Allergan Pharmaceuticals Ireland

Biologics Capacity Expansion Project

Natura Impact Statement

MDE1096Rp0002

RPS

Natura Impact Statement
for the
Allergan Pharmaceuticals Ireland
Biologics Capacity Expansion Project

DOCUMENT CONTROL SHEET

Client	Allergan Pharmaceuticals Ireland					
Project Title	Biologics Capacity Expansion Project					
Document Title	Natura Impact Statement					
Document No.	MDE1096Rp0002					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	32	1	1	2

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
F01	Final	B. Deegan	P. Chadwick	E. Oliviera	West Pier	31 July 2012

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ACRONYMS AND ABBREVIATIONS

AA	Appropriate Assessment
DAHG	Department of Arts, Heritage and the Gaeltacht
DECLG	Department of Environment, Community and Local Government
EC	European Community
EIA	Environment Impact Assessment
EPA	Environmental Protection Agency
IPPC	Integrated Pollution Prevention and Control
NPWS	National Parks and Wildlife Service
SAC	Special Area of Conservation
SPA	Special Protection Area

GLOSSARY

Appropriate Assessment	An assessment of the effects of a plan or project on the Natura 2000 network. The Natura 2000 network comprises Special Protection Areas under the Birds Directive, Special Areas of Conservation under the Habitats Directive and Ramsar sites designated under the Ramsar Convention (collectively referred to as European sites). Also known as Habitats Directive Assessment.
Baseline environment	A description of the present state of the environment of an area.
Cumulative effects:	Effects on the environment that result from incremental changes caused by the strategic action together with other past, present, and reasonably foreseeable future actions. These effects can result from individually minor but collectively significant actions taking place over time or space.
Environmental assessment:	The preparation of an environmental report, the carrying out of consultations, the taking into account of the environmental report and the results of the consultations in decision-making and the provision of information on the decision (in accordance with Articles 4 to 9 of the SEA Directive).
Habitats Directive (92/43/EEC):	Council Directive of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna.
Mitigation measures:	Measures to avoid/prevent, minimise/reduce, or as fully as possible, offset/compensate for any significant adverse effects on the environment, as a result of implementing a P/P.
Biologics Plant	A plant engaged in the preparation of drugs, vaccines, etc. synthesized from living organisms using a biological process.
Pharma Plant	A plant engaged in the preparation of drugs, vaccines, etc. using chemical processes..
BOTOX	A trademark for a preparation of botulinum toxin, used to treat blepharospasms, strabismus, and muscle dystonias and to smooth facial wrinkles.
Compounding	To produce or create by combining two or more ingredients or parts.
Filling area/ Fill room	The area of a plant used to fill dosing vials/bottles with finished product.
Unit Dose	A unit dose is the amount of a medication administered to a patient in a single dose.
Lyophiliser Units	A lyophiliser is a freeze-drying process used to preserve the perishable material and make it more convenient for transport.
Natura 2000	The Natura 2000 network comprises Special Protection Areas under the Birds Directive, Special Areas of Conservation under the Habitats Directive and Ramsar sites designated under the Ramsar Convention (collectively referred to as European sites).

1 INTRODUCTION

This Natura Impact Statement (NIS) contains a record of the Appropriate Assessment, undertaken by RPS on behalf of Allergan Pharmaceuticals Ireland, in respect of the proposed Biologics Capacity Expansion Project located immediately north of the existing Allergan facility at Carrowbeg, Westport, Co. Mayo. This NIS was undertaken in accordance with the requirements of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora; the Planning and Development Act 2010; and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011).

1.1 EXISTING SITUATION

The existing Allergan facility is located on 10.5 hectares and has two manufacturing spaces, a Pharma Plant and a Biologics Plant. The facility also includes associated warehouse, laboratories, office areas and maintenance facilities. The Pharma Plant consists of the plastics manufacturing area, compounding and filling areas, Unit Dose as well as packaging halls. The Biologics Plant, which has undergone expansion in the past decade, is smaller and consists of compounding, filling and packaging production areas with facilities and warehouse space.

In the Biologics Plant, the main manufacturing activity is the filling and freeze drying of Botulinum toxin with other excipients followed by the packaging and labelling of BOTOX® vials. In addition, activities at the Biologics Plant include the manufacture of neurotherapy products which are used in the treatment of migraines, upper limb spasticity, eye muscle problems and for cosmetics purposes.

In recent years the global demand for both the cosmetic and medicinal BOTOX® products has increased dramatically. Estimated demand for the BOTOX® products is projected to continue to increase significantly with a projected doubling of global demand in the next decade.

While the existing Westport operation can meet the current demand, the facility needs to expand to meet the significant increases projected in global demand. Allergan have assessed options such as increasing the numbers of production shifts at the existing plant, but these measures will only keep pace with global demand in the short term (circa 2-3 years). Following a rigorous assessment of alternatives, the option to construct a new biologics facility at the Westport facility was chosen to meet the projected demand. The proposed Biologics Capacity Expansion Project will increase the plant capacity for BOTOX® production by approximately 160% and will allow Allergan to meet the projected global demand in the long term.

1.2 LEGISLATIVE CONTEXT – HABITATS DIRECTIVE

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as "The Habitats Directive", provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of European Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs), designated under the Habitats Directive, and Special Protection Areas (SPAs), designated under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment of Natura 2000 Sites, (abbreviated AA):

Article 6(3) states:

> *"Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*".

Article 6(4) states:

> *"If, in spite of a negative assessment of the implications for the [Natura 2000] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted*.
>
> *Where the site concerned hosts a priority natural habitat type and/or a priority species the only considerations which may be raised are those relating to: human health or public safety; beneficial consequences of primary importance for the environment; or, further to an opinion from the Commission, other imperative reasons of overriding public interest".*

This means that where the implementation of the proposed Biologics Capacity Expansion Project is likely to have a significant effect on a Natura 2000 site, the Local Authority must ensure that an appropriate assessment is carried out in view of that site's conservation objectives. The proposed Biologics Capacity Expansion Project can be approved by the Local Authority only if it has been ascertained that it will not adversely affect the integrity of the Natura 2000 site(s) concerned, or in the case of a negative assessment and where there are no alternative solutions, the scheme can only be approved for reasons of overriding public interest.

2 METHODOLOGY

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in relation to this AA has had regard to the following guidance:

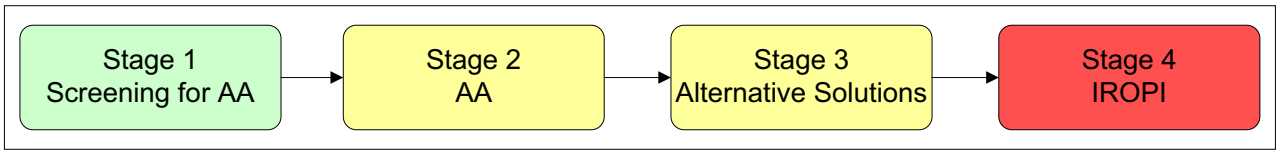
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of Environment, Heritage and Local Government. http://www.npws.ie/media/npws/publications/codesofpractice/AA%20Guidance%2010-12-09.pdf

- Managing Natura 2000 Sites: the Provisions of Article 6 of the Habitats Directive 92/43/EEC, European Commission 2000; http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf

- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC; http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf

- Guidance Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the Concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission. http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf

These guidance documents promote a four stage assessment approach with the outcome from each stage determining if a following stage is required. The four stages are shown in **Figure 1** and briefly described in **Sections 2.1-2.4**.



Source: Taken from Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (2010)

Figure 1: Stages of Appropriate Assessment

2.1 STAGE 1

Screening / Test of Significance - this stage identifies whether the project is directly connected to or necessary for the management of a Natura 2000 site; and identifies whether the project is likely to have significant impacts upon a Natura 2000 site either alone or in combination with other projects or plans.

The output from this stage is a determination, for each Natura 2000 site within 15km of the project or plan, of not significant, significant, potentially significant, or uncertain effects. The latter three determinations will cause that site to be brought forward to Stage 2.

2.2 STAGE 2

Appropriate Assessment – this stage considers the impact of the project on the integrity of the Natura 2000 site(s), either alone or in combination with other projects or plans, with respect to (1) the site's conservation objectives; and (2) the site's structure and function and its overall integrity. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts must be addressed.

The output from this stage is a Natura Impact Statement (NIS). This document must include sufficient information for the competent authority to carry out the appropriate assessment. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

2.3 STAGE 3

Assessment of Alternative Solutions - the process examines alternative ways of achieving the objectives of the project that avoid adverse impacts on the integrity of the Natura 2000 sites. This assessment may be carried out concurrently with Stage 2 in order to find the most appropriate solution. If no alternatives exist or all alternatives would result in negative impacts to the integrity of the Natura 2000 site(s) then the process either moves to Stage 4 or the project is abandoned.

2.4 STAGE 4

Assessment Where Adverse Impacts Remain - an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

3 STAGE ONE: SCREENING

3.1 INTRODUCTION

This screening process is an assessment of the Natura 2000 sites that the proposed Biologics Capacity Expansion Project could potentially affect. This process:

- Identifies sites within a 15km radius of the proposed project;
- Provides an outline summary of the proposed development;
- Summarises what the possible effects on those Natura 2000 sites could be; and
- Screens out Natura 2000 sites that are unlikely to be affected.

3.2 SITE LOCATION AND DESCRIPTION OF PROJECT

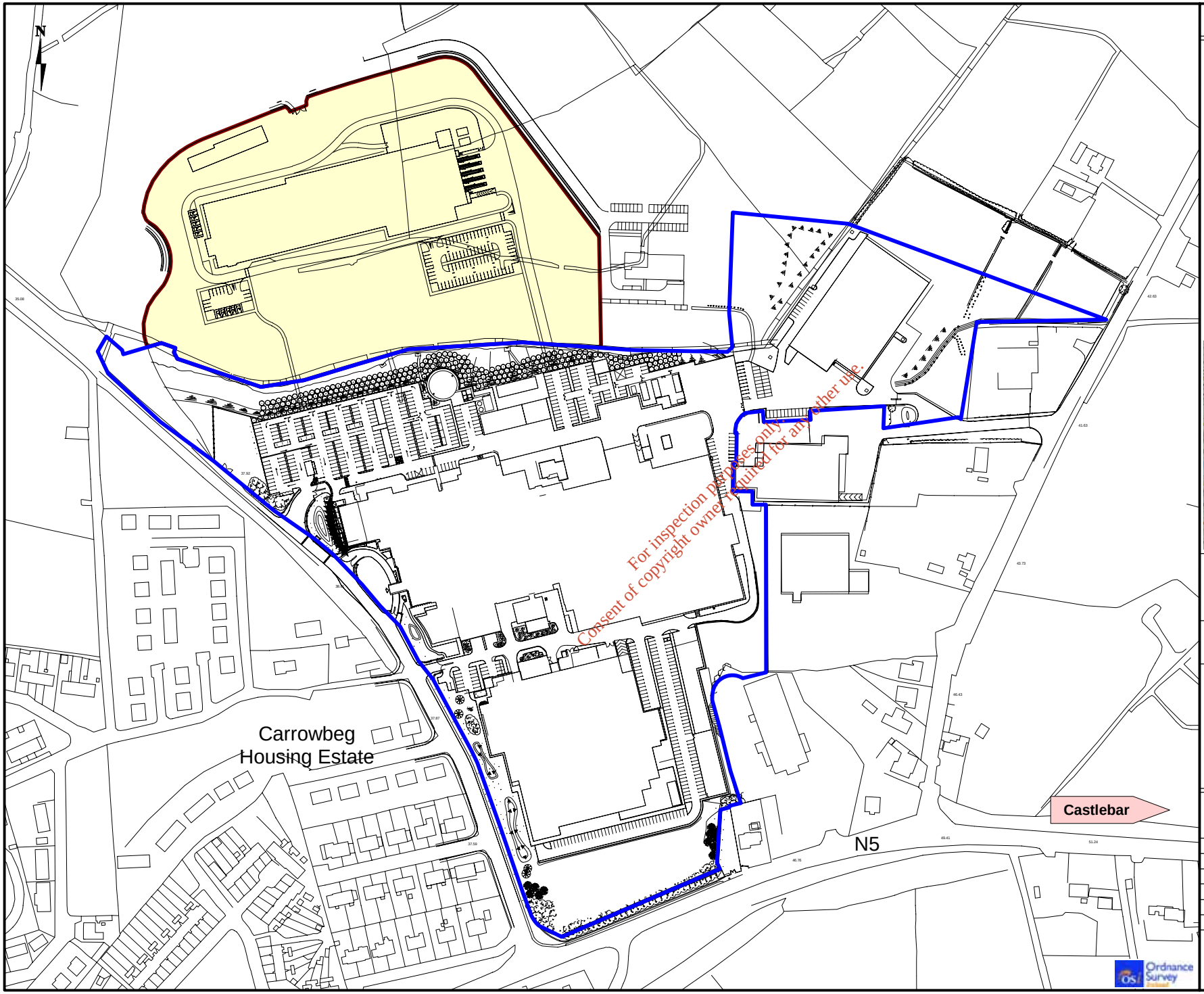
The proposed development is located in the townland of Carrowbeg, to the east of Westport, immediately north of the existing Allergan facility, which has been located at this site since 1977. The location of the proposed development is presented in **Figure 2**.

Land use to the south of the proposed development is the existing Allergan facility and land use to the immediate east, north and west is agricultural. The Carrowbeg Housing Estate is the nearest residential area and is located to the southwest of the site. A number of commercial operations are located to the south east of the site.

Current access to the site is via a third class road from the N5, Castlebar to Westport road, which is located approximately 400 meters to the south of the site. This third class road currently serves traffic accessing the Carrowbeg Housing Estate and the existing Allergan facility from the N5.

The following elements are included in the proposed Biologics Capacity Expansion Project, as shown in the proposed site layout presented in **Figure 3**:

- Proposed Biologics II Building;
- Services Area (mechanical, electrical and water services) and Services Yard;
- Loading Bay at Proposed Biologics II Building;
- A series of internal access roads, links and bridges for pedestrian and vehicular movement between the existing and proposed buildings;
- Car parking spaces for staff/visitors; and
- Landscaping.



LEGEND

- Existing Allergan Site
- Proposed Allergan Development

Client

ALLERGAN PHARMACEUTICALS IRELAND WESTPORT, COUNTY MAYO

Project

EIA for Plant Extension

Title

Site Location

Figure 2

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Approved by: xxx			
Scale: 1:3,500 (A4)		Drawing No. Mi0001	Rev. D01
Date: 23/07/2012			

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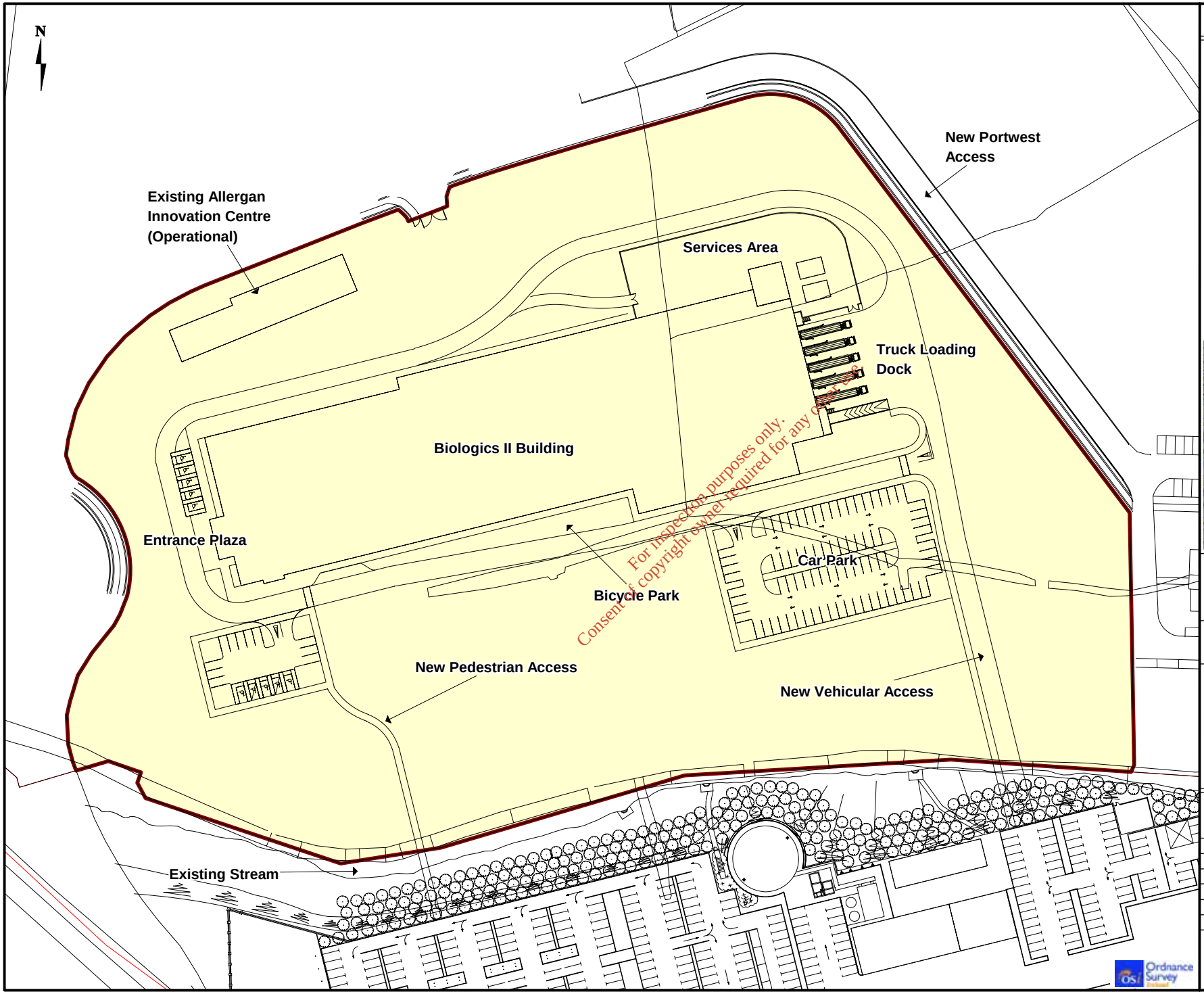

LEGEND

Proposed Allergan Development

Client

ALLERGAN PHARMACEUTICALS IRELAND WESTPORT, COUNTY MAYO

Project

EIA for Plant Extension

Title

Site Layout of the Proposed Biologics Capacity Expansion Project

Figure 3

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Approved by:	xxx		
Scale:	1:1,500 (A4)	**Drawing No.**	Mi0002
Date:	23/07/2012	**Rev.**	D01

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3.2.1 Proposed Biologics II Building

The proposed Biologics II Building is a single structure with a footprint of approximately 8,800m^2 and a maximum height of approximately 16.4 metres consisting of production, warehousing and administrative areas. The building will consist of four floors as follows:

- Basement – used to house the base of the two lyophiliser units (with capacity for one additional unit) and ancillary plant only. The proposed production process requires a basement technical space in order to achieve a gravity process flow within the lyophiliser area;
- Ground Floor – office/administration areas, gowning/changing areas, production areas, cold storage areas, fill room, inspection, packaging, warehousing, maintenance and plant area. The warehouse will be a single open area covering the ground to second floors;
- First/Technical Floor – office/administration areas, air handling units and ancillary plant items; and
- Second Floor - office/administration areas.

The facility, equipment and systems will be designed to conform to all relevant GMP (Good Manufacturing Practice) requirements including the EU GMP Volume 4 "*EU Guidelines to Good Manufacturing Practice*" Annex 1 "Manufacture of Sterile Medicinal Products" and the US FDA Guidance for Industry "*Sterile Drug Products Produced by Aseptic Processing- Current Good Manufacturing Practice 2004*".

3.2.2 Bridge Structures

The proposed Allergan plant will be accessed via the site entrance to the existing Allergan plant and a newly constructed internal road network. The new access road will require installation of a single span vehicular bridge over the existing stream at the eastern boundary of the site. In addition, a new single span pedestrian bridge will also be constructed over the stream close to the western boundary of the site.

3.2.3 Surface Water

A surface water drainage network will be provided to discharge by gravity to the stream that runs between the existing and proposed plants. On the EPA mapping database this stream is named as

the Coolbarreen River, however, this may be incorrect and this report simply refers to this water body as an unnamed stream. The internal drainage network proposed for the development will consist of uPVC pipework of sizes ranging from 150mm to 450mm diameter. Two underground surface water attenuation tanks will be located to the east and west of the site with capacity to store a total of 2,080 m^3 (620m^3 in Chamber A to the west of the site and 1,460m^3 in Chamber B to the east of the site). For large paved areas a pervious pavement drainage solution will be incorporated in the design and all surface water from the loading bay and car park areas shall pass through one of two approved Class 1 full retention oil/petrol separators. All surface water will be held in a monitoring chamber before being discharged to the surface water system with automatic shut off valves connected to the monitoring system to prevent discharges of potentially contaminated surface water. All over ground oil and chemical storage tanks will be adequately bunded to protect against spillage.

3.2.4 Foul Sewer

It is proposed to collect all foul water generated on the proposed development site by means of a separate foul sewer drainage system of uPVC pipework of 225mm diameter and subsequently discharge to the existing Local Authority foul sewer network. The internal foul sewers proposed will be a designed gravity system. Adequately sized and sited grease, oil and fat interceptors will be installed on all commercial kitchen waste drainage lines prior to connection to mains lines. The proposed foul sewer line will connect to the Local Authority foul sewer network adjacent to the existing roundabout immediately west of the site of the proposed development. The Local Authority foul sewer network is treated at the Westport Wastewater Treatment Plant before discharging to Clew Bay.

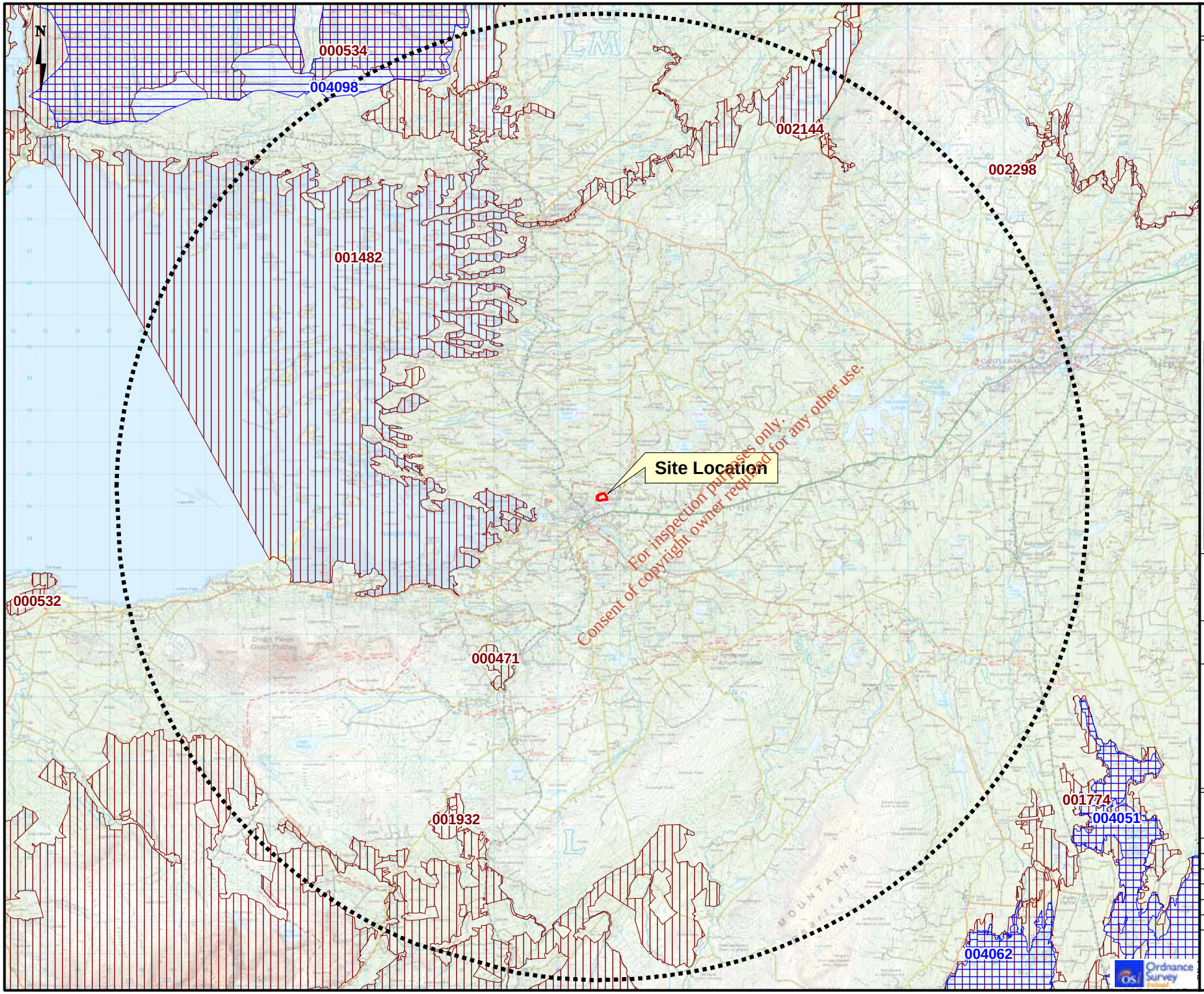
3.2.5 Process Water

Process water generated at the proposed development will consist of make up water, excess water from the filling process, filter flushing and reject product waste waters. It is proposed to collect all process water generated on the site by means of a process water network of stainless steel piping of 100 to 250mm diameter. Under the terms of the existing IPPC licence, all process water discharged from the plant must be treated by decontamination using heat treatment of sodium hypochlorite dosing prior to discharge. This condition will be included in the updated IPPC licence for the expanded plant and decontamination measures will be carried out *in situ* in the production areas as per normal practice. No process water will be discharged from the production areas without adequate decontamination to eliminate the presence of toxins in the water. This water will be diverted onto the existing plant via a sump and rising main to the east of the proposed site directing the process water to the existing balancing tank for balancing and equalisation. The discharge from the balancing tank is to the Local Authority foul sewer network under the terms of the IPPC licence from the EPA and is treated at the Westport Wastewater Treatment Plant before discharging to Clew Bay.

3.3 IDENTIFICATION OF DESIGNATED CONSERVATION SITES

The EU Habitats Directive contains a list of habitats (Annex I) and species (Annex II) for which SACs must be established by Member States. Similarly, the EU Birds Directive contains lists of important bird species (Annex I) and other migratory bird species for which SPAs must be established. Those that are known to occur at a site are referred to as 'qualifying interests' and are listed in the Natura 2000 forms which are lodged with the EU Commission by each Member State. A 'qualifying interest' is one of the factors (such as the species or habitat that is present) for which the site merits designation.

Figure 4 identifies the Natura 2000 sites that are within a 15km radius of the proposed development, in line with guidance. A brief description of each Natura 2000 site is provided in **Sections 3.3.1 to 3.3.6**, based on the Site Synopsis (NPWS).



LEGEND

- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- 15km Buffer

Client

ALLERGAN PHARMACEUTICALS IRELAND WESTPORT, COUNTY MAYO

Project

EIA for Plant Extension

Title

SACs & SPAs within 15km of the Proposed Development

Figure 4

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Approved by:	xxx		
Scale:	NTS	**Drawing No.**	Mi0003
Date:	23/07/2012	**Rev.**	D01

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3.3.1 Clew Bay Complex SAC (001482)

Clew Bay is a wide, west-facing bay on the west coast of Co. Mayo. It is open to the westerly swells and winds from the Atlantic with Clare Island giving only a small amount of protection. The geomorphology of the bay has resulted in a complex series of interlocking bays creating a wide variety of marine and terrestrial habitats, including several listed on Annex I of the E.U. Habitats Directive: large shallow bay, lagoon, Atlantic salt-meadows, drift lines, perennial vegetation of stony banks, embryonic shifting dunes, Marram dunes, dune slacks and old Oak woodland.

Clew Bay is considered to have the most significant shingle reserves in the country, and has (on the islands) the only examples of incipient gravel barriers in Ireland. Associated with the shingle (and dunes) are good examples of annual vegetation of drift lines. Lough Furnace located at the north-eastern corner of Clew Bay is a good example of a deep, stratified, saline lake lagoon in a very natural state. Salinity levels can vary considerably here depending on rainfall and tides. The lake is one of the very few permanently stratified lakes known in Ireland and Britain.

Important populations of Otter and Common Seal are found in Clew Bay (the latter with a maximum count of 95 in the all-Ireland survey of 2003). Both of these species are listed on Annex II of the E.U. Habitats Directive.

The juxtaposition within Clew Bay of a wide variety of habitats, including seven listed on Annex I of the E.U. Habitats Directive, and the combination of important flora and fauna, including one Red Data Book plant and two mammals listed on Annex II of the E.U. Habitats Directive, make this a site of considerable national and international importance.

3.3.2 Owenduff / Nephin Complex SAC (000534)

This large area of relatively intact blanket bog and mountains incorporates the catchment of the Owenduff River and much of the Nephin Beg Mountain range. Lough Feeagh, which is located approximately 5 km north-northwest of Newport Town, lies in the southeast corner of the site. The site is an SAC selected for blanket bog, a priority habitat on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for alpine heath, wet heath, Juniper scrub, lowland oligotrophic lakes, upland oligotrophic lakes, dystrophic lakes, floating river vegetation and transition mires, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Shining Sickle-moss, Marsh Saxifrage, Atlantic Salmon and Otter.

Marsh Saxifrage (*Saxifraga hirculus*) has been recorded in two flushes on this site. This species is protected under the Flora Protection Order (1999), and is one of the rarest flowering plants in Ireland.

It is also listed in Annexes II and IV of the EU Habitats Directive. Its decline in Ireland is due to the drainage and exploitation of its peatland habitat. The Rare Bog Orchid (*Hammarbya paludosa*), a species protected in Ireland under the Flora Protection Order (1999), has also been recorded from the site. Another rare plant, Marsh Clubmoss (*Lycopodiella inundata*) has been recorded on this site and this species is listed in the Red Data Book.

The Owenduff/Nephin Complex is one of the best and largest examples of intact blanket bog in the country. The range and quality of habitats present here is excellent, and a number of rare and protected plant and animal species occur. The Owenduff River system is the largest in the country which remains virtually free of conifer plantations. The site is a striking wilderness of bog and mountain, a unique landscape which is of international ecological importance.

3.3.3 Owenduff / Nephin Complex SPA (004098)

The Owenduff / Nephin Complex SPA supports an excellent diversity of bird species characteristic of blanket bog and mountain habitats. In particular, there are four regularly occurring species that are listed on Annex I of the E.U. Birds Directive, i.e. Greenland White-fronted Goose, Merlin, Peregrine and Golden Plover.

Greenland White-fronted Geese regularly visit the site in winter though numbers nowadays are relatively low (average peak of 27 in the winters 1998/99-2002/03; range 17-42). The population is a sub-flock of the main Bog of Erris population (4 other sub-flocks). Merlin nests within the site (population conservatively estimated at between 4 and 8 pairs). This small falcon has a preference for heather bog areas, particularly marginal zones between blanket bog and heath/upland grassland. Red Grouse occurs on the bogs throughout the site, particularly where there is a good cover of Heather (*Calluna vulgaris*), which provides the principal food for the bird.

The site is heavily stocked with sheep and in places the bog habitats have been damaged from overgrazing. In the most severe cases, peat erosion occurs and threatens water quality in the rivers. The Greenland White-fronted Goose and Red Grouse populations are particularly sensitive to deterioration in habitat quality.

The Owenduff/Nephin Complex SPA provides one of the best examples of blanket bog and upland bird communities in the country. Of particular importance is that there are four regularly-occurring species that are listed on Annex I of the E.U. Birds Directive, as well as a good population of Red Grouse. Much of the site is a National Park.

3.3.4 Newport River SAC (002144)

This site consists of the Newport River, its tributaries the Skerdagh, Glenisland Crumpaun/Boghadoon and Bracklagh/Cloondaff and Lough Beltra, and is an SAC selected for Atlantic Salmon and Freshwater Pearl Mussel, species listed on Annex II of the E.U. Habitats Directive.

The interest of this site lies primarily in the presence of a significant population of Freshwater Pearl Mussel (*Margaritifera margaritifera*), also protected under the 1976 Wildlife Act. A survey in 1995 estimated the population of the Pearl Mussel within the site at approximately 5,000 individuals. The water quality of the river is good and the mussels were found throughout the river system in both gravel and rocky bed areas.

For a large proportion of the river's course it flows through wet heath, but the site also contains broad-leaved deciduous woodland, which comprises Ash (*Fraxinus excelsior*), Hawthorn, Downy Birch (*Betula pubescens*), Alder (*Alnus glutinosa*), Willow (*Salix* spp.), Holly and Oak. In addition these areas are rich in ferns, liverworts, lichens and mosses.

Otter, Badger, Irish Hare and Common Frog, four Red Data Book species which are also protected under the 1976 Wildlife Act, occur in the site. The Common Lizard is also believed to be present and is protected under the 1976 Wildlife Act.

The Kingfisher, a species listed on Annex I of the E.U. Birds Directive, has been recorded along the Newport River and Red Grouse can be found on areas of wet heath within the site.

3.3.5 Brackloon Woods SAC (000471)

This wood is situated approximately 4 km east of Croagh Patrick Mountain and 7 km south-west of Westport, Co. Mayo. The area is underlain by soils derived from schist and gneiss. Brackloon Wood is an Old Oak Wood, a habitat listed on Annex I of the EU Habitats Directive.

The Owenee River forms the eastern boundary of the site and a number of small streams run through the wood forming small patches of marshy ground. The Narrow-leaved Helleborine (*Cephalanthera longifolia*), an orchid of damp woods, has been recorded on the site. This species is protected under the Flora (Protection) Order, 1999. The Badger, a Red Data Book species, is also known from the site.

Sheep grazing and the spread of Rhododendron (*Rhododendron ponticum*) pose the most serious threats to the value of site. Although this woodland has been fragmented by coniferous plantations, the basic structure persists and Brackloon Woods remain an area of considerable ecological importance.

3.3.6 Mweelrea / Sheeffry / Erriff Complex SAC (001932)

The Mweelrea / Sheeffry / Erriff Complex covers a large area of the scenic hills of south Mayo. Several river catchments are encompassed within the site, including the Bundorragha and Glenummera Rivers, as well as Fin Lough, Doo Lough and Glencullin Lough, the upper catchment of the Bunowen River and parts of the Derrycraff and Ownemore Rivers.

The site is a candidate SAC selected for active blanket bog, lagoons, machair, decalcified dunes and petrifying springs, all priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for floating river vegetation, Atlantic salt meadows, Mediterranean salt meadows, wet and dry heath, Juniper scrub, alpine heath, calcareous rocky and siliceous rocky vegetation, alkaline fen, transition mires, upland and lowland oligotrophic lakes, dystrophic lakes, Rhynchosporion, drift line vegetation, dunes with creeping willow, embryonic shifting dunes and Marram dunes, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Freshwater Pearl Mussel, Atlantic Salmon, Otter, the Whorl snails *Vertigo angustior* and *V. geyeri,* the plant Slender Naiad and the liverwort Petalwort.

Several oligotrophic lakes occur within the site. Arctic Charr has been recorded from Doo Lough and there is a pre-1930 record of this fish species from Lough Glenawough. Arctic Charr is listed in the Irish Red Data Book as threatened in Ireland.

The coastal plain at Dooaghtry represents perhaps the finest example of machair habitat in Ireland. This area includes dunes, dune machair, Oak (*Quercus* sp.)/Birch (*Betula* sp.) woodland, freshwater lakes, lagoon, marsh and saltmarsh, and supports a rich flora. There is an unconfirmed record of the rare, Starry Stonewort (*Nitellopsis obtusa*) from a machair lake at Dooaghtry - this species is listed in the Red Data Book.

The Mweelrea / Sheeffry / Erriff Complex is an extremely large site containing a wide range of habitats, including many that are listed on Annex I of the EU Habitats Directive, of which five are given priority status, i.e. blanket bog, petrifying springs, lagoons, machair and decalcified dune heath. The site supports populations of rare and threatened plants (mosses, liverworts, stoneworts, ferns and flowering plants) and animals (invertebrates, fish, birds and mammals).

3.4 SCREENING ASSESMENT

3.4.1 Elements of the Project Likely to Give Rise to Impacts on Natura 2000 sites

The proposed development is not directly connected or necessary to the management of the six Natura 2000 sites located within the 15km radius of the site. Only those features of the proposed works that have the potential to impact on features and conservation objectives of the identified Natura 2000 sites are considered. In the initial screening of impacts, a number of potential impacts have been identified as summarised in **Table 3.1**. These include:

- Pollution of the stream to the south of the site and the downstream Clew Bay Complex SAC with suspended solids due to runoff of soil from construction areas, or due to disturbance of fine subsurface substrates in the course of in-stream construction and excavation, which can have severe negative impacts on invertebrate and plant life, and on all life stages of fish;

- Pollution of the stream to the south of the site and the downstream Clew Bay Complex SAC with substances associated with the construction process, such as fuels, lubricants, waste concrete, waste from site toilet and wash facilities, etc.; and

- The introduction and spread of invasive species such as Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), Giant hogweed (*Heracleum mantegazzianum*), etc. during the construction phase can have significant impacts on the ecological functioning of watercourses.

As there will be no discharge of foul or process water (as it will be treated at the Westport Wastewater Treatment Plant before discharging to Clew Bay) from the proposed development and the surface water drainage system has been designed to include attenuation, Class 1 oil/petrol interceptors and a monitoring system with automatic shut off valves, during the operational phase, no impacts on the stream to the south of the site or the downstream Clew Bay Complex SAC are anticipated.

Table 3.1: Potential Significant Impacts on Natura 2000 Sites from the Proposed Development

Site Name	Direct Impacts	Indirect/ Secondary	Land - Take	Resource Requirements (Drinking Water Abstraction Etc.)	Emissions (Disposal to Land, Water or Air)	Excavation Requirements	Transportation Requirements	Duration of Construction, Operation, Decommissioning
Clew Bay Complex SAC	No impact on qualifying interest.	Potential negative impacts during construction of the proposed Biologics Capacity Expansion Project.	The proposed works are not within the Clew Bay Complex SAC, therefore, it will not impact on the site in this regard. No impact on qualifying feature.	Abstraction for water or other natural resources are not proposed for this project. No impact on qualifying feature.	Potential negative impacts during construction of the proposed Biologics Capacity Expansion Project.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest
Owenduff / Nephin Complex SAC	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.
Owenduff / Nephin Complex SPA	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.
Newport River SAC	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.
Brackloon Woods SAC	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.
Mweelre / Sheeffry / Erriff Complex SAC	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.	No impact on qualifying interest.

3.4.2 Likely Changes to the Site

The likely changes that will arise from the proposed Biologics Capacity Expansion Project have been examined in the context of a number of factors that could potentially affect the integrity of the Natura 2000 sites (**Table 3.2**).

Table 3.2: Likely Changes to Natura 2000 sites

Site Name	Reduction of Habitat Area	Disturbance to Key Species	Habitat or Species Fragmentation	Reduction in Species Density	Changes in Key Indicators of Conservation Value (water quality etc.)	Climate Change
Clew Bay Complex SAC	Potential negative impact	Potential negative impact	Potential negative impact	Potential negative impact	Potential negative impact	None
Owenduff / Nephin Complex SAC	None	None	None	None	None	None
Owenduff / Nephin Complex SPA	None	None	None	None	None	None
Newport River SAC	None	None	None	None	None	None
Brackloon Woods SAC	None	None	None	None	None	None
Mweelre / Sheeffry / Erriff Complex SAC	None	None	None	None	None	None

3.5 CONCLUSIONS

The likely impacts that will arise from the construction and operation of the proposed development have been examined in the context of a number of factors that could potentially affect the integrity of the Natura 2000 network (**Table 3.2**). On the basis of the findings of this Screening for Appropriate Assessment, it is concluded that the Proposed Biologics Capacity Expansion Project:

(i) is not directly connected with or necessary to the management of a Natura 2000 site; and

(ii) may have an effect on a Natura 2000 site, the Clew Bay Complex SAC.

Therefore, applying the Precautionary Principle and in accordance with Article 6(3) of the Habitats Directive, the proposed Biologics Capacity Expansion Project will be brought forward for a Stage 2 Appropriate Assessment.

4 STAGE TWO: APPROPRIATE ASSESSMENT

4.1 INTRODUCTION

In this section, one Natura 2000 site (Clew Bay Complex SAC) is described and all potential impacts resulting from the proposed development are discussed in relation to the conservation objectives of this designated site.

4.2 DESCRIBE THE ELEMENTS OF THE PROJECT THAT ARE LIKELY TO GIVE RISE TO SIGNIFICANT EFFECTS ON THE SITE

There is potential for significant adverse effects on a Natura 2000 site as set out in the screening assessment (summarised in **Table 3.2**) for the following reasons:

- Pollution of the stream to the south of the site and the downstream Clew Bay Complex SAC with suspended solids due to runoff of soil from construction areas, or due to disturbance of fine subsurface substrates in the course of in-stream construction and excavation, which can have severe negative impacts on invertebrate and plant life, and on all life stages of fish;

- Pollution of the stream to the south of the site and the downstream Clew Bay Complex SAC with substances associated with the construction process, such as fuels, lubricants, waste concrete, waste from site toilet and wash facilities, etc.; and

- The introduction and spread of invasive species such as Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), Giant hogweed (*Heracleum mantegazzianum*), etc. during the construction phase can have significant impacts on the ecological functioning of watercourses

- Cumulative impacts with other plans and projects with the potential to impact on the stream to the south of the site and the Clew Bay Complex SAC.

The effects outlined above are a risk associated with the project but the potential for all risks will be minimised through a series of specific mitigation measures that are presented in **Section 4.5** of this report.

4.2.1 Pollution with suspended solids

Potential impacts from suspended sediment due to runoff of soil from construction areas can have severe negative impacts on invertebrate and plant life and on all life stages of fish. In addition, the following can affect the ecology of the stream to the south of the site and the downstream Clew Bay Complex SAC:

- Suspended sediment can reduce water clarity and visibility in the stream and downstream in the SAC, impairing the ability of fish and birds to find food items;
- Settled sediments can smother and displace aquatic organisms such as macroinvertebrates in the downstream SAC, reducing the amount of food items available to fish and birds; and
- Increased levels of sediment can displace fish out of prime habitat into less suitable areas (Chilibeck *et al*, 1992). Suspended solids can abrade or clog the gills of fish. It takes a high concentration of solid wastes to clog a fish gill and cause asphyxiation, but only a little to cause abrasions and thus permit the possibility of infections (Solbe, 1988).

4.2.2 Pollution with other substances associated with the construction process

The potential exists for a range of serious pollutants to enter the stream to the south of the site during construction of the proposed development. For example, any of the following will have deleterious effects on fish, plants and invertebrates if allowed to enter watercourses:

- Raw or uncured concrete and grouts;
- Wash down water from exposed aggregate surfaces, cast-in-place concrete and concrete from concrete trucks;
- Fuels, lubricants and hydraulic fluids for equipment used on the proposed development site; and
- Bitumen and silanes used for waterproofing concrete surfaces.

4.2.3 Introduction and Spread of Invasive Species

The introduction and spread of invasive species such as Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), Giant hogweed (*Heracleum mantegazzianum*), etc. can

have significant impacts on the ecological functioning of ecosystems. As well as being aggressive colonists of aquatic environments and shading local flora, in winter plants die back exposing soil. The soil is then eroded into the stream to the south of the site, altering substrate characteristics, and discharged into Clew Bay.

4.3 CONSERVATION OBJECTIVES

Article 6 of the Habitats Directive states that:

> *"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications of the site in view of the site's conservation objectives".*

The importance of a site designated under the Habitats Directive is defined by its qualifying features or interests. Qualifying interests for any Natura 2000 site are listed on a *pro forma*, called the Natura 2000 standard data form, which forms the basis of the rationale behind designation, and informs the Conservation Management Plan for targeted management and monitoring of key species and habitats.

4.3.1 Clew Bay Complex SAC

The conservation objectives from the NPWS (19 July 2011 – Version 1.0) (see **Appendix A**) for the Clew Bay Complex SAC are set out below:

1. The status of Geyer's whorl snail as a qualifying Annex II species for Clew Bay Complex SAC is currently under review. The outcome of this review will determine whether a site specific conservation objective is set for this species;
2. To maintain the favourable conservation condition of Mudflats and Sandflats not covered by seawater at low tide in Clew Bay Complex SAC;
3. To maintain the favourable conservation condition of Lagoons in Clew Bay Complex SAC;
4. To maintain the favourable conservation condition of Large shallow inlets and bays in Clew Bay Complex SAC;
5. To maintain the favourable conservation condition of Annual vegetation of driftlines in Clew Bay Complex SAC;
6. To maintain the favourable conservation condition of Perennial vegetation of stony banks in Clew Bay Complex SAC;

7. To restore the favourable conservation condition of Atlantic salt meadows in Clew Bay Complex SAC;
8. To restore the favourable conservation condition of Otter in Clew Bay Complex SAC;
9. To maintain the favourable conservation condition of Harbour seal in Clew Bay Complex SAC;
10. To restore the favourable conservation condition of Embryonic shifting dunes in Clew Bay Complex SAC; and
11. To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* in Clew Bay Complex SAC.

4.4 DESCRIBE HOW THE PROJECT WILL EFFECT KEY SPECIES AND KEY HABITATS

4.4.1 Operation

The Clew Bay Complex SAC is located approximately 2.2km away from the proposed development. Direct impacts to habitats and species will therefore not occur.

During the operation of the proposed project the run off from hard standing will be designed to SuDS standards and include attenuation, Class 1 oil/petrol interceptors and a monitoring system with automatic shut off valves. These design features will remove the potential for negative impacts associated with surface water drainage to impact on the qualifying features of the Natura 2000 site.

In addition, as all foul and process water from the existing facility and the proposed Biologics development s to sewer in accordance with the EPA IPPC licence. Therefore, no direct impacts on water quality from the operation of the proposed project are anticipated.

4.4.2 Construction

There is potential for alterations to the quality of surface water entering the Natura 2000 site as a result of the proposed project construction works. Suspended solids and other construction generated pollutants (e.g. fuels, oils, lubricants, etc.) could enter the stream to the south of the site, which discharges to Clew Bay and this would result in negative effects on the qualifying interests of these Natura 2000 sites.

Accidental spillage of contaminants during construction may cause short to long term, moderate to significant impacts to soil, surface water and the groundwater environment if not stored and used in an environmentally safe manner. In addition, waste material generated from construction activities may

require disposal off-site if not suitable for reuse on site. Temporary storage on site may be required and impacts to surface waters from direct runoff during rainfall events may occur. Again, the potential for surface water contamination exists if any of the contaminants enter the stream to the south of the site and discharge to Clew Bay, which will result in negative effects on the qualifying interests of the Natura 2000 site.

If such substances were to reach Clew Bay in sufficient quantities, the quality of the marine and terrestrial habitats could be adversely affected. The macro-invertebrates which inhabit the mudflats could be directly affected by such pollutants. In turn, the fish, birds and mammals which feed on these organisms could be affected by a reduced food supply or by directly ingesting oil residues, etc.

The introduction and spread of invasive species such as Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), Giant hogweed (*Heracleum mantegazzianum*), etc. during the construction phase can have significant impacts on the ecological functioning of ecosystems. As well as being aggressive colonists of aquatic environments and shading local flora, in winter plants die back exposing soil. The soil is then eroded into the stream to the south of the site, altering substrate characteristics, and discharging into Clew Bay.

The effects outlined above are a risk associated with the proposed development but the potential for all risks will be minimised through a series of specific mitigation measures that are presented in **Section 4.5** of this report.

4.4.3 Cumulative and in Combination Impacts

This step aims to identify at this early stage any possible significant in-combination or cumulative effects/impacts of the proposed development with other such plans and projects on the Clew Bay Complex SAC. Other plans and projects specific to this Natura 2000 site include the following:

- Mayo County Development Plan 2008 – 2014;
- Strategic Environmental Assessment of the Mayo County Development Plan 2008 – 2014;
- Adopted Roadworks Scheme 1012;
- Westport Town and Environs Development Plan 2010 – 2016;
- Variations to the Westport Town and Environs Development Plan 2010 – 2016;
- Ballina and Environs Development Plan 2009 – 2015;
- Ballinrobe Local Area Plan 2010;
- Ballyhaunis Local Area Plan 2010 – 2016;

- Castlebar and Environs Development Plan 2008 – 2014
- Charlestown / Bellaghy Local Area Plan 2009 – 2015;
- Draft Swinford Local Area Plan 2008;
- Variations to the Mayo County Development Plan 2008 – 2014;
- Newport Sewage Scheme;
- Daubentons Bat Waterways Survey;
- Corrib On-Shore Pipeline Project;
- Litter Management Plan 2011 – 2014;
- Western River Basin Management Plan 2010;
- Water Services Investment Programme;
- IPPC Programme;
- Groundwater Pollution Reduction Programme;
- Surface Water Pollution Reduction Programmes; and
- Shellfish Waters Pollution Reduction Plan.

As all foul and process water from the existing Allergan facility is to sewer in accordance with the EPA IPPC licence no direct impacts on water quality from the operation of the proposed development are anticipated and there is no potential for in combination impacts in relation to either surface water quality or hydrology from the operation of the proposed development on the qualifying interests of the Natura 2000 site.

No other pathway has been identified by which any of the plans and projects identified could have a significant 'in combination' effect on the Natura 2000 site. In fact, the in combination effect of the above water related plans and programmes would have positive effects on water quality resulting in positive indirect impacts on any receiving Natura 2000 site.

4.5 MITIGATION MEASURES

Where a likely significant adverse effect has been identified during an Appropriate Assessment or cannot conclusively be ruled out, it may be possible to proceed with a proposal where mitigation measures can be implemented to address the adverse effect. Measures have therefore been included in the design of the proposed Biologics Capacity Expansion Project to ensure that the adverse impacts identified will be mitigated.

4.6 MITIGATION OF THE POTENTIAL IMPACT DURING CONSTRUCTION

4.6.1 Reduction and Prevention of Suspended Solids Pollution

Release of suspended solids to the stream to the south of the site should be kept to a minimum and in the case of discharges to watercourses with salmonid fish should not exceed 35mg/l of total suspended solids. The key factors in erosion and sediment control are to intercept and manage run-off. This limits the potential for soils to be eroded and enter watercourses in runoff. Runoff and surface erosion control is more effective and less expensive than sediment control using sediment control ponds only.

The following general guidelines for erosion and sediment control shall be adhered to during the construction phase. These guidelines are largely based on Goldman *et al* (1986):

i. Schedule development close to sensitive watercourses to minimise risk of potential erosion by, where possible, planning construction activities during drier months, halting construction during periods of heavy precipitation and run-off to minimise soil disturbance, and restrict vehicular and equipment access or provide working surfaces/pads.

ii. Retain existing vegetation where possible and physically mark clearing boundaries on the construction site.

iii. Re-vegetate denuded areas, particularly cut and fill slopes and disturbed slopes as soon as possible. Use mulches or other organic stabilisers to minimise erosion until vegetation is established on sensitive soils.

iv. Cover temporary fills or stockpiles which are likely to erode with polyethylene sheeting.

v. Divert runoff away from denuded areas.

vi. Minimise the length and steepness of slopes where possible.

vii. Minimise runoff velocities and erosive energy by maximising the lengths of flow paths for precipitation runoff, constructing interceptor ditches and channels with low gradients to minimise secondary erosion and transport, and lining unavoidably steep interceptors or conveyance ditches with filter fabric, rock or polyethylene lining to prevent channel erosion.

viii. Retain eroded sediments on site with erosion and sediment control structures such as sediment traps, silt fences and sediment control ponds. Sediment traps shall not be constructed immediately adjacent to or within natural watercourses. A buffer zone shall remain between the sediment trap and the watercourse with the natural vegetation left intact.

ix. Access roads shall be constructed of a non-friable clean well graded material typically of clause 804 to ensure no fines washout during precipitation, and no breakdown under loading.

x. Where possible instream work should be avoided. If unavoidable keep instream work to a minimum and as far as possible protect the natural stream conditions and structure to promote stability of bank and bed structures and retain riparian vegetation.

xi. All watercourse crossings will incorporate clear span structures, with no proposed structures within the watercourses itself. The clear span structures and their method of construction and installation shall be agreed with Inland Fisheries Ireland (IFI). Such structures shall ensure that the river banks remain intact and natural.

xii. Temporary stream diversions should only be carried out in consultation with Inland Fisheries Ireland (IFI). The diversion should be excavated in isolation of stream flow, starting from the bottom end of the diversion channel and working upstream to minimise sediment production. The temporary channel should be constructed in such a way as to minimise suspended solids released when the river is re-routed. Upon completion the bank should be stabilised around the temporary diversion.

xiii. Sediment control ponds shall be designed for a minimum retention time of 15 hours.

xiv. It is important that at the planning stage provision is made for a sufficient land area to accommodate the necessary sediment control measures.

xv. Other than clear span bridge structures with no in-stream structures, strictly no temporary stream crossings or temporary culverting shall take place without the prior agreement of IFI.

xvi. Machinery shall never cross a watercourse by entering it (e.g. at fords).

4.6.2 Reduction or Elimination of Pollution with other Substances Associated with the Construction Process

As the stream to the south of the site discharges to the Clew Bay Complex SAC measures shall be put in place to ensure that no significant impact on the cSAC is caused by pollution generated during the construction process.

Where the construction site is close to the watercourse, the following guidelines based on Chilibeck *et al* (1992), NRA (2005) and SRFB (2007) shall be followed:

i. Raw or uncured waste concrete shall be disposed of by removal from the site or by burial on the site in a location and in a manner that will not impact on the watercourse.

ii. Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks shall be trapped on-site to allow sediment to settle out and reach neutral pH before clarified water is released to the river or drain system or allowed to percolate into the ground.

iii. Fuels, lubricants and hydraulic fluids for equipment used on the construction site should be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice (Enterprise Ireland BPGCS005).

iv. Fuelling and lubrication of equipment shall not be carried out on site close to the watercourse.

v. Any spillage of fuels, lubricants or hydraulic oils shall be immediately contained and the contaminated soil removed from the site and properly disposed of.

vi. Oil booms and oil soakage pads shall be kept on site to deal with any accidental spillage.

vii. Waste oils and hydraulic fluids shall be collected in leak-proof containers and removed from the site for disposal or re-cycling.

viii. Prior to any instream work ensure that all construction equipment is mechanically sound to avoid leaks of oil, fuel, hydraulic fluids and grease.

ix. All pumps using fuel or containing oil should be locally and securely bunded when situated within 25m of waters or when sited such that taking account of gradient and ground conditions there is the possibility of discharge to waters.

x. Foul drainage from site offices etc. shall be removed to a suitable treatment facility or discharged to a septic tank system constructed in accordance with EPA guidelines.

4.6.2.1 Mitigation for Siting Facilities

In general the following, sites for storage areas, machinery depots, site offices, temporary access roads or the disposal of spoil should be located as far as is practicable from any watercourse. In general any site, which is at least 50m from the watercourse may be chosen where feasible. Disposal of spoil shall not be carried out in any location where runoff can occur into watercourse.

4.6.2.2 Mitigation for Invasive Species

All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) shall be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive aquatic / riparian species such as Japanese knotweed in accordance with the Office of Public Works Environmental Standard Operating Procedures (see **Appendix B**). A sign off sheet shall be maintained to confirm cleaning.

5 CONCLUSIONS

An Appropriate Assessment of the proposed Biologics Capacity Expansion Project at Allergan Pharmaceutical, Westport, Co. Mayo has been carried out. Once best practise is followed in the construction of the proposed development, and the mitigation measures presented in this document are fully implemented, it is considered that this development will not have a significant negative impact upon the Clew Bay Complex SAC and its habitats and species.

6 BIBLIOGRAPHY

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APPENDIX A

CONSERVATION OBJECTIVES FOR THE CLEW BAY COMPLEX SAC

National Parks and Wildlife Service

Conservation Objectives

Clew Bay Complex SAC 001482

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

001482 Clew Bay Complex SAC

QI	Description
1013	Geyer's whorl snail *Vertigo geyeri*
1140	Mudflats and sandflats not covered by seawater at low tide
1150	* Coastal lagoons
1160	Large shallow inlets and bays
1210	Annual vegetation of drift lines
1220	Perennial vegetation of stony banks
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
1355	Otter *Lutra lutra*
1365	Common seal *Phoca vitulina*
2110	Embryonic shifting dunes
2120	Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")

Supporting documents, relevant reports & publications (listed by date)

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

Title: Monitoring and Assessment of Irish Lagoons for the purpose of the EU Water Framework Directive
Year: in prep
Author: Roden, C.M.; Oliver, G.
Series: Unpublished report to the EPA

Title: Clew Bay Complex SAC (001482): Conservation objectives supporting document - marine habitats and species [Version 1]
Year: 2011
Author: NPWS
Series: Unpublished Report to NPWS

Title: Clew Bay Complex SAC (001482): Conservation objectives supporting document - coastal habitats [Version 1]
Year: 2011
Author: NPWS
Series: Unpublished Report to NPWS

Title: Otter tracking study of Roaringwater Bay
Year: 2010
Author: De Jongh, A.; O'Neill, L.
Series: Unpublished Draft Report to NPWS

Title: Subtidal benthic surveys (Clew Bay)
Year: 2009
Author: Aquafact
Series: Unpublished Report to NPWS

Title: Saltmarsh Monitoring Report 2007-2008
Year: 2009
Author: McCorry, M.; Ryle, T.
Series: Unpublished Report to NPWS

Title: Clew Bay baseline intertidal survey
Year: 2009
Author: RPS
Series: Unpublished Report to NPWS

Title: Coastal Monitoring Project 2004-2006
Year: 2009
Author: Ryle, T.; Murray, A.; Connolly, C.; Swann, M.
Series: Unpublished Report to NPWS

Title: The phytosociology and conservation value of Irish sand dunes
Year: 2008
Author: Gaynor, K.
Series: Unpublished PhD thesis, National University of Ireland, Dublin

Title: Saltmarsh Monitoring Report 2006

Year: 2007

Author: McCorry, M.

Series: Unpublished Report to NPWS

Title: Inventory of Irish coastal lagoons

Year: 2007

Author: Oliver, G.

Series: Unpublished Report to NPWS

Title: A Survey of Intertidal Mudflats and Sandflats in Ireland

Year: 2006

Author: Aquafact

Series: Unpublished Report to NPWS

Title: Otter Survey of Ireland 2004/2005

Year: 2006

Author: Bailey, M.; Rochford, J.

Series: Irish Wildlife Manuals No. 23

Title: Otters - ecology, behaviour and conservation

Year: 2006

Author: Kruuk, H.

Series: Oxford University Press

Title: Survey of sensitive subtidal benthic marine communities

Year: 2006

Author: MERC

Series: Unpublished Report to NPWS

Title: Harbour seal population assessment in the Republic of Ireland: August 2003

Year: 2004

Author: Cronin, M.; Duck, C.; Ó Cadhla, O.; Nairn, R.; Strong, D.; O'Keeffe, C.

Series: Irish Wildlife Manuals No. 11

Title: Summary of National Parks & Wildlife Service surveys for common (harbour) seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), 1978 to 2003

Year: 2004

Author: Lyons, D.O.

Series: Irish Wildlife Manuals No. 13

Title: Broadscale mapping of candidate marine Special Area of Conservation. Clew Bay Complex, cSAC (001482)

Year: 2003

Author: SSI; Aquafact

Series: Unpublished Report to NPWS

Title: A Survey of selected littoral and sublittoral sites in Clew Bay, Co. Mayo

Year: 1999

Author: Aquafact

Series: Unpublished Report to NPWS

Title: National Shingle Beach Survey of Ireland 1999

Year: 1999

Author: Moore, D.; Wilson, F.

Series: Unpublished Report to NPWS

Title: Aquatic vegetation of Irish coastal lagoons

Year: 1998

Author: Hatch, P.; Healy, B.

Series: Bulletin of the Irish Biogeographical Society. 21: 2-21

Title: A survey of the vegetation of Irish coastal lagoons

Year: 1996

Author: Hatch, P.

Series: Unpublished Report to NPWS

Title: The spatial organization of otters (*Lutra lutra*) in Shetland

Year: 1991

Author: Kruuk, H.; Moorhouse, A.

Series: J. Zool, 224: 41-57

Title: Otter survey of Ireland

Year: 1982

Author: Chapman, P.J.; Chapman, L.L.

Series: Unpublished Report to Vincent Wildlife Trust

Title: Lough Furnace, County Mayo; physical and chemical studies of an Irish saline lake, with reference to the biology of *Neomysis integer*

Year: 1977

Author: Parker, M.M.

Series: Unpublished PhD thesis, University of Dublin, Trinity College.

Spatial data sources

Year:	Interpolated 2011
Title:	Intertidal and subtidal surveys 1999, 2006, 2009; broadscale mapping 2003
GIS operations:	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data; expert opinion used as necessary to resolve any issues arising
Used for:	Marine community types, 1140 (maps 2 & 4)
Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary
Used for:	1160, 1365 (maps 3 & 9)
Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; Saltmarsh and Sand Dune CO datasets erased out if applicable
Used for:	Marine community types base data (map 4)
Year:	Revision 2011
Title:	Inventory of Irish Coastal Lagoons. Version 3
GIS operations:	Clipped to SAC boundary
Used for:	1150 (map 5)
Year:	Revision 2010
Title:	Saltmarsh Monitoring Project 2007-2008. Version 1
GIS operations:	QIs selected; clipped to SAC boundary; overlapping regions with Sand Dune CO data investigated and resolved with expert opinion used
Used for:	1330 (map 6)
Year:	2009
Title:	Coastal Monitoring Project 2004-2006. Version 1
GIS operations:	QIs selected; clipped to SAC boundary; overlapping regions with Saltmarsh CO data investigated and resolved with expert opinion used
Used for:	1210, 2110, 2120 (map 7)
Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	Creation of an 80m buffer on the marine side of the high water mark (HWM); creation of a 10m buffer on the terrestrial side of the HWM; combination of 80m and 10m HWM buffer datasets; creation of a 10m buffer on the landward side of the river banks data; creation of a 20m buffer applied to river centerline and stream data; combination of 10m river banks and 20m river and stream centerline buffer datasets; combined river and stream buffer dataset clipped to HWM; combination of HWM buffer dataset with river and stream buffer dataset; overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary; expert opinion used as necessary to resolve any issues arising
Used for:	1355 (map 8)

Year:	2011
Title:	NPWS rare and threatened species database
GIS operations:	Dataset created from spatial references in database records; expert opinion used as necessary to resolve any issues arising
Used for:	1365 (map 9)

1013 Geyer's whorl snail *Vertigo geyeri*

The status of Geyer's whorl snail as a qualifying Annex II species for Clew Bay Complex SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species.

1140 Mudflats and sandflats not covered by seawater at low tide

To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 2	Habitat area was estimated using OSI data as 1277ha. See marine supporting document for further details
Community distribution	Hectares	The following sediment communities should be maintained in a natural condition: Intertidal sandy mud with *Tubificoides benedii* and *Pygospio elegans* community complex; Sandy mud with polychaetes and bivalves community complex; and Fine sand dominated by *Nephtys cirrosa* community. See map 4	The likely area of sediment communities was derived from a combination of intertidal and subtidal surveys undertaken in 1999, 2006 and 2009. See marine supporting document for further details

1150 * Coastal lagoons

To maintain the favourable conservation condition of Lagoons in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5 for mapped lagoons	The main lagoon is Furnace Lough. Claggan Lagoon has also been mapped, however, further information is required on this lagoon. NB there maybe other lagoons within the SAC. The following targets and notes concentrate on the largest lagoon, Furnace Lough
Habitat area	Hectares	Area stable, subject to slight natural variation. Favourable reference area of surveyed lagoons is 163.3ha. Furnace Lough- 162.1ha; Claggan Lagoon- 1.2ha. See map 5	Areas calculated from spatial data derived from Oliver, 2007. NB there maybe other lagoons within the SAC
Salinity regime	Practical salinity units (psu)	Maintain current spatial and temporal variation in salinity regime	Furnace Lough is a natural, deep (up to 21m), stratified lagoon with natural periodic overturns and anoxia. It has permanent open connection to the sea through which seawater enters when tides exceed MHWN though this connection is somewhat constricted by weirs. There are major freshwater inputs at the northern end from the large Lough Feeagh/Burrishoole catchment area. The surface layer is oligohaline to mesohaline (0.5-12.0 psu) for most of the time but salinity varies from north (fresh water) to south (high salinity) and summer to winter. The waters are sharply stratified, a permanant halocline runs from 1-3m down to 8m, below which the water is of constant salinity (approx. 20psu), anaerobic and stagnant (Parker, 1977). See Oliver (2007) and Roden and Oliver (in prep.) for further information
Hydrological regime	Metres	Maintain current annual water level fluctuations	This is to ensure maintenance of the current communities of the lagoon margins and the current hydrological functioning of the lagoon itself, especially the salinity regime
Hydrological regime	Discharge (m^3/second)	Maintain/restore freshwater discharge regime	There is evidence that the original hydrological regime in the Burrishoole catchment has been impacted due to overgrazing and afforestation resulting in changes to run-off regimes with associated increased siltation and eutrophication. The extent to which these changes have impacted on Lough Furnace is unclear but needs further study

1150 * Coastal lagoons

To maintain the favourable conservation condition of Lagoons in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Barrier	Weir function	Maintain current weir structure at Furnace Lough to ensure maintenance of the current salinity regime	In Furnace Lough, input to and output of saline water is affected to an unknown degree by two weirs. The effect of the weirs needs to be quantified to determine their effect on the salinity regime of the lagoon. These weirs or some similar type structures are shown on the first edition of the 6" OS maps and therefore have been in place for over 170 years
Water quality: chlorophyll a	µg/L	Maintain annual median chlorophyll in Furnace Lough at less than 2.5µg/L	These limits are needed to ensure that excessive shading from phytoplankton does not reduce submergent macrophytes colonisation of the littoral zone the lagoon (J. Ryan, pers comm). The current median levels are less than the target but summer levels are elevated (Roden and Oliver, in prep.) and should be closely monitored
Water quality: Molybdate Reactive Phosphorus (MRP)	mg/L	Maintain annual median MRP in Furnace Lough at less than 0.01mg/L	These limits are needed to ensure that excessive shading from phytoplankton does not reduce submergent macrophytes colonisation of the littoral zone areas of the lagoon (J. Ryan, pers comm). The current median levels in Furnace Lough are 0.005mg/L (Roden and Oliver, in prep). It is possible that the target may be exceeded during periods of overturn. Collection of data on nutrient levels close to the halocline would be useful for the assessment of this possibility
Water quality: Dissolved Inorganic Nitrogen (DIN)	mg/L	Maintain annual median DIN (Dissolved inorganic nitrogen) in Furnace Lough at less than 0.15mg/L	These limits are needed to ensure that excessive shading from phytoplankton does not reduce submergent macrophytes colonisation of the littoral zone of the lagoon (J. Ryan, pers comm). The current median levels of DIN in Furnace Lough are less than 0.1mg/L (Roden and Oliver, in prep)
Water quality: Biological Oxygen Demand (BOD)	mg/L	Maintain annual median BOD (Biological Oxygen Demand) in Furnace Lough at less than 2.0mg/L	These limits are needed to ensure that excessive shading from phytoplankton does not reduce submergent macrophytes colonisation of the littoral zone of the lagoon (J. Ryan, pers comm). The current annual median levels of BOD in Furnace Lough are just below the target (Roden and Oliver, in prep) and should be closely monitored. The relationship between organic matter, mainly peat silt, imput from L. Feeagh and BOD in the surface waters and anoxia in the deeper waters warrants further investigation

1150 * Coastal lagoons

To maintain the favourable conservation condition of Lagoons in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Depth of submergent macrophyte colonisation	Metres	Maintain/increase the depth of submergent macrophyte colonisation of the lagoon	Increased depth of colonisation increases both the extent and diversity of submergent macrophytes. In comparison with similar lagoons the extent of submergent macrophyte colonisation in Furnace Lough appears to be restricted probably due to high water colour. However data on the depth of colonisation and water colour and the relationship between them is lacking. It is also possible that anoxia may be a problem, at least in some areas. These issues need to be investigated
Typical plant species	Number and m²	Maintain number and extent of listed lagoonal specialists, subject to natural variation	Species in Furnace Lough listed in Oliver (2007), Hatch (1996) and Hatch and Healy (1998). A very limited number of plant species are currently listed for the site based on a series of shallow water transects. A snorkelling survey of this complex lagoon is required establish if that list is fully representative of the flora of the lagoon
Typical animal species	Number	Maintain listed lagoon specialists, subject to natural variation	Species in Furnace Lough listed in Oliver (2007), which rated the aquatic fauna as of moderate-high conservation value based on its high diversity and the presence of rare and unexpected crustaceans
Negative indicator species	Number and % cover	Negative indicator species absent or under control	Eutrophication would favour phytoplankton blooms at the expense of submerged macrophytes

1160 Large shallow inlets and bays

To maintain the favourable conservation condition of Large shallow inlets and bays in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated using OSI data as 10189ha. See marine supporting document for further details.
Community extent	Hectares	Maintain the natural extent of the *Zostera* dominated and maërl dominated communities. See map 4	The likely extent of the *Zostera* dominated and maërl dominated communities was derived from the acoustic survey and the dive survey undertaken in 2006. See marine supporting document for further details
Shoot density	Shoots per m^2	Maintain the high quality of *Zostera* dominated community	2006 diver observation and underwater viewer. See marine supporting document for further details
Community structure	Biological composition	Maintain the high quality of maërl dominated communities	Area established from an acoustic mapping survey 2003 and a 2006 diver observation and underwater viewer. See marine supporting document for further details
Community distribution	Hectares	The following communities should be maintained in a natural condition: Sandy mud with polychaetes and bivalves community complex; Fine sand dominated by *Nephtys cirrosa* community; Intertidal sandy mud with *Tubificoides benedii* and *Pygospio elegans* community complex; Shingle; and Reef. See map 4	The likely area of sediment communities was derived from a combination of acoustic mapping survey in 2003, intertidal data from 1999, 2006 and 2009 and subtidal data obtained in 1999 and 2009. See marine supporting document for further details

1210 Annual vegetation of drift lines

To maintain the favourable conservation condition of Annual vegetation of driftlines in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Bartraw - 0.04ha and Rosmurrevagh - 0.08ha. See map 7	Current area unknown. Two sub-sites (Bartraw and Rosmurrevagh) were mapped during the Coastal Monitoring Project (Ryle et al., 2009), giving a total estimated area of 0.12ha. NB further unsurveyed areas maybe present in the site. Habitat is very difficult to measure in view of its dynamic nature which means that it can appear and disappear within a site from year to year. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes	Current distribution unknown. Majority of habitat found at Bartraw and Rosmurrevagh, although there may be additional patches distributed throughout the site. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Accumulation of organic matter in tidal litter is essential for trapping sand and initiating dune formation. Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: *Cakile maritima, Honckenya peploides*, *Salsola kali* and *Atriplex* spp.	Based on data from Ryle et al. (2009) . See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details

1220 Perennial vegetation of stony banks

To maintain the favourable conservation condition of Perennial vegetation of stony banks in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession	Current area unknown, but Clew Bay is considered to have the largest shingle reserves in the country. It was recorded from Clew Bay Complex, Bartraw and Rosmurrevagh during the National Shingle Beach Survey (Moore and Wilson, 1999), but the extent was not mapped. The Coastal Monitoring Project mapped 0.48ha of this habitat at Bartraw and 0.01ha at Rosmurrevagh (Ryle et al., 2009). The extent is considerably greater than this figure, as substantial shingle deposits are known to occur in association with many of the drumlins in Clew Bay. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution unknown at present, although the habitat has been recorded at Clew Bay Complex (Moore and Wilson, 1999), as well as Bartraw and Rosmurrevagh (Moore and Wilson, 1999; Ryle et al., 2009). See coastal habitats supporting document for further details
Physical structure: Functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Site represents the only known example of incipient gravel barrier formation in the country. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Moore and Wilson (1999) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain the presence of species-poor communities with typical species: *Honckenya peploides*, *Beta vulgaris* ssp. *maritima*, *Crithmum maritimum*, *Tripleurospermum maritimum*, *Glaucium flavum* and *Silene uniflora*	Based on data from Moore and Wilson (1999) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Moore and Wilson (1999) and Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. See coastal habitats supporting document for further details

1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

To restore the favourable conservation condition of Atlantic salt meadows in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Mallaranny - 19.76ha, Tooreen - 1.06ha, Rosmurrevagh - 6.40ha, Tierna - 0.39ha, Rockfleet Castle - 0.37ha, Rosharnagh East - 0.03ha, Caraholly - 0.36ha, Kiladangan - 0.96ha, Annagh Island - 5.23ha, Bartraw - 0.38ha. See map 6	Based on data from the Saltmarsh Monitoring Project (McCorry, 2007). Ten sub-sites were mapped (34.94ha) and additional areas of potential saltmarsh (3.92ha) were identified for an examination of aerial photographs, giving a total estimated area of 38.86ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 6 for known distribution	Based on data from McCorry (2007). See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats backing document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry (2007). The efficiency of sediment circulation throughout a saltmarsh depends on the creek pattern. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from McCorry (2007). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% area outside creeks vegetated.	Based on data from McCorry (2007). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)	Based on data from McCorry (2007). See coastal habitats supporting document for further details

1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

To restore the favourable conservation condition of Atlantic salt meadows in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on data from McCorry (2007). See coastal habitats supporting document for further details

1355 Otter *Lutra lutra*

To restore the favourable conservation condition of Otter in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in west estimated at 70% (Bailey and Rochford, 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 233.1ha above high water mark (HWM); 47.3ha along river banks/ around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 2426.7ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 10.2km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 141.3ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase. For guidance, see map 8	Otters will regularly commute across stretches of open water up to 500m. e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

1365 Common seal *Phoca vitulina*

To maintain the favourable conservation condition of Harbour seal in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use	See marine supporting document for further details
Breeding behaviour	Breeding sites	The breeding sites should be maintained in a natural condition. See map 9	Attribute and target based on background knowledge of Irish breeding populations, review of data from Lyons (2004) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Moulting behaviour	Moult haul-out sites	The moult haul-out sites should be maintained in a natural condition. See map 9	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004), Cronin et al. (2004) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Resting behaviour	Resting haul-out sites	The resting haul-out sites should be maintained in a natural condition. See map 9	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	See marine supporting document for further details

2110 Embryonic shifting dunes

To restore the favourable conservation condition of Embryonic shifting dunes in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Bartraw - 0.02ha and Rosmurrevagh - 1.38ha. See map 7	Current area unknown. Two sub-sites (Bartraw and Rosmurrevagh) were mapped during the Coastal Monitoring Project (Ryle et al., 2009), giving a total estimated area of 1.40ha. NB further unsurveyed areas maybe present in the site. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 7 for known distribution	Mobile dunes are well developed at Rosmurrevagh, while those at Bartraw have been compromised by the installation of coastal protection works. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of *Elytrigia* and/or *Leymus* should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species: *Elytrigia juncea* and/or *Leymus arenarius*	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn (Hippophae rhamnoides) should be absent or effectively controlled. See coastal habitats supporting document for further details

2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")

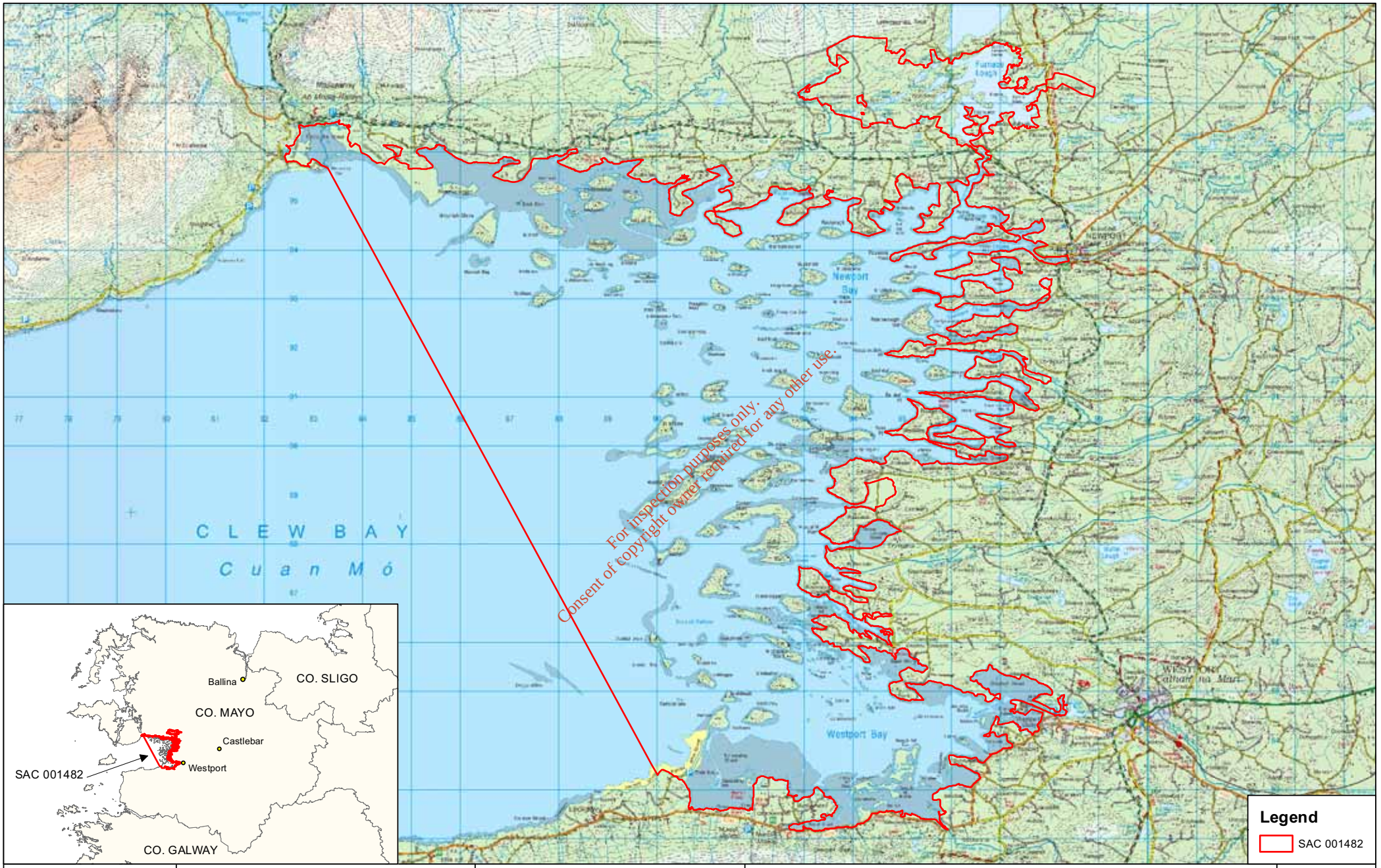
To restore the favourable conservation condition of Shifting dunes along the shoreline with Ammophila arenaria in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession. For sub-sites mapped: Bartraw - 0.18ha and Rosmurrevagh - 0.36ha. See map 7	Current area unknown. Two sub-sites (Bartraw and Rosmurrevagh) were mapped during the Coastal Monitoring Project (Ryle et al., 2009), giving a total estimated area of 0.54ha. NB further unsurveyed areas maybe present in the site. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 7 for known distribution	Mobile dunes are well developed at Rosmurrevagh, while those at Bartraw have been compromised by the installation of coastal protection works. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. *Ammophila* reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth encouraging further accretion. Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: plant health of dune grasses	Percentage cover	More than 95% of *Ammophila* and/or *Leymus* should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities dominated by *Ammophila arenaria* and/or *Leymus arenarius*	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details

2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")

To restore the favourable conservation condition of Shifting dunes along the shoreline with Ammophila arenaria in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. See coastal habitats supporting document for further details



An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht

MAP 1:
CLEW BAY COMPLEX
CONSERVATION OBJECTIVES
SAC DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document.

COUNTY MAYO

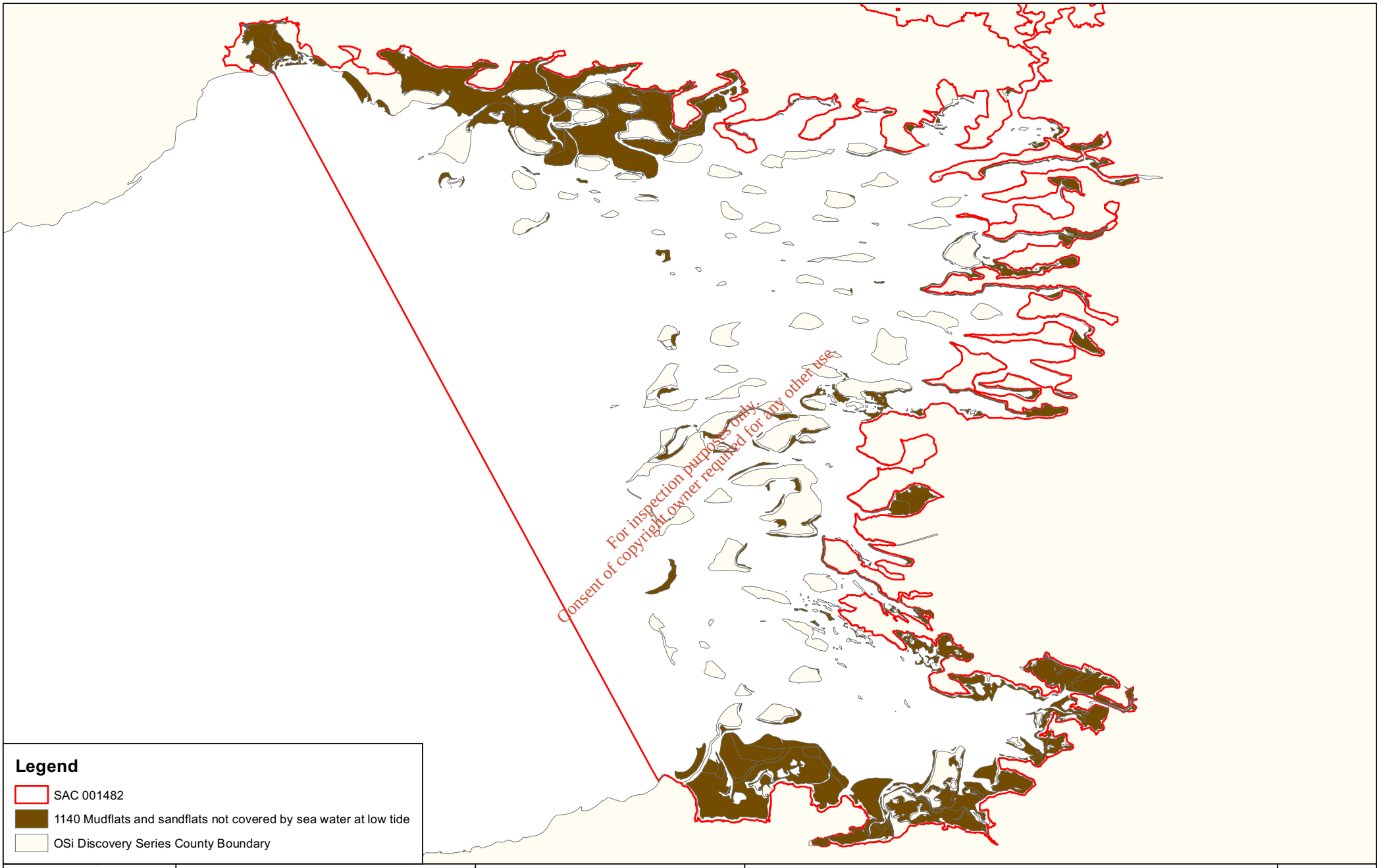
0 1 2 3 4 km

N

SITE CODE

SAC 001482
Version 1.05

Map Version 1
Date: June 2011



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Department of Arts, Heritage and the Gaeltacht

MAP 2:
CLEW BAY COMPLEX
CONSERVATION OBJECTIVES
TIDAL MUDFLATS AND SANDFLATS

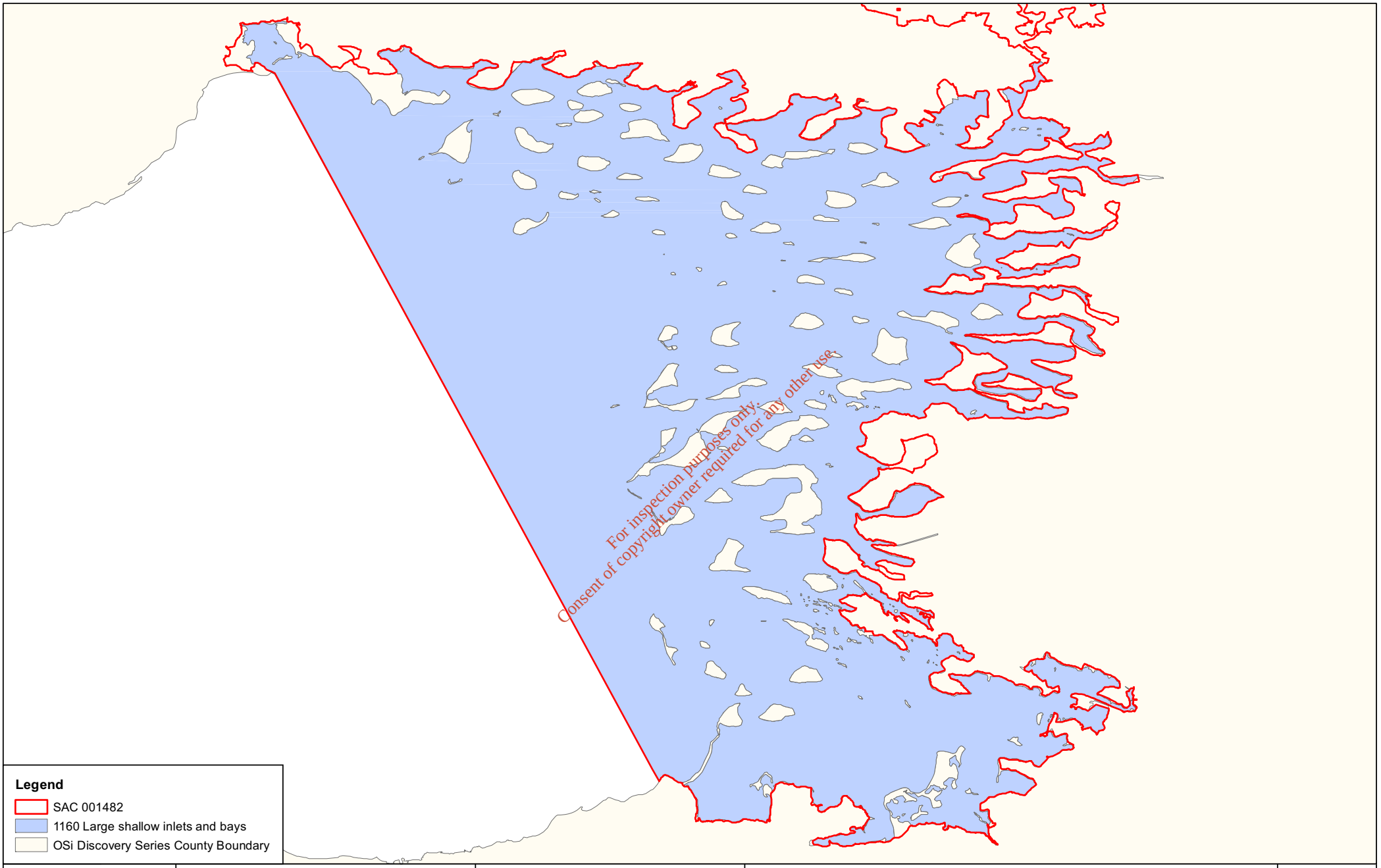
Map to be read in conjunction with the NPWS Conservation Objectives Document.

COUNTY MAYO

SITE CODE

SAC 001482
Version 1.05

Map Version 1
Date: June 2011



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Department of Arts, Heritage and the Gaeltacht

MAP 3:
CLEW BAY COMPLEX
CONSERVATION OBJECTIVES
LARGE SHALLOW INLETS AND BAYS

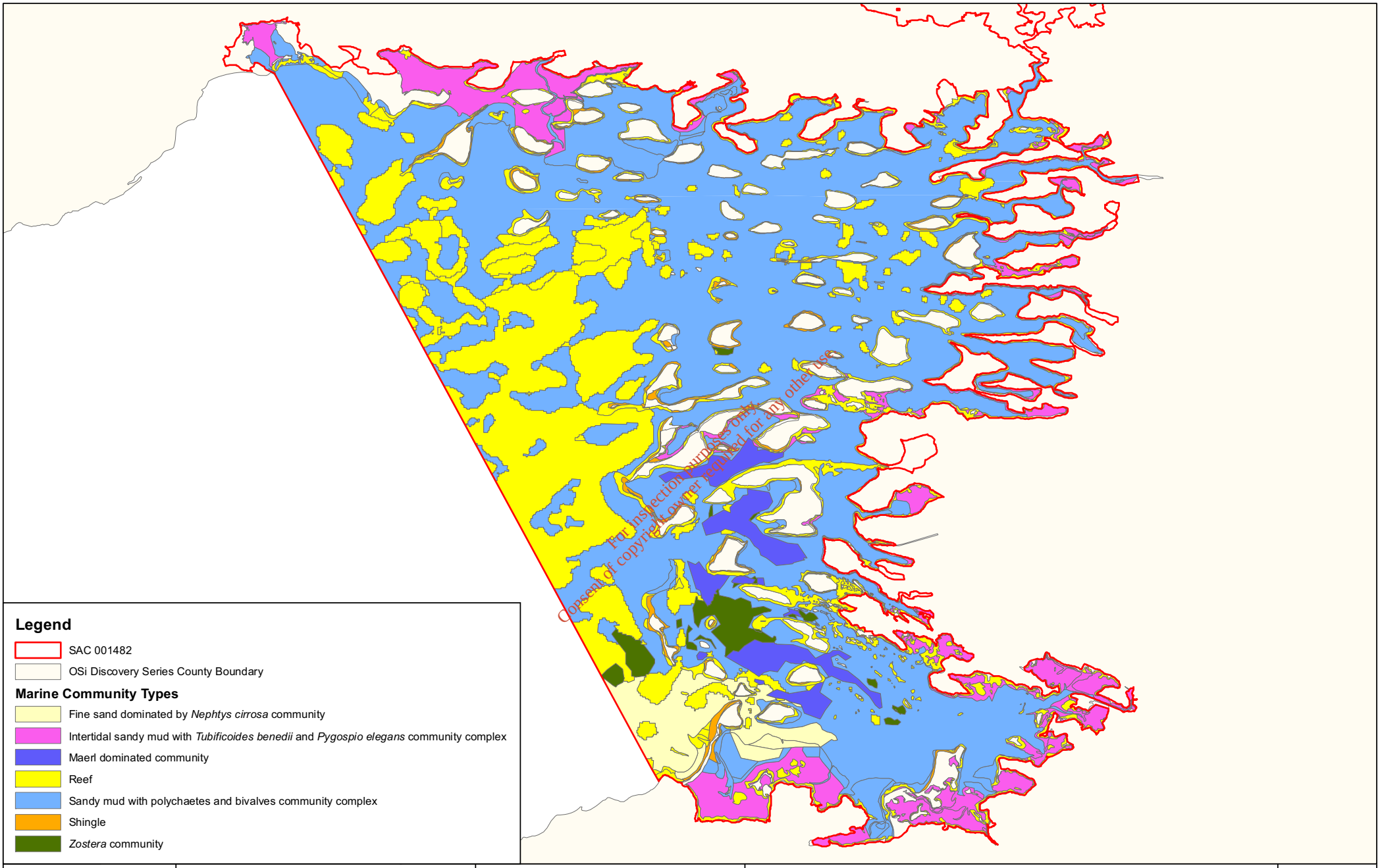
Map to be read in conjunction with the NPWS Conservation Objectives Document.

COUNTY MAYO

SITE CODE

SAC 001482
Version 1.05

Map Version 1
Date: June 2011



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Department of Arts, Heritage and the Gaeltacht

MAP 4:
CLEW BAY COMPLEX
CONSERVATION OBJECTIVES
MARINE COMMUNITY TYPES

Map to be read in conjunction with the NPWS Conservation Objectives Document.

COUNTY MAYO

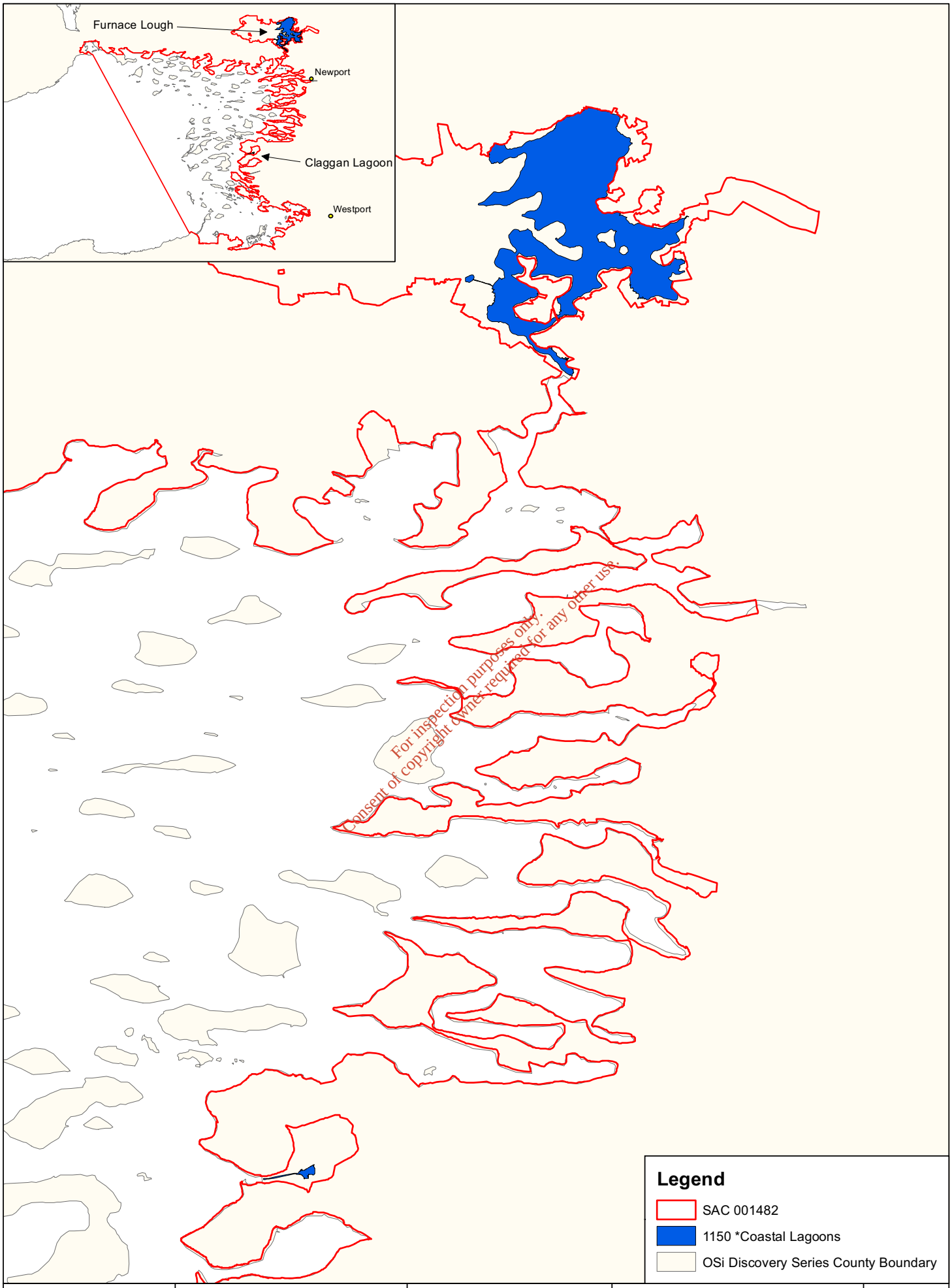
0 1 2 3 km

N

SITE CODE

SAC 001482
Version 1.05

Map Version 1
Date: June 2011



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Department of Arts, Heritage and the Gaeltacht

MAP 5:
CLEW BAY COMPLEX
CONSERVATION OBJECTIVES
COASTAL LAGOONS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

COUNTY MAYO

0 0.5 1 km

N

The mapped boundaries are of an indicative and general nature only.
Boundaries of designated areas are subject to revision.
Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Nil sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta.
Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059208)

SITE CODE

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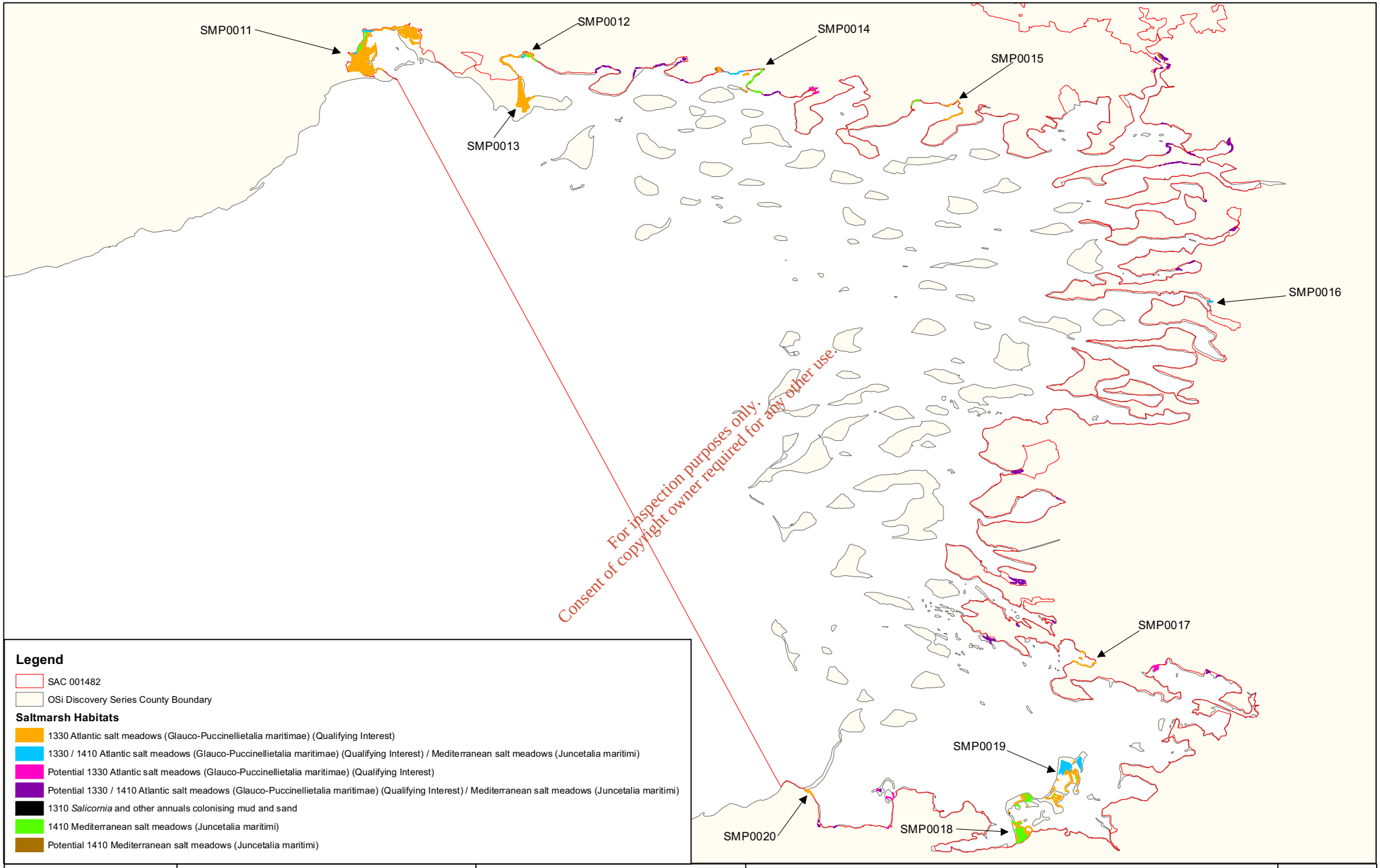
Version 1.05

Map Version 1
Date: June 2011



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Department of Arts, Heritage and the Gaeltacht

MAP 6:
CLEW BAY COMPLEX
CONSERVATION OBJECTIVES
SALTMARSH HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

COUNTY MAYO

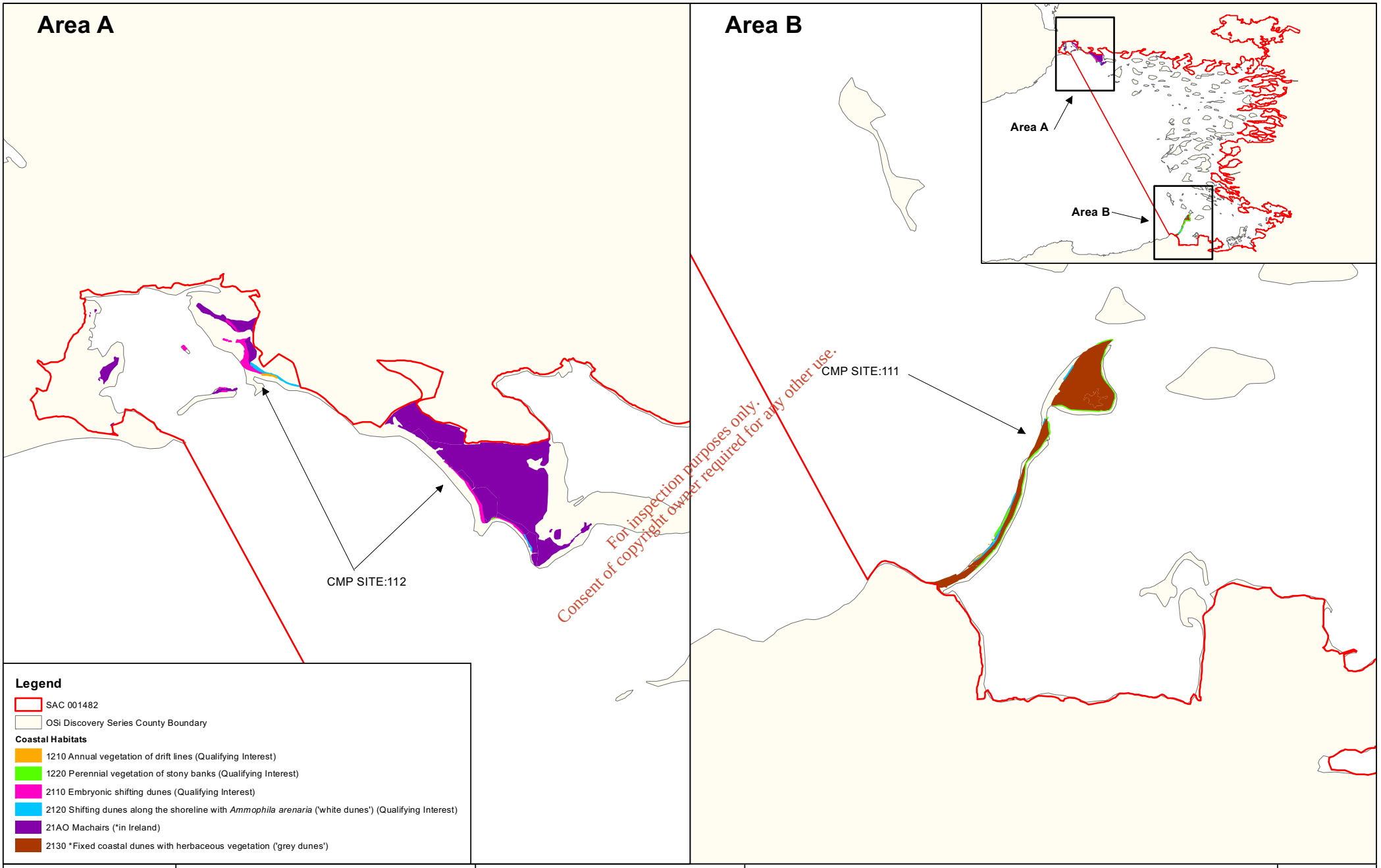
0 1 2 3 km

N

SITE CODE

SAC 001482
Version 1.05

Map Version 1
Date: June 2011



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Department of Arts, Heritage and the Gaeltacht

MAP 7:
CLEW BAY COMPLEX
CONSERVATION OBJECTIVES
COASTAL HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

COUNTY MAYO

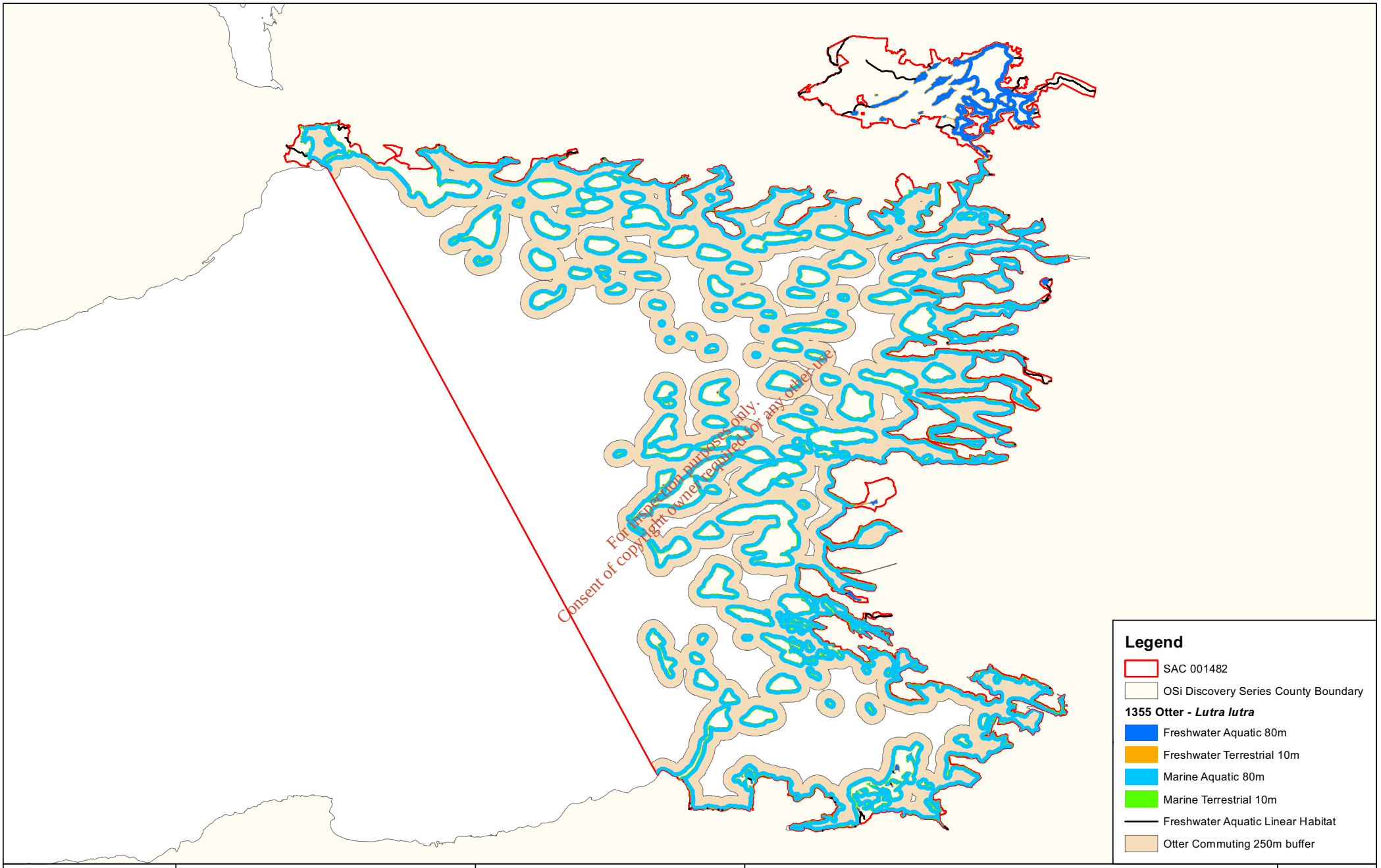
0 0.25 0.5 0.75 1 km

N

SITE CODE

SAC 001482
Version 1.05

Map Version 1
Date: June 2011



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Department of Arts, Heritage and the Gaeltacht

MAP 8:
CLEW BAY COMPLEX
CONSERVATION OBJECTIVES
OTTER

Map to be read in conjunction with the NPWS Conservation Objectives Document.

COUNTY MAYO

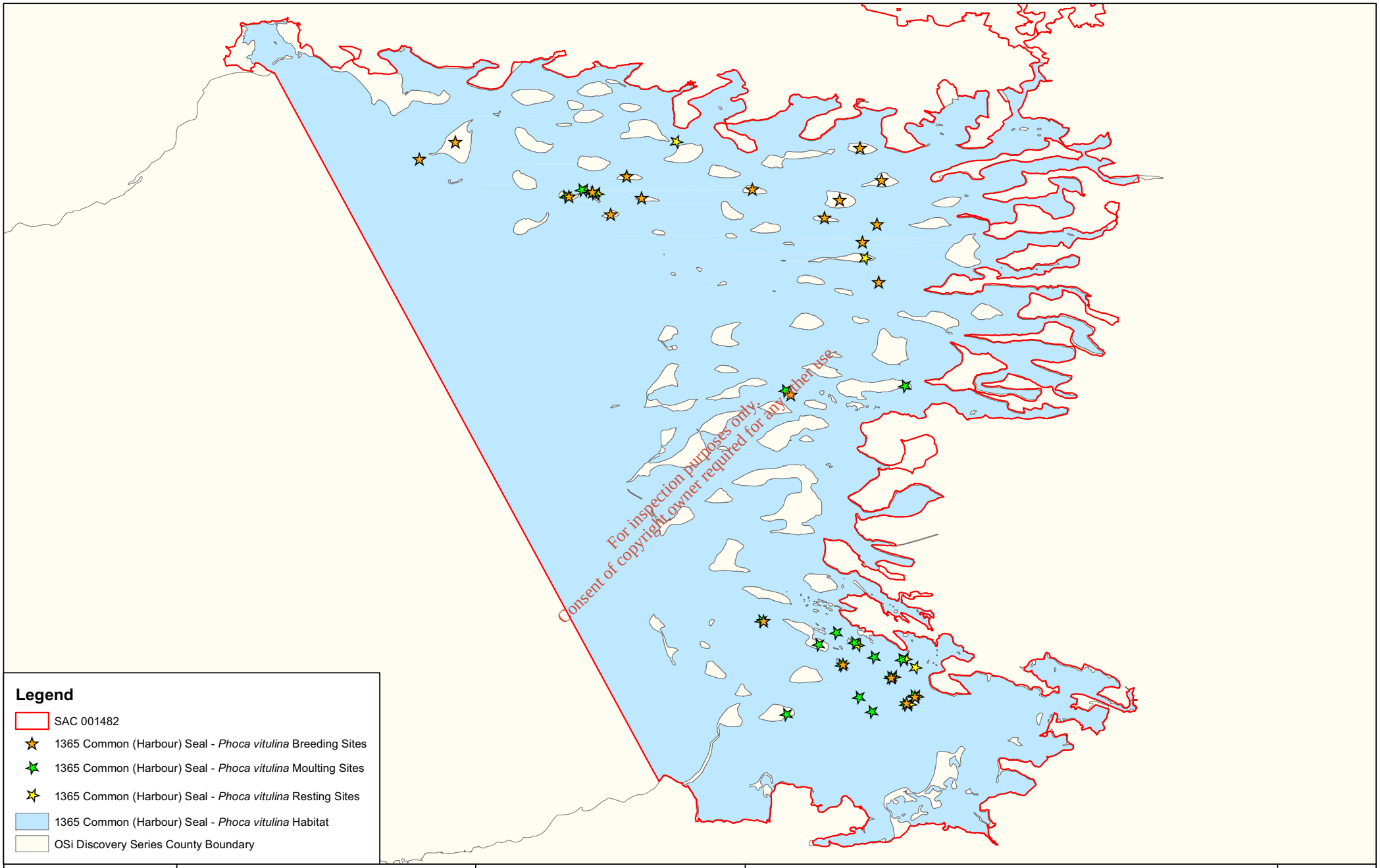
0 1 2 3 4 km

N

SITE CODE

SAC 001482
Version 1.05

Map Version 1
Date: June 2011



An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht

MAP 9:
CLEW BAY COMPLEX
CONSERVATION OBJECTIVES
COMMON HARBOUR SEAL

Map to be read in conjunction with the NPWS Conservation Objectives Document.

COUNTY MAYO

0 1 2 3 km

N

SITE CODE

SAC 001482
Version 1.05

Map Version 1
Date: June 2011

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

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Citation:
NPWS (2011) Conservation Objectives: Clew Bay Complex SAC 001482. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Series Editors: Rebecca Jeffrey & Naomi Kingston
ISSN 2009-4086

APPENDIX B

OFFICE OF PUBLIC WORKS ENVIRONMENTAL STANDARD OPERATING PROCEDURES

The Office of Public Works

Arterial Drainage Maintenance Service

Environmental Management Protocols

&

Standard Operating Procedures

The Office of Public Works
Environment Section
West Region Drainage Maintenance
Headford
Co. Galway
Telephone: +353 (0)93 35 456
Fax: +353 (0)93 35 631

The Office of Public Works
Arterial Drainage Maintenance
Environmental Management Protocols & Standard Operating Procedures

Contents:	Current Version
Environmental Management Protocols	April 2011
Environmental Drainage Maintenance Guidance Notes (10 Steps to Environmentally Friendly Maintenance)	April 2011
Lamprey Standard Operating Procedure	V2 April 2009
Crayfish Standard Operating Procedure	V2 April 2009
Otter Standard Operating Procedure	V2 April 2009
Mussels Standard Operating Procedure	V2 April 2009
Invasive Species Standard Operating Procedure	V2 March 2009
Zebra Mussel Standard Operating Procedure	V2 May 2009
Blank OPW/ EREP Audit Form	April 2011
NPWS Local Contact Details	May 2009
Fisheries Contact Details	April 2011
OPW Bridges on National Primary Roads	March 2009

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ENVIRONMENTAL MANAGEMENT PROTOCOLS

ARTERIAL DRAINAGE MAINTENANCE SERVICE
(APPLICABLE TO ENGINEERS, TECHNICIANS AND FOREMEN)

OPW
The Office of Public Works
Oifig na nOibreacha Poiblí

PART I – OPERATIONS MANAGEMENT

COMMUNICATIONS - STATUTORY STAKEHOLDERS

- By the end of September of each year, each Drainage Region to forward a ***draft*** copy if its Annual Works Programme for the coming year to OPW's Environment Section, and to the Inland Fisheries Ireland (IFI) EREP Project Manager who will review it for appropriate sites and study locations for the Environmental River Enhancement Programme 2008 -2012.
- By end of November of each year, each Drainage Region to forward the relevant sections of the Finalised Annual Maintenance Programme for the coming year with a copy of appropriate scheme maps, to the National Parks & Wildlife Services (NPWS) Regional Managers and the IFI Directors.
- When compiling the programme the type of works proposed should be indicated for each channel under the headings A-F to facilitate the Screening for Appropriate Assessment (AA).
    - A – Silt & Vegetation Management
    - B – Aquatic Vegetation Cutting
    - C – Bank Protection
    - D – Bush Cutting/Branch Trimming
    - E – Tree Cutting
    - F – Bridge/ Structure Repairs
- Ideally, approximate timing (season/month) and approximate duration of works should be included for each channel.
- Works that fall within SACs, SPAs or NHAs are to be highlighted on the programme.
- As a follow up, the Drainage Regions offer the opportunity for a meeting with the stakeholders to discuss the programme and where a meeting is requested, preferable for this to take place as early as possible in the year.
- Prior to entry onto a channel contained wholly or partly within an SAC, SPA or NHA, three weeks notice in advance of entry, and for SAC & SPA an AA Screening Statement/Conclusion Statement must be completed and forwarded through the NPWS District Conservation Officer.

INTERIM STAKEHOLDERS MEETINGS

- In addition to the start of the year stakeholder meeting to overview the Annual Works Programme, Regional Offices will offer and facilitate a schedule of more frequent and catchment focused meetings.
- The need and the frequency of these meetings will be determined on a regional basis in partnership with the relevant stakeholders.
- Typically a frequency of every 2-3 months to discuss the following 2-3 months work on the catchment, identifying any further environmental sensitivities, appropriate mitigating measures, follow up joint site visits where deemed beneficial and flagging any opportunities for added benefit in proposed River Enhancement works.
- Typical attendance includes a range of OPW Management Staff, i.e. Engineer, Technician and/or Foreman, NPWS Rangers and/or DCO and IFI Officers.
- OPW Engineer will compile minutes of the meeting to record attendance and a brief account

of main decisions and follow up actions.

- Any channel specific information resulting from these meetings, such as timing requests should be entered into the Records Database in accordance with the National Recording Process.
- Fruitful consultations with statutory stakeholders such as NPWS and IFI are of critical importance to continuously improving environmental performance. However, in the interest of maximising the efficiency of stakeholders input, Management Staff are as far as practical, to plan their consultative requirements and address a range of aspects in any one discussion forum. Interim Stakeholder Meetings or similar forums offer good opportunities to maximise consultation efficiencies.

Correspondence

- All Environment related correspondence/complaints should be logged on the Engineering Services Correspondence Database as per normal protocol. Complaints received should be forwarded to the Environment Section should assistance be required.

Walkover Surveys

- As a component to the EREP Project, on a number of channels, EREP team will request for Walkover Surveys as an opportunity to discuss in detail on site the environmental options for a particular channel with a range of relevant stakeholders.
- Typical attendance will be an IFI EREP representative, a range of OPW Management Staff and relevant Operational Crew if deemed beneficial, local IFI Officer and/or NPWS Ranger or DCO.
- OPW Management Staff to liaise with EREP team and coordinate the site visit with local IFI and NPWS to facilitate their participation if these stakeholders wish to attend.
- Environmental procedures as agreed on-site will be recorded by IFI EREP team and issued to the OPW Engineer as part of the design guidance for the particular Enhanced Maintenance works.
- Regional Management Staff to ensure that Operational Staff carry out the works in accordance with the agreed procedures.

Natura 2000 Site Assessments

- All scheduled maintenance operations in the vicinity of a Natura 2000 Site i.e. an SAC or SPA, will require Screening for Appropriate Assessment and Stage II Appropriate Assessment where required.
- By the end of September of each year, each Drainage Region to forward a ***draft*** copy if its Annual Works Programme for the coming year to OPW's Environment Section to facilitate this process.
- Environment Section will procure the Ecological Consultant, collate all the channel lists and issue completed AA Screening Statements/Conclusion Statements to the respective OPW engineers as completed.
- The Ecological Consultant will consult with OPW management to define the precise extents of proposed works in each Natura 2000 Site.
- In addition, the Ecological Consultant will be carrying out walkover surveys for pre and post maintenance works for a representative number of the sites and OPW Management will be required to facilitate the same.
- OPW Management Staff will issue the relevant completed Assessments directly to the NPWS District Conservation Officer.In addition, Environment Section will issue all of the Assessments to the Development Applications Unit, DEHLG, Dun Sceine, Harcourt Lane,

Dublin 2.

- Preferably for the Assessments to be forwarded to the DCO as soon as it is completed, but in any case with a minimum of three weeks notice before commencement of the works.
- Management Staff to implement all prescribed mitigating measures and ensure that Operational Staff are made aware of all relevant site specific mitigating measures.

Current version of Designated Sites GIS Layers available on Socialtext

Environmental River Enhancement Programme (EREP)

- After reviewing the draft Annual Works Programme, IFI EREP team will revert to the respective Regional Engineers Office and request follow up meetings as required to discuss aspects of the programme in relation to the EREP.
- Enhancement sites require ground truthing to ensure they are technically feasible as envisaged. This is to be coordinated by the IFI EREP team with local IFI and OPW personnel as required.
- Sites shortlisted by IFI EREP team for Capital Enhancement works are emanating from a screening process of technical feasibility in terms of gradient and water quality. In the future, sites selected will increasingly be resulting from other requirements such as the Water Framework Directive Programme Of Measures under Morphology.
- IFI EREP team in consultation with the local IFI and OPW, will prioritise sites on a basis of best return for investment. IFI EREP team will liaise with the Regional Offices to assist in identifying channels deemed suitable for capital enhancement which should be integrated with the following years work programme. In some cases, a situation may arise where the site selected is not overlapping with the current Annual Works Programme but where feasible and subject to any third party agreement, OPW will accommodate these works.
- Similarly for enhanced maintenance works, IFI EREP team in consultation with the local IFI and OPW, will select sites again that are technically feasible and offer best return for investment. These sites will normally be from channels on the current Annual Works Programme.
- IFI EREP team will coordinate all the scientific monitoring works, provide the enhancement design details and guidance to OPW Management Staff and maintain a reasonable level of site supervision, proportional to the complexity of the works and the experience of the OPW Staff involved.
- Consultations with local IFI through the Interim Stakeholder meetings are encouraged to identify sites suitable for Enhancement works and in some cases the local IFI may also be in a position to produce an enhancement design. All enhancement designs and works are to be coordinated through the IFI EREP team to facilitate formal recording into the national EREP project and allow for biodiversity and/or hydromorphology monitoring if required. Local IFI may coordinate with IFI EREP team or alternatively OPW Regional Staff coordinate directly with the EREP team.
- A small portion of channels have more infrequent maintenance cycles and these cases can offer particularly good opportunities for enhanced maintenance type works. Channels programmed where maintenance works have not being carried out for in excess of 10 years, to be flagged to IFI EREP team for possible Walkover Surveys and guidance on appropriate EDM procedures.
- Management Staff to ensure that as far as practical, all Operational crews have an opportunity to get experience on these projects.

- Each Regional Engineer is to make provision in the Annual Works Programme for Plant & Labour resources in addition to provisions in the Annual Budget for materials subject to expenditure constraints. Typical resources are as follows:

Capital Enhancement

Region	Target (Km)	Capital Costs	Machine Weeks	ManWeeks
East Region	20	€200,000	30	60
South West Region	14	€140,000	21	42
West Region	16	€160,000	24	48
	50	**€500,000**	**75**	**150**

Enhanced Maintenance *(in conjunction with routine maintenance)*

Region	Target (Km)	Capital Costs	Machine Weeks	ManWeeks
East Region	20		15	0
South West Region	14		11	0
West Region	16		12	0
	50		**38**	**0**

- Progress targets for EREP to be shown on monthly production reports.
- OPW are the primary contact point for liaison with landowners including the organising of access and egress for machinery and materials. Brochures on EREP are available in all Regional Offices. Additional copies can be obtained through OPW Environment Section.
- Management Staff are encouraged to maximise the use of all available on-site materials such as stone from historical spoil heaps as opposed to importing materials at a higher cost.
- In addition, Management Staff are encouraged to maximise synergies with other funding sources such as Fisheries Development grants attained by local Angling Clubs which could combine with OPW plant and labour to supply materials.
- In all cases, Inland Fisheries Ireland are the statutory authority to give design guidance to OPW. Angling Clubs or other sectoral funding sources to liaise with the Fisheries authorities in respect of all design and environmental monitoring requirements.
- As-Built plans are to be completed by the IFI EREP team for all enhancement works. This will entail a site visit by IFI and relevant OPW Staff where requested. These will be retained by IFI as well as any relevant design information.
- IFI EREP team will forward a copy of the As-Built plans to Environment Section who will upload the same to Socialtext for access to the information by all Staff.
- At the end of the year, IFI EREP team will forward Environment Section a GIS layer of that year's works for uploading to OPWs GIS records.

Current version of Enhancement GIS Layer available on Socialtext

National Recording Process

- Weekly Record Cards can contain information on Lamprey, Crayfish, Kingfisher, Mussels, Otter and other site specific environmental information as arises.
- Environmental information on Cards will be recorded onto the Records Database by each Drainage office. The latest Records Database has been revised to integrate environmental records.
- On an interim basis, a copy of all Cards with environmental information to be copied and

forwarded to Environment Section by each Drainage Office. This is to allow Environment Section to review the detail of information being recorded, feedback to the Operational crews through the Management Staff and attain a national consistency in the style of information being recorded.

- All relevant information to be uploaded to GIS by Environment Section.
- All other relevant environmental information sourced by Management Staff whether from direct observations or through stakeholder consultations, should be entered into the Records Database.
- Relevant environmental information sourced through the EREP project and related research will be forwarded by IFI EREP team to Environment Section directly for centralised GIS uploading.
- On an annual basis, Environment Section will compile an update of Weekly Records Cards species records and make available to all Staff via Socialtext to assist in tracking progress.
- On an ongoing basis, Environment Section will make available the various OPW compiled species records to other authorities to assist in contributing to any appropriate national conservation knowledge.
- As described above, each drainage office will upload onto the Records Database all environmental information from the Weekly Record Cards and all other broader environmental information attained by Management Staff. Within a few years, it's envisaged that multiple regional Staff will be able to use the new Records Database, and then environmental information from all sources will be uploaded directly by a whole host of Staff. Typically this will include any mitigating agreements for particular channels agreed with stakeholders or any other individuals observation such as protected species presence noted during a separate site visit.

SALMONIDS

- As far as practicable, the maintenance works are to be scheduled to accommodate salmonid (Salmon & Trout) spawning areas, as is in place across all regions for many years. This is a widespread measure on many catchments and is most applicable to medium gradient channels with gravel substrate.
- Prior to works commencing, consult with local IFI. Ideally, consultations to be conducted through Interim Stakeholder Meetings or alternatively, direct contact in respect of the specific site.
- Maintenance operations on salmonid spawning beds typically carried out between July and September but timing subject to adjustment due to local knowledge of IFI.
- Raking of spawning gravels to improve spawning capacity also typically carried out between July and September.
- River enhancement works to enhance both the fisheries and the broader ecology of the drainage channel are covered under the EREP project.
- In the future, as the extent of completed enhancement works increases, there is a risk of damage to structures due to future maintenance. All channels scheduled for maintenance to be checked against GIS records for presence of previous enhancement works. Where a presence is indicated, carry out a site visit as appropriate and in consultation with IFI , devise on-site procedures to protect or enhance existing instream structures.

Current version of Enhancements & Spawning GIS Layers available on Socialtext.

LAMPREY (BROOK, RIVER & SEA) & CRAYFISH

- All channels scheduled for maintenance to be checked against GIS records for presence of Lamprey or Crayfish.

- In accordance with the SOPs, Operational Staff will closely observe the spoil three times daily and report to the Foreman any Lamprey or Crayfish located.
- Mitigating procedures to apply when:
  - GIS records indicate species presence, or
  - Operational Staff locate Lamprey or Crayfish during operations, or
  - Where particularly suitable habitat is identified by an environmental stakeholder.
- If significant populations are encountered, notify IFI EREP team and facilitate scientific studies if site deemed suitable by IFI.
- If significant populations are encountered, notify NPWS Ranger and local IFI Officer and conduct site visit as necessary.
- Combination of Mitigating Measures to be selected as applicable to the site while balancing the Flood Risk Management requirements and a sustainable approach to the conservation of Lamprey and/or Crayfish.
- Identify extent of channel applicable and the mitigating measures to apply.
- Inform Operational Staff of mitigating requirements.

Suite of relevant Mitigating Measures as follows:

On site measures

- Skip sections to retain intact habitat either in one long reach or multiple short reaches.
- Maintenance in an upstream direction to avoid secondary disturbance of a species moving downstream. Balance with the advantage of maintenance in a downstream direction where instream vegetation minimises siltation.
- Confine maintenance to 2/3 of channel width leaving marginal vegetation and silt intact.
- Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective. This is effective for Lamprey juveniles as they are in the silt. For Crayfish, cutting of "Flaggers" type vegetation is effective but cutting of "water celery" mat type vegetation is less effective as it can result in Crayfish being removed within the weed mass.

Forward planning measures

- Annual maintenance of the channel in shorter segments sequentially completing the same over a number of years. Balance with maintaining reasonably operational efficiency in terms of machinery moving, transport, access and egress.
- Longer time periods between maintenance cycles e.g. move from 4-6 years to 7 to 8 years. Balance with overall river ecology as longer maintenance cycles will lead to more heavy-scale works.
- Timing of maintenance to accommodate Lamprey spawning. Stakeholder consultations between OPW and local IFI for salmomid mitigating purposes, to include consideration of Lamprey spawning. This is to be applied to channels where Lamprey spawning habitat is known as informed by IFI or other stakeholder. For River & Brook Lamprey, no works on relevant spawning channel from end March to start of June subject to adjustment due to local knowledge of IFI. For Sea Lamprey, as they spawn during the summer months, restrictions from late April to early July are required. To be applied to channels where Sea Lamprey spawning is known as informed by IFI or other stakeholder and timing subject to adjustment due to local knowledge of IFI. Note that Sea Lamprey are much less widespread so envisaged that the scale of this mitigation will be very limited.
- Loosening spawning bed gravels. Stakeholder consultations between OPW and IFI for salmonid gravel loosening purposes, now to include consideration of Lamprey spawning as above.
- Enhance channel profile such as skewed cross section and promote deposition of silt along margins. Integrate with IFI discussions on planning the EREP to avail of enhancement

opportunities particularly for channels where Lamprey or Crayfish presence is recorded.

- Modification of OPW structures which impede upstream migration. Identification of weirs as barriers to be as informed by IFI or other stakeholder. Where modification designs required, liaison with IFI EREP team to integrate the improvement works into the EREP project. Identification of a bridge apron step attained through ongoing site inspections by OPW Management Staff or other stakeholder. In consultation with IFI, steps at bridges to be modified by a rock armour type ramp or similar. Envisaged that these measures will be of a limited scale on drained channels.

GIS Records:

- Where Lamprey or Crayfish are discovered, Operational Staff will have recorded the same on the Weekly Record Cards. Cards with species location information will be uploaded to the Records Database as stated in the National Recording Process.
- All new Lamprey spawning location information attained through stakeholder consultation to be recorded on the Records Database in accordance with the National Recording Process.
- All database records of species location will be uploaded to GIS by Environment Section.
- IFI EREP team conducting ongoing research on Lamprey & Crayfish as a component of the EREP works. Scientific data calculating species density for some sites will be developed and to be supplied by IFI to OPW and uploaded to GIS by Environment Section.

Current version of relevant SOPs: V2 April 2009
Current version of relevant GIS Layers available on Socialtext.

OTTER

- Research to date indicates that Otters are widespread across all sizes of drainage channels nationally, hence it is prudent to assume that Otter use any particular site.
- In accordance with the Otter SOP, Operational Staff will walkover the works area one week in advance in conjunction with the Health & Safety assessment noting dense cover with access directly to the water that is to be avoided where feasible.
- In addition, any recognisable signs of Otter presence observed such as Spraints, Footprints or suspected Holts, will be recorded on the Weekly Record Cards. These signs were identified in Otter Awareness Training carried out across all regions in 2008.
- While holts are usually well concealed, where Operational Staff observe a suspected holt such as a burrow opening, in consultation with Management Staff, subject to flood risk management functions, no works to within a 50m buffer each side.

Bridge mammal crossing enhancement

- As a component of ongoing consultations with NPWS and other stakeholders, evidence may arise from time to time as to a particular spot for Otter road kill. Typically this can arise where the Otter always traverses the roadway as opposed to going through the bridge. While this scenario is not known to be a widespread issue in Ireland, the highest risk locations are on the National Primary Roads which have the heaviest traffic volumes.
- There are 170 National Primary Road bridges on OPW channels as listed in the table referenced below and Management Staff are to have particular regard to these locations if evidence arises on a possible road kill "hot spot".
- Enhancement works will typically take the form of a bolt-on wildlife ledge or similar. Design and configuration is to carried out in consultation with NPWS and relevant Local Authority.
- On an annual basis, Environment Section will review the national website www.biology.ie which records Otter road kill reports from the public. Any road kill location which overlaps with an OPW channel will be flagged by Environment Section to the relevant Management

Staff.

- Current understanding is that Otter road kill is not a significant issue in Ireland. It's envisaged that while the justification for bridge mammal crossing works may arise for some scenarios, these measures will be of a limited scale on drained channels.

Current version of Otter SOP: *V2 April 2009*
Current version of National Primary Roads & OPW Bridges: *March 2009*

Freshwater Pearl Mussel

- GIS records from NPWS show the locations of the 91 known FWPM populations in Ireland.
- The following OPW channels have been identified as containing FWPM:

Channel	Scheme	Location	Most Recent Record
CH9	Corrib Headford	Oughterard	2009
C1/21/3	Moy	Approx 500yrds from outfall to into L. Cullin	2004
C1 Sect M&N	Moy	Ballygallagart	2004
C1/21/14	Moy	Crossmolina	2008
C1	Dunmanway FRS	d/s of the Long Bridge	2003
C1	Owvane	Approx 1400 yrds from outfall	2002
C1	Feale	d/s Listowel near Scartleigh cemetary	2006
**Owenaher	Moy	u/s of C1/54	1996
**Brown Flesk River	Maine	Trib of C1 Maine near Farranfore	1987
** Galey River	Feale	Approx 1400yrds u/s of C1/18 near Ahavoher Br.	1950
**River Liffey	Ryewater	(Lucan) Approx 3.5km d/s C1 Ryewater outfall	1894

** Although not on OPW channels - these channels may or may not contain populations of FWPM. Works in the vicinity which could impact on a possible population need to be considered in close consultation with local NPWS knowledge.

- While highly unlikely to have instream works in a FWPM habitat, if a new population located by Operational Staff during operations, works to cease.
- Notify NPWS and in consultation with NPWS, area to be skipped or non in-stream works carried out as agreed for the specific site.
- For operations in the vicinity of known populations, mitigating procedures to apply:
- Consult with NPWS and local IFI and conduct site visit as necessary.
    - Typically only selective non in-stream works adjoining the population.
    - Works such as removal of a fallen tree is to be completed by lifting clear of the channel to minimise any channel bed disturbance due to the branches being dragged.
    - Assess need for silt management procedures for works upstream of the population and implement in consultation with NPWS.

Current version of relevant SOPs: *V2 April 2009*
Current version of FWPM GIS Layer available on Socialtext.

Swan & Duck Mussels

- Swan and Duck Mussels are not strictly a protected species, however they are of conservation interest.
- Both species are similar in appearance and habitat requirements and distinguishing between them is not necessary unless local environmental stakeholders can identify the exact species.

- As the Mussel SOP, if Operational Staff locate the same, Management Staff will be notified.
- Where significant populations are encountered notify NPWS Ranger and local IFI Officer, and where they are interested in visiting the site, facilitate a site visit as necessary.
- Identify extent of channel applicable and the mitigating measures to apply.
- Typical Mitigating Measures include:
  - Operational Staff to observe spoil and return any Mussels to the channel whom are expected to recolonise the channel bed.
  - Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective.
  - Skip sections to retain intact habitat either in one long reach or multiple short reaches.
  - Confine maintenance to 2/3 of channel width leaving marginal vegetation and silt intact.
- Record species presence on the Weekly Record Cards which will be recorded on the Records Database.

Current version of relevant SOPs: V2 April 2009

KINGFISHER

- Avoid disturbing nesting sites in banks.
- Visual sightings of Kingfisher by Operational Staff to be recorded on the Weekly Record Cards.
- Sightings by Management Staff to be recorded on the Weekly Record Cards where works in progress or on other occasions, record by separate map or channel reference format.
- All sightings to be recorded on the Records Database in accordance with the National Recording Process.
- All database records of species location will be uploaded to GIS by Environment Section.
- On an annual basis, Environment Section will issue the records to Birdwatch Ireland whom will add to the national Kingfisher database.

Current version of Kingfisher GIS Layer available on Socialtext.

BIRDS

- Removal of any abnormally dense layer of vegetation is to be executed between September and February (inclusive) to minimise impacts on nesting birds unless there are other overriding requirements such as Health & Safety.
- For SPAs containing important over-wintering bird populations, in consultation with the NPWS, regard to be given to timing or phasing of the works to minimise potential disturbance.

BATS

- While the removal of large mature trees is not typically a requirement of maintenance works, where the case arises, in consultation with NPWS, regard to be given to the likelihood of bat roosting habitat.
- Typical mitigating measure would be to leave tree in fallen position for 24hrs to allow any bats vacate.
- Masonry bridges offer niches and crevices suitable for bat roosts and where masonry bridges are scheduled for maintenance works, regard to be given to the likelihood of bat roosting habitat. Typical maintenance works at low level such as wing wall repair or underpinning foundations have limited potential to impact on bat roosts. Where the case arises that repair works are to be above the high water level such as the upper arch, in consultation with

NPWS, assess the potential for the works impacting on bat roosts.

- Typical mitigating measure would be to contract a bat specialist to survey for bat presence before works commence, to avoid entombment of any bats.

Wetlands - Bogs, Fens & Turloughs

- All channels scheduled for maintenance which overlap SAC designations to be checked against the list of channels that impinge on Raised Bog, Fen habitat or Turloughs and have regard to any NPWS agreements noted *.
- OPW Management Staff to consult with NPWS for expert opinion as to any evidence of ongoing ecological decline of the Bog, Fen or Turlough and judgement on, if the drainage datum set by the Drainage Scheme and its maintenance is an ongoing contributing factor by affecting the hydrological regime of the same.
- Where a likely impact is identified, conduct site visit as necessary and in consultation with NPWS, mitigating measures to be selected such as:
- Skipping the channel in question while taking cognisance of the flood risk management requirements.
- Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective.
- Inspection by OPW line management to assess the possibility of over digging the channel below the original design datum. Presence of an existing water level control such as a bridge floor to be established and alternative reference datum to be installed if deemed warranted.

** Environment Section currently developing a list of channels which overlap with Raised Bog, Fen habitat and Turloughs within SACs. Channels that are subject to a previous NPWS agreement /understanding of the extent of maintenance will be recorded.*

Current version of Wetlands channels list available on Socialtext.

Invasive Species – Plants

- Multiple invasive plant species are widespread nationally as described in the SOP and prudent to assume that one or more of these plants can be present on any works site.
- At present the OPW does not have any direct responsibility for the management of Invasive species. However to ensure OPW operations are not a vector for these invasives, measures are required to reduce the risk of spread.
- Ensure machine washing equipment transported to site for all appropriate machinery movements as described in the Invasive Species SOP.
- Ongoing EDM site audits by Environment Section will include confirmation that machine washing was executed in accordance with the SOP for the last applicable machine transfer.
- In some cases, OPW will assist other authorities in the control of invasive species. In these projects, the works are typically carried out in partnership between a number of authorities such as IFI, NPWS and relevant Local Authority. As scenarios arise where OPW are requested to assist in an invasive species control project, Management Staff are encouraged to support the multi-authority partnership model which will maximise resource efficiencies for all parties while still achieving a broader environmental good.

Current version of relevant SOP: *V2 March 2009*

Invasive Species – Zebra Mussel

- Zebra Mussels are present in the River Shannon, Grand Canal and are in many lakes such as

L Derg, L Ree, L Garra, L Key, L Derragh, Derravaragh, L Sheelin and L Corrib. This species is spreading and it is prudent to assume that works in any large sluggish river or near a lake has potential to contain Zebra Mussel.

- For any proposed works in the vicinity of potential Zebra Mussel waters, flag for Operational Staff and ensure particular attention to cleaning procedures for all equipment prior to removal from site.
- Any new location of Zebra Mussel uncovered during operations, notify NPWS and IFI for their information.
- Record on Weekly Record Sheet which will be uploaded on the Records Database in accordance with the National Recording Process.
- On an annual basis, Environment Section will collate the records nationally and issue to any relevant authorities to assist in tracking the species spread.

Current version of relevant SOP: *V2 May 2009*

Tree Management

- A small portion of channels have more infrequent maintenance cycles typically where self cleaning gradients are present. These sites can entail abnormally dense tree cover which may be required to be managed for conveyance or fisheries purposes. Removal of any abnormally dense layer of vegetation is to be executed between September and February (inclusive) to minimise impacts on nesting birds unless there are other overriding requirements.
- IFI requests to reduce "tunnelling" on drainage channels to be accomodated where feasible. OPW Management Staff to facilitate a site visit with the IFI Officer as required and devise a selective approach to the tree removal so as to retain a dappling of shade along the channel length.
- Excess woody vegetation to be collected and utilised by the following in order of preference:
  - Reused by adjoining landowner for domestic firewood.
  - Subject to landowners agreement, stockpile excess to form natural cover and niche habitat, preferably with some connection of cover to the channel e.g. along a hedge leading to the water.
  - Shred and spread along the adjoining top of bank allowing the material to degrade rapidly and recolonisation of the underlying vegetation.

Environmental Drainage Maintenance (EDM) Guidelines

- A portion of operational crews will be audited annually for implementation of the EDM Guidelines and other standard environmental procedures as adopted.
- Auditing will be carried out separately by both IFI and OPW Environment Section on a rotational basis to ensure all operational crews are audited at least once every three years.
- Audit results will be recorded on a standard format with the following feedback:
  - All audit results will be forwarded to the relevant Engineer for that Drainage Scheme within two working weeks.
  - In the event of an audit showing elements of unreasonable non-compliance with procedures, the relevant Engineer will be notified within one working day.
  - Audit results will be forwarded to OPW Systems Co-ordinator for inclusion in monthly regional benchmarking reports.
  - IFI EREP team will compile an overall summary of their findings in their end of year report under the EREP project.
- Design for Enhanced Maintenance works under EREP will include a design element for full

scale implementation of the EDM Guidelines such as Boulder Replacement and Excavating Pools.

- Management Staff to ensure that as far as practical, all Operational crews have an opportunity to get experience on these projects.

Current version of EDM Guidelines: April 2011
Current version EDM Audit Sheet: April 2011

PART II – DEPOT MANAGEMENT

Depot Waste Management

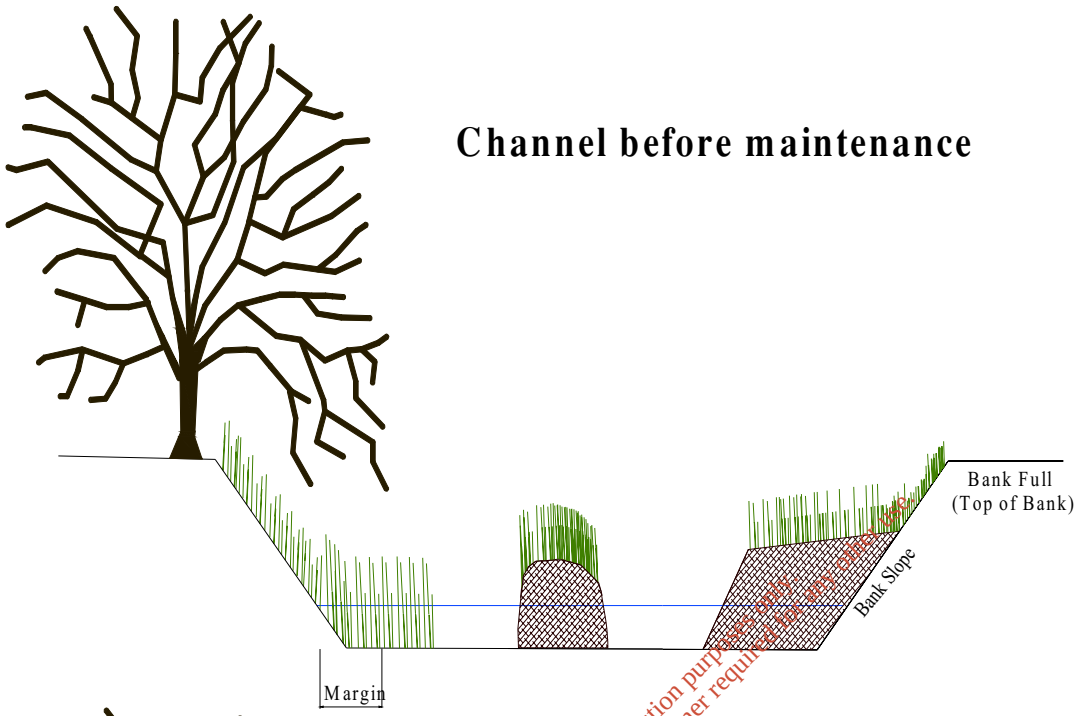
- 12 Waste Management Plans are available on Socialtext covering the 12 Drainage Offices.
- Environment Section will review 2 plans per annum and audit implementation.
- Updated Plans together with an overview of findings will be forwarded to the relevant Coordinator and uploaded to Socialtext.

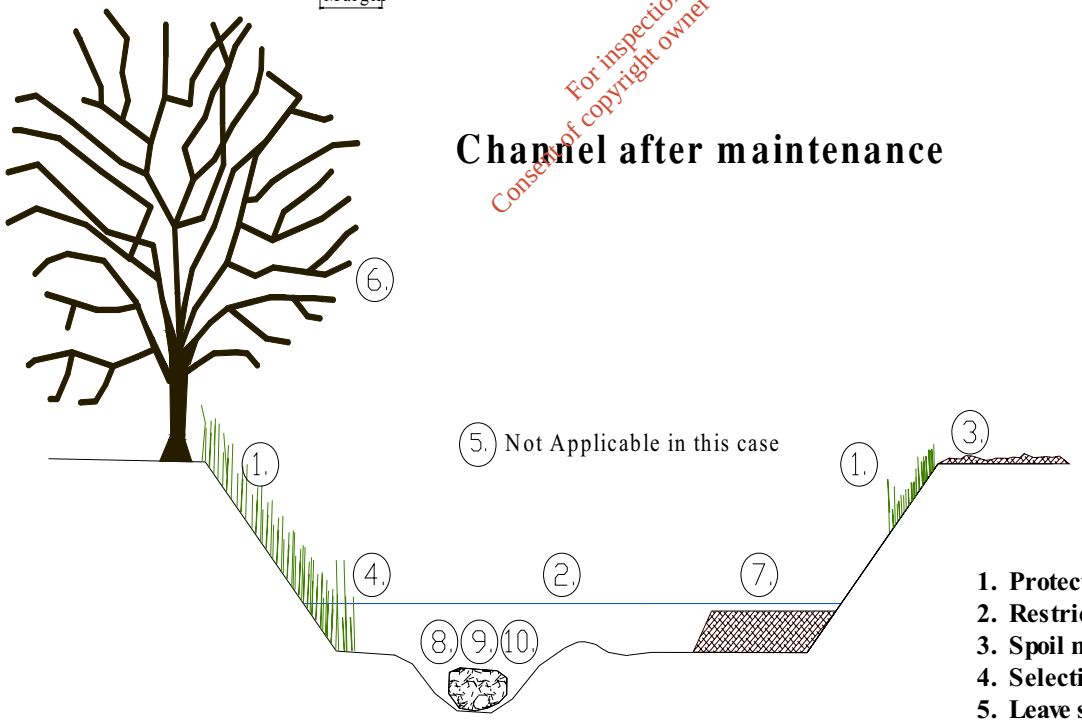
Future Revisions

- Envisaged that this set of Protocols will be a fluid document and will be periodically updated as procedures are revised or new procedures introduced. In addition, to be used as a framework document for quality control purposes to reference the latest versions of all supporting information.

Environmental Drainage Maintenance Guidance Notes

10 Steps to Environmentally Friendly Maintenance





1. Protect bank slopes
2. Restrict maintenance to channel
3. Spoil management
4. Selective vegetation removal
5. Leave section untouched
6. Management of trees
7. Manage berm to form two stage channel
8. Replace stones and boulders
9. Loosen gravel beds
10. Re-profile channel bed

Iascach Intíre Éireann
Inland Fisheries Ireland

April 2011

Environmental Strategies for Channel Maintenance

1. Protect bank slopes

1.1 Do not disturb the non-working bank slope

1.2 Minimise any effect on working bank

1.3 Leave margin of vegetation at foot of each bank slope

2. Restrict maintenance to channel

2.1 Remove only necessary silt – **<u>no new diggings</u>**

2.2 Remove instream material only

2.3 Retain marginal vegetation

2.4 Check spoil regularly. ***See Lamprey & Crayfish SOPs***

3. Spoil Management

3.1 Maximise spoil placement on bank full line or spoil heaps
and
3.2 Minimise spoil placement on bank slopes

3.3 Spread spoil as thinly as possible

3.4 Allow water to drain out of bucket over the water – lets small fish, lamprey and crayfish escape

4. Selective Vegetation Removal

4.1 Retain a band of vegetation on both sides at water's edge

4.2 Selectively manage instream vegetation

4.3 Maximise use of weed-cutting bucket

4.4 Avoid maintenance in coarse fish channels from 1st April to 1st July

4.5 Retain 1/3 to ½ of instream floating type vegetation, such as *Ranunculus* (water crowfoot) – see photo to right

5. Leave sections untouched

5.1 If channel capacity is not affected, leave section alone

6. Management of Trees

6.1 Remove trees that are blocking the flow

6.2 Tree-cutting window 1st September to 28th February

6.3 Remove overhanging branches to known flood level

6.4 Use saw secateurs for removal, not excavator bucket

6.5 Manage Trees to reduce very heavy shading

6.6 Manage briars and scrub.
See Otter SOP

7. Manage berms to form two-stage channels

7.1 Retain berm where channel capacity is not affected

7.2 Remove top of berms to low flow levels

7.2 Remove vegetation and soil from gravel berms

7.3 Replace sod to the berm where feasible

7.4 Only narrow berms if 'excessively' wide for the channel (i.e. greater than a third of the channel width

8. Replace stone and boulders

8.1 Reinstate boulders and gravels as removed by maintenance operations

8.2 Reinstate suitably sized boulders into channel from spoil heaps where feasible

8.3 Boulders should be placed at or below low flow level and spaced out

9. Work in gravel bed channels

9.1 Loosen or toss bed gravels to wash out fines

9.2 Only considered between 1st July and 30th September

9.3 No work in gravel bed / spawning channels in fisheries 'closed season' ***Note:*** This varies locally check with local IFI

10.1 Excavate bed to form deeper pool areas and shallow riffles

10.2 Overdeepen the channel along one side and place spoil on opposite side –particularly on curves and bends

10.3 Use existing boulders to form **simple** low-level structures

10.4 Record where such works are carried out

Actions during Maintenance Operations

- Machine gangs to closely observe the spoil three times daily for Lamprey (and Crayfish).
- Where Lamprey encountered:
  - Contact area Foreman immediately.
  - Foreman to contact Engineering Staff in line with the Environmental Management Protocols.
  - Record the location and abundance of Lamprey on the time card.

Measures as directed by Foreman to minimise impact may include:

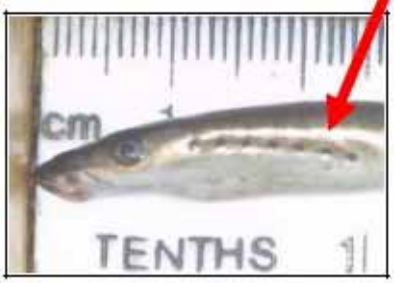
- Skip a defined stretch of channel.
- Confine maintenance to 2/3 of channel width leaving marginal vegetation and silt intact.
- Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective.

Lamprey in the spoil

RIVER, BROOK & SEA LAMPREY IDENTIFICATION CARD

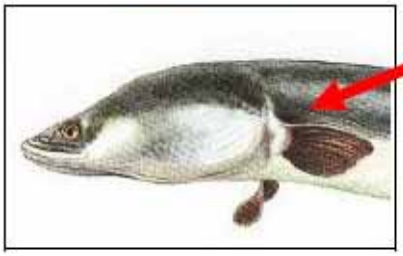
Gill Pores

Lamprey and young eels can look very similar. These key identifying features can be used to distinguish the two species



Lamprey:

- Gill Pores (Holes)
- No Fins
- No Jaw
- Average length 8 to 15cm (3 to 6 inches)



No Gill pores

Eels: No Gill Pores

Paired Fins

Jawed Mouth

Average length 65cm (26 inches)

Juvenile Lamprey:

- Juvenile Lampreys live in the sediment.
- It is in this juvenile phase that they can be removed from the sediment during maintenance.

Adult Lamprey:

- Largest is the Sea Lamprey species.
- Also are River and Brook Lamprey
- Length from 30 to 60cm (12 to 24 inches).

Actions during Maintenance Operations

- Machine gangs to closely observe the spoil three times daily for Crayfish (and Lamprey).
- Where Crayfish encountered:
  - Contact area Foreman immediately.
  - Foreman to contact Engineering Staff in line with the Environmental Management Protocols.
  - Record the location and abundance of Crayfish on the time card.

Measures as directed by Foreman to minimise impact may include:

- Skip a defined stretch of channel.
- Confine maintenance to 2/3 of channel width leaving marginal vegetation and silt intact.
- Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective.

Crayfish in the spoil

WHITE-CLAWED CRAYFISH

Identification

- Resemble small lobsters.
- Colour varies from light to dark green-brown, with large front claws.
- Adults typically 7cm - 10cm (3" - 4") long.
- Juveniles can be a small as 2cm (1") long.
- Prefer channels with
  - dense weed cover (flaggers / watercelery) or
  - with a mixture of rocks / gravels that provide crevices for cover.

Week before Maintenance Operations begin:

- Operational staff will walkover works area one week in advance in conjunction with the PRA noting areas of dense cover with access directly to the water. (As identified during Otter Awareness Training)
- These areas of suitable cover should be avoided where feasible during maintenance.
- Suspected presence of an Otter holt to be reported immediately to area Foreman, who will contact Engineering Staff in line with the Environmental Management Protocols.
- Signs of Otter presence observed such as Spraints, Footprints or suspected Holts, to be recorded on the Weekly Record Cards.

Measures to minimise disturbance may include:

- Retain suitable cover where possible.
- Areas of dense scrub to be avoided by large plant.
- Skip stretch of channel in proximity of suspected holt.

Otters

- Widespread presence on OPW channels.
- Shy animals and not normally seen.
- Adults 1 metre long and weigh 10kg.
- Streamlined profile.

OTTER

Holts

- Usually well concealed.
- Typically burrows, or spaces under banks, tree roots or dense cover.

Spraints

- Found on rocks, paths, channel junctions.
- Dark, oily, sweet smelling.

Suitable areas of cover

Dense bankside vegetation, particularly where there is direct covered access to the water.

Any isolated clumps of dense vegetation giving cover along an open length of channel.

Foot-prints

FRESH WATER PEARL MUSSELS

Before Maintenance Operations begin:

- Maintenance must not commence where a known population of Fresh Water Pearl Mussel exists (as listed in the Environmental Management Protocols).

- In the unlikely event of new population of Fresh Water Pearl Mussel being encountered during maintenance,
  - **All works must cease immediately.**
  - Contact area Foreman.
  - Record the location of Mussels on the time card.

Measures to minimise disturbance may include:

- Placing of straw bales to prevent movement of silt.
- Any exceptional / emergency works to be carried out in close consultation with the NPWS.
- For exceptional / emergency works e.g. fallen tree obstruction – these to be lifted clear of the channel to prevent disturbing the channel bed.

MUSSELS

Fresh Water Pearl Mussels *(Margaritifera margaritifera)*

- Shells very thick & heavy – shaped like a kidney.
- Shell colour is dark-brown – black, to blue & black.
- Adults range in length from approx. 6 cm – 12 cm (2.5 – 5 inches) and can live for over 100 years.
- Suitable rivers are reasonably fast flowing, with very clean, good quality water, gravel bed, preferably with large cobbles.

Not to be confused with Duck & Swan Mussel

- Egg-shaped shells 12 -16cm (5-6 inches) long.
- Thin shiny shells, usually brownish yellow with traces of green.
- Found in slow moving water.
- If encountered, contact area Foreman and return Mussels to channel.
- Record location of Mussels on time card

Measures to reduce the risk of spread of invasive species

All excavators, weed cutting boats, tractors, dumpers & other machinery employed on maintenance must be thoroughly cleaned down using a power washer unit prior to being;

(a) transported by Low- Loader

(b) moving to another catchment within the Region

(c) moving to another Region.

Notify your supervisor immediately if you see any of the invasive species listed.

Full details of all species are available in the CFB's Field guide to the Identification of Aquatic Invasive Species

Giant Hogweed

Found on the banks of many rivers throughc
Ireland.
Can grow to a height of 4 metres.
Seeds are carried by water and spread ve
quickly.
!!!Avoid contact with the sap of this plant
it can cause extensive lesions or blistering
the skin.

Japanese Knotweed

Grows up to 2-3m in height along roadsid
and river corridors throughout the country.
Even a tiny piece of this plant can produce
new plant.
Leaves are heart-shaped with a pale stri
down the centre.
In Summer cream flowers arise from the ti
of the red-flecked stems.

Himalayan Balsam

Grows in dense strands up to 3m high, and is fou
widespread across Ireland along banks of rivers.
Seed pods explode scattering seeds.
Dies back in Autumn exposing bare banksides
erosion.
White or pink flowers, smooth hollow stem, ov
shaped pointed leaves with jagged edges.

Curly waterweed – *Lagarosiphon major*

Found in lakes and slow flowing waterways up to 6m deep.
Spread by fragmentation from one watercourse to another on
boat hulls, trailers, outboard motors or angling equipment.
Significant weed stands located in Lough Corrib.

Zebra Mussels

Distinctive stripy shell, very small (1-3cm).
Attach in clusters to hard surfaces – boats, pipes, buoys.
Refer to the Zebra Mussel Standard Operating Procedure.

All photographs courtesy of Central Fisheries Board

Actions for Maintenance Operations

1) Zebra Mussels detected on site

- Where Zebra Mussels are found, remark on the extent of Mussels on the Weekly Report Card and notify the Foreman/Technician.
- Technicians/Engineers to notify Environment Section of location and grid reference.
- Environment Section to update the National Database.

2) Maintenance close to R. Shannon or infested lakes

- Where a machine is working close to the R. Shannon or an infested lake, ensure that prior to the machine transferring to a new site, buckets and tracks are thoroughly cleaned of any material such as silt or vegetation.
- Ganger / Driver to visually inspect the bucket, tracks and any equipment that was in the water to ensure no Mussels are present.

3) Maintenance close to outlets/inlets of any lakes

- Where a machine is working close to any lake, ensure that prior to machine transferring to a new site, buckets are clean of any material such as silt or vegetation.
- Ganger / Driver to visually inspect the bucket and other equipment that was in the water to ensure no Mussels are present.

4) Boats and other equipment

- Boats or other water based equipment that is to be transferred between river catchments should be thoroughly cleaned on the outside, drained of any bilge water and inspected for the presence of Mussels.
- If it's suspected that the equipment was in contact with Zebra Mussel waters, steam clean the hull and trailer and leave the boat or equipment out of water for four weeks prior to moving.

OPW Role

Although it is a relatively low risk, OPW could spread Zebra Mussels if aquatic vegetation or excavated material containing Mussels is inadvertently transported to another non-infested channel. Adult Mussels can survive for up to four weeks out of water hence its critical not to transport the same. Larvae are tiny and barely visible but will not survive on a machine bucket if there is no silt, stones or vegetation to shelter it.

Environmental Threat

Zebra Mussels are thumbnail-sized black & orange striped shellfish. They grow into dense clusters and attach to any underwater hard surface. They are an invasive species that damage the natural ecology of the infested waters. They expand into catchments through been transported by man's activities e.g. transferring fishing boats. Once in a particular lake or river, if conditions are favourable, they will multiply and spread with the currents. It is envisaged that they will keep expanding their territory unless man makes a concerted effort to prevent transport of the Mussels into non-infested waters.

OPW Site Audit Form

Region: _____ **CDS:** _____

Channel (name & code): _____ Section (chg – chg): _____

Foreman: _____ Driver(s): _____

Auditor: _____ **Date:** _____

Site surveyed from- working bank: ☐ non-working bank: ☐

GPS Reference: _____ Photographs: Yes ☐ No ☐

Weather Conditions: _____ Water levels: _____

Wetted/Base width: 0-3m ☐ 3-6m ☐ 6-10m ☐ 10-15m ☐ >15m ☐

Velocity Rating: Slow ☐ Moderate ☐ Fast ☐ Torrential ☐

Bed Type: _____ Machine Number: _____

OPW SOP AWARENESS / COMPLIANCE

Invasive Species SOP: Poor / Fair / Good / Excellent

Protected Species SOP's: Poor / Fair / Good / Excellent

Spill Kit Present: YES / NO

Environmental Drainage Maintenance Constraints

Maintenance Constraints		Working Bank	Non Working Bank
Ownership:	Woodland		
Ownership:	Tillage		
Ownership:	Position of Fencing		
Availability of suitable stone			
Placement of spoil			
Time of year:	Tree cutting		
Time of year:	Wildlife		
Time of year:	Fisheries		
Potential Habitat for Annex II Species	Lamprey		
	Crayfish		
	Otter		
	Pearl mussel		
	Salmon		

Comments on Audit Findings

Maintenance Strategies Achieved - *(based on section recently maintained)*							
	Maintenance Options	Working Bank		Non-working Bank		Instream Channel	
		Suitability	Compliance*	Suitability	Compliance*	Suitability	Compliance*
1	**Protect Bank Slopes**						
	Non-working bank left intact						
	Protect working bank slope						
2	**Restrict Maintenance to Channel**						
	Restrict maintenance to open channel						
	Use of SOPs for lamprey and crayfish						
3	**Spoil Management**						
	Best practice placement of spoil						
	Spread spoil thinly						
	Let water drain from bucket over channel						
4	**Selective Vegetation Removal**						
	Manage instream vegetation (Attn SOPs)						
	Retain marginal vegetation both sides						
	Potential for weed cutting bucket						
	Outside coarse fish spawning *(April 1st to July 1st)*						
5	**Leave Sections Intact**						
	Sections skipped						
6	**Management of Trees**						
	Remove trees blocking flow						
	Observe tree cutting window						
	Remove low hanging branches to known flood level						
	Use chainsaw/secuters for tree removal or thinning						
	Tree thinning management						
	Manage scrub - Otter & Birds SOP						
7	**Manage Berms to form 2 Stage Channels**						
	Retain berms (no maintenance)						
	Top berm to just over summer water flow						
	Re-sod berms where suitable						
	Only narrow berms if OVER-WIDE						
8	**Replace Stone & Boulders**						
	Replace stone and gravel coming out in digging bucket (No New Diggings)						
	Replace large stones/boulders into channel from old spoil						
9	**Working in Gravel Bed Channels**						
	Loosen/toss gravels *(between July 1st & Sept. 30th)*						
	No instream works outside of Fisheries Window *(between July 1st & Sept. 30th)*						
	Use of silt barriers in winter/spring						
10	**Re-profile Channel Bed**						
	Dig pool - riffle sequences						
	Reprofile cross-section						
	Use existing stone to create 'simple' instream structures						

*based on rating system: 0-10, with 0=no compliance and 10=full compliance

Total Compliance (%)			
OVERALL COMPLIANCE (%)			

Department of the Environment, Heritage and Local Government / An Roinn Comhshaoil, Oidhreachta agus Rialtais Áitiúil

National Parks & Wildlife Service (NPWS) / An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra, 7 Ely Place, Dublin 2.
Regional Information/Eolas Reigiúnach . . . . . (01) 888 2000
Locall/Glaoch Áitiúil: 1890 20 20 21
Fax/Faics: . . . . . (01) 888 3272
Internet/Idirlíon: . . . . . www.npws.ie & www.environ.ie
E-mail/Ríomhphost: . . . . . natureconservation@environ.ie

Eastern Division / Rannán an Oirthir
Divisional Manager: . . . . . (01) 8883243
Divisional Ecologist: . . . . . (01) 6678256

South Eastern Region/Réigiún an Oirdheiscirt
(Carlow, Kilkenny, Wexford & Wicklow (incl. Wicklow Mountains National Park))
Regional Office: . . . . . (0404) 45800
Regional Manager: . . . . . (0404) 45802
Deputy Regional Manager: . . . . . (0404) 45801
Education Centre: . . . . . (0404) 45656
Information Office (Wicklow Mtns Nt Park). . . . (0404) 45425
District Conservation Officer:
(North Wexford & Wicklow) . . . . . (0404) 45807
District Conservation Officer:
(Carlow, Kilkenny & Wexford) . . . . . (056) 7722135

North Eastern Region/Réigiún an Oirthuaiscirt
(Dublin, Kildare, Laois, Louth, Meath & Offaly)
Regional Manager: . . . . . (045) 520 622
Deputy Regional Manager: . . . . . (045) 520 644
District Conservation Officer:
(Kildare, Laois & Offaly) . . . . . (045) 521 713
District Conservation Officer:
(Dublin, Louth & Meath) . . . . . (046) 909 3506

Western Division/Rannán an Iarthair
Divisional Manager: . . . . . (091) 704 206
Divisional Ecologist: . . . . . (091) 704 208

Western Region/Réigiún an Iarthair
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Regional Office: . . . . . (064) 31440
Regional Manager: . . . . . (064) 70145
Deputy Regional Manager: . . . . . (064) 70143
District Conservation Officer:
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District Conservation Officer:
(South & West Cork and South & West Kerry). . . (028) 37347

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Regional Manager: . . . . . (074) 972 1837
Deputy Regional Manager: . . . . . (074) 913 7090
District Conservation Officer:
(Donegal Nth & Glenveagh National Park) . . . (074) 913 7440
District Conservation Officer:
(Donegal, Leitrim West & Sligo) . . . . . (071) 966 6178

North Midlands Region/An Réigiún Lár Tíre Thuaidh
(Cavan, Leitrim East, Longford, Monaghan, Roscommon & Westmeath)
Regional Office: . . . . . (071) 9666178
Regional Manager: . . . . . (071) 966 6934
Deputy Regional Manager: . . . . . (044) 934 2661
District Conservation Officer:
(Cavan, Leitrim, Longford & Monaghan) . . . . . (049) 433 5750
District Conservation Officer:
(Roscommon & Westmeath) . . . . . (044) 933 7007

National Parks & Nature Reserves/Páirceanna Náisiúnta
Ballycroy National Park County Mayo, Lagduff More, Ballycroy, Westport, Co. Mayo. . . . . (098) 49996
Burren National Park, NEPS Building, St. Francis Street, Ennis, Co. Clare . . . . . (065) 6822662
Connemara National Park, Letterfrack, Co. Galway . . . . . (095) 41054
Coole Park Nature Reserve, Gort, Co. Galway . . . . . (091) 631 804
Glenveagh National Park, Church Hill, Letterkenny, Co. Donegal . . . . . (074) 9137090
Killarney National Park, Muckross House, Killarney, Co. Kerry . . . . . (064) 31440
Wexford Wildfowl Reserve, North Slob, Wexford . . . . . (053) 9123129
Wicklow Mountains National Park, Kilafin, Laragh, Co. Wicklow . . . . . (0404) 45800

Inland Fisheries Ireland March 2011

IFI Region	Director	Address	Telephone	Region/Scheme
IFI Blackrock	William Walsh	15a Main Street Blackrock Co. Dublin	01 2787022	East: Glyde & Dee, Boyne, Blackwater, Bally-Teigue
IFI Ballina	John Connelly	Ardnaree House Abbey Street Ballina Co. Mayo	096 22788	West: Moy, Bonet
IFI Ballyshannon	Dr. Milton Matthews,	Station Road Ballyshannon Co. Donegal	071 9851435	West: Donegal schemes, Kilcoo, Duff
IFI Limerick	Sean Ryan	Ashbourne Business Park Dock Road Limerick	061 300238	East: Inny, Brosna West: Boyle, Ballyglass South: Killimor, Carrighahorig, Nenagh, Groody, Maigue, Deel, Feale
IFI Macroom	Dr. Patrick Buck	Sunnyside House, Macroom Co. Cork	026 41221	South: Maine, Owvane
IFI Clonmel	Suzanne Campion	Anglesea Street Clonmel Co. Tipperary	052 80055	East: Brickey
IFI Galway	Amanda Mooney	The Weir Lodge Earl's Island Galway	091 563118	West: Corrib Headford, Mask,
IFI	Dr. Ciaran Byrne	Unit 4 Swords Business Campus Balheary Rd Swords Co. Dublin	01 8842600	All
EREP Project Manager	**Dr. Karen Delanty**	**Unit 4 Swords Business Campus Balheary Rd Swords Co. Dublin**	**01 8842624**	**All**

(Note: Completed flood relief schemes are not listed but proposed works should be discussed with the relevant local IFI)

OPW Bridges (numbering 170) intersecting National Primary Roads.

Scheme	Channel ID	Bridge No.	National Route type	Bridge Name
Glyde and Dee	C2 (7C)	B80	N01	
Glyde and Dee	C2 (7E1)	B839	N01	
Glyde and Dee	C2 (7E1)	B840	N01	
Broadmeadow and Ward	C2/1	B230	N02	
Broadmeadow and Ward	C2/1	B239	N02	
Broadmeadow and Ward	C2	B204	N02	Coolatrath br.
Broadmeadow and Ward	C2/3	B243	N02	
Broadmeadow and Ward	C1/6/1	B86	N02	
Broadmeadow and Ward	C1/6/1/1	B96	N02	
Broadmeadow and Ward	C1/6	B68	N02	
Broadmeadow and Ward	C1	B16	N02	
Boyne	C1	B4	N02	Slane br.
Glyde and Dee	C2 (7H)	B101A	N02	
Glyde and Dee	C2 (17)	B179	N02	
Glyde and Dee	C2 (14B)	B118	N02	
Glyde and Dee	C2 (14)	B867	N02	
Glyde and Dee	C2 (1)	B30	N02	
Glyde and Dee	C2 (13)	B111	N02	
Glyde and Dee	C2 (16B4)		N02	
Glyde and Dee	C1 (1)	B15	N02	Aclint Br
Glyde and Dee	C29 (2)	B441	N02	
Glyde and Dee	C29 (3)	B443	N02	
Glyde and Dee	C25 (8)	B341	N02	
Glyde and Dee	C25 (7D1)	B672	N02	
Monaghan Blackwater	C1/1/5	B7	N02	
Monaghan Blackwater	C1/1/5/6/1	B1	N02	
Monaghan Blackwater	C1/3/5/2	B8	N02	
Monaghan Blackwater	C1/3/6/3	B1	N02	Hoaf Br
Boyne	C1/8/24	BX1	N03	
Boyne	C1/8/23	B733	N03	
Boyne	C1/8/21	B723	N03	
Boyne	C1/8/16	B644	N03	
Boyne	C1/8	B126	N03	Clavens Br
Boyne	C1/8/8	B294	N03	
Boyne	C1/12/7	B875	N03	Dillon's Br
Boyne	C1/12/7	B915	N03	
Owenmore	Behy Bridge	BX1	N04	
Boyle	C6/7/5	B2	N05	Ballanagare Br
Boyle	C6/7/1/4	B2	N05	
Boyle	C6/7/1	B3	N05	Cloonshanville Br
Boyle	C1/3/2/1	B4	N05	
Boyle	C1/9/1	B1	N05	
Boyle	C1	B4	N05	Old Lung Bridge
Boyle	C1/8	B1	N05	New Lung Bridge
Boyle	C1/45	B8	N05	
Moy	C1/31/2	B3	N05	
Moy	C1/31	B4	N05	
Moy	Not on a channel	B2	N05	Trimoge
Moy	Not on a channel	B2	N05	
Moy	Not on a channel	B1	N05	
Moy	C1/30/3/1	B1	N05	
Moy	C1/28/2	B3	N05	
Moy	C1/28/1	B4	N05	
Moy	C1/25	B6	N05	
Moy	C1/23/3	B2	N05	
Moy	C1/23	B9	N05	
Moy	Not on a channel	B1	N05	
Moy	C1/21/1/5/2/2	B3	N05	
Moy	C1/21/1/5/2/11	B2	N05	
Moy	C1/21/1/5/1/15	B1	N05	

Moy	C1/21/1/5/2/18	B1	N05	
Moy	C1/21/1/5/2/19	B2	N05	
Moy	C1/21/2/5/2/20/4	B1	N05	
Boyle	C1/44/15	B2976	N06	
Boyle	C1/44/17	B2984	N06	
Boyle	C1/64/1/11/6	B3337	N06	
Boyle	C1/64/1/11	B3303	N06	Miltownpass Br.
Boyle	C1/64/1/11/4	B3319	N06	
Boyle	C1/64/1/11/4/2	B3331	N06	
Boyle	C1/64/1/13/2	B3330	N06	
Boyle	C1/64/1/13	B3372	N06	Rochfort Br.
Boyle	C1/64/1/13/4	B3384	N06	
Brosna	C27 (1)	B150	N06	
Brosna	C1 (1)	B11	N06	Kilbeggan Br.
Brosna	C17 (1)	B143	N06	
Brosna	C17 (SE)	B726	N06	
Brosna	C17 (5)	B138	N06	New Br
Brosna	C17 (4)	B135	N06	
Corrib Clare	C1	B3	N06	Quincentennial Br.
Nenagh	C1/9	B23	N07	Ollatrim Br
Nenagh	C1/9/24	B4	N07	
Monaghan Blackwater	C1/1/6/1	B11	N12	Tyholland Br
Blanket Nook	C1/3	B23	N13	
Swilly embankments	E9	B1	N14	
Swilly embankments	C1/5	B9	N14	
Deele and Swillyburn	C1	B6	N14	
Deele and Swillyburn	C1/11	B19	N14	
Deele and Swillyburn	C2	B20	N14	
Abbey	C1/4	B39	N15	
Abbey	C1/4	B31	N15	
Abbey	C1/3A	B30B	N15	
Abbey	C1/2	B21 - B23	N15	
Abbey	C1/1	B18	N15	
Duff	C1	B1	N15	
Bonet	C1/12/3	B1	N16	
Bonet	C1/12	B5	N16	
Bonet	C1/12	B4	N16	
Bonet	C1/12	B2	N16	
Bonet	C1	B5	N16	
Bonet	C1/13/2	B1	N16	
Bonet	C1/13	B1	N16	
Moy	C1/50/2	B3	N17	
Moy	C1/50	B4	N17	
Moy	C1/48/3	B2	N17	
Moy	C1/48	B3	N17	
Moy	C1/45/4	B2	N17	
Moy	C1/45	B13	N17	
Moy	C1/30/5/9	B3	N17	
Moy	C1/30/5/9	B15	N17	
Corrib Mask	CM4/43/4	B2	N17	
Corrib Mask	CM4/34	B10	N17	
Corrib Mask	CM4/34/2	B2	N17	
Corrib Clare	C3/30	B8	N17	
Corrib Clare	C3/30/4	B1	N17	
Corrib Clare	C3/26	B2	N17	
Corrib Clare	C3/26/9	B1	N17	
Corrib Clare	C3/26/1	B3	N17	
Corrib Clare	C3/12/2	B1	N17	
Corrib Clare	C3	B14	N17	
Corrib Clare	C3	B2	N17	Claregalway bridge
Fergus	D7	B3	N18	
Owenagarney	C2	B1	N18	
Owenagarney	C4	B3	N18	
Coonagh Embankments	C10	B9	N18	

Coonagh Embankments	D13	B113	N18	
Coonagh Embankments		B1	N18	
Maigue	C1/36	B1	N20	Helena's br.
Maigue	C1/37/1	B3	N20	
Maigue	C1/37	B1	N20	
Maigue	C1	B23	N20	Creggane br.
Maigue	C1/33	B1	N20	Cappanafaha br.
Maigue	C1/30	B2	N20	Ballynabanoge br
Maigue	C1/26	B1	N20	
Maigue	C1/15	B10	N20	
Maigue	C1/10/5	B3	N20	
Maine	C1/28	BX1	N21	
Maine	C1/34	B117	N21	
Maine	C1/35	BX2	N21	
Deel SR	C12/2/2	B125	N21	
Deel SR	C12/2/2/2	B127	N21	
Deel SR	C12/2/1	B123	N21	
Deel SR	C10	B95	N21	Ballyfraley br.
Deel SR	C8	B76	N21	Reens br.
Maigue	C1/17/10	B1	N21	
Maigue	C1/17/8	B2	N21	
Maigue	C1/17/5	B1	N21	
Maigue	C1	B1	N21	Adare br.
Maigue	C1/15	B5	N21	
Maine	C1	B3	N22	Maine br.
Maine	C1/32	B110	N23	Dysert br.
Maine	C1/33	B114	N23	Killfinnaun br.
Maine	C1	B9	N23	Herbert br.
Groody	C1/4	B29	N24	
Groody	C1	B4	N24	
Groody	C1/7	B53	N24	
Groody	C1/9	B56	N24	
Moy	C1/9/1	B1	N26	
Moy	C1/9	B2	N26	
Moy	F/282	B	N26	
Moy	C1/14	B1	N26	
Moy	RIVER	B3	N26	
Moy	C1/37	B1	N26	
Moy	C1/38	B1	N26	
Moy	RIVER	B2	N26	Cloongullaun br.
Moy	C1/39	B3	N26	
Moy	C1/39	B6	N26	
Moy	C1/39	B9	N26	
Moy	C1/39/3	B1	N26	

Otter Wildlife Passes and OPW Drainage Channels

- It has been brought to the attention of the OPW that there may be a need for small mammal passes on some of the maintained channels.

- The National roads constitute less than 6 percent of roads in this country, approx. 3 National Primary and 3 percent National Secondary. In spite of this they a carry over 42 percent of the traffic.
  It is for this reason that the focus will be on the National Primary road crossings.

- The national road kill survey was analysed and the data from the web site "www.biology.ie" was cross-referenced against OPW channel locations and the results were inconclusive, as the web page is not widely used. It appears for now that OPW channel road crossings have no affect on the deaths of otters as per this information.

Next Steps:

1) Consult NPWS throughout all regions to review any evidence of otter road kills on National Primary roads or are they aware of any other such road deaths.

1. Where there appears to be mammal deaths on National Primary roads that intersect OPW channels it will be seriously considered to install in the bridge (where possible) a small mammal pass to allow ease of access for otters.

Otter Habitat Disruption

- Otters, along with their breeding and resting places, are protected under the provisions of the Wildlife Act, 1976, as amended by the Wildlife (Amendment) Act, 2000. They are also included in Annex I and Annex IV of the Habitats Directive, which is transposed into Irish Law in the European Communities (Natural Habitats) Regulations (S.I. 94 of 1997), as amended.

Otter Pass Details

- Mammal Ledges and underpasses should be constructed parallel to the watercourse.
- Underpasses should be of a diameter of 600mm up to a length of 20m. Where lengths exceed this the pipe should be increased to 900mm diameter
- An underpass should be no more than 50m of the watercourse with channels or fencing guiding the animals to it.

Where there is sufficient space under the bridge for a ledge the following should be provided:

- Fencing: See "figure 1; Specification for Mammal Resistant Fencing" in the NRA, National Roads Authority, Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes, for more detail. Also, Design Manual for Roads and Bridges, DMRB Volume 10, Section 1, Part 5, Chapter 9.
- A bolt on ledge can be used under a bridge where there is no dry passage. The bolt on ledge should provide otters with a dry walkway of between 300mm and 450mm wide, constructed from 4.5mm Durbar patterned galvanised plate.
- At some sites, considerations of responsibility, cost, aesthetics or practicality might indicate the use of a solid ledge; this is most likely where an existing otter-ledge has proved to be sited too low to offer dry passage at spate conditions. A solid ledge can be created in 3 ways; concrete bagging, shuttering plus new concrete and concrete blocks.
- See (OPW, 2007), (DMRB, 2001) and (NRA 2006) for further Details

References

- NRA (2006) – National Roads Authority, Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes.
- NRA (2005) – National Roads Authority, Guidelines for the Crossing of Watercourses During the Construction Of National Road Schemes.
- OPW (2007) – Series of Ecological Assessments on Arterial Drainage Maintenance No. 4, Ecological Impact Assessment (EcIA) of the Effects of Statutory Arterial Drainage Maintenance Activities on the Otter (Lutra lutra).
- OPW (2006) – Screening of Natura 2000 Sites for Impacts of Arterial Drainage Maintenance Operations. Environment Section, Engineering Services, Office of Public Works.
- DMRB (2001) - Design manual for roads and bridges (DMRB). Volume 10, Section 4 Environmental Design and Management Nature Conservation. Part 4 HA 81/99 Nature conservation advice in relation to otters. Section 1, Part 9 HA 81/99.