to be impacted at Renmore will not be lost to the proposed future construction of the Galway Harbour extension. The Stony Bank area will however be subject to less disturbance by storms and wave action because of increased shelter and, as a result, the future vegetation of the Stony Bank area may not be as dominated by plant species characteristic of more dynamic shingle habitat such as Sea Radish *(Raphanus raphanistrum* subsp. *maritimus).* It is likely that native grassland species more typical of vegetated shingle habitat, *e.g*. False Oat-grass *(Arrhenatherum elatius)* and Red Fescue *(Festuca rubra),* will increase in cover and dominate the vegetation of this Stony Bank habitat in the future by reason of the increased shelter which will arise as a result of the development proposed.

4 GUIDANCE ON COMPENSATORY MEASURES

4.1 GUIDANCE DOCUMENT ON ARTICLE 6 OF THE "HABITATS" DIRECTIVE (EU, 2018)

Relevant extracts from the EU Guidance Document (EU, 2018) are set out below in Sections 4.1.1 to 4.1.9.

4.1.1 Article 6(4) of the "Habitats" Directive, which has been transposed into Irish Law provides, '*inter alia*', as follows:

> "… *If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or a project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of the Natura 2000 is protected*"

4.1.2 The EU guidance notes that *"Article 6(4) of the Directive 92/43 can apply only after the implications of a plan/project have been studied in accordance with Article 6(3) of that Directive",* and goes on to state that "*the assessment of any imperative reasons of overriding public interest and that of the existence of less harmful alternatives require a weighing up against the damage caused to the site by the plan or project under consideration."*

4.1.3 It notes (page 56) that it "*must be documented that:*

1. *The alternative put forward is the least damaging for habitat, for species and for the integrity of the Natura site and that no other feasible alternative exists that would not adversely affect the integrity of the site.*
2. *There are imperative reasons of overriding public interest and*
3. *All compensatory measures necessary to ensure the overall coherence of the Natura 2000 is protected are taken".*

4.1.4 The Guidance document on page 56 also states that "*the compensatory measures adopted must always be communicated to the Commission".*

4.1.5 On page 60, the EU Guidance document notes that *"compensatory measures are independent of the project*" and that "*the overall ecological coherence of the Natura network is maintained".* It also notes on this same page that "*compensatory measures should be additional to the actions that are normal practice under the Habitats and Birds Directives"*.

4.1.6 On page 63 the Guidance document states that "*in order to ensure the overall coherence of Natura 2000, the compensatory measures proposed for a project should a) address, in comparable proportions, the habitats and species negatively affected and b) provide functions comparable to those which had justified the selection criteria for the original site, particularly regarding the adequate geographical distribution".*

4.1.7 Under Section 3.7.8, page 63 (and also the last paragraph of page 64), the document states that "*best efforts should be made to ensure that compensation is in place before hand"* (*i.e.,*before construction).

4.1.8 The Guidance document notes (page 64, paragraph 3) that "*the compensation might consist of the biological improvement of a substandard habitat of the same type within an existing designated site*" and goes on in paragraph 4 to state that "*Compensatory*

measures appropriate or necessary to offset the adverse effects on a Natura 2000 site may consist of:
habitat improvement in existing sites: improving the remaining habitat on the site concerned in proportion to the loss due to the plan or project" and in the last paragraph of that same page lists a range of compensatory measures that includes amongst others: *"Species recovery*
Land purchase
Rights acquisition and
Reserve creation".

4.1.9 Section 3.7.9 of the (EU, 2018) document entitled "*Key elements to consider in the compensation measures*" (page 65) lists, amongst others, the following elements that need to be considered:

"Tight coordination and cooperation between Natura 2000 authorities, assessment authorities and the proponent of the plan or project.

Clear objectives and target values according to the site's conservation objectives.

Description of the compensatory measures, accompanied by a scientifically robust explanation of how they will effectively compensate for the negative effects of the plan or project on the species and habitats affected in light of the site's conservation objectives and how they will ensure that the overall coherence of Natura 2000 is protected.

Demonstration of the technical feasibility of the measures in relation to their objectives.

Demonstration of the legal and or financial feasibility of the measures according to the timing required.

Analysis of suitable locations and acquisition of the rights (purchase, lease…) to the land to be used for the compensatory measures.

Explanation of the time-frame in which the compensation measures are expected to achieve their objectives.

Time table for implementation and co-ordination with the schedule for the plan or project implementation.

Specific monitoring and reporting schedules based on progress indicators according to the objectives of the compensation measures".

4.1.10 In addition to the above statements, on pages 65 – 70, the Guidance sets down seven criteria for designing compensatory measures which have been used in the development of these compensatory measures. These are as follows:

- Targeted compensation
- Effective compensation
- Technical feasibility
- Extent of compensation measures
- Location of compensation measures
- Timing of compensation measures
- Long term implementation.

All of the above points have been considered and addressed and incorporated into the compensatory measures now proposed.

5 RELEVANT EU PRECEDENTS

5.1 EXAMINATION OF PREVIOUS 6(4) PROJECTS

By way of developing potential compensatory measures for the loss of habitats that would arise if the GHE plan were to go ahead, previous Article 6(4) of the Habitat Directive projects were examined to assess the type of compensatory measures that were proposed and agreed. In many of these cases, compensatory measures included:-

- Habitat management plans for the habitats present at the sites to ensure the ecological status of the habitats in the future and
- Annual monitoring plans to track the ecological status of these habitats.

These options were deemed feasible for the GHE project.

Of the cases of 6(4) examined the following 6 in particular are relevant to the GHE project: refer also Appendix No. 6:

1. Long distance suburban railway connection from Bad Cannstatt to Stuttgart via the Rosenstein portal (C(2018) 466

2. Widening of the B 173 between Lichtenfels and Kronach, Michelau-Zettlits section (C(2015) 9085)

3. Deepening and widening of the ship fareway of the River Main at the sections Wipfeld, Garstadt and Schweinfurt (C(2013) 1871)

4. Construction project of the new port of Granadilla (Tenerife), 2006 EU Commission Opinion C (2006) XXX,

5. Nied TGV Compensation, 2004 EU Commission Opinion C (2004) 3460 (9/9/2004) Salt meadow reserve precedent,

6. Project Mainport Rotterdam, 2003 EU Commission Opinion C (2003) 1308 24/04/2003) Marine Reserve precedent, see Appendix IV.

It should be noted that all these cases involved loss of, or adverse impacts on, priority habitats. **No** priority habitats will be impacted or lost in the proposed Galway Harbour Extension and even though no priority habitats will be impacted, the proposed management plans presented in this report are far more extensive than what was deemed acceptable in the above cases. What is proposed herein will provide a very high level of compensation.

5.2 DESCRIPTION OF RELEVANT COMPENSATORY MEASURES IN CONNECTION WITH OTHER PROJECTS

1. With regard to the railway extension (C(2018 466), the priority species *Osmoderma eremita*, the Hermit Beetle, was the species that was going to be impacted and the German Government not only proposed the enlargement of the existing cSAC but also the implementation of maintenance and monitoring measures to ensure that the compensatory measures were being successful.

2, 3 In relation to both the widening of the roadway between Lichtenfels and Kronach (C(2015) 9085), and the deepening of the River Main (C(2013) 1871), a part of the compensation plan devised by the German Government for both projects included putting in place a specific implementation and monitoring scheme involving a specific timetable.

4. For the construction of the new harbour in Tenerife, compensatory measures were required for expected effects on the priority species, *Caretta caretta*, the priority habitat "Fixed coastal dunes with herbaceous vegetation and 2 Natura sites. These included the following:

    1. The establishment of an independent and permanent foundation to monitor the status and trends in local biodiversity as well as assuring that mitigation and compensatory measures are carried out properly.
    2. Designation of a new Site of Community Importance (SCI) (area 0.93 ha) for the protection of the plant *Atractilys preauxiana*
    3. Designation of 2 new SCIs that host sandbanks that are slightly covered by sea water all the time
    4. A monitoring programme to assess the conservation status of *Caretta caretta* and
    5. The implementation of a restoration project for an SCI to re-establish its favourable conservation status.

5. With regard to the Nied example, compensatory measures were required for the loss of ca 3.75 ha of salt meadow and subhalophytic meadow (which are listed as priority habitats in the EU “Habitats” Directive). There were three separate measures taken to address those losses. These were:

    1. Preservation of the remaining 31 ha of salt meadows near the rail way line by means of a management agreement between the contacting 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 Marsh. 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 focusing 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.

6. With regard to the Project Mainport Rotterdam, this 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 2500 ha from the sea (Maasvlakte 2) and

    - creation of a new area of 750 ha 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, 100 ha 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 did not involve creation of new habitat but entailed 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".

5.3 CONCLUSIONS REGARDING RELEVANT 6(4) PROJECTS

These six examples of IROPI projects, all of which included priority habitats and that were accepted by the Commission are of considerable relevance to developing compensatory measures for loss of non-priority habitats. The 3 German compensation plans C(2018) 466, C(2015) 9085 and C(2013) 1871, included the implementation of maintenance and monitoring measures to ensure that the compensatory measures were successful. In the Tenerife example, the implementation of a restoration project to re-establish a favourable conservation status is the relevant aspect of the successful compensation measures accepted by the Commission. In the Nied example, a management plan for remaining areas of the priority habitat "salt meadow" proved acceptable to the Commission. In relation to the loss of Intertidal in the Rotterdam case, the designation of an area as a marine reserve was accepted by the Commission.

These successful 6(4) examples helped guide the approach to the identification of Compensatory Measures undertaken by GHC for the GHE project now proposed herein.

Those examples included preservation by agreement with farm owners, of similar habitat types to those impacted, including, monitoring restoration and land management as well as reduced sea bed disturbance.

6 REVIEW OF LOCATIONS AND METHODS CONSIDERED FOR COMPENSATORY MEASURES

6.1 PRELIMINARY SURVEYS

Having regard to the seven criteria for designing compensatory measures as set out in the EU Guidance document on Article 6 of the "Habitats" Directive 92/43/EEC (EU, 2018) and taking into account the EU Precedents as arising, a study of possible suitable areas within Galway Bay for the development of compensatory measures commenced.

The desk studies, including a review of published data *e.g.* literature on the NPWS website and published data (NPWS, 2006; McCorry, 2007; McCorry and Ryle, 2009; NPWS, 2013a) were also reviewed. Available mapping, aerial photography and walk over surveys initially looked at the northern coastline of Galway Bay to the west of Barna and beyond Spiddal towards Rossaveal.

Consideration was given to the creation of both Intertidal and Stony Bank habitats within the boundary of the Galway Bay cSAC but as this would require possible destruction of qualifying interest habitats and that also there would be a level of uncertainty that the created habitat would last in perpetuity, this type of compensatory measure was not examined any further.

The initial search of the northern shore did not yield locations where adequate areas of the habitats in question could be found that would be suitable for the development of compensatory measures.

Following reviews with NPWS and ABP in late 2016 the focus shifted to Inner Galway Bay along the Eastern shoreline from Oranmore to Rinville to Ardfry and to Tawin Island, see Figure 7: Key Plan of Survey Areas.

Field survey work comprising walking the shoreline to record Intertidal habitat types and Stony Bank found that the most extensive areas of these habitat types were present at Tawin.

The Tawin area was therefore selected as the preferred site for a more detailed qualitative study to determine which part of Tawin Island would be most suitable for the identification of compensatory habitat areas, in terms of developing management plans for ecological restoration / improvement of these habitats.

Figure No. 7 – Key Plan of Survey Areas, Inner Galway Bay.

6.2 QUALITATIVE SURVEYS

Three areas on Tawin Island were identified for qualitative surveys, see Figure 8 below, of a complex of fucoid-dominated reef habitat and Mud and Sand flat habitat and Stony Bank:

1. Mweeloon Lagoon,
2. Glasheen Island and
3. Tawin West.

The qualitative survey work was carried out in April 2017 and a summary of the results can be found in Appendix No. 7.

Figure No. 8 - Locations of the 3 Tawin Study Areas.

Of the three sections of Tawin Island examined, the area of Mweeloon [No. 1] is considered the most similar to the area where the proposed expansion of the Galway Harbour is proposed. This is because it is less exposed as it faces to the northwest and the fetch distance to the north shore is *ca* 5 km. The Renmore site is also sheltered from the strong southwest and westerly winds as it protected from these winds by the Mutton Island causeway, so the storm fetch is southerly and south easterly also of *ca* 5 km.

The fetch distance of Tawin West and Glasheen Island is potentially thousands of kilometres. This is reflected by the clear signs of coastal collapse observed at both these areas. Furthermore, the exposed nature of the southern shore makes it impossible for finer sediments to accrete and therefore does not allow Mud and Sand flats, exposed at low water, to occur there. This habitat type only occurs in the inner parts of both Glasheen Island and Tawin West.

Observations also showed that although there is some erosion, the northern shoreline of Mweeloon is experiencing a lower level of erosion in comparison to the southern shore of Glasheen Island and Tawin West. Given the lower level of exposure along the northern shoreline of Mweeloon, sandy sediments can and do accrete there and there are extensive areas of this habitat type at that location. Sea weeds are abundant on this shore whereas macroalgae only occur on the lower half

of the southern shore at Glasheen Island and Tawin West. The sheltered nature of the inner parts of Mweeloon Bay give rise to muddy sediments and lug worm casts were noted on the surface of these sediments.

To the north of Mweeloon lagoon there is a well-developed area of Stony Bank habitat which shelters the lagoon and the fringing Salt Marsh habitat which occurs along the southern and eastern shore of the lagoon. Most of the Stony Bank habitat occurs on Lurgan Island with a smaller area of habitat occurring on the mainland to the east of Lurgan Island, see Figure 9: Area identified for detailed study.

6.3 IDENTIFICATION OF STUDY AREA FOR DETAILED STUDY

The EU precedents referenced earlier with respect to the provision of compensatory measures, *i.e.* Nied and Rotterdam and others, were based on the principle of ecological restoration / improvement of existing habitats under specific management plans for the habitats in question. A similar approach is proposed for the development of proposals for compensatory measures for the development of the Galway Harbour Extension.

- A key element in the development and implementation of an appropriate management plan is the necessity to have full control of the activities on or adjacent to the habitats in question. This can be best achieved, in this case, by acquiring ownership of appropriate lands and control of licences for marine areas where same exist.

The qualitative surveys have established that two separately owned land holdings that adjoin Mweeloon Lagoon together with the adjacent shorelines include significant areas of both Intertidal and Stony Bank habitats that could be considered, subject to further detailed study, as candidate areas for the proposal for compensatory measures under targeted management plans.

This “study area” outlined in red on Figure No. 9 was subjected to further detailed quantitative studies, both terrestrial and marine, in August / September 2017.

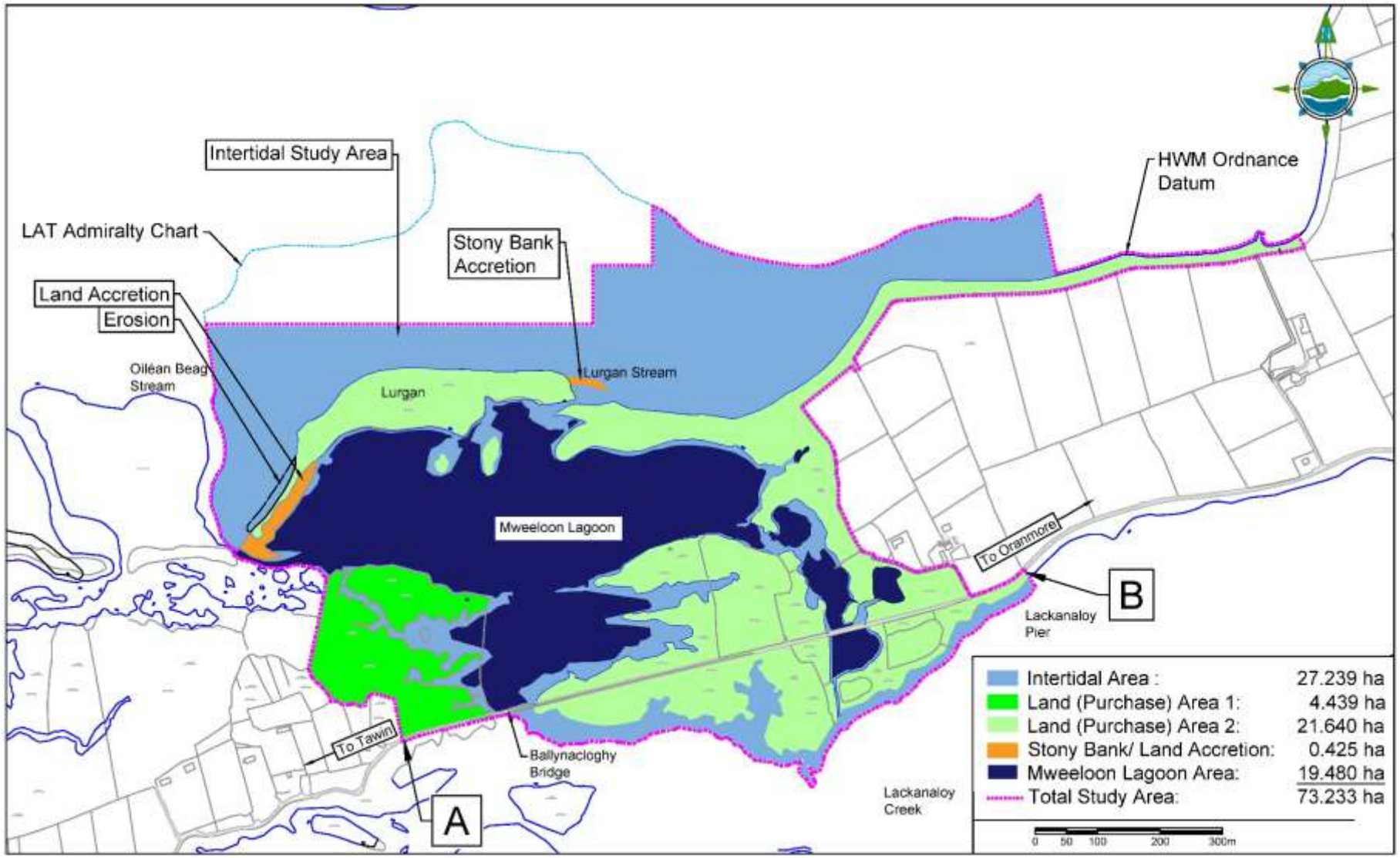

Figure No. 9 – Area identified for detailed study, at Mweeloon, Tawin.

7 QUANTITATIVE SURVEYS AT MWEELOON

7.1 INTRODUCTION

Surveys of the Intertidal and Stony Bank habitats for which compensatory measures are required were carried out in August / September 2017 to provide species lists and quantification in terms of numbers of species and spatial extent of each habitat. The full reports for these habitats are presented in Appendices No. 8, 9 and 10 of this report.

7.2 REFERENCE SITES

In carrying out the qualitative and quantitative surveys of the lands Mweeloon Lagoon, it was also necessary to select "reference sites" within the sites to be selected and with the same characteristics as the areas of the sites to be managed for biological restoration so as to allow for the comparison of these reference areas with the managed areas of the site.

7.3 INTERTIDAL HABITAT

The survey findings for the Intertidal habitat are included in Appendix No. 8. The 66 shoreline transects (T1 – T66, see Figure 3.1 of Appendix 8) of the area of Mweeloon surveyed as part of this quantitative survey fall into a number of different categories. The first category is the eighteen shore line transects that face north into Galway Bay (T 1 – T10 and T59 – T66). The coast here experiences full daily symmetrical tidal variation including the longer lunar variations of the Spring and Neap cycles. These shores show the full range of zonation associated with such tidal conditions. At low water Spring tide, the length of the exposed shore is up to *ca* 200m particularly at the eastern end of Lurgan Island. The supratidal habitat along the entire length of this northern shore is comprised of limestone boulders and cobbles interspersed with gravel. The profile of this habitat is very steep but shallows rapidly as it continues into the upper shore habitat. The shore profile continues to level out with distance from the shore and by mid tide, it has flattened out considerably. Lower shore substrates at these sites are a sandy shell substrate with bivalves such as oysters (*Ostrea edulis*) and clams (*Tapes* and *Dosinia*). Small amounts of live maerl (*Lithothamnion* sp.) can also be found at low water. Although some intravariation in lichen and algal species was recorded in these sixteen transects *e.g.* some lacked *Pelvetia* or *Ascophyllum*. Overall, the typical zonation pattern was recorded on these shores with lichen species occurring in the supratidal and high shore levels followed by *Pelvetia, Fucus spiralis, F. vesiculosus, Ascophyllum* and finally, *F. serratus.* Band width of these algae can be tens of meters in extent. These algal species are also all found at the Renmore site where the proposed harbour extension is planned. At the western end of Lurgan Island where the outflow from Mweeloon Lagoon via Oileanbeag Stream fans out to a width of *ca* 100m, this zonation pattern is far less clear as there is always some level of water that covers the substrate.

With regard to invertebrate taxa, they too show the classic zonation with isopods (*Ligia*) occurring under stones above high water and talitrid amphipods present in rotting weed at the High Water mark, littorinid gastropods and amphipods in the *Pelvetia* zone, other littorinid species, limpets and dog whelks and barnacle species at mid shore levels and echinoderms and bivalves at low water. As for the algae noted above, these invertebrate species are also found at the Renmore site.

At the two locations to the east and west of Lurgan Island where sea water enters and leaves Mweeloon Lagoon at Lurgan Stream and Oileanbeg Stream dense populations of mussels (*Mytilus edulis*) were observed. Mussel beds are also a feature of the Renmore site.

There is some aquaculture (Oyster *(Magallana (Crassostrea))* production being carried out off the north shore of Mweeloon and access to the production and/or spat collection sites is via tractor along the shore from the east. The trestles on which the oysters are grown have localised impacts on the sea bed ecology by shading the sea bed from direct sunlight and thereby reducing algal

growth, causing minor alteration in oceanography and therefore affecting Intertidal ecology and faeces from the oysters falling on the sea bed and causing changes in sedimentary conditions. The passage of tractors along the sea shore crushes sea weeds. Animals that live on stones or in the sediment also can be crushed.

The non-native invasive tunicate, *Didemnum vexillum* is present adjacent to and at the fish farm sites. See Appendix 9 “Management Options for *Didemnum* by Martina O’Brien and Dr. Tasman Crowe”.

Given the fact that Intertidal communities are exposed to a wide range of physical and chemical variability *i.e.* large variations in Winter and Summer temperatures and salinities and high levels of perturbation due to wind and wave action and violent storm surges during exceptional hurricane events, their sensitivity to impacts is low and their recoverability is high.

As outlined in Section 2.1, the extent of the Intertidal habitat *i.e*. Fucoid dominated reef and Mud/Sand flat complex to be impacted arising from the development of the Galway Harbour Extension at Renmore is 5.93 ha as measured to the low water mark LAT [Lowest Astronomical Tide].

In order to allow for direct comparison of that part of Galway Bay at Renmore with the area around Tawin, the same tidal datum has been used in Tawin. Besides allowing for the direct comparison of the two areas, it is important that the LAT datum is used as much of the aquaculture activities off Mweeloon occur around this datum.

The extent of Intertidal habitat both on the perimeter of Mweeloon Lagoon and on the foreshore to the north extending out to the LAT datum that is being offered for management is 27.239 ha, see Figure 10.

The areas being offered as Intertidal habitat will be cleared of existing fish farming or preserved free of fish farming where it has not yet been developed. Monitoring will be undertaken throughout the proposed Intertidal preserve areas to record, recovery where fish farming will have been removed, and record the long term condition of unfarmed areas, and compare these with the respective lagoonal areas. Separate reference site areas will not be required for Intertidal areas.

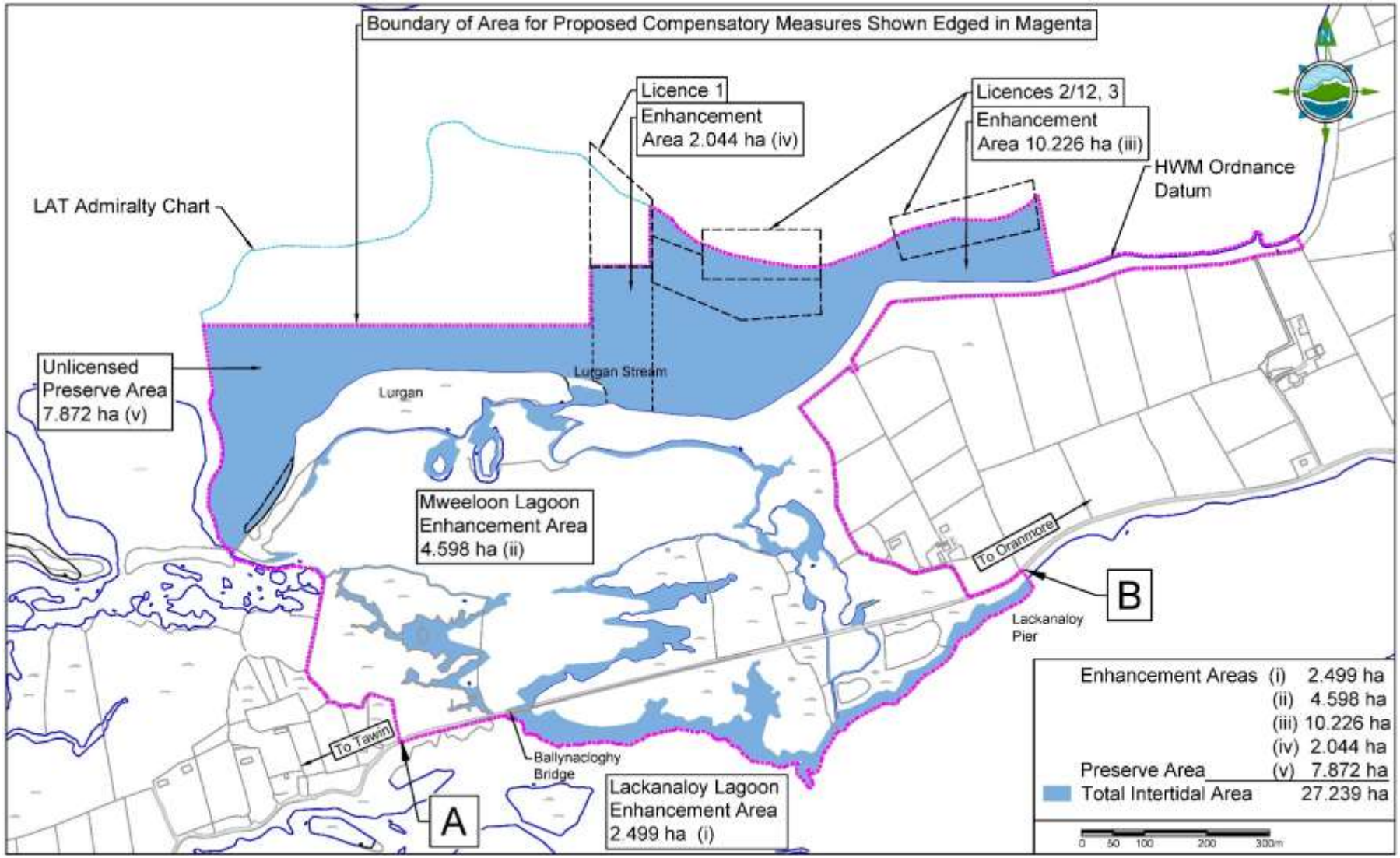

Figure No. 10 – Intertidal Management Area.

7.4 STONY BANK

Figure 11 shows the area of Stony Bank in the Mweeloon Lagoon study area.

Results of the survey of Stony Bank are included in Appendix No. 10. The main species of the vegetated shingle areas is the tall grass species *Arrhenatherum elatius* with *Festuca rubra*, *Galium verum, Plantago lanceolata* and *Trifolium repens* also locally common. On a small area of the high shingle ridge, where a skeletal calcareous soil occurs, there is development of species-rich calcareous grassland vegetation characterised by the occurrence of rarer, base-demanding plant species such as *Thymus polytrichus, Carlina vulgaris, Sesleria caerulea, Campanula rotundifolia, Koeleria macrantha* and *Linum catharticum*.

- The occurrence of calcareous grassland vegetation on vegetated shingle is very rare.

Along the northern shore of the island there is a wide shingle beach with a narrow band of pioneer shingle vegetation. This species-poor shingle vegetation is generally dominated by large rounded cobbles and is typically dominated by *Raphanus raphanistrum* subsp. *maritimus* with frequent *Festuca rubra* and *Arrhenatherum elatius.*

During the survey the attractive yellow-horned poppy *Glaucium flavum* was noted growing on shingle substrate. Along the Atlantic coast of Ireland, this species is very rare and the shingle beaches of Inner Galway bay are the most northerly sites known along the west coast of Ireland.

- The rare and attractive Yellow-Horned Poppy, *Glaucium flavum,* is a very distinctive species which has never been recorded at Renmore.

The extent of Stony Bank to be impacted arising from the development of the Galway Harbour Extension is 0.35 ha whereas the extent of Stony Bank to be found on the Study Area is 3.053 ha.

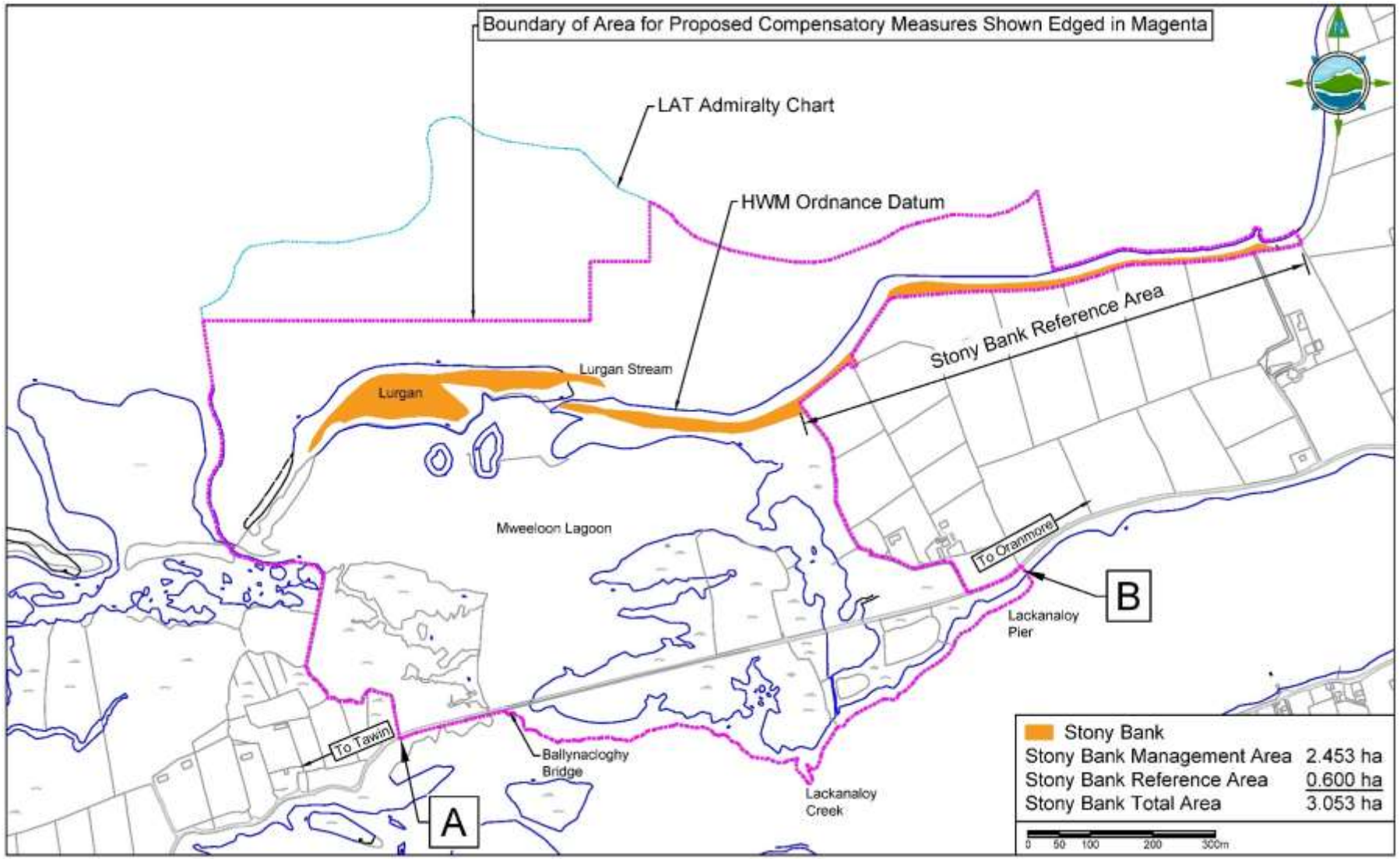

Figure No. 11 – Stony Bank Management and Reference Area.

8 COMPARATIVE ANALYSIS OF RENMORE AND MWEELOON

8.1 INTERTIDAL AREAS AT RENMORE AND MWEELOON

Mud flat habitat was not recorded at either the Renmore or the Mweeloon site.

Only small areas of Sand flat were recorded for the Renmore site while at the Mweeloon site, this habitat is more extensive. The two sites are comparable in terms of the extent of coarser, shelly gravel material. Fucoid-dominated communities were present at both sites and contained the same suite of macroalgal and macroinvertebrate species. Both areas support populations of blue mussels, *Mytilis edulis*, with the Renmore site having a greater spatial extent of this species. Both areas also support populations of native oysters.

There are some differences between the two sites and these are in the area of sediment chemistry. As a consequence of the residue of the historic organic loadings, now partly relieved by the Mutton Island Treatment Plant and of the remaining organic loading of the River Corrib System, the Intertidal area at Renmore remains significantly impacted and is classified there as inadequate / unfavourable status on a National scale [NPWS (2013b)].

The Intertidal sediments of the northern shore of Mweeloon that face Galway City experience little or no enrichment from organic carbon loading and the sediment chemistry of this shore is different to that at the Renmore site with normal levels of both oxygen and sedimentary hydrogen sulphide. However, intertidal sediments within the lagoons are oxygen-poor and high in levels of hydrogen sulphide. These conditions naturally come about due to low current speeds within the lagoons whereby settlement of fine particles with natural levels of organic content settle out to the sea bed and over centuries, have built up and give rise to these sediment chemistry conditions

8.1.1 Aquaculture at Mweeloon

Historically, the eastern part of Galway Bay was a well-known area for dredging the native oyster, *Ostrea edulis.* However, in the latter part of the last century, the parasite, *Bonamia* devastated the native stock of oysters and commercial culturing of the non-native but *Bonamia*-tolerant, Pacific oysters *(Magellana (Crassostrea) gigas)* began.

Along the north shore of Mweeloon Lagoon there are licenced sites that are used to grow Pacific oysters (*Magellana gigas,* see Figure 12, for locations of license sites) in plastic mesh bags. The bags rest on low-lying trestles that are placed at low water and the oysters feed on phytoplankton in the sea water. As they grow, they require grading to separate out the faster growers from the slower ones. Furthermore, the bags can become heavily fouled by sea weeds and other marine organisms. For these reasons, the trestles are visited at low water on Spring tides when the farmer cleans the bags and grades the stock. Tractors are used to carry equipment, stock and personnel to the trestles. The cycle from small oyster to market size takes about 2 to 3 years at which time the stock is sold to market.

These aquaculture activities all give rise to negative impacts on the Intertidal habitat in the following ways:

- The trestles and the bags in which the oysters are grown have localised impacts on the sea bed ecology by shading the sea bed from direct sunlight and thereby reducing algal growth, causing minor alterations in oceanography and therefore affecting intertidal ecology. Faeces from the oysters falling on the sea bed cause changes in sedimentary conditions.
- The passage of tractors along the sea shore crushes sea weeds. Animals that live on stones or in the sediment are also crushed.

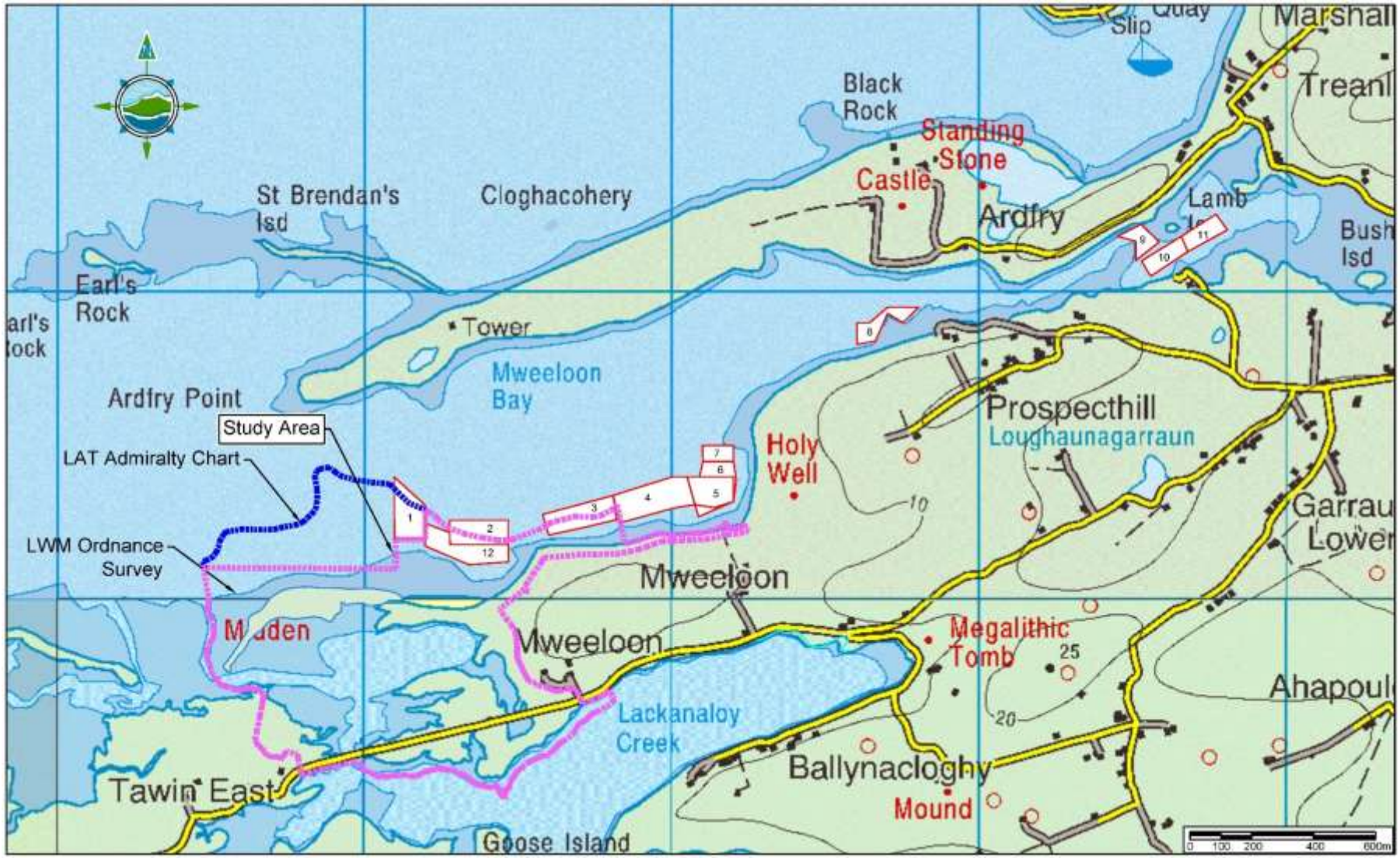

Figure No. 12 – Aquaculture licence sites in Study Area.

The aquaculture sites off Mweeloon north east of Lurgan, see [Photograph 1] are serviced by tractors which travel westwards from the access point opposite licence area 5. The invasive, non-native tunicate, *Didemnum*, has been recorded in the oyster culture sites in the general area of Tawin. See inserts into [Photograph 1] showing *Didemnum* on oyster trestle frames.

Photograph No. 1 – Oyster trestles northeast of Lurgan, Tawin and *Didemnum* examples.

8.2 STONY BANK AREAS AT RENMORE AND MWEELOON

The area of Stony Bank habitat at Mweeloon is much larger in extent and is in better ecological condition than the area of the same habitat at Renmore. The area at Renmore contains a number of non-native plant species, most notably *Lactuca tatarica*, which reduces the ecological condition of the habitat.

At Mweeloon, the Stony Bank habitat supports a small population of the rare yellow-horned poppy (*Glaucium flavum*).

8.2.1 Winter / Spring Grazing at Mweeloon

Field surveys of the Stony Bank habitat at Mweeloon during the Summer and Autumn of 2017 revealed the habitat to be in relatively good condition with little indication of overgrazing or habitat disturbance. This relatively good condition is due to the absence of the heavy grazing/poaching pressure which was present during the late winter/early Spring of 2017. In the Spring of 2017 there was evidence of localized vegetation and soil disturbance due to overgrazing and trampling on the eastern portion of the Stony Bank habitat at Mweeloon where livestock had unhindered access. Evidence of poaching and overgrazing by cattle has also been observed during the Spring months in subsequent years.

Photograph No. 2 – Grazing / tracking on Stony Bank habitat at Mweeloon (Spring 2017).

9 AREAS FOR MANAGEMENT UNDER COMPENSATORY MEASURES FOR THE GHE

As indicated in Section 6.3, to ensure full control into the future for the management of the ecological restoration of the habitats to be compensated for would be best achieved by acquiring the land ownership of the areas shown in dark green / pale green and control of some of the aquaculture licences that exist in the marine Intertidal area shown in blue in Figure 10.

Purchases of Land
Galway Harbour Company has therefore entered into binding agreements entitling it to purchase outright parts of two separate land holdings and 3 year binding option agreements commencing 01.12.,2018 entitling it to purchase control of 2 licenced aquaculture areas within the area shown in blue, within the Study Area. See Appendix 20 which provides confirmation by the GHC Solicitors Blake and Kenny of the land purchase and aquaculture licence control agreements achieved.

The extent of these land holdings are:-

Part of Folio GY11234	4.439 ha
Part of Folio GY44409	21.640 ha
Total Area to be Acquired	**26.079 ha**

Figure No. 13 following shows the extent of Stony Bank on the lands to be purchased.

It also shows the extent of Intertidal habitat which comprises lagoonal Intertidal area around the Mweeloon Lagoons relating to the lands agreed to be purchased and the marine Intertidal area on the northern sea shore of those lands.

Purchase of Control of Aquaculture Licences
Control of the lagoonal Intertidal area of 7.097 ha, 2.499 ha at Lackanaloy Lagoon and 4.598 ha at Mweeloon Lagoon arises on foot of the land acquisitions, stated above.
Control of the marine Intertidal arises as follows;-

- Options for the purchase of control of aquaculture licences relating to areas 1 and 3 have been entered into. The purchases of control will complete within 3 months of F.G.S.P. (Final Grant of Satisfactory Planning Permission) and all trestles and associated equipment will be removed from area 3 within 3 months from completion of the purchase.

- An option agreement has also been entered into for the exchange of licenced area 1 for area 2 involving therefore the removal of all aquaculture activities from areas 2 and 3 which are close to each other. This exchange of licence area 1 for receipt of area 2 will also be implemented within 3 months of F.G.S.P. whiles allowing the owner of area 2 a further 12 months to vacate area 2 so that during that time the transfer of the trestles and oysters from area 2 to area 1 can be completed.

- The licence application for area 12, by the holder of the licence for area 2, (12 had been proposed to replace 2) has been withdrawn as agreed. The contract for the exchange of area 1 for area 2 agrees that the area south of Areas 1 and 2 (including area 12) will not be subject to further licence application by the Licencee, who has the use of that area to service Licence Area 2. The licencee of area 2 has also agreed not to apply for any further licence on any of the area to the west of area 1 and as shown within the boundary of the area of the proposed compensatory measures as shown on Figure 10.

For licenced areas see Figure 12.

9.1 ENHANCEMENT OF INTERTIDAL AND STONY BANK AREAS

Enhancement of the Intertidal areas as shown on Figure 10, will be as follows:

i) 2.499 ha of lagoonal Intertidal habitat at Lackanaloy Lagoon which is foreshore to the lands agreed to be purchased.

ii) 4.598 ha of lagoonal Intertidal habitat at Mweeloon Lagoon. This lagoon is surrounded by lands which GHC have agreement to purchase and which also contain some other minor perched lagoons / ponds.

Both these areas of Intertidal habitat which total 7.097 ha will have the benefit of the proposed Intertidal Management Plan which includes land purchase, land management to control run off, litter control, *Didemnum* monitoring and control, survey and annual report.

iii) 10.226 ha of marine Intertidal habitat. This is the eastern section of the marine Intertidal habitat within which the options for the acquisition of control of existing active aquaculture licences 2 and 3 have been contracted. This area will benefit from control of aquaculture licences, land purchases, land management, litter control, *Didemnum* monitoring and control, removal of aquaculture, reduction in tractor access to adjacent aquaculture licence areas.

iv) 2.044 ha Marine Intertidal habitat, south of aquaculture licence area 1.

v) 7.872 ha. Total iv) and v) 9.916 ha. These are the western sections, which are south and west of Aquaculture Licence Area No. 1. These areas will be enhanced by the land purchase, land management, litter control, *Didemnum* monitoring and control and they will be preserved from further Aquaculture licence application / development. See Figure 10. [40.261 *Didemnum* Area].

The above 5 areas provide 27.239 ha of Intertidal area which will be enhanced. The 27.239 ha of Intertidal enhancement is proposed to be allocated

- 17.79 ha as the compensatory measure at the 3 : 1 ratio for the 5.93 ha of Intertidal proposed to be lost to the GHE development.

The 5 Intertidal sub-areas above are shown on Figure 13.

It has been agreed that Licence area 1 which to date has not been stocked with trestles and oysters, will, subject to revision of its licence conditions be serviced by boat. This will then further reduce the need for tractor access to sub-area iv) 2.044 ha.

The enhancement of Stony Bank areas will be as detailed in the Stony Bank Management Plan in Section 10.2.

Table No. 1 sets out the areas of the two habitat types contracted to be acquired for management under compensatory measures arising from the proposal to develop the Galway Harbour Extension.

The Table also indicates the area proposed to be used as a Stony Bank reference area.

Description	Habitat Type	
	Intertidal ha	Stony Bank Ha
Area of Habitat within the Compensatory Study Area *	27.239*	3.053*
Area to be reserved as Reference areas	----**	0.600**
Area of Habitat available for enhanced Management under Compensatory Measures within Study Area	27.239	2.453
Area of Habitat to be impacted by the development of Galway Harbour Extension	5.93	0.35
Area of Habitat allocated to be Managed under Compensatory Measures for the development of the Galway Harbour Extension**	17.790***	1.050***
Ratio management area to area to be impacted	3 : 1	3 : 1

Table No. 1 – Habitat Areas identified for Management within Study Area

*, *** Some of the area of the 27.239 ha of Intertidal and of the 3.053 ha of Stony Bank habitats are being allocated for compensatory measures for habitats historically impacted by earlier development by Galway Harbour Company at Galway Harbour Enterprise Park (GHEP). Those are described later in Section 15 and are as outlined in Table No. 2.

**A reference area will not be separately required in the Intertidal area. Sampling will be carried out across the entire area as all of the Intertidal area referred to will be maintained free from aquaculture and with much reduced tractor access. The monitoring within the Management Area of various lagoons, of former licenced sites and virgin areas, will provide the requisite reference data of the various Intertidal habitat recoveries, being obtained.

**A Stony Bank reference area is proposed for the eastern 0.600 ha of Stony Bank. This has been previously fenced off from the main land holding and has been little grazed. This area will be used as a reference area to study the merits of the enhanced managed light grazing proposed on the 2.453 ha. The light grazing of the 2.453 ha is preferable to the non-grazing of the reference area which is a long narrow strip which is most difficult to graze. The merits of the light grazing will therefore be apparent when compared with the non-grazed reference area proposed.

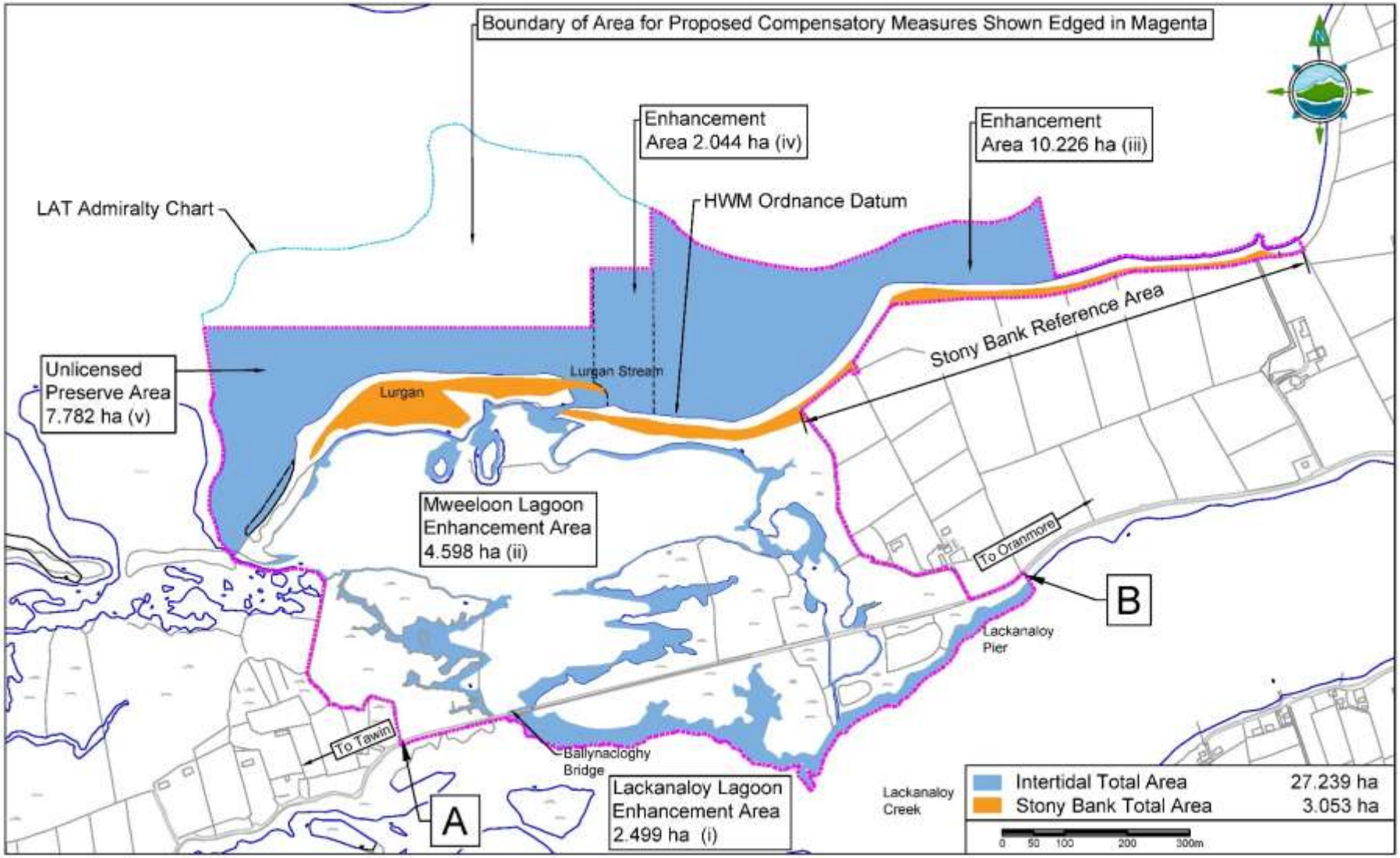

Figure No. 13 – Extent of Intertidal Habitat, Stony Bank Habitat and Reference Area within Study Area.

9.2 OBJECTIVES OF THE COMPENSATORY MEASURES PROPOSALS

The central objective of the planned compensatory measures being proposed is to provide for the ecological restoration (or biological improvement) of two habitats *i.e.* Intertidal Mud and Sand flats and Stony Bank, in order to repair damage caused by human activities that affect the diversity and physical quality of selected habitats in the vicinity of Mweeloon. Those activities include biological and physical impacts of agriculture and aquaculture. The impact of over-grazing is as previously referenced in NPWS reports (NPWS Salt Marsh Monitoring Programme Project, 2006. The principal impacts of aquaculture trestles are shading of the Intertidal area beneath them, tractor access to those trestles and faecal deposition from the oysters.

This type of compensation is among the types of compensation recommended by the EU, (EU, 2018) and see 4.1.7., above which states that compensation

> "*could consist of the biological improvement of substandard habitat within an existing designated site…"*

This approach was implemented in a previous successful IROPI case in Nied, eastern France [see Chapter 5 above] which involved compensation for a loss of priority habitat *i.e.* salt meadow, by conserving and managing remaining salt meadow habitat in that geographic region of the EU.

The purpose of this objective is to re-establish the structure and natural ranges of the habitats at Mweeloon.

The aims of the compensatory measures are to:

1. Re-establish the natural range of each habitat's ecological composition
2. Re-establish its structure and
3. In time, its dynamics.

As the two habitats that will be lost are ecologically different *i.e.* one is a marine habitat and the other is a terrestrial one, specific habitat management plans have been developed for each habitat. There is however some degree of overlap between the plans *e.g.* the benefits of enhanced land management, an annual monitoring plan and removal of flotsam and jetsam are proposed for each habitat.

The habitat management plans also note that immediately after aperiodic events such as the storms that Ireland experienced in 2014, 2017 and 2018, surveys are required to document any changes in the two habitats brought about by these violent events. Changes resulting from storms include the erosion of soil and terrestrial vegetation along the shoreline, the piling up of large volumes of algae, cobble and stone and potentially, the breeching of the lagoonal shoreline.

The elements included in each of the management plans have been selected to ensure feasibility and that there will be no ambiguity or concern about any one of the measures failing.

In relation to the aquaculture activities off Lurgan Island, the holders of licences 1 and 3 have contracted options that they will, subject to F.G.S.P., surrender the control of these licences to GHC. GHC has also contracted an option for the exchange of control of Licence Area 1 for Licence Area 2. The removal of trestles from Licence Areas 2 and 3 will reduce the surfaces which host the invasive species *Didemnum vexillum* (referred to herein for simplicity as *Didemnum")* and removal of those trestles will help in the control of *Didemnum* in the *Didemnum* management control area as proposed and as shown on Figure 14. The removal of the trestles and making fallow former licenced areas will restore those areas to their prior condition.

The agreements reached regarding the purchase of control of Areas 1 and 3 and exchange of control of Licence Area 1 for 2 also agreed that further application for licences by the adjacent licencees 1, 2 and 3 in the Intertidal area shown on Figure 10 will not be sought. It also agreed that

an additional area of Intertidal habitat for *Didemnum* control be included, which is as shown on Figure 14 giving a total *Didemnum* management control area of 40.261 ha.

In relation to the Stony Bank habitat, a critical part of ensuring the success into the future of the management plan is that the lands in question will be owned by the Harbour Company. This has been achieved. Refer Appendix No. 20.

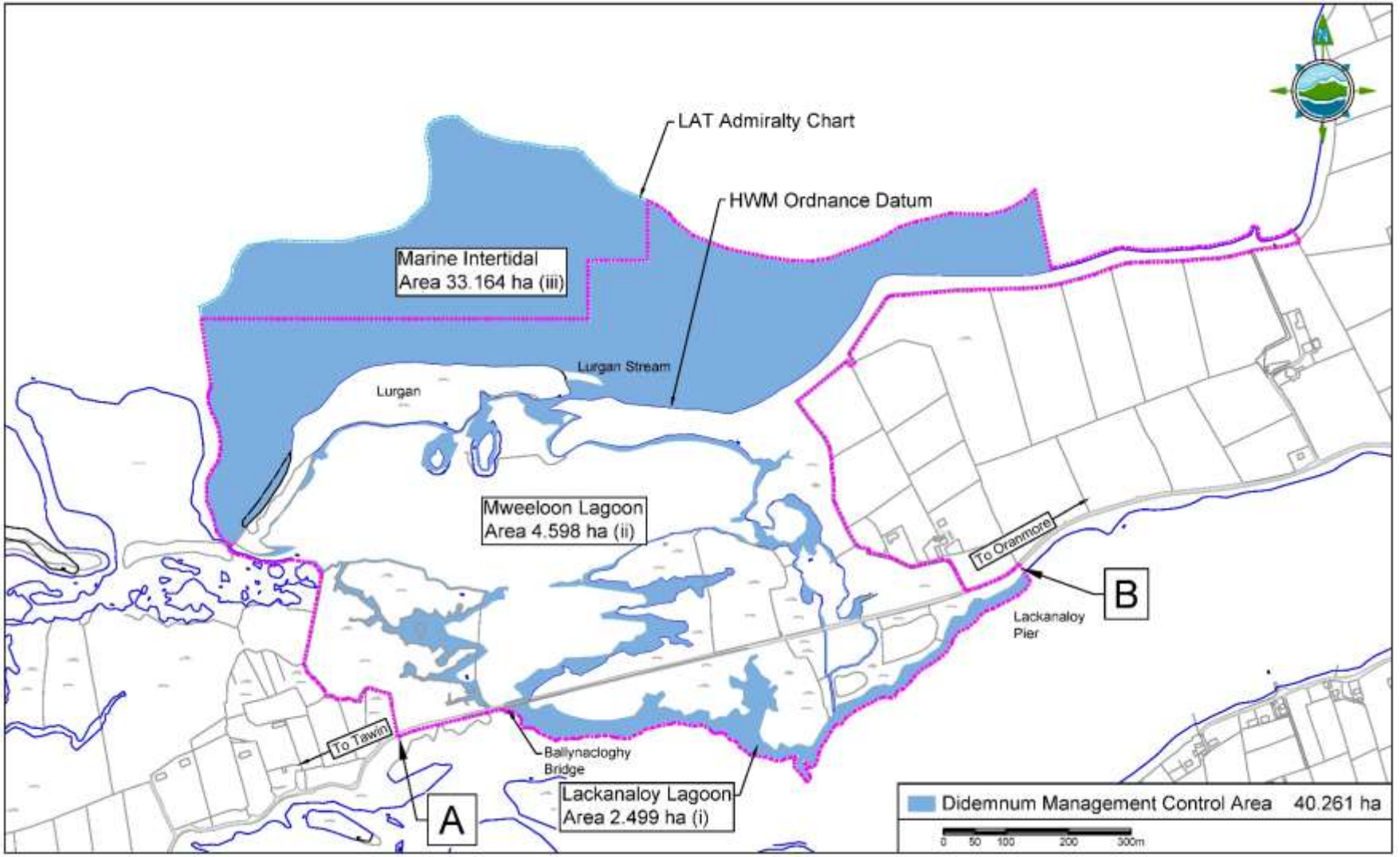

Figure No. 14 – *Didemnum* management control area.

9.3 THE DESIGN OF THE MANAGEMENT PLANS FOR INTERTIDAL AND STONY BANK HABITATS

The design of the Management Plans took into account EU Guidance on Article 6 of the "Habitats" Directive (EU, 2018) which lists the following 7 topics:

- Targeted compensation
- Effective compensation
- Technical feasibility
- Extent of compensation
- Location of compensatory measures
- Timing of compensation
- Long term implementation

In order to comply with the Guidance Document, these 7 criteria were used to identify and develop compensation measures for the GHE project. The principles set out in the Commission's Guidance on Article 6 (EU, 2018), see pages 55 – 73 Appendix 2, are elaborated on below.

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.

- The 2 habitats that will be affected by the proposed Galway Harbour Extension are Intertidal Mud and Sand flats and Stony Bank and these are the focus of the management plans proposed.

Effective Compensation
Compensatory measures must be feasible, operational and measurable and so provide provable results in reinstating ecological conditions needed to ensure the overall coherence of the Natura 2000 network.

- The environmental enhancements to be provided will be measurable and effective.
- The proposed methods to control the non-native invasive tunicate species, *Didemnum vexillum* have been shown to be effective
- The removal of oyster trestles and related tractor access traffic will reduce impact on these areas
- The proposed stocking densities and agricultural practices are effective measures to minimise impacts on the terrestrial habitat.
- The Intertidal and Stony Bank Management Plans will bring other measurable benefits as listed in those plans in Sections 10.1 and 10.2 herein.

Technical Feasibility
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.

- The proposed Intertidal management plan has been designed to ensure reinstatement of ecological conditions and the compensatory measures proposed are feasible.
- The proposed terrestrial management plan is technically very feasible.

Extent of Compensation Measures

Compensatory 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, compensatory areas should be based on the areas lost by the project. The EU Guidance document on Article 6 (EU, 2018 p. 67) 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 shown that with such an extent, the measures will be fully 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)".*

- The compensatory measures propose ratios for the GHE impacts of 3 : 1 and the measures will be implemented before the damage occurs, as previously indicated on Table 1, Section 9.

Location of compensation measures

- The proposed compensatory measures are located within the Galway Bay cSAC (site code 000268). This complies with the advice of the Guidance Document.

Timing of compensation

The EU Guidance on Article 6 (EU, 2018 p. 69) notes that a site must not be irreversibly affected *i.e. commencement of development works* before compensation is in place[1] 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 measures[2].
- The implementation of the measures can commence within 3 months of F.G.S.P. and will show positive environmental results commencing directly.

Long term implementation

Compensatory measures being proposed take into account a number of different aspects of what the EU Guidance Document on Article 6 (EU, 2018, pages 69 and 70) regards as long term implementation and these include:

- applying binding enforcement tools at the National level to ensure the full implementation and effectiveness of compensation
- applying the necessary legal means in cases requiring land or rights purchase, is deemed essential for the effective implementation of the compensatory measures and
- establishing monitoring programmes to ensure that the compensatory measures are maintained over the longer term.

[1] See section 3.7.15 of the Guidance Document

[2] As required under Section 3.7.15 of the Guidance Document.

The EU Guidance document notes that compensatory measures must be feasible and operational in reinstating the ecological conditions needed to ensure the overall coherence of the Natura 2000 network.

- The management plan complies with each of the above criteria. This is described in more detail in Section 13 (comparison with guidance criteria) of this document for both Intertidal habitats and Stony Bank habitat and primarily relate to the level of control possible when the lands and licences are purchased.
- The cost of the implementation will be borne by the GHC.

10 MANAGEMENT PROPOSALS AND IMPLEMENTATION PLANS

10.1 MANAGEMENT PROPOSAL AND IMPLEMENTATION PLANS FOR INTERTIDAL AREAS

This complex of two different marine habitat types [Fucoid dominated reef (1170) and Mud and Sand flat (1140)] are found throughout the Tawin peninsula. In the proposed management area, the habitat covers an area of *ca* 27.239 ha as measured to the bottom of the Admiralty Lowest Astronomical Tide (LAT). The proposed management plan for the selected site in Tawin will bring about biological improvement of the Intertidal habitat and protect the habitat in the long term, and help to re-establish the structure and functioning of this habitat within the Natura 2000 site. The Management Plan will include the following 14 components:

- Purchases of control and exchange of aquaculture licences will be completed within 3 months of F.G.S.P. A satisfactory planning permission being when the entire planning process will be deemed to be complete and final and GHC are satisfied to commence the development (F.G.S.P.).
- Implementation of the management plan for the Intertidal habitat will commence within a further 3 months, total 6 months.
- Trestles will be removed from Licence Area 3, commencing within 6 months and from Licence Area 2 commencing within 18 months. Trestles will have been fully removed from Area 3 within 12 months and from Area 2 within 2 years.
- The benefits of the removal of oyster trestles will begin to arise directly on removal as the shading will be removed and oyster faeces will be scoured away by succeeding tides particularly the next set of Spring tides, total 6 months. The reduction in tractor use and access will allow recovery to commence directly. After 12 months significant recovery will have been achieved in this habitat, total 18 months.
- *Didemnum* control will commence within 3 – 9 months depending on time of year, after the initial 3 months for completion of purchase. Immediate improvement will begin to be achieved which will be apparent within a further 3 months, that is within 9 - 15 months of F.G.S.P. The *Didemnum* monitoring and control will be pursued as a long term measure thereafter over the entire of the area as shown on Figure 14 and for as long as *Didemnum* remains an issue.

No	**Intertidal Management Plan** **Management proposal and implementation plans for Intertidal Areas**
1	Carry out on an on-going basis a programme to control the colonial non-native tunicate [marine invertebrate] *Didemnum vexillum* at the locations of the oyster farms to be removed and extended area adjacent to Mweeloon Lagoon, in accordance with methodology as briefly described later in Section 10.1.2 and more fully in Appendix 9, see Figures 10 and 14. Implementation: 1st late Spring – early Autumn (May to August) after F.G.S.P.
2	**Cease aquaculture** Finalise the purchase and exchange of control of licences for aquaculture on the foreshore with a view to removing the oyster trestles immediately and on a permanent basis, resulting in a permanent fallowing of aquaculture operations at these particular sites. Remove aquaculture structures in the management areas as they can cause changes in composition of benthic communities around them. They also support the non-native, invasive species, *Didemnum*. Implementation: 6 months after F.G.S.P.

3	**Cease construction of drainage channels** Prevent the construction of and cease the maintenance of any land drainage channels. Maintained drainage channels can give rise to greater volumes of either fresh or salt water being contaminated on the land and then discharging to the Intertidal area which in turn may alter the physical, chemical and biological characteristics of the habitat. Implementation: 3 months after F.G.S.P.
4	**Control tractor access** Tractors are used to access the aquaculture installations over Intertidal areas and in doing so, they damage algae and both epibenthic and infaunal species. Tractor access will be controlled by:- - The fallowing of aquaculture will reduce tractor use, - Restricting access route to along the highest part of the shore line but below the Stony Bank habitat as per aquaculture licences, - Tractor access will only be required for remaining aquaculture licence area 1, - Apply to change tractor access to licence area 1 to boat access, as agreed with licence holders. Implementation: 3 months after F.G.S.P.
5	**Eliminate winter and supplementary feeding** Eliminate winter feeding of livestock and all supplementary feeding and specifically the use of ring feeders on the adjacent purchased lands. This will stop related poaching and rutting of lands at feeding and at gate sites and help to prevent run off to the Intertidal habitat. The addition of nutrient to the Intertidal habitat causes changes in macroalgal species *e.g.* excessive growth of green algae. Implementation: 3 months after F.G.S.P.
6	**Prevent construction of sea defences** Prevent the construction of any further sea defence works or dumping of materials to act as a sea defence save for works or repairs of existing defences as referred to at paragraph 7 below. Such activities may cause physical damage to upper shore habitats. Implementation: 3 months after F.G.S.P.
7	**Sensitive repair of existing sea defence wall** In order to protect the Lagoon Priority habitat, sensitive repair of the existing sea defence wall to prevent erosion/ingress by the sea as may be required. The ecology and oceanography of the lagoon and its Intertidal habitat and species has the potential of being changed if the Stony Bank habitat is breached. Therefore, in order to protect the lagoon, some sensitive repair of the existing sea defence wall, at the north west of Lurgan Island, and as described in Section 17.1 will be undertaken as may be required. Implementation: 3 months after F.G.S.P. Annually and after significant storm events (see Bullet 11 following), GHC will survey the condition of the existing sea defence wall and will sensitively undertake repair, if required.
8	**Control flotsam and jetsam** Regular removal of flotsam and jetsam and other refuse. This is to improve the visual and aesthetic quality of the habitat. Implementation: 3 months after F.G.S.P. (and every 3 months thereafter) and immediately after a Force 9 or greater storm event.

9	**Annual biological surveys** Annual biological surveys of the habitats by GHC ecologists to document any changes in their extent and their characterising species. This is an essential scientific element of the restoration plan. Implementation: Annually during September, to be submitted to Galway Harbour Company by mid October.
10	**Review of plan** In the light of the results of the annual biological surveys, the GHC ecologist will adjust/modify the management plan and submit it to the Galway Harbour Company Board as the annual report. Implementation: Within 4 weeks after the annual surveys has been completed, mid November.
11	**Surveys after storms** Immediately following storm force 11, or greater events, carry out surveys to assess possible damage to this habitat. Such extreme events can give rise to sudden and extensive changes to the physical, chemical and biological characteristics of Intertidal habitats and it is important to document such changes directly after the event. This will also contribute to the recording of the natural recovery processes. Implementation: Within 10 working days after the storm event occurs.
12	**Independent audit of surveys** Commission an annual, independent audit of the progress of the management plan. This is to ensure that the annual surveys and management proposals can be independently reviewed and validated. Implementation: Complete 2 weeks after submission of the annual report to The Galway Harbour Company, 1 December.
13	**Modify plan following audit** In the light of the results of this independent audit and possible changes due to storm events, the GHC ecologist will adjust/modify the management plan. Implementation: After receipt of independent audit, 1 Dec. Submit annual surveys, audit and proposed modifications to co-ordinating Bodies*. This will be done by mid December annually, which process will make the annual report available to the public via the Galway City Council, Planning File.
14	**Signage** Erection of signage including drawings at chosen vantage points demonstrating what the project comprises and what species are contained within each habitat. Implementation: During Year 1 of the compensatory measures.

Notes:

i) **Control of Aquaculture Licences**
The Purchases are to be completed within 3 months of F.G.S.P. and implementation of Management Plan will commence directly accordingly.

ii) **Annual Monitoring Report Process**
The annual survey report and audit when reviewed and modified will be submitted to Galway City and County Council Planning Offices and other notice parties as may be directed by the planning condition in this regard. This putting of the annual report on the planning file will allow public scrutiny of the annual survey / audit. Should the public or the notice parties raise concerns about these reports, such concerns will be addressed

in the ongoing management and survey / audit process in the following management season.

*10.1.1 * Co-ordinating Bodies*

Co-ordinating bodies proposed are:-

1) Galway City Council, which is the Planning Authority for the GHE project and who will thus be notified that this important planning condition is or is not being honoured. Should any concern arise with regard to the continued implementation of these proposed compensatory measures, the Planning Authority for the GHE project will have the capacity to notify the GHC accordingly and thus ensure that implementation is continuously maintained in the long term.
2) Galway County Council, which is the Planning Authority for the area in which these compensatory measures are located. Galway County Council will also therefore be aware of the purpose of these management proposals and of the standards as being achieved.
3) NPWS, which is the Natura Authority will therefore be kept appraised of the success of these compensatory measures by the annual reporting system.
4) Teagasc and DAFM, both these bodies have particular relevance to the best available advice with regard to the management of both terrestrial and marine habitats. Should other bodies request to be part of the co-ordinating bodies, GHC will accept same as may be conditioned by ABP.

10.1.2 Cease Aquaculture

As noted in Section 8 above, along the north shore of Mweeloon Lagoon there are a number of licenced aquaculture sites that are used to grow Pacific oysters, see Figure 12 for licence locations, in plastic mesh bags.

Section 8 above noted that these aquaculture activities give rise to negative impacts on the Intertidal habitat. In order to reduce these impacts on the Intertidal habitat, GHC has agreed, as part of the management plan for the Intertidal habitat, to buy the control of 2 licences, 1 and 3, as shown on Figure 11 above. It was further agreed to exchange the control of Licence Area 1 for the control of Licence Area 2. This will allow the removal of the oyster trestles from areas 2 and 3 and thus leave those sites permanently fallow thereby preventing the impacts referred to above.

See Appendix 20 which confirms these agreements.

10.1.3 Intertidal Habitat enhancement Areas, Monitoring / Reference Areas

The Intertidal area to be provided comprises of 2 areas of Lagoonal Intertidal:-

i) 2.499 ha being a portion of that habitat within the bigger and more southerly Lackanaloy Lagoon.
ii) 4.598 ha being the entirety of that habitat within the Mweeloon Lagoon.

It also comprises of a further 3 areas of marine Intertidal.

iii) 10.226 ha presently partly licenced for use for oyster production on trestles and which are accessed by tractors at low tides. The control of these licenced areas has been agreed to be purchased subject to F.G.S.P., to allow such use to be ceased and the licenced areas cleared of the trestles and related materials. This will remove the need for the related tractor access.
iv) 2.044 ha south of Area 1 which is presently licenced for oyster production. This area will be preserved free from extension of oyster farm licencing.
v) 7.872 ha presently unlicenced and not subject to licence application. This area will be preserved free from further licence application and related tractor access.

Each of the 5 areas will benefit from various elements of the Intertidal management plans. The respective areas of greater / lesser enhancement will act as reference areas for the other areas as follows.

The full control of the Mweeloon Lagoon and reduced terrestrial stocking of its adjacent lands relative to the Lackanaloy Lagoon area, Areas (i) and (ii). Likewise, the removal of trestles and tractor pressures on (iii) and the measurable recovery therein relative to area, (iv) subject to some tractor access and (v) subject to no tractor access.

The Intertidal reference monitoring will therefore be within the Intertidal sub-areas as proposed and be on the basis of relative results from within those sub areas as outlined.

10.1.4 Control of Didemnum

The colonial non-native tunicate, *Didemnum vexillum*, has been recorded at a number of oyster farms in inner Galway Bay, one of which is located in Mweeloon Bay. It is probable that the tunicate was brought into Galway Bay in oyster spat imported into Ireland from France. As part of the proposed compensation plan, it is proposed to establish a programme to control the *Didemnum* population in Mweeloon. This programme will be designed and implemented by Martina O'Brien and Dr. Tasman Crowe of the Department of Zoology, University College, Dublin. See Appendix 9 for the full text of their report on management options for *Didemnum*]. Suitably qualified personnel will carry out the *Didemnum* control programme and prepare an annual report on the results.

Martina O'Brien carried out her Ph.D. research on the control of *Didemnum* in Clew Bay under the supervision of Dr. Crowe. The main findings of Martina O'Brien's research results were that *Didemnum* populations could be effectively controlled by the regular turning of oyster bags thereby causing the tunicates to dry out and die. For those colonies that live on the trestles, she found that spraying with acetic acid (vinegar) was an effective and inexpensive method to control the species. Both these techniques will be used in the *Didemnum* control element of the Intertidal management plan. The bag turning occurs all year round while the most effective period to carry out spraying with acetic acid is during the late Spring, Summer and early Autumn months on low Spring tides.

General background

Didemnum vexillum ("Didemnum"), a colonial ascidian (sea-squirt), native to Japan has become widely invasive in coastal marine ecosystems over the past two decades (Lambert 2009; Stefaniak *et al.* 2009). This species competes with native marine invertebrates for space and it can rapidly overgrow natural and man-made substrates (Minchin and Sides 2006; Gittenberger 2007; Bullard and Whitlatch 2009; Carman and Grunden 2010). Within aquaculture sites *Didemnum* can extensively foul equipment and stock resulting in increased operational and labour costs (Fitridge *et al.* 2012). Overgrowth can also reduce the growth and survival of commercially important species (Auker 2010; Piola *et al.* 2010; Switzer *et al.* 2011; Rolheiser *et al.* 2012; Fletcher *et al.* 2013). Artificial substrates enable high biomass populations of invasive species to persist in environments where they may otherwise struggle to remain. These populations act as a reservoir of propagules enabling the further spread of invasive species to other areas and regions.

Didemnum was first documented in Ireland in June 2005 where it was discovered fouling immersed man-made structures within Malahide marina (Minchin & Sides, 2006), North Co. Dublin. The hulls of boats, pontoons, chains, ropes and buoys were extensively fouled and assemblages of native biota were overgrown by colonies of this invader (Minchin & Sides, 2006). Subsequent to this initial discovery, it has been documented at a number of other sites throughout the country including Clew Bay, Carlingford Lough, Galway Bay, Strangford Lough and most recently in Dunmanus Bay, Co. Cork (Minchin & Sides, 2006; Kelly & Maguire, 2008; Kleeman 2009; http://woodshole.er.usgs.gov, pers obs.).

Site visit

In Galway Bay, the first documented sighing of *Didemnum* was in Parknallagh in July 2007 [see Appendix 9 for full report]. While no formal survey was conducted in the area, reports of the species have been made to the north and south of this initial recording, suggesting that the species has spread from an initial introduced source population or that multiple independent introductions have occurred.

On 9th, January 2018, a site visit to a licensed oyster aquaculture site in Mweeloon Bay was conducted. At the site, *Didemnum* was found growing over a range of artificial and natural substrates. Biofouled substrates included oyster trestles, bags, rubber ties, algae and other biofouling marine invertebrates. However, cultured oysters did not appear to be directly fouled by *Didemnum*. While *Didemnum* was predominantly found fouling trestles and substrates on the southern end of the site, it was not restricted to these areas (*i.e.* a number of colonies had become established on trestles further North). Colonies ranged in size and morphology from encrusting two dimensional mats to characteristic lobed growth forms. A small number of colonies were found growing over algae (*Ascophyllum nodosum*) along the shoreline.

Control and Monitoring Programme: General approach

As *Didemnum* has been established in Galway Bay since 2007 and multiple populations now persist in areas to the North and South of the site of interest, prevention and eradication no longer represent viable options for the management of this species. At this late stage of invasion, a comprehensive control programme represents the most appropriate management action for *Didemnum* in Mweeloon Bay. Control techniques implemented would reduce the abundance of *Didemnum* and impacts at the farm site and in the surrounding environment. Reduction in abundance at this site would also slow its spread beyond its current established range and create a “firebreak” to the spreading of *Didemnum* at the Compensatory Area at Mweeloon.

The general strategy recommended in this report involves substantially reducing the abundance of *Didemnum* within the first year of the programme and subsequently. This will involve management techniques to maintain the achieved reduced abundance level. This will be achieved through the application of simple but effective chemical (*i.e.* vinegar sprays) and physical (*e.g.* desiccation, hand removal) control techniques all of which have been shown to substantially reduce the abundance of *Didemnum* in similar field scenarios. It is intended that the control and monitoring programmes are implemented over a long term period (*i.e.* years).

It is proposed to control *Didemnum* in the Intertidal area as shown on Figure 14 *i.e.* the Intertidal area with the study area. This will be done in the Intertidal areas shown, at low Spring tides by mustering a team of operatives to spray any visible signs of the *Didemnum* with the recommended acetic acid. Galway Harbour Company will assist any of the existing adjacent fish farmers in Mweeloon Bay who are willing to co-operate / collaborate in this regard when their operatives are on site and will monitor the extent of crew needed to cover the Mweeloon Bay Intertidal areas to achieve the *Didemnum* control proposed.

10.1.5 Intertidal Habitat Expected Results

- Removal of trestles and aquaculture equipment to have commenced within 6 months of F.G.S.P. Such removals to be complete within 12 and 24 months of F.G.S.P. and benefits will begin to arise directly as trestles are removed.
- Control of litter / flotsam and jetsam to commence within 3 months of F.G.S.P.
- Management plan items to commence within 3 months of F.G.S.P. or appropriate time of year for *Didemnum* and annual reporting.
- Significant benefit will therefore generally have begun to arise within 6 months of F.G.S.P. and will have been significantly achieved within 24 months in each regard.

10.2 MANAGEMENT PLAN AND IMPLEMENTATION PLANS FOR STONY BANK

The compensatory measures for Mweeloon are also designed to bring about biological improvement of the Stony Bank habitat, to protect the habitat in the long term and help to re-establish the structure and functioning of this habitat within the Natura 2000 site.

- Purchases of lands will be completed within 3 months of F.G.S.P.
- Implementation of the management plan for the Stony Bank habitat will commence within a further 3 months, corresponding with the stage of the grazing season then arising.
- The benefits of the land management plan will begin to arise directly.
- Within 12 months of F.S.G.P. significant recovery will have been achieved in this habitat which will be enhanced and maintained into the future on a long term basis.

The proposed management plan will include the following 21 components:

No	**Stony Bank Management Plan** **Management proposal and implementation plan for Stony Bank**
1	**Purchase lands** Purchase options for land areas 1 and 2 at Mweeloon and Tawin East as shown in Figure 9 have been agreed. This will ensure that all aspects of the management plan can be successfully implemented. The purchase of these lands is considered to be vitally important as it ensures the capacity to manage the lands as required to provide for the successful restoration of habitat quality. This meets the long term implementation criterion stated in the EU guidance document. Implementation: Land purchases to be completed within 3 months after F.G.S.P.
2	**Organic farming principles** Manage the Stony Bank habitat that is to be purchased in accordance with organic farming principles. The use of appropriate and extensive organic farming on the lands, will contribute to the improvement of the habitat in terms of species composition and function. The restoration of the terrestrial habitat will then follow a natural progression. This will be monitored on an annual basis [see below]. Implementation: Immediately after lands have been purchased.
3	**Curtail grazing** Curtail grazing levels by horses, cattle, sheep and other grazing stock. This will allow optimal growth and flowering of the vegetation and reduce poaching. Through ownership and set stocking management, the appropriate stocking density of animals on the land can be ensured, thereby maximising the successful management of the habitat. This will limit light grazing to Summer and Autumn rather than the previous Winter and Spring use which is more damaging. This will facilitate the elimination of the need for supplementary feeding as per (12) below. To achieve this, the grazing of the lands will be undertaken within the period from 1st May to 31st October, subject to appropriate weather and ground conditions, with a stocking density of 0.5 - 1.0 livestock units / ha. Stock density may be adjusted following observations of grazing effects during the first and subsequent years of implementation. Implementation: Immediately after lands have been purchased.

4	**Repair stone walls, fences and gates** Rebuild and maintain the broken stone wall and fence network and form / replace 8 missing gates, 6 damaged gates and repair 5 existing gates. This action is essential to achieve access and grazing control to and within the lands. Implementation: In the late Spring/Summer after lands have been purchased.
5	**Cease fertilizing** Cease fertilizer and slurry spreading on the lands and curtail dunging in this habitat by repair of animal fencing. By stopping fertilizing and supplementary feeding on the lands, the Stony Bank habitat areas will return to a natural state and nitrogen and phosphorous soil contents will return to natural Stony Bank levels. Implementation: Immediately after lands have been purchased.
6	**Soil nutrient survey** At the commencement of the management plan, carry out a soil nutrient survey of both the area to be managed and the reference site. This will determine the levels of Nitrogen and Phosphorous in the soil prior to the initiation of any other element of the compensation plan. The results will be used as the base line for future soil nutrient surveys and hydrochemical modelling studies to track changes in soil chemistry given the adoption of organic farming principles. Implementation: In the late Spring/Summer after lands have been purchased.
7	**No herbicides** Prevention of the use of herbicides within the lands. This intervention will remove any risk of herbicidal damage to plants. It is planned to control noxious weeds such as ragwort by pulling them by hand and the spreading of briars by cutting them back in late Summer. The reduced levels of poaching by livestock on the lands will also contribute to the reduction of noxious weed infestations. Note that species such as ragwort and briar / scrub are largely confined to areas of dry grassland within the lands. Implementation: Immediately after lands have been purchased.
8	**Animal health** Ensure livestock using the lands will be outside of the withdrawal period for medicines and anthelmintics. This action will remove any potential for impact on coprophillic or coprophaegous species. Implementation: Immediately after lands have been purchased.
9	**Prevent removal of cobbles** Prevent removal of cobbles. This is an essential element for the protection of Stony Bank habitat. Implementation: Immediately after lands have been purchased.

10	**No drainage channels** Prevent the construction of any drainage channels on the lands. Construction activities have the potential to damage the habitat and must therefore not be allowed. Implementation: Immediately after lands have been purchased.
11	**Control tractor access** Control access by tractors to the habitat. By minimizing tractor access and confining unavoidable access to critically required occasions *e.g.* removal of sick or dying livestock, the damaged areas of habitat will recover and improve. Implementation: Immediately after lands have been purchased.
12	**Eliminate winter feeding** Eliminate winter feeding and all supplementary feeding. This will stop related poaching and rutting of lands at feeding and at gate sites. These farming activities give rise to significant localised damage to habitats and by eliminating them, the damage cannot occur. This proposed feeding plan will also contribute to the reduction of weed infestation and the transfer of parasites. This will avoid the import of seed and minerals and increased dunging and poaching at feeding locations. Implementation: Immediately after lands have been purchased.
13	**No further sea defences** Prevent the construction of any further sea defence works or dumping of materials to act as a sea defence in order to protect lands. These activities give rise to damage to the habitat because of machinery and personnel tracking/walking over it. Prevention will remove this pressure. Implementation: Immediately after lands have been purchased.
14	**Sensitive repair of existing sea defence wall** In order to protect the Lagoon Priority habitat, sensitive repair of the existing sea defence wall to prevent erosion/ingress by the sea as may be required. The ecology and oceanography of the lagoon and its Intertidal habitat and species has the potential of being changed if the Stony Bank habitat is breached. Therefore, in order to protect the lagoon, some sensitive repair of the existing sea defence wall, at the north west of Lurgan Island, and as described in Section 17.1 will be undertaken as may be required. Implementation: 3 months after F.G.S.P. Annually and after significant storm events (see Bullet 11 following), GHC will survey the condition of the existing sea defence wall and will sensitively undertake repair, if required.
15	**Control flotsam and jetsam** Regular removal of flotsam and jetsam and other litter. This action will help to improve the condition of the habitat and its visual appearance. Implementation: Every 3 months after lands have been purchased and directly after a Force 9 or greater storm event.

16	**Annual biological surveys** Annual biological surveys of this habitat (including the control site) to document any changes in its extent and its characterising species. This is an essential scientific element of the restoration plan. Monitoring of shingle habitat will closely follow the survey approaches which have been developed by NPWS over the past 15 years. Implementation: 1 year after the compensation plan commenced and to be submitted to Galway Harbour Company Board by mid October.
17	**Review of plan** In the light of the results of the annual biological surveys adjust/modify the management plan. Implementation: Within 4 weeks after the annual surveys has been completed, mid November.
18	**Surveys following storms** Immediately following storm force 11 events or greater, carry out surveys to assess possible damage to the habitat. Such extreme events can give rise to sudden and extensive changes to the physical, chemical and biological characteristics of Stony Bank habitat and it is important to document such changes directly after the event. This will also contribute to the recording of the natural recovery processes. Implementation: Within 10 working days after the event occurred.
19	**Independent audit of surveys** Commission an annual, independent audit of the progress of the management plan. This is to ensure that the annual surveys and management proposals can be independently reviewed and validated. Implementation: Complete 2 weeks after the submission of the annual report to the GHC Board, 1 December.
20	**Modify plan following audit** In the light of the results of this independent audit and possible changes due to storm events, adjust/modify the management plan. Implementation: After receipt of the Independent Audit, 1 December, Submit the Annual Surveys, Audit and Proposed Modifications to the Co-ordinating Bodies*, mid December, annually.
21	**Signage** Erection of signage including illustrations and photographs at chosen vantage points demonstrating what the project comprises and what species are typical of the habitat. Implementation: During Year 1 of the compensation plan.

Control of Aquaculture Licences
Purchases to be completed within 3 months of F.G.S.P. and implementation of Management Plan to commence directly accordingly.

Co-ordinating Bodies
* Co-ordinating bodies proposed Galway City Council, Galway County Council, NPWS, Teagasc, DAFM

Annual Monitoring Report Process
The annual survey report and audit when reviewed and modified will be submitted to Galway City and County Council Planning Offices and other notice parties as may be directed by the planning condition in this regard. This putting of the annual report on the planning file will allow public scrutiny of the annual survey / audit. Should the public or the notice parties raise concerns about these reports, such concerns will be addressed in the ongoing management and survey / audit process in the following management season.

10.2.1 Commence Management of Stony Bank Lands

In order to allow the proposed management of the Stony Bank lands GHC has agreed the purchase of the two land holdings as shown on Figure 9 surrounding Mweeloon Lagoon, and has prepared the Lease Agreement terms under which those lands will subsequently be managed to ensure the biological enhancement possible will be achieved and monitored to ensure such enhancement is maintained. See Appendix 20 which confirms these Land Purchase Agreements have been contracted.

10.2.2 Stony Bank Monitoring Reference Area

The Stony Bank reference area 0.600 ha has been fenced off for some years from the main land holding which has been agreed to be acquired. This was to prevent animals getting out of the lands, via the access route used by tractors to access the aquaculture areas along the foreshore to this Stony Bank.

Hence this long narrow area of Stony Bank has not been grazed for years so the grass on this area is rank. The area is therefore less beneficial to the Stony Bank species.

The reference area when compared with the presently over grazed area of 2.453 ha which will be subject to appropriate controlled grazing as proposed by the Stony Bank Management Plan will show the relative merits of the appropriate grazing versus the non-grazing situation.

10.2.3 Stony Bank Expected Results

- The purchase of the lands will be completed within 3 months of F.G.S.P. The compensatory measures proposed to enhance and preserve the habitat will then be able to commence directly.
  The benefits of the organic farming, controlled grazing, repaired gate and wall structures, control of fertilizer, herbicides, anthelmintic, reclamation, tractor use, sea defences and litter will all begin to show results within the first growing / grazing season following acquisition.
- Fortnightly walk over surveys to check grazing / land management will be undertaken for the first 3 years. This may then be reduced to monthly surveys when the stock control / grazing management is proving to be successful. The monthly inspections and the post storm surveys will ensure continuous monitoring and management of the habitat in accordance with the Management Plan.
- Emergency works, storm repairs / litter control of storm flotsam and jetsam will be undertaken as proposed.
- The annual surveys, review of Management Plan audit of survey, publication of audited annual report will ensure that the enhancement and preservation proposed will be achieved and continue to be maintained in the long term.

11 ADDENDUM TO THE NATURA IMPACT STATEMENT TO INCLUDE CONSIDERATION OF THE COMPENSATORY MEASURES

An Addendum to the Natura Impact Statement to include:-

- consideration of the Compensatory Measures
- an assessment of the proposed compensatory measures for the Intertidal and Stony Bank habitats in combination with and/or cumulatively with the overall GHE development proposed and the historic GHEP, and
- any other relevant developments in the designated cSAC and SPA sites

has been prepared and accompanies this report.

It found that the impacts from the proposed Intertidal and Stony Bank Management Plans will not have any significant effects on the Galway Bay cSAC Natura 2000 site, its qualifying interests / special conservation interests or conservation objectives of any other Natura 2000 site.

With regard to the potential for the need to repair the existing sea defence wall at Lurgan to protect the lagoonal priority habitat area within Mweeloon, the assessment found that any impacts of the repair would be short term (1 growing season) and that the protection of the priority habitat into the future was of much greater ecological importance.

The Compensatory Measures for the Intertidal and Stony Bank habitats in Tawin have been designed to bring about a significant improvement over time of each habitat and thereby improve the overall functioning of the cSAC as an ecosystem. This is a positive, long term impact on the designated sites.

Some temporary negative construction impacts associated with some of the measures proposed *e.g.* repairing stone walls, replacing gates, removing aquaculture structures, have been identified but as they are short term (*i.e.* limited to weeks in duration), they are not considered as being significant. The positive impacts of these repairs will facilitate the implementation of organic farming principals, reduced grazing levels/stocking densities and control of *Didemnum* all of which will have a long term positive impact of the cSAC. The biological diversity proposed to be lost to the GHE and which has been lost by the previous GHEP development within the Galway Bay cSAC site will both be addressed by the compensatory measures.

Due to the lack of connectivity between Tawin and the GHE/GHEP project and other projects in Galway City, no cumulative impacts between these measures and those projects are predicted. Furthermore, as the GHC will own the lands at Tawin, no development on them will occur thereby ensuring the protection of these elements of the Natura site into the future.

In relation to the SCIs of the Inner Galway Bay SPA all of which are aquatic species, most of them *i.e.* Heron, Brent Goose, Widgeon, Teal, Shoveler, Ringed Plover, Dunlin, Bar-tailed Godwit, Curlew, Redshank, Turnstone, Black-headed Gull and Common Gull forage or roost on the sea shore. Great Northern Diver, Cormorant, Red-breasted Merganser, Sandwich Tern and Common Tern feed by diving in the sea. Brent Goose, Lapwing and Curlew may also feed on pasture fields. Given the preference for living in/near the sea, these species cannot be impacted by the repairs to gates and stone walls. Additionally as it is planned to carry out such repairs in the Summer, species that migrate to Ireland in the Winter cannot be affected by such repairs.

The removal of oyster trestles and control of *Didemnum vexillum* at oyster farms is predicted to have a minor positive effect on shore birds.

12 LONG TERM MONITORING

12.1 INTRODUCTION

Long term annual surveys of the Compensatory habitats will be undertaken by the GHC ecologists and a report presented to GHC recommending any revisions of management proposed to further enhance the management of the Compensatory Areas. This report will be subject to independent ecological audit and adjustment if required. The audited and adjusted report will issue to the coordinating bodies and be available for public access via the Planning File. This process is proposed to ensure that the Compensatory Measures being implemented bring about a measurable improvement in ecological conditions in the compensatory area.

12.2 PROPOSED ANNUAL INTERTIDAL SAMPLING STRATEGY.

The same approach to sampling the Intertidal habitat as described in Section 7 above and in Appendix 18 will be adopted for the annual surveys, *i.e*. core sampling where sediments are present and quadrate sampling and photography on hard substrata. Sampling design and statistical analyses of the results to allow for a meaningful interpretation of results is a critical part of a monitoring programme that will answer the specific questions that the monitoring programme seeks to answer.

With regard to Intertidal habitat quality, once the *Didemnum* control plan has been initiated, it will be possible to document the reduction in numbers of colonies and their spatial extent within 2 to 3 years. Future annual monitoring will continue to track the effects of the control measures and the reduction on numbers of *Didemnum*. Given the known efficacy of treatments in other aquaculture sites, it is considered highly likely that the same level of success will apply to the Mweeloon site. The removal of aquaculture and its related equipment and reduction in the related tractor traffic on the Intertidal area will allow recovery of this habitat.

12.2.1 Costs of Implementation, Management and Monitoring for the Intertidal Habitat Areas

The costs for implementation, management and monitoring for the Intertidal habitat include

1. Acquiring the control of the aquaculture licences,
2. Remove and dispose of the trestles,
3. Carry out the annual *Didemnum* control programme,
4. Collect and dispose of flotsam and jetsam,
5. Surveys after extreme storm events,
6. Undertaking any repairs post extreme storm events,
7. Carry out the annual ecological monitoring surveys and associated reporting,
8. Independent auditing of the reports,
9. Modify (if required) the management plan and
10. Prepare and erect signage.

GHC has budgeted for these costs.

12.2.2 Restoration of Intertidal Habitat

The beneficial effects of the management plan on the structure and functioning of the Intertidal habitat at Mweeloon will include:

1. The permanent control of the licenced sites into the future will ensure the long term improvement of the ecology, structure and functioning of the Intertidal habitat at Mweeloon.
2. The removal of oysters from the area and the structures on which they grow.
3. Faecal matter that was generated by the farmed shellfish at the farmed site will be dispersed over the first Spring/Neap tidal cycle.

4. The long term control programme of the non-native invasive tunicate, *Didemnum vexillum* will help to restore the structure and functioning of the habitat within the Natura site.
5. As there will be much reduced tractor traffic at the fallowed sites, there will be much reduced crushing or damage caused to algae, lichens or marine invertebrates.
6. The reduction in stock numbers on the land and the prevention of supplementary feeding will help to reduce run off of nutrient enriched water to the Intertidal habitat thereby reducing the likelihood of green algal blooms on the shore.

12.3 STONY BANK MONITORING

The reduction in stocking densities in cattle and horses and limiting of tractor access to specific locations will bring about a speedy and readily measurable improvement in habitat quality.

The composition and condition of Stony Bank vegetation will be assessed using condition assessment techniques devised by the National Parks and Wildlife Service. These detailed surveys will be carried out once a year in late August/early September just before the removal of grazing livestock. In addition to these detailed annual surveys, general walkover inspections of the Stony Bank areas will be carried out every two weeks when livestock are grazing in order to check for signs of localized overgrazing or poaching. This regular inspection of the areas will inform the ongoing management of the site and allow for the fine-tuning of the grazing regime, if required.

The purchase/lease management agreement will ensure that the lands are preserved and managed as proposed, ensuring that the enhancements proposed will be achieved as the management and use of the lands will be for the benefit of the habitats to be protected and enhanced.

12.3.1 Costs of Implementation, Management and Monitoring for the Stony Bank Habitat Areas

GHC have budgeted for the costs of implementation, management and monitoring for the Stony Bank habitat which include:

1. Buying the land,
2. Construct gates and rebuild walls,
3. Carry out the soil nutrient survey,
4. Collect and dispose of flotsam and jetsam and other litter,
5. Surveys after extreme storm events,
6. Undertaking any repairs post extreme storm events,
7. Fortnightly monitoring of stocking levels and associated poaching,
8. Carry out the annual ecological monitoring surveys and associated reporting,
9. Auditing of the report independently,
10. Modify (if required) the management plan and
11. Prepare and erect signage.

12.3.2 Restoration of the Stony Bank Habitat

The beneficial effects of the management plan on the structure and functioning of the Stony Bank habitat at Mweeloon will include:

1. The purchase of the lands where this habitat occurs will ensure then long term improvement of it into the future.
2. The reduction in stocking densities of farmed animals will reduce poaching of this habitat.
3. The construction of walls, wire fences and the erection of gates will control the movement of stock.
4. Adherence to organic farming principals will contribute to habitat improvement and species composition and function.
5. Cessation of use of fertilizers will contribute to the improvement of this habitat and its species composition and function.

6. The elimination of Winter feeding at Stony Bank habitats will contribute to habitat improvement and species composition and function.
7. Restriction of tractor access will prevent damage to this habitat.
8. The prevention of removal of Stony Bank habitat material for use in construction is an essential part of protecting this habitat into the future.

12.4 CONCLUSION INTERTIDAL AND STONY BANK HABITATS MONITORING

The compensatory measures package proposed for the loss of Intertidal and Stony Bank habitat that will arise if the Galway Harbour Extension proceeds has been designed in the light of the EU 6 Guidance document (EU, 2018) and previous successful 6(4) precedents that the Commission considered and with which the Commission agreed. These precedents included permanent damage to EU priority habitats whereas in the case of the Galway Harbour Extension, no priority habitats are being affected.

The compensation measures have been designed to ensure that they can be successfully, easily and quickly implemented well before any construction activities take place at Renmore which is a requirement in the EU Guidance document (***op.cit.***). The measures also include for an annual monitoring programme and reporting to an independent review body which is also a requirement in the EU Guidance document (***op.cit.***).

The Guidance document also states that *"compensatory measures should be additional to the actions that are normal practice under that Habitats and Birds Directives"* and the following measures that are being proposed are considered to be additional to normal practices:

1. Control of the licenced aquaculture sites 3.27 ha and the purchase of 26.079 ha of lands,
2. Reducing tractor access to the land and to the shore,
3. Removal of aquaculture structures from the licence areas proposed,
4. Control of non-native invasive species associated with aquaculture activities, (*Didemnum*),
5. Control of stocking densities and adherence to organic farming practices,
6. No use of fertilizers or herbicides,
7. Control of noxious weeds by hand,
8. Elimination of Winter feeding and supplementary feeding,
9. No construction of new sea defences or drainage channels,
10. Picking of litter at the site,
11. Annual terrestrial and Intertidal biological surveys,
12. Independent reviews of these annual surveys,
13. Amendments to the compensatory measures if deemed necessary,
14. Public access to these reports via the Galway City Council Planning Department,
15. The establishment of a marine management area of 27.239 ha of Intertidal area and a further 19.480 ha of Lagoonal area, as detailed in Section 17 herein.
    This gives a total of Marine and Lagoonal areas which will be managed of 46.719 ha in extent,
16. Erection of signage at Tawin and at Galway Harbour outlining the compensation programme.

13 COMPARISON WITH GUIDANCE CRITERIA

The Intertidal management plan (IMP) and Stony Bank management plan (SBMP) are now considered against each of the seven criteria set down in the EU 6 Guidance Document (EU, 2018).

13.1 INTERTIDAL HABITAT

Marine Intertidal areas 2 and 3 will be cleared of and or preserved from further aquaculture which will allow restoration of these areas from the impacts of that use. The EU Guidance document (EU, 2018) states on page 64 that "*the compensation might consist of the biological improvement of a substandard habitat of the same type within an existing designated site".* This approach to the proposed compensatory measures for loss of Intertidal habitat is therefore in line with the EU Guidance document. See also other measures stated in Section 10. The invasive non-native tunicate, *Didemnum vexillum* will be controlled in the areas to be preserved and the adjacent area to the north west. These areas are as shown on Figure 14.

Lagoonal Intertidal areas will be enhanced by the adjacent land management proposals.

- **Targeted Compensation**

The proposed management plan has been designed to improve in a measurable way the structure and function of the Mud/Sand flat exposed at low water and fucoid-dominated reef complex habitat, compensatory area, for that which has been or will be lost as part of the Harbour development plan.

The EU Guidance Document (EU, 2018) under the topic Targeted Compensation on Page 64 notes that "…*the compensation measures must necessarily consist of ecological measures".*

The proposed compensation plan that includes for the reduction of tractor movements on the shore, the control of non-native *Didemnum* and the reduction in aquaculture practices at the site all comply with this element of the Guidance Document.

- **Effective Compensation**

The proposed plan is also very feasible in that the Mud/Sand flat exposed at low water and fucoid-dominated reef complex habitat at Mweeloon is present. Given that the land and aquaculture licences will be controlled, a high level of success is ensured. The reduction in tractor movements on the shore is an effective measure to reduce crushing of algae, lichen and invertebrate organisms on the shore while the control of the non-native invasive *Didemnum* populations and reduction of aquaculture activities will help to restore the structure and function of this habitat with the Natura 2000 network.

It is therefore regarded as a highly effective plan. Furthermore, the implementation of annual surveys will provide a highly significant data base for Article 17 monitoring as required under the EU "Habitats" Directive.

- **Technical Feasibility**.

The proposed management plan is highly technically feasible as functioning Mud/Sand flat exposed at low water and fucoid-dominated reef complex habitat is present and will be under the control of the applicant at the site where the management plan will be implemented. The *Didemnum* control methods outlined in Section 10 are very feasible and have been shown to be effective methods to control this non-native species.

- **Extent of Compensation**

A total of 5.93 ha of Mud/Sand flat exposed at low water and fucoid-dominated reef complex will be lost because of the construction of the Galway Harbour Extension. This compensatory measure at Mweeloon extends over 27.239 ha, 17.790 ha of which is dedicated for the 5.93 ha loss of Intertidal habitat where Sand flat and fucoid- dominated reef occur as a result of the proposed GHE. This

replacement is *ca* 3 : 1 ratio which is above the 1 : 1 ratio listed in the EU Guidance Document (EU, 2018) on page 67.

- **Location of Compensatory Measures**.

As Mweeloon lies within the boundary of the Galway Bay cSAC, the proposed compensatory measures satisfy this element of the Guidance document (EU 2018) where it is stated on page 68 …"*locating compensation within or nearby the Natura 2000 site concerned where suitable conditions for the measures to be successful seems the most preferred option"*.

- **Timing of Compensatory Measures**

The timing of the individual elements of the Intertidal habitat measures are given in the Table in Section 10.1 above. Once F.G.S.P. is awarded, the compensatory measures will be put in place within 6 months. Within these 6 months, the aquaculture structures will have been removed, thereafter tractor access will be reduced for those sections of the foreshore. The adherence to organic farming principals on the adjacent lands will be in place and the *Didemnum* control plan will have commenced.

The proposed compensatory measures therefore satisfies this element of the EU Guidance Document (EU, 2018) which states on page 69 that *"the result of compensation should be operational at the time the damage occurs on the site"*. Enhancement will have commenced at Tawin long before work commences at Renmore.

- **Long Term Implementation.**

As the control of the lands and aquaculture licences have been contracted, this will ensure the long term implementation of the measures for the Intertidal habitats within the compensation area. This aspect of the proposed compensatory measures will provide "*a sound legal and financial basis for long term implementation",* and ensure *"their protection, monitoring and maintenance be secured in advance of impacts upon habitats and/or species…….*" which is stated in the EU Guidance Document on page 69.

The document goes on to state on page 70 …"applying *the necessary legal means in case land or rights purchase is deemed essential for the effective implementation of the measures*" and also " *establishing monitoring programmes*…". This proposed compensatory measure therefore satisfy this element of the EU Guidance Document.

The proposed improvement of Intertidal habitat that will be brought about by the methods outlined above will bring about an improvement in functioning of the mosaic of Intertidal habitats as it will restore the habitat in terms of its biological communities and the transfer of energy between lower and higher trophic levels affected by human activities on the shore.

With regard to the EU 6 Guidance document (EU, 2018 p.60), which states that *"compensatory measures should be additional to the actions that are normal practice under that Habitats and Birds Directives"*, the following measures that are being proposed are considered to be additional to normal practices:

1. Complete purchase of control of Aquaculture Licences,
2. Reducing tractor access on the shore,
3. Removal of aquaculture structures from the licence areas proposed,
4. Control of non-native invasive species associated with aquaculture activities, (*Didemnum*)
5. No construction of new sea defences or drainage channels,
6. Picking of litter in the Intertidal and supratidal zones
7. Annual biological surveys
8. Independent reviews of these annual surveys
9. The establishment of a marine management area of 46.719 ha in extent comprising of the Intertidal area and the Mweeloon Lagoon area.

In terms of selecting indices to monitor changes in the Intertidal habitat, the most obvious and clearest indicator will be the reduction of the impact on species and the physical nature of the Intertidal area when tractor use is reduced over the foreshore areas used to service the aquaculture licence areas that will be fallowed. It is anticipated that within 2 years, the habitat will have fully recovered because, as noted above, given the wide range of physical and chemical variability that the Intertidal habitat experiences naturally *i.e.* large variations in Winter and Summer temperatures and salinities and high levels of perturbation due to wind and wave action and violent storm surges during exceptional hurricane events, their sensitivity to impacts is low and their recoverability is high.

The use of such statistical indices as diversity, evenness and richness statistics are appropriate objective ways to track changes. These standard univariate methods require information of numbers of species and numbers of individuals. These methods were used in the data analyses of the quantitative survey of the Intertidal habitat study that was carried out at Renmore and at Mweeloon and will be used in all future monitoring studies.

It is considered most likely that measurable changes in Intertidal ecology *i.e.* reduction in green algae will take many years and long term annual surveys will be required to document these restoration or ecological changes.

Another clear indicator of monitoring changes will be the reduction / control of *Didemnum* at the aquaculture site. It is considered that the control programme will represent immediate improvement in Intertidal ecology at the aquaculture site. This will be documented on an annual basis and reported on in the annual report. However, if subtidal populations of this species have established themselves in the area, full and permanent control of the organism will not be possible and hence control measures will require continuous long term implementation.

The proposed Compensation plan also satisfies other elements of the EU Guidance document (EU, 2018) that notes on page 64 the "*the range of compensatory measures and accompanying measures found in current practice in the EU under the "Habitats" Directive also includes:*

Species recovery
Land purchase
Rights acquisition
Reserve creation [see page 71].

During the development of these Intertidal management plans, there has been close coordination and cooperation with both An Bórd Pleanála (ABP) and the National Parks and Wildlife (NPWS). This included direct meetings with each party to discuss the evolution of the compensatory proposals and tripartite meetings to present the outline of the plans. This is listed as a requirement in the EU Guidance document (EU, 2018) on page 65 that states that *"tight coordination and cooperation between Natura authorities, assessment authorities and the proponent of the plan or project"* is required.

13.2 STONY BANK

Stony Bank areas that are subject to periodic grazing and poaching damage by cattle have been contracted to be purchased. These areas will be restored by appropriate control and management of these and the adjacent lands. The EU Guidance document (EU, 2018) states on page 64 that "*the compensation might consist of the biological improvement of a substandard habitat of the same type within an existing designated site".* This approach to the proposed compensatory measures for loss of Stony Bank is therefore in line with the EU Guidance document. Stocking densities will be reduced, fertilizer, herbicide and anthelmintics controlled and litter picked and other land use issues controlled as per the Stony Bank management plan.

- **Targeted Compensation**

The proposed plan has been designed to improve in a measurable way the structure and function of the Stony Bank habitat compensatory area, for that which will be impacted as part of the Harbour development plan.

These compensatory measures comply with this element of the Guidance document. Areas of Stony Bank habitat have been subject to uncontrolled grazing by cattle and vehicular access in the past. The future quality of the habitat will be ensured by controlling the levels of grazing and curtailing vehicular access and the implementation of the Stony Bank management plan proposed and which will be included in the future land lease agreements to farmers who will work the lands.

- **Effective Compensation**

The proposed compensatory measures comply with this element of the EU Guidance document in that it satisfies all other elements of that document. Given that the land in which the Stony Bank habitat is located will be purchased, a high level of success is ensured. It is therefore regarded as a highly effective measure. Furthermore, the implementation of annual surveys and independent auditing will provide a highly significant database for Article 7 monitoring.

- **Technical Feasibility**

The proposed compensatory measures are highly technically feasible as the areas of Stony Bank habitat are easily accessible and will be owned by Galway Harbour Company. In the future, grazing levels within the site area will be managed by the owner through management agreements with local landowners / tenants.

- **Extent of Compensation**

A total of 0.35 ha of Stony Bank habitat will be impacted as a result of the construction of the Galway Harbour Extension. This compensation plan extends over 3.053 ha of Stony Bank habitat. A 3:1 ratio will be provided for this element of the loss, which is above the 1 : 1 ratio listed in the EU Guidance document (EU, 2018 on page 67).

- **Location of Compensatory Measures**

As Mweeloon lies within the boundary of the Galway Bay cSAC, this proposed compensatory measures plan satisfies this element of the Guidance document where it is stated …"*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"*.

- **Timing of Compensatory Measures**

On receipt of F.G.S.P. there will be no time lag. Indeed, these compensatory measures will be in place well before any development takes place at the Renmore site. The proposed compensatory measures therefore satisfy this element of the EU Guidance Document.

- **Long Term Implementation**

As the control of the lands at Mweeloon have been contracted, this will ensure the long term implementation of the measures for the Stony Bank habitats within the compensation area. This aspect of the proposed compensatory measures will provide "*a sound legal and financial basis for long term implementation",* and ensure *"their protection, monitoring and maintenance be secured in advance of impacts upon habitats and/or species*……." which is stated in the EU Guidance Document on page 69..

The document goes on to state on page 70…"*applying the necessary legal means in case land or rights purchase is deemed essential for the effective implementation of the measures*" and also " *establishing monitoring programmes*…". This proposed compensatory measure will therefore satisfy this element of the EU Guidance Document.

The EU Article 6 Guidance document p. 60 (EU, 2018) states that *"compensatory measures should be additional to the actions that are normal practice under that Habitats and Birds Directives or*

obligations laid down in EU law", the following measures that are being proposed are considered to be additional to normal practices:-

1. Complete the purchase options for the Stony Bank lands,
2. Reduction of stocking densities,
3. Adherence to organic farming practices such as no use of fertilizers, slurry, herbicides
4. Anthelmintic withdrawal periods,
5. Controlling tractor access on the shorelands,
6. No construction of new sea defences,
7. Picking of litter in the Intertidal and supratidal zones and Stony Bank / land areas,
8. Annual biological surveys
9. Independent reviews of these annual surveys

The proposed Compensation plan also satisfies other elements of the EU Guidance document (EU, 2018) that notes on page 64 the "*the range of compensatory measures and accompanying measures found in current practice in the EU under the "Habitats" Directive also includes:*

Species recovery
Land purchase
Rights acquisition
Reserve creation [see page 71].

The EU guidance document (EU, 2018) on page 65 notes that *"tight coordination and operation between Natura 2000 authorities, assessment authorities and the proponent of the plan or project"* is needed. As these management plans evolved, the Galway Harbour Authority and its team of consultants had regular contact and meetings with An Bord Pleanála (which is the assessment authority in Ireland) and the National Parks and Wildlife Service (which is the Irish Natura 2000 authority).

14 PART 1 – GALWAY HARBOUR EXTENSION COMPENSATORY MEASURES SUMMARY

14.1 SUMMARY OF COMPENSATORY MEASURES PROPOSED FOR THE GHE INTERTIDAL AND STONY BANK HABITAT IMPACTS

Intertidal and Stony Bank habitat areas have been identified at Mweeloon, Tawin which are presently in sub-standard condition, but which can be favourably managed on a perpetual basis under detailed Management Plans to allow for their restoration and continued future preservation. These areas have been contracted to be purchased.

The areas will be provided as compensatory measures for the proposed losses at a ratio of 3:1 for the Intertidal habitat and for Stony Bank.

The extent of habitats to be impacted are set out in Section 3.

The areas of compensatory habitat being provided are set out in Sections 9 and are shown on Figures 10 and 11 and in Table No. 2 below and are at a ratio of 3 : 1.

	Habitat Type	
	Intertidal	Stony Bank
Area of Habitat to be impacted by the development of GHE	5.93 ha	0.35 ha
Area of Habitat proposed as Compensatory Measures for the GHE	17.79 ha	1.05 ha
Ratio of Compensatory Habitat to Habitat to be impacted	3 : 1	3 : 1

Table 2 – Intertidal and Stony Bank Habitat Impact Areas and Compensatory Areas

- The proposed management and enhancement of the habitats has been subject to Appropriate Assessment and meet the criteria of the EU Guidance Document on Article 6.

- The site identified for the compensatory measures has a considerable range of additional habitats and benefits which are discussed in the following sections. These will add to the compensation required for the GHE and also compensate for previous habitat losses incurred by the Galway Harbour Enterprise Park (GHEP) as requested by NPWS.

- The available areas of Intertidal and Stony Bank habitat in excess of the 3 : 1 ratio are further detailed in Part 2, Sections 15 and 16 of this report. Part 2 relates to the previous development of the Galway Harbour Enterprise Park.

Part 2

Galway Harbour Enterprise Park Compensatory Measures

15 DEVELOPMENT OF GALWAY HARBOUR ENTERPRISE PARK [GHEP]

It is acknowledged by Galway Harbour Company that areas of three separate habitats at Renmore were impacted by the development of the Galway Harbour Enterprise Park in the 1990's.

The habitat types and areas affected are shown on Figure No. 15 following and were as follows:-

i) 8.58 ha of Fucoid dominated reef habitat [1170] and Mud and Sand flat habitat [1140] complex
ii) 0.28 ha of perennial vegetation of Stony Bank [1220]
iii) 7.39 ha of Salt Marsh complex of which
- 2.21 ha was deemed with considerable certainty to be Atlantic Salt Marsh [1330] and Mediterranean Salt Marsh [1410] complex, and so is stated as a 'definite' Salt Marsh area
- 5.18 ha was stated as 'Transitional' Salt Marsh as it was calculated as same on a precautionary basis.

The Habitat Map in Appendix No. 11 was drawn up using various historical maps and photographs to represent the various habitats that existed at Renmore prior to the development of the Galway Harbour Enterprise Park in the 1990's.

Two of the habitat types *i.e.* i) Intertidal and ii) Stony Bank that have already been impacted by the development of the Galway Harbour Enterprise Park which are immediately adjacent to habitats that are likely to be impacted in the development of the Galway Harbour Extension have already been assessed in earlier sections of this proposal.

Areas i) and ii) above will be provided for by the area of these habitats in excess of the 3 : 1 ratio stated at Section 14.1. See Table 5 Section 16.

The third habitat type *i.e.* iii) Salt Marsh is assessed in the following section.

GHC were initially considering only the purchase of the lands at Mweeloon to address the Stony Bank land control requirement. When the studies being undertaken in that regard confirmed that the previous Salt Marsh loss at GHEP could be resolved at this location, GHC undertook to acquire the greater extent of the lands as now indicated and thus address the previous loss.

The purchase of all the Salt Marsh lands will be completed within 3 months of F.G.S.P. which will allow these Salt Marsh management measures to be implemented directly thereafter.

The Salt Marsh will be an additional and retrospective compensatory measure as GHEP was developed in the late 1990's.

Figure No. 15 following was derived from the Habitat Map in Appendix No. 11 and shows both Atlantic and Mediterranean Salt Marsh grouped together under the broad heading of Salt Marsh as it was not possible to differentiate between the two habitat types from the historical records.

In addition and on a precautionary basis, further areas impacted are designated as Transitional Salt Marsh giving a combined area of 7.39 ha impacted at that time. It is important to note that some of this Transitional Salt Marsh area may have comprised of dry grassland habitat. The compensatory ratio will therefore also appear to be precautionarily low.

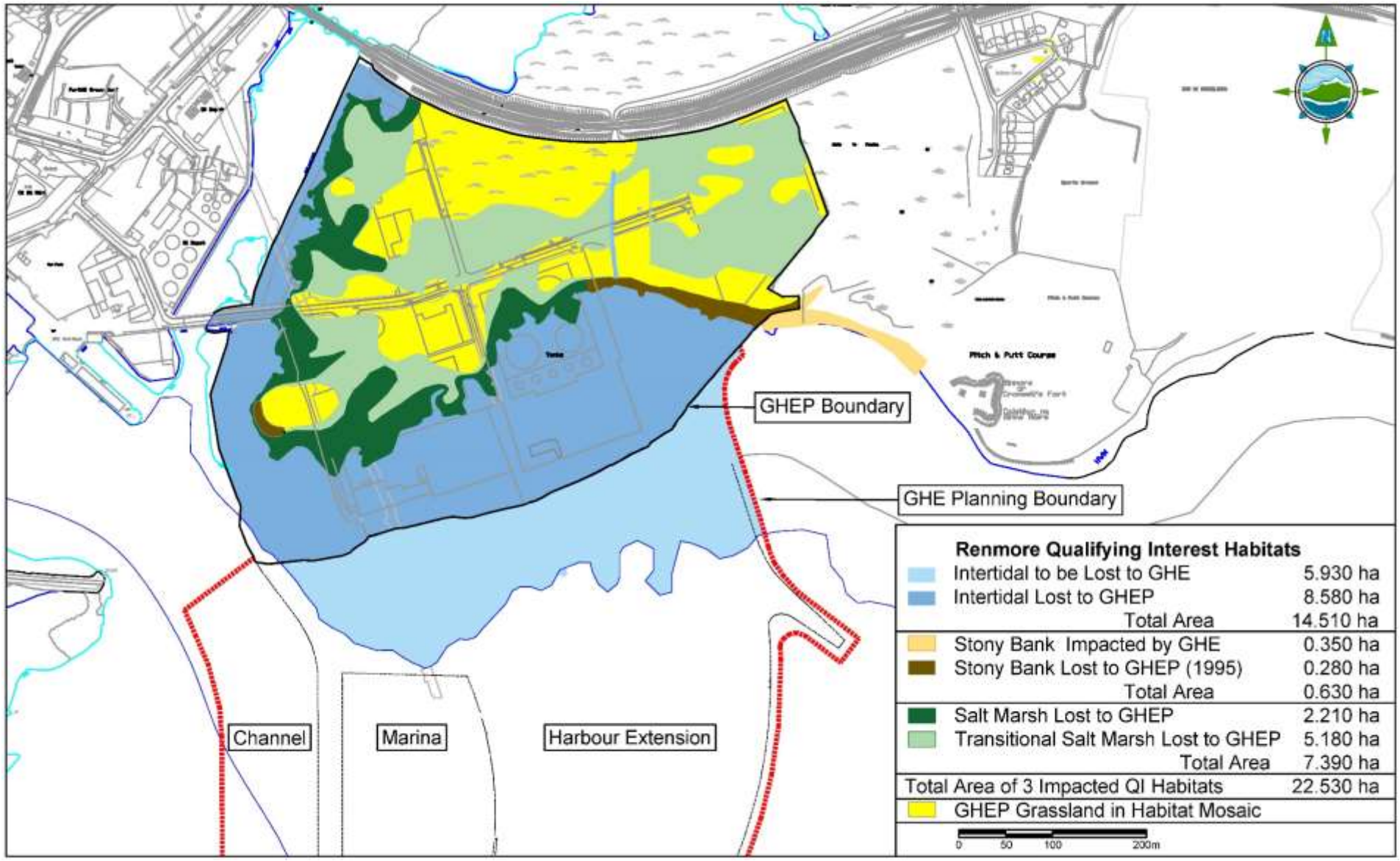

Figure No. 15 – Habitats to be Lost or Impacted by GHE and Previously Lost to GHEP.

15.1 ASSESSMENT OF SALT MARSH AT RENMORE

Appendix No. 12 includes the findings of a survey of Salt Marsh vegetation carried out by Dr. John Conaghan at Renmore. The conclusion is that at this point in time it is not possible to say with certainty what type of Salt Marsh vegetation occurred to the south of the railway line at Renmore prior to construction of the Galway Harbour Enterprise Park facility during the 1990s. It is likely however, that the Salt Marsh to the south of the railway line was dominated by low-growing Atlantic Salt Marsh vegetation which is more typical of exposed locations along the Atlantic coast. It is of interest to note that any small areas of nearby Salt Marsh habitat in Galway Bay, *e.g.* at Ballyloughane beach *c.*1 km to the east, comprise low-growing Atlantic type Salt Marsh vegetation dominated by *Plantago maritima, Armeria maritima* and *Glaux maritima inter alia.*

15.2 QUALATIVE AND QUANTITATIVE SURVEYS OF SALT MARSH AT MWEELOON

The qualitative surveys carried out on Tawin Island as described earlier in Section 6.2 of this Report identified significant areas of Salt Marsh adjacent to Mweeloon Lagoon.

These areas were examined more closely in the follow up quantitative surveys.

Appendix No. 13 includes the survey findings for Salt Marsh while the extent of Salt Marsh at Mweeloon of 11.715 ha is shown on Figure 16.

Within the survey area, Salt Marsh vegetation generally occurs as a relatively narrow fringe which lies between dry meadow (GS2) vegetation on shallow soil and Intertidal. This dry meadow vegetation is typically dominated by coarse grass species such as *Holcus lanatus, Dactylis glomerata* and *Anthoxanthum odoratum*. Although the fringe of Salt Marsh vegetation present is generally relatively narrow (typically 10 to 20 metres wide) there is good zonation of vegetation evident throughout ranging from pioneer Salt Marsh on stony soils characterised by *Salicornia* sp*.* and *Suaeda maritima* to mid-upper marsh characterised by species such as *Artemisia maritima*, *Festuca rubra, Juncus gerardii* and *Armeria maritima.* The main type of vegetation noted during the initial survey of vegetation is a relatively species-poor middle marsh community which tends to be dominated by a low-growing sward of *Plantago maritima* and *Aster tripolium.* Upper Salt Marsh areas which are less frequently inundated by sea water tend to be dominated by *Festuca rubra, Juncus gerardii* with frequent *Agrostis stolonifera*. The majority of the Salt Marsh habitat occurring comprises the Annex I habitat Atlantic Salt Marsh (Habitat code 1330).

At Mweeloon, the upper limit of Salt Marsh vegetation is usually indicated by the presence of the tall, silver-grey species *Artemisia maritima*. In Ireland, this species has a restricted distribution which is largely confined to Galway Bay, the Shannon estuary and a few scattered locations on the Irish Sea coast, north of Dublin.

The site also contains a small population of the shrubby species *Atriplex portulacoides* which is very rare on the west coast of Ireland.

Currently most of the visible damage to Salt Marsh habitat occurs along the eastern margins of the survey area. The damage is associated with machinery trafficking and localized poaching of the soil associated with cattle grazing which took place prior to 2017. The poaching of soil by cattle is most severe in areas used as grazing tracks and more particularly through gaps in the stone walls.

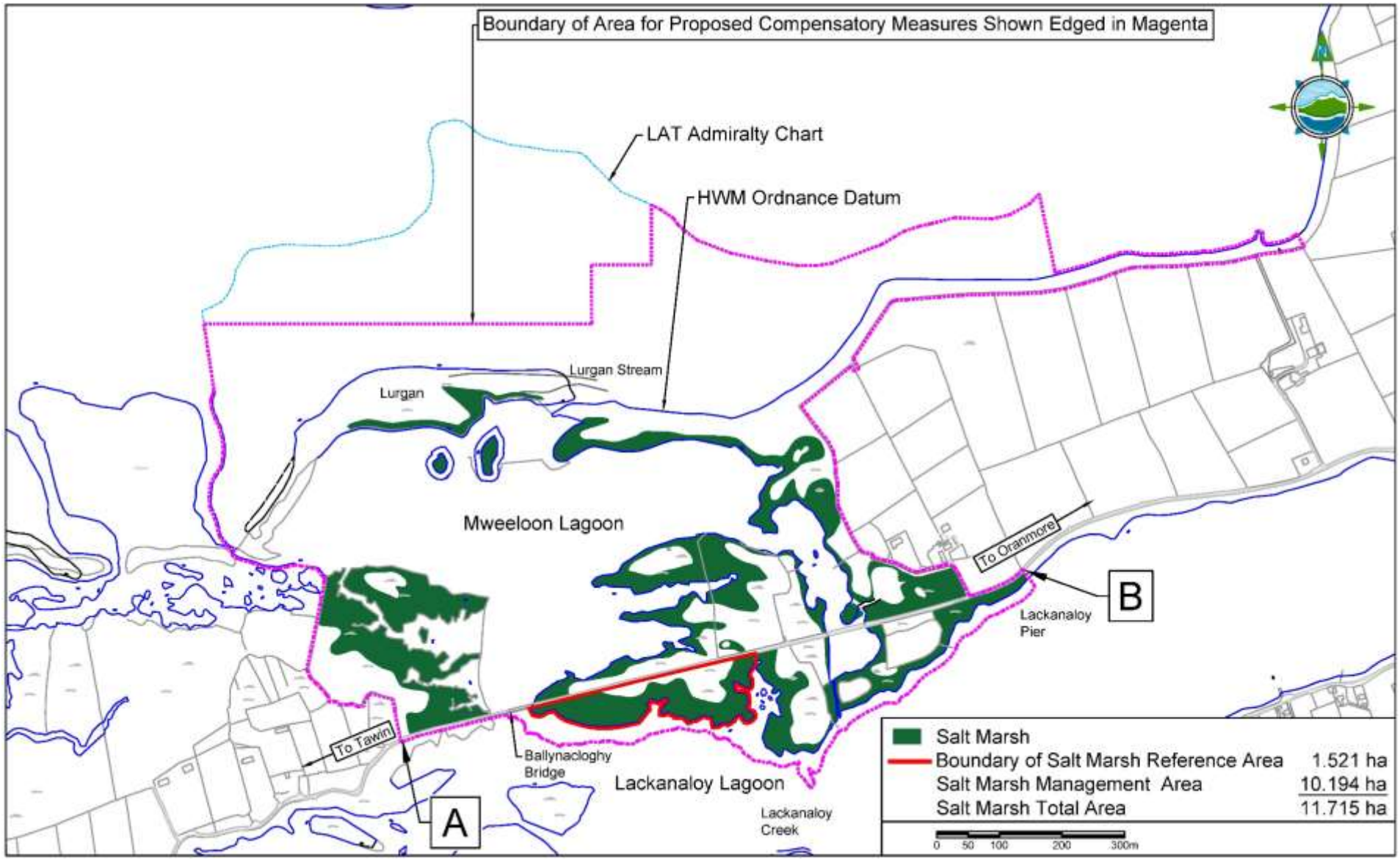

Figure No. 16 – Salt Marsh Management and Reference Areas.

15.3 ECOLOGICAL STATUS OF SALT MARSH AT MWEELOON

Areas of Salt Marsh habitat at Tawin in particular have been described as being of *"unfavourable/inadequate"* status in a report commissioned by National Parks and Wildlife (NPWS Salt Marsh Monitoring Programme Project, 2006, Tawin Island). There are several references in this report to pressures on Stony Bank and Salt Marsh habitats arising from a variety of agriculture pressures such as gazing (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).

Photograph No. 3. Damage to Salt Marsh habitat at Mweeloon due to tracking by vehicles looking northwards. October of 2017.

On p.14 of the NPWS report, the overall status of this area is described as *"unfavourable/inadequate"* while on p.17 under the heading *Habitat structure and function* for Salt Marsh, 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 the NPWS 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".*

From the observations made during the period when field studies were been carried out, it was noted there was a seasonal/aperiodic sequence to episodes of impact events on Stony Bank and Salt Marsh habitat. This is related to how much stock is put on the land, when they are put on the land, for how long they are left there, how much supplementary feeding is given and how it is given

and climatic conditions that occur when they are on the land. It is quite evident that the Salt Marsh habitat shown in Photographs 23, 24 and 26 of Appendix 14, Part 2 is seriously degraded.

Appendix 14, Part 3 shows the aerial photography for the Mweeloon, Stony Bank and Salt Marsh lands. Aerial pictures (AP) 1 – 3 show signs of the machinery and animal tracks from the main farm entrance (middle section of AP 3), past the northern part of An Loch and then heading in a northwestern direction through AP 2 and westwards in AP 1. AP 4 and AP 5 show localized areas of impact caused by livestock.

15.4 AREA OF SALT MARSH FOR MANAGEMENT UNDER COMPENSATORY MEASURES

Figure No. 16 shows 11.715 ha of Salt Marsh mapped within the study area. A 1.521 ha section of that Salt Marsh to the South of the Tawin / Oranmore road will be grazed as at present as a reference / control area. This area is presently grazed almost all year round, and will continue to be allowed to be grazed in that fashion. 10.194 ha will be managed on a late Spring – early Autumn 6 month grazing basis. Both areas will be monitored to find and ensure the optimum enhanced management of these Salt Marsh lands as compensatory habitat for the combined area of 7.39 ha of Atlantic / Mediterranean Salt Marsh and Transitional Salt Marsh impacted by the development of the Galway Harbour Enterprise Park. The Salt Marsh lands at GHEP had prior to development, been subject to 12 month grazing.

In summary:-

Salt Marsh impacted by GHEP	7.39 ha
Mweeloon Salt Marsh Reference Area	1.521 ha
Mweeloon Salt Marsh Enhanced Management Area	10.194 ha
Compensatory Measures Total Salt Marsh Area	11.715 ha
Ratio Compensatory Measures Area to Impacted Area 11.715 / 7.39 =	1.585 : 1

15.5 MANAGEMENT PLAN FOR SALT MARSH

The Management Plan for the lands at Mweeloon is designed to bring about biological improvement of all of the habitats contained within these lands and to protect these habitats in the long term and the EU Guidance document (EU, 2018) states on page 64 that "*the compensation might consist of the biological improvement of a substandard habitat of the same type within an existing designated site".* This approach to the proposed compensatory measures for loss of Salt Marsh is therefore in line with the EU Guidance document.

The lands agreed to be purchased contain Stony Bank, Salt Marsh, Limestone Pavement (priority habitat), Salt Marsh in mosaic with Limestone Pavement (a rare occurrence), Limestone Pavement in transition to grassland and lands which contain rare plants, *Salicornia* and Yellow Horned Poppy. These lands also enclose Mweeloon Lagoon which is a lagoon and is a priority habitat.

Part 1 of this document outlined the Stony Bank habitat contained in the lands and the Stony Bank Management Plan proposed to ensure its enhancement and long term protection. Part 2 now outlines the Salt Marsh lands and their proposed protection.

The Salt Marsh Management Plan below, outlines the measures proposed to ensure its enhancement and long term protection. The Management Plan will include the following 22 components.

No	**Salt Marsh Management Plan** **Management proposal and implementation plan for Salt Marsh**
1	**Purchase lands** Purchase options for land areas 1 and 2 at Mweeloon and Tawin East as shown in Figure 9 have been agreed. This will ensure that all aspects of the management plan can be successfully implemented. The purchase of these lands is considered to be vitally important as it ensures the capacity to manage the lands as required to provide for the successful restoration of habitat quality. This meets the long term implementation criterion stated in the EU guidance document. Implementation: Land purchases to be completed within 3 months after F.G.S.P.
2	**Organic farming principles** Manage the Salt Marsh habitat that is to be purchased in accordance with organic farming principles. The use of appropriate and extensive organic farming on the lands, will contribute to the improvement of the habitat in terms of species composition and function. The restoration of the terrestrial habitat will then follow a natural progression. This will be monitored on an annual basis [see below]. Implementation: Immediately after lands have been purchased.

3	**Curtail grazing** Curtail grazing levels by horses, cattle, sheep and other grazing stock. This will allow optimal growth and flowering of the vegetation and reduce poaching. Through ownership and set stocking management, the appropriate stocking density of animals on the land can be ensured, thereby maximising the successful management of the habitat. This will limit light grazing to Summer and Autumn rather than the previous Winter and Spring use which is more damaging. This will facilitate the elimination of the need for supplementary feeding as per (12) below. To achieve this, the grazing of the lands will be undertaken within the period from 1st May to 31st October, subject to appropriate weather and ground conditions, with a stocking density of 0.5 - 1.0 livestock units / ha. Stock density may be adjusted following observations of grazing effects during the first and subsequent years of implementation. Implementation: Immediately after lands have been purchased.
4	**Repair stone walls, fences and gates** Rebuild and maintain the broken stone wall and fence network and form / replace 8 missing gates, 6 damaged gates and repair 5 existing gates. See Appendix 14, Part 1. This action is essential to achieve access and grazing control to and across the lands. Implementation: In the late Spring/Summer after lands have been purchased.
5	**Cease fertilizing** Cease fertilizer and slurry spreading on the lands and curtail dunging in this habitat by repair of animal fencing. By stopping fertilizing and supplementary feeding on the lands, the Salt Marsh habitat areas will return to a natural state and nitrogen and phosphorous soil contents will return to natural Salt Marsh levels. Implementation: Immediately after lands have been purchased.
6	**Soil nutrient survey** At the commencement of the management plan, carry out a soil nutrient survey of both the area to be managed and the reference site. This will determine the levels of Nitrogen and Phosphorous in the soil prior to the initiation of any other element of the compensation plan. The results will be used as the base line for future soil nutrient surveys and hydrochemical modelling studies to track changes in soil chemistry given the adoption of organic farming principles. Implementation: In the late Spring/Summer after lands have been purchased.
7	**No herbicides** Prevention of the use of herbicides within the lands. This intervention will remove any risk of herbicidal damage to plants. It is planned to control noxious weeds such as ragwort by pulling them by hand and the spreading of briars by cutting them back in late Summer. The reduced levels of poaching by livestock on the lands will also contribute to the reduction of noxious weed infestations. Note that species such as ragwort and briar / scrub are largely confined to areas of dry grassland within the lands. Implementation: Immediately after lands have been purchased.

8	**No shooting** The owners and their tenants will not shoot on or over the lands or allow other persons to do so. Implementation: Immediately after lands have been purchased.
9	**Animal health** Ensure livestock using the lands will be outside of the withdrawal period for medicines and anthelmintics. This action will remove any potential for impact on coprophillic or coprophaegous species. Implementation: Immediately after lands have been purchased.
10	**No drainage channels** Prevent the construction of any drainage channels on the lands. Construction activities have the potential to damage the habitat and must therefore not be allowed. Implementation: Immediately after lands have been purchased.
11	**Control tractor access** Control access by tractors to the habitat. By minimizing tractor access and confining unavoidable access to critically required occasions *e.g.* removal of sick or dying livestock, the damaged areas of habitat will recover and improve. Implementation: Immediately after lands have been purchased.
12	**Eliminate winter feeding** Eliminate winter feeding and all supplementary feeding. This will stop related poaching and rutting of lands at feeding and at gate sites. These farming activities give rise to significant localised damage to habitats and by eliminating them, the damage cannot occur. This proposed feeding plan will also contribute to the reduction of weed infestation and the transfer of parasites. This will avoid the import of seed and minerals and increased dunging and poaching at feeding locations. Implementation: Immediately after lands have been purchased.
13	**No further sea defences** Prevent the construction of any further sea defence works or dumping of materials to act as a sea defence in order to protect lands. These activities give rise to damage to the habitat because of machinery and personnel tracking/walking over it. Prevention will remove this pressure. Implementation: Immediately after lands have been purchased.
14	**Sensitive repair of existing sea defence wall** In order to protect the Lagoon Priority habitat, sensitive repair of the existing sea defence wall to prevent erosion/ingress by the sea as may be required. The ecology and oceanography of the lagoon and its Intertidal habitat and species has the potential of being changed if the Stony Bank habitat is breached. Therefore, in order to protect the lagoon, some sensitive repair of the existing sea defence wall, at the north west of Lurgan Island, and as described in Section 17.1 will be undertaken as may be required.

	Implementation: 3 months after F.G.S.P. Annually and after significant storm events (see Bullet 11 following), GHC will survey the condition of the existing sea defence wall and will sensitively undertake repair, if required.
15	**Control flotsam and jetsam** Regular removal of flotsam and jetsam and other litter, blown up / thrown up by storm events. This action will help to improve the condition of the habitat and its visual appearance. Implementation: Every 3 months after lands have been purchased and directly after a Force 9 or greater storm event.
16	**Annual biological surveys** Annual biological surveys of this habitat (including the control site) to document any changes in its extent and its characterising species. This is an essential scientific element of the restoration plan. Monitoring of Salt Marsh habitat will closely follow the survey approaches which have been developed by NPWS over the past 15 years. Implementation: 1 year after the compensation plan commenced and to be submitted to Galway Harbour Company Board by mid October.
17	**Cordgrass** Should Cordgrass, which is an invasive (weed) species (Spartina maritima) be recorded in the future, initiate a control programme. Implementation: Immediately after lands have been purchased.
18	**Review of plan** In the light of the results of the annual biological surveys adjust/modify the management plan. Implementation: Within 4 weeks after the annual surveys has been completed, mid November.
19	**Surveys following storms** Immediately following storm force 11 events or greater, carry out surveys to assess possible damage to the habitat. Such extreme events can give rise to sudden and extensive changes to the physical, chemical and biological characteristics of Salt Marsh habitat and it is important to document such changes directly after the storm / flood event. This will also contribute to the recording of the natural recovery processes. Implementation: Within 10 working days after the event occurred.
20	**Independent audit of surveys** Commission an annual, independent audit of the progress of the management plan. This is to ensure that the annual surveys and management proposals can be independently reviewed and validated. Implementation: Complete 2 weeks after the submission of the annual report to the GHC Board, 1 December.

21	**Modify plan following audit** In the light of the results of this independent audit and possible changes due to storm events, adjust/modify the management plan. Implementation: After receipt of the Independent Audit, 1 December, Submit the Annual Surveys, Audit and Proposed Modifications to the Co-ordinating Bodies*, mid December, annually.
22	**Signage** Erection of signage including illustrations and photographs at chosen vantage points demonstrating what the project comprises and what species are typical of the habitat. Implementation: During Year 1 of the compensation plan.

Control of Aquaculture Licences
Purchases to be completed within 3 months of F.G.S.P. and implementation of Management Plan to commence directly accordingly.

Co-ordinating Bodies
* Co-ordinating bodies proposed Galway City Council, Galway County Council, NPWS, Teagasc, DAFM

Annual Monitoring Report Process
The annual survey report and audit when reviewed and modified will be submitted to Galway City and County Council Planning Offices and other notice parties as may be directed by the planning condition in this regard. This putting of the annual report on the planning file will allow public scrutiny of the annual survey / audit. Should the public or the notice parties raise concerns about these reports, such concerns will be addressed in the ongoing management and survey / audit process in the following management season.

15.5.1 Commence Management and Monitoring of Salt Marsh Lands

In order to allow the proposed management of the Salt Marsh lands, GHC when agreeing the land purchases for the Stony Bank, agreed to the purchase of the additional lands containing the Salt Marsh lands surrounding Mweeloon Lagoon. GHC has prepared the Lease Agreement terms under which those lands will also subsequently be managed to ensure the biological enhancement possible will be achieved and monitored to ensure such enhancement is maintained.
See Appendix 20 which confirms these Land Purchase Agreements have been contracted.

The management proposed will therefore be able to be commenced as indicated.

15.5.2 Salt Marsh Monitoring Reference Area

The Salt Marsh reference area will be south of the road. It will be allowed to be grazed on a year round basis and supplementary feeding will be permitted while being grazed.

It will not be allowed to be used for winter feeding when wholly dependent on supplementary feeding causing conspicuous damage to the land and habitat.

The tighter grazing on the reference area which contains 1.521 ha of Salt Marsh will allow comparison with the lighter grazing on the area containing 10.194 ha of Salt Marsh, and so help to guide the grazing management of the entire 11.715 ha over time to the most appropriate grazing regime which give additional detail of how the respective reference areas will allow comparison with the main sections of the areas to be preserved and enhanced.

15.5.3 Restoration of Salt Marsh Lands

The tractor tracking of the land would appear to arise from tractor use to go to see the cattle. The herding of livestock will in the future be by pedestrian access due to the control proposed to limit tractor use.

The ceasing of supplementary feeding will eliminate the tracking of animals to and from the supplementary feeding troughs. Such tracking is more injurious to lands as stock rush to such sites, thus causing more cutting up / poaching of the lands.

The repair of field boundaries and some 14 gates and the change over to 6-month, late Spring / early Autumn controlled set stocking of the lands will allow natural recovery to occur during the first year of managed grazing, which will be enhanced over the following years by monitoring the stocking density and limiting it to that which gives the best recovery of the habitat.

15.5.4 Salt Marsh Expected Results

The benefits of those management controls which will be brought about by the organic farming and the grazing / stocking density control will benefit the Salt Marsh lands directly.

- Significant enhancement will arise in the first grazing season on foot of the wall and gate repairs and the managed reduced grazing.
- The fortnightly walk over surveys will be particularly relevant to see that set stocking of the various fields and rotation of stock between fields is undertaken to provide the most appropriate grazing level for the habitat and plant species. The annual survey will confirm this progress.
- At the end of the second grazing season the bulk of the enhancement will have been achieved. Thereafter the surveys will be to ensure this is maintained and enhanced, to any further extent possible, into the long term.

15.5.5 Addendum to the Natura Impact Statement to include consideration of the Compensatory Measures

The Addendum to the NIS to include consideration of the Compensatory Measures referred to at Section 11 and enclosed herewith has assessed the potential impact of the proposed management plans on the Intertidal and Stony Bank habitats at Mweeloon, and also comprises an assessment of the compensatory measures for Salt Marsh and for the repair of the existing sea wall and has assessed all the Compensatory Measures in combination and/or cumulatively with the GHE development proposed herein along with the historic impacts of the GHEP and any other relevant developments. Furthermore, it also addressed potential impacts on Inner Galway Bay SPA.

Based on the conservation objectives for the Galway Bay cSAC, it has been concluded in the Addendum to the NIS to include consideration of the Compensatory Measures that the proposed Salt Marsh management plan at Mweeloon, alone or in combination with other activities, will not pose any threat to the Atlantic Salt Marsh habitat and as a result the conservation objectives and overall integrity of the cSAC will not be impacted.

The Addendum to the NIS to include consideration of the Compensatory Measures also considers other Qualifying Interests *i.e.* Seminatural dry grasslands, Limestone Pavement, *Salicornia* Muds and otter. It was also concluded that none of these would be affected by the proposed Salt Marsh management plan or the Intertidal and Stony Bank management plans as discussed at Section 11 of this report.

In relation to the SCIs of the Inner Galway Bay SPA all of which are aquatic species, most of them *i.e.* Heron, Brent Goose, Widgeon, Teal, Shoveler, Ringed Plover, Dunlin, Bar-tailed Godwit, Curlew, Redshank, Turnstone, Black-headed Gull and Common Gull forage or roost on the sea

shore. Great Northern Diver, Cormorant, Red-breasted Merganser, Sandwich Tern and Common Tern feed by diving in the sea. Brent Goose, Lapwing and Curlew may also feed on pasture fields. Given the preference for living in/near the sea, these species cannot be impacted by the repairs to gates and stone walls. Additionally as it is planned to carry out such repairs in the Summer, species that migrate to Ireland in the Winter cannot be effected by such repairs.

The removal of oyster trestles and control of *Didemnum vexillum* at oyster farms is predicted to have a minor positive effect on shore birds.

15.6 LONG TERM MONITORING OF SALT MARSH

The composition and condition of Salt Marsh vegetation will be assessed using condition assessment techniques devised by the National Parks and Wildlife Service. These detailed surveys of monitoring stops will be carried out once a year in late August / early September just before the removal of grazing livestock. In addition to these detailed annual surveys, general walkover inspections of the Salt Marsh areas will be carried out every two weeks when livestock are grazing in order to check for signs of localized overgrazing or poaching. This regular inspection of the areas will inform the ongoing management of the site and allow for the fine tuning of the grazing regime, if required and ensure compliance with that proposed grazing control.

15.7 COSTS OF IMPLEMENTATION, MANAGEMENT AND MONITORING OF SALT MARSH

GHC has budgeted for the costs for implementation, management and monitoring for the Stony Bank habitat to include:

1. Buying the land,
2. Construct gates and rebuild walls,
3. Carry out the soil nutrient survey,
4. Collect and dispose of flotsam and jetsam and other litter,
5. Surveys after extreme storm events,
6. Undertaking any repairs post extreme storm events,
7. Fortnightly monitoring of stocking levels and associated poaching,
8. Carry out the annual ecological monitoring surveys and associated reporting,
9. Independent auditing of the reports,
10. Modify (if required) the management plan and
11. Prepare and erect signage.

15.8 COMPARISON WITH GUIDANCE CRITERIA FOR SALT MARSH

- **Targeted Compensation**

The proposed measures have been designed to improve in a measurable way the structure and function of the Salt Marsh habitat compensatory area, for that which was impacted as part of the Galway Harbour Enterprise Park in the 1990's.

These compensatory measures comply with this element of the Guidance document. Areas of Salt Marsh habitat have been subject to uncontrolled grazing by cattle and vehicular access in the past. The future quality of the habitat will be ensured by controlling the levels of grazing and curtailing vehicular access and the implementation of the Salt Marsh management plan proposed. The timing of grazing will be changed from winter / Spring to the Summer / Autumn months in order to eliminate supplementary feeding and reduce poaching of the Salt Marsh.

iv) Effective Compensation

Given that the land in which the Salt Marsh habitat occurs has been contracted and will be purchased, a high level of success is ensured. It is therefore regarded as a highly effective compensatory measure. Control of grazing levels and the erection of walls and gates will reduce the impact of agriculture activities on this habitat. Furthermore, the implementation of annual surveys and independent auditing will provide a highly significant database for Article 17 monitoring and confirm the enhancement achieved and maintained.

v) Technical Feasibility

The proposed compensatory measures are highly technically feasible as the areas of Salt Marsh habitat are easily accessible and will be owned by Galway Harbour Company. In the future grazing levels will be managed by the owner by incorporating the Stony Bank / Salt Marsh management plans in the lease agreements with tenant farmers.

The implementation of the grazing control in the first season will reduce the damage to the lands in that season. The bulk of the enhancement will have been achieved by the end of the second grazing season. Further minor recovery will arise in subsequent seasons.

There will be one tenant for each of the land holdings proposed to be purchased and access and use of the lands will be limited to that tenant only and it will be the responsibility of that tenant to manage the lands in accordance with the terms of the Lease and the Management Plans as proposed and compliance with such requirements will be monitored and ensured by the GHC. Such management will continue on the long term basis as the lands will have been acquired by GHC.

vi) Extent of Compensatory Measures

A total of 7.39 ha of Salt Marsh habitat have been lost as a result of the construction of the Galway Harbour Enterprise Park. The compensatory measures extends over 11.715 ha of Salt Marsh habitat which is larger than the area lost at Renmore. The Salt Marsh at Mweeloon occurs in complex with a further area of 11.381 ha dry grassland which also contains the priority habitat Limestone Pavement. The sum of the Salt Marsh and Dry Grassland areas is 23.096 ha.

vii) Location of Compensation

As Mweeloon lies within the boundary of the Galway Bay cSAC, this proposed compensatory measures satisfies this element of the Guidance document where it is stated …"*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"*.

viii) Timing of Compensatory Measures

Once F.G.S.P. is achieved, the compensatory measures will be put in place within 3 months and there will be no time lag. Indeed, this compensation will be in place well before any of the proposed development takes place at Renmore and once in place habitat recovery will begin immediately. The proposed compensatory measures therefore satisfy this element of the EU Guidance Document (EU, 2018).

ix) Long Term Implementation

As the control of the aquaculture licence at Mweeloon have been contracted, this will ensure the long term implementation of the measures for the Salt Marsh habitats within the compensation area. This aspect of the proposed compensatory measures will provide "*a sound legal and financial basis for long term implementation",* and ensure *"their protection, monitoring and maintenance be secured in advance of impacts upon habitats and/or species…….*" which is stated in the EU Guidance Document on page 69.

The document goes on to state on page 70…"*applying the necessary legal means in case land or rights purchase is deemed essential for the effective implementation of the measures*" and also " *establishing monitoring programmes*…". This proposed compensatory measure therefore satisfy this element of the EU Guidance Document.

With regard to the EU Article 6 Guidance document (EU 2018, page 60), which states that *"compensatory measures should be additional to the actions that are normal practice under that Habitats and Birds Directives"*, the following measures that are being proposed are considered to be additional to normal practices:

1. Complete the purchase options for the Salt Marsh lands,
2. Reduction of stocking densities,
3. Adherence to organic farming practices such as no use of fertilizers, slurry, herbicides,
4. Anthelmintic withdrawal periods,
5. Soil nutrient surveys and modelling studies,
6. Limiting tractor access / machinery access,
7. Rebuilding of field walls and hanging of gates,
8. No construction of new sea defences unless to protect the lagoonal priority habitat,
9. No excavation of new drainage channels

10. Regular removal of litter,
11. Annual biological surveys and
12. Independent reviews of these annual surveys.

Specifically, grazing will be as proposed in Appendix 17: Outline of Grazing Management at Mweeloon by Dr. John Conaghan.

With regard to the annual biological surveys, the composition and condition of Salt Marsh vegetation will be monitored using protocols devised by the NPWS in the recent past [see McCorry and Ryle 2009, Martin *et al.,* 2017]. Monitoring involves the recording of vegetation composition and cover at a number of points or stops within areas of the habitat. Additional important data such as height of vegetation, flowering and the cover of bare soil are also recorded. From these data, the condition of the habitat can be assessed.

In the case of Salt Marsh areas, the presence of >10% bare soil outside of creek areas may indicate the deterioration of the habitat due to damaging operations such as overgrazing, poaching and vehicular access. This restoration will be significantly achieved within the first managed grazing season. Vegetation height and flowering are also important parameters to monitor as the presence of a range of vegetation heights is a desirable feature of Salt Marsh habitats.

Monitoring will be undertaken as proposed in Appendix 19 Proposed Monitoring Plan for Terrestrial habitats.

The proposed Compensation plan also satisfies other elements of the EU Guidance document (EU, 2018) that notes on page 64 the "*the range of compensatory measures and accompanying measures found in current practice in the EU under the "Habitats" Directive also includes:*

Species recovery
Land purchase
Rights acquisition
Reserve creation [see page 71].

Page 68 of the EU Guidance advice on Article 6 (EU, 2018) notes that during the development of compensatory measures "tight coordination and cooperation between Natura authorities, assessment authorities and the proponent of the plan or project" is required. During the evolution of the compensatory measures presented in this document, a number of bipartite and tripartite meetings were held the NPWS, Ireland's Natura 2000 authority and An Bord Pleanála, Ireland's assessment authority at which the measures were explained and discussed.

Those discussions regarding the loss of Salt Marsh at the GHEP during the 1990's and how best that these compensatory measures could address that loss have helped to guide this proposal and have led to the purchase of these Salt Marsh lands and their provision as an additional part of this proposal, for "biological improvement of substandard habitat".

16 PART 2 – GHE AND GHEP COMPENSATORY MEASURES SUMMARY

The following Table summarises the combined effect of development on the three habitats to be impacted by the GHE and previously impacted by the GHEP.

Habitat Type	To be Impacted by Development of GHE	Impacted by Development of GHEP	Total Area
Intertidal	5.93 ha	8.58 ha	14.51 ha
Stony Bank	0.35 ha	0.28 ha	0.63 ha
Atlantic / Mediterranean Salt Marsh Complex	---	2.21 ha	
Transitional Salt Marsh / dry grassland	---	5.18 ha	7.39 ha
		Total	**22.530 ha**

Table No. 3 – Habitat Areas to be Impacted

Table No. 4 following shows the extent of the three habitat types within the study area and available for management under the compensatory measures proposals. It also shows the areas to be reserved as reference sites.

Figure No. 17 shows the extent and location of the reference sites and the areas of each habitat available for management at Mweeloon, Tawin.

Habitat Type	Management under Compensatory Measures	To be Reserved as Reference Site
Intertidal	27.239 ha	-----
Stony Bank	3.053 ha	0.600 ha
Salt Marsh	11.715 ha	1.521 ha
Total	**42.007 ha**	**2.121 ha**

Table No. 4 – Habitats for Reference Sites within the Study Area

The total GHE and GHEP habitat impacts as per Table 3 are 22.530 ha and are shown on Figure No. 15.

The total of these habitats identified for enhancement as per Table 4 are 42.007 ha and are shown on
Figure No. 17.

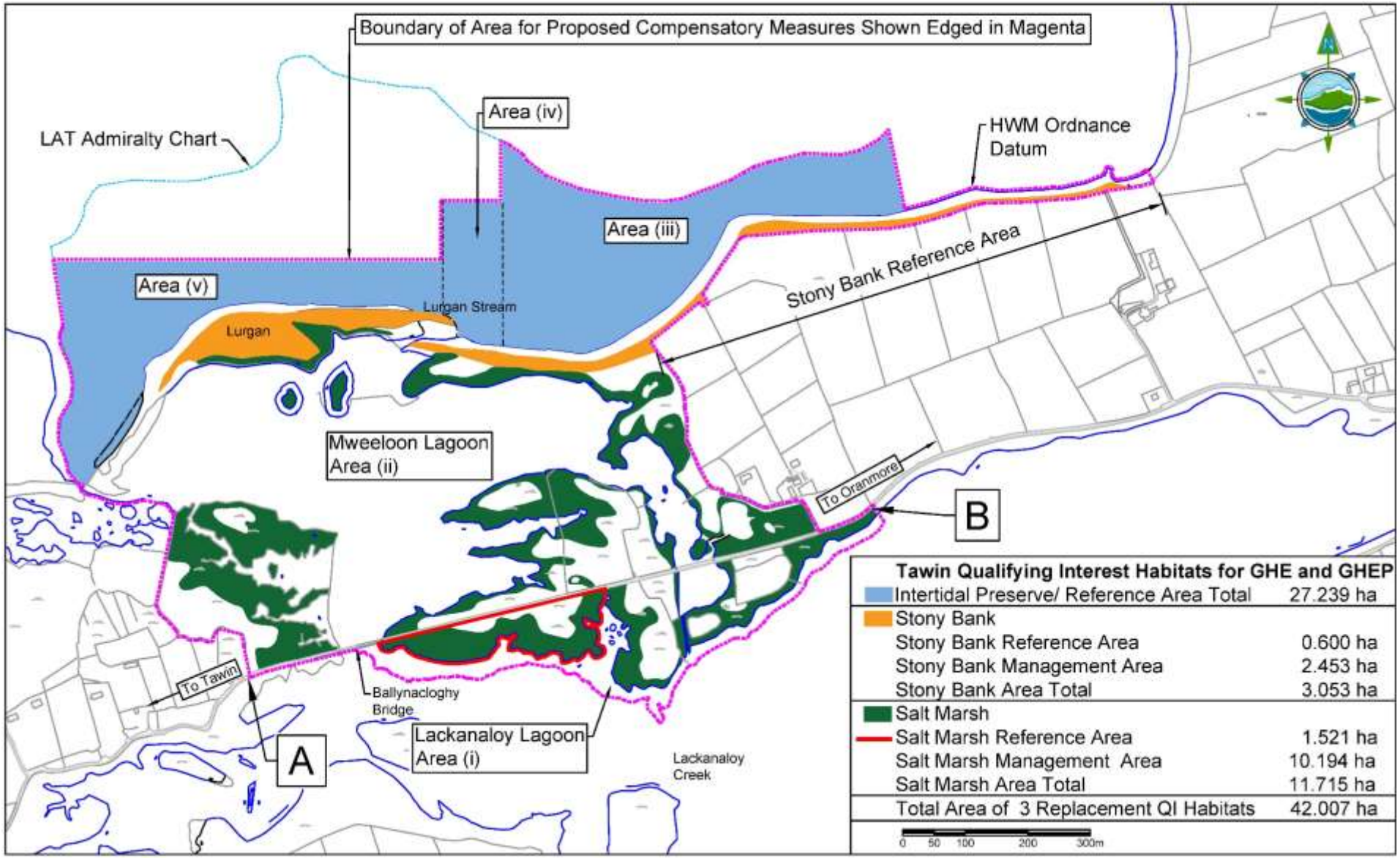

Figure No. 17 - Intertidal, Stony Bank and Salt Marsh Areas for Compensatory Measures at Mweeloon, Tawin.

Sect. 1.5.4. of Guidance states as follows:-

"1.5.4 Extent of compensation

The extent required for the compensatory measures to be effective has a direct relationship to the quantitative and qualitative aspects inherent to the elements of integrity (i.e. including structure and functionality and their role in the overall coherence of the Natura 2000 network) likely to be impaired and to the estimated effectiveness of the measures.

Consequently, compensation ratios are best set on a case-by-case basis and must be initially determined in the light of the information manged during Article 6(3) aqssessment ant ensuring the minimum requirements to meet ecological functionality. The ratios may then be redefined according to the results observed when monitoring the effectiveness, and the final decision on the proportion of compensation must be justified.

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) nor their conservation objectives".

Table No. 5 sets out the compensatory area ratios (comp. ratios) that are proposed for the three habitat types involved.

Habitat	Development of Galway Harbour Extension (GHE)			Development of Galway Harbour Enterprise Park (GHEP)			Development of GHE & GHEP		
	To be Impacted	To be Managed	Comp. ratios	Impacted	To be Managed	Comp. ratios	Total to be Impacted / Impacted	Total to be Managed	Comp. Ratios (Avg.)
Intertidal	5.930	17.790	3.000	---	---				
Intertidal	---	---		8.580	9.449	1.101			
Total							14.510	27.239	1.877
Stony Bank	0.350	1.050	3.000	---	---				
Stony Bank	---	---		0.280	2.003	7.154			
Total							0.630	3.053	4.846
Salt Marsh Definite	---	---		2.210	6.535	2.957			
Salt Marsh Transitional	---	---		5.180	5.180	1.000			
Total	---	---		7.390	11.715	1.585	7.390	11.715	1.585 (avg)
Gross Totals							**22.530**	**42.007**	**1.864**

Table No. 5 – Compensatory ratios for each Habitat type [Areas in hectares]

For the Intertidal habitat, the GHE ratio is 3 : 1, the GHEP is 1.101 : 1 and the average for the GHE and the GHEP impacts combined is and at a ratio of 1.877 : 1.

For Stony Bank a ratio of 3 : 1 is applied to the habitat impacted arising from the GHE. A ratio of 7.154 : 1 will be provided for the habitat historically impacted by the development of GHEP. This is on the basis that the 0.35 ha is impacted by the sheltering effect of the harbour extension whereas the 0.28 ha has been fully covered over by the construction of the Enterprise Park.

As regards Salt Marsh a ratio of 1 : 1 is applied to the historical impact on 5.180 ha of what has been precautionarly designated as 'transitional' Salt Marsh. A ratio of 2.957:1 has been applied to

the recognised 2.210 ha of ‘definite’ Atlantic / Mediterranean Salt Marsh complex that was historically impacted by the GHEP.

A ratio of 1.864 : 1 of replacement habitats on average is identified for the sum of the GHE and GHEP impacts over the three habitat types.

Part 3

Additional Environmental Benefits of the Galway Harbour Company Compensatory Area Proposal at Mweeloon Lagoon

17 ADDITIONAL BENEFITS

17.1 LAGOON HABITAT AT MWEELOON

The area around Mweeloon comprises terrestrial and marine habitats including Intertidal and Subtidal marine habitats, Stony Bank, Salt Marsh and grasslands. Except for two cilled openings to the open sea on the north shore on either side of Lurgan Island and two openings to the south under Ballynacloghy Bridge and a lesser culvert to the east, the marine waters within Mweeloon are land locked and in ecological terms are definable as a lagoon under the EU “Habitats” Directive (1992).

Prior to this finding, the various Tawin lagoons were defined as Intertidal Muds and sands that dry out at low water and both the Admiralty chart of the area and the Ordnance Survey map show exposed sea bed habitat being present at low water. Observations made during the course of the field work carried out during the development of these compensatory measures show that this is not the case and that the area in question comprises lagoon habitat.

Lagoons are listed as Priority habitats in the EU “Habitats” Directive (EU, 1992) and this status requires that they are afforded special protection. This habitat type is not listed on the NWPS site description for the water body at Mweeloon nor indeed is the extensive area of Tawin Island at large as shown on Figure No. 18. In the greater Tawin Island area, the extent of this habitat has been estimated at 265.5 ha. The Mweeloon Lagoon area is shown in navy within the compensatory site area as outlined in red to the north of the greater area of lagoon.

The fact that there is 19.48 ha of priority lagoonal habitat which will be enclosed by the lands contracted to be purchased at the Mweeloon site is of significant additional ecological and conservation interest and adds considerably to the merit of this proposed compensatory measures proposal. See Figure No. 19. The addition of the priority lagoon brings the total of the proposed compensatory measures area to 73.233 ha.

The estimated extent of 265.5 ha of lagoonal habitat at Tawin Island is of considerably high National interest as statistically, it significantly adds 10.9% to the overall area of the habitat on a National scale.

The lands at the northwestern section of Lurgan have historically undergone coastal defence works. In order to protect the lagoon, repair to this existing sea defence wall may be required in the future. Such repair will be undertaken by GHC if required, and the relevant authorities will be consulted in this regard.

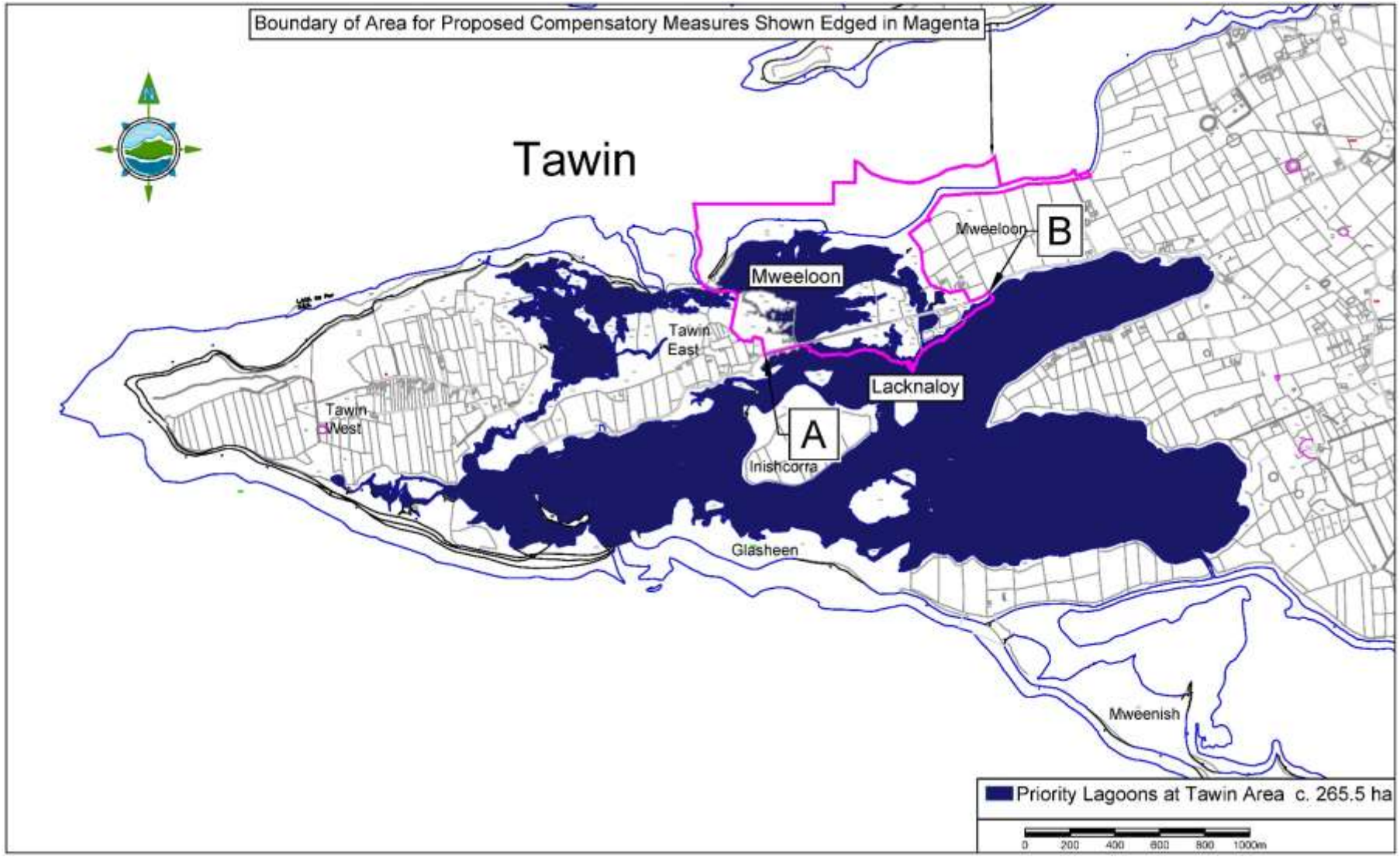

Figure 18 – Extent of Priority Habitat Lagoon, within the Compensatory Area.

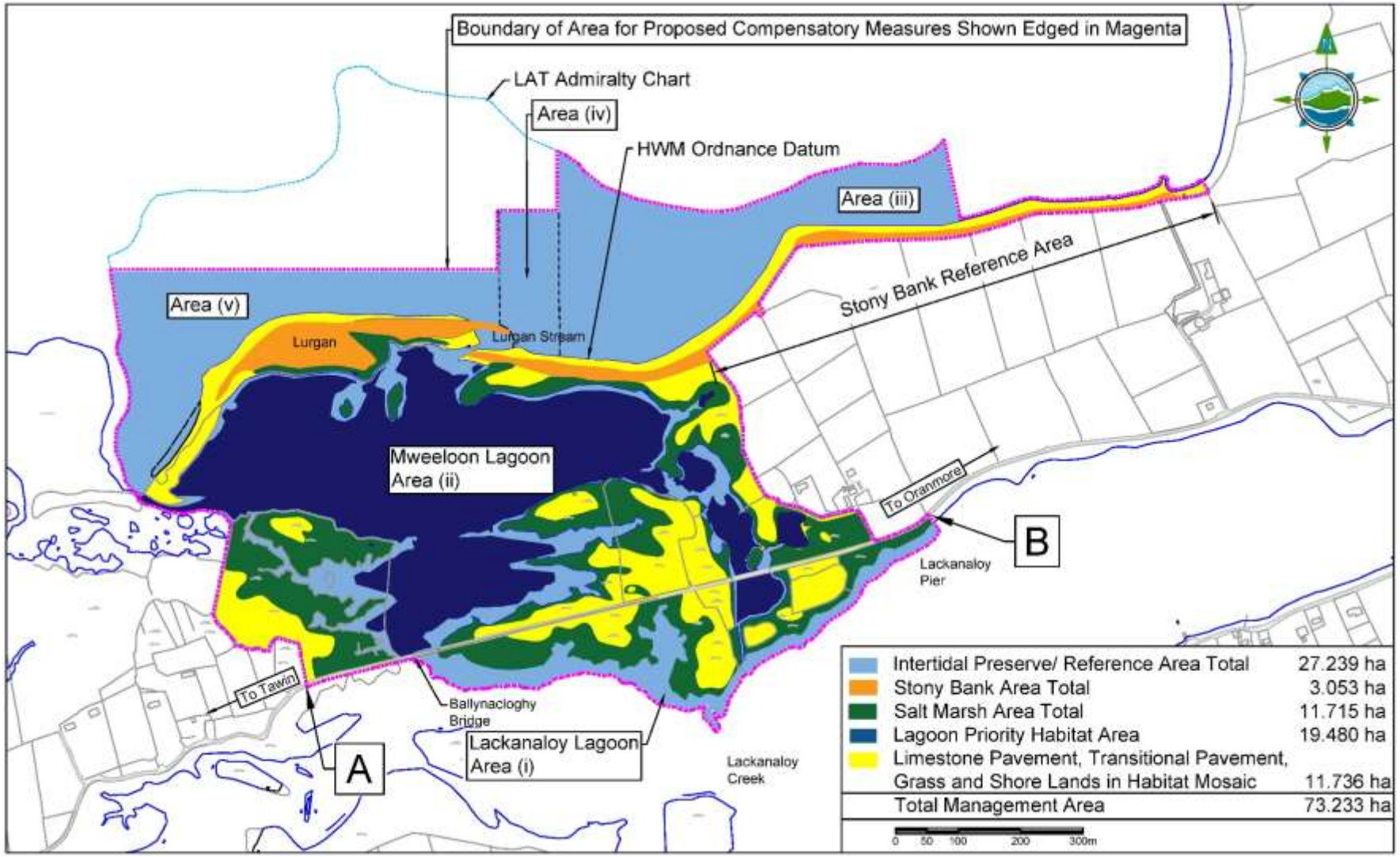

Figure 19 – Intertidal, Stony Bank, Salt Marsh and Lagoonal Areas Limestone Pavement, Transitional Pavement, Grass and Shore Lands within the Compensatory Area.

17.2 PROTECTION OF LIMESTONE PAVEMENT AND OTHER QIS AND RARE SPECIES

17.2.1 QI Habitats and Species

In addition to the dominant Atlantic Salt Marsh and dry grassland habitats at Mweeloon, there are other habitats on this proposed compensatory site, and these are areas of two other EU Annex I habitats, namely Limestone Pavement (Habitat code 8240) and *Salicornia* (Habitat code 1310).

Limestone Pavement [8240], another priority habitat in the EU "Habitats" Directive Article 6 was not previously recorded for the Tawin area before this study. The importance of this is, that as for the Lagoon habitat listed above, the fact that Limestone habitat occurs within the site gives further additional high conservation status to the proposed area. [Refer Photograph 4 following].

Much of the Limestone Pavement habitat is found in association with Salt Marsh species such as *Festuca rubra* and *Artemisia maritima*. This co-occurrence of Salt Marsh and Limestone Pavement habitats is very rare in Ireland and its occurrence at the Tawin site gives the area further additional ecological interest and value.

The Limestone Pavement transitions to calcareous grass land and some grass land above sea flood level. The lesser Perched Lagoons, the Limestone Pavement and the transitional pavement areas will be protected from land reclamation, removal of feature out-cropping rock and change-over to intensive agriculture by the compensatory measures proposed. Those measures will see the lands and the habitats protected, preserved and enhanced, all of which is enabled by the land purchases agreed to allow the provision of these lands as the Compensatory Measures for the proposed GHE and previous GHEP developments.

Another QI habitat for Galway Bay cSAC is *Salicornia* [1310]. This habitat is typically found along the lower reaches of Atlantic Salt Marsh where the substrate is generally muddy and the habitat experiences long periods of inundation by tides. The vegetation is normally sparse with the main species accompanying *Salicornia europaea* (Glasswort or Samphire) and *Suaeda maritima* and the grass *Puccinellia maritima.* This habitat is common at the site and is present along the upper Intertidal sections of much of the lagoonal habitat of Tawin.

A QI species for Galway Bay cSAC, otter, is also known to be present at the site – sprainting sites were observed at a number of locations along the north shore of the proposed compensatory area.

17.2.2 Q1 rare species

Mweeloon supports a population of two rare plant species. Shingle areas contain populations of yellow-horned poppy *(Glaucium flavum)* while Salt Marsh areas support populations of Sea purslane *(Atriplex portaculoides).* Both of these species have a very restricted distribution in Ireland generally and are particularly rare along the west coast of Ireland. The populations of the species which occur at Tawin are among the most northerly known along the west coast. The populations of the species which occur at Mweeloon will be surveyed as part of the future management of the site using rare plant monitoring protocol devised by NPWS. The extent of the populations will be surveyed and mapped using GPS and a number of permanent monitoring quadrats will be established. In these quadrats, the number of plants will be counted and other important data such as associated vegetation and degree of disturbance will be recorded. Using these data, it will be possible to determine the effects of management on the species and this will enable the better protection of these rare species within the site. This research will increase the understanding of the ecology and management of these rare coastal species which could be applied to other populations of the species elsewhere in Ireland in the future.

Photograph No. 4 – Limestone Pavement and Salt Marsh complex at Mweeloon showing undamaged habitat. Note the abundance of *Artemisia maritima* (Wormwood) at this location.

18 POTENTIAL ADDITIONAL BENEFIT

18.1 MWEELOON AS A NATURE RESERVE

During research that was carried out as part of these compensatory measures on previous successful European IROPI cases, one such project called the Project Mainport Rotterdam (2003 EU Commission Opinion C (2003) 1308 24/04/2003) included the establishment of an area of 750 ha designated as a nature reserve. With regard to Nature Reserves in Ireland, the National Parks and Wildlife Service web site shows some 75 nature reserves within the Irish State. This same page also notes that "*…persons interested in acquiring statutory protection of their lands can seek advice on this matter from the Department".* It is proposed to get such advice from the Department in this regard.

The EU Guidance document on Article 6 (EU, 2018) on page 64 specifically mentions the creation of reserves as a possible compensation method.

Galway Harbour Company as owners of the lands adjoining Mweeloon Lagoon would co-operate positively with the relevant agencies to enable the lagoon to be designated as a Nature Reserve. In area, this nature reserve would be 73.233 ha in extent, 19.480 ha of which will be lagoonal in habitat.

Marine reserves are a special type of Marine Protected Area. They are fully and permanently protected from activities that remove animals or plants, or that alter habitats, except as needed for scientific monitoring. Examples of activities that are prohibited in marine reserves are fishing, aquaculture, dredging and shooting. Activities such as walking, swimming, boating and scuba diving are however, allowed. There are at least three other marine reserves in Ireland and these are Lough Ine, Co. Cork, Booterstown Marsh, Co. Dublin and Erris Head, Co. Mayo.

Scientific evidence shows that marine reserves usually boost the abundance, diversity and size of marine species living within their confines. Marine reserves are also able to replenish fished areas when young and adult fish move out of the reserve.

Marine reserves differ from other kinds of Marine Protected Areas that typically exclude only some extractive activities or provide seasonal or short-term protection. Because marine reserves fully protect habitats and the diversity of animals and plants that live in those habitats, they can help produce different outcomes from other management tools. However, reserves alone cannot address problems such as pollution, climate change or overfishing. Other management strategies are needed to compliment marine reserves and it is important to understand the effects of marine reserves as well as how to implement them more effectively.

Signage will be provided along the Tawin Road and at the GHE to indicate what area is covered by the proposed reserve. The signage at Tawin will indicate what activities are prohibited, together with images of the important plant and animal species that are present at the site.

The signage at GHE will point to Tawin and indicate the compensation that will have been provided as compensation for the previous GHEP and proposed GHE developments as well as the merits of the Tawin nature reserve. It will note that these areas are managed organically by farmers on behalf of GHC for the benefit of the habitats, and are not for unapproved public access.

A copy of the Tawin signage will be displayed at the GHE in Renmore to indicate the habitats and species protected at Tawin.

The provision and maintenance of a 73.33 ha reserve containing qualifying interest and priority habitats for the 22.530 ha total of qualifying interest habitats impacted by the GHEP and the proposed GHE development represents an overall ratio of 3.25 : 1.

19 CONCLUSION

It is concluded that, beyond reasonable scientific doubt, the impacts from the proposed compensation measures in themselves are considerably beneficial to the designated sites. It is further confirmed that both alone and in combination with other activities, including the GHE and GHEP that the compensatory measures will avoid any significant, negative effects on the Galway Bay cSAC and Inner Galway Bay SPA Natura 2000 sites and their qualifying interests/special conservation interests or conservation objectives. The compensatory measures proposed will be sufficient to counteract the previously indicated losses for the cSAC that will be caused by the GHE or were caused by the GHEP.

The ratios between areas of habitat lost as part of both the GHE and the GHEP and those gained by taking control of aquaculture licence sites and the purchase of land at Tawin are high.

The proposed compensation measures will have significant, positive, beneficial, long term effects on the area where they will be carried out. These include the making fallow of parts of the Intertidal habitat that are currently being used to farm oysters and therefore, the removal of pressures associated with operating the farms *e.g.* tractor access and the control of a non-native, invasive species, *Didemnum vexillum,* that has infested the farms.

Recovery of Stony Bank and Salt Marsh vegetation will come about by controlling grazing and by the introduction of organic farming principals *e.g.* no use of herbicides within these lands which contain the Stony Bank and Salt Marsh habitats. An essential aspect of the control of grazing is the repair of stone walls and damaged gates. This management and repairs of walls and gates will contribute to the improvement of both habitats in terms of species composition and function.

There are other ecologically significant positive aspects to the targeting of the site at Mweeloon and these are that:

> 2 priority habitats, Limestone Pavement and Lagoon that had previously not been known for that part of Galway Bay cSAC were recorded within the area during biological survey work,

The area of lagoon at Tawin represents an additional *ca* 10% of this habitat on a National scale.

Areas of another Qualifying Interest habitat,
Salicornia Muds, were recorded on the lands and
The rare Horned Poppy (*Glaucium flavum*) was recorded at the site.

Additionally, the measures also include for the purchase of the lands at Mweeloon and Tawin East which will ensure that all aspects of the management plan can be successfully implemented. The purchase of these lands is considered to be a vitally important element of the management plan as it ensures the capacity to allow the successful restoration of habitat quality.

A soil nutrient survey of both the area to be managed and the reference site will be carried out to determine the levels of Nitrogen and Phosphorous prior to the initiation of any element of the compensation plan. This will be used as the base line for future soil nutrient surveys and hydrochemical modelling studies to track changes in soil chemistry given the adoption of organic farming principles.

Livestock using the lands will be outside of the withdrawal period for medicines and anthelmintics. This action will remove any potential for impact on coprophillic or coprophaegous species.

The prevention of removal of cobbles is an essential element for the protection of Stony Bank habitat.

By controlling access by tractors to the 2 terrestrial habitats in question, the damaged areas of habitat will recover and improve. This will also be achieved by the elimination of supplementary Winer feeding.

The regular removal of flotsam and jetsam and other litter will help to improve the condition of the habitats and their visual appearance.

The effects of these compensatory measures will be monitored by carrying out annual biological surveys of the habitats (including the control sites) to document any changes in their extent and their characterising species. These report will undergo a third party audit to ensure that the annual surveys and management proposals can be independently reviewed and validated.

It is important that immediately following significant storm events, surveys need to be carried out to assess possible damage to habitats. Such extreme events can give rise to sudden and extensive changes to the physical, chemical and biological characteristics of Intertidal, Stony Bank and Salt Marsh habitats and it is important to document such changes directly after the event. This will also contribute to the recording of the natural recovery processes. In the light of the possible changes due to storm events and results of the independent audit, the compensation management plan may need to be adjusted or modified.

The total area of the site of these various compensatory measures will be some 73.233 ha which will contain a unique combination of habitats including Intertidal, Lagoonal, Stony Bank, Salt Marsh, Limestone Pavement, Salt Marsh in mosaic with Limestone Pavement, Calcareous Grassland and *Salicornia* Muds including some rare habitat mosaics and plant types, which will be acquired by GHC and managed specifically for the benefit of the coherence of the designated cSAC Galway Bay site.

Finally, as GHC will own the lands, the long term protection of this part of Galway Bay cSAC into the future is assured and will compensate generously for the losses proposed to arise from the GHE and which formerly arose from the GHEP.

20 REFERENCES

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