

**Appendix 11:
Atlantic Marine Energy Test Site
Landscape and Visual Impact Assessment**



Atlantic Marine Energy Test Site Landscape and Visual Impact Assessment

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Landscape and Visual Impact Assessment – Atlantic Marine Test Site

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1 BASIS OF LANDSCAPE AND VISUAL IMPACT ASSESSMENT

1.1 Introduction

This report assesses the potential landscape and visual impacts associated with the construction, operation and decommissioning of a proposed Atlantic Marine Energy Test Site (AMETS) at Annagh, Co. Mayo.

1.2 Methodology

The Methodology of this assessment is based on Best Practice as described in the Guidelines listed in section 1.2.1. The landscape and visual assessment defines the landscape and viewer sensitivity within the study area, the magnitude of change and resulting significance of the visual impacts and impacts on landscape character.

Firstly, a **desk based review** was carried out to ascertain an appropriate study area and to identify potential landscape and visual impacts. This included;

- Review of the preliminary and detailed design drawings of the onshore substation and offshore energy converter plant including all ancillary structures;
- Preparation of a Zone of Theoretical Visibility map for the substation; and;
- Assessment of available maps and local plans to identify relevant policies, designations and existing landscape characterisation within the specified study area.

Fieldwork was then carried out in order to assess and appraise the landscape and seascape character of the area. In the absence of a National Seascape Assessment, local seascape character units were identified and are indicated on Figure 3 (Appendix A). While the Mayo Landscape Appraisal was referenced for existing work on landscape character in the area, fieldwork identified smaller scale local landscape character.

Appropriate viewpoint locations, representative of different types of visual receptors, were identified. This stage of the assessment culminated in the delineation of an appropriate study area which was determined by an assessment of the potential visibility of the structures in terms of distance and topography.

A site survey identified the potential visibility of the proposals, taking into account screening vegetation, topography or other localised factors.

A number of photomontages were prepared (Photomontages 1-4, Appendix B) to illustrate potential impact on sensitive receptors and a series of maps (Figures 1-3, Appendix A) were prepared to indicate where visibility of the proposals would occur.

1.2.1 Guidance Documents

The following guidelines and documents have determined the methodology, terminology and assessment approach used within this chapter.

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- “Advice Notes on Current Practice in the preparation of EIS” 2003, Environmental Protection Agency, Republic of Ireland;
 - “Guidelines for Landscape and Visual Assessment”, Second Edition (2002), edited by The Landscape Institute and Institute of Environmental Management and Assessment;
 - “Photography and Photomontage in Landscape and Visual Impact Assessment”, Landscape Institute, Advice Note 01/11, March 2011
 - “Landscape and Landscape Assessment; Consultation Draft of Guidelines for Planning Authorities”, (2000), DoEHLG;
 - “Guidance on the Assessment of the Impact of Offshore Wind Farms; Seascape and Visual Impact Report”, DTI in association with the Countryside Agency, the Countryside Council for Wales and Scottish Natural Heritage, November 2005
 - “Guide to Best Practice in Seascape Assessment”, the Countryside Council for Wales, Brady Shipman Martin and UCD, 2001
 - Mayo Landscape Appraisal, CAAS Ltd for Mayo County Council;
 - Mayo County Development Plan, 2008-2014

1.2.2 Definition of Study Area

The definition of the study area was based on an assessment of the potential visibility of the structures in terms of distance and topography. It emerged from a combination of ZTV map and site assessment.

The study area for the proposed substation and on land cable works has a radius of 3km and the study area for the wave energy converters and associated infrastructure has a radius of 25km. This reflects the potential high clarity of visibility that can occur when looking over the sea during exceptional weather conditions, especially in a northwards direction when the sun is at a low angle from behind.

1.2.3 Definition of Terms – Landscape and Visual Effects

Landscape effects are defined as the result of physical changes to the fabric of the landscape or seascape resulting from new development. Such physical changes may include the addition, alteration or removal of structures or vegetation or changes to the character of a seascape unit. Landscape effects can be temporary and include those caused by temporary access routes, compounds and construction traffic.

Visual effects relate closely to landscape effects but concern changes in views. Visual assessment concerns people’s perception and response to visual amenity. Effects may result from new elements located in the landscape that cause visual intrusion (i.e. interference with or interruption of the view).

1.2.4 Definition of Magnitude of Effects

Table 1: Criteria for the assessment of magnitude of effects on landscape character

Level	Typical criteria
Negligible	Very minor loss or alteration to one or more key developments / features / characteristics of the baseline i.e. pre-development landscape or view, and / or introduction of elements that are not uncharacteristic with the surrounding landscape – approximating the “no change” situation.
Low	Minor loss of / or alteration to one or more key elements / features / characteristics of the baseline i.e. pre-development landscape or view, and / or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape.
Moderate	Partial loss of / or alteration to one or more key elements / features / characteristics of the baseline i.e. pre-development landscape or view, and / or introduction of elements that may be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving landscape.
High	Total loss of, or major alteration to key elements / features / characteristics of the baseline i.e. pre-development landscape or view, and / or introduction of elements considered as being totally uncharacteristic when set within the attributes of the receiving environment.

Table 2: Definition of magnitude/degrees of visual effects resulting from the proposal

Level	Typical criteria
None	No part of the development, or work or activity associated with it, is discernible
Negligible	Only a small part of the proposals is discernible and / or they are at such a distance that they are scarcely appreciated. Consequently they have very little effect on the scene.
Slight	The proposals constitute only a minor component of the wider view, which might be missed by the casual observer or receptor. Awareness of the proposals would not have a marked effect on the overall quality of the scene.
Moderate	The proposals may form a visible and recognisable new element within the overall scene and may be readily noticed by the observer or receptor.
Substantial	The proposals form a significant and immediately apparent part of the scene that affects and changes its overall character.
Severe	The proposals become the dominant feature of the scene to which other elements become subordinate and they significantly affect and change its character.

1.2.5 Definition of Nature of Effects

The description of the *magnitude* of an effect, as defined above, relates to how much the proposals will alter the landscape character, or the extent of visibility from a particular viewpoint. The *nature* of this alteration can be described as positive (beneficial), negative (adverse) or neutral (no overall change or a balance of positive and negative effects).

Therefore a visual effect may be described as both slight (the proposals form a minor component of the wider view) and neutral (no overall change to the character of the viewpoint), or it may be described as moderate (the proposals form a visible and recognisable element in the overall scheme) and neutral (no overall change to the character of the viewpoint). A visual effect may also be described as slight (the proposals form a minor component of the wider view) and negative (having an adverse effect on the character of the view).

2 THE EXISTING LANDSCAPE

2.1 Site Context

The proposed development is located on the Belmullet Peninsula near Belderra Strand and in the sea, 14km and 5km from Belderra Strand, as indicated on Figures 1 and 3. The proposed substation site is just over 5km west of Belmullet, 200m south east of Belderra Strand. The peninsula is served by one main road, the R313, and a network of local roads. Housing is generally scattered and located along roads. Carne golf club is located 2km to the north of the proposed substation site and Cross Lough is located 1km to the south west.

2.2 Landscape Character

2.2.1 Regional Scale Landscape Character

The Mayo Landscape Appraisal is a document that identifies and describes the landscape character of each part of the county. The substation site is located on the western coast of Character Area B - *North West Coastal Moorland*. The wave energy converter sites are located off the western coastline of this same Area B. This Character Area is described as *“a complex of low lying islands and peninsulas with varying topographical and land cover characteristics but unified by its proximity to the coast.”*

The Belmullet peninsula has significant areas of pasture with dunes along the western coast, the dunes and sand beaches are under tourism development pressure but remain relatively unspoilt. Uninterrupted vistas across the water of bays and channels to opposing shorelines are abundant from areas of the public realm. The Appraisal states that *“the main concern for natural linear features such as coastlines and ridgelines is to avoid penetration by development that will interrupt and reduce the integrity of such elements.”*

Smooth terrain is a characteristic of this unit, and within this type of landscape, distances can appear shorter and consequently, development can appear closer or larger than if it were viewed within a different type of landscape. As a result of this characteristic, development can have a disproportionate visual impact in such terrain due to an inherent inability to be absorbed physically or visually. Low vegetation also contributes to this sensitivity.

In a low lying and open environment, even low ridgelines are important. Ridgelines perform the roles of providing an area with its identity, acting as dominant landscape focal points and defining the extent of visual catchments. It is important that development does not interrupt the integrity of primary ridgelines.

2.2.2 Local scale Landscape Character

The landscape character of the immediate vicinity of the proposed substation site is largely determined by its coastal location and resulting wind speeds. The sand based soil is primarily used for grazing, with intermittent areas of scrubland and a small waterlogged area between Belderra Strand and the substation site with associated vegetation such as flag iris and rushes. The field boundaries consist of post and wire fencing, or in some areas, New Zealand Flax. The local landscape character is particularly open with no vegetation reaching higher than about a metre. There are intermittent houses along the roads. The proposed substation is located in a sloping field which forms a backdrop to the Belderra Strand.



The proposed location of the landfall for the undersea cable is at Belderra strand. This strand is backed by shingle and gravel banks which lead on to Marram dunes. Behind these Marram and fixed dunes is an area of Machair. There is tarmac road access to within 5m of the southern side of the beach where a small car park is located on the seaside of the road.



Apart from intermittent sandy beaches, the coastline in the study area is generally rocky with areas of exposed rocks leading from Belderra Strand to Cross point. The extreme western end of Annagh Head is composed of an undulating area of lowland blanket bog with rocky outcrops. Moving east, the bog has been extensively cut for peat on either side of the road leading to Annagh Head but pockets of intact bog remain.



Emlybeg beach is located at the mid point of the bay at the centre of the study area. The landside of the bay is characterised by sand and cobble beach area which extends landward to elevated sand dune formations. On the day of the site visit, surfers were using this beach.



Any elevated points on the peninsula have views of the coastline and out to sea, such as at the graveyard west of Termoncarragh Lake.



Further south along the peninsula, the land rises to a high point at Termon Hill and long distance views over the peninsula and out to sea are possible from the open and elevated parts of the hill. Settlement is slightly more clustered in this location.



2.3 Seascape character

The Guide to Best Practice in Seascape assessment defines Seascape as:

- Views from land to sea
- Views from sea to land
- Views along coastline
- The effect on landscape of the conjunction of sea and land

For some projects, an assessment of views *from* the sea *to* the land is necessary. However, this tends to be for schemes where the development will be close to the coast and/or commonly seen from the open sea looking towards the land; for example where there is a key ferry route passing by the outside of the development site. Neither of these scenarios applies to the proposed Atlantic Marine Energy Test Sites. The seascape assessment for the Test Sites is therefore mainly concerned with how the scheme will affect distinct character and views as experienced from land and coastal areas. Areas may be coastal in character even if they don't have a view of the sea (e.g. behind sand dunes).

Seascape assessment is a two stage process; Characterisation and Evaluation. A National Seascape Assessment has not yet been carried out but will most likely be carried out as part of the emerging National Landscape Strategy. This would include National, Regional and Local level Seascape Units. It can be assumed that the Belmullet Headland coastline would form a Regional Unit. This unit, on a regional scale, would be sensitive to new developments, considering the fact that the coast is generally undeveloped. It can be assumed that much of the Belmullet Headland can be considered the "hinterland" of the seascape.

Smaller scale and project specific local seascape units have been delineated according to best practice and are indicated on Figure 3 (Appendix A);

Seascape Unit A – Erris Head to Annagh Head

This Seascape Unit is open, with a rocky shoreline and short grazed gently undulating grassland sloping down to the coastline. The coastline is very indented and there are a number of islands, notably Eagle Island with a lighthouse. There is a small beach and pier at Portnafrankagh. The character of the open sea is wild and vast.

This unit would generally be sensitive to change, as it is currently undeveloped and wild in character.

Marine Energy Test Site A would be distantly visible (11-14km) from this Seascape Unit.



Seascape Unit B – Annagh Head to Corran Point

This unit is a bay, with a combination of rocky shoreline and sandy beach. The beaches of Belderra Strand, Emlybeg Strand and Cross Strand are located within this unit. While the terrain is low-lying, there is some sense of enclosure emphasised by the albeit low-lying island group of which Inishglora is the largest. The character of the sea is wild, but slightly enclosed by the nature of the land form.

This unit would generally be sensitive to change, as it is currently undeveloped and wild in character, although houses are visible in the landscape.

Marine Energy Test Site B would be visible from different parts of this Seascape Unit at distances varying from 2km (Annagh Head) and 6km (Emlybeg Strand).

The cable landfall would occur at Belderra Strand and the proposed substation would be located to the rear of the strand.



Seascape Unit C – Corraun Point to Letterbeg

This Seascape Unit consists of long sandy beaches, rocky coastline and gently undulating grazed grassland. The higher ground to the southern part of this unit allows for long distance views out to sea. There is some enclosure provided by the islands of Inishkea North and Inishkea South and the collection of islands off Corraun Point. Housing density slightly increases as one moves south to Letterbeg. The character of the sea is wild with some enclosure provided by land form. In some places the width of the peninsula is only a few hundred metres making the peninsula feel more like an island than part of the general landform.

This unit would generally be sensitive to change, as it is currently generally undeveloped and wild in character, although clusters of houses are visible in the landscape.

It is unlikely that the Marine Energy Test Sites would be visible from these areas in all but the most clear of atmospheric and lighting conditions.



2.4 Planning Context

The Mayo County Development Plan (2008-2014) contains the statutory plans controlling development within the study area. The Plans have been consulted with regard to visual amenity policies, protected views and landscape designations.

Special Areas of Conservation (SACs), proposed Natural Heritage Areas (pNHAs), Natural Heritage Sites (NHAs), and Special Protection Areas (SPAs) produced by the NPWS for County Mayo were taken into consideration in relation to designations at national level. While these designations are primarily concerned with ecological issues, their potential amenity value warrants assessment in terms of landscape value.

2.4.1 Mayo Landscape Appraisal - Areas Designated as Vulnerable

In terms of potential landscape effects, the entire west coast of the Belmullet peninsula is classified in the Mayo Landscape Appraisal as “Vulnerable”. This is defined as an area having “very distinctive features with a very low capacity to absorb new development without significant alterations of existing character over an extended area”.

2.4.2 Mayo Landscape Appraisal - Areas Designated as Sensitive

In terms of potential landscape effects; beaches, dunes, sands, natural grassland coastal lagoons, water bodies, peat bogs, bare rocks and natural grassland are classified in the Mayo Landscape Appraisal as a “Sensitive”. The Appraisal also states that areas which are open and exposed with sparse or low growing vegetation cover will also be regarded as sensitive as there are generally no opportunities for screening. Even if planting is introduced, the exposed nature of these areas will not support any significant tall vegetation. This is the case for the study area for this proposal. A *Sensitive* landscape is defined in the Appraisal as landscape of “distinctive character with some capacity to absorb a limited range of appropriate new developments while sustaining its existing character.”

2.4.3 Mayo Landscape Appraisal - Policy Area 2 - Lowland Coastal Zone

The Belmullet Peninsula falls under Policy Area 2, Lowland Coastal Zone. A number of policies in relation to Policy Area 2 are relevant to this proposal.

Policy 4 states: “Consider development that does not significantly interfere or detract from scenic coastal vistas, as identified in the development plan, when viewed from areas of the public realm.”

Policy 5 states: “Encourage development that will not interrupt or penetrate distinct linear sections of primary ridgelines and coastlines when viewed from areas of the public realm.”

Policy 6 states: “Preserve any areas that have not been subject to recent or prior development and have retained a dominantly undisturbed coastal character.”

Policy 8 states: “Recognise the substantial pockets of residential and rural land uses in some locations and emerging pressures for differing land uses of industry, wind energy and residential development in this policy area.”

Policy 9 states; “continue to facilitate appropriate development in a progressive and clustered manner that respects the scale, character and sensitivities of the landscape.”

Policy 11 states: “Encourage development that will not have a disproportionate effect in the existing character of the landscape in terms of location, design and visual prominence.”

2.4.4 Landscape Sensitivity Matrix

In the Landscape Sensitivity Matrix on page 84 of the Mayo Development Plan, industrial and commercial developments and road projects (which are the closest type of projects to that proposed, as listed in the matrix) are considered to have a low to medium potential for adverse impacts within Policy Area 2. According to this Sensitivity Index, the most significant impacts arising from development in this Policy Area would result from the scale of the development, the location and whether or not there was prior development in the area. Bulk and density, and design would also be factors in determining the potential impact of a development.

The potential landscape impacts arising from the proposed Atlantic Marine Energy Test Sites are described in relation to these criteria in section 4.1 below.

2.4.5 Walking and Cycling Routes

No walking/cycling routes and areas for water-based activities have been identified in the current County Development Plan. The Mayo County Development Board and the associated website 'Mayo Walks' mentions the **Eris Head Loop Walk (5km)**

The Irish Heart Foundation developed Slí na Sláinte 'Path to Health' walking routes throughout the country. The following one walking route and one alternative unmarked walking route have been developed within the study area and are both located within the town of Belmullet:

Broadhaven Slí na Sláinte (3.1km)

Blacksod Slí na Sláinte (2.6km)

Walking Routes within the study area are indicated on Figure 3.

2.4.6 Scenic Routes/Views

The current Mayo County Development Plan 2008-2014 indicates one scenic route with Scenic and Highly Scenic views within the study area. The R313 between Belmullet and Blacksod has been designated as a scenic route with scenic views to either side of the road. The local road surrounding Termon Hill between Blacksod, Fallmore and Letterbeg in the south of the Mullet Peninsula has been classified as a scenic route with Highly Scenic views southwards across Blacksod Bay. This part of the scenic route joins the R313 at Aghleam, north of Termon Hill. Scenic Routes and Views within the study area are indicated on Figure 3.

2.4.7 Natura 2000 sites

The Development Plan for County Mayo indicates a number of designated ecological sites within the study area. However, the online map viewer of the National Parks and Wildlife Service (NPWS) contains the most up to date information on designated ecological sites and was therefore solely used to identify relevant areas within the study area as listed below. While these designations are primarily concerned with ecological issues, their potential amenity value warrants assessment in terms of landscape value.

Proposed Natural Heritage Areas (pNHAs)

Erris Head – 001501

Eagle Island – 001500

Broadhaven Bay – 000472

Mullet/Blacksod Bay Complex – 000470

Inishglora & Inishkeeragh – 000506

Inishkea Islands – 000507

Special Protection Areas (SPAs)

Blacksod Bay/Broadhaven – 004037

Termoncarragh Lake and Annagh Machair – 004093

Cross Lough (Mullet) - 004055
Inishglora/Inishkeeragh – 004084
Inishkea Islands - 004004
Proposed Concrake SPA at Annagh Head

Special Areas of Conservation (SACs)

Erris Head – 001501
Mullet/Blacksod Bay Complex – 000470
Inishkea Islands – 000507

3 CHARACTERISTICS OF THE PROPOSAL

3.1 The Proposal

The proposal subject to this assessment is a fully operational pre-commercial wave energy converter, or small array of same, which will supply energy directly to the electricity network. This includes:

- A substation/transformer/SCADA system with associated access road and landscape works
- On shore civil works
- Subsea cable and cable laying
- Offshore wave energy converter (WEC) plant (including Pelamis and Wavebob shown below)
- Performance measurement equipment (MetOcean buoys, ADCP)
- Cardinal marker buoys, painted yellow with flashing warning lights

Landscape and visual impacts will occur at construction (i.e. access roads, track ways, construction machinery, land and marine traffic and personnel), operational and decommissioning stages. The potential impact of maintenance and monitoring activity will also be assessed. The test site will operate for 10-15 years and will provide test areas for up to 5 prototype technologies, single and in arrays, although it is unlikely that there will ever be more than 2 or 3 types of WEC on site at any one time.

Test Area A will be located approximately 14km from Belderra Strand with the nearest marker buoy approximately 10km from Annagh Head. Test Area B will be located approximately 5km from Belderra Strand, the nearest marker buoy will be approximately 2km from Annagh Head and 3.5km from Cross Point (see Figure 3).



Pelamis



Wavebob

4 LANDSCAPE AND VISUAL EFFECTS

4.1 Landscape Effects

The landscape contained within the study is sensitive to change. Any proposal must not interfere with scenic coastal vistas, interrupt linear sections of coastline, affect undisturbed coastal areas or have a disproportionate effect on the existing character of the landscape in terms of location, design and visual prominence. It must respect the scale, character and sensitivity of the landscape, and have no significant effect on the existing character of the landscape in terms of location, design and visual prominence.

Substation and landfall

The substation is located in an area which is described in the Mayo Landscape Appraisal as vulnerable and sensitive. While there are some residential houses in the near vicinity, the coastal location and lack of significant vegetation would result in a development being potentially highly visible and therefore impacting on the landscape character.

The proposed substation is designed to replicate the scale of a residential house, which is appropriate in terms of scale and design. The location takes advantage of an existing rock outcrop for screening and the proposed naturally contoured berm would extend this screening. The proposed wooden fence boundary treatment is generally consistent with that found in the locality, although post and rail fencing is the most common form of field boundary treatment in the immediate area. The main landscape change arises from the change in texture of the site grassland, along with the new road which curves to take account of the contours. While these two features would be visible when immediately adjacent to the site as seen in **Photomontage 2** (below and in Appendix B), they would not be apparent from other potential points in the landscape such as Belderra Strand (see **Photomontage 1** below and in Appendix B).



Considering the underlying characteristics of the landscape, the existing buildings in the immediate vicinity and the careful siting and screening of the proposal, the landscape effects arising from the substation would be **low** and **neutral**.

There would no impact arising from the cable landfall during the operational period, unless maintenance was required, as the cable will be undergrounded.

Construction and Decommissioning impacts are described in section 4.5 and 4.6 below.

Marine Energy Test Site A

Marine Energy Test Site A is potentially visible from large tracts of the coastline of the Belmullet Peninsula; however, **Photomontage 4** (below and in Appendix B) indicates that visibility of this test site is extremely low. There will be some change in the character of the landscapes that currently experience uninterrupted views out to a wild and vast sea, but visibility of the test site from the land will only be possible under the clearest of atmospheric conditions. The nature of the development and its close relationship to the characteristics of the sea result in landscape effects that are **low** and **neutral**.



The impact of warning lighting will also be low, as one might expect to see occasional lighting associated with shipping or lighthouses over such distances in the sea. The impact will arise due to the permanency of the lighting effect, as opposed to moving lights associated with shipping. Again, this lighting would only be visible from the land in the clearest of conditions.

Construction and Decommissioning impacts are described in section 4.5 and 4.6 below.

Marine Energy Test Site B

Marine Energy Test Site B is potentially visible from tracts of the coastline of the Belmullet Peninsula; however, **Photomontage 3** (below and in Appendix B) indicates that visibility of this test site is extremely low. The landscape in this location is more enclosed due to the nature of the bay and the location of the island grouping around Inishglora. The test site would be perceived as being located on the edge boundary of this bay landscape. There are existing structures in this bay landscape including houses, roads, a graveyard and a golf course and therefore the landscape is not undisturbed. While the test site may be visible, it does not have a disproportionate effect on the character of the landscape.



The nature of the development and its close relationship to the characteristics of the sea result in landscape effects that are **moderate** and **neutral**.

Construction and Decommissioning impacts are described in section 4.7 and 4.8 below.

4.2 Seascape Effects

Seascape Unit A – Erris Head to Annagh Head

Marine Energy Test Site A would be distantly visible (8-10km) from this Seascape Unit. At this distance the potential for visibility of this test site is extremely low. There will be some change in the character of this sensitive seascape, as the currently uninterrupted vista over water to the horizon will be interrupted, but visibility of the test site will only be possible under the clearest of atmospheric conditions. The nature of the development and its close relationship to the characteristics of the sea result in seascape effects that are **low** and **neutral**.

The impact of warning lighting will also be **low**, as one might expect to see occasional lighting associated with shipping or lighthouses over such distances in the sea. The impact will arise due to the permanency of the lighting effect, as opposed to moving lights associated with shipping. Again, this lighting would only be visible from the coast in the clearest of conditions.

Seascape Unit B – Annagh Head to Corran Point

Marine Energy Test Site B is located within this Seascape Unit. This Seascape Unit is more enclosed due to the nature of the bay and the location of the island grouping around Inishglora. There are existing structures in this bay landscape including houses, roads, a graveyard and a golf course and therefore the landscape is not undisturbed. The effects here are different from the other Seascape Units as the test site would not be seen in the context of an expansive sea, but exhibits a closer relationship with the seascape of the bay. While the test site may be visible, it does not have a disproportionate effect on the character of the seascape.

The nature of the development and its close relationship to the characteristics of the sea result in seascape effects that are **moderate** and **neutral**.

The impact of warning lighting will also be **low**, as one might expect to see occasional lighting associated with shipping or lighthouses over such distances in the sea. The impact will arise due to the permanency of the lighting effect, as opposed to moving lights associated with shipping. Again, this lighting would only be visible from the coast in clear of conditions.

It may be possible to view both test sites from this seascape unit in extremely clear weather conditions, the seascape impact would remain **moderate** and **neutral** in this case. Cumulative effects are described in more detail in section 4.7.

There would no impact arising from the cable landfall during the operational period, unless maintenance was required, as the cable will be undergrounded.

Seascape Unit C – Corraun Point to Letterbeg

Marine Energy Test Site A would be distantly visible (8-10km) from this Seascape Unit. At this distance the potential for visibility of this test site is extremely low. There will be some change in the character of this sensitive seascape, as the currently uninterrupted vista over water to the horizon will be interrupted, but visibility of the test site will only be possible under the clearest of atmospheric conditions. The nature of the development and its close relationship to the characteristics of the sea result in seascape effects that are **low** and **neutral**.

The impact of warning lighting will also be **low**, as one might expect to see occasional lighting associated with shipping or lighthouses over such distances in the sea. The impact will arise due to the permanency of the lighting effect, as opposed to moving lights associated with shipping. Again, this lighting would only be visible from the coast in the clearest of conditions.

4.3 Visual Effects

4.3.1 Photomontage locations

It is possible to prepare detailed and highly realistic images that illustrate the likely future appearance of a development from a specific viewing point. These are useful for examining the effects from a limited number of critical viewpoint positions. However, they contribute little to an assessment of the effects on the overall landscape within which an almost infinite number of potential viewpoints exist. There is no meaningful way to illustrate every view within a landscape – the number of potential viewing points is almost infinite. Instead, a representative sample is provided. Views are presented to illustrate a “worst case” locations to examine whether the project will be visible from such locations. The Landscape Institute (UK) Guidelines (2011) on the subject state; *“The landscape professional should select a set of photographic viewpoints which are considered representative of the range of likely effects, viewing experience and viewpoints ensuring that none are under or over represented.”*

As the views are representative of viewing conditions that are encountered, some of them may show vegetation or topography screening some of the development. Such conditions are normal and representative.

A significant limitation of visualisations is that the visual prominence of features in the landscape is significantly affected by lighting conditions and weathers. It is true that all views will appear different in various conditions of lighting, haze, weather and seasons. Again the views provided are representative and not comprehensive – because in addition to there being an almost infinite number of viewpoint points, there are a very large set of combinations and permutations of lighting conditions that could conceivably occur for every view. The Landscape Institute (UK) Guidelines (2011) on the subject state; *“they (photomontages) are subject to the same inherent limitations as photographs, for example only showing the scene as it would appear under the same conditions that prevailed when the original photograph was captured.”*

Thus, at best, visualisations can represent a view from a particular location at a particular time in particular weather conditions. There is no such thing as a fixed or single impact on the appearance or character of the landscape.

The most effective use of photomontages is to view them in the field, The Landscape Institute (UK) Guidelines state; *“It is essential to recognise that two-dimensional photographic images and photomontages alone cannot capture or reflect the complexity underlying the visual experience, and should therefore be considered an approximation of the three-dimensional visual experiences that an observer would receive in the field. As part of a technical process, impact assessment and considered judgements using photographs and/or photomontages can only be reached by way of a visit to the location from which the photographs were taken.”*

4.3.2 Zone of Theoretical Visibility

Methodology

The term 'Zone of Theoretical Visibility' (ZTV) is used to describe the area over which a development can theoretically be seen, and is based on a Digital Terrain Model (DTM) and overlaid on a map base. This is also known as a Zone of Visual Influence (ZVI), Visual Envelope Map (VEM) and Viewshed. However the term ZTV is preferred for its emphasis of two key factors that are often misunderstood:

- Visibility maps represent where a proposed development may be seen theoretically – that is, it may not actually be visible in reality, for example due to localised screening which is not represented by the DTM; and
- The maps indicate potential visibility only - that is, the areas within which there may be a line of sight.

They do not convey the nature or magnitude of visual impacts, for example whether visibility will result in positive or negative effects and whether these will be significant or not. The Landscape Architect's assessment uses the ZTV and one of several tools to determine the actual effects of the proposal.

Conclusions – ZTV and visibility of the proposed substation

A ZTV map was prepared (below and in Appendix A) to illustrate the potential visual impact of the substation at Belderra Strand. This ZTV mapping does not show the screening effects of contours below 10m (including the proposed screening berm or vegetative screening in the landscape. It therefore illustrates a worst case scenario before mitigation measures have been enacted. The map indicates that the substation would be visible from areas in the immediate vicinity up to 1km distance, from the approach to Emlybeg Beach, from parts of Annagh peninsula and from parts of elevated areas more than 4km to the north.

This theoretical visibility was confirmed on site for some locations and the areas which will experience visibility of the substation are indicated by the solid and hatched red lines on Figure 2.

A ZTV was not generated for the Marine Energy Test Sites as the resulting mapping would be misleading. OS digital contour mapping is only available at 10m intervals, therefore screening topography lower than 10m is not included in ZTV generation. This would have particular ramifications for a development located at and just above sea level. The effects of distance and meteorological conditions are not included in ZTV mapping. Areas within the landscape which will experience visibility of the Marine Energy Test Sites were identified by site survey and are indicated by the solid and hatched red lines on Figure 3.

4.3.3 Sensitive receptors

Sensitive receptors in the study area include:

- Private dwellings near the substation site and on Annagh peninsula
- Carne Golf club
- Belderra Strand, Emlybeg strand
- Graveyards west and north of the site

-
- Roads
 - Residences in the wider landscape
 - Sites of cultural heritage significance and associated zone of visual amenity
 - Recreation areas and walking routes, surfing areas
 - Tourist attractions

4.3.4 Visibility of the proposed substation

The following locations would experience visibility of the proposed substation:

- Residences in close proximity to the substation (**moderate negative** visual impact) – see **Photomontage 1**
- Carne Golf Club (**slight neutral** visual impact)
- Belderra Strand (**slight negative** visual impact) – see **Photomontage 2**
- Some roads in the immediate vicinity (**slight to moderate negative** visual impact)
- Very long distance views from the graveyard over 4km to the north (**slight neutral** visual impacts)

Visibility of the substation within the wider landscape is indicated on Figure 1 by the solid and hatched red lines (Appendix A).

4.3.5 Visibility of Marine Energy Test Sites A and B

Given their distance from the coast, the Test Sites would appear clearly separated from the onshore landscape and part of the open sea. The proposed Test Sites would appear most prominent from those coastal areas that have a simple foreground pattern, and thus fewer distracting features, especially when such views are directed towards the proposed development. Visibility would mainly occur from southern directions and at high elevations.

A large water body offers few clues to help us to judge how far away a particular point in the water lies. Distances are particularly difficult to judge when looking out to sea. Differing levels of visibility derived from atmospheric conditions further complicate issues. Even in apparently clear summer conditions, the atmosphere can obscure distant objects. In mist or haze, their colour and sharpness is altered and this can confuse observers.

The horizon is the furthest point on the sea surface that can be seen. Actual distance to the horizon line increases with elevation of the viewer and decreases at lower elevations and with reduced atmospheric clarity. On a clear day, viewed from the beach, the horizon will be in the order of 3 nautical miles (approx. 6km distance). Viewed from a height of 60m, the horizon will be in the order of 16 nautical miles (approx. 32km). Yet the horizon itself will appear much the same in all of these views and is always perceived as very distant. Objects of an unfamiliar appearance may be scaled incorrectly at sea.

A sea view from 1km inland may appear similar to a sea view from 10km inland from greater altitude, in good visibility. But the view from further inland will be of a much larger area of sea, and therefore any object within it will be a much smaller element of the view, and so less significant.

The following locations would experience visibility of the proposed Marine Energy Test Sites A and B in very clear atmospheric conditions (representing a worst case scenario). In normal conditions, the visual effects would be lower. **Photomontages 3 and 4** are representative of the worst case scenario views showing the impact of the parts of the coast closest to the Test Sites:

- Residences with views of the test site locations along the Belmullet Peninsula (**negligible** to **slight negative** visual impact depending on distance to the site)
- Carne Golf Club (**slight negative** visual impact)
- Belderra Strand, Emlybeg Strand (**slight negative** visual impact)
- Belderra Strand (**slight negative** visual impact)
- Some roads in the immediate vicinity (**negligible** to **slight negative** visual impact depending on distance to the site)
- Very long distance views from the graveyard over 4km to the north (**slight negative** visual impacts)

Visibility of both Marine Test sites within the wider landscape is indicated by the solid and hatched red lines on Figure 3. While the potential visibility of Marine Energy Test Site A is indicated on Figure 3, under normal conditions this Test site would not be visible. Very distant visibility may occur under very specific atmospheric and lighting conditions.

4.4 Impact on Designated Areas

4.4.1 Walking and Cycling Routes

There would be no landscape or visual impact on any marked walking or cycling routes

4.4.2 Scenic Routes/Views

Some long distance views of the Test Sites would be possible from two 1km long sections of the Scenic road which runs through the Belmullet peninsula (R313). These sections are indicated on Figure 3. The impact on such views would be negligible considering the scale of the views and the distance between the viewpoint and the test site.

There would be no impact on the “Highly Scenic Views” at the most southern end of the Belmullet peninsula.

4.4.3 Natura 2000 sites

The substation and Test Area B would be visible from parts of the Natura 2000 sites as indicated on Figure 1. The visual impact would range from none to slight depending on proximity to the proposed scheme.

4.5 Construction impacts

The greatest visual impacts during the construction stage would occur in the vicinity of the substation site and the location of the underground cable. These impacts would be **temporary, moderately negative**.

The construction impacts associated with the test sites would largely occur on sea and, while these impacts would also be temporary, there would be **slight negative** visual impacts during the construction period.

4.6 Decommissioning impacts

The site will be operational for a period of 15 years and thereafter it is planned to decommission the substation. This may involve as a worst case scenario

- Demolition of the substation and reinstatement of the site
- Removal of landside cables
- Removal of submarine cables involving works in the intertidal environment]
- Removal of the cable transmission joint bay and reinstatement of the site.

The effects of this work would be similar to those described for the construction stage in 4.5 above.

4.7 Cumulative effects

The following definitions are used to determine cumulative effects on visual impacts.

Definition of types of cumulative effects
In combination Where two or more features are seen together at the same time from the same place, in the same (arc of) view where their visual effects are combined.
In succession Where two or more features are present in views from the same place (viewpoint) but cannot be seen at the same time, together because they are not in the same arc view – the observer has to turn to see new sectors of view whereupon the other features unfold in succession.
In sequence Where two or more features are not present in views from the same place (viewpoint) and cannot, therefore, ever be seen at the same time, even if the observer moved round the arc of view, the observer has to move to another viewpoint to see the second or more of them, so they will then appear in sequence. The frequency of occurrence in the sequence may be highly variable, ranging from frequently sequential when the features keep appearing regularly and with short time lapses between (clearly speed of travel influences this as well as distance between the viewpoints) down to occasionally sequential where there may be long time lapses between appearances, because the observer is moving very slowly and /

or there are large distances between the viewpoints (even if not between the features).

There is no comparable development in the area similar to that proposed and therefore there are no anticipated cumulative effects arising from an interaction with other developments.

Cumulative effects may occur where both test sites may be visible in combination, in succession or in sequence from particular viewpoints.

Cumulative effects *in combination* (i.e. where both test sites are visible in the same viewpoint) would only be possible in the clearest of atmospheric and lighting conditions. In this event both test sites would be visible from the areas marked in red on Figure 3. The landscape and visual impact would generally be **slight** and **neutral**, rising to **moderate** and **neutral** for views from Seascape Unit B – Annagh Head to Corraun Point.

Cumulative effects *in succession* would occur, again only in the clearest of atmospheric and lighting conditions from parts of the landscape closest to Marine Energy Test Site B (i.e. the tip of the Annagh Peninsula). The landscape and visual impact would be **slight** and **neutral**.

Cumulative effects *in sequence* would not be anticipated to be noticeable, considering the significant viewing distance from the land to Marine Energy Test Site A.

5 Mitigation and Residual Impacts

5.1 Mitigation

5.1.1 Location

The scoping reports assessed the potential impacts on a range of locations for the proposed substation.

The preferred location of the proposed substation takes advantage of an existing rock outcrop for screening and the proposed naturally contoured berm would extend this screening. It is clustered with a number of existing buildings and takes advantage of screening provided by the undulating wider landscape.

A range of locations for the Test Sites were also assessed. The location of the Test Sites is determined by the quality and nature of waves, and the aspiration to minimise potential environmental impacts.

5.1.2 Finishes

The proposed substation is designed to replicate the scale of a residential house, which is appropriate in terms of scale and design. The fencing boundary treatment is generally consistent with that found in the surrounding landscape.

The finishes of the Wave Energy Converters are bright for safety reasons and though this heightens visibility, the potential visual impacts must be weighed against safety concerns.

5.1.3 Landscape design

The location takes advantage of an existing rock outcrop for screening and the proposed naturally contoured berm would extend this screening. Landscape mitigation would include natural re-vegetation of berm structures and a change of management of the grassland including no further fertilization of the ground within the site boundary to encourage native grass development.

5.2 Residual Impacts

The following impacts would remain following implementation of mitigation measures:

- Slight visibility in very clear atmospheric and lighting conditions of Marine Energy Test site B, and to a much lesser degree Marine Energy Test Site A from locations identified in Figure 3.
- Slight visibility of the roof of the proposed substation and visibility of the access road from a small number of localised views.

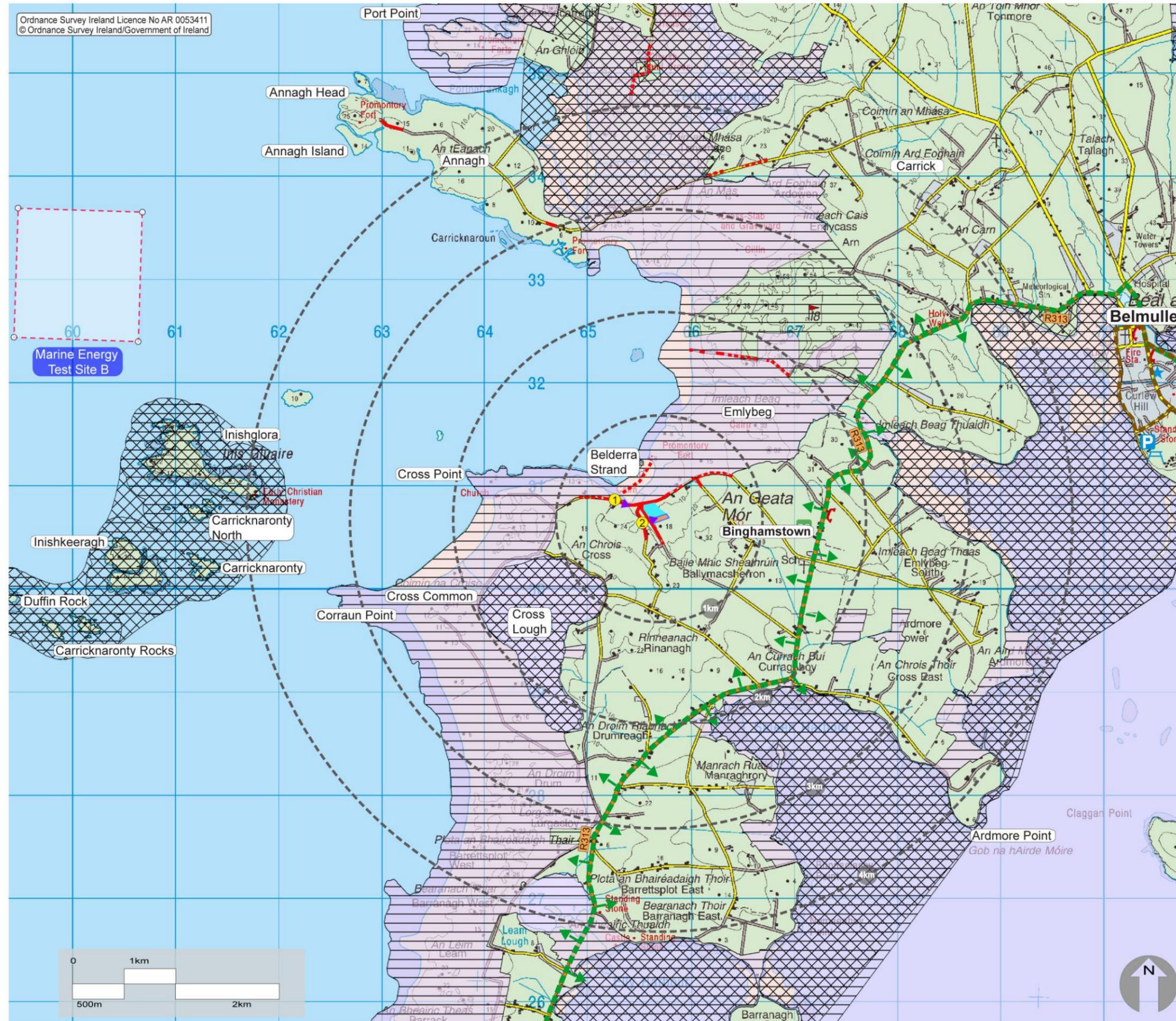
6 Summary

This assessment has followed best practice in terms of landscape and seascape characterisation and assessment. The proposals will be new features in a landscape described in the Mayo Landscape Appraisal as “Vulnerable” and “Sensitive”. However, the location that emerged from a detailed site selection process as well as the design and mitigation measures proposed will result in landscape and visual impacts that range from negligible to slight to moderate and from negative to neutral. Landscape, seascape and visual effects will generally be localised in the area between Annagh Head to Corraun Point.

Appendix A

Figures

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KEY

-  Location of proposed substation site and building
-  Marine Energy Test Site B
-  Photomontage location (PM 1-12)
-  Kilometres distance from centre of site
-  Broadhaven Sli and Blacksod Sli (Irish Heart Foundation Sli na Sláinte)
-  Scenic Views as outlined in Mayo County Development Plan 2008-2014
-  Scenic Road as outlined in Mayo County Development Plan 2008-2014
-  Potential open views of the proposed substation building
-  Potential intermittent views of the proposed substation building

Natura 2000 Sites (Habitat and Birds Protection)

-  Natural Heritage Area (NHA)
-  Proposed Natural Heritage Area (pNHA)
-  Special Area of Conservation (SAC)
-  Special Protection Area (SPA)



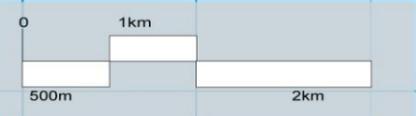
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**THE ATLANTIC MARINE ENERGY TEST SITE
BELMULLET, COUNTY MAYO**

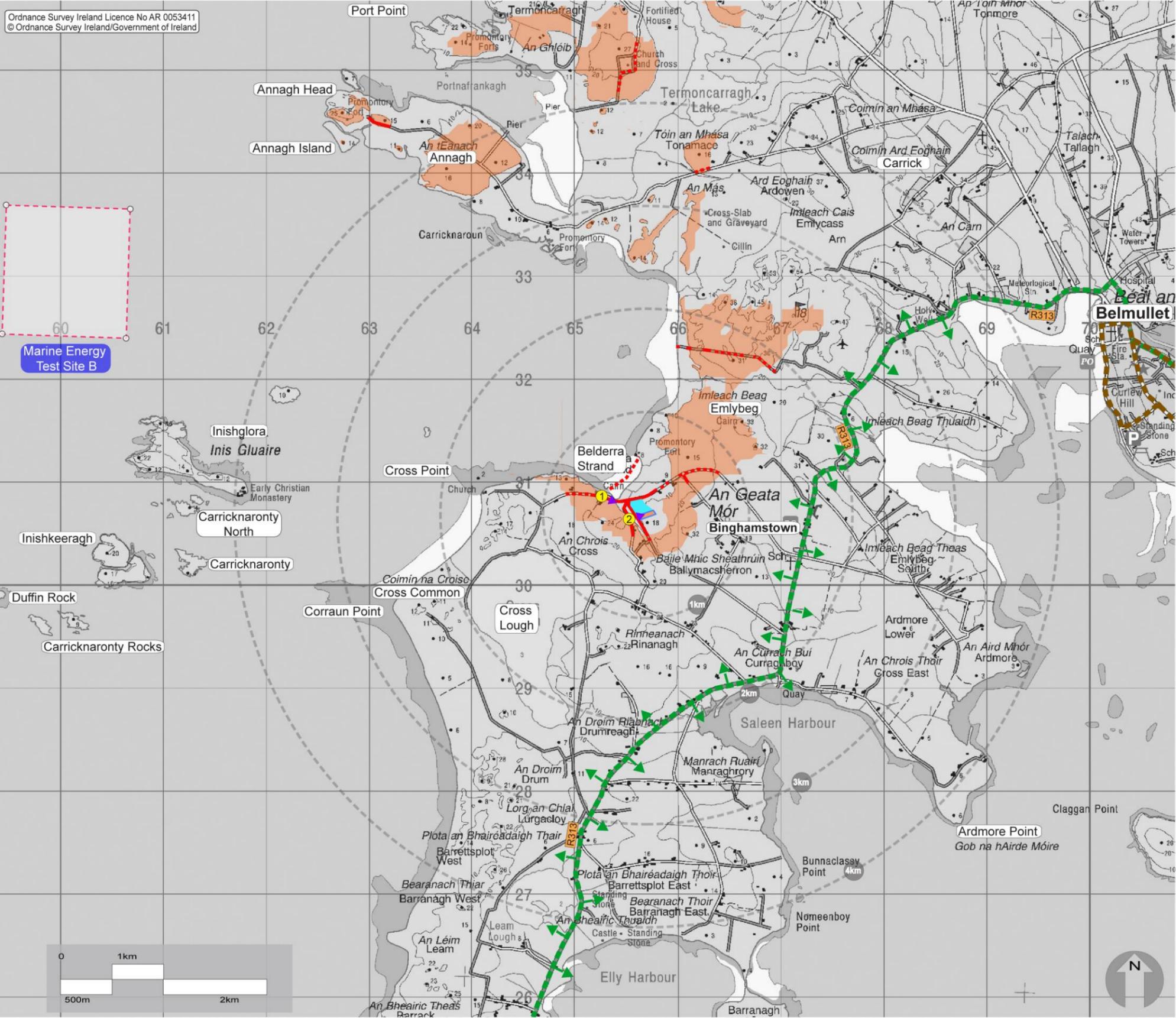
**SUBSTATION SITE:
DESIGNATIONS, PHOTOMONTAGE
LOCATIONS, VISUAL IMPACT**

FIGURE 1 November 2011

Drawn: MS, JS - Checked: DB



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KEY

-  Location of proposed substation site and building
-  Marine Energy Test Site B
-  Photomontage location (PM 1-12)
-  Kilometres distance from centre of site
-  Broadhaven Sli and Blacksod Sli (Irish Heart Foundation Sli na Sláinte)
-  Scenic Views as outlined in Mayo County Development Plan 2008-2014
-  Scenic Road as outlined in Mayo County Development Plan 2008-2014
-  Potential open views of the proposed substation building as encountered during the site survey
-  Potential intermittent views of the proposed substation building as encountered during the site survey
-  Zone of Theoretical Visibility

The Zone of Theoretical Visibility has been mapped for approximately 5km radius from the proposed substation site and is based on an Ordnance Survey Ireland 10m contour model. It does not take account of contours below 10m (for example at Belderra Strand), vegetative screening and hence reflects a lunar landscape, which for the visual impact assessment process represents the "worst case scenario".

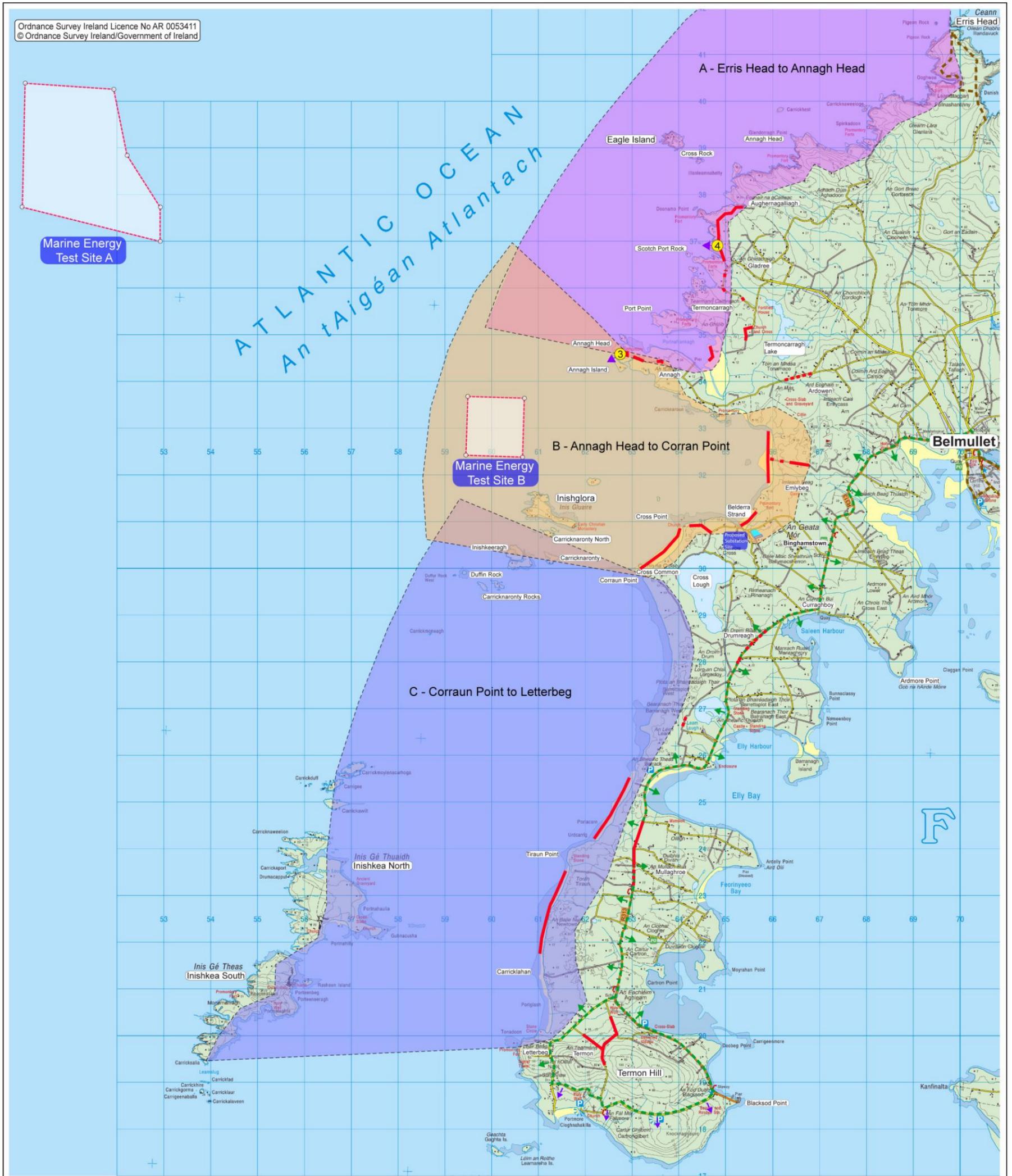


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**THE ATLANTIC MARINE ENERGY TEST SITE
 BELMULLET, COUNTY MAYO**

**SUBSTATION SITE:
 ZONE OF THEORETICAL VISIBILITY**

FIGURE 2 November 2011
 Drawn: MS, JS - Checked: DB



KEY

-  Location of proposed substation site and building
-  Marine Energy Test Sites
-  Photomontage location (PM 1-12)
-  - Broadhaven Slí and Blacksod Slí (Irish Heart Foundation Slí na Sláinte)
-  - Erris Head Walk as described in 'Mayo Walks' by Mayo County Council
-  Scenic Views as outlined in Mayo County Development Plan 2008-2014
-  Scenic Road as outlined in Mayo County Development Plan 2008-2014
-  Highly Scenic Views as outlined in Mayo County Development Plan 2008-2014

-  Potential open views of the proposed Marine Energy Test Sites
-  Potential intermittent views of the proposed Marine Energy Test Sites

- Seascape Character Units**
-  A - Erris Head to Annagh Head
 -  B - Annagh Head to Corraun Point
 -  C - Corraun Point to Letterbeg



THE ATLANTIC MARINE ENERGY TEST SITE
 BELMULLET, COUNTY MAYO

MARINE TEST SITES:
 SEASCAPE CHARACTER UNITS,
 PHOTOMONTAGE LOCATIONS,
 VISUAL IMPACT

FIGURE 3 November 2011
 Drawn: MS, JS - Checked: DB

Appendix B

Photomontages



Existing view



Proposed view

Photomontage 1

View southeast from local road across car park at Belderra Strand

Viewpoint grid reference: E065356 N330851

Arc of view: 38.2 deg.
Date photo taken: 12.08.2011
Time photo taken: 3:10PM

Viewpoint elevation: 17

Height of camera above ground: 1.6m
Nearest distance to substation building: 401m
Recommended viewing distance: 40 - 50cm

THE ATLANTIC MARINE ENERGY TEST SITE
BELMULLET, COUNTY MAYO



November 2011



Existing view



Proposed view

Photomontage 2

View east towards substation site as seen from residential houses

Viewpoint grid reference: E065528 N330654

Arc of view: 38.2 deg.
Date photo taken: 11.08.2011
Time photo taken: 10:40AM

Viewpoint elevation: 15

Height of camera above ground: 1.6m
Nearest distance to substation building: 193m
Recommended viewing distance: 40 - 50cm

THE ATLANTIC MARINE ENERGY TEST SITE
BELMULLET, COUNTY MAYO



November 2011



Existing view



Proposed view

Photomontage 3 (Panoramic)

View southwest towards Marine Test Site B from the summit of Annagh Head

Viewpoint grid reference: E062727 N334585

Arc of view: 60 deg.
Date photo taken: 12.08.2011
Time photo taken: 2:25PM

Viewpoint elevation: 29

Height of camera above ground: 1.6m
Distance to nearest cardinal marker buoy: 2.26km
Recommended viewing distance: 40 - 50cm

THE ATLANTIC MARINE ENERGY TEST SITE
BELMULLET, COUNTY MAYO



November 2011



Existing view

Visibility of power structures is digitally enhanced



Proposed view

Photomontage 4

View northwest from minor road towards Marine Test Site A in the townland of Gladree north of Scotch Port Rock

Viewpoint grid reference: E064826 N336885

Arc of view: 38.2 deg.
Date photo taken: 12.08.2011
Time photo taken: 11:00AM

Viewpoint elevation: 27

Height of camera above ground: 1.6m
Distance to nearest cardinal marker buoy: 11.95km
Recommended viewing distance: 40 - 50cm

THE ATLANTIC MARINE ENERGY TEST SITE
BELMULLET, COUNTY MAYO



November 2011