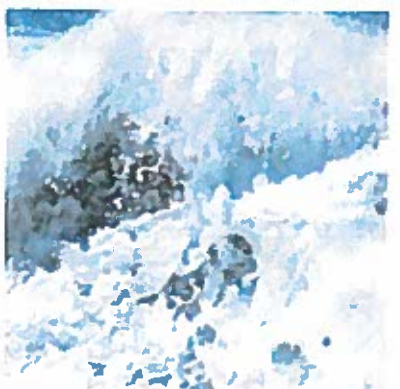


RPS

# Carnegie CETO

## Environmental Scoping

IBE0506 / June 2011





**Liscannor Bay to Mal Bay  
Environmental Scoping Study  
for  
CETO Wave Energy Ireland Ltd.**

## **DOCUMENT CONTROL SHEET**

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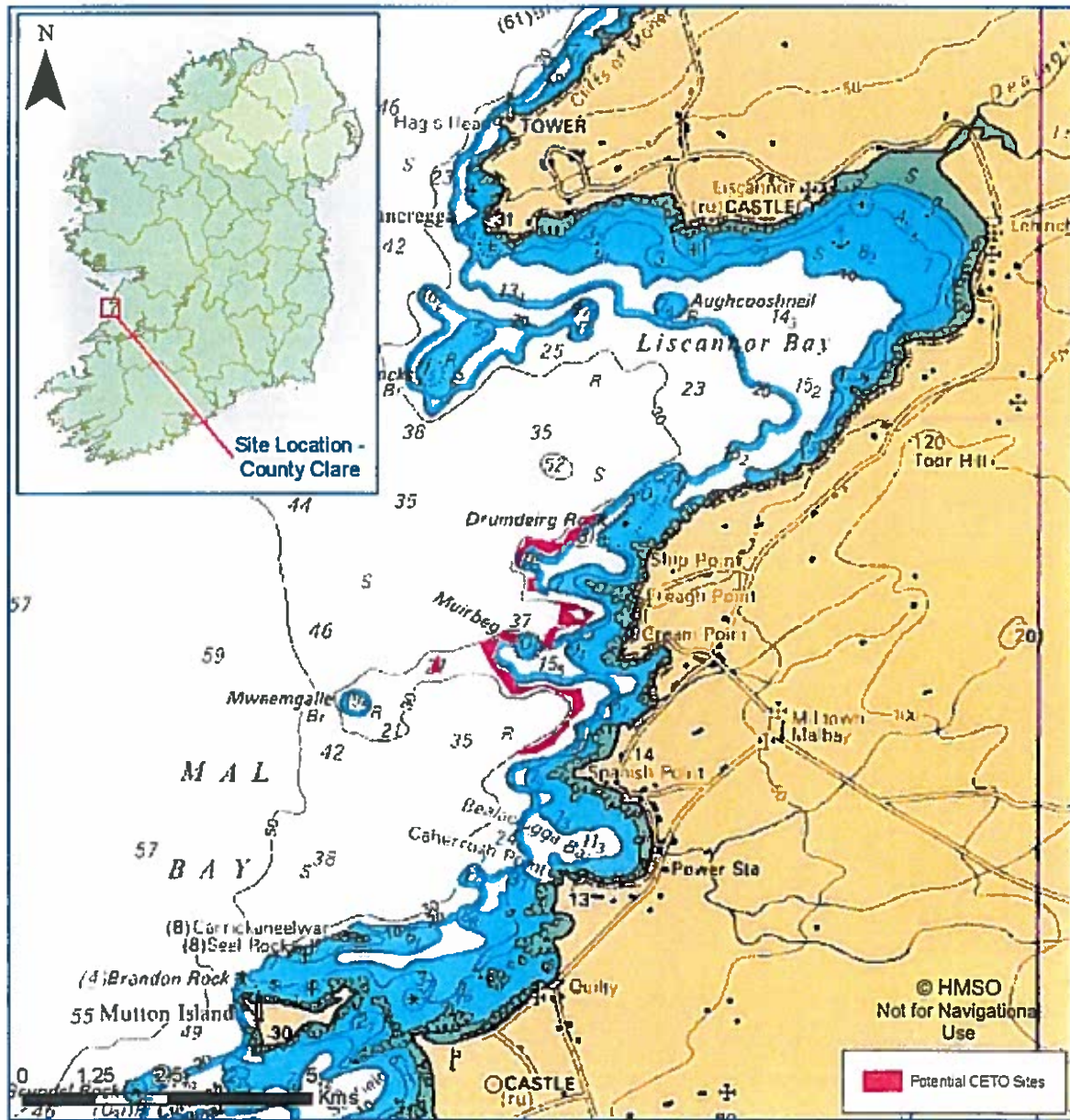
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# 1 INTRODUCTION

Following on from the Stage 1 Site Assessment Study RPS have been commissioned by Carnegie Wave Energy Ltd (Carnegie), through its Irish subsidiary CETO Wave Energy Ireland Ltd (CWE Ireland), to carry out an environmental scoping study on the area between Liscannor Bay and Mal Bay on the County Clare coastline in Ireland. This area was identified as a favoured section of coastline as it met the site requirements for the CETO technology and has a relatively low level of environmental and infrastructural constraints directly intersecting potential site areas. The potential CETO sites outlined in the Stage 1 Assessment are shown in Figure 1.1. These potential areas form the central focus of this environmental scoping study, with a wider geographic area identified by a 15km buffer being taken into consideration.

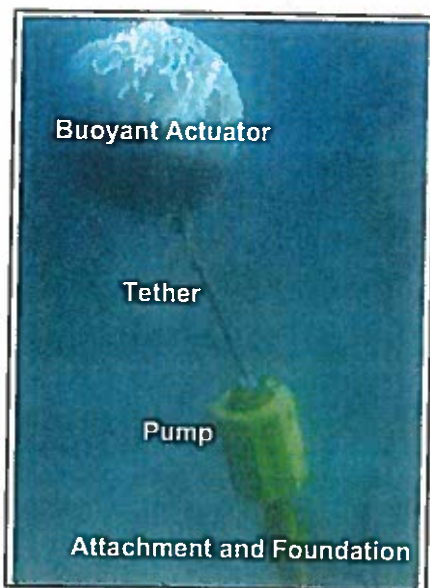
Figure 1.1: Potential CETO sites, Liscannor Bay to Mal Bay



## 2 PROJECT DESCRIPTION

The name CETO comes from the primordial sea goddess in Greek mythology. The modern day CETO technology is an offshore wave energy device being developed by Carnegie in Western Australia. The CETO unit consists of a buoyant actuator that is tethered to a seabed mounted pump that transfers pressurised fluid to shore in a sealed hydraulic network to drive a Pelton Wheel Turbine and electrical generator. **Figure 2.1** provides an overview of the CETO technology, while **Plate 2.1** gives a photograph of the CETO2 one-third scale unit, and **Plate 2.2** gives a photograph of a commercial scale buoyant actuator.

Plate 2.1 CETO2 Unit off Fremantle, Western Australia



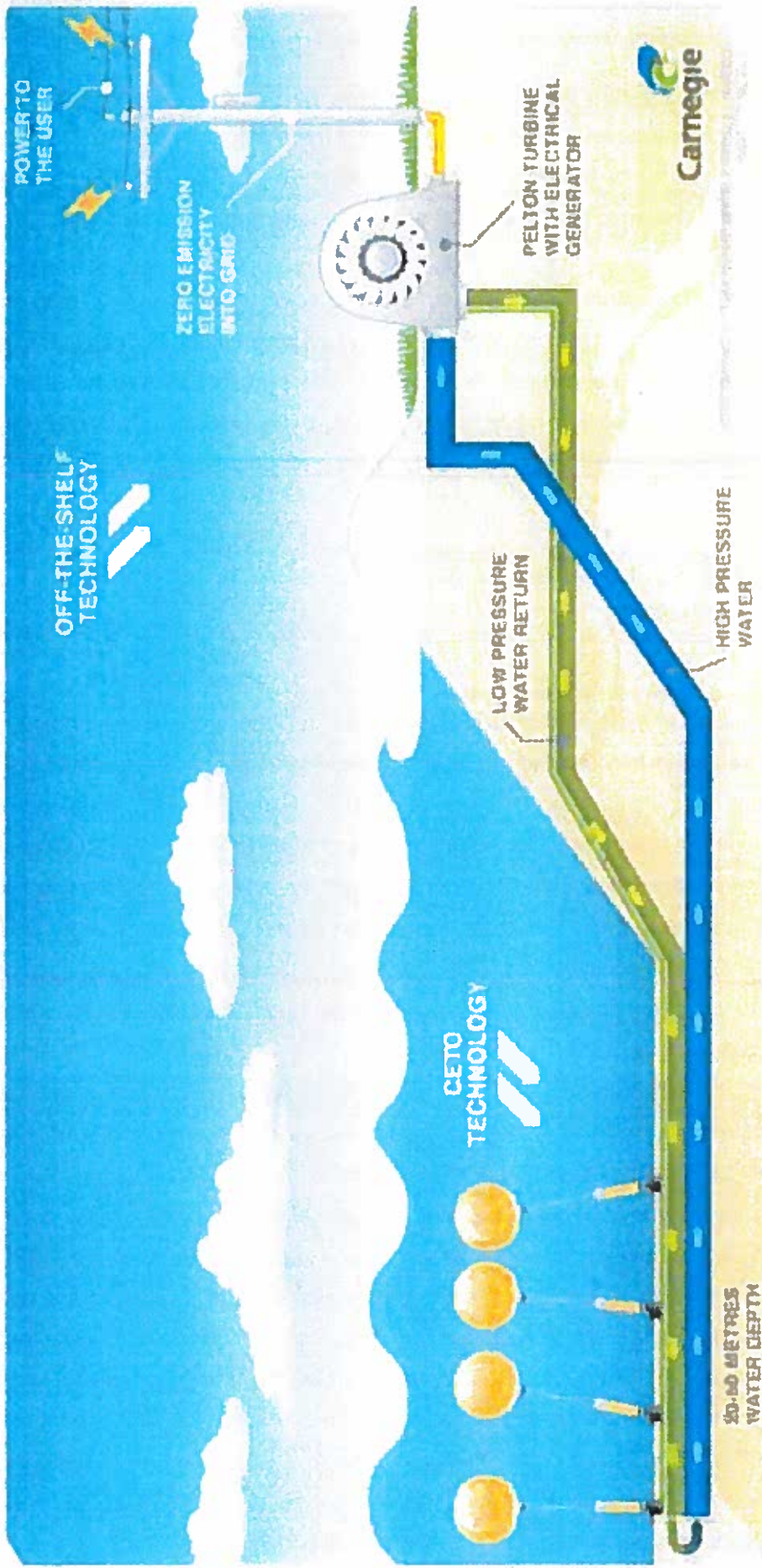
- **Buoyant Actuator** – Absorbs wave energy to drive seabed pump. Fully submerged. Made of steel and plastic.
- **Tether** - Transfers energy from the BA to the pump. Specially designed synthetic rope. Specific stretch and strength characteristics.
- **Pump** – Converts wave energy into hydraulic energy. Adapted from commercially proven designs. Proven sub-sea performance.
- **Attachment and Foundation** – although the CETO unit moves with the wave motion, the system is fixed to the sea bed via appropriate methods (site specific).

• Plate 2.2 Commercial Scale Buoyant Actuator



- The buoyant actuator is the energy collection system of the CETO technology.
- It is a spherical structure 7m in diameter and 5m high.
- It is manufactured primarily from steel and weighs around 25 tonnes.
- The buoyancy is provided by both internal fixed and variable buoyancy
- In operation, the BA will typically sit one to two metres below the ocean surface.
- The BA contains a proprietary system within it to reduce energy in very high wave energy climates

Figure 2.1. Overview of the CETO technology



The CETO units are fully submerged and permanently anchored to the sea floor. They are self-tuning to tide, sea state and wave pattern, making them able to perform in a wide variety of wave heights and are not sensitive to wave direction. The CETO units are manufactured primarily from steel, proven to last for over 20 years in a marine-environment.

By delivering high pressure water ashore, the technology allows either zero-emission electricity to be produced (similar to hydroelectricity) or zero-emission freshwater (utilising standard reverse osmosis desalination technology). The system can also be used for co-production of zero-emission electricity and freshwater. By transferring pressurised fluid ashore for power generation this removes the need for undersea grids or high voltage transmission to shore.

## 2.1 CETO IN IRELAND

Carnegie are looking at the potential of deploying the CETO wave power technology off the west coast of Ireland to harness the strong and consistent Atlantic swells. While the CETO wave technology is quite flexible in terms of operational requirements there are optimal operational conditions, such as water depth and wave climate for most efficient operation. RPS have carried out a Stage 1A GIS based strategic site assessment of the west coast of Ireland to find areas that are suitable for deployment of the CETO technology. Following this, a Stage 1B GIS site constraints modeling exercise was carried out to give each of these potential CETO sites a relative suitability rating based on available environmental and infrastructural data.

Carnegie aim to establish a 5MW pre-commercial demonstration project in Ireland, potentially within one of the areas identified by the site assessment study. The demonstration site as considered in this study is between *Liscannor Bay* and *Mal Bay* on the County Clare coast. The proposed development consists of an array of approximately 30 to 40 CETO units installed in water depths of 25 to 30m. The array is expected to be three rows deep with CETO units positioned at 20m intervals across and perpendicular to the wave front. The submerged offshore CETO array would occupy approximately 2 to 3 hectares of seafloor. A high pressure pipeline will deliver freshwater based fluid to shore for subsequent electricity generation, with a low pressure pipeline returning the freshwater back to the offshore units for re-pressurisation. The onshore power generation is likely to consist of off the shelf Pelton Wheel turbines and generators connected to the local electricity grid.



### 3 RELEVANT ENVIRONMENTAL LEGISLATION

Environmental legislation, plans, policies and programmes which may be relevant to the proposed CETO development in the area of Liscannor Bay to Mal Bay are given in Tables 3.1 to 3.4.

**Table 3.1: Legislation, Plans, Policies and Programmes – International**

Topic	Title	Summary of Objectives
Biodiversity	UN Convention on Biological Diversity (1992)	Objectives include the maintenance and enhancement of Biodiversity.
	The Ramsar Convention The Convention on Wetlands of International Importance (1971 and amendments)	Objectives include protection and conservation of wetlands, particularly those of importance to waterfowl as Waterfowl Habitat.
Climate	UN Kyoto Protocol The United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol 1997	Objectives seek to alleviate the impacts of climate change and reduce global emissions of GHGs.
Cultural Heritage, including Architectural and Archaeological Heritage	The World Heritage Convention - United Nations Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972)	Objectives seek to ensure the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage and ensure that effective and active measures are taken for these.

**Table 3.2: Legislation, Plans, Policies and Programmes - European Union**

Topic	Title	Summary of Objectives
Air	The Air Framework Directive Directive on Air Quality Assessment and Management (Framework Directive) (1996/62/EC)	Objectives include the prevention and/or reduction of airborne pollutants for the protection of human health and environment.
	Directive on National Emission Ceilings for Certain Atmospheric Pollutants (2001/81/EC)	Objectives seek to limit the national emissions of certain airborne pollutants for the protection of human health and the environment.
Biodiversity	The EU Biodiversity Strategy Communication on a European Community Biodiversity Strategy	Objectives seek to prevent and eliminate the causes of biodiversity loss and maintain and enhance current levels of biodiversity.
	The EU Habitats Directive (92/43/EEC)	Objectives seek to prevent and eliminate the causes of habitat loss and maintain and enhance current levels of biodiversity.
	The EU Birds Directive (as modified) (EC/79/409)	Objectives seek to prevent and eliminate the causes of bird species loss and maintain and enhance current levels of biodiversity.

Topic	Title	Summary of Objectives
Climate	Second European Climate Change Programme (ECCP II) 2005.	Objectives seek to develop the necessary elements of a strategy to implement the Kyoto protocol.
	Adapting to climate change in Europe – options for EU action (SEC (2007) 849)	Objective is to kick-start a Europe-wide public debate and consultation on how to take forward possible avenues for action in adapting to climate change at EU level.
Cultural Heritage, including Architectural and Archaeological Heritage	Convention for the Protection of the Archaeological Heritage of Europe (revised) (Valletta 1992)	Objective is to protect the archaeological heritage as a source of the European collective memory and as an instrument for historical and scientific study.
	Convention for the Protection of the Architectural Heritage of Europe (Granada 1985)	Objectives seek to provide a basis for protection of architectural heritage and are a means for proclaiming conservation principles, including a definition of what is meant by architectural heritage, such as monuments, groups of buildings and sites. The Convention also seeks to define a European standard of protection for architectural heritage and to create legal obligations that the signatories undertake to implement.
Environment	EIA Directive (85/337/EEC)	Objective is to require Environmental Impact Assessment of the environmental effects of those public and private projects, which are likely to have significant effects on the environment.
Landscape	European Landscape Convention (ETS No. 176), Florence, 20 October 2000	The Convention promotes the protection, management and planning of European landscapes and organises European co-operation on landscape issues.
Major Accident Hazards	Control of Major Accident Hazards involving Dangerous Substances (96/82/EC)	Directive 96/82/EC on the control of major accident hazards involving dangerous substances (the COMAH Directive) came into force on 3 February 1999 and supersedes Directive 82/501/EEC on the control of major accident hazards of certain industrial activities (Seveso Directive).
Water	Bathing Water Directive 2006/7/EC	The overall objective of the revised Directive remains the protection of public health whilst bathing, but it also offers an opportunity to improve management practices at bathing waters and to standardise the information provided to bathers across Europe.
	The Water Framework Directive EU Water Framework Directive (2000/60/EC)	Objectives seek to maintain and enhance the quality of all surface waters in the EU.
	Groundwater Directive (2006/118/EC)	This directive establishes a regime, which sets underground water quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater.

Table 3.3: Legislation, Plans, Policies and Programmes – Ireland

Topic	Title	Summary of Objectives
Biodiversity	The National Biodiversity Plan (2002)	Objectives include the enhancement and conservation of biodiversity. Although such issues would be dealt with at local or site level, the Plan should have regard to these objectives and promote such objectives where possible.
	The Wildlife Act 1976. The Wildlife (Amendment) Act 2000	The Wildlife Act, 1976 and the Wildlife Amendment Act, 2000 are the principal statutory provisions providing for the protection of Wildlife (both Flora and Fauna) and the control of activities which may impact adversely on the conservation of Wildlife.
	European Communities (Natural Habitats) Regulations, SI 94/1997, as amended SI 233/1998 and SI 378/2005	These Regulations give effect to Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and the Minister to designate special areas of conservation (endangered species and habitats of endangered species) as a contribution to an EU Community network to be known as NATURA 2000.
	The Fisheries Acts, 1939 to 2003 (S.I. No. 17 of 1939; S.I. No. 21 of 2003)	These acts provide for the efficient and effective management, conservation, protection, development and improvement of fisheries, hatcheries and fish farms. The bodies responsible for their implementation are the Fisheries Boards.
	Flora Protection Order 1999	Objectives include it being illegal to alter, damage or interfere in any way with their habitats. This protection applies wherever the plants are found and is not confined to sites designated for nature conservation.
	Quality of Salmonid Waters Regulations 1988 (SI 293 of 1988)	Prescribe quality standards for salmonid waters and designate the waters to which they apply, together with the sampling programmes and the methods of analysis and inspection to be used by local authorities to determine compliance with the standards. Also, give effect to Council Directive No. 78/659/EEC on the quality of fresh waters needing protection or improvement in order to support fish life
Climate	National Climate Change Strategy (2000) and National Climate Change Strategy 2007-2012	Objectives include the reduction of national GHG emissions (including those from the water sector). The Plan should give regard to these objectives and targets for reductions in CO <sub>2</sub> equivalents from the water sector. Adaptation Section of Strategy outlines predicted future trends of climate change in Ireland and proposes adaptation measures.
Cultural Heritage, including Architectural and Archaeological Heritage	National Heritage Plan 2002 - 2007	Core objective is to protect Ireland's heritage. Plan uses the "polluter pays principle" and the "precautionary principle." Sets out archaeological policies and principles that should be applied by all bodies when undertaking a development.
	The National Monuments Acts (1930 to 2004)	Objectives seek to protect monuments of national importance by virtue of the historical, architectural, traditional, artistic or archaeological interest attaching to them and includes the site of the monument, the means of access to it and any land required to preserve the monument from injury or to preserve its amenities.
	The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999	Provides for the establishment of a National Inventory of Architectural Heritage (NIAH). The objective of the NIAH is to aid in the protection and conservation of the built heritage, especially by advising planning authorities on the inclusion of particular structures in the Record of Protected Structures (RPS).
	The Planning and Development Act 2000 and amendments to the Act	Under this Act the County Councils are required to compile and maintain a Record of Protected Structures (RPS) in their Development Plans. Sites included in the RPS are awarded automatic protection and may not be demolished or materially altered without grant of permission under the Planning Acts.

Topic	Title	Summary of Objectives
	Framework and Principles for the Protection of the Archaeological Heritage (1999)	Objective is to set out for all concerned parties the basic principles and approaches for the protection of the archaeological heritage.
	Policy and Guidelines on Archaeological Excavation (1999)	Objective is to set down policy on licensing of excavations, and guidelines for licensees on strategies and method statements, reports and publications.
	Architectural Heritage Protection – Guidelines for Planning Authorities	Objective is to provide a practical guide for planning authorities and for all others who must comply with Part IV of the Planning and Development Act 2000 on the protection of the architectural heritage and support the effort of protecting Ireland's architectural heritage.
Energy	Draft Offshore Renewable Energy Development Plan	A draft plan outlining the proposed future development and exploitation of Ireland's offshore renewable energy industry.
Planning	Planning and Development Acts 2000 – 2010, and the Planning and Development Regulations 2001 (SI No 600 of 2001)	The Planning and Development Acts are the basis for the Irish planning code, setting out the detail of regional planning guidelines, development plans and local area plans as well as the basic framework of the development management and consent system. They provide the statutory basis for protecting natural and architectural heritage, carrying out of Environmental Impact Statements and the provision of social and affordable housing. The Regulations prescribe the detail of the various processes and procedures that make up the planning code and implement the Act of 2000.
	National Spatial Strategy 2002-2020 (2002)	Objectives of the NSS are to achieve a better balance of social, economic and physical development across Ireland, supported by more effective planning.
	National Development Plan 2007 to 2013	Objectives of the NDP are to promote more balanced spatial and economic development.
Sustainable Development	European Communities (Environmental Liability) Regulations 2008 (S.I. 547 of 2008)	These Regulations (SI 547 of 2008) transpose EU Directive 2004/35/CE on environmental liability with regard to the prevention and remedying of environmental damage. The purpose of these Regulations is to establish a framework of environmental liability based on the 'polluter-pays' principle, to prevent and remedy environmental damage.
Water	Sea Pollution Act 1991 (and amendment 1999).	An Act to make provision for the Prevention of Pollution of the sea by oil and other substances; and to give effect to the international convention for the Prevention of Pollution from Ships.
	Foreshore Acts 1933 - 2009	The Foreshore Acts require that a lease or licence must be obtained from the Minister for the Environment, Heritage and Local Government for the carrying out of works or placing structures or material on, or for the occupation of or removal of material from, State-owned foreshore which represents the greater part of the foreshore. Developments on privately owned foreshore also requires the prior permission of the Minister under the Foreshore Acts. (All the foreshore of Ireland is presumed state-owned unless valid alternative title is provided.)
	European Communities (Water Policy) Regulations (SI 722 of 2003)	Provide for the transposition into Irish national law of the provisions of the EU Water Framework Directive.

Table 3.4: Legislation, Plans, Policies and Programmes – Regional and Local

Topic	Title	Summary of Objectives
River Basin Management	Shannon International River Basin Management Plan	Describes existing condition of waters in the River Basin District, the objectives for improving their condition and the measures to be used to deliver these improvements.
Climate Change	Limerick Clare Climate Change Strategy	The aim of the Climate Change Strategy for Limerick and Clare is to clearly identify the solutions to the challenge of reducing energy related emissions and to outline the actions to be taken to meet the requirements under the Kyoto Protocol.
Heritage	Clare Heritage Plan 2003 - 2007	The Clare Heritage Plan aims to collect and make available heritage information, to inform public policy on heritage and support the strategic and integrated management of heritage at a local level and to demonstrate best practice in heritage conservation and raise awareness through education initiatives.
Biodiversity	Clare Biodiversity Action Plan	Outlines the aims and objectives of the Clare Biodiversity Action Plan. The associated Habitat and Species Action Plans identified specific targets for the future.
Development Control	Clare County Development Plan 2011-2017	This Clare County Development Plan 2011-2017 sets out an overall strategy for the proper planning and sustainable development of the functional area of Clare County Council over a 6 year period. One of the objectives of the Plan (CDP 10.4) is to promote and facilitate wave and tidal energy production and to seek to undertake a study during the lifetime of the Plan to investigate ocean/wave energy production in County Clare with a long term objective of facilitating such development along the County's coastline.
	North Clare Local Area Plan 2005- 2011	This document sets out an overall strategy for the proper planning and sustainable development of the North Clare Area. The County Development Plan provides objectives giving the strategic context for the settlements in the Local Plan area whilst the Local Plan is needed to deliver these objectives in the form of land zoning and settlement statements to guide development.
	Draft Clare Local Area Plan 2011 - 2017	This document sets out a overall strategy for the proper planning and sustainable development of the North Clare Area. The County Development Plan provides objectives giving the strategic context for the settlements in the Local Plan area whilst the Local Plan is needed to deliver these objectives in the form of land zoning and settlement statements to guide development.
	Draft Clare Local Area Plan SEA 2011 - 2017	The purpose of the Strategic Environmental Assessment is to provide a clear understanding of the likely environmental consequences of decisions regarding the future accommodation of development and growth within the plan area.

The key Irish legislation relating to offshore marine developments such as this, are the *Foreshore Acts 1933 – 2009*. Before the commencement of any works or activity on State-owned foreshore, a lease or license must be obtained from the relevant Minister. This relates to the carrying out of works or placing of structures or materials on, or for the occupation of or removal of material from State-owned foreshore which represents the greater part of the foreshore. Developments on privately owned foreshore also require the prior permission of the Minister under the Foreshore Acts.

All the foreshore of Ireland is presumed state-owned unless valid alternative title is produced. The foreshore is the seabed and shore below the line of high water of ordinary or medium tides and extends outwards to the limit of 12 nautical miles (or 22.224 km). Applications for foreshore licences or leases are separate from terrestrial planning applications and are granted subject to the payment of fees. The relevant Minister has absolute discretion to accept or reject a proposal to use state-owned foreshore.

- A Foreshore Lease is generally required for the long term construction and operation of an intended project that requires exclusive occupation of the foreshore (e.g., piers, marinas, bridges, roads, and offshore wind farms). Such structures would generally preclude the use of that part of the foreshore for other purposes;
- A Foreshore License is generally required to investigate the suitability of a site for an intended project or for other works (e.g., laying of submarine pipelines and cables) or for development that does not require exclusive occupation of the foreshore. Such activities/development would not generally preclude the use of that part of the foreshore for other purposes.

Following on from the enactment of the *Foreshore and Dumping at Sea (Amendment) Act 2009*, responsibility for certain foreshore functions has transferred to the Minister for the Environment with effect from 15th January 2010. This includes all foreshore offshore energy related developments including – oil, gas, wave, wind and tidal energy. In October 2010 the Minister for the Environment announced a review to the foreshore licensing process, with the aim of producing a more streamlined single stage consent process for project approval, which would be under the responsibility of An Bord Pleanála. However no subsequent official information has been released on this as yet.

The provisions of European Directive 2003/35/EC, known as the Public Participation Directive or PPD, apply to all foreshore consent applications under the Foreshore Acts. This requires the preparation of an Environmental Impact Statement (EIS) by the European Communities (Foreshore) Regulations 2009 (S.I. No. 404 of 2009). These regulations provide an enhanced level of public participation and information sharing on environmental matters. Obligations under the Regulations apply to both the Applicant and the Minister in terms of ensuring appropriate public consultation in respect of the consent application occurs. The *Planning and Development (Amendment) Act 2010* also advises the requirement for any application for the development of the foreshore, to which section 176 of the Planning and Development Regulations apply, to be accompanied by an EIS.

As there is also a land side component to this project, which is occurring above the high water mark, it will also be subject to the Planning and Development Regulations 2001 (SI No 600 of 2001) and will require planning consent from either Clare County Council or An Bord Pleanála. An EIA may also be prescribed for the terrestrial components of the development, depending on issues such as the final land side development footprints, power output and location.

## 4 CONSULTATIONS

Consultation scoping letters and information packs on the proposed project were sent out to selected consultees to establish potential environmental issues to be considered in planning for the proposed development of the CETO technology. The list below demonstrates the consultees contacted:

- Department of Environment Heritage and Local Government (DEHLG) – National Parks and Wildlife Service (NPWS);
- Department of Environment Heritage and Local Government (DEHLG) – Foreshore Unit;
- Department of Communications, Energy and Natural Resources (DCENR);
- Department of Agriculture, Fisheries and Food – Aquaculture and Foreshore Management Division;
- Geological Survey of Ireland;
- Environmental Protection Agency – Office of Climate, Licensing and Resource Use;
- Marine Institute;
- Commissioners of Irish Lights;
- Maritime Safety Directorate, and
- Clare County Council – Environmental Services.

In order to accelerate this pre-planning consultation exercise RPS contacted specific individuals within these organisations to obtain responses. Following initial feedback from Clare County Council the following additional organisation was also contacted as part of this process:

- Limerick Clare Energy Agency



Full feedback responses from the environmental scoping consultations are given in Appendix A, and are summarised in Table 4.1 below.

**Table 4.1 Environmental Scoping Consultation Responses**

Organisation	Comment
Clare County Council	<p>Clare County Council recognise the enormous wave and tidal power potential in County Clare, stating the Council Development Plan Objective for Wave / Tidal Energy CDP 10.4 –</p> <p><i>To promote and facilitate wave and tidal energy production and to seek to undertake a study during the lifetime of the plan to investigate ocean / wave energy production in County Clare with a long term objective of facilitating such development along the County's Coastline.</i></p> <p>The Council recommend information that will be required in future EIA and Planning Applications, such as marine and terrestrial wildlife impacts, visual impacts, transportation assessments, heritage impacts at Freaghcastle, Appropriate Assessment for SACs south of Cleedagh Bridge, foreshore licencing for proposed marker buoys and design information requirements. The council also mention the potential for the development to come under The Strategic Infrastructure Development Act. Finally they recommended consultation with the Limerick Clare Energy Agency.</p>
Commissioners of Irish Lights	<p>Given the submerged nature of the proposed generators, their primary concern would be that the sites are adequately marked with navigation buoys, taking into account the density of leisure, fishing and commercial ferry traffic in the area. As the generators themselves are invisible there may be merit in over-specifying the site perimeter markings.</p>
DEHLG – Development Applications Unit – Nature Conservation	<p>The Development Applications Unit provides nature conservation comments on the CETO proposal. The potential development areas are adjacent to SAC's and SPA's (Natura 2000 sites), therefore are likely to be subject to an Appropriate Assessment (AA), which can be included within the EIA. Cetaceans may be present in the area and are protected under Annex IV of the Habitats Directive. Marine Mammals may be present in the area and are protected under the Wildlife Act 1976. The DAU ask under the Article 6 legislative requirements (AA) that certain information be provided with the application, such as a description of the proposal and specific baseline environmental information (e.g. information on the hydrodynamic environment, marine mammal activity and potential impact on habitats). An assessment of the likely impacts of construction, increased vessel activity, baseline surveys, and operation of the CETO device is required to be carried out and mitigation measures and monitoring will need to be proposed.</p>
DEHLG – Foreshore Unit	<p>DEHLG are currently conducting meeting/discussions with potential developers on the basis of site investigations for potential offshore renewable developments within the context of the Offshore Renewable Energy Development Plan. DEHLG would welcome the opportunity to meet with Carnegie to discuss the proposal further and to outline the policy and requirements with regard to potential renewable developments</p>

	on the foreshore. Contact details given.
DEHLG – National Monuments Service	The National Monuments Service of the DEHLG commented on the need to consult with the Underwater Archaeology Unit and to check the Record of Monuments and Places and the Inventory of Shipwrecks. They note the requirement for a Dive and Detection Device Licence to be applied for via the department for any proposed wreck diving or wreck surveying ( <a href="http://www.archaeology.ie">www.archaeology.ie</a> ). National Monuments Service recommends an underwater archaeological impact assessment will be required for the EIA and provide information on the approach to the assessment and the level of information required. It is noted that all pipelines, cables and landfall areas of the project are to be included in the assessment
Geological Survey of Ireland	Recommend data sources for information on geology and recommend a longer consultation timeframe for EIA scoping.
Marine Institute	The Marine Institute responded with numerous general issues that should be addressed in any future EIA for the development.
Maritime Safety Directorate	No comments at present however will need to be consulted further down the line on Navigational Safety issues.
NPWS – Marine Ecology	Recommend best practice guidelines for marine surveys, <a href="http://www.npws.ie/en/Marine/BestPracticeGuidelines/">http://www.npws.ie/en/Marine/BestPracticeGuidelines/</a> . Note that acoustic seafloor surveys would require the application of mitigation measures to protect marine mammals.

The following key issues were raised in the pre-planning environmental scoping consultations:

- Meetings with Carnegie on the proposal are welcomed and more consultation will be required during the planning and EIA process. A pre-application meeting with DEHLG – Foreshore Unit is advised;
- The competent authorities should be consulted with regards to planned surveys and studies that will be undertaken for the proposal. Licensing from the competent authorities will be required for many of the required surveys and studies;
- The proposal will require an Environmental Impact Statement to accompany the foreshore licence and planning application. The EIA will be required to include site specific and CETO technology specific information to enable a full assessment to be made of potential impacts;
- There is the potential for impacts on adjacent Natura 2000 sites, SACs and SPAs, therefore there is likely to be a requirement for an Article 6 Assessment (Appropriate

Assessment). This can however be incorporated within the Environmental Impact Statement;

- There is the potential for impacts on protected cetaceans and other marine mammals in the area during surveys, construction and operation of the proposal. These potential impacts will need assessed and monitored;
- There is the potential for underwater and terrestrial impacts on known and currently undiscovered archaeological heritage in the area, and
- Adequate navigational marking will be essential for health and safety of local marine traffic.

## 5 ENVIRONMENTAL SENSITIVITIES

The following section summarise the main environmental designations and sensitive areas within 15 kilometres of the identified potential CETO sites between Liscannor Bay and Mal Bay (the study area).

### 5.1 INTERNATIONAL & EUROPEAN DESIGNATIONS

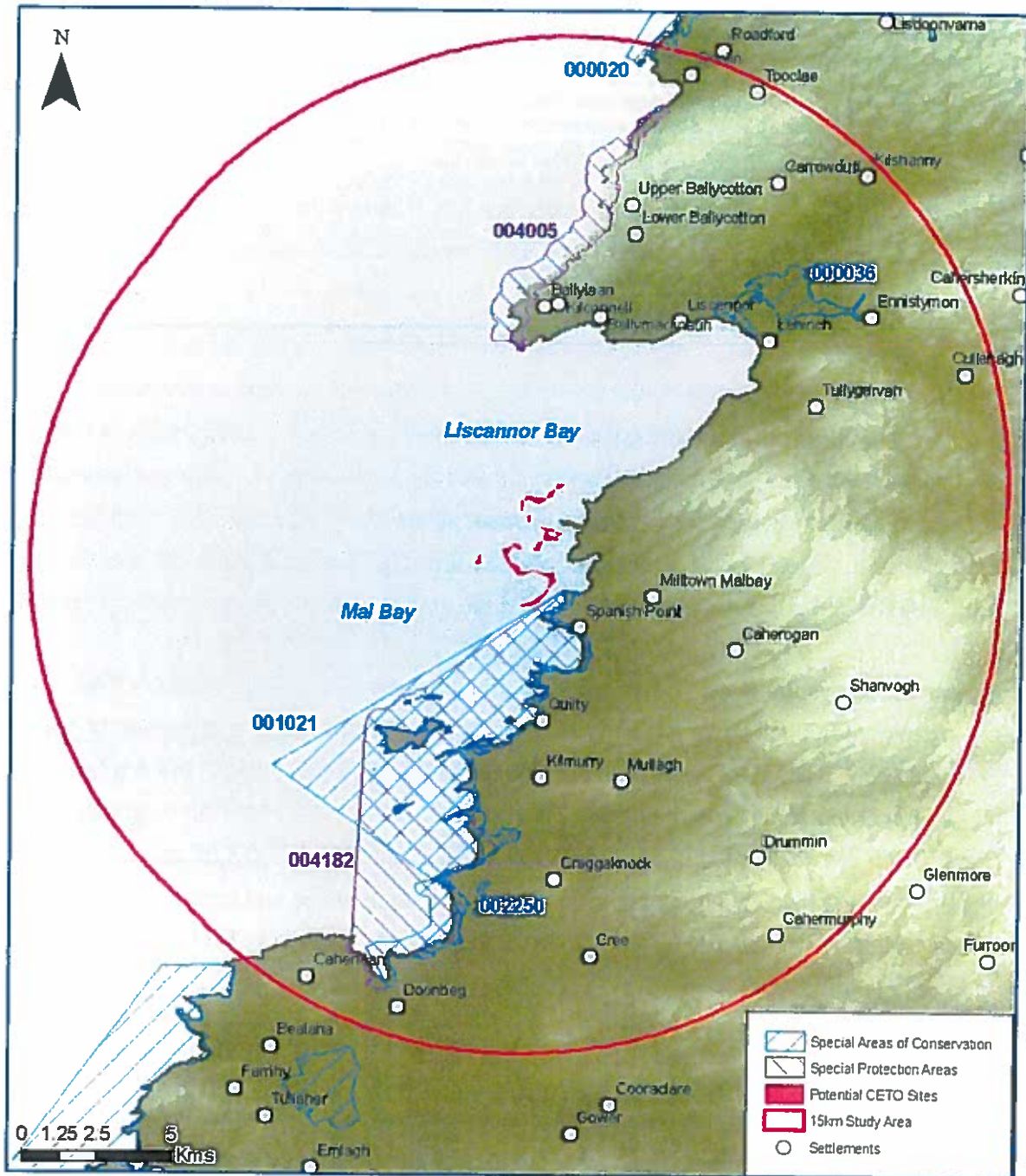
Figure 5.1 shows the European environmental designations (Natura 2000 sites) within the vicinity of the study area. There are no international designations, such as UNESCO World Heritage Sites (WHS), within this area.

There are four Special Areas of Conservation (SACs) that intersect the study area. SACs are designated under the Habitats Directive (92/43/EEC), and are enacted in Ireland by the European Communities (Natural Habitats) Regulations, SI 94/1997, as amended by SI 233/1998 and SI 378/2005. These areas will contain rare and vulnerable habitats and/or species of European importance. A summary of these SACs and their main qualifying features (annexed habitats and species) is given in Table 5.1.

Table 5.1: SACs in the Study Area

Name	Code	Qualifying Features
Black Head - Poulisallagh Complex SAC	SY000020	<u>Annex I Habitats:</u> (3260) Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation, (4060) Alpine and Boreal heaths, (5130) <i>Juniperus communis</i> formations on heaths or calcareous grasslands, (6210) Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco Brometalia</i> )(*important orchid sites), (6510) Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> ), (7220) Petrifying springs with tufa formation ( <i>Cratoneurion</i> ), (8240) Limestone Pavements, (1170) Reefs, (8330) Submerged or partly submerged sea caves, (1220) Perennial vegetation of stony banks. <u>Annex II Species:</u> (1395) Petalwort <i>Petalophyllum ralfsii</i>
Inagh River Estuary SAC	SY000036	<u>Annex I Habitats:</u> (1310) <i>Salicornia</i> and other annuals colonising mud and sand, (1330) Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> ), (1410) Mediterranean salt meadows ( <i>Juncetalia maritimi</i> ), (2120) Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes), (2130) Fixed coastal dunes with herbaceous vegetation (grey dunes).
Carrowmore Point to Spanish Point and Islands SAC	SY001021	<u>Annex I Habitats:</u> (1170) Reefs, (1150) Coastal Lagoons, (1220) Perennial vegetation of stony banks, (7220) Petrifying springs with tufa formation ( <i>Cratoneurion</i> ).
Carrowmore Dunes SAC	SY002250	<u>Annex I Habitats:</u> (2130) Fixed dunes with herbaceous vegetation ('grey dunes'), (2120) Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes'), (2110) Embryonic shifting dunes, (1170) Reefs. <u>Annex II Species:</u> (1014) Narrow mouth Whorl Snail <i>Vertigo angustior</i>

Figure 5.1: Natura 2000 Sites in the Study Area



There are two Special Protection Areas (SPAs) that intersect the area of interest. SPAs are designated under The EU Directive on the Conservation of Wild Birds (EC/79/409), "The Birds Directive", as areas that are important for rare and vulnerable bird species as they use them for breeding, feeding, wintering or migration. A summary of these SPAs and their main qualifying features is given in Table 5.2. Together the SACs and SPAs throughout Europe form the Natura 2000 network.

Table 5.2: SPAs in the Study Area

Name	Code	Qualifying Features
Cliffs of Moher SPA	SY004005	The site qualifies under the E.U. Birds Directive, of special conservation interest for the following species: Chough, Fulmar, Kittiwake, Guillemot, Razorbill and Puffin. The site is also of special conservation interest for holding an assemblage of over 20,000 breeding seabirds.
Mid Clare Coast SPA	SY004182	The site qualifies under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Barnacle Goose, Ringed Plover, Sanderling, Purple Sandpiper, Dunlin and Turnstone. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The Convention on Wetlands in Ramsar, Iran (1971), called the "Ramsar Convention", is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance. These designations are known as Ramsar sites. There are no Ramsar sites within the study area.

## 5.2 NATIONAL DESIGNATIONS

Figure 5.2 shows the National designations that intersect the area of interest. These have been designated under Irish legislation for environmental protection and consist of Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs). There are two NHAs that intersect the study area, being the Slievecallan Mountain Bog and the Cragnashingaun Bogs, which are designated under The Wildlife (Amendment) Act 2000, as areas considered important for the habitats present or which holds species of plants and animals whose habitat needs protection (NPWS 2011). A summary of these NHAs is given in Table 5.3.

Table 5.3: NHAs in the Study Area

Name	Code	Site Synopsis Summary
Slievecallan Mountain Bog NHA	02397	Slievecallan Mountain Bog NHA is a good example of an upland blanket bog. The site supports a diverse range of flora and fauna and is one of few intact areas of blanket bog in this part of the country. The mountain is a significant landmark in the locality and is of high scenic value. Blanket bog habitat is a globally scarce resource, being largely confined to coastal regions at temperate latitudes with cool, wet, oceanic climates. North-west Europe contains some of the best-developed areas of blanket bog in the world. The most extensive areas are found in Ireland and Britain. Upland blanket bogs, due to their exposure to severe climatic conditions at high elevations, are particularly vulnerable to erosion by human activities and extensive areas are currently undergoing active erosion due mainly to overgrazing. The current area of intact upland blanket bog in Ireland represents only a fraction of the original resource, due to the combined impacts of afforestation and overgrazing, and intact examples are therefore extremely valuable for nature conservation. Long-term survival of upland blanket bog requires sensitive management.

Cragnashingaun Bogs NHA	02400	Cragnashingaun Bogs NHA is a good example of both upland and lowland blanket bog in an area of the country where bog habitat is scarce. The site supports a diversity of flora and fauna within a range of blanket bog microhabitats. Blanket bog habitat is a globally scarce resource and is largely confined to coastal regions with cool, wet, oceanic climates at temperate latitudes. North-west Europe contains some of the best developed areas of blanket bog in the world. The most extensive areas are found in Ireland, Britain and Iceland. Lowland blanket bog comprises less than 3% of the world's peatlands. In Europe this type of blanket bog is restricted to Ireland, Britain, Norway and Iceland. The lowland blanket bog that occurs in Ireland is considered to be an extreme hyperoceanic variant of the habitat type, found nowhere else in the world except on the coastal fringes of north-west Scotland.
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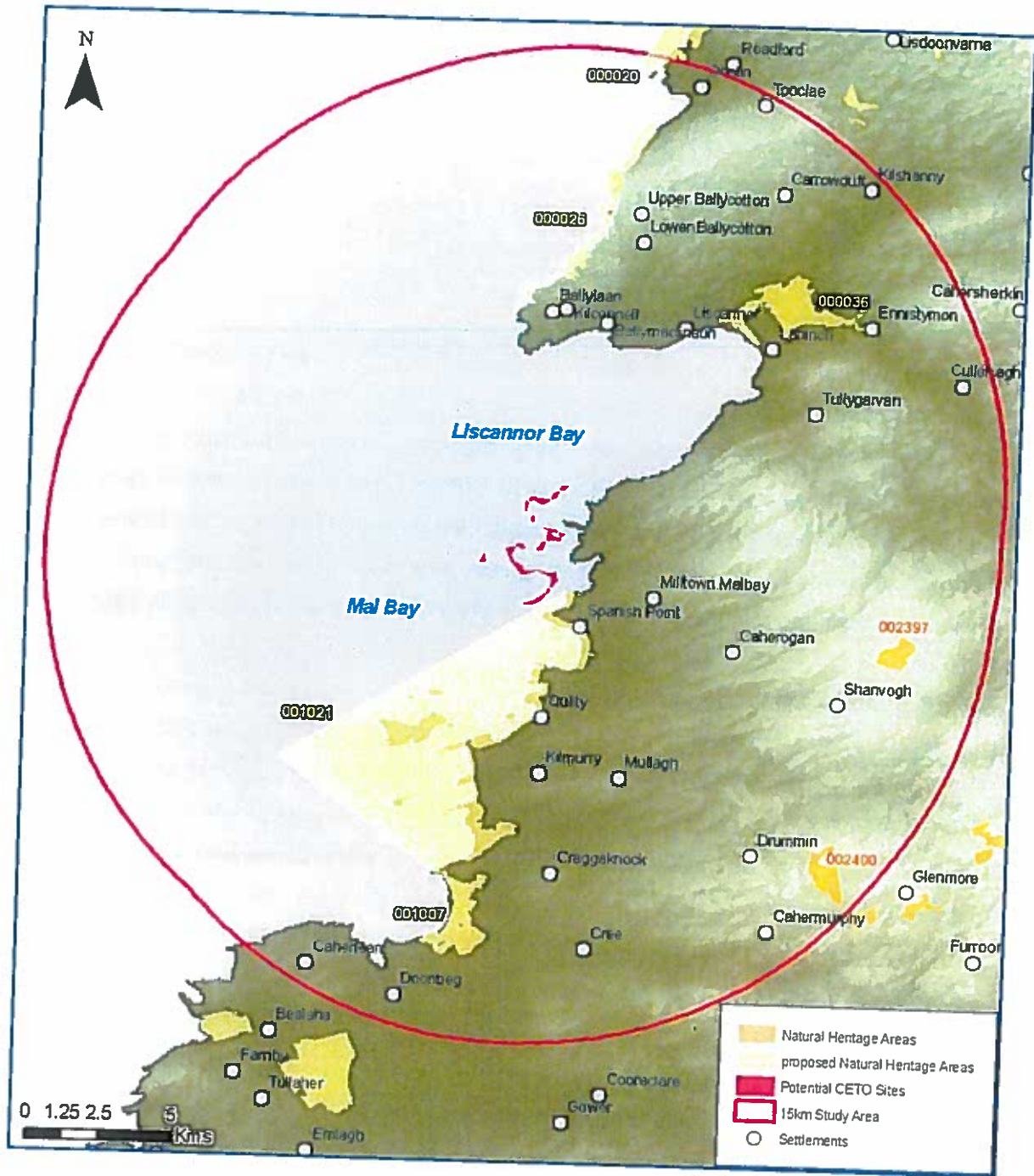
Proposed Natural Heritage Areas (pNHAs) are sites of significance for wildlife and habitats that have not been statutorily proposed or designated. Prior to being adopted as NHA's they are subject to limited protection, such as being recognised by Planning and Licensing Authorities as being areas of ecological value (NPWS, 2011). There are five pNHA's that intersect the study area, being the Black Head - Poulisallagh Complex, the Cliffs of Moher, Carrowmore Point to Spanish Point and Islands, the Inagh River Estuary and the White Strand / Carrowmore Marsh. A summary description of these pNHA's is given in Table 5.4.

Table 5.4: pNHA's in the Study Area

Name	Code	Description
Black Head - Poulisallagh Complex pNHA	000020	No site synopsis available from NPWS
Cliffs of Moher pNHA	000026	No site synopsis available from NPWS
Carrowmore Point to Spanish Point and Islands pNHA	001021	No site synopsis available from NPWS
Inagh River Estuary pNHA	000036	No site synopsis available from NPWS
White Strand / Carrowmore Marsh pNHA	001007	No site synopsis available from NPWS

There are six National Parks within Ireland, none of which are within the study area. The closest is the Burren National Park, which is 30kms north east of the Potential CETO sites. The study area also does not overlap with any Nature Reserves, with the nearest site being Dromore Nature Reserve which is over 30kms east of the Potential CETO sites.

Figure 5.2: NHA and pNHA Sites in the Study Area



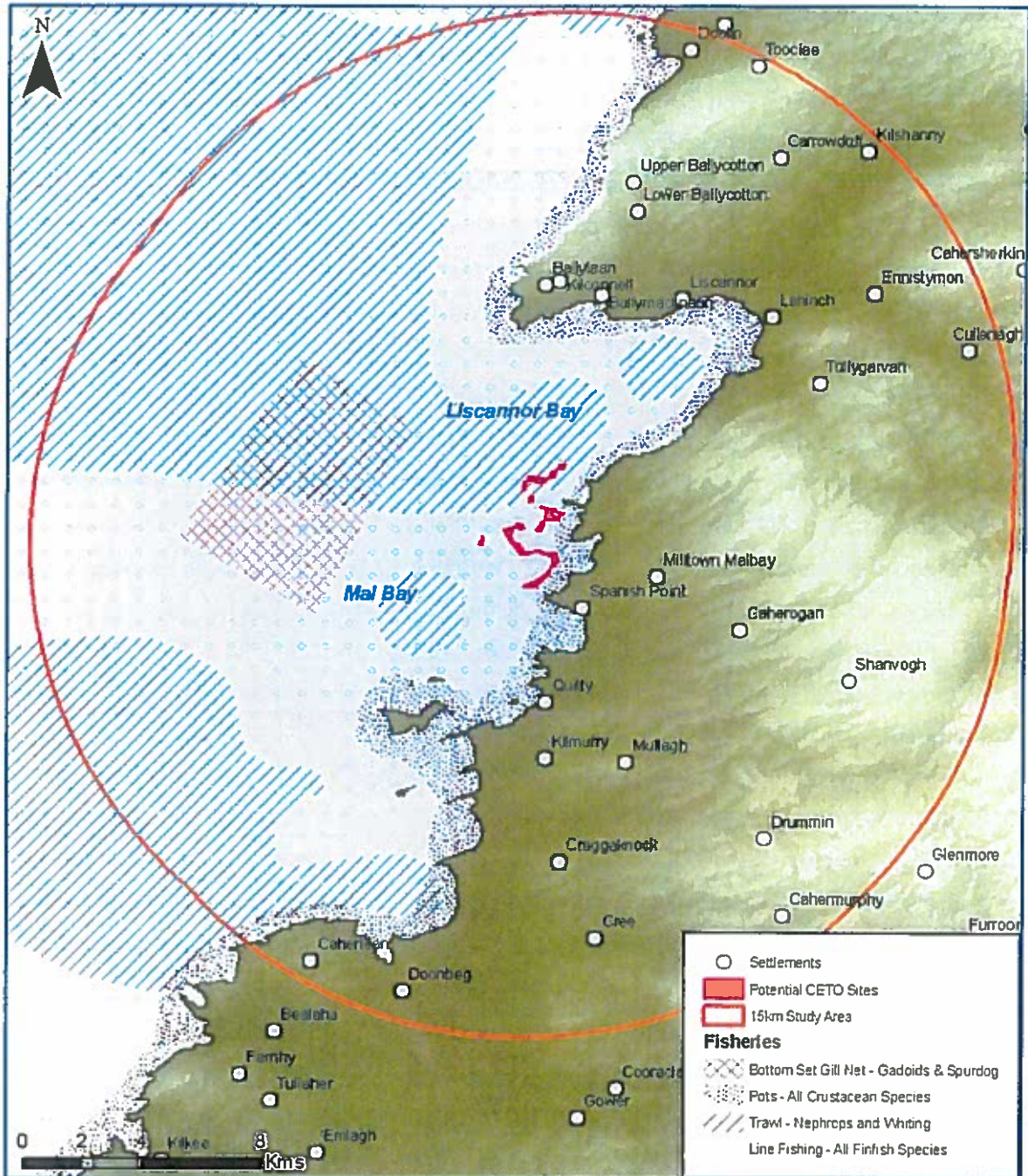
### 5.3 FISHERIES

Figure 5.3 shows the main fishing types and targets within the study area. Trawling for nephrops and whiting, and potting for crustaceans would be the most predominant fishing activities in the area of the potential CETO development. There is also a large area to the west of Spanish Point which is used for bottom set gill nets for Gadoids (cod and hake) and



Spurdog (Dogfish) (Marine Institute, 2007). There are no commercial fishing ports or harbours within the study area.

Figure 5.3: Main Fishing Activities in the Study Area



## 5.4 MARINE MAMMALS

As mentioned previously in **Section 4** there is the potential for cetaceans and other marine mammals to be present within the area identified for the proposed CETO deployment. Cetaceans are protected under Annex IV of the Habitats Directive, while marine mammals are protected under the Wildlife Act 1976. The Irish Whale and Dolphin Groups' (IWDG) database of marine megafauna sightings over the past 10 years off the Irish coastline shows there to have been Bottlenose Dolphin and Harbour Porpoise activity within the vicinity of the potential CETO areas. These sightings have been of individuals or couples of cetaceans, but no sightings have been reported of large pods in the immediate area. Within the study area there have been far more sightings and greater group numbers, mainly of Bottlenose Dolphins, spotted deeper within Liscannor Bay and off the Cliffs of Moher. The greatest number of sightings and the largest group numbers of marine megafauna recorded in the area are off Doolin Point and the Aran Islands (South Sound) to the north of the study area, and off Kilkee to the south of the study area. In the South Sound area there have been numerous sightings of Bottlenose Dolphins, Common Dolphins and Rissos Dolphins, Harbour Porpoises, Basking Sharks and Minke Whales. Offshore of Kilkee there have been sightings of Bottlenose Dolphins, Common Dolphins, Basking Sharks, Humpback Whales and Minke Whales. It is likely that many of these protected marine megafauna will pass through the potential CETO deployment areas from time to time; and their low level of sightings is more due to a lack of spotting activity within the area, rather than a lack of marine megafauna.

## 5.5 WATER QUALITY

River Basin Management Plans (RBMPs) have been published for all the River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive (WFD). The potential CETO development area is within the Shannon International River Basin District. These potential development areas are split between two coastal waterbodies, being the Liscannor Bay coastal waterbody (IE\_SH\_100\_0000) and the Shannon Plume coastal waterbody (IE\_SH\_070\_0000). The overall water status (chemical and ecological quality) of these two coastal waterbodies is currently undetermined. Liscannor Bay has however been classified as being category 2b, 'Not at Risk' of not achieving good ecological or good chemical status/potential at least by 2015. The Shannon Plume was classified as being category 1a, 'At Risk' of not achieving good ecological or good chemical status/potential at least by 2015. The Shannon Plume does however cover the entire west coast of County Clare from Loop Head in the south, to Black Head at Galway Bay

in the north, therefore is likely to be influenced by many activities outside the CETO study area.

The surface waterbodies at Spanish Point and north of Cleedagh are coastal interbasins, so have not been subject to sampling and analysis to establish water status. The Carrowkeel River waterbody (IE\_SH\_28\_410) which runs from Drumbaun in the east to Milltown Malbay in the west is however classified as being of MODERATE status in 2009, with an overall objective for 2015 of RESTORE to Good Status. The waterbody was classified as being 2b, 'Not at Risk' of not achieving good ecological or good chemical status/potential at least by 2015.

The beaches at Travaun (also known as White Strand Milltown Malbay) and Lahinch are Blue Flag beaches, meaning they comply with the 32 criteria, which cover the aspects of environmental education and information, water quality, environmental management, and safety and services. Spanish Point has previously been held Blue Flag status, however it did not meet the criteria in recent years.

## 5.6 GEOLOGY & HYDROGEOLOGY

Figure 5.4 shows the land side Bedrock geology present in the study area, surveyed at 1:100,000 scale. The most predominant geological unit in the area, covering about 75% of the study area, is Sandstone, Siltstone and Mudstone of the Central Clare Group. The next most prominent geological formation within the study area is the Grey Siltstones and Sandstones of the Gull Island Formation, which make up about 24% of the study area. The remaining 1% of the study area is made up of Cherty Limestone (crinoidal intervals), Mudstone (Cherty at base) and Mudstone, Siltstone and Sandstone of the Shannon Group. The bedrock geology of the land mass closest to the potential CETO sites is comprised of Sandstones, Siltstones and Mudstones of the Central Clare Group, with a finger of Mudstone, Siltstone and Sandstone of the Shannon Group at the Cream point / Travaun area.

The Clare County geological site report outlines the coastline from Spanish Point to the beach at Spanish Point town as being potentially of National Importance under the Irish Geological Heritage Programme (IGH) of the Geological Survey of Ireland, under the IGH 9 Upper Carboniferous and Permian theme. The site is described as consisting of well-bedded sandstones, siltstones and mudstones of the Upper Carboniferous (Namurian) Central Clare Group. Sedimentary structures are well preserved here and include cross-bedding, cross-

laminations and symmetrical wave ripples. Some of the thicker sandstone units have undergone segmentation, or boudinage, as a result of the extensional forces exerted on the limbs of folds during the Variscan Orogeny. A marine band is present on the north side of the Spanish Point bay, with a prominent palaeosol horizon 2.5m below it stratigraphically, with rootlets, dessication cracks etc. This represents a higher ground area between deltaic channels, exposed above water when the sediments were accumulating (GSI, 2005). Gley soils dominate much of the Malbay coastline, with occasional peat deposits and brown podzolics further inland.

Figure 5.4: Bedrock Geology in the Study Area

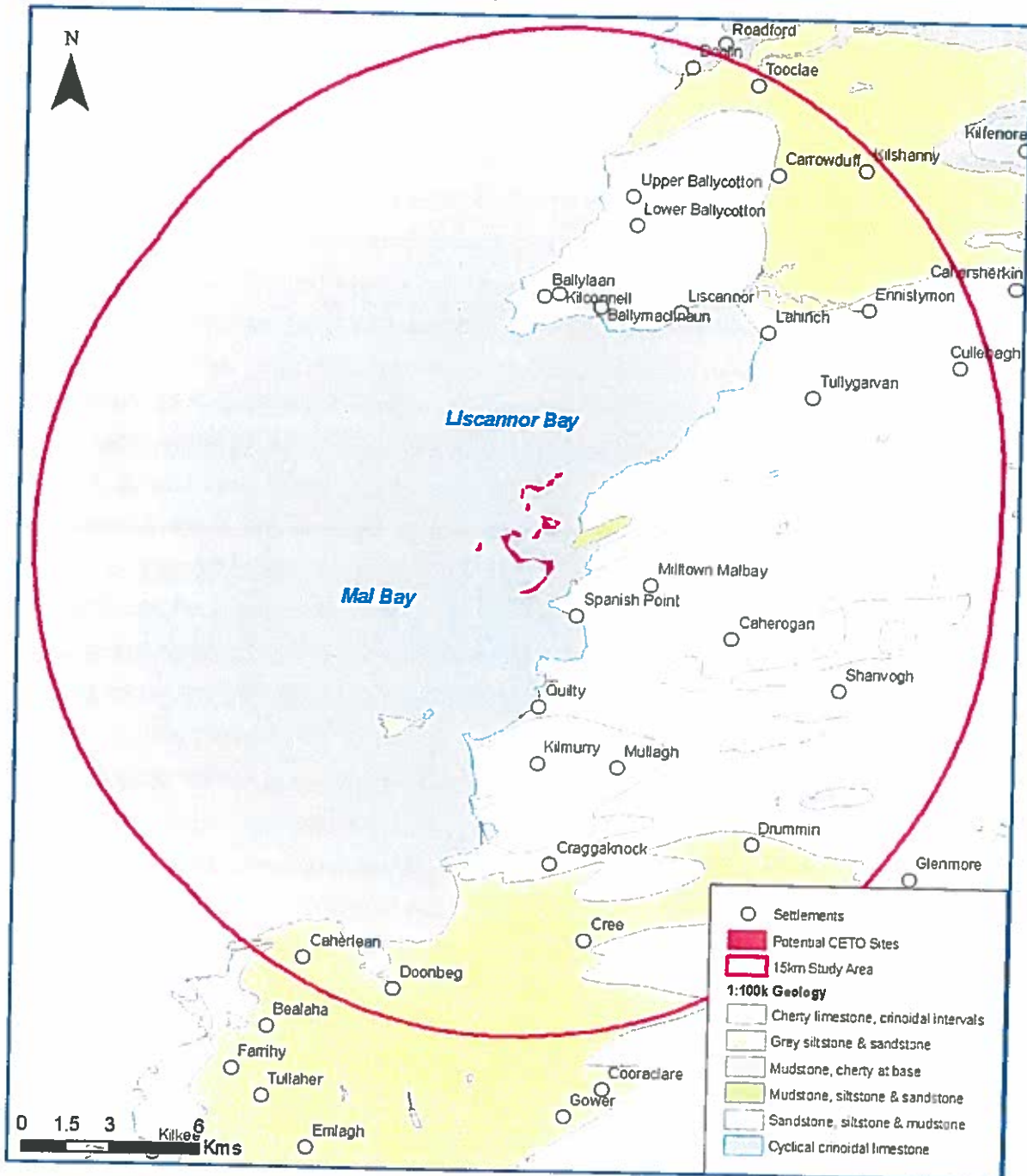


Figure 5.5 shows the aquifer classifications in the study area. These classifications are based on the hydrogeological characteristics and on the value of the groundwater resource. The aquifer classification definitions are given in Table 5.5. The area of interest is almost all of aquifer type LI, so is of bedrock which is moderately productive only in local zones. There are no groundwater source protection areas within the study area.

Figure 5.5: Aquifers in the Study Area

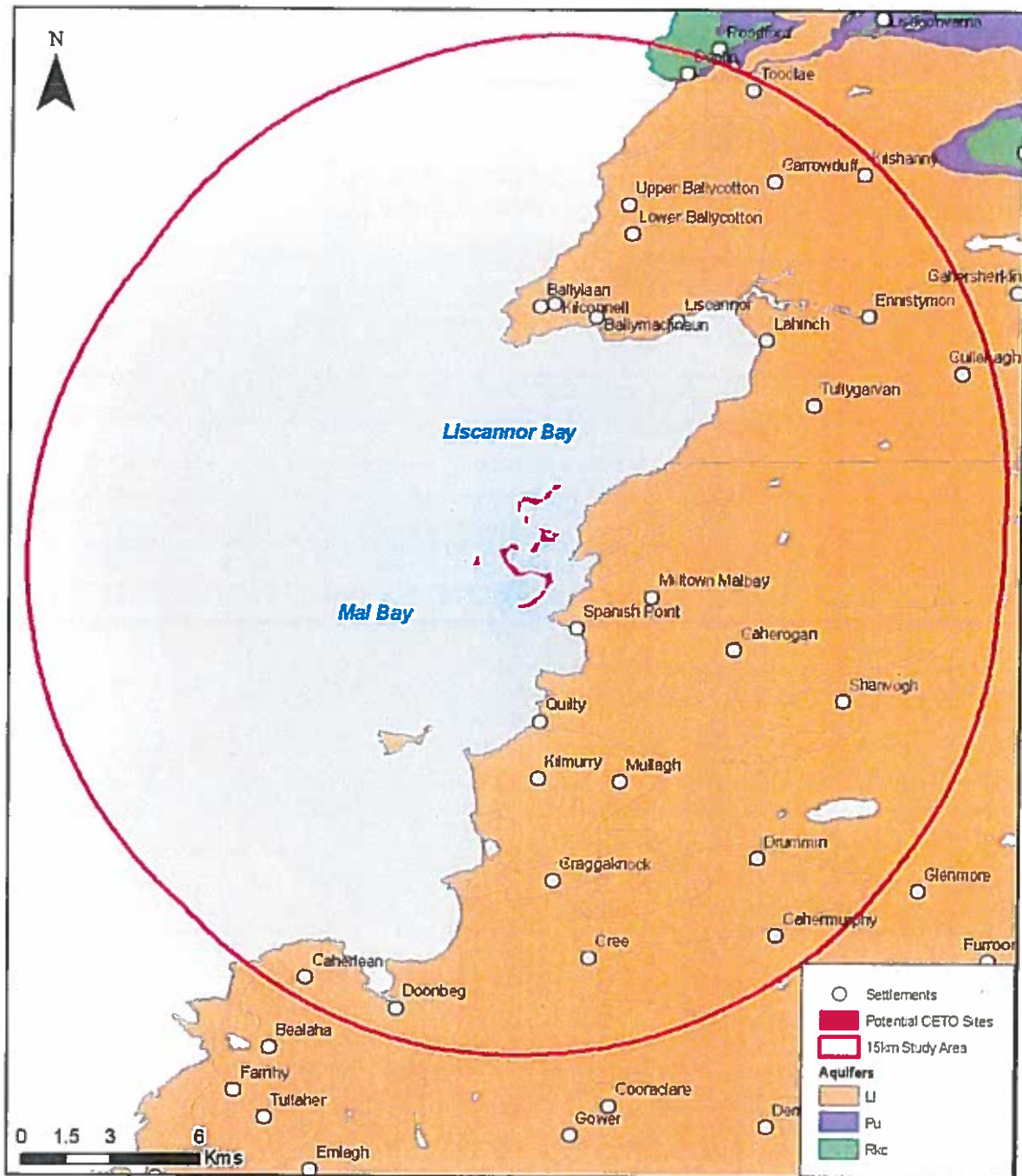


Table 5.5: Aquifer Classification

Symbol	Aquifer Category	Description
LI	Locally Important Aquifers	Bedrock which is Moderately Productive only in Local Zones
Pu	Poor Aquifers	Bedrock which is Generally Unproductive
Rkc	Regionally Important Aquifers	Karstified bedrock (Rk) dominated by conduit flow

Figure 5.6 shows the groundwater vulnerability mapping for the area of interest. The predominant vulnerability class in the area of interest (45% of area) is E - Extreme, with H - High (28%) and Extreme (Rock near surface or Karst) (20%) also making up large portions of the study area. The hydrogeological basis for the GSI groundwater vulnerability categories is summarised in Table 5.6. The ratings are based on pragmatic judgements, experience and available technical and scientific information. The ranking of vulnerability does not take into consideration the biologically-active soil zone, as contaminants from point sources are usually discharged below this zone, often at depths of at least 1m. However, the groundwater protection responses take account of the point of discharge for each activity. The groundwater vulnerability mapping shows the vulnerability of the first groundwater encountered (in either sand/gravel aquifers or in bedrock) to contaminants released at depths of 1-2 m below the ground surface (GSI, 1999). There are no groundwater source protection areas within the study area, and there are no groundwater abstractions within proximity to this coastal area.

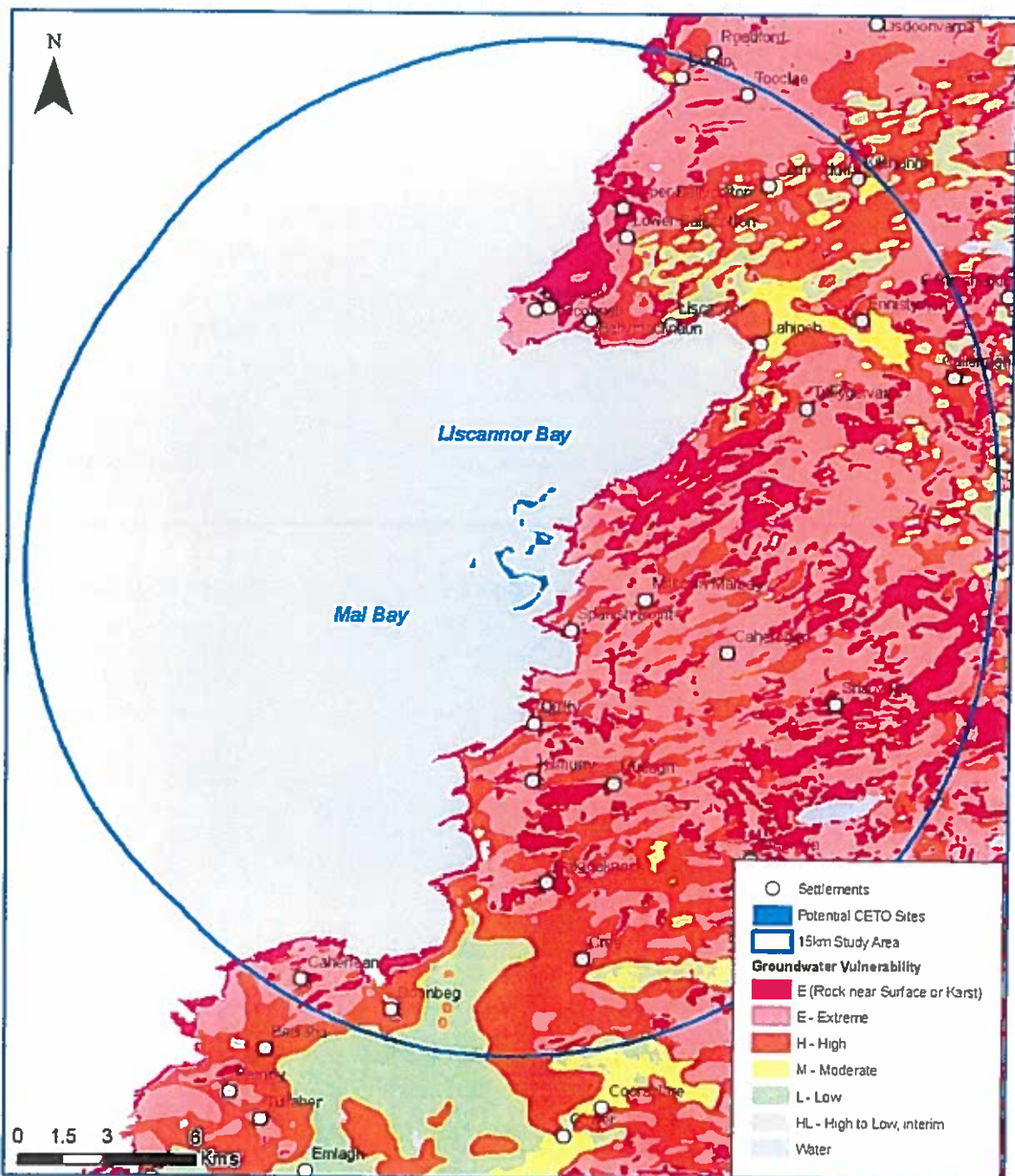
Table 5.6: Groundwater Vulnerability Mapping Guidelines

Vulnerability Rating	Hydrogeological Conditions				
	Soil Permeability Type and Thickness			Unsaturated Zone	Karst Features
	High Permeability (sand / gravel)	Moderate Permeability (e.g. sandy subsoil)	Low Permeability (e.g. clayey subsoil, clay, peat)	Permeability (sand / gravel aquifers only)	(<30m radius)
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High (H)	> 3.0m	3.0m – 10.0m	3.0m – 5.0m	> 3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0m - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

N/A – Not applicable.  
Precise permeability values cannot be given at present.  
Release point of contaminants is assumed to be 1-2m below ground surface.

The Milltown Malbay groundwater body (IE\_SH\_G\_167) received an overall status of GOOD in the Shannon River Basin Management Plan (RBMP) of 2009, with an overall objective of PROTECT for the next RBMP review in 2015. Groundwater status in the RBMP refers to the condition of the water in the waterbody. It is defined by its chemical status and quantitative status, whichever is worse. Groundwaters are ranked in one of 2 status classes: Good or Poor. In the WFD risk assessment for the RBMP this groundwater body was classified as being in category 2a, 'Probably Not at Risk' of achieving good ecological or good chemical status/potential at least by 2015.

Figure 5.6: Groundwater Vulnerability in the Study Area



## 5.7 LANDSCAPE, SEASCAPE & HABITATS

The land side of the potential CETO sites is situated within landscape character area 20 (LCA-20) the Malbay Coastal Farmland. The key characteristics of this landscape are:

- Gently undulating pastoral farmland
- Indented coastline, with some wide sandy bays.
- Strong Atlantic influence through the open and windswept character, reinforced by minimal tree cover and hedgerows.
- Views to Sliabh Callan, often framed by shallow valleys and along the coastline.
- Scattered but frequent settlement. Often individual houses but several small villages and larger settlements including Spanish Point and Milltown Malbay.

To the north east of the potential CETO sites is landscape character area 3 (LCA-3) the Cliffs of Moher and Lahinch. The key characteristics of this landscape are:

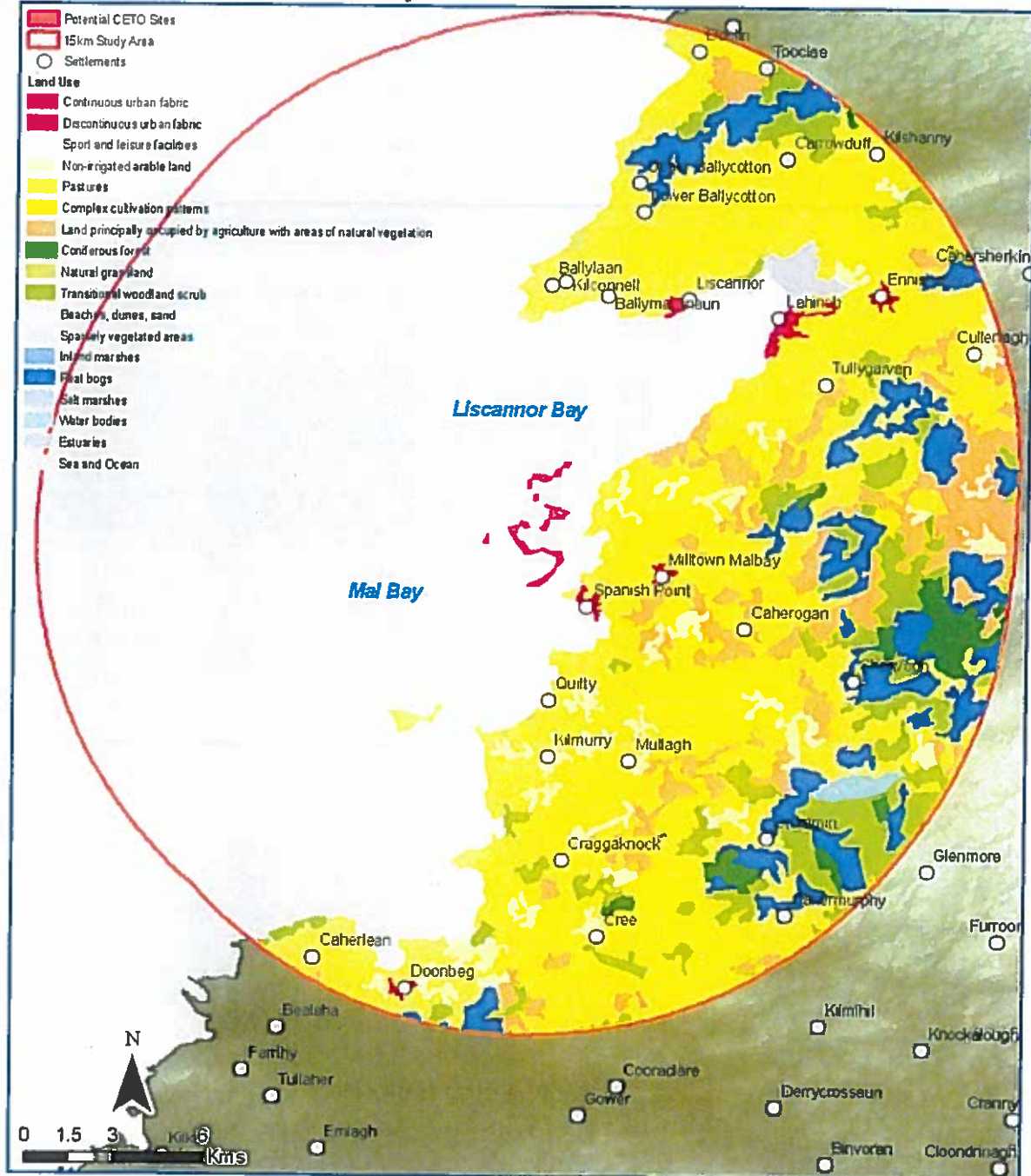
- An area of coastal plateau and farmland gently sloping inwards towards the coast and rivers.
- Liscannor stone walls with slatey appearance are highly distinctive and widely used throughout the area.
- Popular tourist centres at Cliffs of Moher, Lahinch and Liscannor.
- Extensive coastal views are afforded from bays and plateau.
- Away from the coastal road, it is increasingly remote and an isolated sense is retained.
- Character of sea strongly affects the area.

Land use in the study area is mostly pasture land, as shown in **Figure 5.7**. This land use makes up approximately 55% of the total land side study area, with smaller areas of land



classified as being principally occupied by agriculture with areas of natural vegetation (11% of land side study area) and areas of transitional woodland scrub vegetation (11% of land side study area).

Figure 5.7: Land Use in the Study Area



The seascape of the study area is within Seascape Character Area 4 – Liscannor Bay and Seascape Character Area 5 – Malbay. The Malbay Seascape is characterised as follows (Heritage Council, 2004):

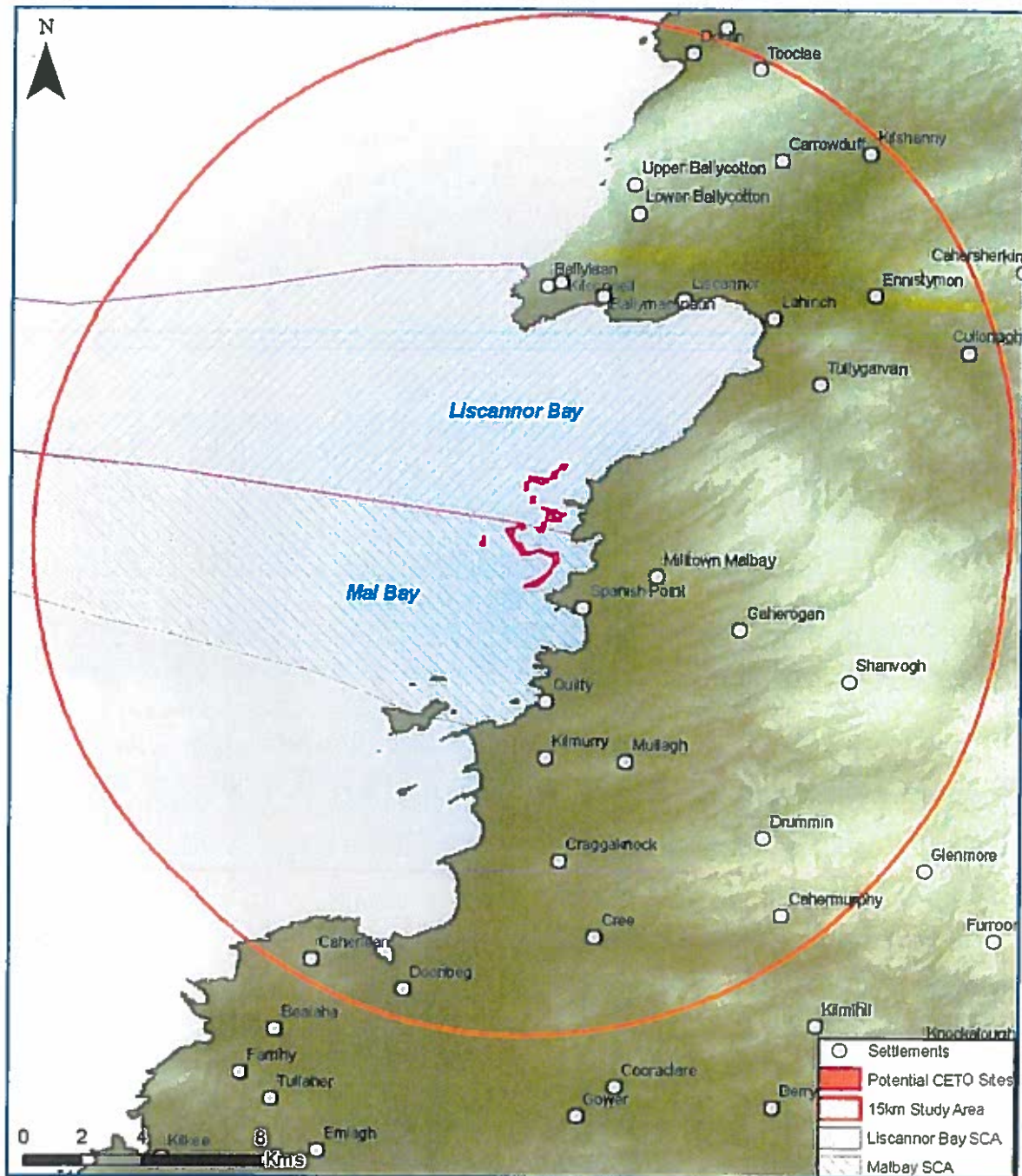
- Part of a SAC extending from Spanish Point to Doonbeg and includes the neighbouring islands.
- Flat, indented coastline, with some wide sandy bays.
- Headland and bay are exposed to westerly Atlantic winds as well as affording impressive sunsets.
- Developments include airport, golf course and campsites.
- Views are available from headland towards Mutton Island, past Caherrush Point.
- Bay displays yellow sand at low tide.

The Liscannor Bay Seascape is characterised as follows (Heritage Council, 2004):

- A broad open bay that affords long views out over the Atlantic Ocean, with low shelving cliffs containing bay beyond beach.
- Sea rescue centre at Lahinch.
- Dolphins are evident around Liscannor Bay.
- A large concrete seawall is located at Lahinch.
- West facing bay that allows views of impressive sunsets.
- Lahinch is a Blue Flag Beach and is also classified as a visually vulnerable and visually sensitive area.

The seascape areas of Liscannor Bay (SCA 4) and Malbay (SCA 5) are shown in **Figure 5.8**. The habitat types found within the Malbay seascape are classified mainly as sea inlets and bays, sand shores, amenity grasslands, coastal reefs, embryonic dunes and shingle and gravel shores. The habitat types found within the Liscannor Bay seascape are classified mainly as tidal rivers, estuaries, lower salt marshes, marram dunes, sand shores, and seawalls, piers and jetties (Heritage Council, 2004).

Figure 5.8: Liscannor Bay and Malbay Seascape Areas



The Clare coast is designated under the Clare Co Co Development Plan as being a Heritage Landscape and the coastal road is designated as a scenic route under the Plan (Clare Co Co, 2011).

Photographs of the potential CETO development area from the coastal road are shown in Plates 5.1 – 5.8, while photographs towards the land of the potential landfall sites, as identified in the Stage 1 Site Assessment are shown in Plates 5.8 – 5.11. Photograph locations are shown in Figure 5.9.

Figure 5.9: Site Photograph Locations

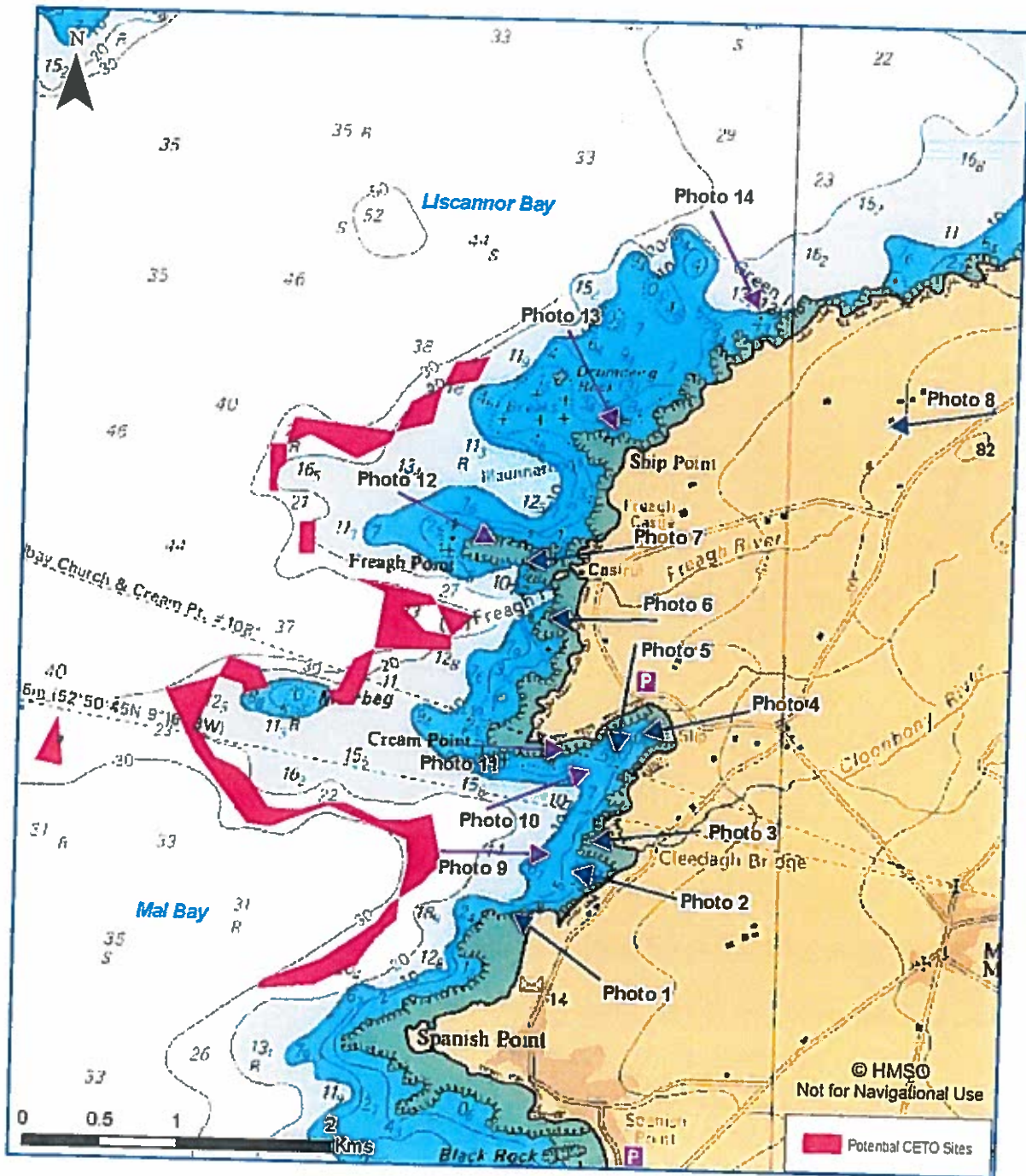


Plate 5.1 – Photo Location 1, Breaffy



Plate 5.2 – Photo Location 2, Cleedagh



Plate 5.3 – Photo Location 3, Cleedagh Bridge



Plate 5.4 – Photo Location 4, Travaun to Cream Point



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Plate 5.5 – Photo Location 5, Travaun



Plate 5.6 – Photo Location 6, Freagh Point



Plate 5.7 – Photo Location 7, Freagh point

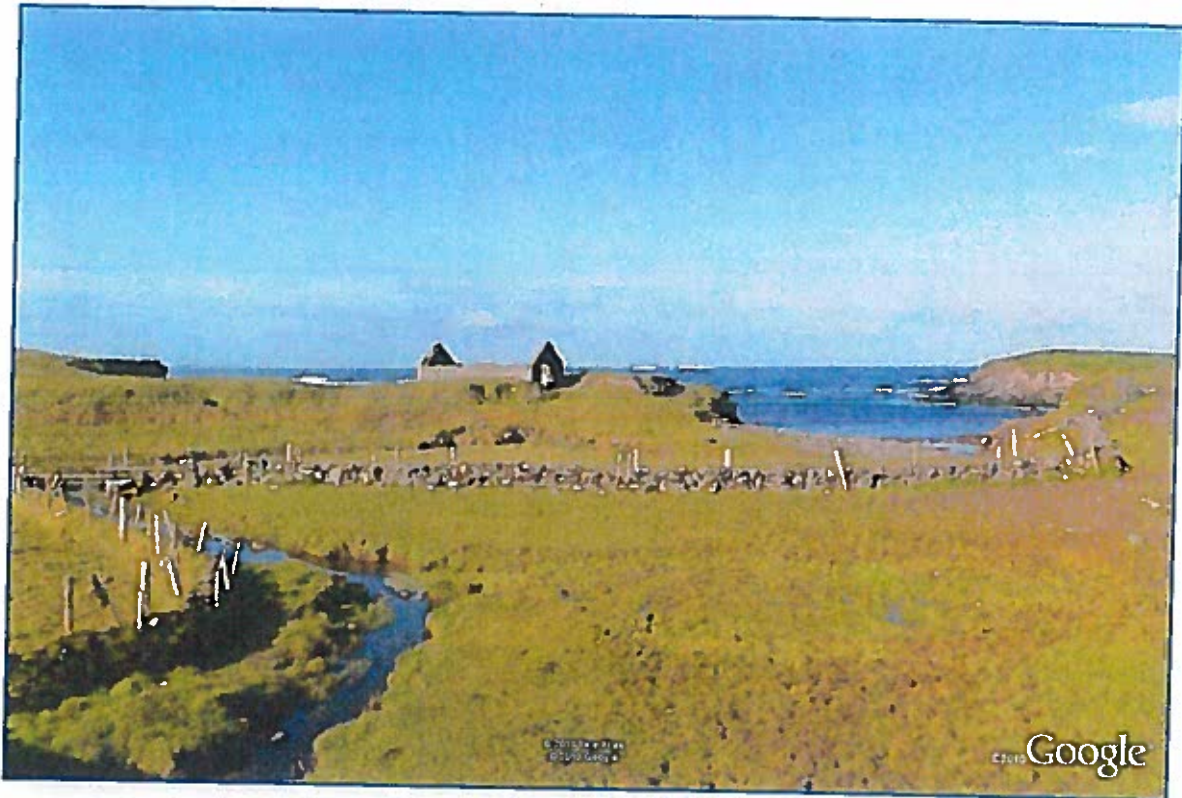


Plate 5.8 – Photo Location 8, Freaghavaleen to Ship Point

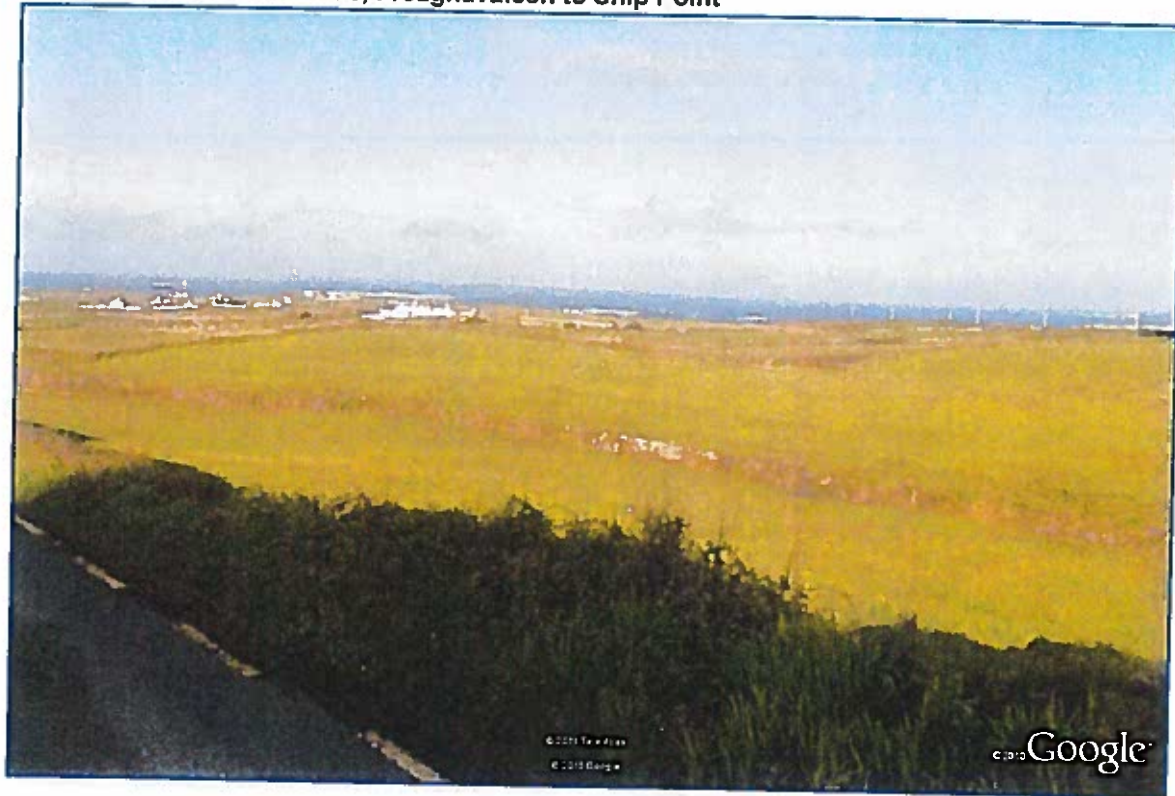




Plate 5.9 – Photo Location 9, Green Island

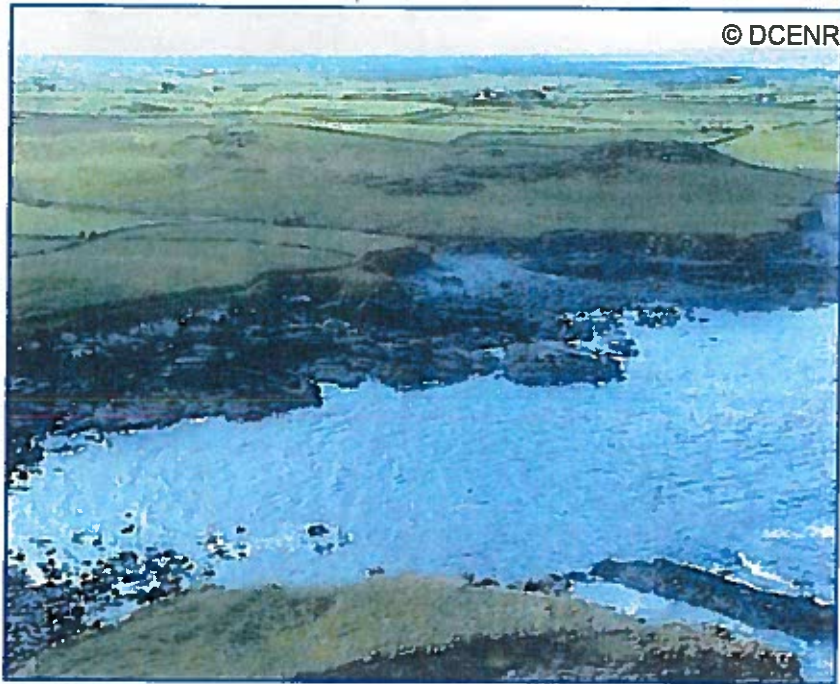


Plate 5.10 – Photo Location 10, Goughlan / Goug



Plate 5.11 – Photo Location 11, Freagh Point



Plate 5.12 – Photo Location 12, Cream Point to Travaun

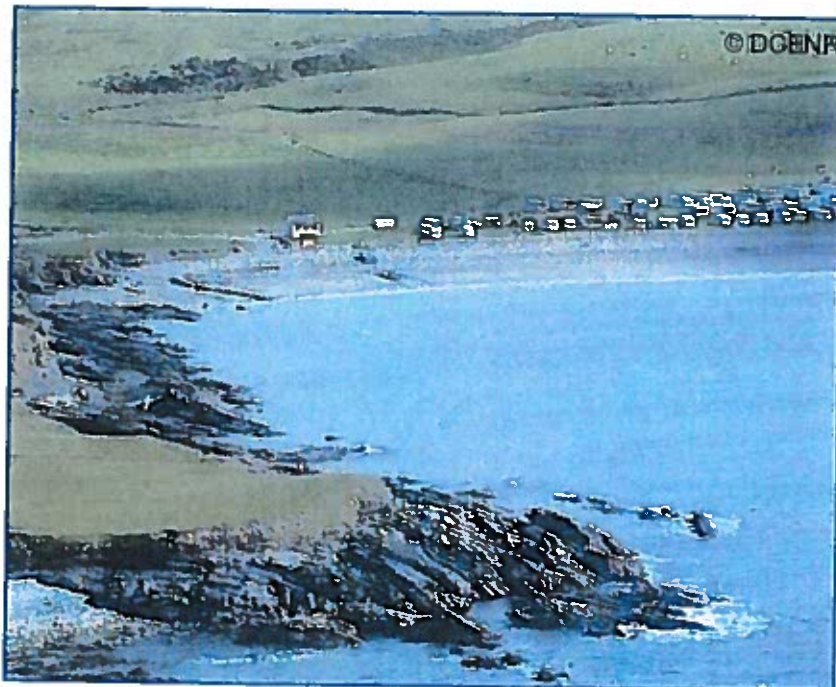


Plate 5.13 – Photo Location 13, Travaun

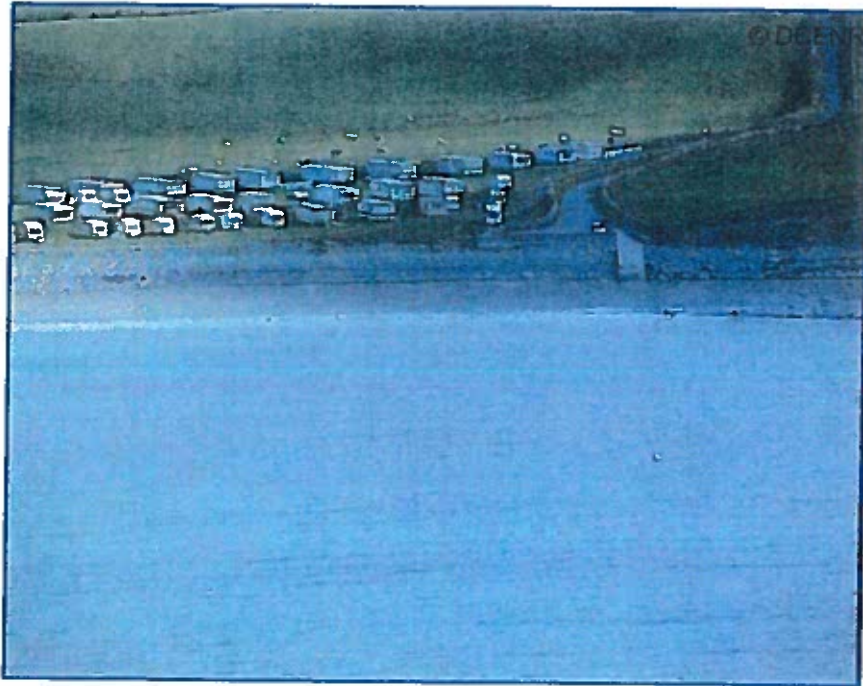


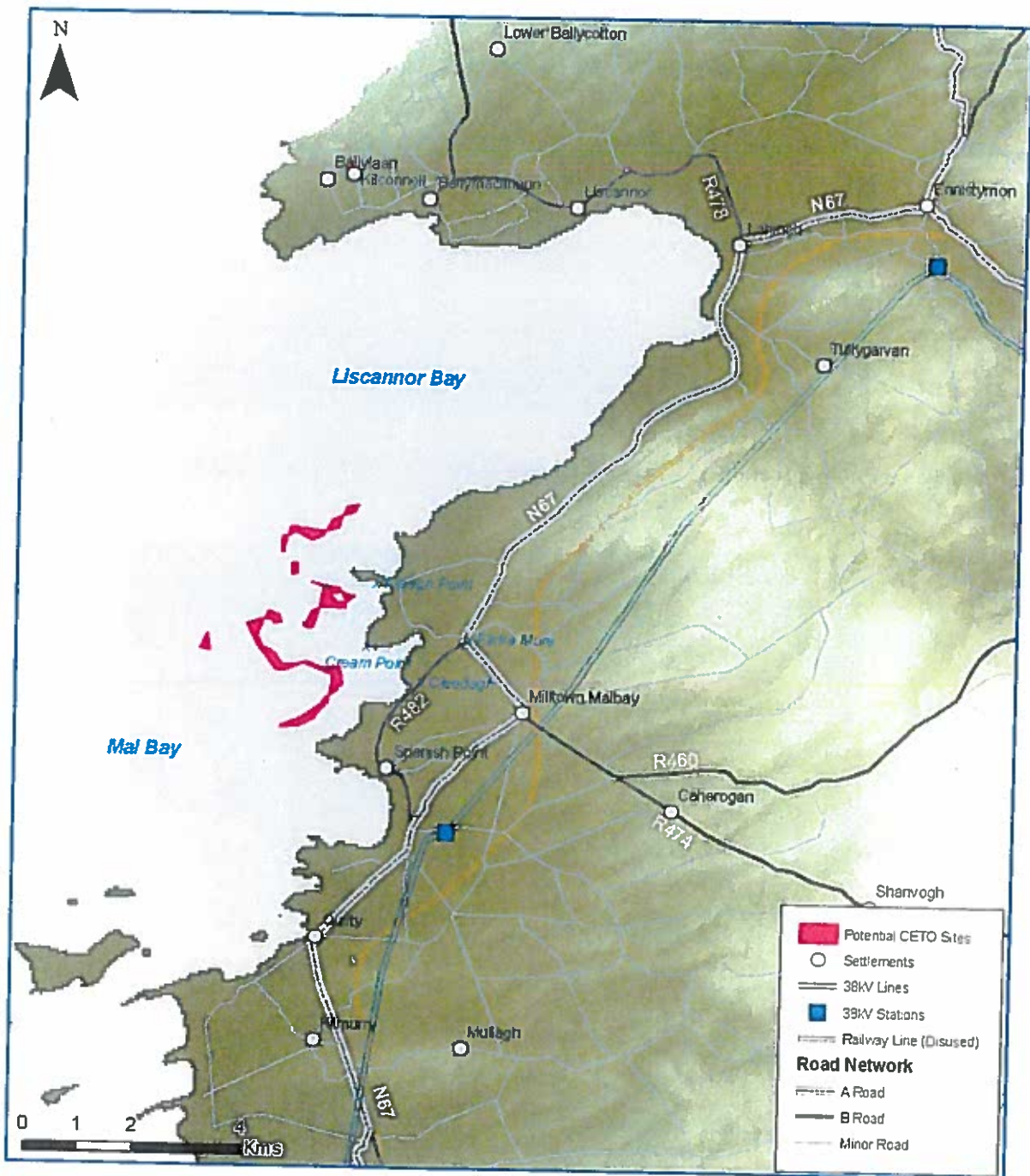
Plate 5.14 – Photo Location 14, Cleedagh Bridge



## 5.8 MATERIAL ASSETS

The main road, rail and electrical transmission infrastructure within the study area is shown below in Figure 5.10.

Figure 5.10: Infrastructure



The N67 national road is the main coastal route in County Clare, running from Galway Bay in the north of the County, along the Clare coast to the Shannon Estuary in the south of the County. Within the vicinity of Malbeggin and Liscannor Bay the N67 runs along the coast from

Quilty in the south of the study area towards Spanish Point, travelling inland to Milltown Malbay and towards the coast again at Firtra More, and then following the southern coast of Liscannor Bay to Lahinch. Where the N67 is inland at Milltown Malbay, the R482 regional road runs along the coastline of the study area between Spanish Point and Cleedagh, and the minor Travaun / Freaghcastle Road runs along the coastline of the study area at Cream Point and Freagh Point.

A 38kV electrical transmission line runs from the south east of Spanish Point (38kV station) in a north easterly direction, passing to the south east of Milltown Malbay, then onto Woodmount (38kV station) which is south of Ennistymon. ESB electrical distribution lines are present throughout the settlements in the area, such as Milltown Malbay and Spanish Point.

The large village of Lahinch and the service town of Ennistymon are connected to local sewer networks and waste water treatment works, whereas the smaller villages and settlement clusters in the area would have a waste water system based on septic tanks, or small waste water treatment systems for larger buildings such as hotels.

The proposed landside of the CETO development area is relatively near (~5kms) to an area designated in the Draft Clare County Council Development Plan as a Preliminary Area for Consideration of Pumped Hydro Energy Storage Facilities (PHES). This area, designated for freshwater hydro development, starts 2kms to the east of Milltown Malbay in the upland areas of Slievecallan, Slieveacurry and Ben Dash, which are to be used for upper reservoir storage of freshwater which can be passed through turbines to a lower reservoir to produce hydro electricity during peak times. Within the Plan the Council recognises the importance of renewable energy storage, particularly pumped freshwater hydro storage (PHES), in meeting its targets in respect of renewable electricity generation and also recognises that there are environmental and cost-saving benefits in the co-location of such facilities with wind energy or wave/tidal energy schemes (Clare Co Co, 2011).

No submarine cables and no military training areas were identified within the study area from the Stage 1 Site Assessment.

## 5.9 AIR AND NOISE

The study area is defined as being within Air Quality Zone D (Rural Ireland), by the Environmental Protection Agency (EPA). Air quality within Zone D is generally classified as

being GOOD, as it is within the limits for measured ozone, nitrogen dioxide, PM<sub>10</sub> and sulphur dioxide. There are however no continuous air quality monitoring sites within the study area. The EPA's Review of Air Quality Monitoring 2010 found Zone D to be 'Below the Lower Threshold Assessment' for nitrogen dioxide, oxides of nitrogen, sulphur dioxide, PM<sub>2.5</sub>, benzene, carbon monoxide, metals and polycyclic aromatic hydrocarbons (PAH's). Zone D was however showing 'Above Lower Threshold Assessment Levels' of PM<sub>10</sub> (thought to be due to domestic solid fuel emissions) and ozone (highly influenced by transboundary sources) (EPA, 2010). There are no known major contributors to air pollution within the vicinity of the potential CETO development areas; however potential emission sources within the immediate area would be domestic fuels from households, vehicle exhausts and agricultural emissions to air (odours and greenhouse gases).

There would be few noise sources within the vicinity of the potential CETO development and landfall areas, with low density housing, low marine and road traffic levels, and the majority of the land use in the area being pasture land. There will therefore be low baseline noise levels within the vicinity of the proposed CETO development.

## 5.10 HUMAN BEINGS

In the 2006 census the North County Clare Plan Area had a population of 18,299. This was an increase of 11% over the ten year inter-censal period from 1996 – 2006, which is quite low in comparison to the population growth in other counties and even Ireland as a whole, which grew by over 15%. The area land side of the potential CETO development sites is of low population density, with scattered housing amongst mainly agricultural land. The nearest population centres to the potential CETO sites are Spanish Point (1.5 kms south east) and Milltown Malbay (3.3 kms east). Liscannor is 6.5 kms to the north north east, while Lahinch is 8.5 kms to the north east of the potential CETO sites.

The Draft North Clare Local Area Plan 2011 – 2017 considers Spanish Point and Milltown Malbay as link settlements, with the council seeking to enhance the complimentary roles of the two settlements. General Objective 3 from the Area Plan for the village of Spanish Point is to "preserve the outstanding coastal setting and landscape whilst encouraging development that will contribute to the strengthening of the settlement structure" (Clare Co Co, 2011).

## 5.11 NAVIGATION

The largest harbour in the study area is the local ferry port at Doolin, which runs a service to Inisheer, although there are also smaller slips and quays at Liscannor, Lahinch, Travaun, Quilty, Seafield and Doonbeg. The closest major shipping route would be approximately 10kms offshore from the potential CETO development areas. This shipping route runs from the south west of Loop Head, through South Sound to Galway Bay. Due to the many reefs and rocky shorelines near the potential CETO development area, combined with the exposure to Atlantic swells it is unlikely that the immediate area would be heavily trafficked with recreational or commercial vessels, however on calmer days the area may be visited by angling boats.

## 5.12 HERITAGE

Within the north County Clare area there are 195 listed protected structures, which are buildings designated as being of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest, which includes churches, castles and tower-houses, coastal batteries and a lighthouse. There are also five Architectural Conservation Areas (ACA) with the north County Clare area, with Milltown Malbay being one of them. An ACA refers to a place, area, group of structures or townscape taking account of building lines and heights, that is of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest or that contributes to the appreciation of a protected structure, and whose character it is an objective of a development plan / local area plan to preserve (Clare Co Co, 2010).

Within the 15km study area there are over 540 sites and monuments that have been discovered and recorded within the DEHLG National Monuments Database. The majority of these sites and monuments are Ringforts, Rathes, Enclosures and Barrows. The sites closest to the potential CETO development areas are coastal forts, raths and enclosures. These sites and monuments are shown in **Figure 5.11**. Clare County Council have commented in their consultation response on the sensitivity of the heritage sites at Freaghcastle, which is most likely the coastal fort and cairn recorded at Freagh Point.

The coastline in the area is famous as having been the site for many shipwrecks, including the loss of many ships from the Spanish Armada, which is how Spanish Point got its name. However following consultation with the National Monuments Service and review of their shipwrecks database, no known shipwrecks were found within 500m of the potential CETO development areas. There are however likely to be more known and unknown shipwrecks

within the 15km study area. Examples of shipwrecks that have been recorded in the area but which have not yet been mapped or have never even actually been found are given in Table 5.7 (Irish Shipwrecks, 2011):

Figure 5.11: Sites and Monuments Record

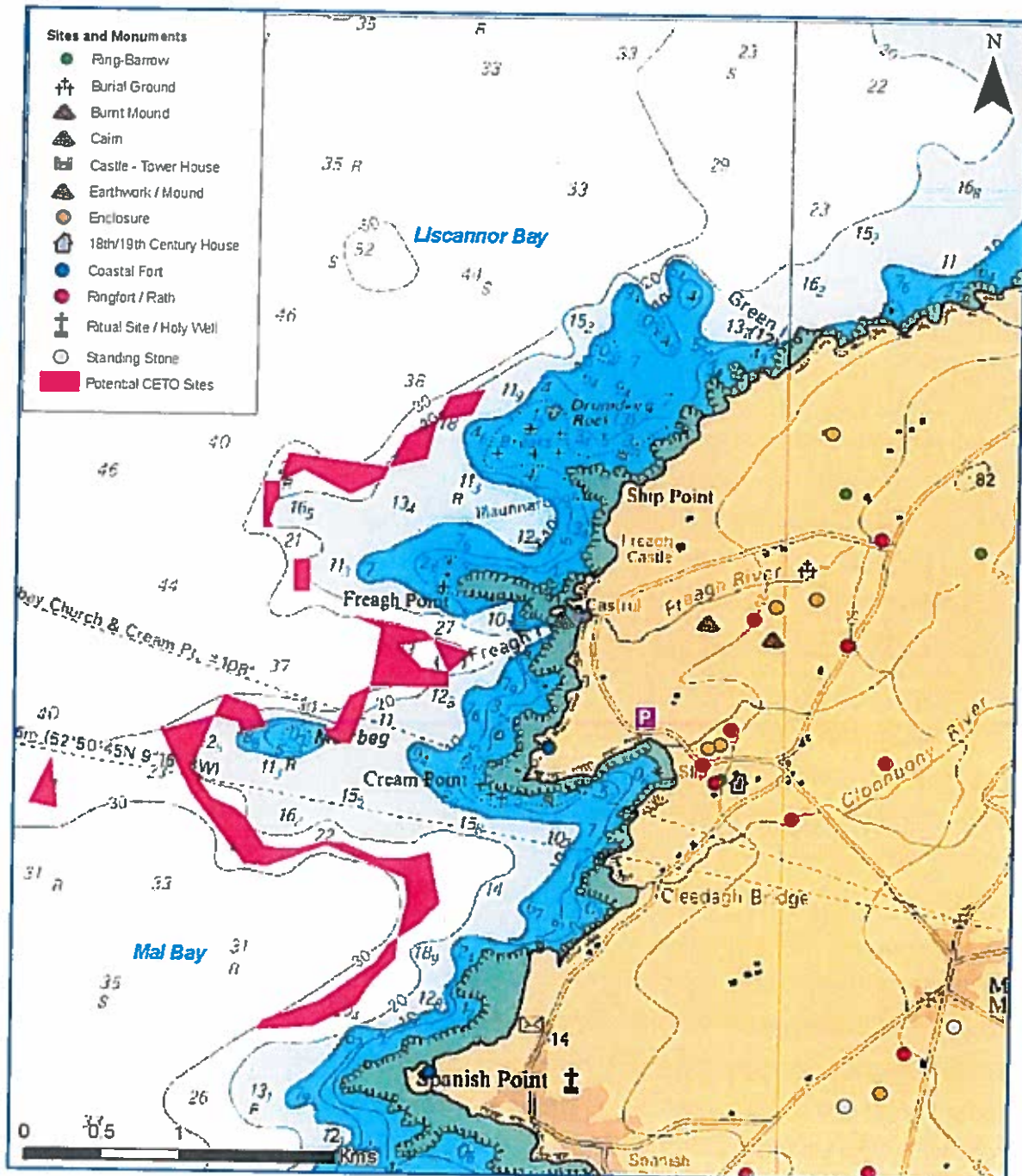




Table 5.7: Recorded Shipwrecks off the Liscannor Bay – Malbay coastline

Vessel Name	Nationality	Location	Date
Lake Patos	British	Liscannor Bay	1904
Maria Jane	British	Liscannor Bay	1898
Elizabeth McLea	British	Liscannor Bay	1894
Ariosto	British	White Strand – Milltown Malbay	1861
Rose Adelaide	French	Liscannor Bay	1848
Lucy	British	Liscannor Bay	1845
Lord Newboro	British	Liscannor Bay	1838
Brilliant	British	Liscannor Bay	1837
Perseverance	British	Malbay	1820
Martin	British	Malbay	1817
Melantho	British	Malbay	1816
Cyrus	-	Malbay	1815
Hope	British	Liscannor Bay	1796