From: Housing Private Secretary <privatesecretary@housing.gov.ie>
Sent: Tuesday, February 27, 2024 3:04 PM
To: Niamh Thornton <n.thornton@pleanala.ie>
Cc: SIDS <sids@pleanala.ie>
Subject: Galway Harbour Extension (Case Number 61.PA0033) - Correspondence from Minister O'Brien

Caution: This is an **External Email** and may have malicious content. Please take care when clicking links or opening attachments. When in doubt, contact the ICT Helpdesk.

Dear Ms. Thornton

Please see attached correspondence from Minister Darragh O'Brien.

Please acknowledge receipt.

Regards

Niamh

Niamh Redmond
Private Secretary to Minister Darragh O'Brien

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*The Minister is a Designated Public Official under the Regulation of Lobbying Act, 2015 (details available on www.lobbying.ie)

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

27th February 2024.

Ms. Niamh Thornton,
Senior Executive Officer,
An Bord Pleanála,
64 Marlborough Street,
Dublin 1.

NOTICE PURSUANT TO SECTION 177AB (3) OF THE PLANNING AND DEVELOPMENT ACT 2000 (AS AMENDED)

Re: Galway Harbour Extension (Case Number 61.PA0033)

Dear Ms Hayes,

I write in response to your letter of 24 March 2021 enclosing a statement of case for imperative reasons of overriding public interest (IROPI), a copy of the planning application and a Natura Impact Statement, pursuant to Section 177 of the Planning and Development Act 2000 (as amended), (the 2000 Act) in respect of a strategic infrastructure application to extend Galway Harbour.

I hereby wish to notify you pursuant to Section 177AB(3) of the 2000 Act, that the Minister of State for Heritage and Electoral Reform, has conveyed his opinion that the compensatory measures proposed are sufficient to ensure that the overall coherence of the Natura 2000 network is protected (see Appendix 1).

As you are aware, I am obliged under Section 177AB(5) of the 2000 Act to inform the Commission of the matter, including the compensatory measures proposed. As such, I intend to send a copy of this notice and the appendices listed below, accompanied by a copy of the statement of case for imperative reasons of overriding public interest (IROPI), the planning application and the Natura Impact Statement as provided to me on 24 March 2021, to the European Commission.

Oifig an Aire Tithíochta,
Rialtais Áitiúil agus Oidreachta
Office of the Minister for Housing,
Local Government and Heritage

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I would be grateful if you could furnish me with a copy of An Bord Pleanála's decision on the planning application, once made, at your earliest convenience so that I may also inform the Commission of the final decision including the compensatory measures adopted.

Yours sincerely,

Darragh O'Brien, TD,
Minister for Housing, Local Government and Heritage

Appendix:
1. Opinion of Minister of State for Heritage and Electoral Reform as provided to Minister for Housing Local Government and Heritage 22 Feb 2024

Appendices for information:
2. Letter from An Bord Pleanála to Minister for Housing, Planning and Local Government,
3. Galway Harbour Extension Compensatory Measures Plan, Accompanying Measures and Additional Environmental Benefits

Appendix 1 Letter from Minister Noonan re Compensatory Measures

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Mr. Darragh O'Brien, T.D.,
Minister for Housing, Local Government and Heritage
Custom House,
Dublin 1
By email: Niamh.Redmond@housing.gov.ie

21 February 2024

Re: Opinion on Compensatory Measures for Galway Port Development by Galway Harbour Company

Dear Darragh,

I refer to previous correspondence in the above matter including letter of 3rd August 2021 and subsequent request to seek my opinion under Section 177 (AB) of the Planning and Development Act (as amended). All issues previously raised by NPWS have now been addressed by the applicant, Galway Harbour Company.

I hereby convey my opinion that the compensatory measures proposed by Galway Harbour Company in their July 2022 document "Compensatory Measures Plan, Accompanying Measures and Additional Environmental Benefits", as submitted to An Bord Pleanála on 30th September 2022, are sufficient to ensure the overall coherence of the Natura 2000 network is protected.

Officials of the Department are available to discuss and clarify for the planning authority any issue arising in this Opinion.

Yours sincerely,

Malcolm Noonan T.D.
Minister of State for Nature, Heritage and Electoral Reform
Designated Public Official under the Regulation of Lobbying Act, 2015 (details available on www.lobbying.ie)

Oifig an tAire Stáit don Dúlra,
Oidhreacht agus Athchóiriú Toghchán
Office of the Minister of State for
Nature, Heritage and Electoral Reform

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Appendix 2 Letter from ABP 24 March 21

Our Case Number: 61.PA0033

An Bord Pleanála

The Minister
Department of Housing, Local Government and Heritage,
C/o Eamonn Kelly, Principal,
EU and International Planning Regulation Section
Custom House,
Dublin 1
D01 W6XO

Department of Housing, Local Government and Heritage
26 MAR 2021
RECEIVED

Date: 24th March, 2021

Re: Galway Harbour Extension.

Dear Minister,

I have been asked by An Bord Pleanála to refer to the above-mentioned strategic infrastructure application submitted to the Board under the provisions of section 37E of the Planning and Development Act 2000 as amended.

The Board is of the view that the proposed development as part of this application should be given consent for imperative reasons of overriding public interest (IROPI).

In this regard and in accordance with the provisions of section 177AA of the Planning and Development Act 2000 as amended the Board is required to set out the imperative reasons of overriding public interest that necessitate the giving of consent for the proposed development.

In coming to its decision on the Statement of Case to be submitted to the Minister in relation to the above application, in accordance with the requirements of Section 177AA(2), the Board had regard to a range of matters, including the following:

(a) the report of the Senior Planning Inspector dated the 27th day of February 2015, together with the associated reports of the Ecological Consultant and the Consultant Marine Hydrologist,

(b) the Environmental Impact Statement, the Natura Impact Statement and the addenda to the Natura Impact Statement (January 2015) and (April 2019), and all supplementary documentation submitted with the original application,

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(c) all the observations and submissions on file including all oral submissions made at the oral hearing held between the 13th day and the 23rd day of January 2015,

(d) the European Commission Habitats Directive 92/43/EEC,

(e) the European Commission document, entitled "Managing Natura 2000 Sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC" (2000),

(f) 'Habitats Directive 92/43/EEC' – Clarification of the Concepts of Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission - 2007/2012,

(g) the various bilateral and tripartite meetings that were held between the Board, the Applicant and the National Wildlife and Parks Service of the Department of Culture, Heritage and the Gaeltacht in respect of potential compensatory measures proposed,

(h) the reports prepared on behalf of the applicant in relation to the potential compensatory measures submitted to An Bord Pleanála on the 9th day of August 2017 and the 26th day of April 2019,

(i) the supplementary reports prepared by the Consultant Ecologist dated the 11th day of September and the 19th day of December 2019,

(j) the report from the National Parks and Wildlife Service, dated the 8th day of April 2020,

(k) the supplementary report prepared by the Senior Planning Inspector in respect of the compensatory measures proposed dated the 6th day of October 2020,

(l) the meetings held by the Board on the 25th day of June, the 2nd day of July, the 13th day of August and the 3rd and 21st days of September 2015, in respect of the original application and the Inspector's recommendation, and

(m) the subsequent meetings in respect of the Compensatory Measures Report submitted by the applicant and the supplementary reports pertaining to this information held on the 28th day of June 2016, the 13th day of December 2016, the 3rd day of April 2017, the 27th day of July 2017 and the 11th day of December 2017.

On foot of the above information, the Board concluded as follows:

Deliberations on Article 6(3) and Article 6(4) of the Habitats Directive

- In its meeting on the 21st day of September 2015, the Board focussed its deliberations on the Appropriate Assessment issues required under Article 6(3) of the Habitats Directive, and on the possible application of Article 6(4) of the Directive (Imperative Reasons of Overriding Public Interest - IROPI) to the case. The Board accepted and adopted the Appropriate Assessment carried out in the report of the Senior Planning Inspector and the specialist ecological consultant appointed by the Board in respect of the potential effects of the proposed development on the potentially affected European Sites, having regard to the Sites' Conservation Objectives, namely that the integrity of the Galway Bay Complex

Special Area of Conservation (site code: 000268) will be affected by the direct and permanent loss of fucoid-dominated reef habitat [1140] and mud and sand flat habitat [1140] and the loss of perennial vegetation of stony banks [1220].

- It was also concluded that a significant adverse effect on the integrity of the Inner Galway Bay Special Protection Area (site code: 004031) or the Lough Corrib Special Area of Conservation (site code: 000297) will not arise in view of the Sites' Conservation Objectives. It was also concluded that the proposal will not lead to any negative impacts on the priority habitats associated with the Galway Bay SAC at Lough Atalia and Renmore Lough.

- The Board decided that consent could not be granted under the provisions of Article 6(3) of the Directive and decided to invoke Article 6(4) (IROPI) for further consideration of the proposal.

- In deciding not to accept the Senior Planning Inspector's conclusion that the proposed development will adversely impact on the integrity of the European sites, that viable alternative solutions could exist which may have a lesser impact in terms of affecting the integrity and coherence of European Sites and on that basis, that there was no convincing case for invoking IROPI, the Board weighed the loss of the qualifying interests of the Galway Bay SAC against the imperative reason for the proposed development which were primarily social and economic in nature.

- The Board therefore noted that the provisions of Section 177AA(3) would apply in this instance, in that the European sites affected do not host a priority natural habitat type or priority species, and that the imperative reasons of overriding public interest therefore may include reasons of a social or economic nature.

Imperative Reasons of Overriding Public Interest

In accordance with the provisions of Section 177AA(a) of the Act, setting out the imperative reasons of overriding public interest that necessitate the giving of consent for the proposed development, the Board noted the following:

- The Board concluded that the proposal presents an integrated development that enhances the social, economic and recreational benefits of the port for the wider benefit of the population of Galway and its regional hinterland.

- The enhancement of port facilities also aligns with the European transportation policy's promoting 'short-sea shipping' as a cost effective and environmentally sustainable alternative to road transport. The enhancement of the port serving the region will therefore align with European, national and regional policies in favour of balanced spatial and economic development.

- The port and the tradition of maritime trade is fundamental not just to the economy of Galway but also to its culture and identity.

- In relation to alternatives, the Board took a step-by-step approach to this question, as advised in the relevant guidance from the European Commission. In relation to (i) the do-

nothing scenario, the Board concluded that failing to address the existing constraints would make the port unviable and ultimately lead to the demise of the port in the medium to long term and would fail to address the existing Seveso constraints, would impede tourism and the potential to develop a new urban quarter.

- In relation to (ii) alternative locations within Galway Bay, the Board generally agreed with the Inspector that alternative proposals for a harbour extension within the Bay was not feasible and would result in greater impacts on the Conservation Objectives of the Galway Bay SAC and Inner Galway Bay SPA.

- While it is acknowledged that there are several other Irish ports, including Shannon-Foynes which are capable of handling the existing and planned future commercial freight tonnage at Galway Port, however, shifting commercial shipping activities away from Galway to Shannon-Foynes would seriously impair the Port of Galway's ability to fulfil its historical role as Tier 3 regional port as envisaged in the National Ports Policy. It may also undermine Galway's development as a Gateway City designated in the NSS and subsequently reinforced in the National Planning Framework, and would inhibit marine/leisure tourism-related expansion within Galway City.

- In relation to (iii) alternative configurations, the Board concluded that there was no alternative design available that would deliver on project aims but result in less interference with the sensitive ecology of the area.

- The Board therefore concluded that there were no feasible alternatives.

- The Board also had regard to the existing constraints affecting the existing operations of Galway Port. Failure to address these deficiencies would signal the demise of commercial shipping in the medium to long term. The social and economic benefits of the project include positive impacts to tourism, marine research and development, including offshore renewable energy, urban regeneration and marine leisure opportunities.

- The loss of the qualifying interests of the Galway Bay SAC has been weighed against the imperative reasons for the proposed development which are primarily social and economic in nature.

On the basis of the above considerations the Board decided to explore the possibility of compensatory measures, as provided for in Article 6(4) of the Directive.

Compensatory Measures

In accordance with the provisions of Section 177AA(b) of the Act, relating to the compensatory measures, the Board invited Galway Harbour Company to confirm that it wished the project to be considered for approval under Article 6(4) of the Directive. The Board indicated to the applicant that the compensatory measures should offset the negative effects of the project such that the overall coherence of the European Sites network is maintained.

- A report, entitled 'Proposed Compensatory Measures', was submitted to An Bord Pleanála on the 9th day of August 2017. This report contained information relating to initial preliminary desk-based studies assessment and mapping of potential areas in the

Greater Galway Bay area. The eastern part of Galway Bay was identified as the most suitable for the purposes of potentially providing habitats that can be improved by way of compensatory measures.

- The Phase 2 Report was subsequently submitted to the Board on the 26th day of April 2019. A separate addendum to the Natura Impact Statement to include the consideration of compensatory measures was submitted to accompany the Compensatory Measures Report. This report set out detailed compensatory measures at Tawin Island in East Galway Bay and assessed the compensatory measures against EU guidance criteria.

The Board concluded, on the basis of:

(a) the Compensatory Measures Report submitted,

(b) together with the further clarification on certain matters issued through additional information submissions, including comments from the National Parks and Wildlife Service,

(c) the report prepared by the Consultant Ecologist employed by the Board, and

(d) the supplementary report prepared by the Senior Planning Inspector specifically in relation to the compensatory measures proposed,

that the chosen site at Tawin Island was deemed to be suitable to provide effective compensatory measures for the loss of habitat associated with the proposed expansion of Galway Harbour. The Board also have regard to the monitoring programme proposed which sets out clear and unambiguous objectives with appropriate targets and indicators which are considered to be fit for purpose. Thus, the Board is satisfied that appropriate compensatory measures can be put in place to offset and compensate for any impact that will arise as a result of the Galway Harbour Extension, so as the overall coherence of the network of European Sites is maintained.

Conclusions in respect of Statement of Case

On the basis of the foregoing, the Board is satisfied that an appropriate Statement of Case can be prepared and submitted to the Minister in accordance with the provisions of Section 177AA(2) of the Planning and Development Act 2000, as amended.

The Board prepared a statement of case in accordance with the provisions of section 177AA(2) of the Act in support of planning consent to be given for imperative reasons of overriding public interest (IROPI) and compensatory habitat measures. A copy of the Statement of Case is attached as an appendix to this letter.

Copies of the following documentation are enclosed:

1. A copy of the planning application (cd no. 1), a copy of the Natura impact statement dated (January 2015) (hard copy) and dated (April 2019) (cd no.2)

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2. Reports prepared on behalf of the applicant in relation to the potential compensatory measures submitted to An Bord Pleanála on the 9th day of August, 2017 and the 26th day of April, 2019 (cd no.2)

3. The supplementary report prepared the Inspector in respect of the compensatory measures proposed dated the 6th day of October, 2020 (hard copy).

4. The Natura impact statement dated (January 2014) (cd no.1).

5. Errata and Addenda to the Natura impact statement (October 2014) (cd no.2).

6. Additional Addendum/Errata to the Natura impact Statement (January, 2015) (hard copy) and addendum to the Natura impact statement to include consideration of the Compensatory Measures (April, 2019) (cd no.2).

7. The supplementary reports prepared by the Consultant Ecologist dated the 11th day of September and the 19th day of December, 2019 (hard copy).

The Board requests that you consider the adequacy of the compensatory measures proposed by the applicant, and to advise as to whether there are imperative reasons of overriding public interest in this case to enable consideration of the proposed development to proceed.
If you request any further information/clarification in relation to this process please do not hesitate to contact the undersigned officer of the Bord.

Yours faithfully,

J. Hayes

Josephine Hayes
Senior Executive Officer
01-8737264

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Appendix 3 Galway Harbour Extension Compensatory Measures Plan

Galway Harbour Company

Galway Harbour Extension

Compensatory Measures Plan, Accompanying Measures and Additional Environmental Benefits



TOBIN CONSULTING ENGINEERS

An Bord Pleanála (Ref: 61.PA 0033)

AQUAFACT APEM Group

Client:	**Galway Harbour Company**
Project:	**Galway Harbour Extension**
Title:	**Compensatory Measures Plan, Accompanying Measures and Additional Environmental Benefits**

PROJECT NUMBER: 7476				**DOCUMENT REF: CMP**			
C	Minor revisions after meeting	BOC	22.07.22	BR	25.07.22	JF	25.07.22
B	Draft for Review	BOC	31.05.22	BR	31.05.22	JF	31.05.22
A	Draft for Review	BOC	13.05.22	BR	13.05.22	JF	13.05.22
Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
TOBIN Consulting Engineers / AQUAFACT APEM Group							

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Part 1 - Galway Harbour Extension Introduction

1. Introduction

1.1. Overview

An Bord Pleanála (ABP) conducted an Appropriate Assessment (AA) of the Galway Harbour Extension (GHE) and concluded that the development will cause:

- Direct and Permanent Loss of 5.93ha of [1170] fucoid dominated reef habitat and [1140] Mud and Sand Flat habitat of the Galway Bay Complex Special Area of Conservation (SAC), and the,
- Loss of perennial vegetation of stony banks [1220] (0.35 ha) due to the sheltering effect of the harbour extension will also have a significant adverse effect on the integrity of the SAC.

The AA also ruled out beyond reasonable scientific certainty any significant effects to any other Qualifying Interests of the Galway Bay Complex SAC or any other SACs.

The AA also ruled out beyond reasonable scientific certainty any significant effects to the Galway Bay Special Protection Area (SPA) or any other SPAs.

The Compensatory Measures for the GHE development will provide:

- 17.790 ha of the Intertidal habitat at Mweeloon which equates to a compensatory ratio of 3 : 1 (*i.e.* 17.790 ha : 5.930 ha)
- 0.844 ha of the stony bank at Tawin West which equates to a compensatory ratio of 2.411 : 1 (*i.e.* 0.844 ha : 0.350 ha)

This document outlines the Compensatory Measures proposed by Galway Harbour Company (GHC) to compensate for the potential impacts to Qualifying Interests of the Galway Bay Complex Special Area of Conservation (SAC) arising from the development of Galway Harbour Extension GHE. The objectives of the proposed Compensatory Measures are to contribute to the achievement of the Conservation Objectives that have been set for the Qualifying Interests for which the SAC is designated and help ensure that the overall coherence of the Natura 2000 network is protected. The Compensatory Measures, which are summarised in brief in **Section 1.2**, are presented in full in **Section 2 Compensatory Measures** (see Part 2 of this document and **Figure 2-1**).

This document also presents a set of actions that will be undertaken by the GHC to supplement the proposed Compensatory Measures. The proposed actions, termed Accompanying Measures, are summarised in **Section 1.3** and detailed in full in **Accompanying Measures** (Part 3 of this document and **Figure 3-3**).

The Accompanying Measures proposed in the Plan will help manage pressures affecting the habitats and improve the Conservation Status of the habitats area at Mweeloon and Tawin West.

The historic development of the Galway Harbour Enterprise Park (GHEP) in the mid-1990s under planning permission reference number 68/95 resulted in the loss of some areas of Intertidal, stony bank and salt marsh habitats. The areas of habitat lost due to the GHEP are:

- 8.580 ha of Intertidal habitat,
- 7.390 ha of salt marsh, and
- 0.280 ha of stony bank.

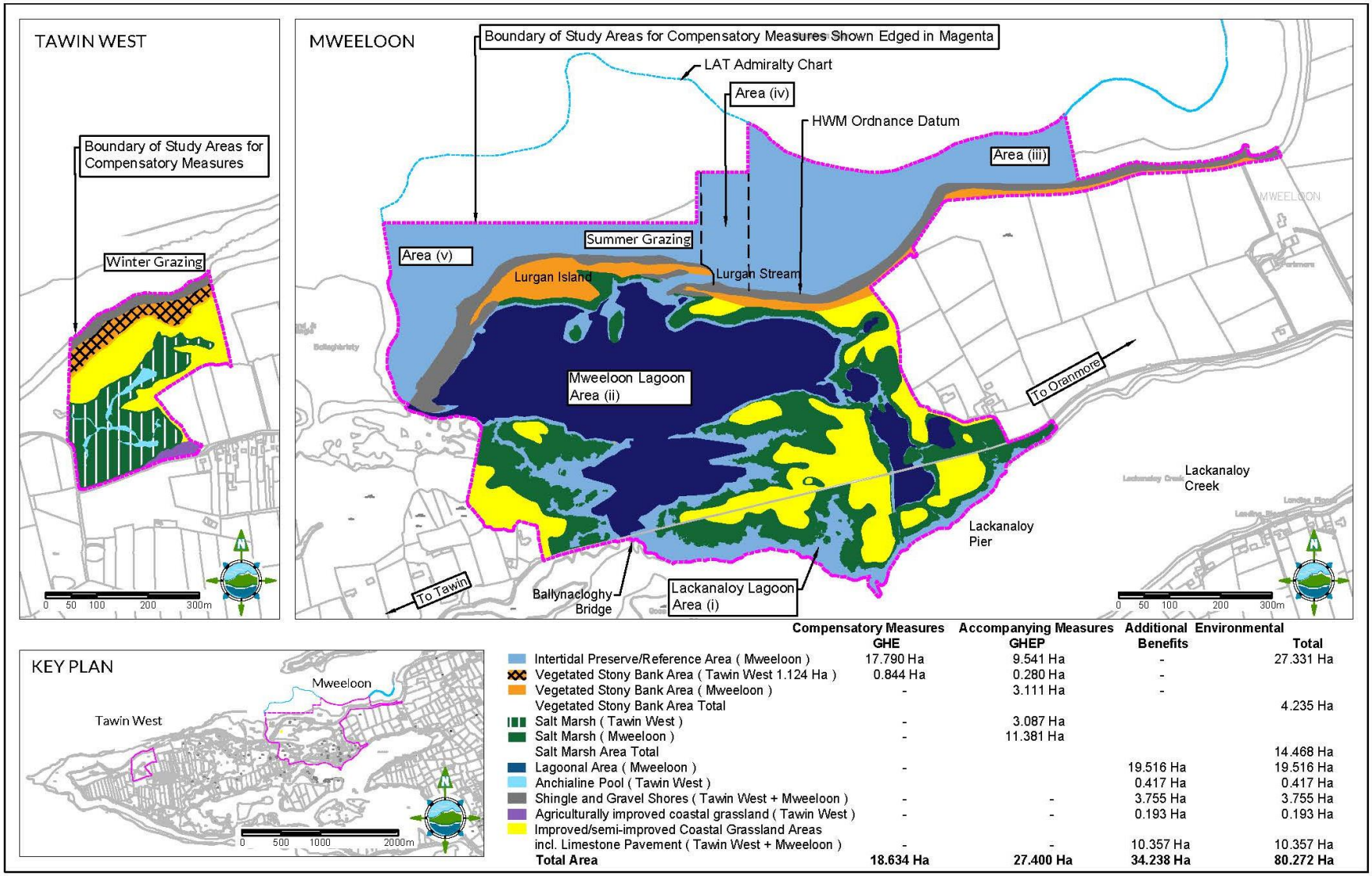
Adjacent to the Compensatory Areas, the following Accompanying habitat areas are put forward to address these historic losses:

- 9.541 ha of Intertidal habitat at Mweeloon which equates to a ratio of 1.11 : 1 (*i.e.* 9.541 ha : 8.580 ha),
- 14.468 ha of salt marsh habitat at Mweeloon and at Tawin West which equates to a ratio of 1.96 : 1 (*i.e.* 14.468 ha : 7.390 ha), and

- 0.280 ha of stony bank at Tawin West which equates to a ratio of 1 : 1 (*i.e.* 0.280 ha : 0.280 ha, without counting the 3.111 ha of stony bank habitat at Mweeloon).

The Compensatory Measures and Accompanying Measures will also provide additional environmental benefits in the Tawin and Mweeloon areas. These environmental benefits are summarised in **Section 1.4** and detailed in full in **Section 4 Additional Environment Benefits** (Part 4 of this document and **Figure 4-3**).

The spatial extent of the habitats relating to the Compensatory Measures, Accompanying Measures and Additional Environment Benefits are shown in **Figure 1-1**. The spatial extents are also presented in **Table 1.1**.



	Compensatory Measures GHE	Accompanying Measures GHEP	Additional Environmental Benefits	Total
Intertidal Preserve/Reference Area (Mweeloon)	17.790 Ha	9.541 Ha	-	27.331 Ha
Vegetated Stony Bank Area (Tawin West 1.124 Ha)	0.844 Ha	0.280 Ha	-	
Vegetated Stony Bank Area (Mweeloon)	-	3.111 Ha	-	
Vegetated Stony Bank Area Total				4.235 Ha
Salt Marsh (Tawin West)	-	3.087 Ha		
Salt Marsh (Mweeloon)	-	11.381 Ha		
Salt Marsh Area Total				14.468 Ha
Lagoonal Area (Mweeloon)	-		19.516 Ha	19.516 Ha
Anchialine Pool (Tawin West)			0.417 Ha	0.417 Ha
Shingle and Gravel Shores (Tawin West + Mweeloon)	-	-	3.755 Ha	3.755 Ha
Agriculturally improved coastal grassland (Tawin West)	-	-	0.193 Ha	0.193 Ha
Improved/semi-improved Coastal Grassland Areas incl. Limestone Pavement (Tawin West + Mweeloon)	-	-	10.357 Ha	10.357 Ha
Total Area	**18.634 Ha**	**27.400 Ha**	**34.238 Ha**	**80.272 Ha**

Figure 1-1: Intertidal, Stony Bank, Salt Marsh, Lagoonal Areas, Anchialine Pool, Improved/semi-improved Coastal Grassland Areas including Limestone Pavement, Grass and Shore Lands.

Table 1.1: Spatial Extents - Compensatory Measures, Accompanying Measures and Additional Environment Benefits

		Compensatory Measures GHE	Accompanying Measures GHEP	Additional Environmental Benefits	Total
	Intertidal Preserve/ Reference Area (Mweeloon)	17.790 Ha	9.541 Ha	--	27.331 Ha
	Vegetated Stony Bank Area (Tawin West 1.124 Ha)	0.844 Ha	0.280 Ha	--	
	Vegetated Stony Bank Area (Mweeloon) Vegetated Stony Bank Area Total	--	3.111 Ha	--	4.235 Ha
	Salt Marsh (Tawin West)	--	3.087 Ha		
	Salt Marsh (Mweeloon) Salt Marsh Area Total	--	11.381 Ha		14.468 Ha
	Lagoonal Area (Mweeloon)	--		19.516 Ha	19.516 Ha
	Anchialine Pool (Tawin West)			0.417 Ha	0.417 Ha
	Shingle and Gravel Shores (Tawin West + Mweeloon)	--	--	3.755 Ha	3.755 Ha
	Agriculturally improved coastal grassland (Tawin West)	--	--	0.193 Ha	0.193 Ha
	Improved/semi-improved Coastal Grassland Areas incl. Limestone Pavement (Tawin West + Mweeloon)	--	--	10.357 Ha	10.357 Ha
	Total Area	**18.634 Ha**	**27.400 Ha**	**34.238 Ha**	**80.272 Ha**

1.2. Summary of the Compensatory Measures Plan

1.2.1. Background

Following an extensive review of published literature / aerial photography, terrestrial / marine studies, interaction with landowners / oyster farmers and consultations with National Parks and Wildlife Services (NPWS) and ABP, areas of land and shoreline at Tawin containing Intertidal and stony bank habitats that lie within Galway Bay Complex SAC, were identified as appropriate areas for the implementation of Compensatory Measures. The habitats identified are in need of restoration and would not have been restored in the normal course were it not for the measures proposed herein.

There are two distinct Compensatory Areas at Tawin. The first Compensatory Area is located to the east of Tawin Island and comprises Mweeloon Lagoon and the shoreline extending from Lurgan Island to Mweeloon Bay (see **Figure 1-2**). This area is herein referred to as Mweeloon. The second

Compensatory Area is located to the western end of Tawin Island (see **Figure 1-2**). This area is herein referred to as Tawin West.

The Compensatory Measures Plan comprises two interrelated plans;

- Intertidal Management Plan at Mweeloon (see **Section 2.1**)
- Land Management Plan at Tawin West (see **Section 2.3**)

The objective of Compensatory Measures within the Plans are to positively improve a habitat's conservation status by reducing and/ or removing harmful aquaculture, agriculture and littering pressures acting on habitats of the Galway Bay Complex SAC. Specifically, the measures are designed to help achieve Favourable Conservation Condition targets which have been set for habitat attributes. The habitats attributes target linked to Compensatory Measures are detailed in **Section 2.1** and **Section 2.3**.



Figure 1-2: Compensatory Areas outlined in red.

1.2.2. Galway Harbour Extension / Impact on Galway Bay Complex SAC

The proposed GHE into deeper water to the south of the existing port will occupy a part of the Galway Bay Complex SAC.

An Bord Pleanála (ABP) 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 which is an overlapping complex of [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 Intertidal and stony bank habitats to be lost or impacted due to the proposed GHE are shown in **Figure 1-3**.

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 during its future existence and use. All possible alternatives were considered in order to seek to minimse 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. **Section 2 Compensatory Measures** of this report sets out the Compensatory Measures, necessary to ensure that the overall coherence of Natura 2000 is protected.

The Compensatory Measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Minister of Housing, Local Government and Heritage and the European Commission must be informed of the Compensatory Measures.

The Compensatory Measures for the GHE development will provide:

- 17.790 ha of the Intertidal habitat at Mweeloon which equates to a compensatory ratio of 3 : 1 (*i.e.* 17.790 ha : 5.930 ha)

- 0.844 ha of the stony bank at Tawin West which equates to a compensatory ratio of 2.411 : 1 (*i.e.* 0.844 ha : 0.350 ha)

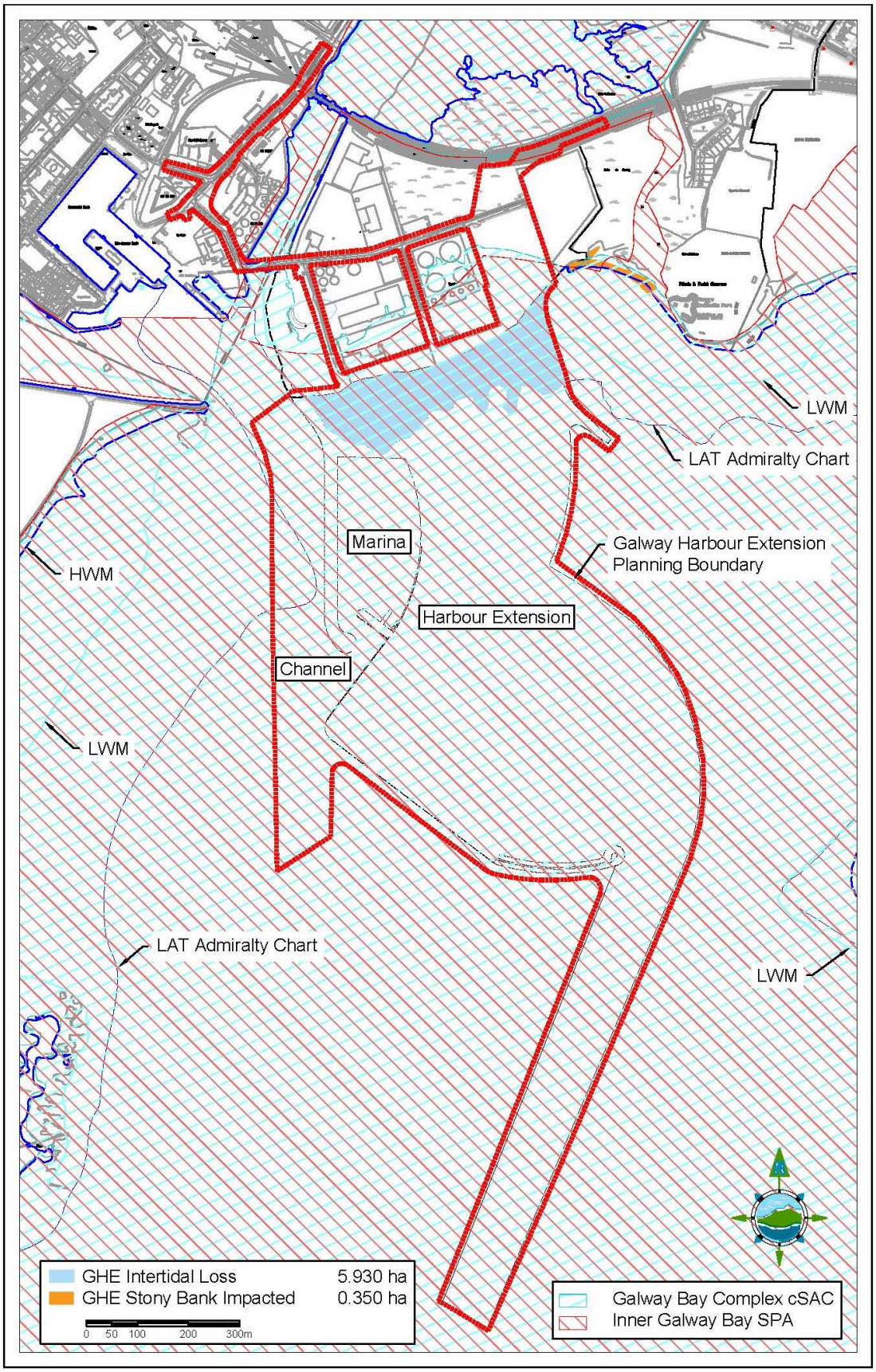


Figure 1-3: Habitats to be Lost or Impacted by GHE.

1.2.3. Article 6(4) and Compensatory Measures

Having completed an Appropriate Assessment (AA), An Bord Pleanála ("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 SAC would occur. The Board invited 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 SAC.

The EU Guidance Document on Article 6 (2018) was followed in the identification of Compensatory Measures particularly with regard to the concept of "the biological improvement of substandard habitat within an existing designated site…". The current iteration is also informed by and complies with the guidance contained within the European Commission's publication; *"Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC"* (28/9/2021).

Precedence for this approach was approved at EU level in the New Port Granadilla (Tenerife), Nied TGV and Mainport Rotterdam projects and other projects. 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.

1.3. Summary of the Accompanying Measures

The historic development of the Galway Harbour Enterprise Park (GHEP) in the mid-1990s resulted in the loss of some areas of Intertidal, stony bank and salt marsh habitats. The areas of habitat lost due to the GHEP are: 7.390 ha of salt marsh, 8.580 ha of Intertidal habitat and 0.280 ha of stony bank

As part of the Compensatory Measures programme, GHC will undertake a series of actions at Mweeloon that will accompany and complement the Compensatory Measures. The actions, which are referred to herein as Accompanying Measures, will help improve the Conservation Status of intertidal habitat, salt marsh and stony bank at Mweeloon, and salt marsh and stony bank at Tawin West. The actions are detailed in **Accompanying Measures (Part 3** of this document).

Adjacent to the Compensatory Areas, the following Accompanying habitat areas are put forward to address these historic losses:

- 9.541 ha of Intertidal habitat at Mweeloon which equates to a ratio of 1.11 : 1 (*i.e.* 9.541 ha : 8.580 ha),
- 14.468 ha of salt marsh habitat at Mweeloon and at Tawin West which equates to a ratio of 1.96 : 1 (*i.e.* 14.468 ha : 7.390 ha), and
- 0.280 ha of stony bank at Tawin West which equates to a ratio of 1 : 1 (*i.e.* 0.280 ha : 0.280 ha, without counting the 3.111 ha of stony bank habitat at Mweeloon).

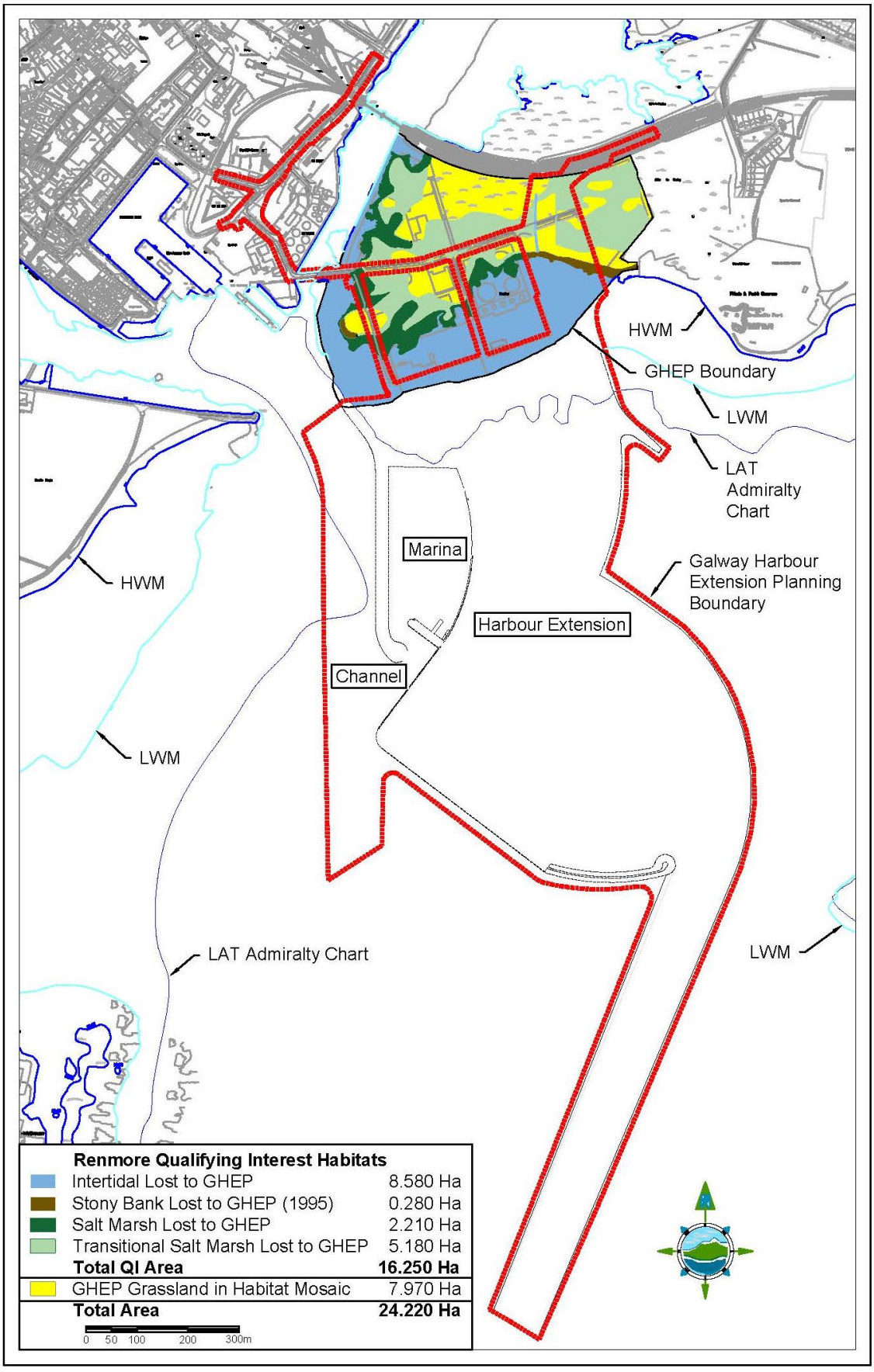


Figure 1-4: Habitats Previously Lost or impacted as a result of historic development of GHEP along those habitats to be lost or impacted by the GHE.

1.4. Summary of the Additional Environmental Benefits

The marine waters at Mweeloon south of Lurgan Island and mostly north of Ballynacloghy Bridge are enclosed by lands that GHC has contracted to purchase as part of its provision of compensatory measures. The waters are in ecological terms definable as a lagoon. The spatial distribution of the lagoon habitat relative to GHC lands at Mweeloon and Tawin is shown in **Figure 1-5**. Lagoons (Habitats code 1150) are listed as Priority habitats in the EU Habitats Directive and this status requires that they are afforded special protection. The ability to provide the proposed management of activities on the lands once acquired by GHC will be of environmental benefit to the lagoon habitat.

In addition to the dominant Atlantic salt marsh and dry grassland habitats at Mweeloon, there are other habitats on this site, including other EU Annex I habitats such as Limestone Pavement (Habitat code 8240; Limestone Pavement is listed as a Priority Habitat in the Habitats Directive).

Landward of the shingle coastline at Tawin West supports a zone of well-developed coastal grassland which grades into salt marsh vegetation further to the south. This salt marsh vegetation is subject to regular tidally-driven inundation via underground seawater seepage through the limestone bedrock and occasional sea flooding. The seawater collects in a small, elongate anchialine pool (a tidally-driven pond feature) located close to the centre of the compensatory area (see **Figure 1-6**). The management of activities on the lands held by GHC will be of environmental benefit to the anchialine pool feature and vegetation in the area.

Further details on **Additional Environment Benefits** are provided in **Section 4** and the habitats areas are summarised as follows:

- Lagoonal Area 19.516 Ha
- Anchialine Pool 0.417 Ha
- Shingle and gravel shores 3.755 Ha
- Agriculturally improved coastal grassland 0.193 Ha
- Improved / semi-improved coastal grassland areas including Limestone Pavement 10.357 Ha.

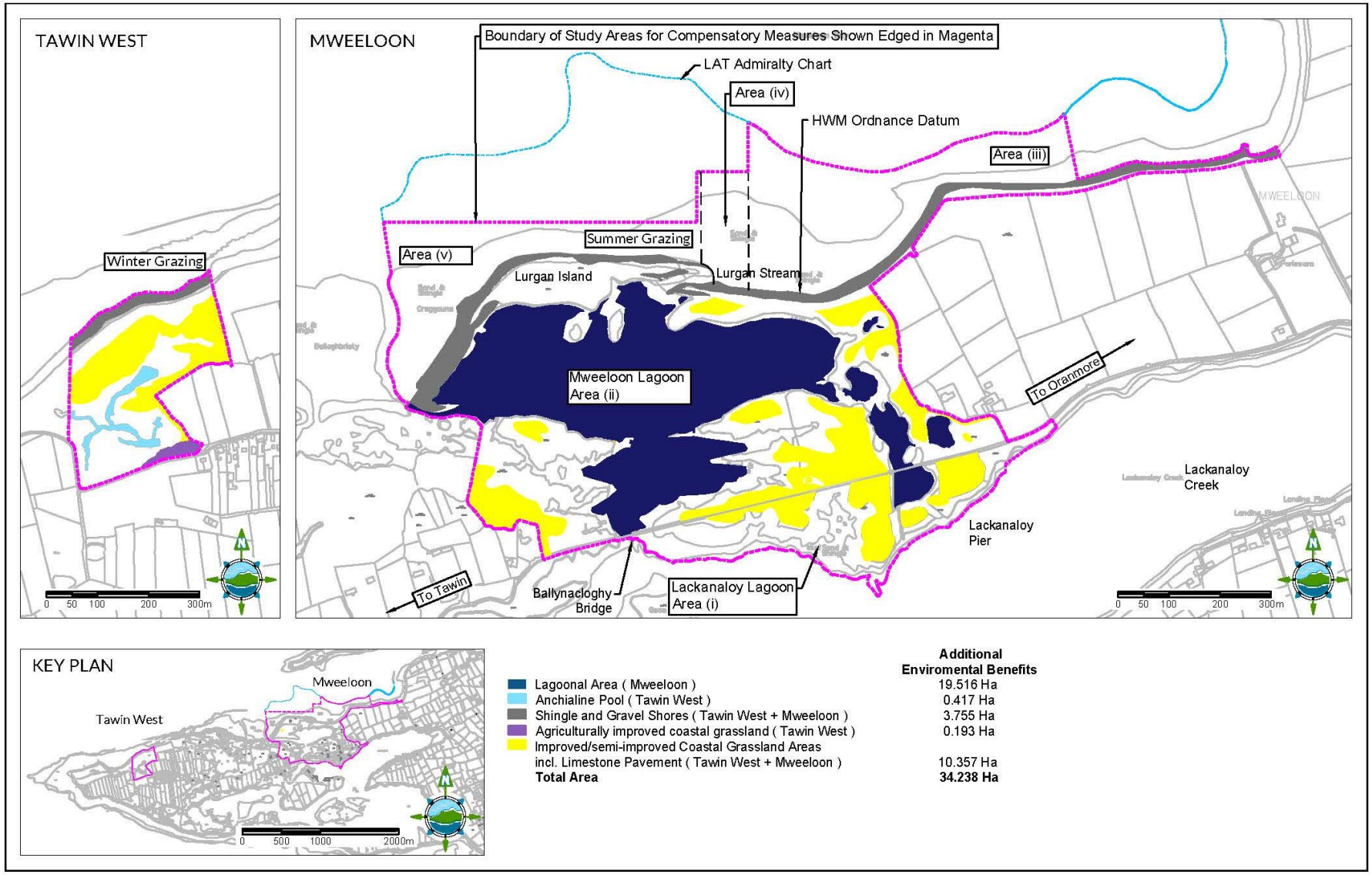


Figure 1-5: Lagoon habitat at Mweeloon relative to GHC lands.



Figure 1-6: Anchialine pool at Tawin West.

Part 2 - Compensatory Measures

2. Compensatory Measures

The Compensatory Measures for the GHE comprise;

- Intertidal Management Plan at Mweeloon (see **Section 2.1** below), and,
- Land Management Plan at Mweeloon (see **Section 2.2**).

2.1. Intertidal Management Plan at Mweeloon

2.1.1. Aim

At the Mweeloon Compensatory Area an Intertidal Management Plan will be implemented. The Plan includes measures to compensate for the impacts associated with GHE that will result in:

- Direct and Permanent Loss of 5.93ha which is an overlapping complex of [1170] Fucoid Dominated Reef habitat and [1140] Mud and Sand Flat habitat of the Galway Bay Complex SAC.

The spatial extent of the Intertidal habitat at Renmore to be lost or impacted due to the proposed GHE is shown in **Figure 2-1**. The Compensatory Measures in the Intertidal Management Plan relate to 27.331 ha of Intertidal habitat at Mweeloon (see **Figure 2-1**). Of this 27.331 ha Intertidal habitat an area of 17.790 ha[1] is set as compensation against the impacted area of 5.930 ha (equating to a compensatory ratio of 3 : 1 *i.e.* 17.790 ha : 5.930 ha).

[1] 17.790ha (65%) of the 27.331ha of Intertidal at Mweeloon is allocated for compensatory measures.

0.844ha (75%) of the 1.124ha of stony bank at Tawin West is allocated for compensatory measures.

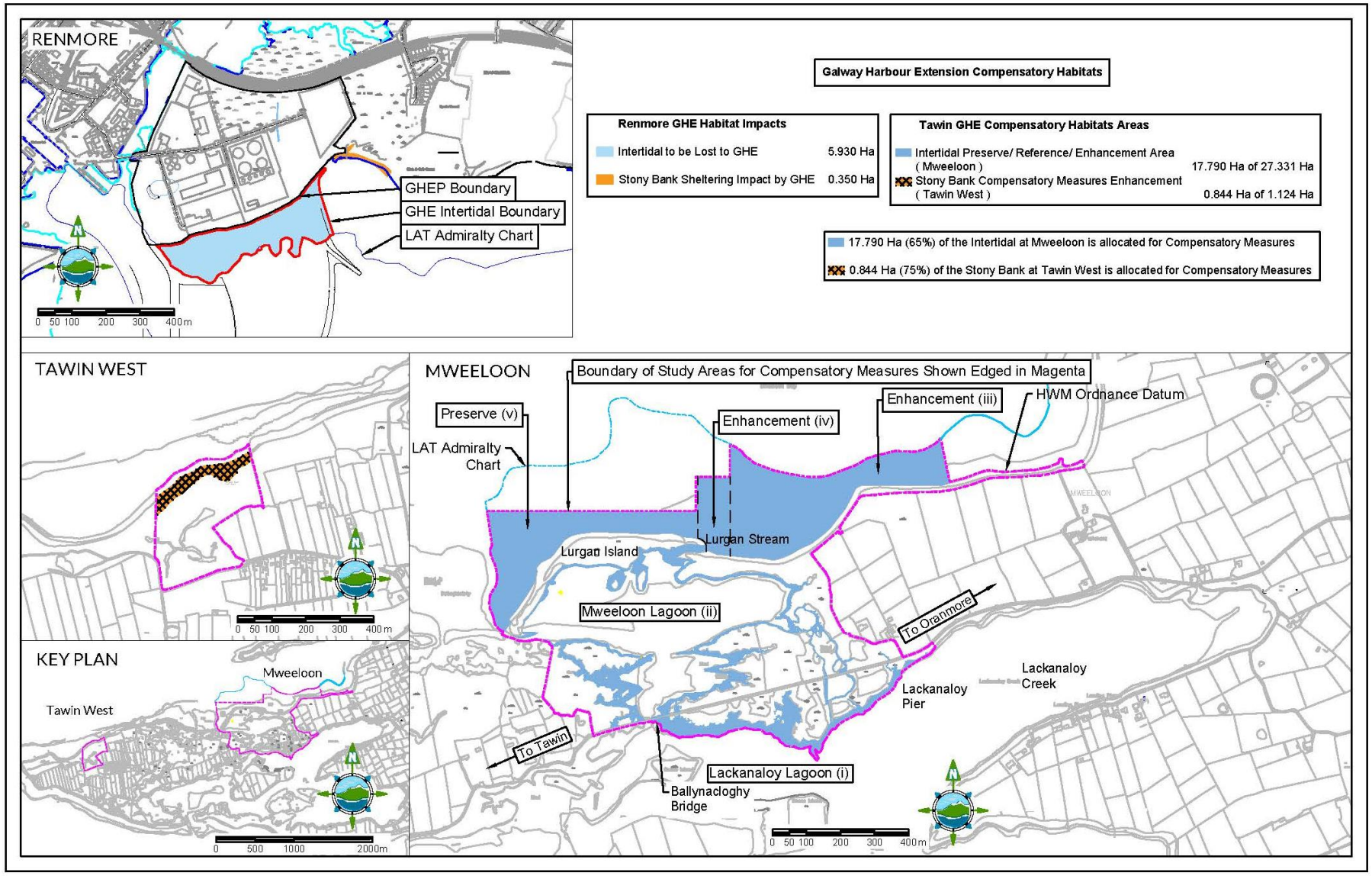


Figure 2-1: COMPENSATORY MEASURES - GHE Intertidal and Stony Bank Habitat Area Impacted at Renmore and Compensatory Areas at Tawin.

2.1.2. Objectives and Compensatory Measures

A central part of the Intertidal Management Plan is that GHC has acquired the control of two aquaculture licences within the Compensatory Area (Site ref: T09/376B and T09/377A) (see **Figure 2-2** and **Figure 2-3**). The Qualifying Feature habitats in the Compensatory Area which overlap or are adjacent the aquaculture licenses in question include:

1. 1140 Tidal Mudflats and Sandflats (see **Figure 2-4** and **Figure 2-5**)
2. 1170 Reefs (see **Figure 2-4** and **Figure 2-5**)

1160 Large Shallow Inlets and Bays (see

3. **Figure 2-6** and **Figure 2-7**)

The marine community types identified within Qualifying Interest habitat 1140, 1160 and 1170 in relation to the aquaculture licenses are shown in **Figure 2-8** and **Figure 2-9**. The Conservation Objective for 1140 Tidal Mudflats and Sandflats, 1170 Reefs and 1160 Large Shallow Inlets and Bays is to maintain Favourable Conservation Condition which is defined by the habitat attributes and targets set out in **Table 2.1**.

The habitats identified have aquaculture activity and are in need of restoration and would not have been restored in the normal course were it not for the measures proposed herein which are over and above normal practice.

The four main objectives of the Intertidal Management Plan are:

1. Control of the non-native, invasive tunicate *Didemnum vexillum* (Didemnum) in Mweeloon.
2. Fallowing of parts of Mweeloon Bay that are used for oyster cultivation.
3. Implementation of "nature friendly[2]" farming practices that besides having beneficial effect on terrestrial habitats, may also have beneficial effect on intertidal marine ecology.
4. Collection and disposal of anthropogenic litter and rubbish from within the Compensatory Area

Details of the Compensatory Measures for objective **1** through **4** are described respectively in **Section 2.1.5** through **Section 2.1.6**. The Compensatory Measures are listed in **Table 2.2**.The direct linkage between the Compensatory Measures and the habitat attributes are also outlined in the **Table 2.2**.

[2] Farming practices appropriate to the Conservation Objectives of the Galway Bay Complex SAC. The practices are further defined in **Section 2.1.5** ***e.g.*** reduced stocking densities, and the discontinuation of fertilizer *etc*.



Figure 2-2: Aquaculture licensed sites.



Figure 2-3: Closer view of previous aquaculture licensed sites

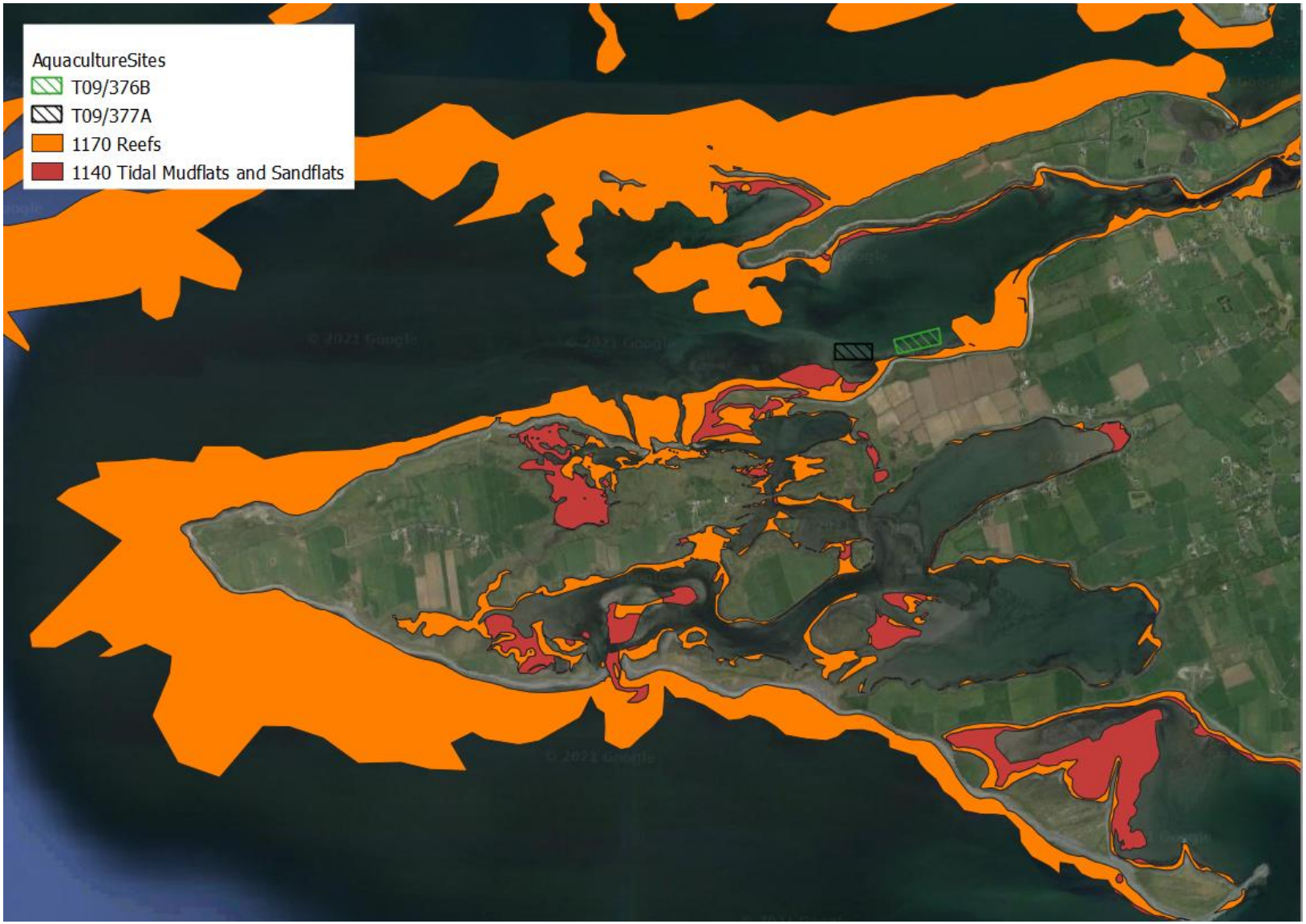


Figure 2-4: Aquaculture licensed sites relative to Qualifying Interest habitats 1170 Reefs and 1140 Tidal Mudflats and Sandflats.



Figure 2-5: Closer view of aquaculture licensed sites relative to Qualifying Interest Habitats 1170 Reefs and 1140 Tidal Mudflats and Sandflats



Figure 2-6: Aquaculture licensed sites relative to Qualifying Interest habitat 1160 Large Shallow Inlets and Bays.



Figure 2-7: Closer view of aquaculture licensed sites relative of Qualifying Interest habitat 1160 Large Shallow Inlets and Bays

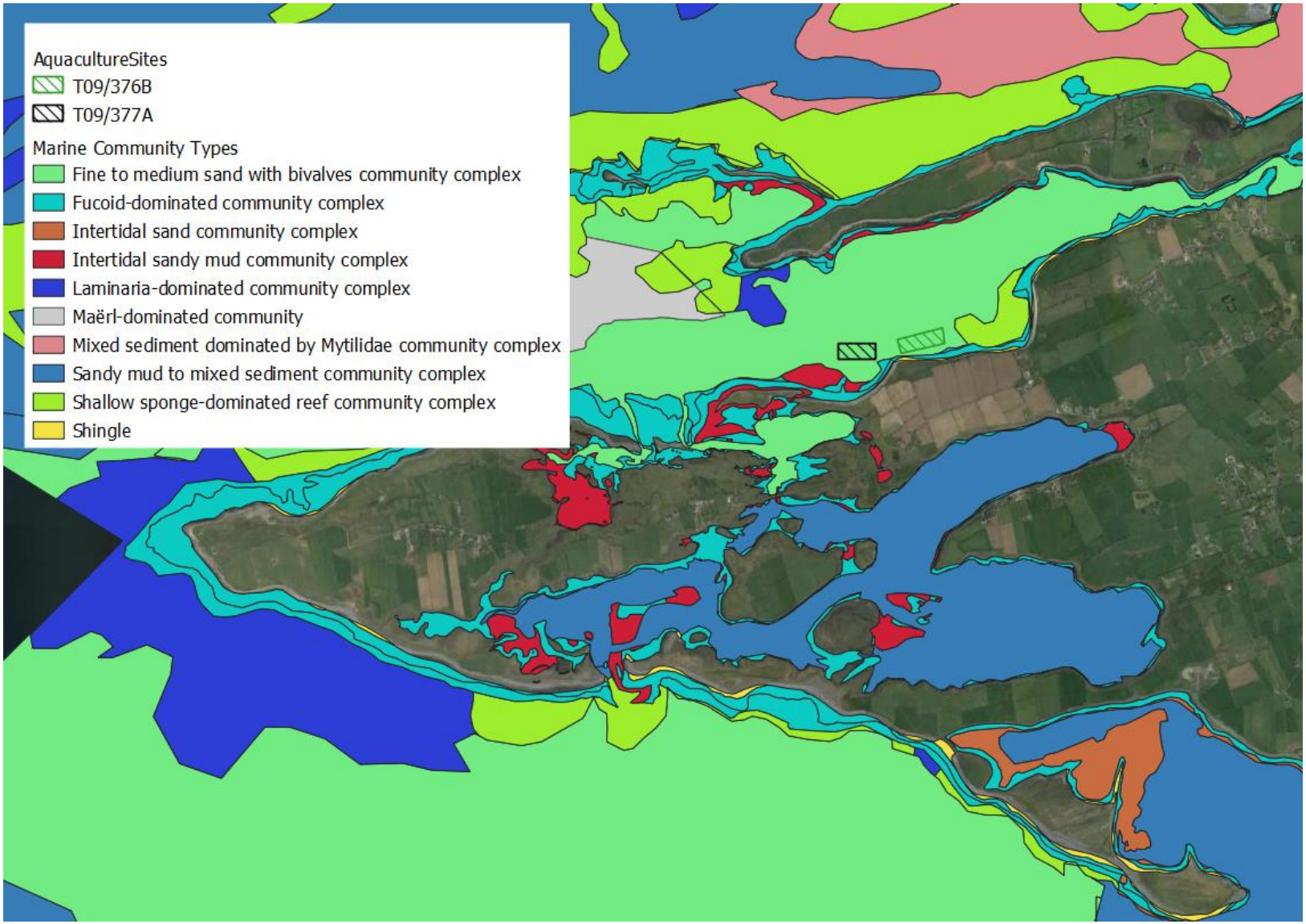


Figure 2-8: Aquaculture licensed sites relative to community types identified with Qualifying Interest habitat 1140, 1160 and 1170.

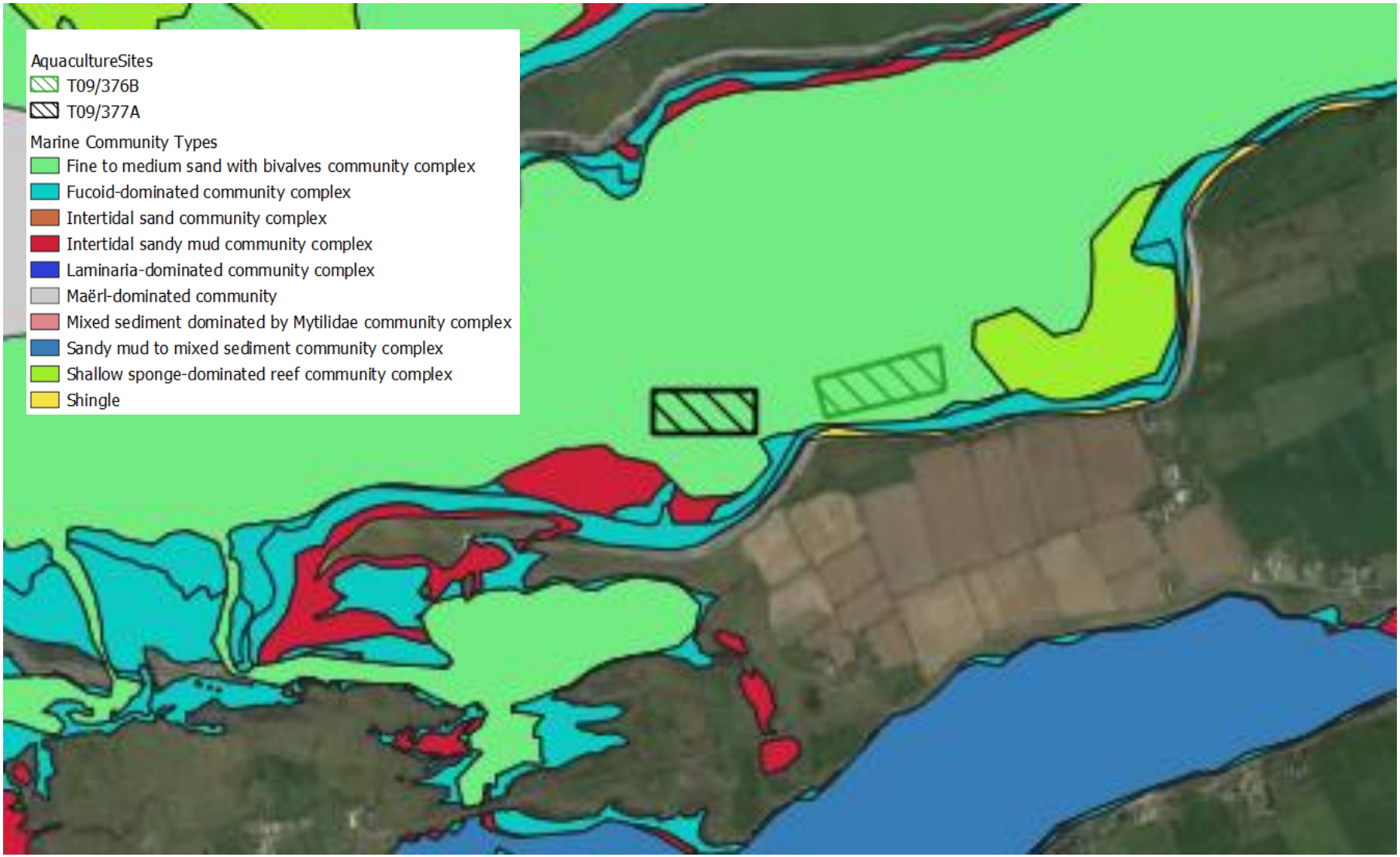


Figure 2-9: Closer view of aquaculture licensed sites relative to community types identified with Qualifying Interest habitat 1140, 1160 and 1170.

Table 2.1: Habitats, Measure and Target (NPWS 2013[3])

Habitat	Attribute	Measure	Target
1140 Tidal Mudflats and Sandflats	1) Habitat Area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes
	2) Community Distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sandy mud community complex; and Intertidal sand community complex
1170 Reefs	1) Distribution	Occurrence	The distribution of reefs is stable or increasing, subject to natural processes.
	2) Habitat Area	Hectares	The permanent habitat area is stable, subject to natural processes
	3) Community extent	Hectares	Maintain the extent of the *Mytilus*-dominated reef community, subject to natural processes.
	4) Community structure: *Mytilus* density	Individual per sqm	Conserve the high quality of the *Mytilus*-dominated reef community, subject to natural processes
	5) Community structure	Biological composition	Conserve the following community types in a natural condition: Fucoid dominated community complex; Laminaria dominated community complex; and Shallow sponge-dominated community complex
1160 Large Shallow Inlets and Bays	1) Habitat Area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes
	2) Community extent	Hectares	Maintain the extent of the *Zostera*-dominated community complex and the maërl-dominated community, subject to natural processes
	3) Community structure: *Zostera* density	Shoots per sqm	Conserve the high quality of *Zostera*-dominated communities, subject to natural processes
	4) Community structure	Community composition	Conserve the high quality of the maërl-dominated community, subject to natural processes
	5) Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sandy mud community complex; Intertidal sand community complex; Fine to medium sand with bivalves community complex; Sandy mud to mixed sediment community complex; Mixed sediment dominated by Mytilidae community complex; Shingle; Fucoid-dominated community complex; *Laminaria*-dominated community complex; and Shallow sponge-dominated community complex

[3] NPWS (2013) Conservation Objectives: Galway Bay Complex SAC 000268. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Table 2.2: Compensatory Measures at Mweeloon for Intertidal

Measure	
1	**Control of *Didemnum*** Carry out on an on-going basis a programme to control the colonial non-native tunicate [marine invertebrate] *Didemnum vexillum* at Mweeloon Lagoon, in accordance with methodology described in **Section 2.1.3**. **Direct linkage to habitat attribute:** **1140 Tidal Mudflats and Sandflats** 2) Community Distribution - Conserve the following community types in a natural condition: Intertidal sandy mud community complex **1170 Reefs** 5) Community structure - Conserve the following community types in a natural condition: Fucoid dominated community complex **1160 Large Shallow Inlets and Bays** 5) Community distribution - Conserve the following community types in a natural condition: Intertidal sandy mud community complex; Fine to medium sand with bivalves community complex; Shingle; Fucoid-dominated community complex
2	**Repair/ Maintain Fences and Gates** GHC will repair/ maintain fences and gates along the boundary of the land purchase areas in the Mweeloon Compensatory Area to prevent trespass. As GHC will own the land, it will put padlocks on external gates and only allow individuals who lease the land for appropriate agricultural purposes access to them, thereby preventing any potential for removal of cobbles *etc*. in the future. **Direct linkage to habitat attribute:** **1160 Large Shallow Inlets and Bays** 5) Community distribution - Shingle;
3	**Signage** Information signs will also be erected at selected locations along the site boundaries to inform the public of the objective of the project and warn against trespass and the removal of material from the shore.
4	**Cease Construction of Drainage Channels** Prevent the construction of and cease the maintenance of any land drainage channels.

Measure	
5	**Cease Aquaculture** Complete the purchase of the control of licences for aquaculture on the foreshore within 3 months of Final Grant of Satisfactory Planning Permission (F.G.S.P). with a view to removing the oyster trestles within 12 months and on a permanent basis, resulting in a permanent fallowing of aquaculture operations at these particular sites (see **Section 2.1.4** for further details). **Direct linkage to habitat attribute:** **1140 Tidal Mudflats and Sandflats** 2) Community Distribution - Conserve the following community types in a natural condition: Intertidal sandy mud community complex **1170 Reefs** 5) Community structure - Conserve the following community types in a natural condition: Fucoid dominated community complex **1160 Large Shallow Inlets and Bays** 5) Community distribution - Conserve the following community types in a natural condition: Intertidal sandy mud community complex; Fine to medium sand with bivalves community complex; Shingle; Fucoid-dominated community complex
6	**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 (see **Section 2.1.4** for further details). Tractor access will be controlled by: • The fallowing of aquaculture will reduce tractor use, • Restricting access route to along the highest part of the shoreline but below the stony bank habitat as per aquaculture licences, • Tractor access will only be required for remaining active aquaculture licenced areas. **Direct linkage to habitat attribute:** **1140 Tidal Mudflats and Sandflats** 2) Community Distribution - Conserve the following community types in a natural condition: Intertidal sandy mud community complex **1170 Reefs** 5) Community structure - Conserve the following community types in a natural condition: Fucoid dominated community complex **1160 Large Shallow Inlets and Bays** 5) Community distribution - Conserve the following community types in a natural condition: Intertidal sandy mud community complex; Fine to medium sand with bivalves community complex; Shingle; Fucoid-dominated community complex
7	**Nature friendly Farming Practices** The implementation of "nature friendly" farming practices that besides having beneficial effect on terrestrial habitats, will also have beneficial effect on intertidal marine ecology. These measures include: controls on the use of anthelmintic drugs with expiry of the withdrawal period before treated livestock can be brought onto the lands at Mweeloon, no herbicide and no fertilizer.
8	**Removal of anthropogenic litter and rubbish** Regular removal of anthropogenic litter and rubbish. Removal will occur every 3 months and directly after a Force 9 or greater storm event. Litter and rubbish will be removed to recycling / licensed disposal site.

Measure	
9	**Annual Review of the implementation of the Compensatory Measures Plan will be undertaken** Annual Reports on the Implementation of the Compensatory Measures Plan will be prepared and submitted to the Planning Authority and to NPWS/ DHLGH. The Annual Report will include a section describing monitoring activities, results and any recommendations arising for the adaptation of the Compensatory Measures, in view of the monitoring results. It is proposed that Annual Meetings with the Planning Authority and NPWS/DHLGH will be convened to discuss the Annual Reports and any modifications/ adaptations that are recommended, for their approval. If matters of significance arise in the intervening months that may warrant more immediate amendment of a compensatory measure, approval of same will be sought by correspondence or by an extraordinary meeting, the latter on request. **Compensatory Measures Plan Implementation** It is expected that the implementation of the CMP will be overseen by Galway City Council ("GCC") as the planning authority for the Galway Harbour Extension The envisaged implementation approach is that an annual report will be prepared by Galway Harbour Company ("GHC") and their specialist team in relation to the monitoring and management of the compensatory measures areas, adjacent areas of accompanying measures and additional environmental benefits, all in line with the CMP. This annual report will be submitted to GCC. The planning authority (GCC) is expected to determine the methodology and procedures for implementation, including the circulation of the annual report to the relevant stakeholders, one of which will be NPWS, and perhaps Galway County Council and others as GCC consider appropriate. It is envisaged that the implementation will include an annual meeting of all of the stakeholders, including GHC, and will allow for more frequent meetings if required. The implementation is expected to include site visits at appropriate seasonal times by the relevant stakeholders. For example, there may be a site visits in early Spring and again in September before and after the appropriate growing seasons on the lands. The annual report will then be submitted to GCC before the year end in order to allow time for GCC, NPWS and other relevant stakeholders to review the findings and make recommendations as required ahead of the next spring season.

2.1.3. Objective 1. Control of *Didemnum vexillum*

Didemnum vexillum is an invasive colonial sea squirt (tunicate) that grows in bays and coastal waters and can form extensive mats on rocky substrates and artificial substrates. At Mweeloon *Didemnum* is found on intertidal oyster trestles and bags, and on rocks, cobbles, boulders, rock outcrops in the area. *Didemnum* present in intertidal oyster trestles at Mweeloon is shown in **Figure 2-10.** The *Didemnum vexillum* management control area in the Mweeloon Compensatory Area extends from Lurgan Island eastwards to the southeastern shoreline of Mweeloon Bay (see **Figure 2-11)**.

The target of this element of the Intertidal Management Plan is to control the population of *Didemnum* which is present on oyster trestles and bags, and other hard surfaces at the site. Using the SACFOR scale (Superabundant, Abundant, Common, Frequent, Occasional, Rare) to describe % cover of the tunicate at the oyster farms at present, it is scored at Abundant.



Figure 2-10: *Didemnum vexillum* at the aquaculture site

2.1.3.1. Method

An annual control regime for the species is proposed as part of the Compensatory Measures.

An objective of the control regime is to reduce the population of *Didemnum* in the area by removing trestles and bags to reduce the area of artificial structure available for colonisation.

For the trestles and bags that will remain in use at Mweeloon, the control regime focuses on methods that are known to be an effective method to control *Didemnum.* These methods include the regular

turning of the oyster bags to increase "drying out" periods and spraying with acetic acid (vinegar) by hand to treat and kill the tunicate *in situ*.

To date some trestles and bags previously actively used at Mweeloon have been removed allowing localised reductions in population levels. However, where trestles and bags remain *Didemnum* persists. *Didemnum* is also known to persist at hard substrate areas (*e.g.* rocks, cobbles, boulders, rock outcrops.

2.1.3.2. Indicator

The Abundance and Distribution Range method (ADR) developed by Olenin *et al.* (2007) and used recently by Cottier-Cook *et al*. (2019) in a survey of *Didemnum* in Loch Creran, Scotland is the indicator that will be used to measure the relative effectiveness of the control regime at Mweeloon. Use of the ADR tool will readily and quickly show the effectiveness of the control regime.

In addition, a photographic survey will be carried out to visually document the population and distribution of *Didemnum* before the control practice commences and on an annual basis post-commencement.

It is proposed to carry out this *Didemnum* control regime throughout the entire reference site (*i.e.* Areas 1a, 2, 3 and 4 shown on **Figure 2-12**). This is to ensure that, if populations are left in close proximity to the fallow site, they cannot re-infest the fallow area.

2.1.3.3. Threshold

The threshold for this objective of the Intertidal Management Plan is to reduce the percentage cover of *Didemnum* in Mweeloon Bay to within *circa* 50% of what it is at the start of the Plan within 5 years of its commencement. In future years, it may be possible to achieve total removal of the tunicate at the site.

The control of the invasive tunicate *Didemnum* will evolve depending on results *etc* and the efficacy of the treatment will be checked shortly after use and repeated if necessary to ensure a satisfactory control is achieved.

2.1.3.4. Management Goal

The presence of the non-native tunicate *Didemnum* at the Mweeloon aquaculture site that lies within Galway Bay SAC is, in conservation terms, an unacceptable fact. Removing and controlling the tunicate at least from a part of the SAC is an important management goal of this objective. The measures to control the *Didemnum* will evolve depending on results *etc* and the efficacy of the treatment would be checked shortly after use and repeated if necessary to ensure a satisfactory control is achieved

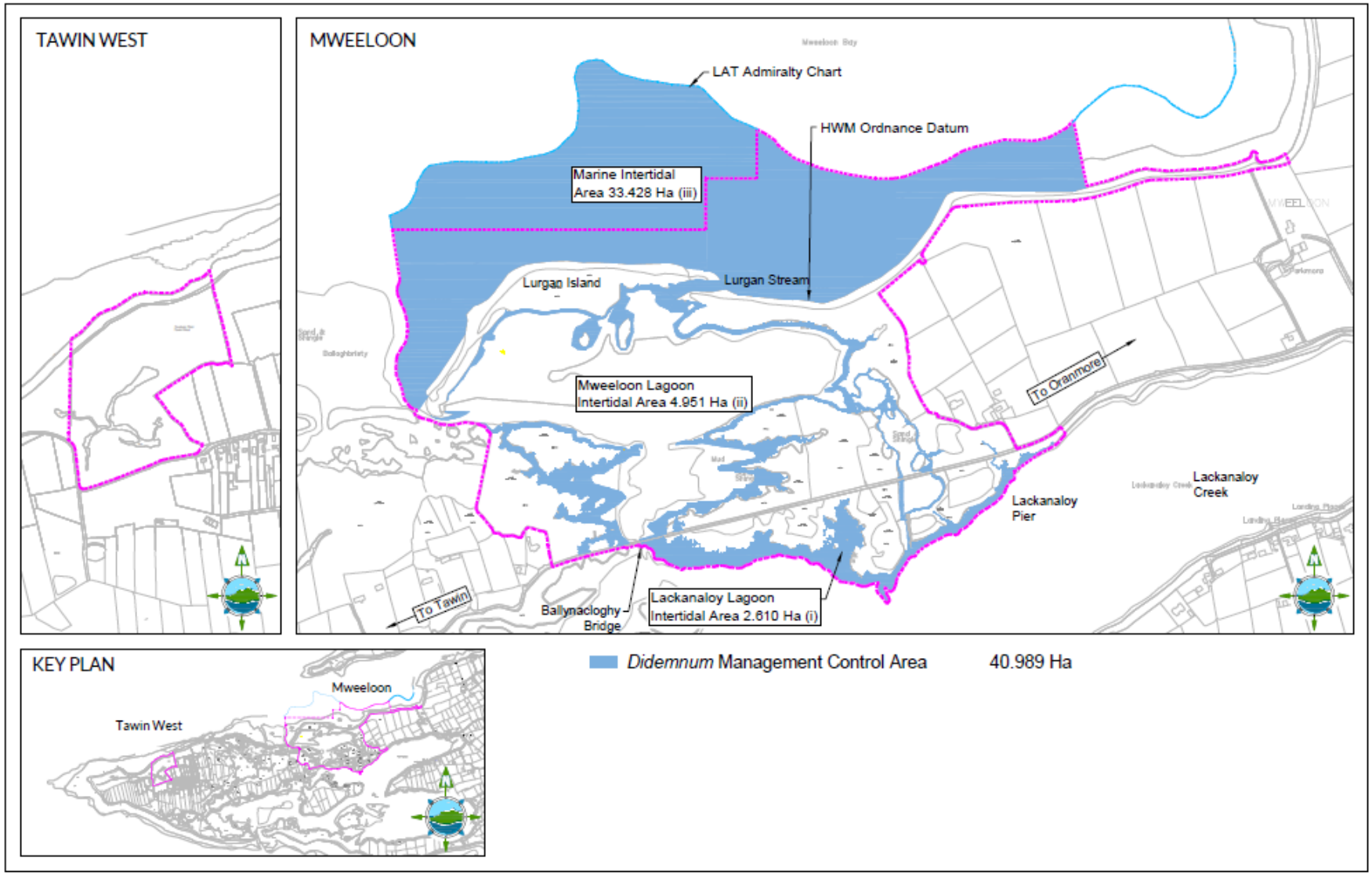


Figure 2-11: *Didemnum* Management Control Area

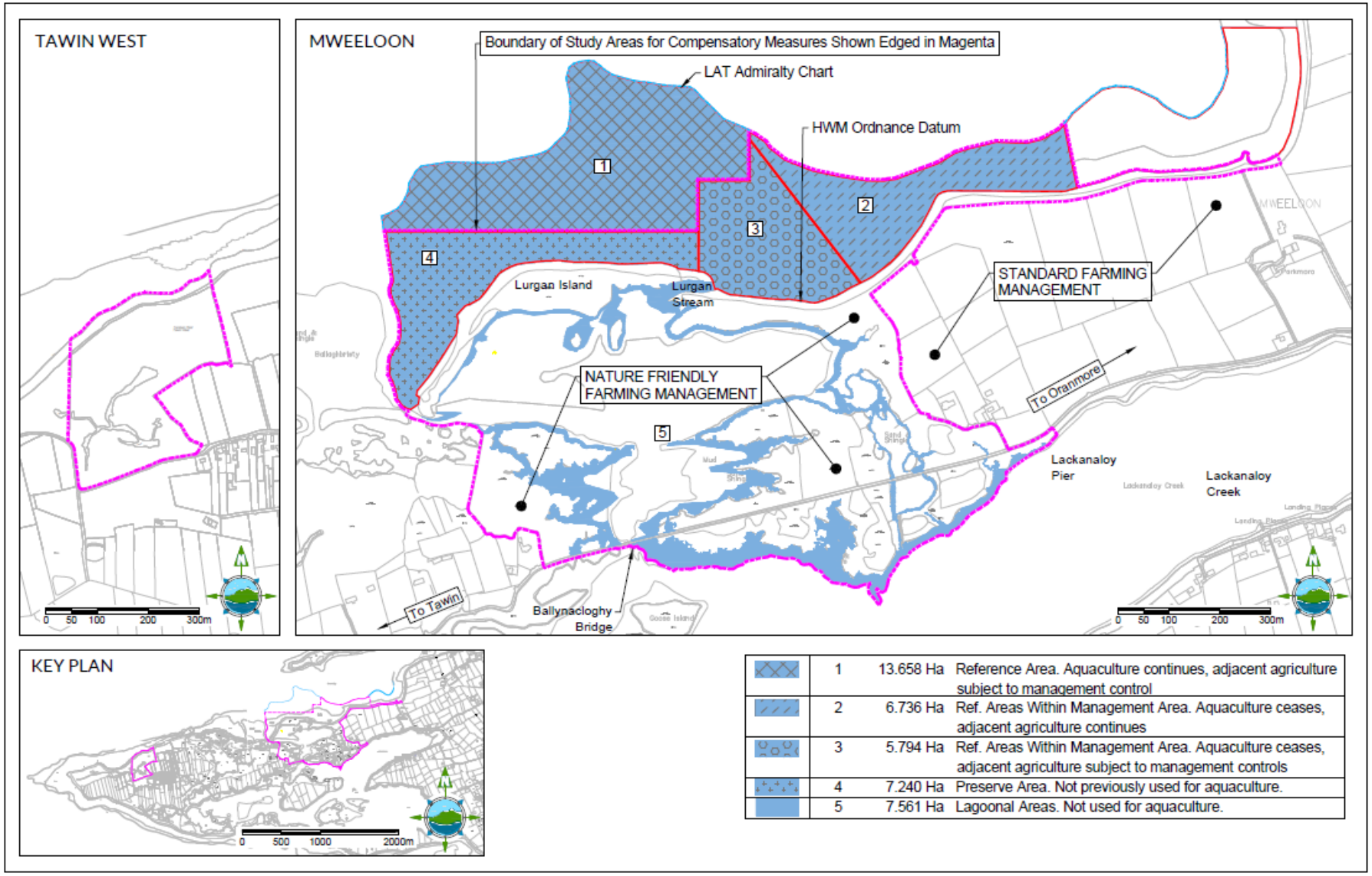


Figure 2-12: Reference areas.

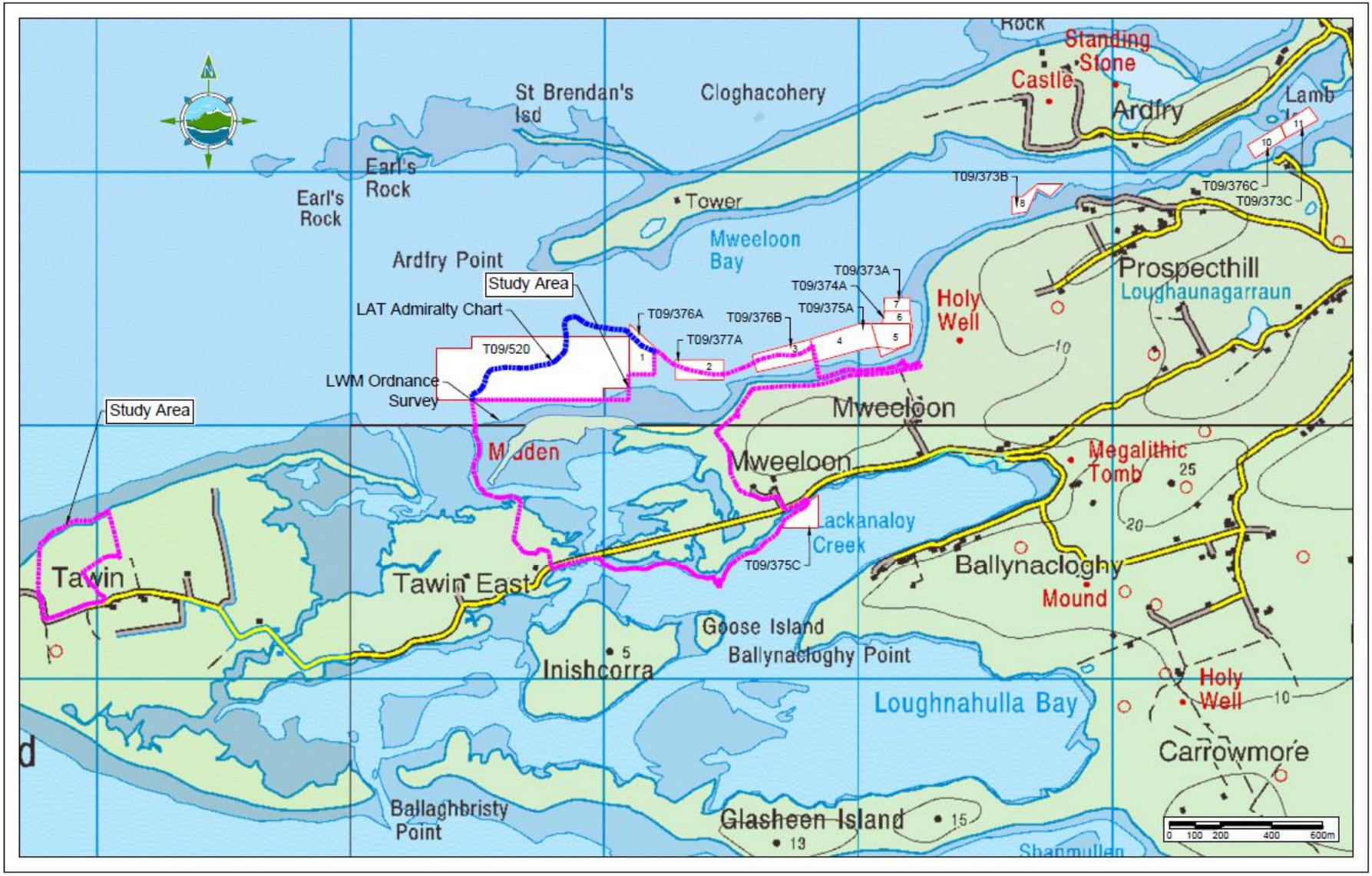


Figure 2-13: Aquaculture License Sites in Study Areas.

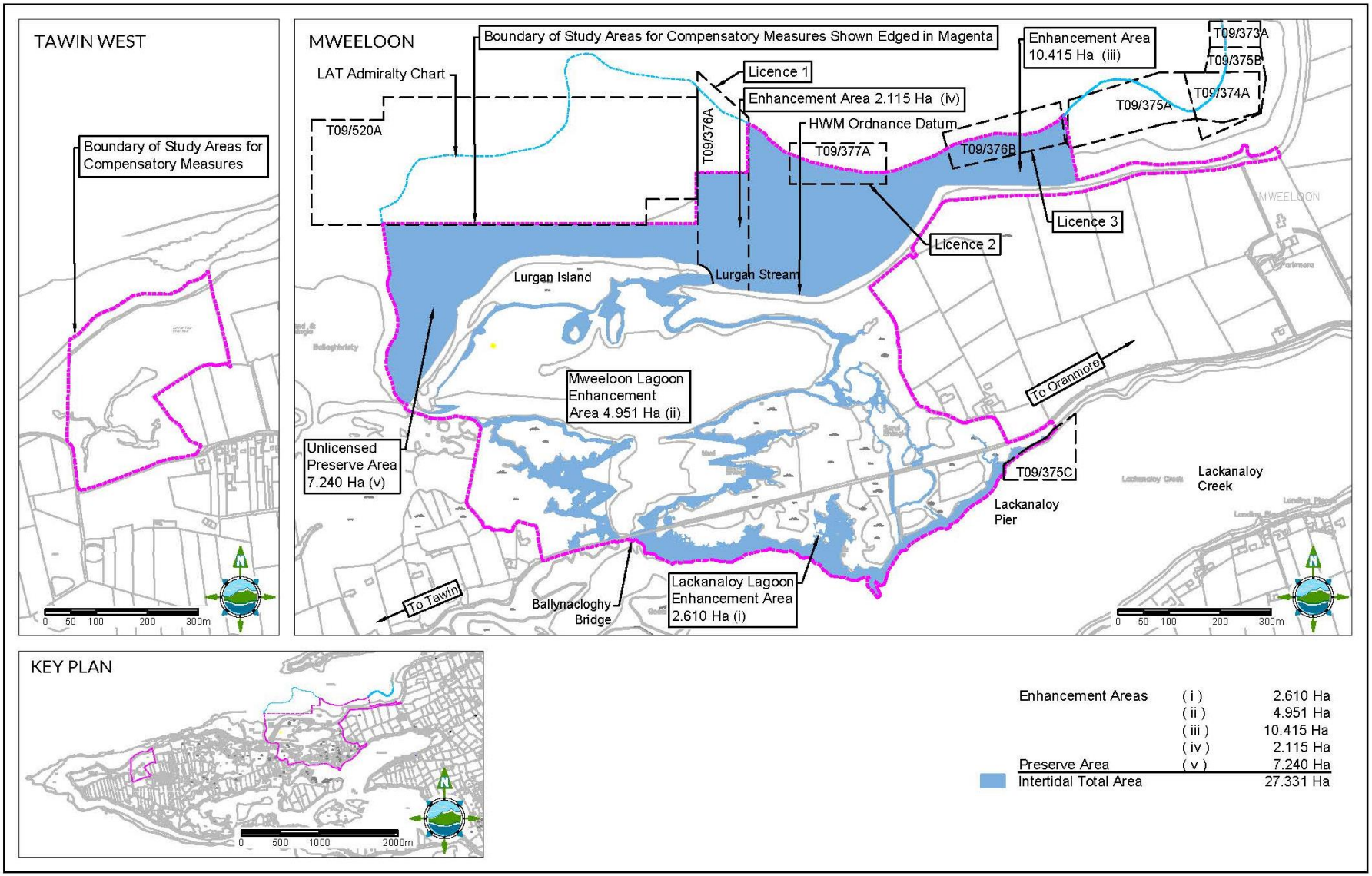


Figure 2-14: Aquaculture License Sites in Intertidal Management Area.

2.1.4. Objective 2. Removal of Oyster Trestles and Cessation of Tractor Movements

The second target of the marine aspect of the Intertidal Management Plan is the permanent fallowing of sites in Mweeloon Bay that are currently used for culturing oysters by removing trestles, bags, oysters, (and thereby preventing oyster effluent) and the elimination of tractor traffic to and from the fallow sites in order to return the habitats to their natural condition.

2.1.4.1. Methods

It is intended that the experimental design, methodologies and indicators used in the Forde *et al*. (2015) study will be used to track change in faunal community composition and sediment characteristics over time at the Mweeloon site following the removal of the trestles and cessation of tractor traffic.

At the Mweeloon area, benthic samples will be recovered at 10 stations within each of the following:

- an active aquaculture site
- a fallowed aquaculture site.
- active access route
- a virgin control site

At each station two core samples will be taken, one core for faunal analysis and one core for sediment granulometry and organic carbon analysis. At each station, REDOX depth will be at the assessed visually using a transparent, plastic core. Summaries of the faunal and sediment analyses are presented in **Appendix A** below. Sampling will be carried out as listed below:

1. Before the trestles are removed
2. 1 week post removal
3. 1 month post removal
4. 6 months post removal
5. 1 year post removal
6. Once a year for 5 years post removal

2.1.4.2. Indicators

Univariate and multivariate statistical analyses will be used to assess changes in sediment characteristics, faunal diversity measures and Infaunal Quality Index Ecological Status (see **Appendix A** for further detail).

The full suite of analysed data will provide a comprehensive and robust data set on which to base conclusions from the results of the statistical analyses. It will also allow comparisons in "*ante et post*" conditions at the fallow site, the active production site and the access route.

2.1.4.3. Thresholds

Details on threshold levels for biological data, organic carbon levels and mean size of sand particles are presented in **Appendix A**.

2.1.4.4. Management Goal

The objective of this target is to be able to demonstrate the effects of fallowing oyster production sites on intertidal benthic ecology. Given the number of sampling locations, the number of replicates and the temporal extent of the survey period, it is considered that this sampling strategy is adequately specific to:

1. Establish a baseline of the intertidal habitat and
2. Determine the success of this aspect of the Compensatory Measure.

Success of this aspect of the Compensatory Measures is defined as the stabilisation of the benthic fauna at the fallow sites and on the former access routes in comparison to what is present at the active aquaculture site and access route.

2.1.5. Objective 3. Establishment of "nature friendly" Farming Practices

The commencement of "nature friendly" farming practices including reduced stocking densities, and the discontinuation of fertilizer use are likely to bring about changes in intertidal ecology including the reduction in the spatial extent of green algae that are known to react positively to increased levels of organic enrichment. The presence/absence and percentage cover of green algae such as *Ulva* (+ synonym *Enteromorpha*) will be documented as part of each annual survey to record changes in intertidal ecology due to these alterations in agricultural practices.

2.1.5.1. Methods

At the Mweeloon area, benthic samples will be recovered at 10 stations at fallowed aquaculture sites adjacent to an area of intensive agriculture (**Figure 2-12**, Area 2) and an area of "nature friendly" agriculture (**Figure 2-12**, Area 3 & 4).

The same methods as outlined for Objective 2 will be applied to these surveys. A much longer time scale (decadal) is required to demonstrate this and well may be masked by a stronger signal such as a rise in sea temperature or an increase in storm activity.

2.1.5.2. Indicators

The same suite of indicators as listed for Objective 2 will be used in the Objective 3 study.

2.1.5.3. Threshold

As is noted above in the methods section, a much longer time scale (decadal) is required to demonstrate this and, as the response may be masked by a stronger signal, it is not possible to set a threshold level for this target.

2.1.5.4. Management Goal

One potential positive aspect of the Intertidal Management Plan is that it may demonstrate, over an extended time period, a reduction in green algae on the shore.

2.1.6. Objective 4. Removal of Litter

The control of litter across the habitats comprising and immediately adjacent to the purchased lands forms part of the Intertidal Management Plan at Mweeloon. The Intertidal Management Plan includes the collection and disposal of anthropogenic litter and rubbish in the intertidal and supratidal zones including salt marsh and stony bank habitats. Removal of anthropogenic litter and rubbish will occur every 3 months after lands and directly after a Force 9 or greater storm event.

2.2. Land Management Plan at Tawin West

2.2.1. Tawin West Land Management Plan

2.2.1.1. Aim

The Compensatory Area at Tawin West comprises a range of coastal habitats which occur to the south of a shingle coastline along the eastern shore of Galway Bay. An area of south-facing vegetated stony bank habitat occurs directly behind the shingle shoreline.

This stony bank area supports a well-developed grassland flora with few areas of bare shingle rock exposed. The aim of the Land Management Plan at Tawin West is to compensate for "*the loss of perennial vegetation of stony banks due to the sheltering effect of the GHE*". The management will improve the status the stony bank habitat in the area which currently has a high cover of negative plant species.

The Land Management Plan includes measures to compensate for the impacts associated with GHE that will result in:

- 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".

The spatial extent of the stony bank [1220] at Renmore to suffer loss due to the proposed GHE is shown in **Figure 2-1**. The Compensatory Measures in the Land Management Plan relate to 1.124 ha of stony bank habitat at Mweeloon (see **Figure 2-1**). Of this 1.124 ha of stony bank habitat at Tawin West an area of 0.844 ha[4] is set as compensation against the impacted area of 0.350 ha (equating to a compensatory ratio of 2.411 : 1 *i.e.* 0.844 ha : 0.350 ha).

The key measures to be implemented at the Tawin West Compensatory Area to compensate for the loss of 1220 stony bank habitat are detailed in **Table 2.4**. Specifically, the Compensatory Measures proposed in the plan will help improve the Conservation Status of the stony bank habitat area at Tawin West.

2.2.1.2. Methods

The vegetation composition and cover of the stony bank habitat area will be monitored in a number of vegetation plots (relevés) which will be surveyed on an annual basis. The monitoring approach will closely follow the NPWS survey guidelines (Martin *et al*., 2017).

2.2.1.3. Indicators

All vegetation will be recorded however particular attention will be paid to the presence and cover of negative weedy/ruderal species such as *Lolium perenne, Cirsium vulgare, Cirsium arvense* and *Urtica dioica*. The high cover of these species indicates intensive agricultural use and reduces the conservation value of the habitat.

2.2.1.4. Threshold

The cover of negative species should be reduced as much as possible throughout the entire stony bank area. The combined cover of negative plant species should be less than 25% in all monitoring plots and no single species should be present in more than 60% of the monitoring plots.

[4] The stony bank area not included as Compensatory Habitat measures is 0.280 ha. This area of stony bank habitat is put forward to address historic loss of this habitat type due to the GHEP.

2.2.1.5. Management Goal

The main management goal will be the maintenance of a low cover of negative plant species in the long term through the implementation of a low intensity grazing regime. This low grazing level will also result in the full flowering and seed set of the native stony bank flora. The total area of stony bank habitat included in the Compensatory Area at Tawin is 1.124 ha, 0.844 ha of which is proposed as Compensatory Habitat for the loss.

The Conservation Objective for 1220 stony banks is to maintain Favourable Conservation Condition which is defined by the habitat attributes and targets that are set out in **Table 2.3**.

2.2.1.6. Objectives/ Measures

The Compensatory Measures to be implemented at the Tawin West Compensatory Area to compensate for the loss of stony banks habitat at Renmore are detailed in **Table 2.4**. The measures will help achievement of Favourable Conservation Condition of stony bank habitat.

Table 2.3: Habitats, Measure and Target (NPWS 2013[5]).

Habitat	Attribute	Measure	Target
1220 stony banks	1) Habitat Area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession
	2) Habitat Distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
	3) Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
	4) Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
	5) Vegetation composition: typical species and subcommunities	Percentage cover at a representative sample of monitoring stops	Maintain the typical vegetated shingle flora including the range of subcommunities within the different zones. Typical species include sea sandwort (*Honckenya peploides*), sea beet (*Beta vulgaris ssp maritima*), rock samphire (*Crithmum maritimum*), sea mayweed (*Tripleurospermum maritimum*), yellow-horned poppy (*Glaucium flavum*) and sea campion (*Silene uniflora*)
	6) Vegetation composition: negative indicator species	Percentage cove	Negative indicator species (including non-natives) to represent less than 5% cover

[5] NPWS (2013) Conservation Objectives: Galway Bay Complex SAC 000268. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

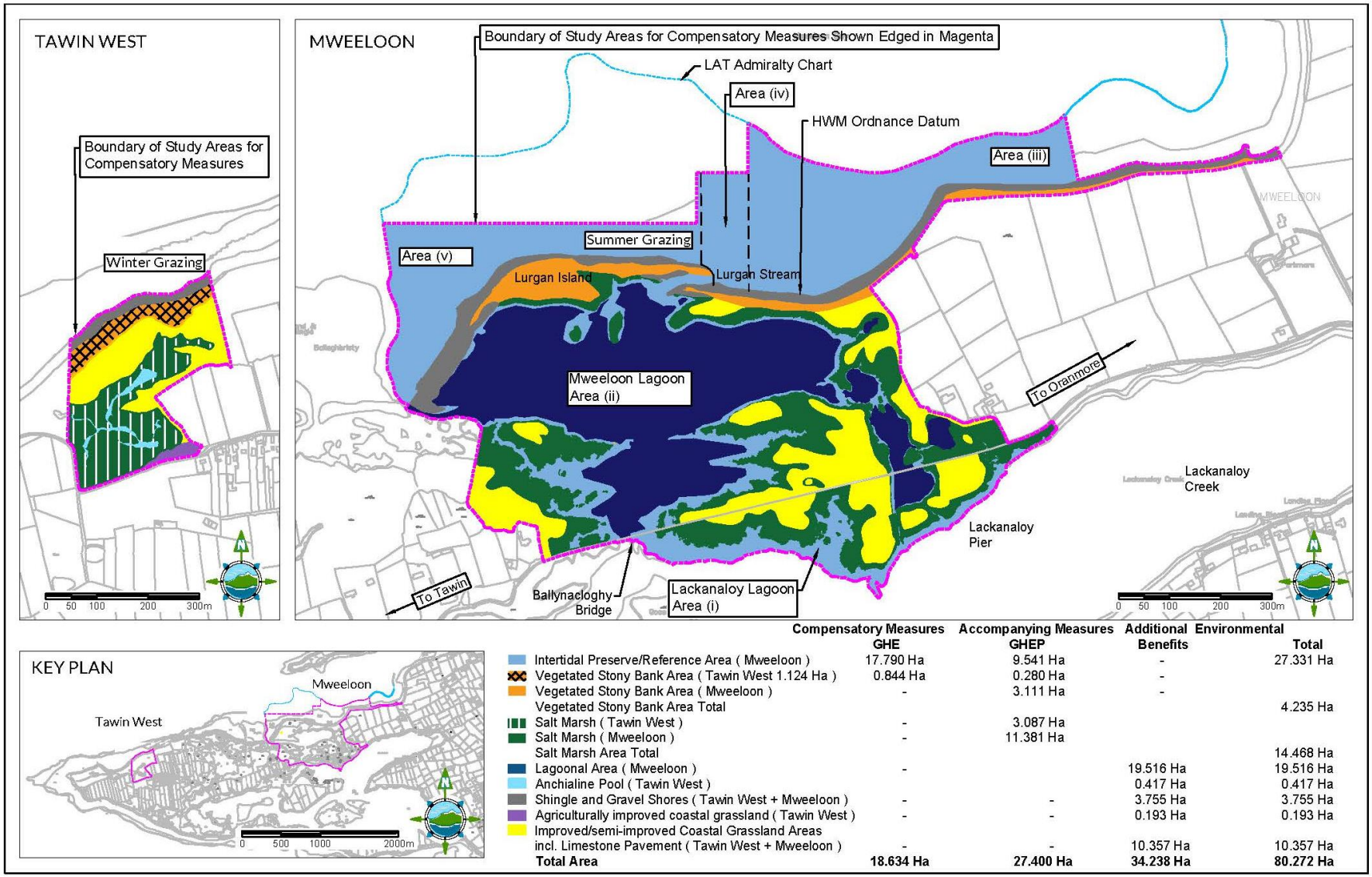
Table 2.4: Compensatory Measures at Tawin West for Stony Bank

Measure	
1	**Repair/ Maintain Fences and Gates** GHC will erect / maintain a fence and 2 gates along the boundary of the land purchase area (see Land purchase Area 3 in **Figure 2-16** below) in the Tawin West Compensatory Area and repair / maintain the existing fences / stone walls on the seaward boundary and boundaries with adjacent lands to prevent trespass and control stock. As GHC will own the land, it will put padlocks on external gates and only allow individuals who lease the land for agricultural purposes access to them, thereby preventing any potential for removal of cobbles *etc*. in the future. The land leases will contain conditions regarding the nature and use of same accordingly.
2	**Signage** Information signs will be erected at selected locations along the site boundaries to inform the public of the objective of the project and warn against trespass and the removal of material from the shore.
3	**Grazing** Regulating grazing will reduce overgrazing and dunging and to a lesser extent, poaching of the habitat. There will be no grazing between the 1st of April and the 31st of August. A light grazing regime will be implemented between the 1st of September and the 31st of March at a grazing intensity of between 0.5 to 1.0 LU per hectare. These measures will promote the flowering/ seed set and growth of plant species which will benefit insect species. The lands outside of the areas of stony bank habitats within the Compensatory Area at Tawin West (see the habitats in **Figure 2-15**) comprise coastal grassland and salt marsh habitat. These areas will be subject to the same grazing regime outlined above which will benefit both the vegetation and birds of the area. Walkover inspections will be carried out at regular intervals (approximately every month) in order to monitor grazing and the development of vegetation throughout the year. This will ensure that potential problems such as localized poaching will be identified at an early stage and the appropriate management measures can be taken. **Direct linkage to stony bank habitat attribute** 4) Vegetation structure: zonation - Occurrence 5) Vegetation composition: typical species and sub-communities. 6) Vegetation composition: negative indicator species
4	**Inspections** Walkover inspections to be carried out at regular intervals (approximately every month) in order to monitor grazing and the development of vegetation throughout the year. This will ensure that potential problems such as localized poaching will be identified at an early stage and the appropriate management measures can be taken.
5	**Control Use of Anthelmintic Drugs** Animals to be brought onto the lands will be treated in advance so that they will be outside of the recommended anthelmintic 28 day withdrawal periods.
6	**Control Vehicle Access** By minimizing tractor access and confining unavoidable access to very limited occasions *e.g.* removal of sick or dying livestock.

7	**Nature friendly Farming Practices** The implementation of "nature friendly" farming practices that besides having beneficial effect on terrestrial habitats, are likely to have beneficial effect on intertidal marine ecology. These measures include : controls on the use of anthelmintic drugs with expiry of the withdrawal period before treated livestock are brought onto the lands at Tawin West, no herbicide and no fertiliser (see **Section 2.1.5** for further details).
8	**Herbicide** Cease use of herbicide.
9	**Fertilizer** Cease the use of fertilizer on the lands and reduce dunging in this habitat by repair of animal fencing and control of livestock access to the lands. By ceasing fertilizing and supplementary feeding on the lands, the stony bank areas will return to a natural state and nitrogen and phosphorous soil contents will return to natural levels. **Direct linkage to stony bank habitat attribute** 4) Vegetation structure: zonation - Occurrence 5) Vegetation composition: typical species and sub-communities. 6) Vegetation composition: negative indicator species
10	**Eliminate winter and supplementary feeding** Eliminate winter feeding of livestock and supplementary feeding and specifically the use of ring feeders. This will stop related poaching and rutting of lands at feeding sites and around gates. However, should it become apparent that grazing animals are losing condition before the site has been grazed to an optimal level, options for nutritional supplements may be considered for the welfare of the livestock. Any proposal to permit supplementary feed on the site must be agreed in writing with NPWS/ DHLGH. **Direct linkage to stony bank habitat attribute** 4) Vegetation structure: zonation - Occurrence 5) Vegetation composition: typical species and sub-communities. 6) Vegetation composition: negative indicator species
11	**Removal of anthropogenic litter and rubbish** Regular removal of anthropogenic litter and rubbish. Removal will occur every 3 months and directly after a Force 9 or greater storm event (see **Section 2.1.6** for further details).
12	**Surveys** Annual survey to be undertaken will monitor stony bank and salt marsh vegetation at Tawin West. The results/observations of these surveys will inform ongoing habitat management. Monitoring surveys will follow the approach outlined in Martin *et al*. (2017) and McCorry and Ryle (2009). Long-term tide level monitoring to be conducted using water level recorders in the anchialine pool area at Tawin west.

13	**Turf stripping** This method may be used over small areas, typically <1 sqm, to remove small dense patches of agricultural grass species, such as *Lolium perenne*. Stripping of the vegetation would expose a shallow stony, dry soil which would favour the colonization and growth of a more natural stony bank flora. No turf stripping will be undertaken without the prior agreement of NPWS/ DHLGH. **Direct linkage to stony bank habitat attribute** 4) Vegetation structure: zonation - Occurrence 5) Vegetation composition: typical species and sub-communities. 6) Vegetation composition: negative indicator species
14	In recognition of local concerns that a breach of the stony banks, within the compensatory measures area, may occur that would result in flooding damage to local homes, consideration is to be given to appropriate long term protection measures that would not affect the Conservation Objectives of the SAC. If a breach in the stony bank occurs, management actions *i.e.* sensitive reconstruction of the stony bank that will have no long term negative effects on site mobility and the Conservation Objectives may be considered as a temporary short-term measure, subject to agreement with NPWS/DHLGH. The detailed long-term monitoring and assessments of the existing geological features and habitats which will be undertaken will establish the potential implications of the management options on the site. Management actions will be subject to appropriate approvals with input provided by NPWS. Any medium-longer term proposed management actions will be submitted to the Planning Authority and NPWS/DHGLG as part of the Annual Review process. Depending on the nature of the proposed management actions, statutory approvals may also be required, such as planning permission or Ministerial Consent, all of which are subject to the requirements of the Habitats Directive, including appropriate assessment.

15	**Annual Review of the implementation of the Compensatory Measures Plan will be undertaken** Annual Reports on the Implementation of the Compensatory Measures Plan will be prepared and submitted to the Planning Authority and to NPWS/ DHLGH. The Annual Report will include a section describing monitoring activities, results and any recommendations arising for the adaptation of the Compensatory Measures, in view of the monitoring results. It is proposed that Annual Meetings with the Planning Authority and NPWS/DHLGH will be convened to discuss the Annual Reports and any modifications/ adaptations that are recommended, for their approval. If matters of significance arise in the intervening months that may warrant more immediate amendment of a compensatory measure, approval of same will be sought by correspondence or by an extraordinary meeting, the latter on request. **Compensatory Measures Plan Implementation** It is expected that the implementation of the CMP will be overseen by Galway City Council ("GCC") as the planning authority for the Galway Harbour Extension The envisaged implementation approach is that an annual report will be prepared by Galway Harbour Company ("GHC") and their specialist team in relation to the monitoring and management of the compensatory measures areas, adjacent areas of accompanying measures and additional environmental benefits, all in line with the CMP. This annual report will be submitted to GCC. The planning authority (GCC) is expected to determine the methodology and procedures for implementation, including the circulation of the annual report to the relevant stakeholders, one of which will be NPWS, and perhaps Galway County Council and others as GCC consider appropriate. It is envisaged that the implementation will include an annual meeting of all of the stakeholders, including GHC, and will allow for more frequent meetings if required. The implementation is expected to include site visits at appropriate seasonal times by the relevant stakeholders. For example, there may be a site visits in early Spring and again in September before and after the appropriate growing seasons on the lands. The annual report will then be submitted to GCC before the year end in order to allow time for GCC, NPWS and other relevant stakeholders to review the findings and make recommendations as required ahead of the next spring season.



	Compensatory Measures GHE	Accompanying Measures GHEP	Additional Benefits	Environmental Total
Intertidal Preserve/Reference Area (Mweeloon)	17.790 Ha	9.541 Ha	-	27.331 Ha
Vegetated Stony Bank Area (Tawin West 1.124 Ha)	0.844 Ha	0.280 Ha	-	
Vegetated Stony Bank Area (Mweeloon)	-	3.111 Ha	-	
Vegetated Stony Bank Area Total				4.235 Ha
Salt Marsh (Tawin West)	-	3.087 Ha		
Salt Marsh (Mweeloon)	-	11.381 Ha		
Salt Marsh Area Total				14.468 Ha
Lagoonal Area (Mweeloon)	-		19.516 Ha	19.516 Ha
Anchialine Pool (Tawin West)			0.417 Ha	0.417 Ha
Shingle and Gravel Shores (Tawin West + Mweeloon)	-	-	3.755 Ha	3.755 Ha
Agriculturally improved coastal grassland (Tawin West)	-	-	0.193 Ha	0.193 Ha
Improved/semi-improved Coastal Grassland Areas incl. Limestone Pavement (Tawin West + Mweeloon)	-	-	10.357 Ha	10.357 Ha
Total Area	**18.634 Ha**	**27.400 Ha**	**34.238 Ha**	**80.272 Ha**

Figure 2-15: GHE Intertidal and Stony Bank Habitat Area Impacted and Renmore and Compensatory Areas at Tawin.

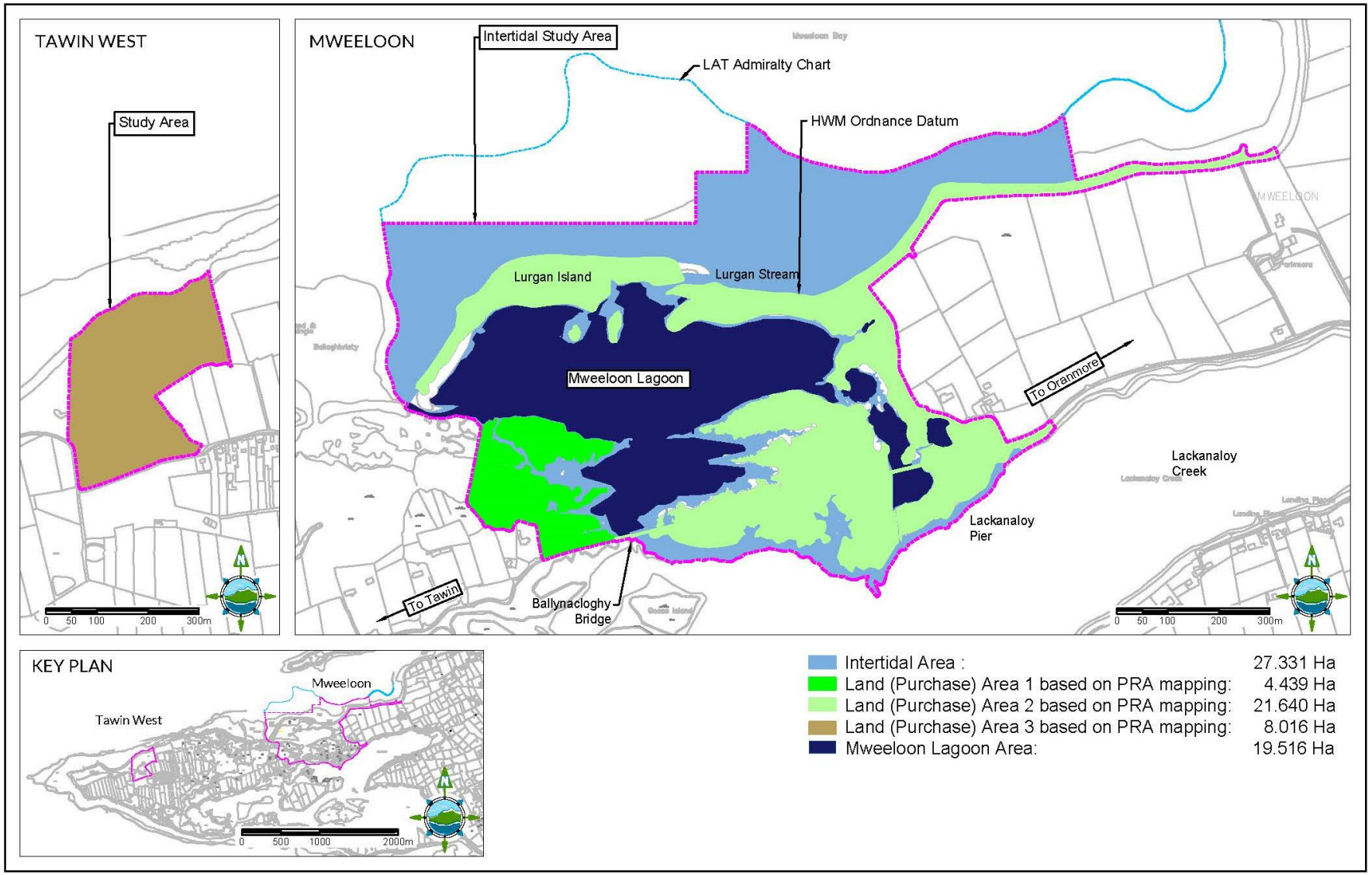


Figure 2-16: Areas identified for detailed study showing land purchase areas

2.3. Compensatory Measures Assessment Matrix

In accordance with the assessment criteria outlined in the European Commission (EC) Guidance document '*Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission*', the proposed compensatory measures for the GHE are assessed in **Table 2.5** below.

Table 2.5: Compensatory Measures Matrix

How were compensatory measures identified?	Compensatory Measures were identified through the Appropriate Assessment process, in particular the findings of the Natura Impact Statement (NIS). The findings of the NIS considered that the GHE would result in the loss of intertidal habitat [1170] Fucoid Dominated Reef habitat and [1140] Mud and Sand Flat habitat and, stony bank [1220]. The measures that have been identified here are designed to compensate for the impacts associated with GHE that will result in loss of Fucoid Dominated Reef habitat, Mud and Sand Flat habitat and stony banks habitats of the Galway Bay Complex SAC. The measures will help achievement of Favourable Conservation Condition.
What alternative measures were identified?	Alternative measures are presented in the Compensatory Measures Report (CMR). This presents a review of other options for the GHE and include the following: 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. A synopsis of the assessment is also presented in the presented in the Compensatory Measures Report (CMR) (dated April 2019). This synopsis is presented in this document in **Appendix B**.
How do these measures relate to the conservation objectives of the site?	The Compensatory Measures relate to the following habitats of the Galway Bay Complex SAC: • [1140] Mudflats and sandflats not covered by seawater at low tide • [1170] Reefs • [1220] Perennial vegetation on stony banks, The conservation objective of habitats 1140, 1170 and 1220 of this site is to maintain Favourable Conservation Condition. The proposed Compensatory Measures will help achievement of Favourable Conservation Condition.

Do these measures address, in comparable proportions, the habitats and species negatively affected?	The Compensatory Measures proposed are technically feasible and will be effective. As outlined above, the GHE will cause the loss of an area of:- • 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, • 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*". The Compensatory Measures for the GHE development will provide: • 17.790 ha of the Intertidal habitat at Mweeloon equates to a compensatory ratio of 3 : 1 (*i.e.* 17.790 ha : 5.930 ha) • 0.844 ha of the stony bank at Tawin West equates to a compensatory ratio of 2.411 : 1 (*i.e.* 0.844 ha : 0.350 ha)
How would the compensatory measures maintain or enhance the overall coherence of Natura 2000?	The proposed Compensatory Measures will help maintain the Favourable Conservation Condition of habitats 1140, 1170 and 1220. These measures have been designed to achieve the attributes and targets for the Qualifying Interests within the Galway Bay Complex SAC.
Do these measures relate to the same biogeographical region in the same Member State?	Yes, these measures relate to habitats in the same biogeographical areas (*i.e.* the Atlantic region for terrestrial habitats and Marine Atlantic for the marine habitats) in the Member State in question
If the compensation measures require the use of land outside the affected Natura 2000 site, is that land under a legal agreement between the relevant parties. The long-term ownership and control of the project or plan proponent or relevant national or local authority?	GHC have purchased or contracted to purchase lands as part of the Compensatory Measures package. The lands in question are located at Mweeloon and Tawin West.
Do the same geological, hydrogeological, soil, climate and other local conditions exist on the compensation site as on the Natura 2000 site adversely affected by the project or plan?	The habitats impacted are Fucoid dominated reef [1170] and Mud and Sand Flat [1140] of the Galway Bay Complex SAC. The habitats are found throughout the Tawin peninsula include the Mweeloon and Tawin West Compensatory Areas located in the south of the SAC. The vegetated stony bank Habitat at Tawin West has a similar species composition and structure to the area of the habitat which occurs at Renmore.
Do the compensatory measures provide functions comparable to those that had justified the selection criteria of the original site?	Yes. The GHE will cause the loss of an area of Intertidal habitat [1170] Fucoid Dominated Reef habitat and [1140] Mud and Sand Flat habitat, and stony bank [1220]. Compensatory Measures are proposed for areas of Intertidal habitat at Mweeloon to compensate for the loss of Intertidal habitat 1170 and 1140, while Compensatory Measures are proposed for an area of stony bank at Tawin West.

What evidence exists to demonstrate that this form of compensation will be successful in the long term?	With regard measures for intertidal habitats, the removal of the aquaculture activities and pressures acting on benthic habitats at Mweeloon will result in the faunal community and sediment structure reverting to a natural pre-impact state. In a published study on the impact of intertidal aquaculture on benthic habitats Forde *et al*. (2015) showed that the ecological status of habitats was significantly higher in the absence of tractor traffic. Consequently, the cessation of tractor activity at the sites at Mweeloon will positively affect the ecological status of benthic habitats. Similarly, as a result of the removal of the trestles and oyster stock, shellfish faecal/ pseudofaecal material released to the benthic habitats will cease. As a result the infaunal communities present will shift from one characterised by species tolerant of higher level of organics to one characterized by organic sensitive species. *Didemnum* has been shown to negatively alter marine habitats, interfere with fishing, aquaculture, and other coastal and offshore activities. *Didemnum* overgrows other organisms such seaweed, scallops, mussels, and oysters that depend on the seafloor for habitat. The annual control regime for *Didemnum* is proposed as part of the Compensatory Measures will reduce pressure on species and habitats in the area. Nature friendly farming practices including reduced stocking densities, and the cessation of fertilizer use will bring benefit to terrestrial habitats and is likely to bring about positives changes in intertidal ecology including the reduction in the spatial extent of green algae that are known to react positively to increased levels of organic enrichment. For stony bank habitats, a reduction in grazing intensity will improve habitat condition by reducing the incidence of poaching[6] of land and dunging by herbivores. It will also result in an increase in the flowering of grasses and forbs which will be beneficial for insects. The lack of disturbance resulting from the exclusion of livestock during the bird breeding season could also benefit bird breeding. Similarly, the reduction in nutrient inputs will over time lead to a decline of more nutrient demanding plant species typical of impacted areas of stony bank vegetation. A reduction in poaching levels will also lead to a decline in bare soil area and thus reduce the germination opportunities for biennial/perennial weed species.

[6] Poaching is the name for damage done to grass and the underlying soil by livestock which has been allowed to stand and walk on it for prolonged periods in wet conditions

2.4. Conclusion

This assessment has been completed in relation to the compensatory measures proposed in accordance with Article 6(4) of the EU 'Habitats' Directive 92/43/EEC and the Guidance documentation in relation to same and provides a professional scientific examination of the project.

The conclusion of this assessment is that Compensatory Measures are required to compensate for potential impacts to intertidal habitat [1170] Fucoid Dominated Reef habitat and [1140] Mud and Sand Flat, and stony bank habitat [1220] of the Galway Bay Complex SAC.

The Compensatory Measures are proposed to ensure that the overall coherence of the Natura 2000 network is protected and they are proposed at a ratio significantly greater than 1:1 (3:1 and 2.411:1 respectively)

The proposed Compensatory Measures based on EU Guidance (EU, 2018) and IROPI precedents, will bring about an improvement in the condition of areas of stony bank at Tawin West, and Intertidal habitats at Mweeloon. The ecological condition of the habitats in the area may also be improved.

The Compensatory Measures for these habitats have been designed to bring about a significant improvement over time for habitats and thereby improve the overall functioning of the SAC as an ecosystem. The biological diversity proposed to be lost to the GHE will be addressed by these measures.

The integrity, coherence and Conservation Objectives of the Galway Complex Bay SAC site will be protected by these Compensatory Measures now proposed for the present GHE.

Part 3 – Accompanying Measures

3. Accompanying Measures

3.1. Mweeloon and Tawin West Land Management Plans

3.1.1. Galway Harbour Enterprise Park

The development of the GHEP in the mid-1990s resulted in the loss of areas of Intertidal, stony bank and salt marsh habitat. The areas of habitat lost due to the GHEP are:

- 7.390 ha of salt marsh habitat
- 8.580 ha of Intertidal habitat
- 0.280 ha of stony bank habitat

3.1.2. Salt marsh and stony bank habitat

The terrestrial area at Mweeloon and Tawin comprises shingle coastline, stony bank habitat and well-developed coastal grassland which grades into salt marsh vegetation.

3.1.2.1. Aim

The aim of the Land Management Plans is to improve the status of salt marsh habitat 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and 1220 stony bank habitats at Mweeloon and salt marsh habitat 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) at Tawin West.

The Accompanying Measures proposed in the Plan will help manage pressures affecting the habitats and improve the Conservation Status of the habitats area at Mweeloon and Tawin West.

The total area of salt marsh habitat at Mweeloon is 11.381 ha and 3.087 ha at Tawin West (see **Figure 3-1**) therefore a total area of 14.468 ha is put forward to address the loss of 7.390 ha of salt marsh habitat due to the GHEP which equates to a ratio of 1.96 : 1 (*i.e.* 14.468 ha : 7.390 ha).

The total area of stony bank habitat at Mweeloon is 3.11 ha (see **Figure 3-2**). This 3.11 ha area is in reasonably good condition and hence is not now proposed as Compensatory area, it will to its benefit be subject to enhanced future management and the proposed monitoring regime. The total area of stony bank habitat at Tawin West is 1.124 ha, 0.280 ha of which is not included as Compensatory Habitat measures but is put forward to address historic loss of 0.280 ha of this habitat type due to the GHEP which equates to a ratio of 1 : 1 (*i.e.* 0.280 ha : 0.280 ha, without counting the 3.111 ha of stony bank habitat at Mweeloon), (see **Figure 3-2**).

3.1.2.2. Methods

The vegetation composition and cover of the salt marsh habitat area will be monitored in a number of vegetation plots (relevés) which will be surveyed on an annual basis. The monitoring approach will closely follow the NPWS survey guidelines outlined in McCorry and Ryle (2009).

The vegetation composition and cover of the stony bank habitat area will be monitored in a number of vegetation plots (relevés) which will be surveyed on an annual basis. The monitoring approach will closely follow the NPWS survey guidelines (Martin *et al.,* 2017).

3.1.2.3. Indicators

Salt marsh vegetation will be recorded and particular attention will be paid to the presence of bare soil due to poaching by livestock. The main negative plant species in the context of salt marsh habitats is *Spartina anglica*. It is noted that this invasive species has not been recorded in the Galway Bay area.

All stony bank vegetation will be recorded however particular attention will be paid to the presence and cover of negative weedy/ruderal species such as *Lolium perenne, Cirsium vulgare, Cirsium arvense*

and *Urtica dioica*. The high cover of these species indicates intensive agricultural use and reduces the conservation value of the habitat.

3.1.2.4. Threshold

Within salt marsh areas the cover of bare soil should be less than 10%, outside of creek areas. Structural variation of salt marsh vegetation will be noted in response to grazing levels.

Throughout the stony bank area cover of negative plant species should be reduced as much as possible.

3.1.2.5. Management Goal

The overall management goal of the Management Plan at Mweeloon and Tawin West is to improve the status of salt marsh. The measures proposed in the Plan will help improve the Conservation Status of the habitat area at both areas. The Conservation Objective for habitat 1130 within the Galway Bay Complex SAC is to maintain Favourable Conservation Condition which is defined by attributes and target set out in **Table 3.1**.

The management goal with respect to salt marsh habitat is to maintain a low cover of bare soil in the salt marsh habitat in the long term. This will be achieved through the implementation of low intensity grazing regimes. The optimal management of grazing will also ensure the better flowering and seed set of the salt marsh flora and improve the structure of the various salt marsh vegetation types.

The main management goal for stony bank will be the maintenance of a low cover of negative plant species in the long term through the implementation of a low intensity grazing regime.

The Conservation Objective for 1220 stony banks is to maintain Favourable Conservation Condition which is defined by the habitat attributes and targets that are set out in **Table 2.3**.

3.1.2.6. Objectives/ Measures

The Accompanying Measures to be implemented at the Mweeloon and Tawin West are detailed in **Table 3.2**. The Accompanying Measures will help improve the conservation status of the salt marsh and stony bank habitats.

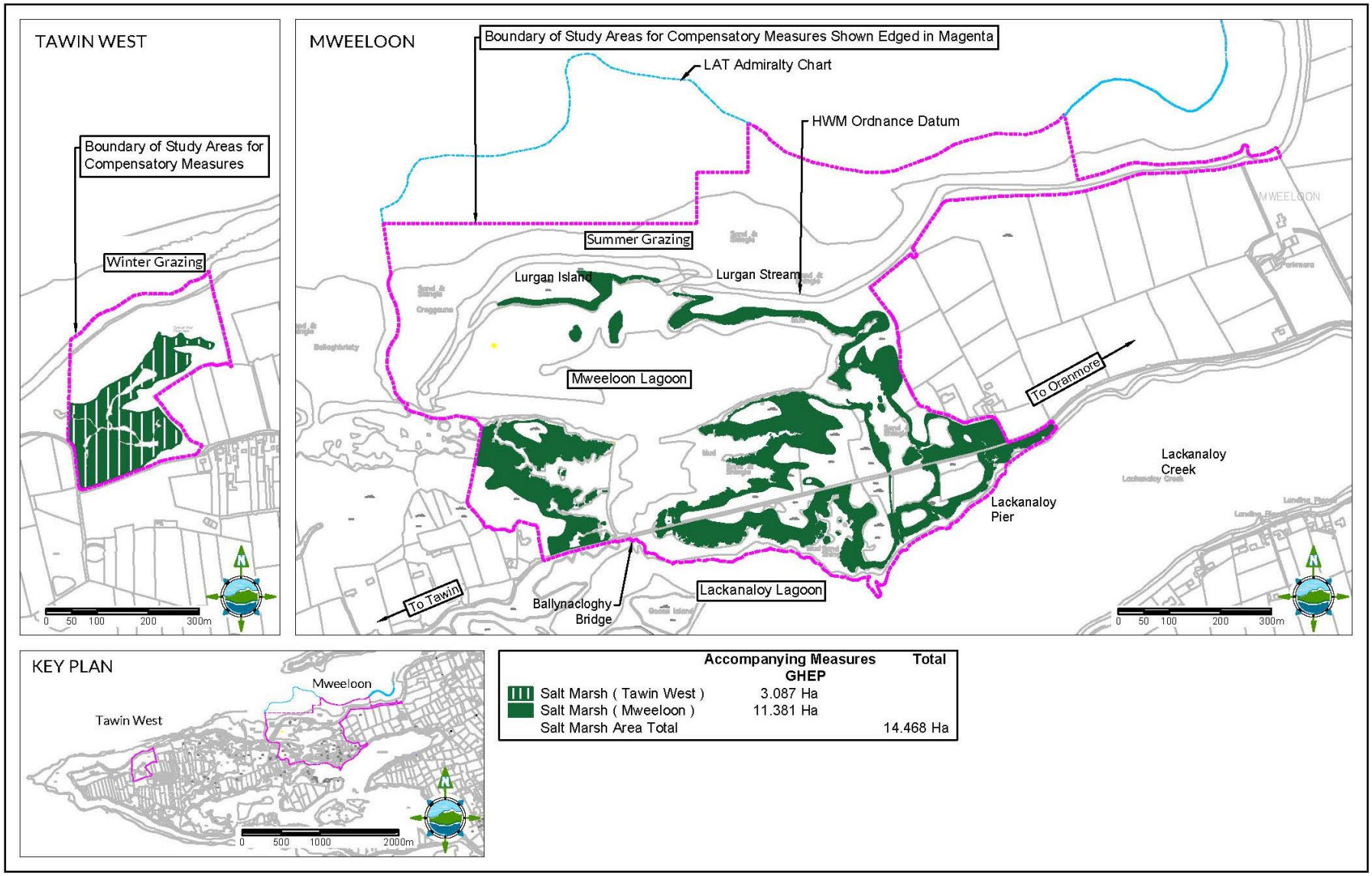


Figure 3-1: Salt Marsh Management Areas

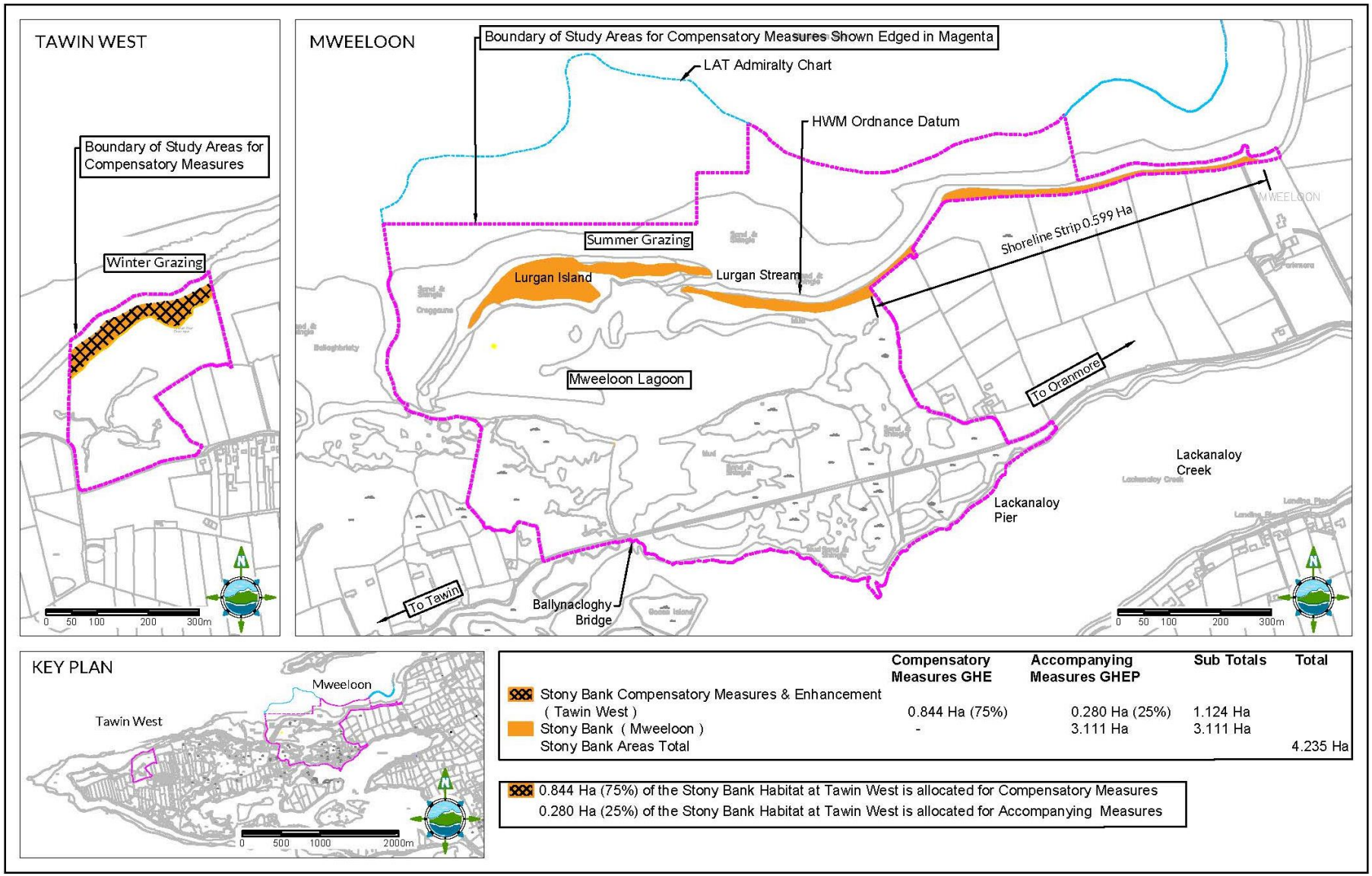


Figure 3-2: Stony Bank Areas

Table 3.1: Habitats, Measure and Target (NPWS 2013[7])

Habitat	Attribute	Measure	Target
1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	1) Habitat Area	Hectares	Area increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Barna House - 2.33ha, Seaweed Point - 1.41ha, Roscam West and South - 3.30ha, Oranmore North - 4.24ha, Kilcaimin - 6.82ha, Tawin Island - 53.85ha, Tyrone HouseDunbulcaun Bay - 9.83ha, Kileenaran - 15.37ha, Kinvara West - 13.33ha, Scanlan's Island - 4.13ha.
	2) Habitat Distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
	3) Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions
	4) Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession
	5) Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime
	6) Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
	7) Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward
	8) Vegetation structure: vegetation cover	Percentage over at a representative sample of monitoring stops	Maintain more than 90% area outside creeks vegetated
	9) Vegetation composition: typical species and subcommunities	Percentage cover at a representative sample of monitoring stops	Maintain range of subcommunities with typical species listed in SMP (McCorry and Ryle, 2009)
	10) Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	There is currently no common cordgrass (*Spartina anglica*) in this SAC. Prevent establishment of cordgrass

[7] NPWS (2013) Conservation Objectives: Galway Bay Complex SAC 000268. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Table 3.2: Accompanying Measures

Accompanying Measures	
1	**Repair/ Maintain Fences and Gates** GHC will repair / maintain fences and (repair / replace) gates along the boundary of the land purchase areas in the Mweeloon Compensatory Area to prevent trespass and within the lands to facilitate livestock management and control grazing. As GHC will own the land, it will put padlocks on external gates and only allow individuals who lease the land for approved agricultural purposes access to them, thereby preventing any potential for removal of cobbles *etc*. in the future. The land leases will contain conditions regarding the nature and use of same accordingly.
2	**Signage** Information signs will also be erected at selected locations along the site boundaries to inform the public of the objective of the project and warn against trespass and the removal of material from the shore.
3	**Cease construction of drainage channels** Prevent the construction of and cease the maintenance of any land drainage channels. **Direct linkage to Atlantic Salt Meadow habitat attribute** 4) Physical structure: creeks and pans; Occurrence 5) Physical structure: flooding regime; Hectares flooded; frequency
4	**Grazing** Regulating grazing will reduce over grazing and dunging and to a lesser extent, poaching of the habitat. During close consultation and discussions with the current owners and lessees of the lands at Mweeloon it was decided that a light grazing regime will be implemented between May 1st and October 31st, at a grazing intensity of between 0.5 to 1.0 LU per hectare. Grazing during these months will be closely monitored. As the areas at Mweeloon and Tawin West will be subject to different grazing regimes, the results of the vegetation monitoring will provide important comparative information regarding the ecological management of vegetation in salt marsh and stony bank areas. The areas to be grazed at Mweeloon and Tawin West will be compared and will therefore act as reference areas to each other. This will ensure that potential problems such as localized poaching will be identified at an early stage and the appropriate management measures can be taken. Vegetation surveys will take place annually in mid-May and early August in order to reveal the vegetation composition and the degree of flowering. Walkover inspections will be carried out at regular intervals (approximately every month) in order to monitor grazing and the development of vegetation throughout the year. The lands outside of the areas of salt marsh and stony bank habitats at Mweeloon comprise coastal grassland. These lands will be subject to the same grazing regimes as the stony bank and salt marsh which will benefit the vegetation of the full area.

4 contd/.	**Direct linkage to Atlantic Salt Meadow habitat attribute** 6) Vegetation structure: zonation, Occurrence 7) Vegetation structure: vegetation height - Centimetres 8) Vegetation structure: vegetation cover, Percentage over at a representative sample of monitoring stops 9) Vegetation composition: typical species and sub-communities: Percentage over at a representative sample of monitoring stops **Direct linkage to stony bank habitat attribute** 4) Vegetation structure: zonation - Occurrence 5) Vegetation composition: typical species and sub-communities. 6) Vegetation composition: negative indicator species
5	**Inspections** Walkover inspections to be carried out at regular intervals (approximately every month) in order to monitor grazing and the development of vegetation throughout the year. This will ensure that potential problems such as localized poaching will be identified at an early stage and the appropriate management measures will be taken.
6	**Control Use of anthelmintic drugs** Animals to be brought onto the lands will be treated in advance so that they will be outside of the recommended anthelmintic 28 day withdrawal periods.
7	**Control Vehicle Access** By minimizing tractor access and confining unavoidable access to very limited occasions *e.g.* removal of sick or dying livestock.
8	**Nature friendly Farming Practices** The implementation of "nature friendly" farming practices that besides having beneficial effect on terrestrial habitats, will be likely to have beneficial effect on intertidal marine ecology (see **Section 2.1.5** for further details).
9	**Herbicide** Cease use of herbicide. **Direct linkage to Atlantic Salt Meadow habitat attribute** 6) Vegetation structure: zonation, Occurrence 7) Vegetation structure: vegetation height - Centimetres 8) Vegetation structure: vegetation cover, Percentage over at a representative sample of monitoring stops 9) Vegetation composition: typical species and sub-communities: Percentage over at a representative sample of monitoring stops

10	**Fertilizer** Cease the use of fertilizer on the lands and curtail dunging in this habitat by repair of animal fencing. By ceasing fertilizing and supplementary feeding on the lands, the salt marsh areas will return to a natural state and nitrogen and phosphorous soil contents will return to natural levels. **Direct linkage to Atlantic Salt Meadow habitat attribute** 6) Vegetation structure: zonation, Occurrence 7) Vegetation structure: vegetation height - Centimetres 8) Vegetation structure: vegetation cover, Percentage over at a representative sample of monitoring stops 9) Vegetation composition: typical species and sub-communities: Percentage over at a representative sample of monitoring stops **Direct linkage to stony bank habitat attribute** 4) Vegetation structure: zonation - Occurrence 5) Vegetation composition: typical species and sub-communities. 6) Vegetation composition: negative indicator species
11	**Eliminate winter and supplementary feeding** Eliminate winter feeding of livestock and supplementary feeding and specifically the use of ring feeders. This will stop related poaching and rutting of lands at feeding sites and around gates. **Direct linkage to Atlantic Salt Meadow habitat attribute** 6) Vegetation structure: zonation, Occurrence 7) Vegetation structure: vegetation height - Centimetres 8) Vegetation structure: vegetation cover, Percentage over at a representative sample of monitoring stops 9) Vegetation composition: typical species and sub-communities: Percentage over at a representative sample of monitoring stops **Direct linkage to stony bank habitat attribute** 4) Vegetation structure: zonation - Occurrence 5) Vegetation composition: typical species and sub-communities. 6) Vegetation composition: negative indicator species
12	**Removal of anthropogenic litter and rubbish** Regular removal of anthropogenic litter and rubbish. Removal will occur every 3 months and directly after a Force 9 or greater storm event.
13	**Vegetation Surveys** The set of annual surveys to be undertaken will monitor stony bank and salt marsh vegetation at Mweeloon. The results/observations of these surveys will inform ongoing habitat management. Monitoring surveys will follow the approach outlined in Martin *et al.* (2017) and McCorry and Ryle (2009).
14	**Stony Bank Surveys** The spatial extent of the stony bank habitat at Lurgan Island and east of the Lurgan stream will be surveyed annually and also after significant storm events.

15	**Future Assessment and Monitoring Studies** Detailed shoreline topographical surveys and bathymetric surveys and photographic surveys of the sea defence units and ongoing monitoring of level and displacement of these units. Detailed hydrodynamic and sediment transport modelling studies of the local and wider area, sediment sampling and distribution analysis, storm event analysis and the possible seeding of tracer sediments to identify and track movement of the shingle. Long-term tide level monitoring to be conducted using water level recorders, one, within the Mweeloon Lagoon, a second in the southern Lagoonal area south of the Tawin causeway road and a third in the open sea near Mweeloon Bay.
16	**Stony Bank and Sea Defences** The stony bank and sea defences at Lurgan Island act as a barrier between the open sea and Mweeloon lagoon, helping preserve the ecosystem function of this priority habitat by maintaining existing water regime, and circulation of sediment and organic matter. A breach of the stony bank and sea defences at Lurgan Island could expose the inner lagoon area to greater flooding impact and to storm waves and much increased flow through Ballynacloghy Bridge into the larger lagoon to the south. To counter any breach and potential impacts to the lagoonal and adjacent salt marsh habitats, management actions including sensitive works on the stony bank and sea defences may be indicated. Detailed long-term monitoring and assessments will be undertaken to establish the potential implications of any management options (such as retaining, repairing, enhancing or removing) on the site and the Conservation Objectives of each of the relevant qualifying interests. Any proposed management actions will be submitted to the Planning Authority and NPWS/ DHGLG as part of the Annual Review process. It will be for NPWS/DHLGH to decide on any prioritisation of the Conservation Objectives for qualifying interests, should conflicting management actions be indicated. Depending on the nature of the proposed management actions, statutory approvals may also be required, such as planning permission or Ministerial Consent, all of which are subject to the requirements of the Habitats Directive, including appropriate assessment.

17	**Annual Review of the implementation of the Compensatory Measures Plan will be undertaken** Annual Reports on the Implementation of the Compensatory Measures Plan will be prepared and submitted to the Planning Authority and to NPWS/ DHLGH. The Annual Report will include a section describing monitoring activities, results and any recommendations arising for the adaptation of the Compensatory Measures, in view of the monitoring results. It is proposed that Annual Meetings with the Planning Authority and NPWS/DHLGH will be convened to discuss the Annual Reports and any modifications/ adaptations that are recommended, for their approval. If matters of significance arise in the intervening months that may warrant more immediate amendment of a compensatory measure, approval of same will be sought by correspondence or by an extraordinary meeting, the latter on request. **Compensatory Measures Plan Implementation** It is expected that the implementation of the CMP will be overseen by Galway City Council ("GCC") as the planning authority for the Galway Harbour Extension The envisaged implementation approach is that an annual report will be prepared by Galway Harbour Company ("GHC") and their specialist team in relation to the monitoring and management of the compensatory measures areas, adjacent areas of accompanying measures and additional environmental benefits, all in line with the CMP. This annual report will be submitted to GCC. The planning authority (GCC) is expected to determine the methodology and procedures for implementation, including the circulation of the annual report to the relevant stakeholders, one of which will be NPWS, and perhaps Galway County Council and others as GCC consider appropriate. It is envisaged that the implementation will include an annual meeting of all of the stakeholders, including GHC, and will allow for more frequent meetings if required. The implementation is expected to include site visits at appropriate seasonal times by the relevant stakeholders. For example, there may be a site visits in early Spring and again in September before and after the appropriate growing seasons on the lands. The annual report will then be submitted to GCC before the year end in order to allow time for GCC, NPWS and other relevant stakeholders to review the findings and make recommendations as required ahead of the next spring season.

3.1.3. Intertidal habitat

As outlined in **Section 2.1**, the Compensatory Measures in the Intertidal Management Plan relate to 27.331 ha of Intertidal habitat at Mweeloon, of which 17.790 ha is set as compensation for Intertidal area impacted by the GHE (see **Figure 3-3**). The remaining habitat area 9.541 ha which is not included as Compensatory Habitat measures is put forward to address historic loss of 8.580 ha of this habitat type due to the GHEP. The complementary action proposed are the same as the compensatory measures are outlined for Intertidal habitats in **Section 2.1**.

Tawin Qualifying Interest Habitats for GHE and GHEP					
		Compensatory Measures GHE	**Accompanying Measures GHEP**	**Sub Totals**	**Total**
	Intertidal Preserve / Reference Area (Mweeloon)	17.790 Ha	9.541 Ha		27.331 Ha
	Stony Bank Compensatory Measurements & Enhancement (Tawin West)	0.844 Ha	0.280 Ha	1.124 Ha	
	Stony Bank (Mweeloon)	--	3.111 Ha		
	Stony Bank Areas Total				4.235 Ha
	Salt Marsh (Tawin West)	--	3.087 Ha	3.087 Ha	
	Salt Marsh (Mweeloon)	--	11.381 Ha	11.381 Ha	
	Salt Marsh Area Total				14.468 Ha
	Total Area of 3 Replacement QI Habitats	**18.634 Ha**	**27.400 Ha**		**46.034 Ha**

Adjacent to the Compensatory Areas, the following Accompanying[8] habitat areas are put forward to address these historic losses:

- 9.541 ha of Intertidal habitat at Mweeloon which equates to a ratio of 1.11 : 1 (*i.e.* 9.541 ha : 8.580 ha),
- 14.468 ha of salt marsh habitat at Mweeloon and at Tawin West which equates to a ratio of 1.96 : 1 (*i.e.* 14.468 ha : 7.390 ha), and
  0.280 ha of stony bank at Tawin West which equates to a ratio of 1 : 1 (*i.e.* 0.280 ha : 0.280 ha, without counting the 3.111 ha of stony bank habitat at Mweeloon).

See **Figure 3-3**.

[8] 9.541ha (35%) of the 27.331ha of Intertidal at Mweeloon is allocated for the Accompanying Measures.

0.28ha (25%) of the 1.124ha of stony bank at Tawin West is allocated for the Accompanying Measures

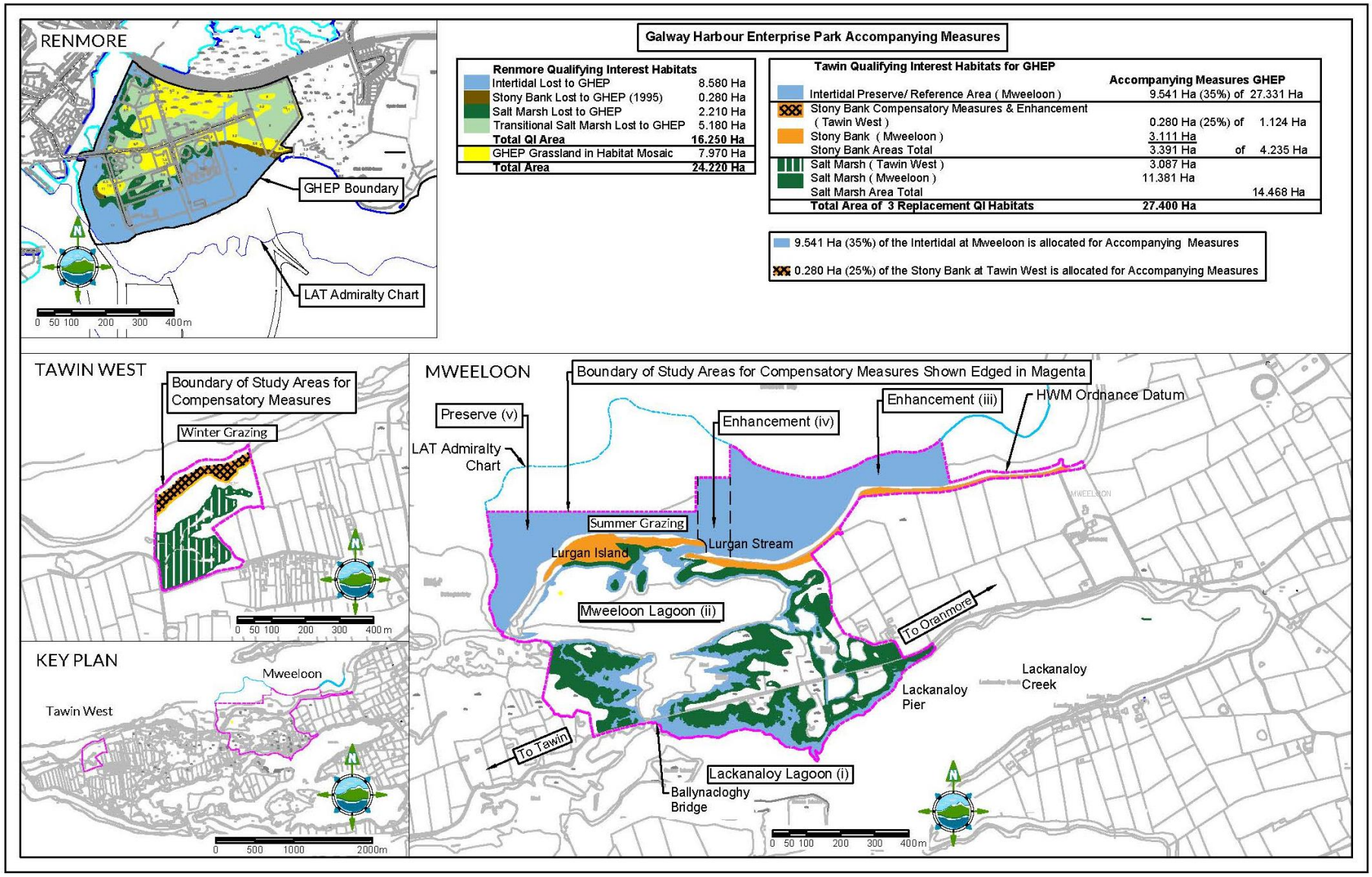


Figure 3-3: ACCOMPANYING MEASURES - Combined Intertidal, Stony Bank and Salt Marsh Areas within the Study Areas

Part 4 - Additional Environmental Benefits

4. Additional Environmental Benefits

4.1. 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 Compensatory Measures for the GHE 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 4-1**. 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 Areas at Mweeloon and Tawin West outlined in magenta. The fact that there is 19.516 ha of priority lagoonal habitat which will be enclosed and protected by agriculturally controlled lands and preserved free from aquaculture / *Didemnum* by the GHC ownership of the lands is of significant additional ecological and conservation interest.

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.

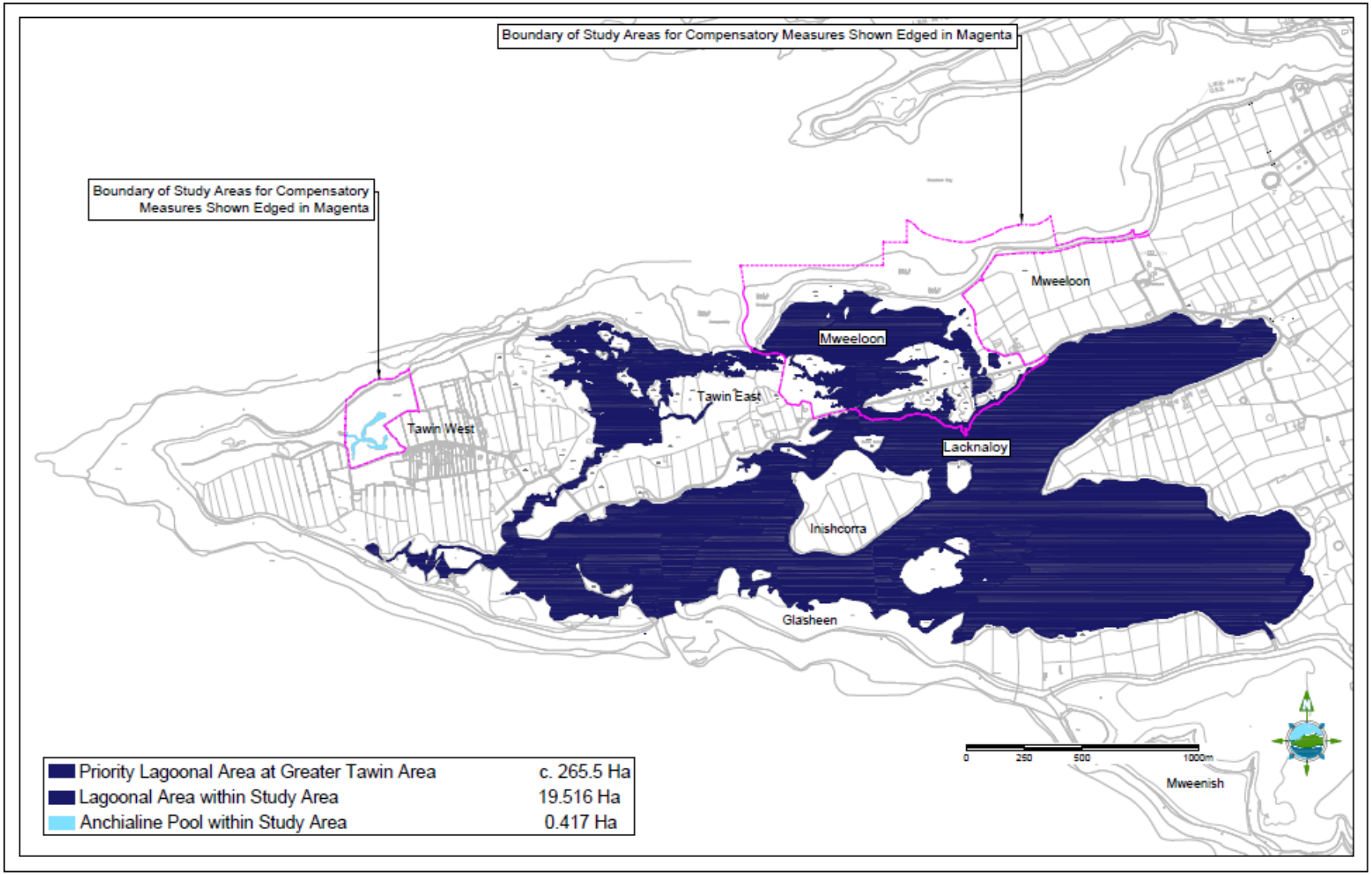


Figure 4-1: Extent of Priority Lagoon Habitat at Mweeloon relative to the Compensatory Areas at Mweeloon and Tawin West.

4.2. Protection of Limestone Pavement and Other QIs and Rare Species

4.2.1. QI Habitats and Species

In addition to the dominant Atlantic salt marsh habitat 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). As noted above limestone Pavement is listed as Priority habitats in the EU "Habitats" Directive (EU, 1992). The occurrence of these habitats at Mweeloon gives further additional high conservation status to the area. [Refer to Photograph in **Figure 4-4**].

Much of the Limestone Pavement habitat occurs 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 Mweeloon site gives the area further additional ecological interest and value.

The Limestone Pavement also transitions to small areas of calcareous grass land above sea flood level. The lesser Perched Lagoons, 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* and other annuals colonizing mud and sand [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 being *Salicornia europaea* (Glasswort or Samphire) and *Suaeda maritima* and the grass *Puccinellia maritima*. This habitat is common at the site, although the area is relatively small. It is present along the upper Intertidal sections of much of the lagoonal habitat of Mweeloon.

The salt marsh vegetation at the Tawin West Compensatory Area is subject to regular tidal inundation via underground seawater seepage through the limestone bedrock with seawater collecting in a small, elongate anchialine pool located close to the centre of the compensatory area (see **Figure 1-6** and **Figure 4-4**). The management of activities on the lands will be of environmental benefit to the anchialine pool feature and vegetation in the area.

A QI species for Galway Bay Complex SAC, 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.

4.2.2. Locally rare plant species

Mweeloon supports a population of two locally 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 western 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.

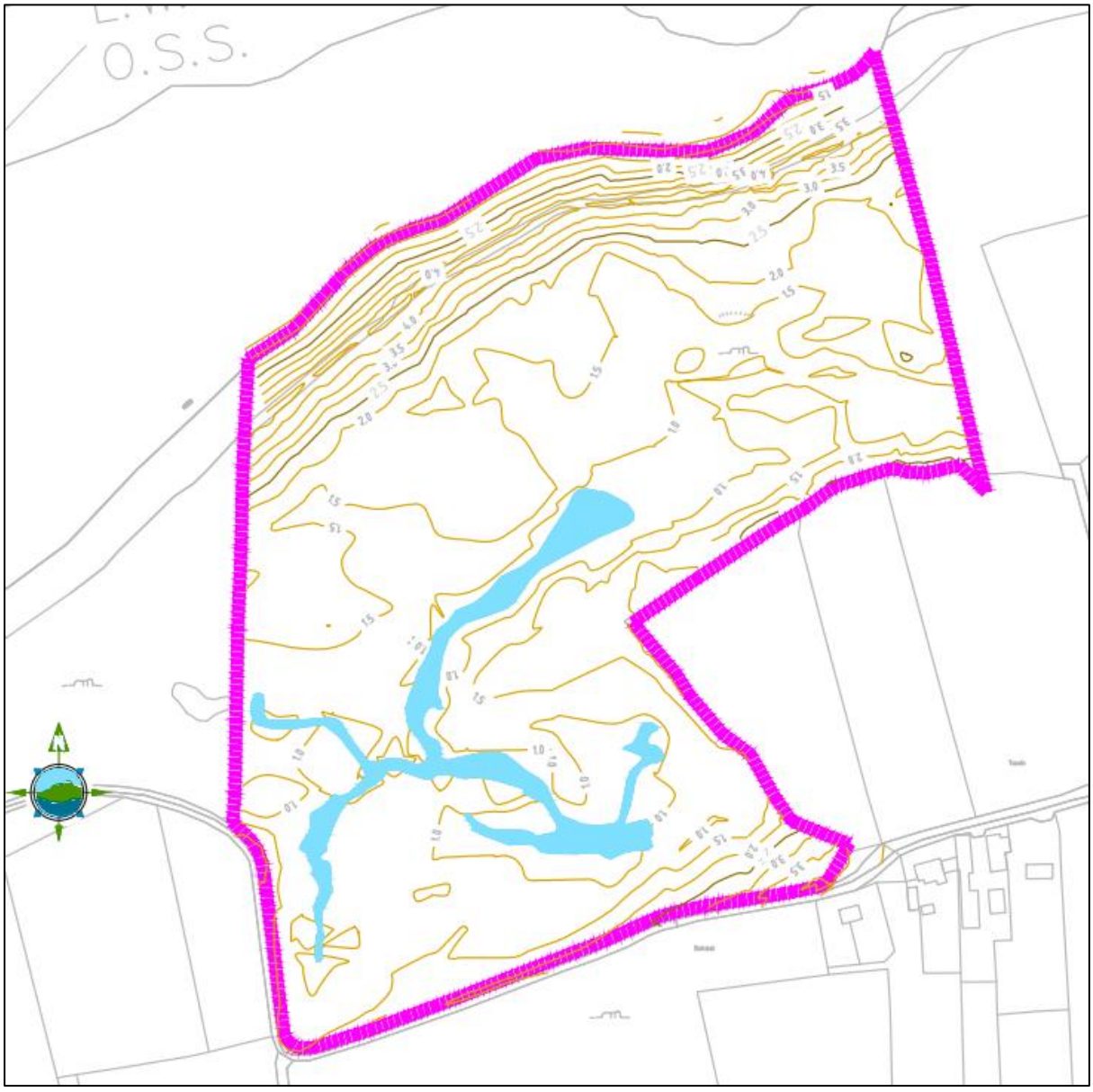


Figure 4-2: Contour mapping at Tawin West. Extent of anchialine pool shown in blue.

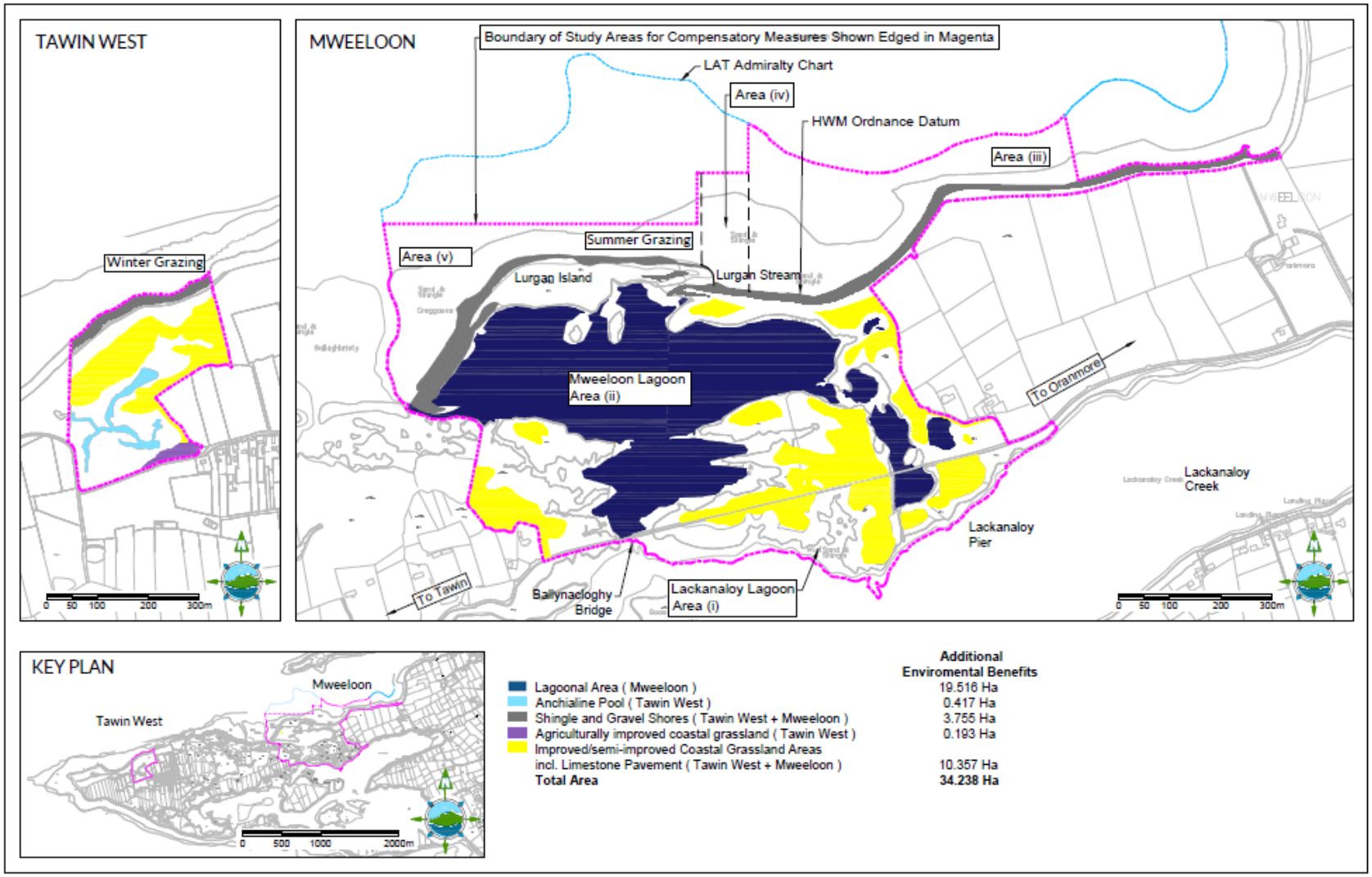


Figure 4-3: ADDITIONAL ENVIRONMENTAL BENEFITS - Habitat Areas.

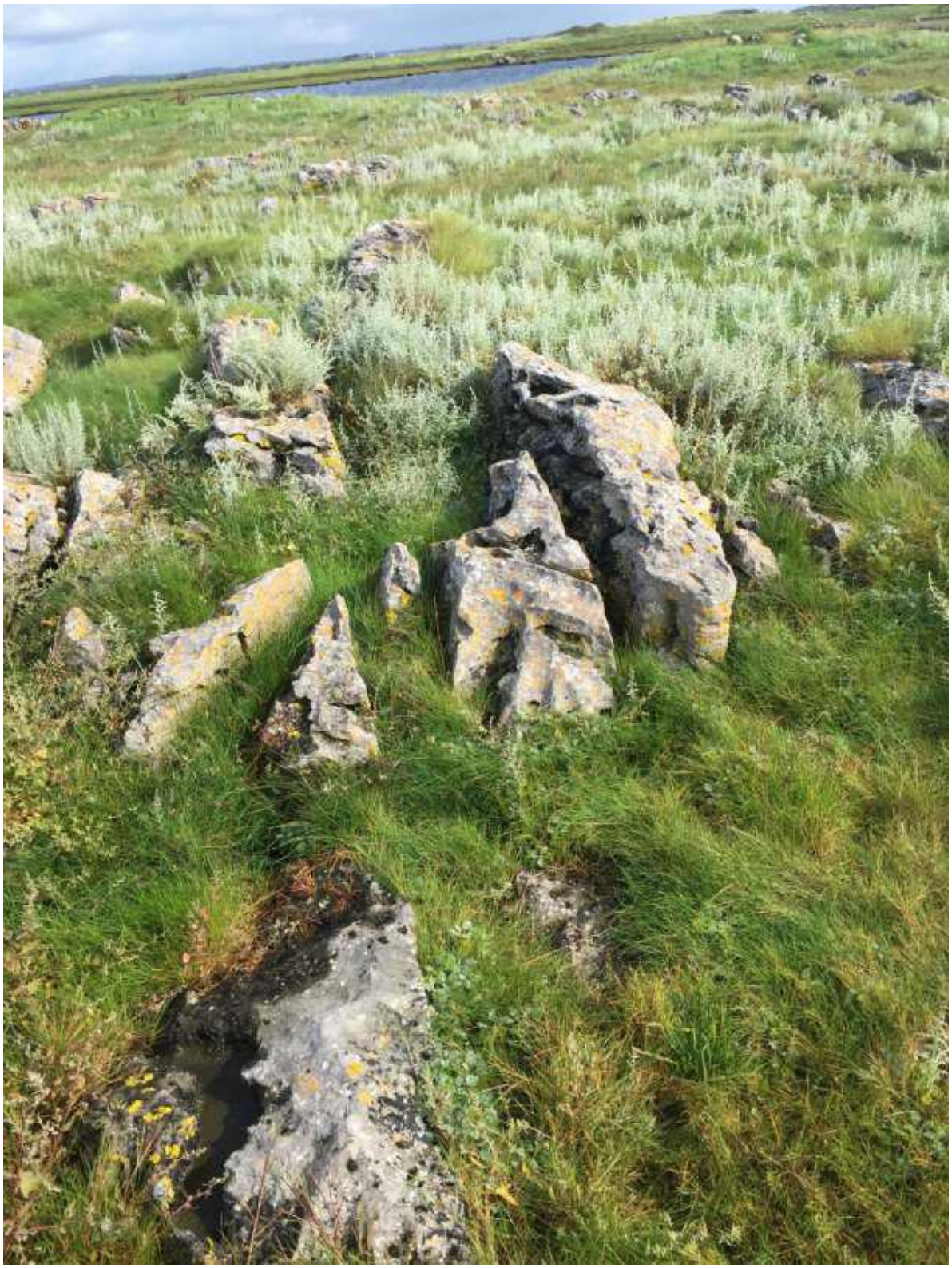


Figure 4-4: Limestone Pavement and Salt Marsh complex at Mweeloon showing undamaged habitat. Note the abundance of *Artemisia maritima* (Wormwood) at this location.

5. References

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Appendix A

Methods (Intertidal)

Methods Overview

The effects of mollusc aquaculture on marine ecology has received some focus of research not only in Ireland (Forde *et al.,* 2015 *inter alia*) but also further afield (for reviews see McKindsey *et al.,* 2011; Gallardi, 2014). Forde *et al.* (2015) investigated the impact of oyster trestle cultivation activities on intertidal soft sediment habitats and infaunal communities at six sites located within four designated Natura 2000 sites distributed around the north-west, west and south coasts of Ireland. Specifically, the study investigated changes in sediment characteristics and associated infaunal communities **1)** underneath trestles and **2)** along access routes.

Results showed that sediment characteristics and the associated infaunal community structure and diversity indicators across the sites was highly variable, with increases in species abundance and diversity attributed to faecal/pseudofaecal material produced by the oysters acting as a source of additional food for the infaunal taxa.

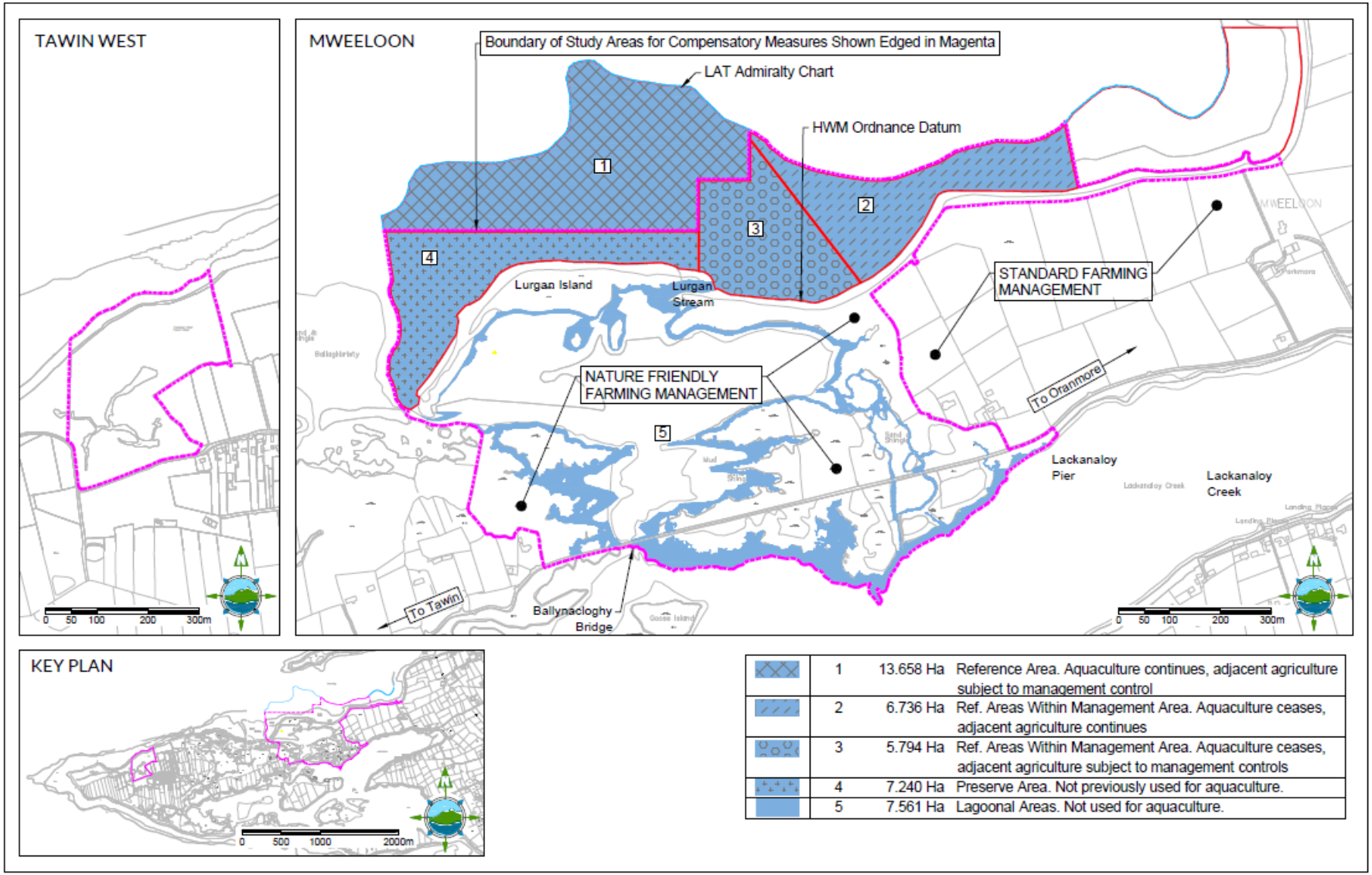
The variability across sites prevented the detection of the general effects of cultivation activity on sediment characteristic and faunal community structure. To overcome variability, the Water Framework Directive (WFD) Ecological Quality Ratio (EQR) Infaunal Quality Index (IQI) indicator was used to assess impacts on the Ecological Status (ES) of the infaunal communities.

This study showed that traffic along access routes had a significant negative impact on ES. The negative impact on ES was attributed to tractor and trailer traffic and the consequent compaction of sediments. This study highlighted the IQI EQR indicator as a tool for the management of aquaculture activity and as a potential tool for assessing the conservation status of designated habitats in Natura 2000 sites.

Design

Within the Mweeloon marine reference site, four areas will be selected and these are as follows:

1. At the trestles of an active aquaculture site and adjacent to an area of intensive agriculture including the access route to and from it,
2. At an aquaculture site that will be fallowed and adjacent to an area of intensive agriculture,
3. At an aquaculture site that will be fallowed and adjacent to an area of “nature friendly” agriculture and
4. At a location on the tractor access route to the active aquaculture site.



Intertidal Reference areas.

Within each of these including the access routes, 10 stations will be selected. At each station two core samples will be taken, one core for faunal analysis and one core for sediment granulometry and organic carbon analysis. At each station, REDOX depth will be at the assessed visually using a transparent, plastic core. Summaries of the faunal and sediment analyses are presented below. Sampling will be carried out as listed below:

1. Before the trestles are removed
2. 1 week post removal
3. 1 month post removal
4. 6 months post removal
5. 1 year post removal
6. Once a year for 5 years post removal

The temporal changes at the fallowed sites will be compared to temporal changes at a nearby trestle oyster site where cultivation activity will be continued *i.e.* an active production site and at the access route. All sites to be investigated will be selected to ensure that they are comparable in terms of shore tidal height and sediment type.

Samples for quantitative faunal analysis will be sieved on a 1mm mesh sieve, preserved, sorted and identified to species level where possible.

The faunal samples will be processed in a systematic way to ensure that no samples are omitted. A daily inventory of what samples have been sorted/identified/counted will be maintained.

Conspicuous fauna will be placed in an illuminated shallow white tray and sorted first by eye to remove large specimens and then sorted using a stereo microscope at 6 to 10 times magnification. Following the removal of larger specimens, the samples will be placed into Petri dishes, approximately one-half teaspoon at a time and sorted using a binocular microscope at x25 magnification. The fauna will be maintained in stabilised 70% industrial methylated spirit (IMS) following retrieval and identified to species level where practical using a binocular microscope, a compound microscope and all relevant taxonomic keys. AQUAFACT APEM Group has an extensive library of taxonomic publications (including BEQUALM/NMBAQC guides).

Species nomenclature will be classified in accordance with Howson & Picton (1997). After identification and enumeration, specimens will be separated and stored to species where possible. All containers will be clearly labelled on the outside stating site, date, sample code, replicate number and name of individual who analysed the sample. A permanent internal label bearing the same information will also be included with all containers. Specimens will be stored in stabilised Industrial Methylated Spirits (IMS) in containers with adequate seals and labelled accordingly. Residual detritus will be kept in a separate container for each sample, labelled inside and outside. Sample residue will be preserved in alcohol in containers with adequate seals and labelled accordingly. All faunal abundance data will be recorded in an Excel spreadsheet. The following description outlines the methodology for granulometric analyses.

Approximately 25g of dried sediment is weighed out and placed in a labelled 1L glass beaker to which 100 ml of a 6 percent hydrogen peroxide solution is then added. This is allowed to stand overnight in a fume hood. The beaker is placed on a hot plate and heated gently. Small quantities of hydrogen peroxide are added to the beaker until there is no further reaction. This peroxide treatment removes any organic material from the sediment which can interfere with grain size determination. The beaker is then emptied of sediment and rinsed into a. 63µm sieve. This is then washed with distilled water to remove any residual hydrogen peroxide. The sample retained on the sieve is then carefully washed back into the glass beaker up to a volume of approximately 250ml of distilled water. 10ml of sodium hexametaphosphate solution is added to the beaker and this solution is stirred for ten minutes and then allowed to stand overnight. This treatment helps to dissociate the clay particles from one another. The beaker with the sediment and sodium hexametaphosphate solution is washed and rinsed into a 63µm sieve. The retained sample is carefully washed from the sieve into a labelled aluminium tray and placed

in an oven for drying at 100ºC for 24 hours. When dry this sediment is sieved through a series of graduated sieves ranging from 4 mm down to 63µm for 10 minutes using an automated column shaker. The fraction of sediment retained in each of the different sized sieves is weighed and recorded. The silt/clay fraction is determined by subtracting all weighed fractions from the initial starting weight of sediment as the less than 63µm fraction was lost during the various washing stages.

The particle size (PSA) data will be processed using GRADISTAT (Blott and Pye, 2001) software to derive sediment type classification and sediment particle parameters including (ø) particle graphic mean values (Mz) and sediment distribution modality. All sediment samples will be classified using Folk and Ward (1957). Mz is a parameter used to describe the mean particle size of a distribution and is analogous to the graphic mean employed with the normal distribution in conventional statistics (Forde *et al*., 2012); consequently, the Mz parameter can be used with confidence where sediments exhibit unimodal distributions. If the particle size distribution of the sediment is unimodal (or approximately unimodal), Mz values will be used to track change in average particle size over time.

Indicators

Regarding statistical analyses, univariate statistics will include:

1. Species richness which is a measure of the total number of species present for a given number of individuals.
2. Evenness which is a measure of how evenly the individuals are distributed among different species.
3. The Shannon-Wiener index which incorporates both species richness and the evenness component of diversity (Shannon & Weaver, 1949).
4. This diversity index is then converted to Effective Species Number (ENS) to reflect 'true diversities' that can then be compared across communities. The ENS is equivalent to the number of equally abundant species that would be needed in each sample to give the same value of a diversity index, *i.e.* Shannon-Weiner Diversity index. The ENS behaves as one would intuitively expect when diversity is doubled or halved, while other standard indices of diversity do not. If the ENS of one community is twice that of another then it can be said that that community is twice as diverse as the other.
5. Multivariate statistical analyses will be used to investigate change in community structure.

Other indicators will include the level of reduction of organic carbon in the sediments and the increase in median particle size (Mz) at the fallow site in comparison to the actively farmed site.

Thresholds

Based on the results of Forde *et al.,* (2015), it is predicted that as there will less organic matter in the sediment post-fallowing, numbers of individuals of suspension and deposit feeding taxa such as *Macomangulus* and *Polycirrus* (that were recorded in the reference area of Mweeloon as part of the intertidal survey for the report) will decrease. The threshold for these taxa is that there will be a statistically significant reduction in their densities 5 years post-removal.

Amphipoda are known to be sensitive to increased organic carbon loadings and densities in taxa such as *Bathyporeia* (that has also been recorded at the site) are predicted to increase post-fallowing. The threshold for densities of these taxa is that there will be a statistically significant increase in their densities 5 years post-removal.

Nematoda and Oligochaeta are known to be tolerant to increases in organic loadings and a threshold for densities of these taxa is that there will be a statistically significant reduction in their densities 5 years post-removal.

With regard to changes in numbers of individuals and numbers of species, it is predicted that post-removal of trestles, this should be reflected in the Effective Species Number (ENS). A threshold for the ENS is that there will be a statistically significant reduction in ENS 5 years post-removal.

Threshold values for a decrease in levels of organic carbon and mean grain size is that there will be a statistically significant reduction in these values 5 years post-removal.

Regarding the access route, it is predicted that numbers of species and numbers of individuals will increase over time. A threshold for densities of taxa is that there will be a statistically significant reduction 5 years post-removal.

References

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Howson, C.M and Picton, B (1997). The Species Directory of the Marine Fauna and Flora of the British Isles and Surrounding Seas. Edition: 2ndPublisher: Belfast: Ulster Museum.

McKindsey, C.W., Archambault, P., Callierc, M.D., Olivier, F. (2011). Influence of suspended and off-bottom mussel culture on the sea bottom and benthic habitats: a review. Canadian Journal of Zoology. 89, 622–646.

Appendix B

Alternative Solutions

Alternative Solutions

Extracted from Compensatory Measures Report (dated April 2019)

2.3.3 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.

2.3.4 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 project's 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.

2.3.5 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[9].

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:

[9] **Additional footnote to original text -** The new harbour will facilitate intermodal transport through the Port and potentially reduce road transport from Dublin/Rosslare to the West

- 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.

Appendix C

Drawings and Figures

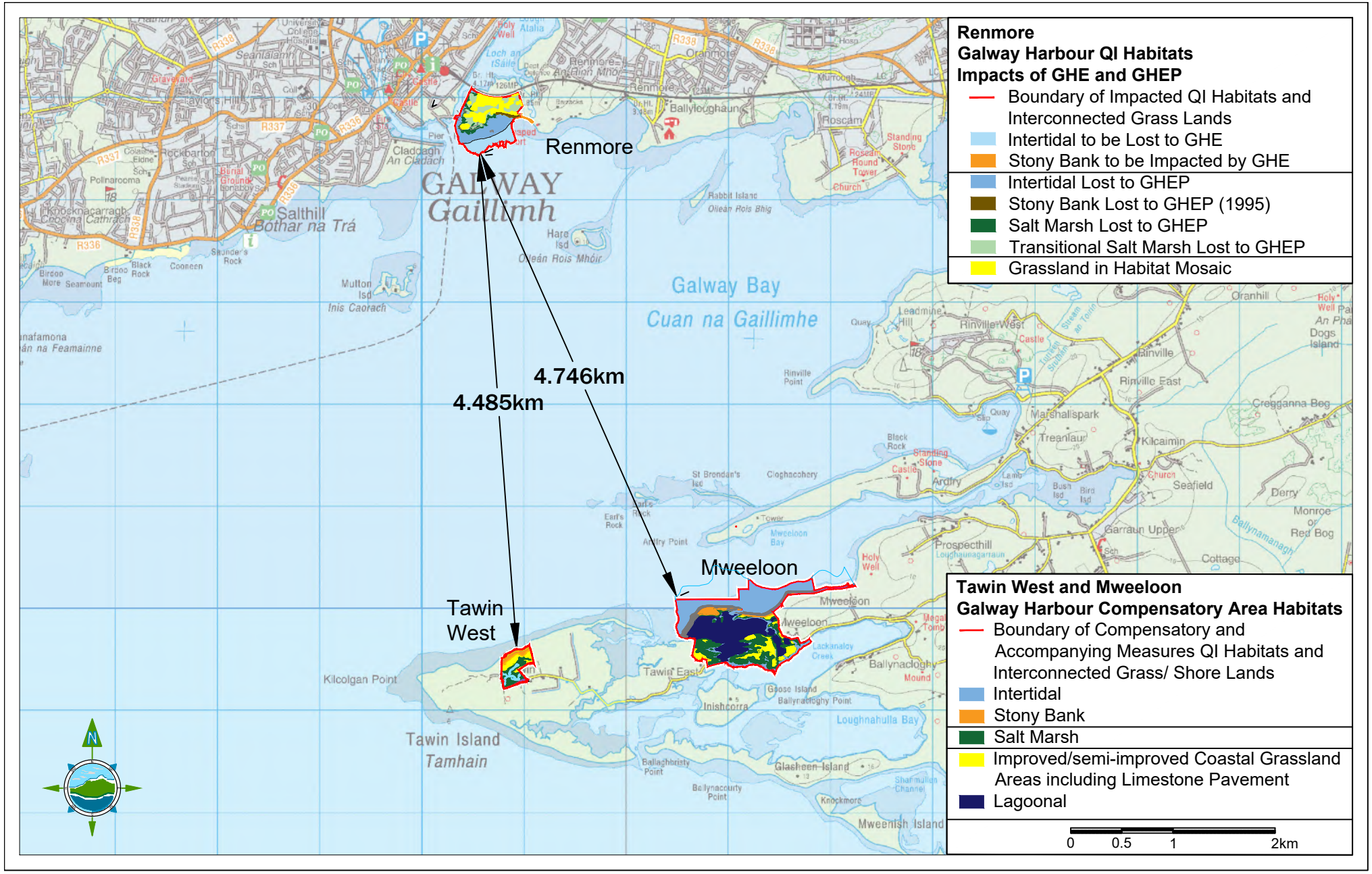


Fig.1 Galway Harbour site at Renmore and Compensatory Sites at Tawin West and Mweeloon.

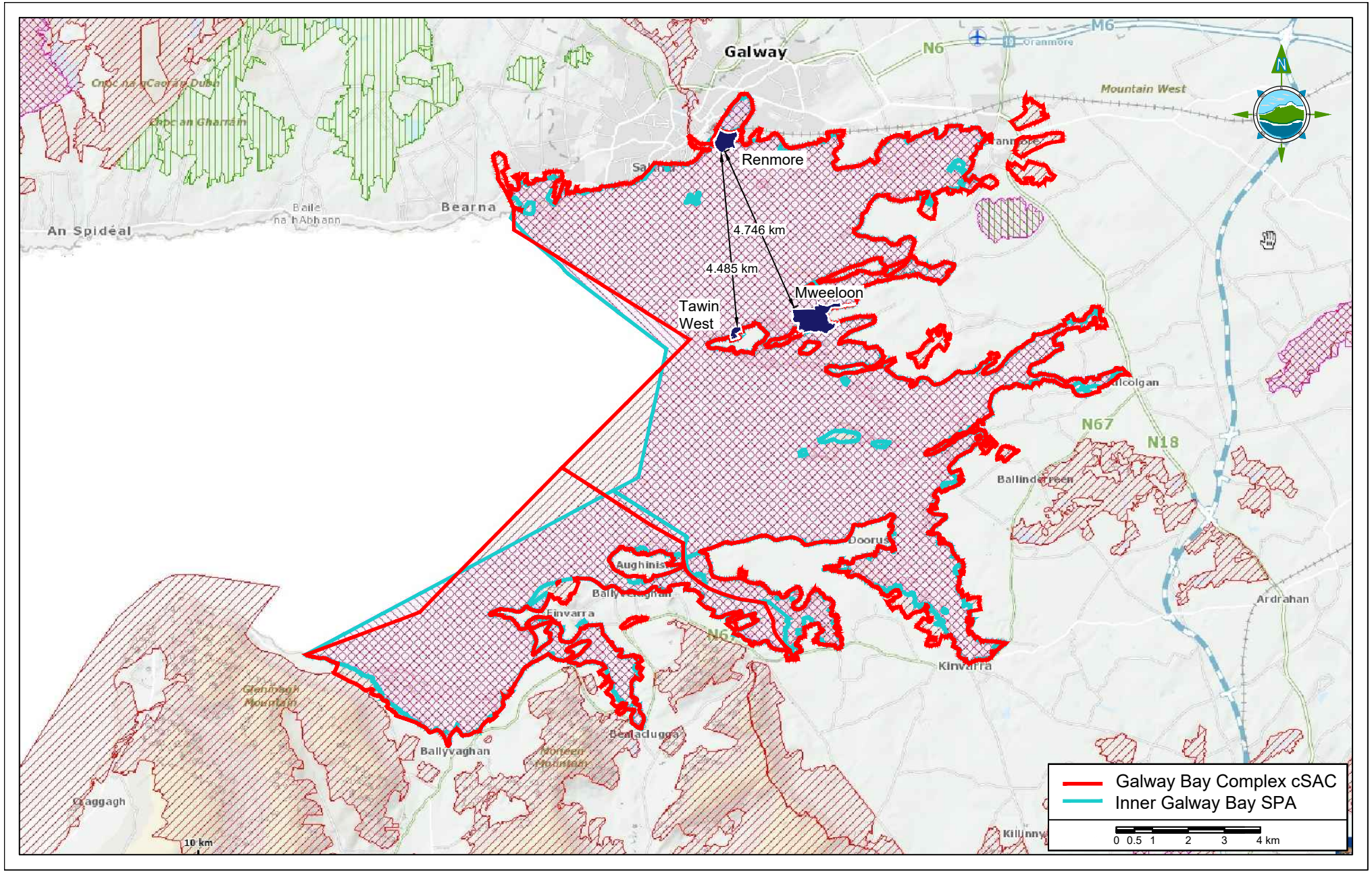


Fig. 2 Galway Bay Complex cSAC 000268 and Inner Galway Bay SPA 004031 Showing the Harbour Site at Renmore and the Compensatory Sites at Tawin West and Mweeloon.

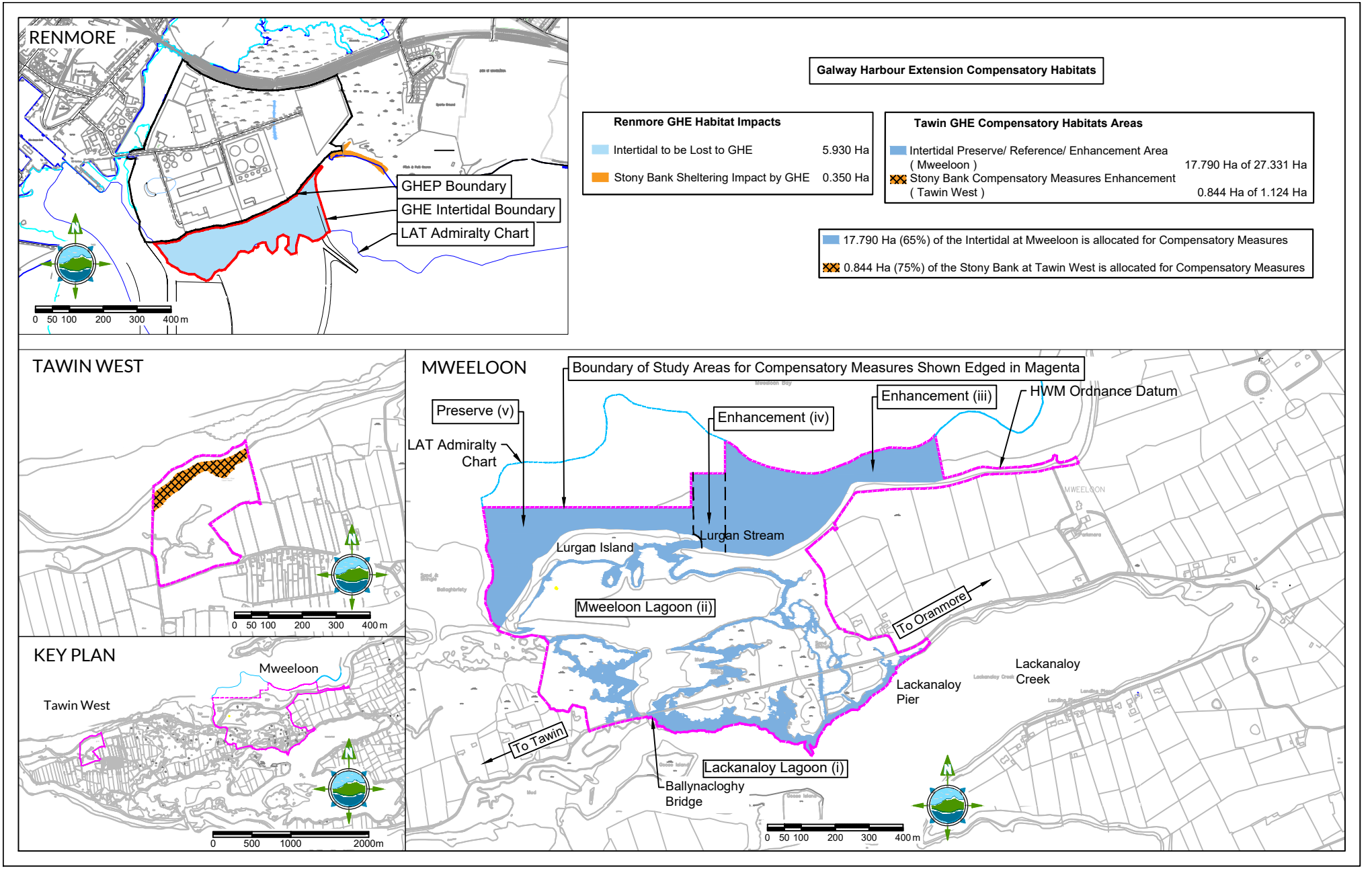


Fig 3. GHE Intertidal and Stony Bank Habitat proposed Impacts at Renmore and Compensatory Areas at Tawin.

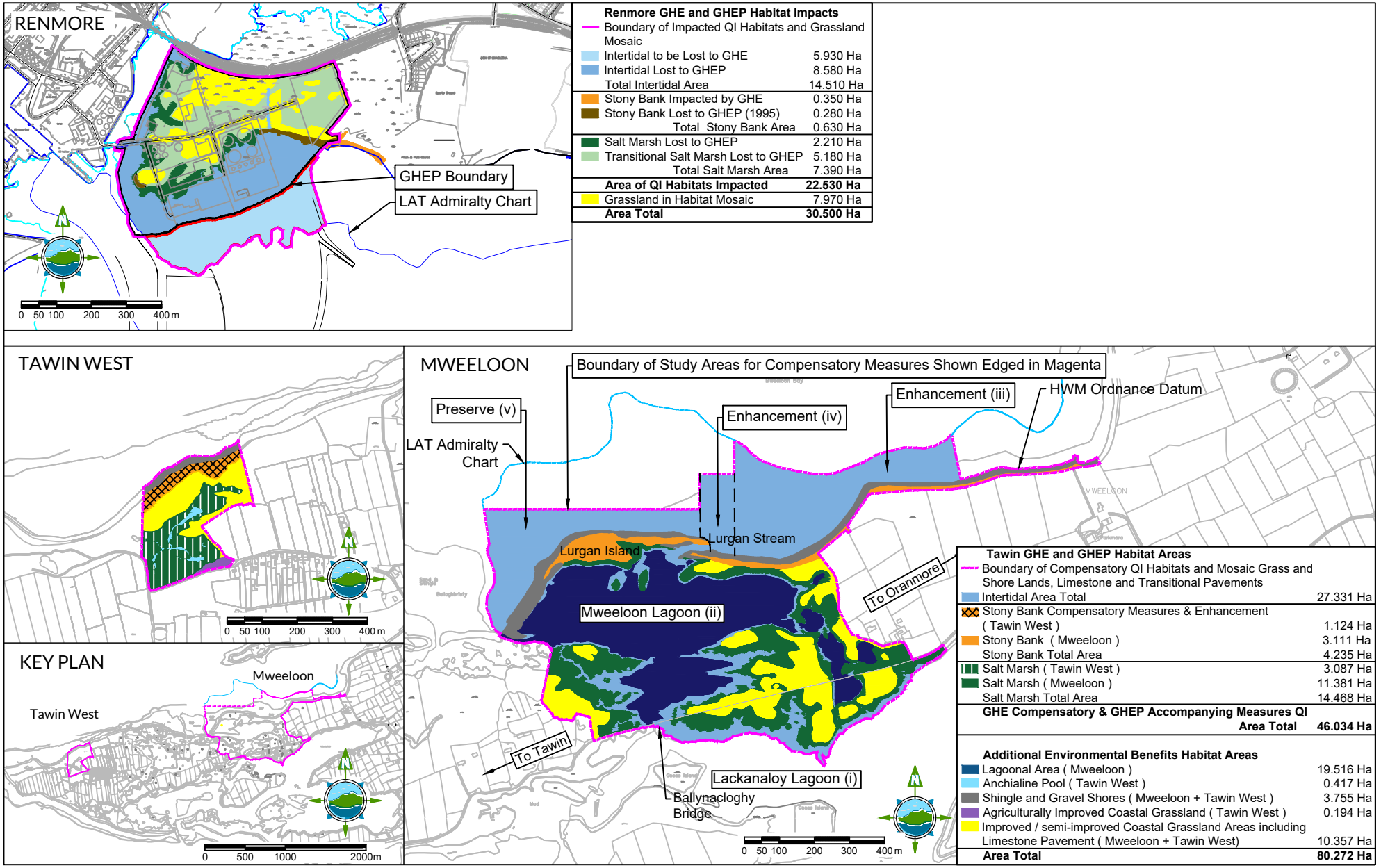


Fig 4. GHE and GHEP Intertidal, Stony Bank and Salt Marsh. Impacts on Habitats at Renmore and Proposed Compensatory Plan Areas at Tawin.

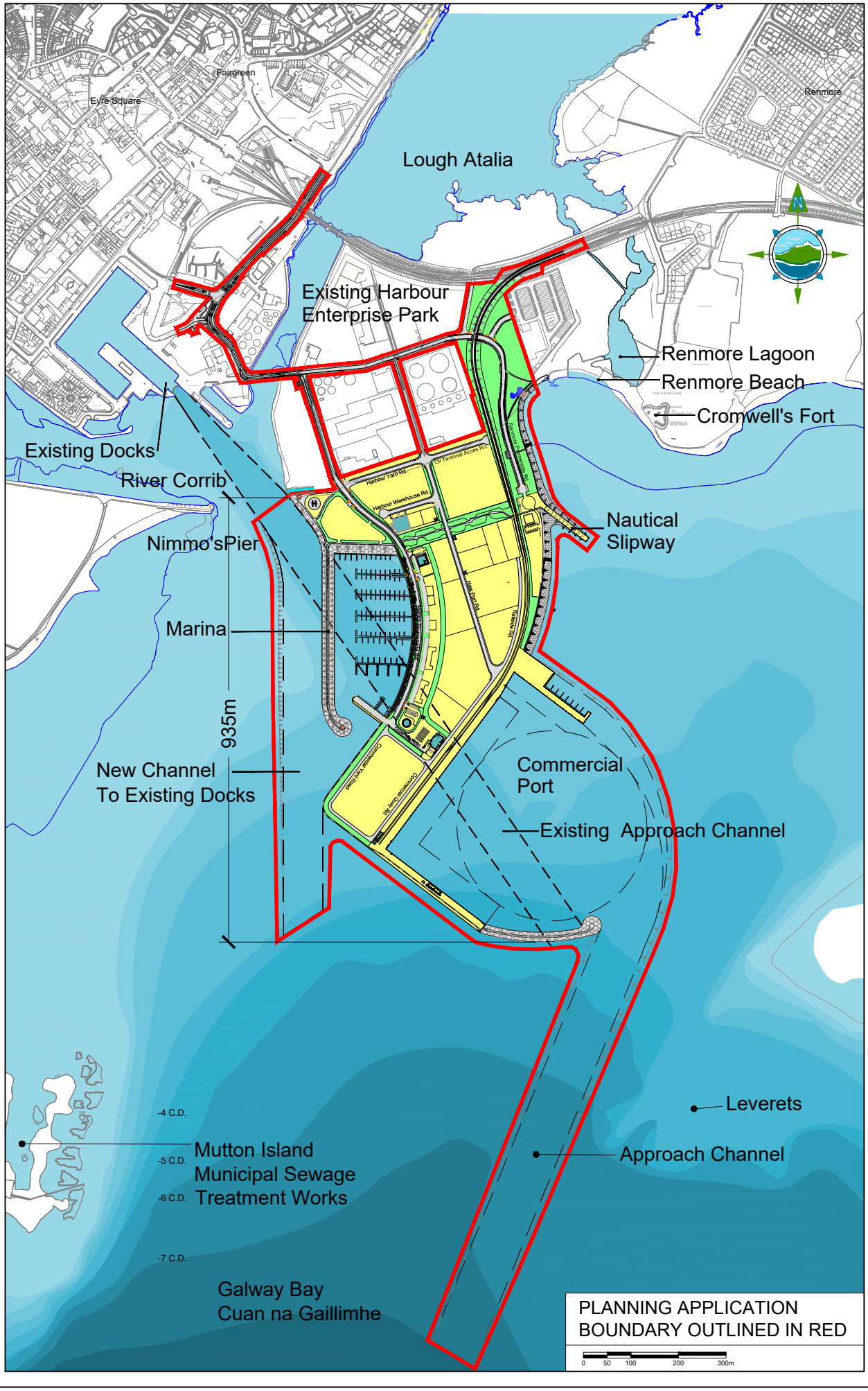


Fig. 5 Planning Application Site Layout.

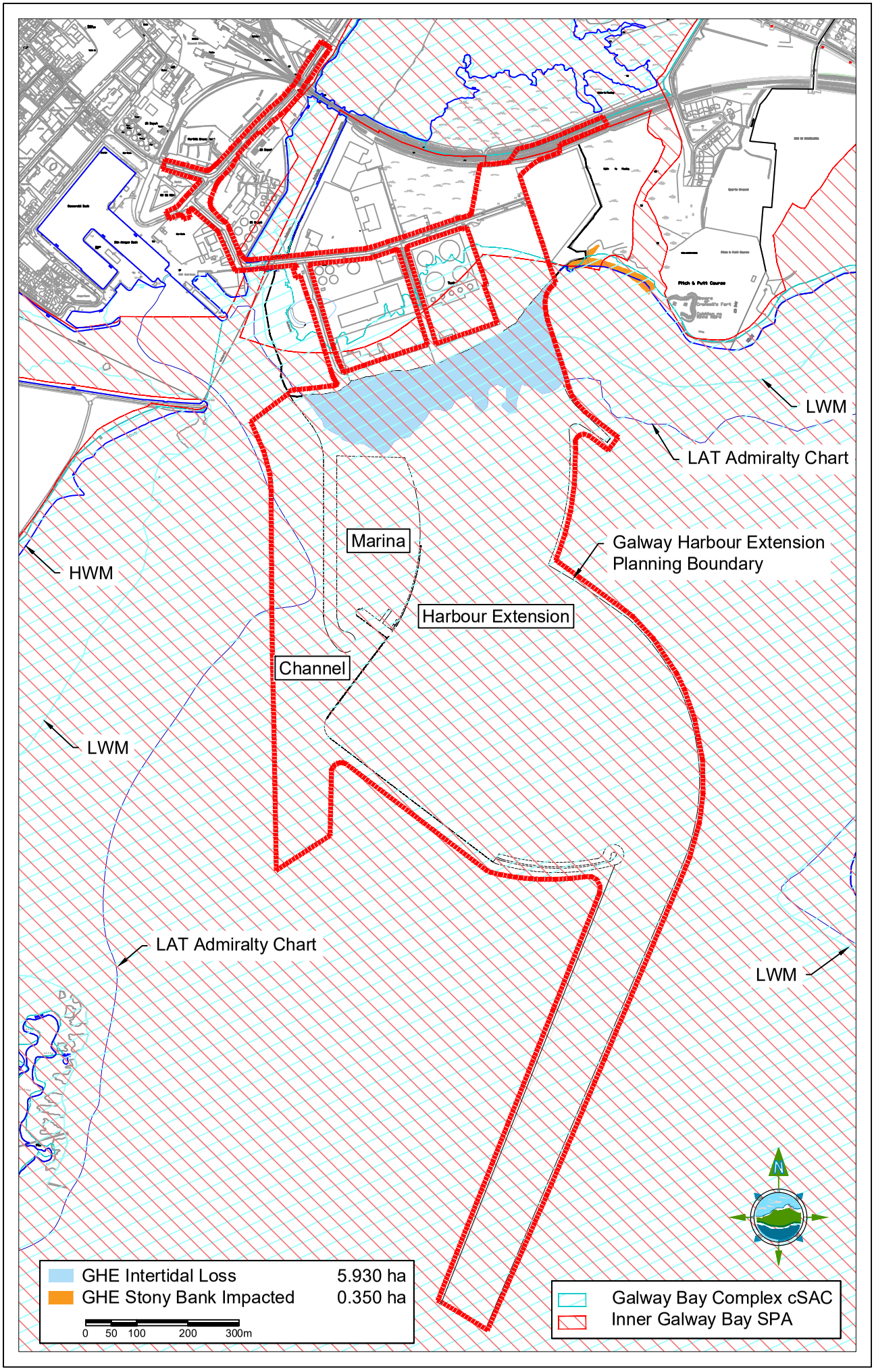


Fig. 6 GHE Habitat Losses.



Fig. 7 Key Plan of Survey Areas, Inner Galway Bay.



Fig. 8 Locations of Tawin Survey Areas "1", "2" and "3"

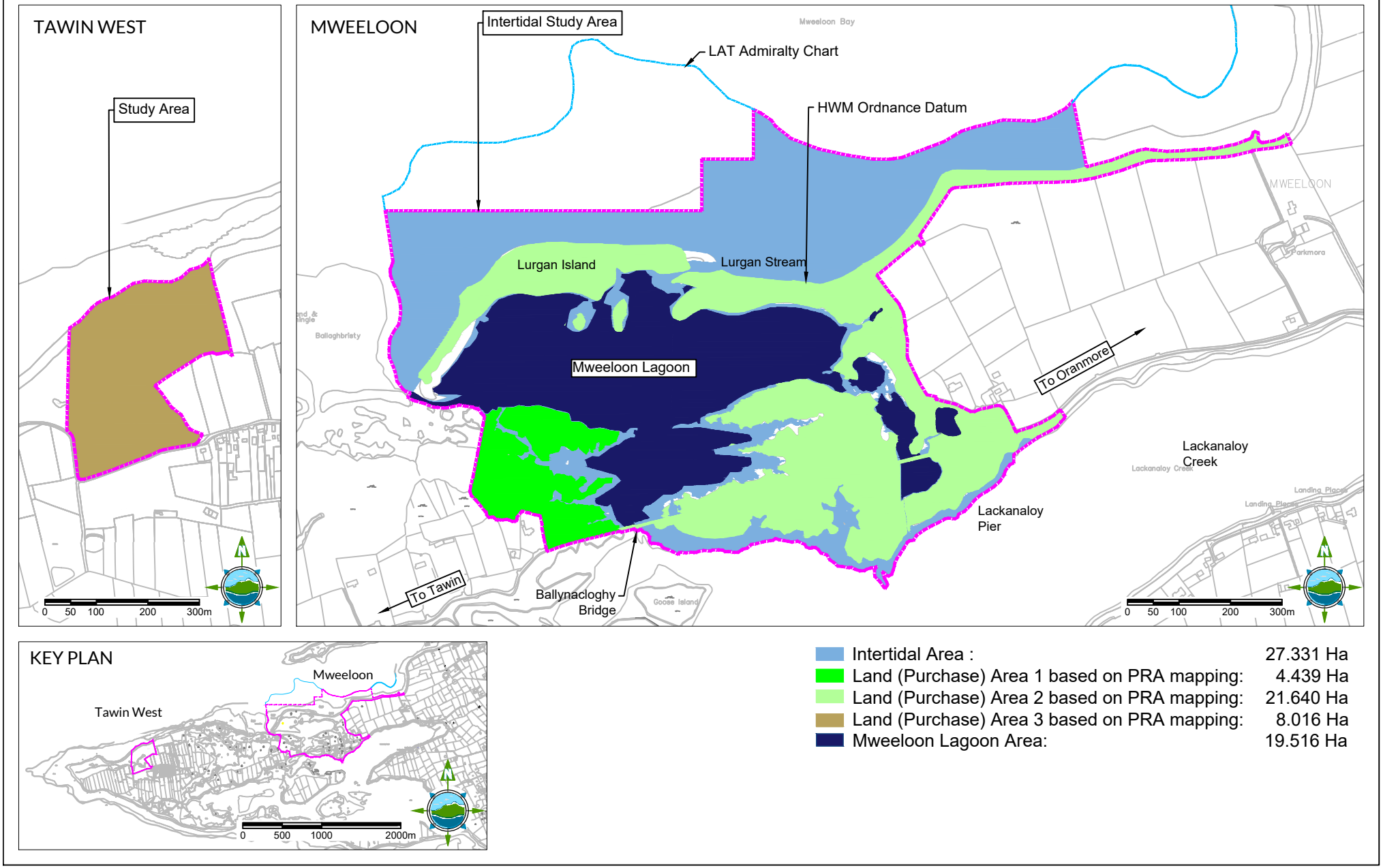


Fig. 9 Areas Identified for Detailed Study.

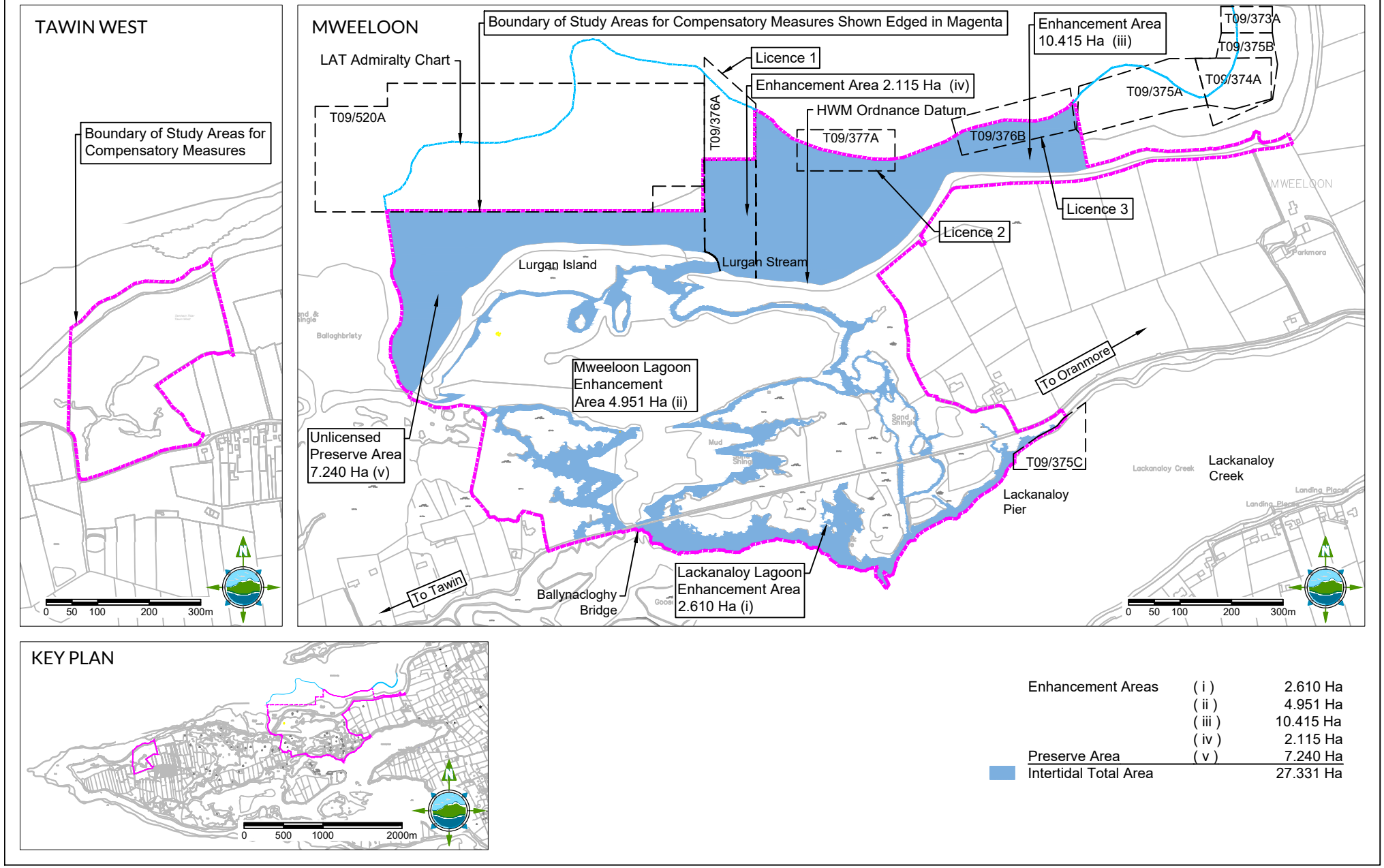
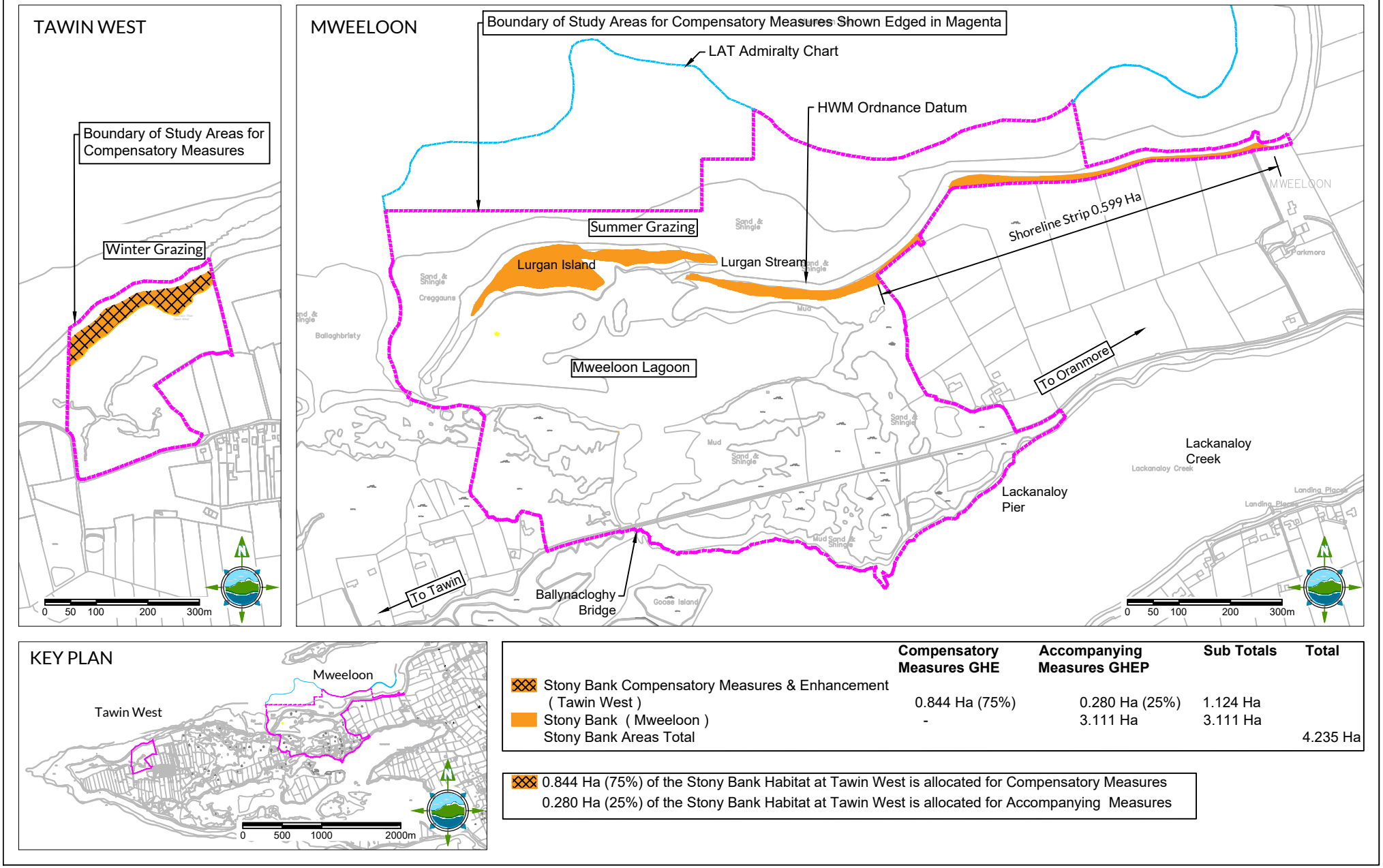


Fig. 10 Intertidal Management Area.



	Compensatory Measures GHE	Accompanying Measures GHEP	Sub Totals	Total
Stony Bank Compensatory Measures & Enhancement (Tawin West)	0.844 Ha (75%)	0.280 Ha (25%)	1.124 Ha	
Stony Bank (Mweeloon)	-	3.111 Ha	3.111 Ha	
Stony Bank Areas Total				4.235 Ha

0.844 Ha (75%) of the Stony Bank Habitat at Tawin West is allocated for Compensatory Measures
0.280 Ha (25%) of the Stony Bank Habitat at Tawin West is allocated for Accompanying Measures

Fig. 11 Stony Bank Management and Reference Areas.

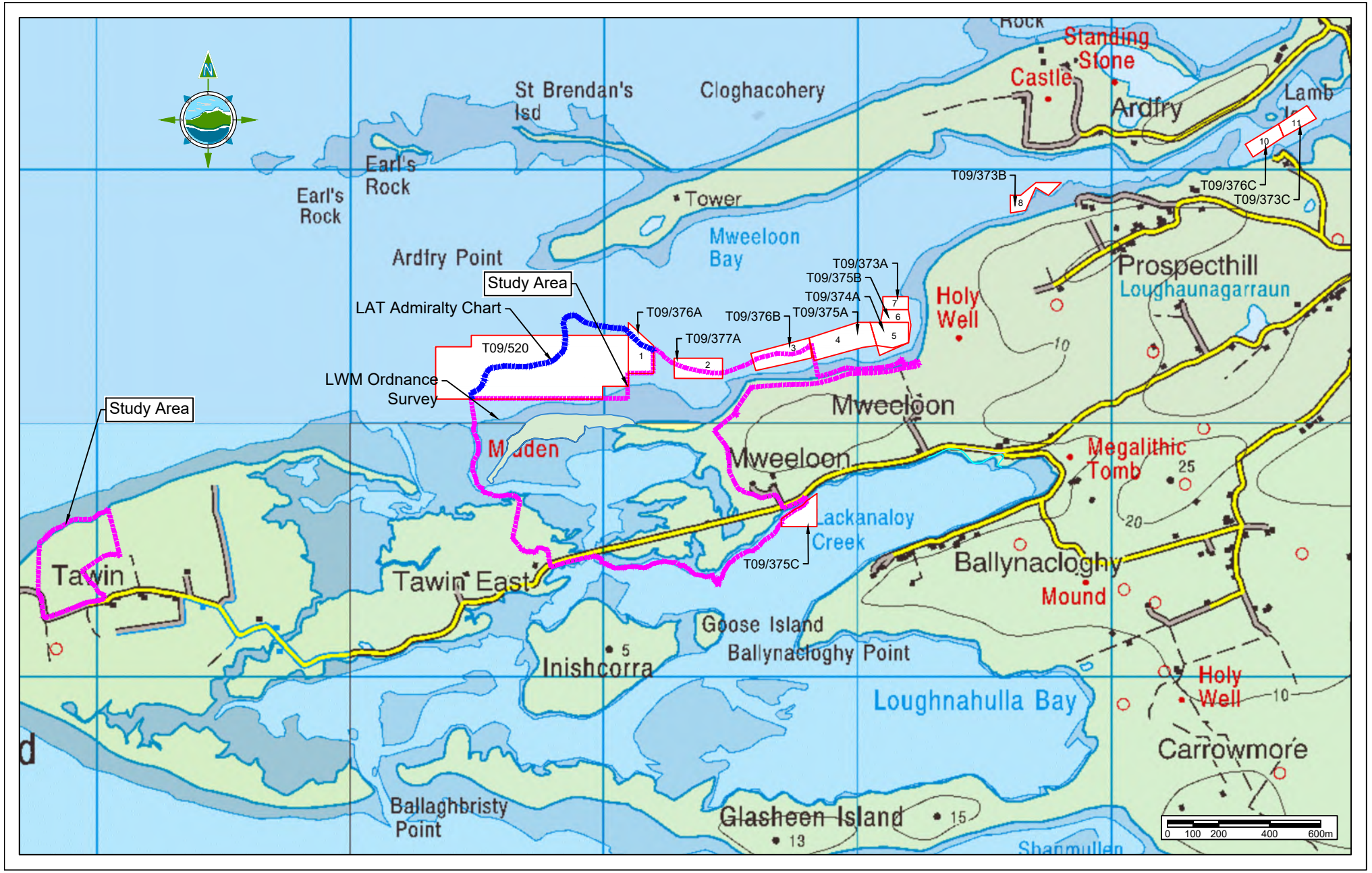
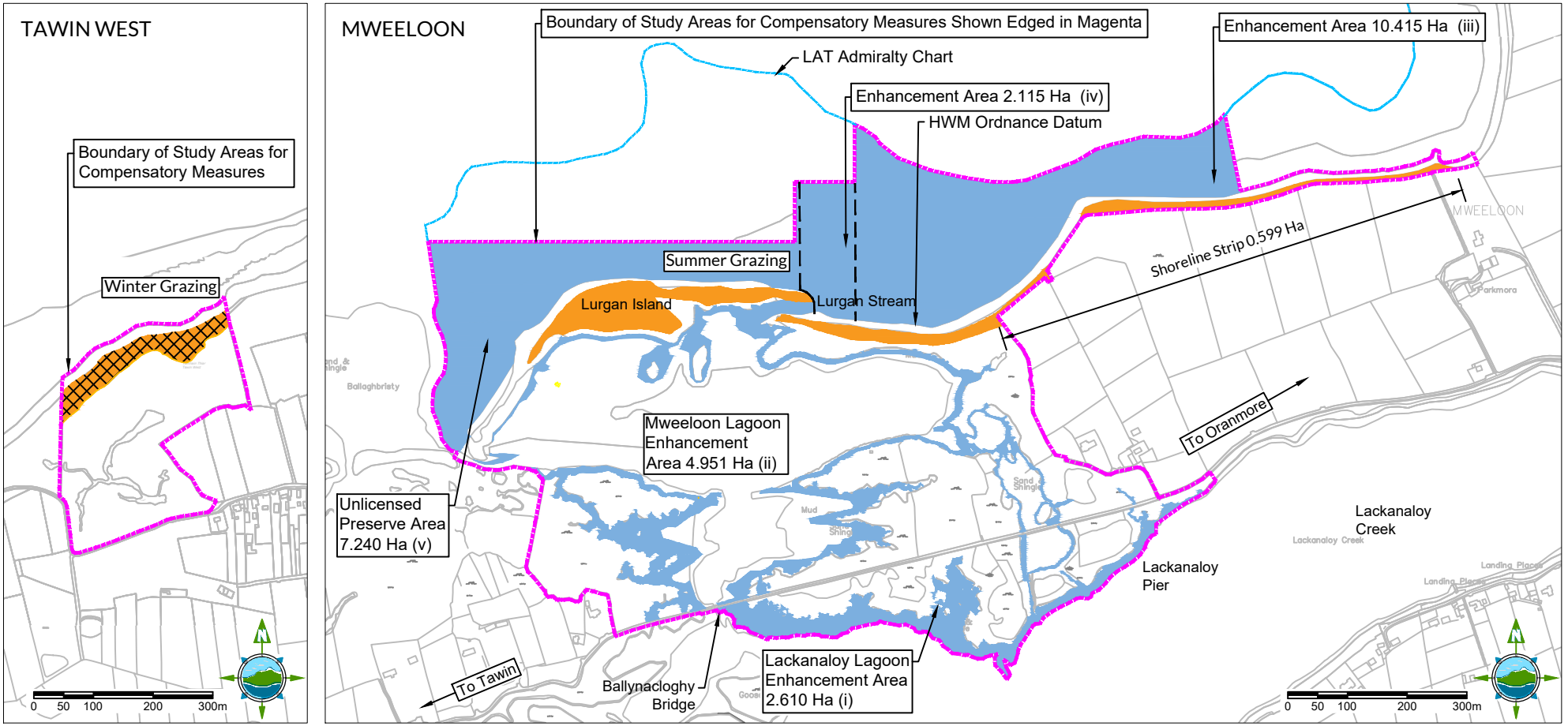
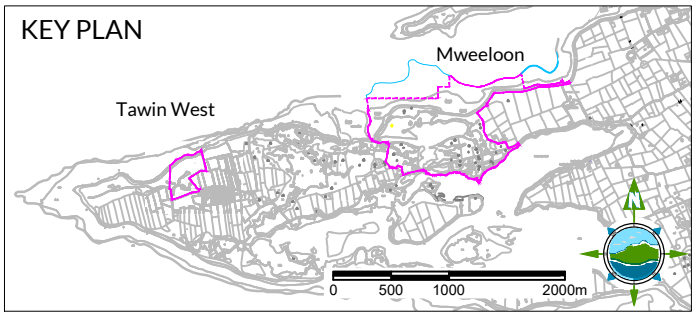


Fig. 12 Aquaculture License Sites in Study Areas.





	Compensatory Measures GHE	Accompanying Measures GHEP	Sub Totals	Total
Intertidal Preserve/ Reference Area (Mweeloon)	17.790 Ha (65%)	9.541 Ha (35%)		27.331 Ha
Stony Bank Compensatory Measures & Enhancement (Tawin West)	0.844 Ha (75%)	0.280 Ha (25%)	1.124 Ha	
Stony Bank (Mweeloon)	-	3.111 Ha	3.111 Ha	
Stony Bank Areas Total				4.235 Ha

- 17.790 Ha (65%) of the Intertidal Habitat at Mweeloon is allocated for Compensatory Measures
- 9.541 Ha (35%) of the Intertidal Habitat at Mweeloon is allocated for Accompanying Measures
- 0.844 Ha (75%) of the Stony Bank Habitat at Tawin West is allocated for Compensatory Measures
- 0.280 Ha (25%) of the Stony Bank Habitat at Tawin West is allocated for Accompanying Measures

Fig. 13 Extent of Intertidal Habitat & Stony Bank Habitat within the Study Area.

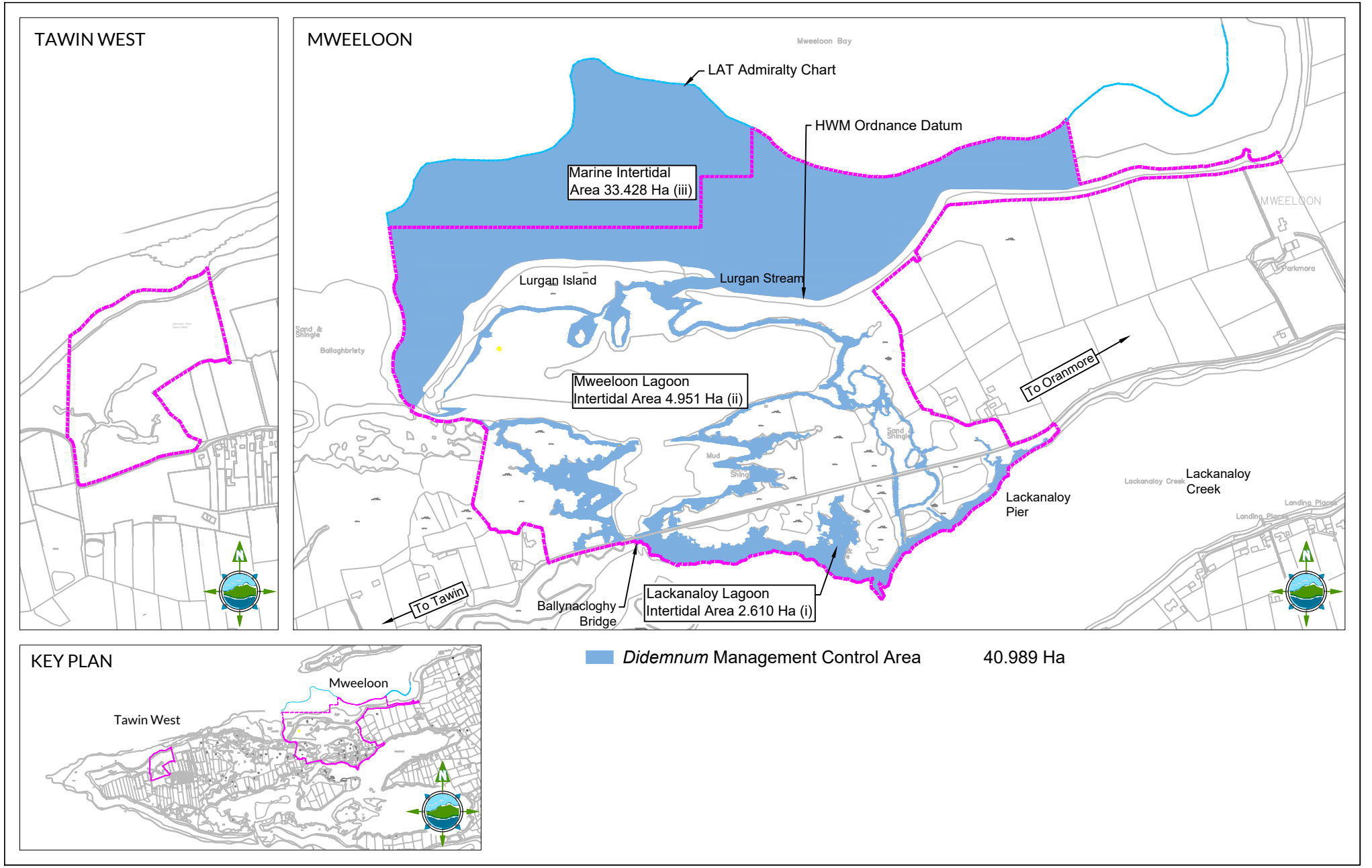


Fig. 14 *Didemnum* Management Control Area.

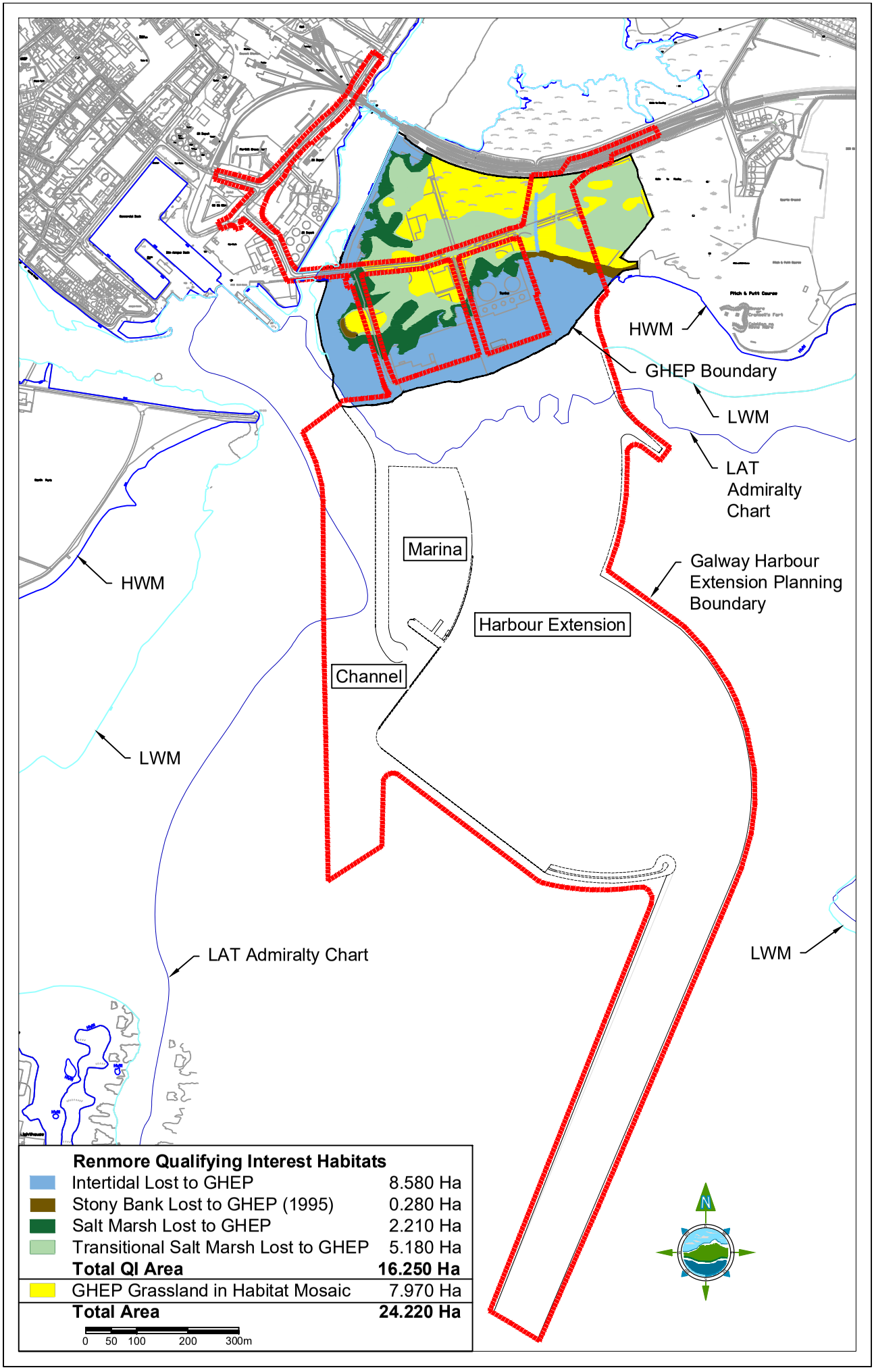
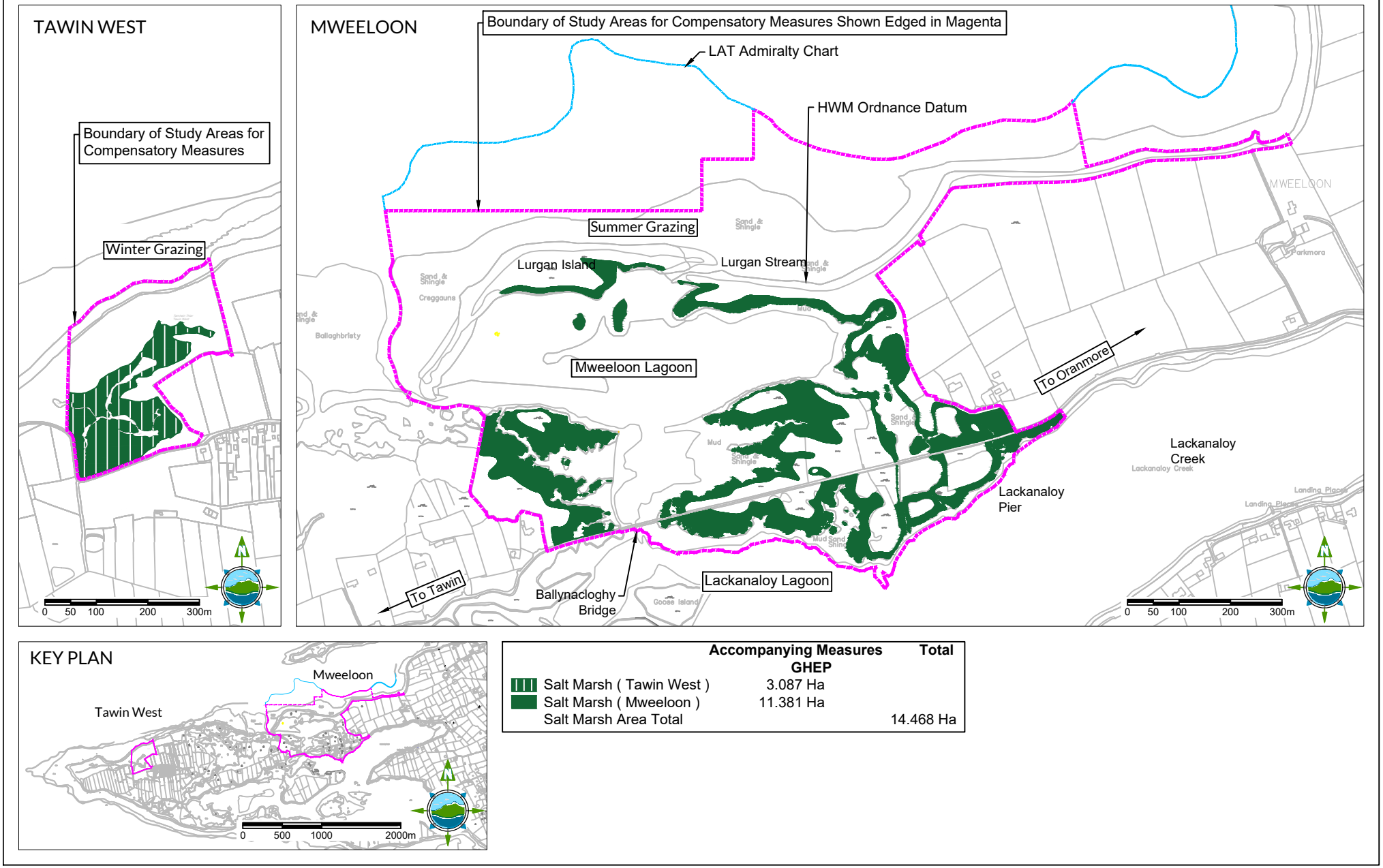
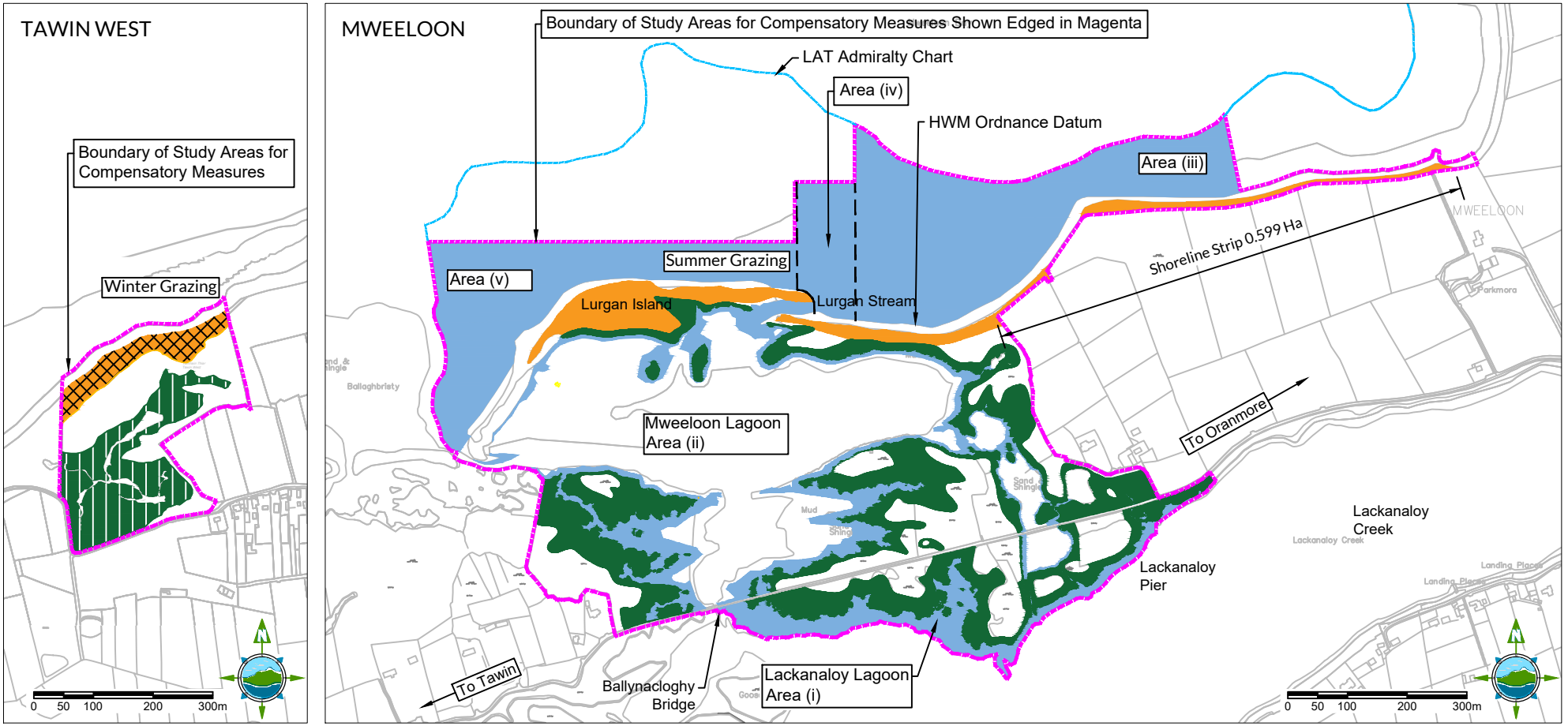


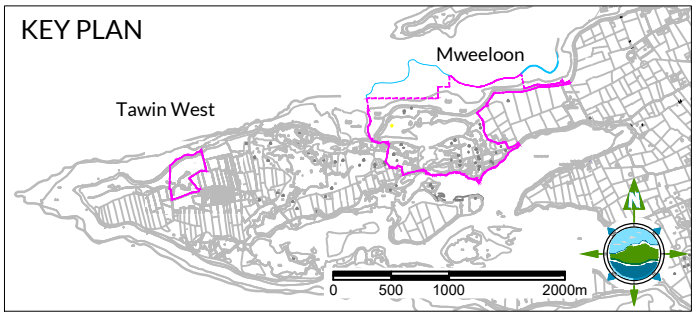
Fig. 15 Habitats to be Lost or Impacted by GHE and Previously Lost to GHEP.



	Accompanying Measures GHEP	Total
Salt Marsh (Tawin West)	3.087 Ha	
Salt Marsh (Mweeloon)	11.381 Ha	
Salt Marsh Area Total		14.468 Ha

Fig. 16 Salt Marsh Accompanying Measures Areas.





Tawin Qualifying Interest Habitats for GHE and GHEP	Compensatory Measures GHE	Accompanying Measures GHEP	SubTotals	Total
Intertidal Preserve/ Reference Area (Mweeloon)	17.790 Ha (65%)	9.541 Ha	27.331 Ha	
Stony Bank Compensatory Measures & Enhancement (Tawin West)	0.844 Ha (75%)	0.280 Ha	1.124 Ha	
Stony Bank (Mweeloon)	-	3.111 Ha	3.111 Ha	
Stony Bank Areas Total				4.235 Ha
Salt Marsh (Tawin West)	-	3.087 Ha	3.087 Ha	
Salt Marsh (Mweeloon)	-	11.381 Ha	11.381 Ha	
Salt Marsh Area Total				14.468 Ha
Total Area of 3 Replacement QI Habitats	**18.634 Ha**	**27.400 Ha**		**46.034 Ha**

Fig. 17 Combined Intertidal, Stony Bank and Salt Marsh Areas within the Study Areas.

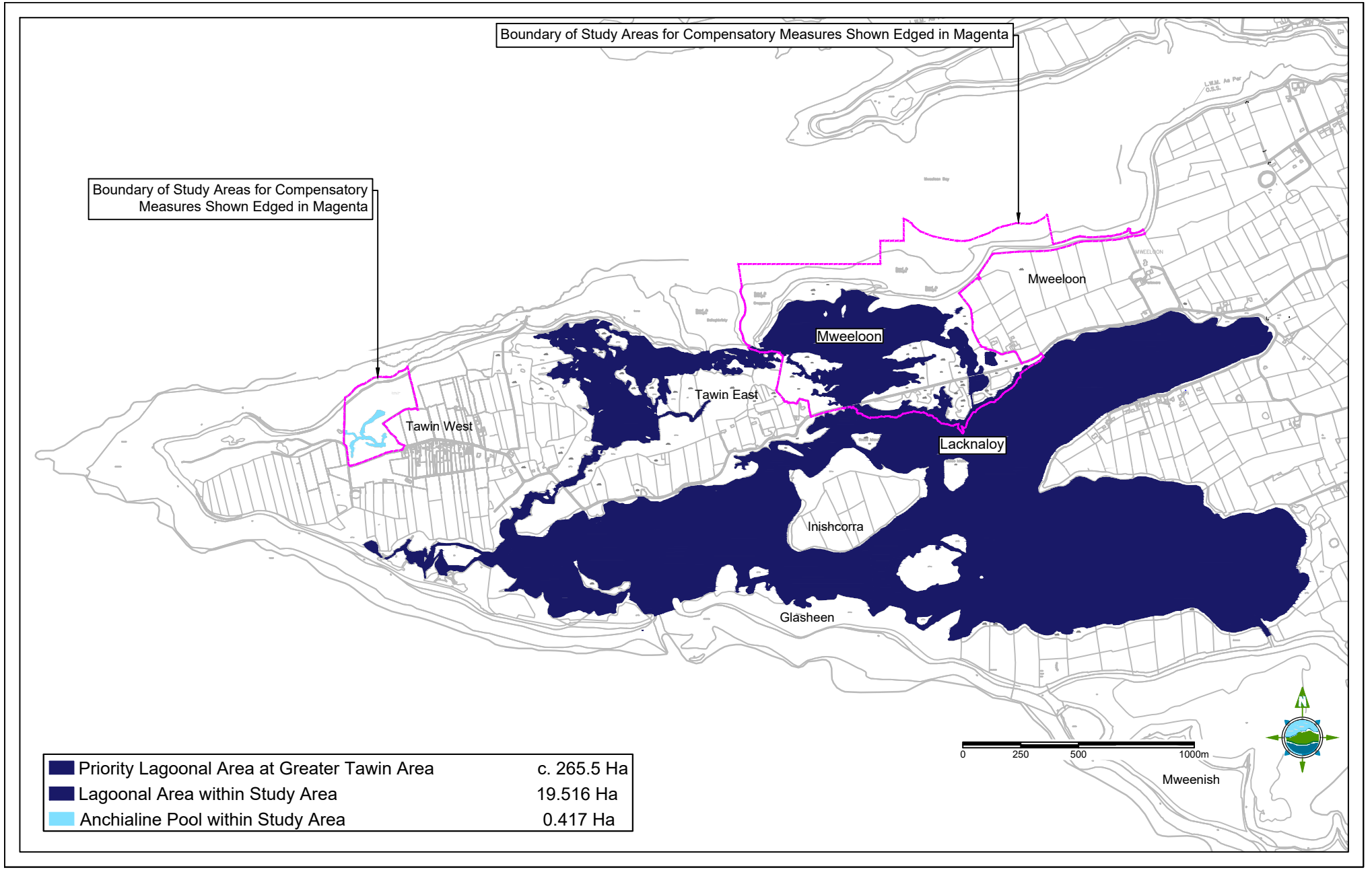
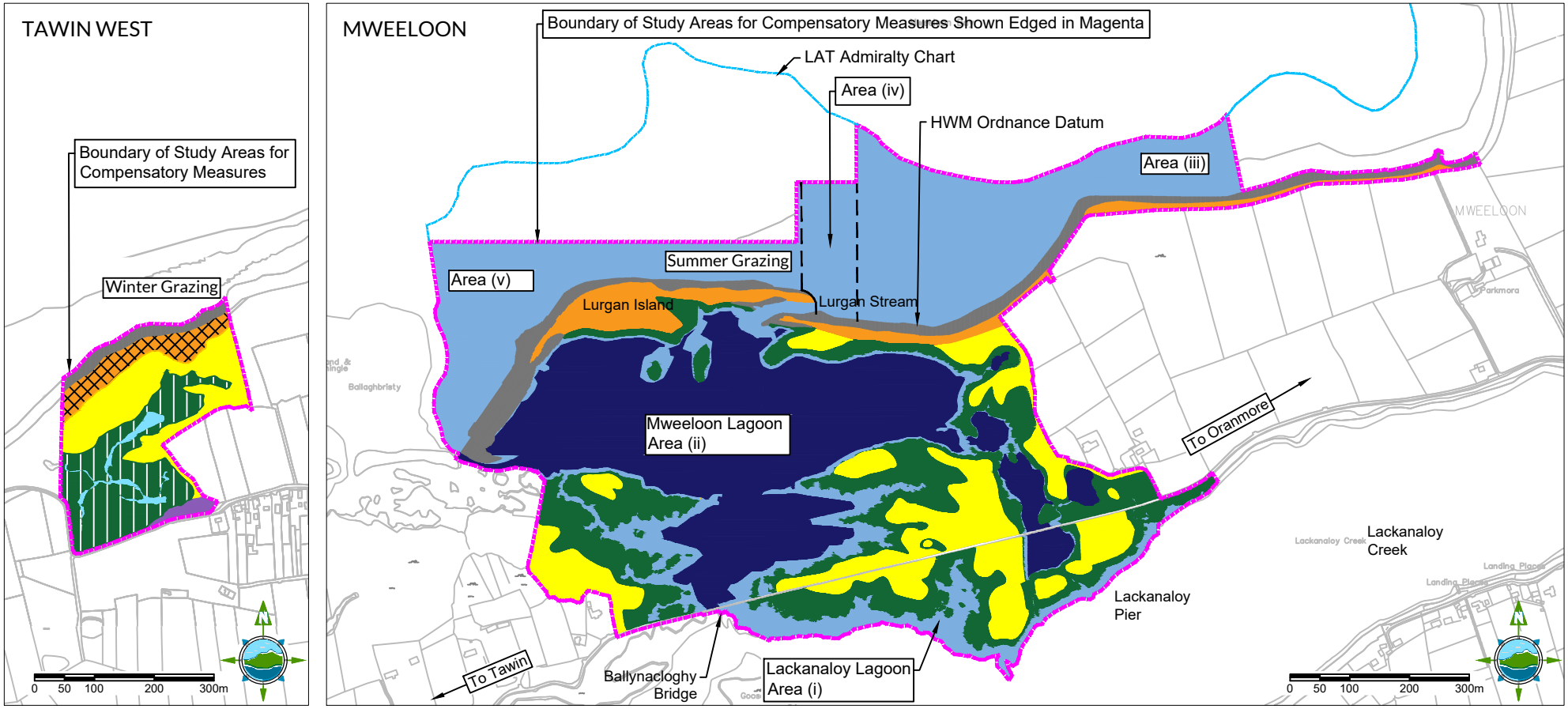
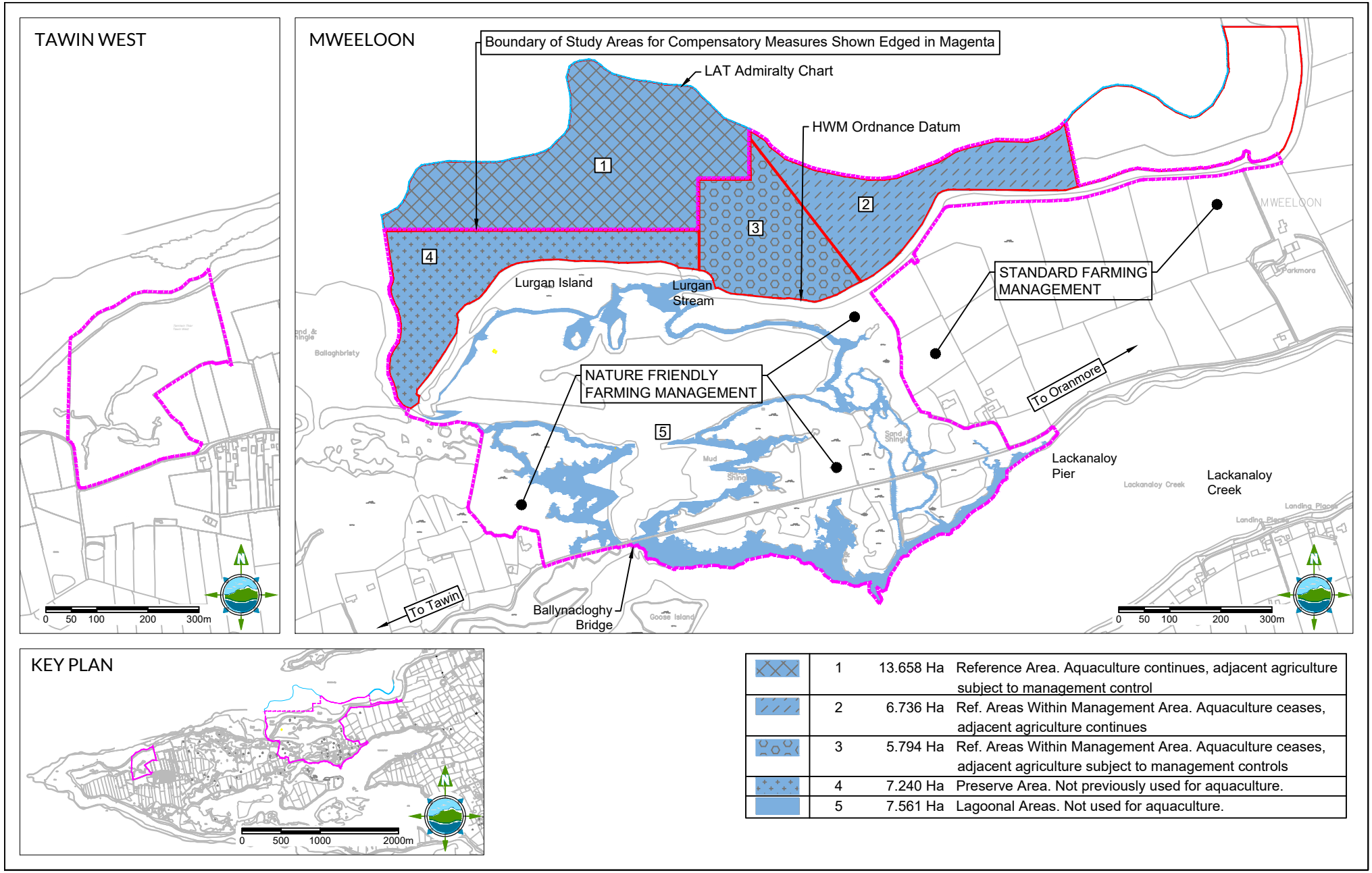


Fig. 18 Extent of Priority Habitat Lagoonal Areas and Anchialine Pool within the Study Areas and the Greater Tawin Area.



	Compensatory Measures GHE	Accompanying Measures GHEP	Additional Environmental Benefits	Total
Intertidal Preserve/Reference Area (Mweeloon)	17.790 Ha	9.541 Ha	-	27.331 Ha
Vegetated Stony Bank Area (Tawin West 1.124 Ha)	0.844 Ha	0.280 Ha	-	
Vegetated Stony Bank Area (Mweeloon)	-	3.111 Ha	-	
Vegetated Stony Bank Area Total				4.235 Ha
Salt Marsh (Tawin West)	-	3.087 Ha		
Salt Marsh (Mweeloon)	-	11.381 Ha		
Salt Marsh Area Total				14.468 Ha
Lagoonal Area (Mweeloon)	-		19.516 Ha	19.516 Ha
Anchialine Pool (Tawin West)			0.417 Ha	0.417 Ha
Shingle and Gravel Shores (Tawin West + Mweeloon)	-	-	3.755 Ha	3.755 Ha
Agriculturally improved coastal grassland (Tawin West)	-	-	0.193 Ha	0.193 Ha
Improved/semi-improved Coastal Grassland Areas incl. Limestone Pavement (Tawin West + Mweeloon)	-	-	10.357 Ha	10.357 Ha
Total Area	**18.634 Ha**	**27.400 Ha**	**34.238 Ha**	**80.272 Ha**

Fig.19. Intertidal, Stony Bank, Salt Marsh, Lagoonal Areas, Anchialine Pool, Improved/semi-improved Coastal Grassland Areas including Limestone Pavement, Grass and Shore Lands within the Compensatory Areas.



	1	13.658 Ha	Reference Area. Aquaculture continues, adjacent agriculture subject to management control
	2	6.736 Ha	Ref. Areas Within Management Area. Aquaculture ceases, adjacent agriculture continues
	3	5.794 Ha	Ref. Areas Within Management Area. Aquaculture ceases, adjacent agriculture subject to management controls
	4	7.240 Ha	Preserve Area. Not previously used for aquaculture.
	5	7.561 Ha	Lagoonal Areas. Not used for aquaculture.

Fig. 20 Intertidal Reference Areas.

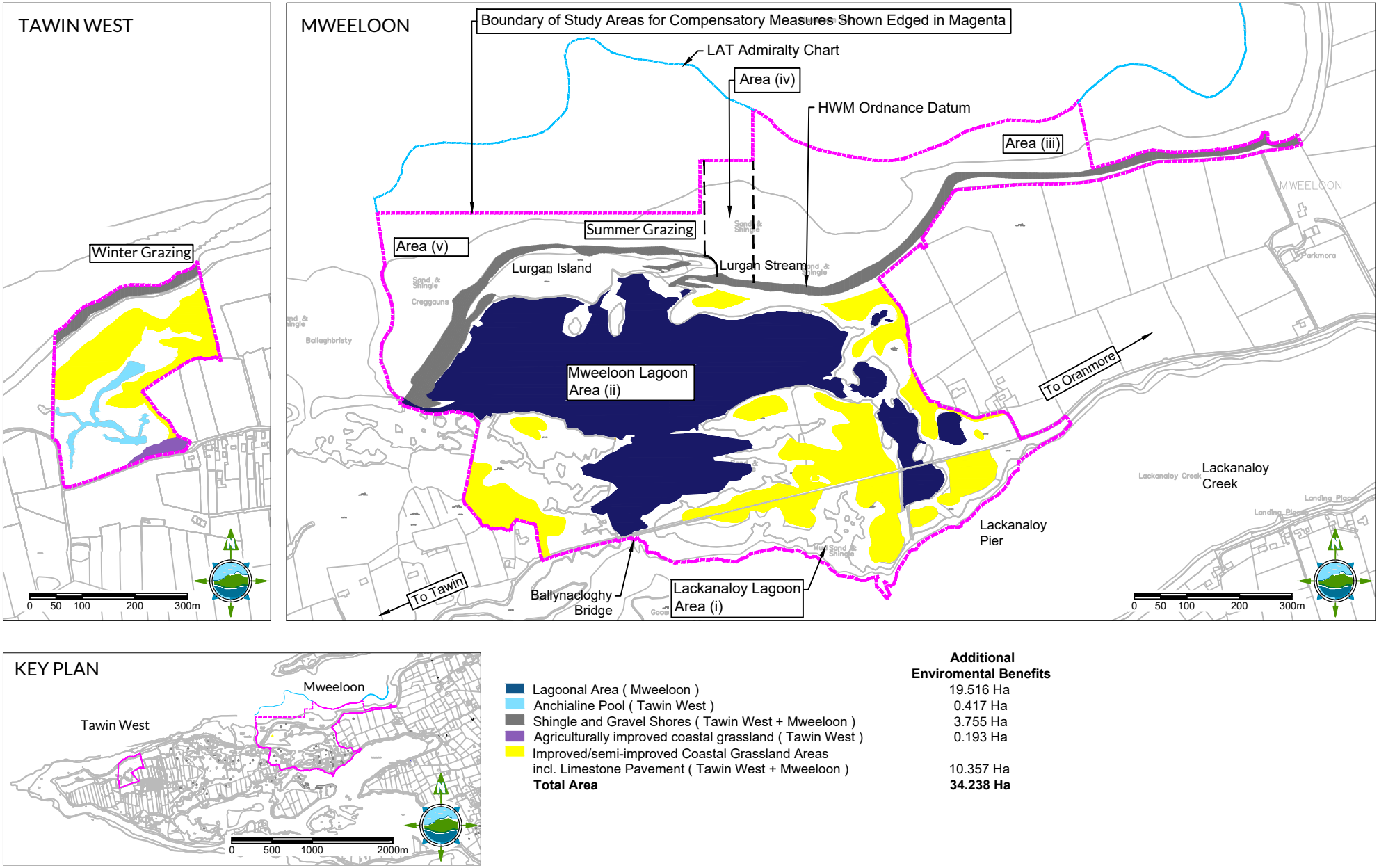


Fig. 21 Additional Environmental Benefits - Habitat Areas.

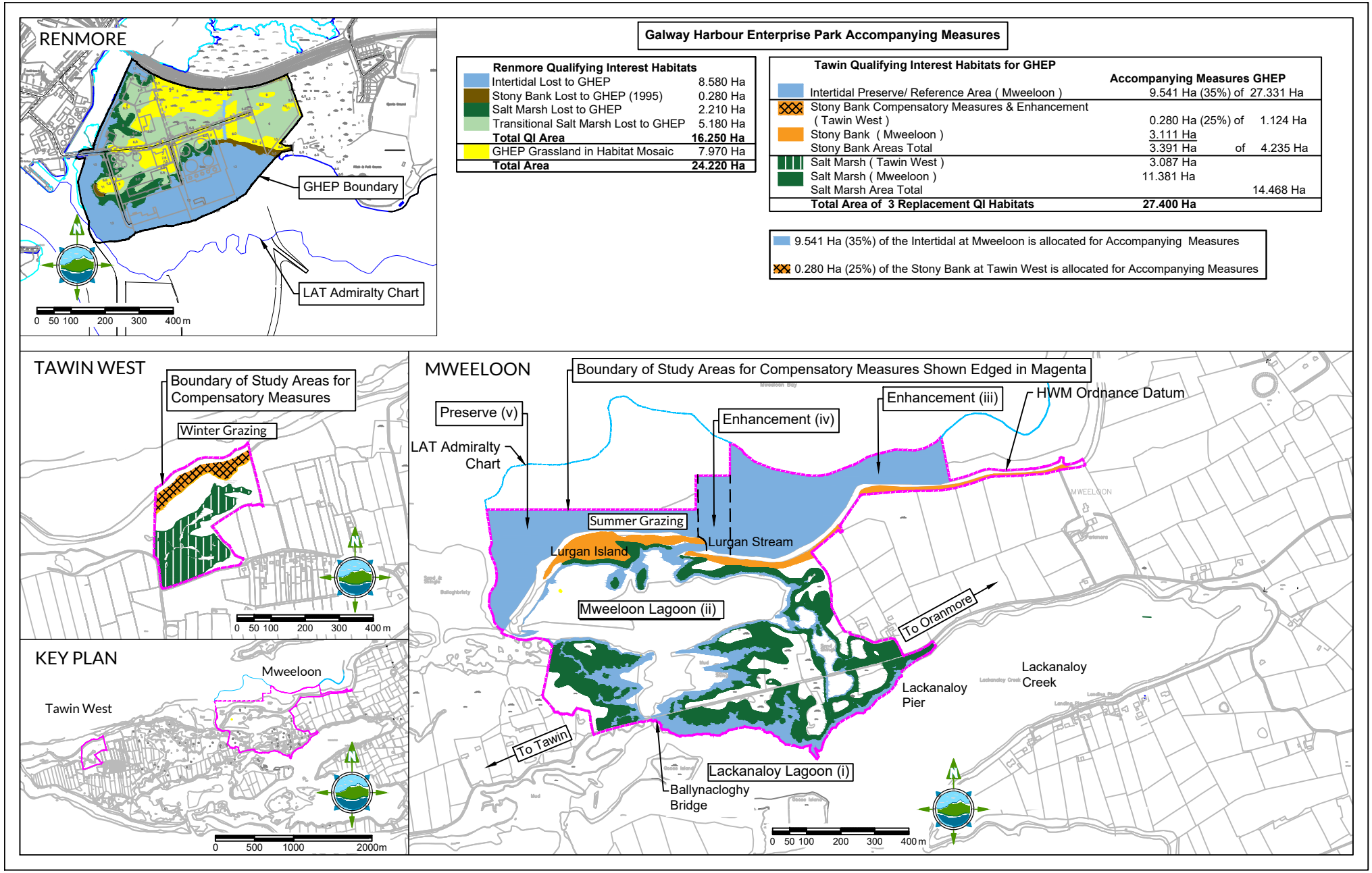


Fig. 22 GHEP Intertidal , Stony Bank and Salt Marsh historic impacts at Renmore and Accompanying Measures at Tawin.

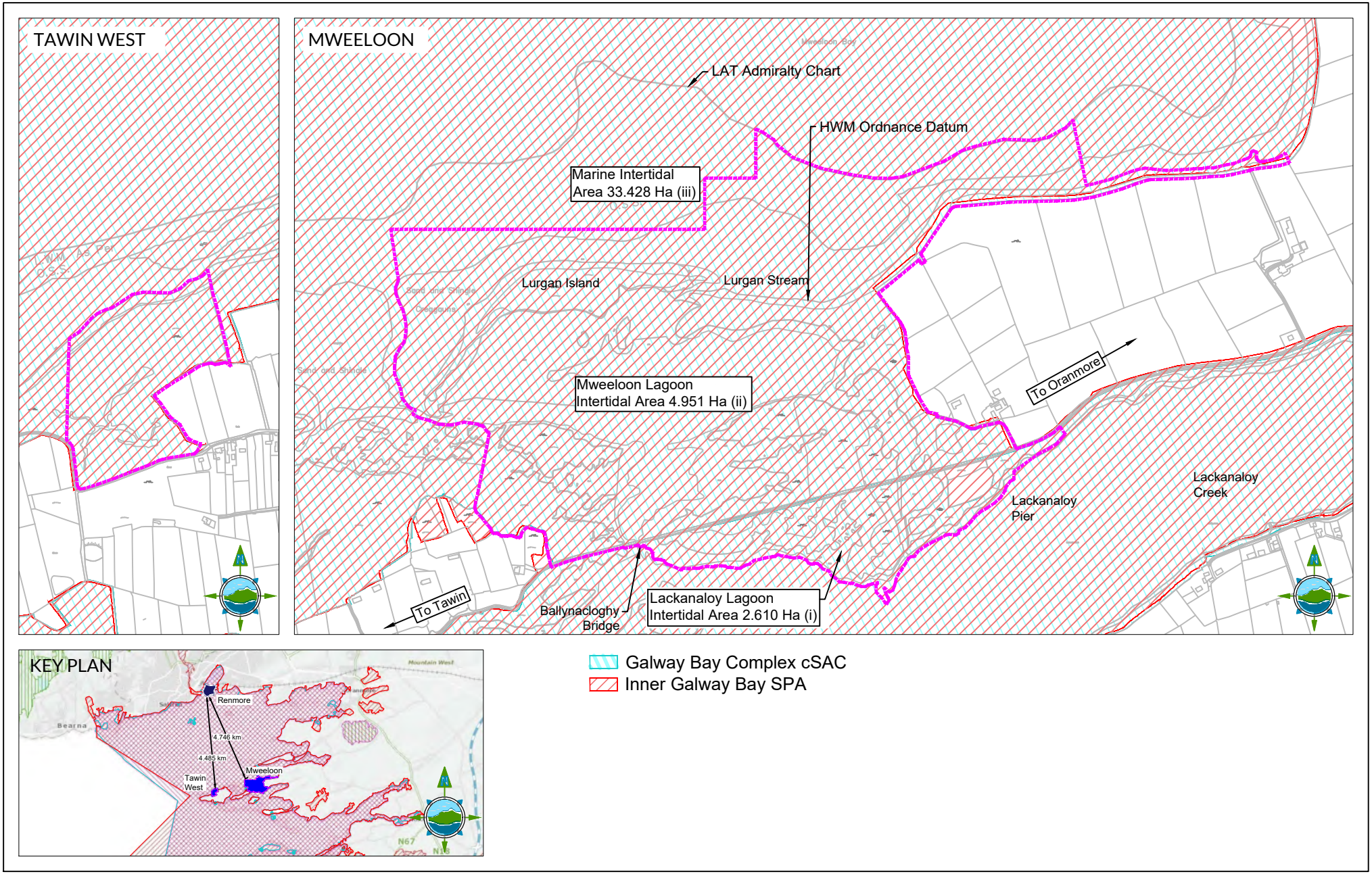


Fig. 23 Galway Bay Complex cSAC000268 and Inner Galway SPA 004031 Showing the Harbour and the Compensatory Sites at Tawin West and Mweeloon.

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