Inishmaan Island SAC (site code 212)
Conservation objectives supporting document -coastal habitats

NPWS

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Table of Contents

Please note that the opinions expressed in the site reports from the Coastal Monitoring Project (CMP) are those of the authors and do not necessarily reflect the opinion or policy of NPWS.

Please note that this document should be read in conjunction with the following report: NPWS (2014). Conservation Objectives: Inishmaan Island SAC 000212. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

1 Introduction

Achieving Favourable Conservation Status (FCS) is the overall objective to be reached for all Annex I habitat types and Annex II species of European Community interest listed in the Habitats Directive 92/43/EEC (Commission of the European Communities, 2007). It is defined in positive terms, such that a habitat type or species must be prospering and have good prospects of continuing to do so.

Inishmaan is the middle of the three Aran Islands situated approximately 15km off the west coast of County Clare. Geologically, the island is an extension of the Burren. The shallow soil is, in many places, an artificialcombination of sand and seaweed built up over the centuries. Pockets of rendzina are found throughout the limestone pavement. The site is of major scientific importance owing to the range of outstanding Karstic Carboniferous Limestone and coastal habitats, some of which are listed as Annex I habitats under the European Habitats Directive, including three listed as priority habitats.

The range of Annex I coastal habitats present includes sea cliffs, embryonic dunes, Marram dunes, shingle and stony beaches and machair. The latter is a priority habitat under the Habitats Directive. The coastal habitats play host to a number of rare plant species, including purple milk vetch (*Astragalus danicus*) and hairy violet (*Viola hirta*) both of which are legally protected under the Flora Protection Order (1987). Another rarity found on the coastal sands and shingle is the Red Data Book species sea kale (*Crambe maritima*).

Inishmaan is of considerable scientific interest primarily for the wide range of good quality habitats that occur and the floristic richness of many of the habitats. The island supports an impressive array of critically rare and threatened plant species.

Inishmaan Island SAC (site code: 212) is designated for a range of coastal habitats including vegetated shingle, saltmarsh and sand dunes. The following five coastal habitats are included in the list of qualifying interests for the site (* denotes a priority habitat):

- Perennial vegetation of stony banks (1220)
- Embryonic shifting dunes (1210)
- Shifting dunes along the shoreline with *Ammophila arenaria* (2120)
- Machair (21A0)*
- Vegetated sea cliffs of Atlantic and Baltic coasts (1230)

The first habitat represents vegetated shingle, the next three are associated with sand dune systems, and the last sea cliffs. The first four habitats are usually found in close association

with each other. The distribution of sand dune sites within Inishmaan Island is presented in Appendix I, and vegetated sea cliffs in Appendix II.

The CMP also recorded Annual vegetation of driftlines at this SAC.

This backing document sets out the conservation objectives for the five coastal habitats listed above in Inishmaan Island SAC, which is defined by a list of parameters, attributes and targets. The main parameters are (a) Range (b) Area and (c) Structure and Functions, the last of which is broken down into a number of attributes, including physical structure, vegetation structure and vegetation composition.

The targets set for the **shingle** are based in part on the findings of the National Shingle Beach Survey (NSBS), which was carried out in 1999 on behalf of the National Parks and Wildlife Service (NPWS) (Moore & Wilson, 1999), however, the NSBS did not survey Inishmaan Island. Vegetated shingle was not recorded or assessed at Inishmaan Island by the Coastal Monitoring Project (Ryle *et al*., 2009

The targets set for the **sand dune habitats** are based primarily on the results of the Coastal Monitoring Project (CMP) (Ryle *et al.*, 2009) and this document should be read in conjunction with that report.

The CMP surveyed, mapped and assessed a total of one sub-sites within Inishmaan Island SAC (Ryle *et al*., 2009):

1. Inishmaan

The distribution of sand dune habitats within Inishmaan Island SAC is presented in Appendix II. As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for the sub-site and this is included the Appendices to this document (Appendix IV).

At Inishmaan, sand dune and machair habitats are confined to the northeastern corner of the island at Sandhead (Ceann Gainimh). The machair comprises a wide flat plain with underlying limestone, it is fringed by foredunes and annual strandline vegetation. Sandhead beach is the largest stretch of sandy beach on the island.

The annual strandline vegetation occurs over a very wide band of beach reaching 100m in width in places. To the north, the machair is fringed by a rocky headland at Carrickmore (An Charraig Mhór) and a cobble beach at Calamore (An Caladh Mór). The landward edge of the machair grades in to wet grassland. The machair habitat occurs in mosaic with limestone pavement (Ryle *et al*., 2009).

Sandhead Lake (Loch Ceann Gainimh) occurs behind the foredunes at Sandhead and has been described as a sedimentary lagoon. A large part of the lake was infilled during the development of Inishmaan Airport in the recent past. Part of the surrounding machair was also taken during this development. A football pitch has partially modified the machair in the southern part of the site (Ryle *et al*., 2009).

The conservation objectives for the sand dune habitats in Inishmaan Island SAC are based on the findings of the report for this site, combined with the results of Gaynor (2008). It is thought that the sub-site as surveyed by the CMP represents the total area of sand dunes within Inishmaan Islands SAC.

The targets set for **vegetated sea cliffs** is based on the findings of the Irish Sea Cliff Survey (ISCS) (Barron *et al.,* 2011) and this document should be read in conjunction with that report. The Irish Sea Cliff Survey (ISCS) surveyed one sub-site (Carrowntemple) within inishmaan Island SAC.

2 Conservation Objectives

The conservation objective aims to define the favourable conservation condition of a habitat or species at a particular site. Implementation of these objectives will help to ensure that the habitat or species achieves favourable conservation status at a national level.

3 Perennial vegetation of stony banks

Perennial vegetation of stony banks is vegetation that is found at or above the mean high water spring tide mark on shingle beaches (i.e., beaches composed of cobbles and pebbles). It is dominated by perennial species (i.e. plants that continue to grow from year to year). The first species to colonise are annuals or short-lived perennials that are tolerant of periodic displacement or overtopping by high tides and storms. Level, or gently-sloping, high-level mobile beaches, with limited human disturbance, support the best examples of this vegetation. More permanent ridges are formed by storm waves. Several of these storm beaches may be piled against each other to form extensive structures.

3.1 Overall Objective

The overall objective for ‘perennial vegetation of stony banks’ in Inishmaan Island SAC is to ‘maintain the favourable conservation condition’. This objective is based on an assessment of the current condition of the habitat under a range of attributes and targets. The assessment is divided into three main headings (a) Range, (b) Area and (c) Structure and Functions.

3.2 Area

3.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target for favourable condition is *‘no decrease in extent from the established baseline’*. Bearing in mind that coastal systems are naturally dynamic and subject to change even within a season, this target is assessed subject to natural processes, including erosion and succession.

Thecurrent extent of this habitat in Inishmaan Islands SAC is unknown. The National Shingle Beach Survey did not survey this site.

The CMP surveyed the site but did not record or assess this habitat (Ryle *et al.* (2009).

The target is that the area should be stable or increasing, subject to natural processes, including erosion and succession.

3.3 Range

3.3.1 Habitat distribution

There is limited information on the distribution of vegetated shingle on Inishmaan Island.

The target is that there should be no decline or change in the distribution of this habitat, unless it is the result of natural processes, including erosion and succession.

3.4 Structure and Functions

A fundamental aim of shingle conservation is to facilitate natural mobility. Shingle beaches are naturally dynamic systems, making them of geomorphological interest as well as ecological interest. They are constantly changing and shingle features are rarely stable in the long term.

3.4.1 Functionality and sediment supply

The health and on-going development of this habitat relies on a continuing supply of shingle sediment. This may occur sporadically as a response to storm events rather than continuously. Interference with the natural coastal processes, through offshore extraction or coastal defence structures in particular, can interrupt the supply of sediment and lead to beach starvation.

The target is to maintain and restore where possible the natural circulation of sediment and organic matter, without any physical obstructions.

3.4.2 Vegetation structure: zonation

Ecological variation in this habitat type depends on stability; the amount of fine material accumulating between the pebbles; climatic conditions; width of the foreshore and past management of the site. The ridges and lows also influence the vegetation patterns, resulting in characteristic zonations of vegetated and bare shingle. In the frontal less stable areas of shingle, the vegetation tends to be dominated by annuals and short-lived salt-tolerant perennials. Where the shingle is more stable the vegetation becomes more perennial in nature and may include grassland, heathland and scrub, depending on the exact nature of the site. The presence of lichens indicates long term stability of the shingle structure.

The target is to maintain the range of coastal habitats, including transitional zones, subject to natural processes including erosion and succession.

3.4.3 Vegetation composition: typical species & sub-communities

The degree of exposure, as well as the coarseness and stability of the substrate determines species diversity. The shingle habitat in Inishmaan Island SAC is known to support a typical flora for this habitat type such as spear-leaved orache *(Atriplex prostrata*), sea mayweed (*Tripleurospermum maritimum*), curled dock (*Rumex crispus*), sea milkwort (*Glaux maritima*) and beet (*Beta vulgaris*).

The Red Data Book species sea kale (*Crambe maritima*) occurs at this site.

The target for this attribute is to ensure that the typical flora of vegetated shingle is maintained, as are the range of sub-communities within the different zones.

3.4.4 Vegetation composition: negative indicator species

Where the shingle becomes more stabilised negative indicator species can become an issue. Negative indicator species can include non-native species (e.g. *Centranthus ruber, Lupinus arboreus*); species indicative of changes in nutrient status (e.g. *Urtica dioica*) and species not considered to be typical of the habitat (e.g. *Pteridium aquilinum*).

There are no records of negative species occurring in this habitat within this SAC

The target for this attribute is that negative indicator species (including non-native species) should make up less than 5% of the vegetation cover.

4 Sand dune habitats

Sand dunes are hills of wind-blown sand that have become progressively more stabilised by a cover of vegetation. In general, most sites display a progression through strandline, foredunes, mobile dunes and fixed dunes. Where the sandy substrate is decalcified, fixed dunes may give way to dune heath. Wet hollows, or dune slacks, occur where the dunes have been eroded down to the level of the water table. Transitional communities can occur between dune habitats and they may also form mosaics with each other. Dune systems are in a constant state of change and maintaining this natural dynamism is essential to ensure that all of the habitats present at a site achieve favourable conservation condition.

In Ireland, there are nine sand dune habitats (including annual vegetation of drift lines) listed under Annex I of the EU Habitats Directive (92/43/EEC) (* denotes a priority habitat):

- Annual vegetation of drift lines (1210)
- **Embryonic shifting dunes (2110)**
- **Shifting dunes along the shoreline with *Ammophila arenaria* (2120)**
- Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130) *
- Decalcified dunes with *Empetrum nigrum* (2140) *
- Decalcified dune heath (2150) *
- Dunes with *Salix repens* (2170)
- Humid dune slacks (2190)
- **Machair (21AO) ***

Four dune habitats were recorded by Ryle *et al*. (2009) but only the three habitats indicated in bold above are listed as Qualifying Interests for Inismaan Islands SAC. These habitats include mobile areas at the front as well as more stabilised parts of dune systems. Annual vegetation of driftlines was also recorded by the CMP at this sub-site

Annual vegetation of drift lines is found on beaches along the high tide mark, where tidal litter accumulates. It is dominated by a small number of annual species (i.e. plants that complete their life-cycle within a single season). Tidal litter contains the remains of marine algal and faunal material, as well as a quantity of seeds. Decaying detritus in the tidal litter releases nutrients into what would otherwise be a nutrient-poor environment. The habitat is often represented as patchy, fragmented stands of vegetation that are short-lived and subject to frequent re-working of the sediment. The vegetation is limited to a small number of highly specialised species that are capable of coping with salinity, wind exposure, an unstable substrate and lack of soil moisture. Typical species include spear-leaved orache (*Atriplex prostrata*), frosted orache (*A. laciniata*), sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*) and prickly saltwort (*Salsola kali*).

Embryonic dunes are low accumulations of sand that form above the strandline. They are sometimes referred to as foredunes, pioneer dunes or embryo dunes, as they can represent the primary stage of dune formation. They are characterised by the presence of the salt-tolerant dune grasses sand couch (*Elytrigia juncea*) and lyme grass (*Leymus arenarius*), which act as an impediment to airborne sand. Strandline species can remain a persistent element of the vegetation.

Where sand accumulation is more rapid, marram grass (*Ammophila arenaria*) invades, initiating the transition to mobile dunes (Shifting dunes along the shoreline with *Ammophila arenaria*). Marram growth is actively stimulated by sand accumulation. These unstable and mobile areas are sometimes referred to as ‘yellow dunes’ (or white dunes in some European countries), owing to the areas of bare sand visible between the tussocks of marram.

Machair (21A0) is a highly specialised and complex dune habitat that is confined globally to the north-west coasts of Ireland and Scotland. It comprises a flat or gently undulating sandy plain that develops in an oceanic location with a cool moist climate. Machair systems are highly calcareous, the sediments usually containing a high percentage of shell fragments and having pH values in excess of 7. The vegetation is herbaceous, with low frequency of sand-binding species (Gaynor, 2006). Irish machair is a priority habitat under the EU Habitats Directive.

The Biomar Machair Survey surveyed all Irish sand dune sites at which machair formed a significant element (Crawford *et al*.,1996). Comparison of the CMP with this 1992 survey revealed considerable degradation of machair habitat, which could be attributed to changes in farming practices which has seen many machair commonages being fenced (stripped) resulting in greater concentration of livestock in confined areas, overgrazing, supplementary feeding and poaching of the land (Ryle *et al.,* 2009).

All the dune habitats indicated above occur as a complex mosaic of constantly changing and evolving vegetation communities. They are inextricably linked in terms of their ecological functioning and should be regarded as single geomorphological units. As such, no dune habitat should be considered in isolation from the other dune habitats present at a site, or the adjoining semi-natural habitats with which they often form important transitional communities.

The CMP surveyed one sub-site within Inishmaan Island SAC:

1. Inishmaan

Detailed descriptions from the Coastal Monitoring Project (Ryle *et al.,* 2009) of this sub-site and each sand dune habitat found are presented in Appendix III. A total of 49.61ha of sand dune habitat was mapped within Inishmaan Island SAC, of which 3.60ha represents annual vegetation of driftlines, which is not listed as a qualifying interest for this particular site.

4.1 Overall objectives

The overall objective for 'Embryonic shifting dunes' in Inishmaan Island SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)' in Inishmaan Island SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Machair' in Inishmaan Islands SAC is to 'restore the favourable conservation condition'.

These objectives are based on an assessment of the recorded condition of each habitat under a range of attributes and targets. The assessment is divided into three main headings (a) Area (b) Range and (c) Structure and Functions.

4.2 Area

4.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. Baseline habitat maps were produced for the sand dune habitats in Inishmaan Island SAC during the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009). This map is included with the individual site report in Appendix III at the end of this document. The total areas of each sand dune habitat within the SAC as estimated by Ryle *et al*. (2009) are presented in the second column of the following table. These figures were subsequently checked and adjusted to take into account some overlapping polygons and mapping errors. The adjusted figures are presented in the final column.

Habitat	**Total area (ha) of habitat from CMP**	**Total area (ha) of habitat within SAC boundary**
Embryonic shifting dunes	1.563	1.563
Shifting dunes along the shoreline with *Ammophila arenaria*	1.611	1.611
Machairs	46.954	42.842
Total	**50.128**	**46.016**

The general target for this attribute in the case of each habitat is that the area should be stable, or increasing. Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is always assessed subject to natural processes, including erosion and succession.

4.3 Range

4.3.1 Habitat distribution

The distribution of sand dune habitats as mapped by Ryle *et al.* (2009) is presented in Appendix I.

At Inishmaan, the CMP noted that the eastern part of the machair occurs over a rock promontory and is very exposed and eroding down to the underlying limestone. The machair is flanked on the seaward edge by mobile dunes and a wide area of embryonic dunes (*Ryle et al*. 2009).

The target is that there should be no decline or change in the distribution of these sand dune habitats, unless it is the result of natural processes, including erosion, accretion and succession.

4.4 Structure and Functions

The location, character and dynamic behaviour of sand dunes are governed by a combination of geographic, climatic, edaphic and anthropogenic factors. Sand dunes are highly complex, dynamic systems, where the habitats occur in a complex and constantly evolving and changing mosaic. They function as systems in terms of geomorphology and hydrology and maintaining the favourable conservation condition of the habitats present depends on allowing these processes to continue unhindered. Maintaining the favourable conservation condition of all of the sand dune habitats in Inishmaan Island SAC in terms of structure and functions depends on a range of attributes for which targets have been set as outlined below.

4.4.1 Physical structure: functionality and sediment supply

Coastlines naturally undergo a constant cycle of erosion and accretion. There are two main causes of erosion: (a) those resulting from natural causes and (b) those resulting from human interference. Natural causes include the continual tendency towards a state of equilibrium between coasts and environmental forces, climatic change (particularly an increase in the frequency of storms or a shift in storm tracks), relative sea level rise and natural changes in the sediment supply. Human interference is usually associated with changes in the sediment budget, either directly, through the removal of beach or inshore sediment, or indirectly, by impeding or altering sediment movement. It is important to recognise that the process of coastal erosion is part of a natural tendency towards equilibrium. Natural shorelines attempt to absorb the energy entering the coastal zone by redistributing sediment.

Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Sediment supply is especially important in the embryonic dunes and mobile dunes, as well as the strandline communities where accumulation of organic matter in tidal litter is essential for trapping sand and initiating dune formation. The construction of physical barriers such as sea defences can interrupt longshore drift, leading to beach starvation and increased rates of erosion. Sediment circulation and erosion also has a role to play in the more stabilised dune habitats. Cycles of erosion and stabilisation are part of a naturally functioning dune system, where the creation of new bare areas allows pioneer species and vegetation communities to develop, increasing biodiversity. The construction of physical barriers can interfere with the sediment circulation by cutting the dunes off from the beach resulting in fossilisation or over-stabilisation of dunes.

An airport and football pitch have reduced the area of machair and fragmented the habitat (Ryle *et al*., 2009).

The front of the mobile dune at Inishmaan is steep and eroding naturally. This is a highly dynamic part of the site (Ryle *et al.,* 2009).

The target for this attribute is to maintain and where possible restore the natural circulation of sediment and organic matter throughout the entire dune system, without any physical obstructions.

4.4.2 Physical structure: hydrological and flooding regime

Typically, a true machair plain represents the area where wind erosion has eroded a dune system to a level just above the water table, where the wet consistency of the sand prevents further erosion. In general, the degree of flatness depends on the age of the system, as well as the underlying topography, geology, outcropping of local rocks and historical management. Machair plains can be terminated on the landward side by a lake or associated marsh/fen (Gaynor, 2006). Consequently, the condition and conservation of the machair habitat can be inextricably linked to the local hydrology.

Wet machair can essentially be compared to humid dune slacks due to the periodic fluctuations and the proximity of the groundwater table to the surface throughout the year. The frequency and duration of periods of flooding or inundation determines the vegetation composition. The water table depth has been identified as the primary determining factor in vegetation variation, followed by weak trends in calcium and sodium availability. Other contributing factors include stage of development, precipitation, distance from the sea, the grazing regime, recreational pressure, nature of the sediment, soil pH and the porosity of the sediment.

Like dune slacks, machair is highly sensitive to human influences on hydrology, either through water abstraction, drainage works or increased nutrient inputs. Water abstraction interferes with the local hydrology, potentially having serious implications for the plant and animal communities of wet machair communities.

The target is to ensure that the hydrological regime continues to function naturally and that there are no increased nutrient inputs in the groundwater.

4.4.3 Vegetation structure: zonation

The range of vegetation zones on a dune system should be maintained. Gaynor (2008) highlights the highly transitional nature of much of the vegetation; therefore, it is important that the transitional communities are also conserved, including those to the saltmarsh communities.

A range of coastal habitats occurs at Inishmaan. The machair habitat at this site occurs in mosaic with limestone pavement (Ryle *et al*., 2009).

The target is to maintain the range of coastal habitats, including transitional zones, subject to natural processes, including erosion and succession.

4.4.4 Vegetation structure: bare ground

This target applies to the machair habitat. It does not apply to the other habitats present where high levels of bare sand are a natural component of the habitat. In the fixed and slack areas some degree of instability is vital. Constant cycles of erosion and stabilisation provide the necessary conditions for the establishment of pioneer species and species that favour open conditions such as petalwort (*Petalophyllum ralfsii*) and a range of invertebrates, helping to increase biodiversity.

The target is to achieve up to (but not exceed) 10% bare sand, with the exception of pioneer slacks which can have up to 20% bare sand. This target is assessed subject to natural processes.

4.4.5 Vegetation composition: plant health of dune grasses

The health of the dune grasses (particularly *Ammophila arenaria* and *Elytrigia juncea*) are assessed by the plant parts above the ground (they should be green) and the presence of flowering heads. This gives a clear indication of the status of the supply of blown sand, which is required for these species to thrive.

The CMP noted that the mobile dune habitat was functioning well and there was a plentiful supply of sand from the wide beach. The CMP also recorded that the accreting embryo dunes were dominated by healthy plant species (Ryle *et al.,* 2009).

The target for this attribute is that more than 95% of the dune grasses should be healthy.

4.4.6 Vegetation structure: vegetation height

This attribute applies to the more fixed habitats (including machair). A varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. The ecological benefits of moderate levels of grazing on dunes have been well documented (Gaynor, 2008). Moderate grazing regimes lead to the development of a species-rich vegetation cover. The animals increase biodiversity by creating micro-habitats through their grazing, dunging and trampling activities. Grazing slows down successional processes and in some cases reverses them, helping to achieve a diverse and dynamic landscape. The effects of trampling assist the internal movement of sand through the development of small-scale blowouts, while dunging can eutrophicate those dune habitats whose nutrient-poor status is crucial for the survival of certain vegetation types. Many species, from plants to invertebrates, benefit immensely from the open and diverse system created by a sustainable grazing regime. Many dune species are small in size and have relatively low competitive ability. Consequently, the maintenance of high species diversity on a dune system is dependent on the existence of some control to limit the growth of rank coarse vegetation (Gaynor, 2008).

At Inishmaan, there is light grazing predominantly by cattle which, according to the CMP is impacting positively on the machair (Ryle *et al.* 2009).

The target for this attribute is to maintain structural variation within the sward.

4.4.7 Vegetation composition: typical species & sub-communities

Species diversity and plant distribution in dunes is strongly controlled by a range of factors, including mobility of the substrate, grazing intensities, moisture gradients, nutrient gradients and human disturbance. In the younger, more mobile dunes, marram (*Ammophila arenaria*) is common, while groundsel (*Senecio vulgaris*), sea rocket (*Cakile maritima*) and dandelion (*Taraxacum* sp.) are also present. The fixed, more stable dune vegetation includes lady's bedstraw (*Galium verum*), common birdsfoot trefoil (*Lotus corniculatus*), wild thyme (*Thymus praecox*), kidney vetch (*Anthyllis vulneraria*), wild pansy (*Viola tricolor*) and biting stonecrop (*Sedum acre*).

The CMP noted that typical species diversity is low at Inishmaan compared to most other west coast sites but similar to Na Muirbhigh machair on Inishmore Island. Moss cover is very high throughout the machair.

Typical species were recorded in both the embryo and mobile dunes by the CMP.

The target for this attribute is to maintain a typical flora for the particular sand dune habitat.

4.4.8 Vegetation composition: negative indicator species

Negative indicators include non-native species (e.g. *Hippophae rhamnoides*), species indicative of changes in nutrient status (e.g. *Urtica dioica*) and species not considered characteristic of the habitat. Sea-buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled.

The main invasive species identified in Gaynor (2008) were bracken (*Pteridium aquilinum)* and sea buckthorn (*Hippophae rhamnoides)*. The invasion of non-native species compromises the typical plant community structure. Bracken (*Pteridium aquilinum)* is becoming increasingly dominant, particularly where sites have been abandoned or where grazing levels have been significantly reduced. The vegetation retains many elements of the original vegetation cover, but there is a reduction in biodiversity. As the canopy becomes taller and ranker, many of the low-growing species disappear. In this case, the vegetation is treated as a sub-community of the original community that was invaded. This is always the case unless the original vegetation cover has been completely destroyed, as can happen with *H. rhamnoides*, which can form dense impenetrable thickets.

The negative indicator species common ragwort (*Senecio jacobaea*) was recorded rarely on the machair by the CMP.

The target is that negative indicators (including non-native species) such as *Hippophae* should make up less than 5% of the vegetation cover.

4.4.9 Vegetation composition: scrub/trees

This attribute only applies to machair. Scrub encroachment leads to reduction in dune biodiversity and needs to be controlled. The presence of scrub and trees which have deep roots can also lower the groundwater table which can have significant impacts on the slack communities.

The target for this attribute therefore is that the cover of scrub and tree species should be under control, or make up less than 5% of the vegetation cover.

4.4.10 Vegetation composition: bryophytes

This attribute applies to machair. Bryophytes are an important element of the machair flora. Moss cover is well developed within the machair habitat at this SAC and typically attains 90% cover. Frequently occurring species include *Campylium stellatum, Drepanocladus revolvens,*

Ctenidium molluscum and *Philontis fontana*, most of which are indicative of wet, base-rich conditions.

Throughout the machair at Inishmaan there is a high cover of bryophytes (Ryle *et al*., 2009).

The target for this attribute therefore is that the cover of bryophytes should and should always be at least an occasional component of the vegetation (Ryle *et al*., 2009).

5 Vegetated sea cliffs

Sea cliffs can be broadly divided into two categories: hard (or rocky) cliffs and soft (or sedimentary) cliffs, both of which are covered by Annex I habitat 'vegetated sea cliffs of the Atlantic and Baltic coasts'. Hard cliffs are composed of rocks such as limestone, sandstone, granite or quartzite which are hard and relatively resistant to erosion. Soft cliffs are composed of softer rock such as shale or unconsolidated material such as glacial till. Vegetation of hard sea cliffs in exposed situations exhibits a strong maritime influence and is relatively stable. Soft cliff habitats are more prone to slope failure which results in the presence of fast-colonising pioneer species.

Defining the limits of what constitutes a sea cliff is problematic and a number of different interpretations have been used in the past (Fossitt, 2000; JNCC, 2004; Browne, 2005; Commission of the European Communities, 2007). In order to address any inconsistencies, the following definition for sea cliffs was developed and used during the Irish Sea Cliff Survey (Barron *et al*., 2011):

"A sea cliff is a steep or vertical slope located on the coast, the base of which is in either the intertidal (littoral) or subtidal (sublittoral) zone. The cliff may be composed of hard rock such as basalt, or of softer substrate such as shale or boulder clay. Hard cliffs are at least 5m high, while soft cliffs are at least 3m high. The cliff top is generally defined by a change to an obvious less steep gradient. In some cases the cliff may grade into the slopes of a hillside located close to the coast. In these cases the cliff is defined as that part of the slope which was formed by processes of coastal erosion, while the cliff top is where there is the distinct break in slope. Both the cliff and the cliff top may be subject to maritime influence in the form of salt spray and exposure to coastal winds. A cliff can ascend in steps with ledges, and the top of the cliff is taken to occur where erosion from wave action is no longer considered to have been a factor in the development of the landform. The cliff base may be marked by a change in gradient at the bottom of the cliff. Where the base is exposed it can be characterised by scree, boulders, a wave-cut platform or sand, among other substrates.

During this survey where cliffs occur within the subtidal zone the base was considered to be the high water mark. A cliff is considered to have reached its end point where it is no longer over 5m high (hard cliffs) of 3m high (soft cliffs), or no longer has a steep slope. To be considered in this study, a cliff had to be a minimum of 100m in length. Sea cliffs may support a range of plant communities such as grassland, heath, scrub and bare rock communities, among others."

Cliffs are known to occur particularly in the south west of the site where sheer vertical cliffs are found. Hard and soft cliffs have been noted in this SAC (Browne, 2005; Barron *et al.,* 2011).

Populations of *C*hough (*Pyrrhocorax pyrrhocorax)* also occur at this site.

5.1 Overall Objective

The overall objective for 'vegetated sea cliffs of the Atlantic and Baltic coasts' in Inishmaan Island SAC is to 'Maintain favourable conservation condition'. The objective is based on an assessment of the current condition of the habitat under a range of attributes and targets. The assessment is divided into three main headings, (a) Area, (b) Range and (c) Structure and Functions.

5.2 Area

5.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target is 'no decrease in extent from the established baseline'. Bearing in mind that coastal systems are naturally dynamic and subject to change even within a season, this target is assessed subject to natural processes, including erosion and succession.

The distribution of vegetated sea cliffs as identified during the Irish Sea Cliff Survey (ISCS) (Barron *et al*., 2011) is shown on a map in Appendix III.

The sea cliffs in Inismaan SAC are best developed along the south west of the site, where they can reach heights of 20 to 30m OD (Barron *et al*., 2011).

As cliffs are linear features on maps, their extent is measured in kilometres rather than hectares, as you would with other habitats. During the ISCS (Barron *et al*., 2011), the cliff was divided in to sections based on physical characteristics and vegetation cover. Breaks (i.e.

non-cliff areas) of between 80m and 500m along a length of cliff were discounted from the calculations. The total length of the cliff sections within the sub-site in Inishmaan Island SAC is presented in the following table. The area that is located within the SAC boundary is also presented.

There are differences in the figures given below. This is explained by the fact that the ISCS mapped the total sea cliff resource at the site and not all of the sea cliff mapped is contained within the SAC boundary. In addition, the county boundary line was used to draw the line for the ISCS, while a different mapping dataset than was used to draw the SAC boundary. As a result, the length of cliff inside the SAC boundary may be underestimated. The total length of cliff sections for the ISCS site was 2.35 km However, when, this dataset was clipped to the SAC boundary 1.80km was included in the boundary. However in reality this figure is likely to be higher as a result of these mapping anomalies.

Site name	Total area/length (km) of sea cliff sections assessed by ISCS	Total area/length (km) of sea cliff within SAC boundary
Carrowntemple	2.35	1.80

5.3 Range

5.3.1 Habitat Distribution

The distribution of sea cliffs throughout Inishmaan Island SAC as identified by the Irish Sea Cliff Survey is presented in Appendix II.

Sea cliffs are distributed along the west and south west coastline of Inishmaan Island (Browne, 2005; Barron *et al*., 2011). Hard cliff types are present within the site, which are unlikely to be redistributed through natural processes, unlike more dynamic coastal systems such as sand dunes and saltmarshes.

5.4 Structure and Functions

A fundamental aim of sea cliff conservation is to facilitate some degree of natural mobility through slumping. Sea cliffs can be of geomorphological interest as well as ecological interest and also erosion can expose geological features of interest.

5.4.1 Functionality and hydrological regime

Coastal protection works can disrupt the natural integrity of a sea cliff. The health and ongoing development of vegetated sea cliffs relies on natural processes such as erosion continuing without any impingement. This is generally a bigger issue for soft cliffs which require a degree of slumping and erosion to expose bare soil for pioneer species to colonise; otherwise the vegetation is replaced by hardy grasses and scrub of little conservation value can develop. In addition, cliff erosion provides an important sediment source to sites further along the coast (e.g. sand dunes). Preventing erosion at a cliff site can lead to beach starvation at another site.

Flushes can be associated with cliffs in areas where the groundwater seeps out onto the cliff face. This is more usually associated with soft cliffs where these flushes contribute to the natural instability of the ground and provide patches of wetland habitat.

Hydrological features such as freshwater seep were identified by the ISCS as occurring at Inishmaan (Barron *et al*., 2011).

The target is to maintain, or where necessary restore, the natural geomorphological processes without any physical obstructions, and the local hydrological regime including groundwater quality.

5.4.2 Vegetation structure: zonation

Ecological variation in this habitat type depends on a number of physical and biological factors, in particular climate, degree of exposure to sea-spray, geology and soil type, as well as the level of grazing and sea bird activity. The rocky cliff flora often grades naturally into coastal heath vegetation and maritime grassland.

Adjacent habitats to the sea cliffs at Inishmaan include exposed rock and littoral rock (Barron *et al.,* 2009)

The target is to maintain the sea cliff habitat, as well as transitional zones, including those to terrestrial communities.

5.4.3 Vegetation structure: vegetation height

A varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. Grazing increases the species diversity and is particularly important for maritime grasslands and coastal heath, which are often associated with sea cliffs. The target is to maintain the structural variation in the sward height.

5.4.4 Vegetation composition: typical species & sub-communities

Different sea cliff communities develop in a number of habitat zones related to the degree of maritime influence (exposure to wind and sea spray), geology and soil type. In general, Irish sea cliffs display a range of zones running in a series of horizontal bands up the cliff face, each of which has its own distinct sub-communities including:

- Splash zone
- Pioneer zone
- Rock crevice/cliff ledge zone
- Maritime grassland zone
- Maritime heath zone
- Maritime slope flush zone

There is considerable variation but the general pattern would be that the maritime influence is strongest near the base of the cliff and becomes gradually less dominant towards the cliff top. At the cliff base, vegetation is naturally very open and the species present have a high tolerance to salinity. The splash zone generally has a well-developed lichen flora dominated by species such as *Verrucaria maura*, *Ramalina* spp. and *Xanthoria* spp. These plant communities are dependent on rock crevices for rooting. Moving up the cliff, between the splash zone and the cliff top, vegetation on the cliff ledges is less open and can support some species which are not exclusively associated with coastal conditions. Closer to the cliff top maritime grasslands can occur. The plant communities and physical characteristics of maritime grasslands vary depending on the degree of exposure and whether or not grazing is a factor. Plant communities typical of sea birds and maritime therophyte communities are exceptions to this horizontal zonation and can occur as a mosaic with the other plant communities. The following tables presents lists of species that are considered typical of the different zones associated with soft cliffs and hard cliffs by Barron *et al*. (2011), such as those found in Inishmaan.

Many of the cliffs on Inishmaan are unvegetated, but in places rock samphire (*Crithmum maritimum*), sea spleenwort (*Asplenium marinum*), rock sea-spurrey (*Spergularia rupicola*), thrift (*Armeria maritima*) and roseroot (*Sedum rosea*) are found. Lower plants are particularly well represented in this habitat where lichens are an important group of sea cliff species.

Typical pioneer slope species on soft cliffs		
Agrostis stolonifera	*Equisetum spp.*	*Tussilago farfara*
Daucus carota	*Lotus corniculatus*	
Flush on soft cliffs		
Equisetum spp.	*Orchid species*	*Schoenus nigricans*
Coastal heath		
Calluna vulgaris	*Erica cinerea*	*Ulex gallii*
Daboecia cantabrica	*Erica tetralix*	*Vaccinium myrtillus*
Empetrum nigrum	*Scilla verna*	
Coastal grassland on soft cliffs		
Agrostis stolonifera	*Dactylis glomerata*	*Festuca rubra*
Anthyllis vulneraria	*Daucus carota*	*Lotus corniculatus*
Arrhenatherum elatius	*Elytrigia repens*	*Tussilago farfara*

Typical splash zone species on hard cliffs		
Ramalina spp	*Verrucaria maura*	*Xanthoria spp*
Typical crevice and ledge species on hard cliffs		
Anthyllis vulneraria	*Asplenium marinum*	*Armeria maritima*
Aster tripolium	*Atriplex prostrata*	*Beta vulgaris ssp. maritima*
Catapodium marinum	*Cerastium diffusum*	*Crithmum maritimum*
Festuca rubra	*Inula crithmoides*	*Lavatera arborea*
Ligusticum scoticum	*Limonium sp*	*Plantago coronopus*
Plantago maritima	*Sedum anglicum*	*Sedum rosea*
Silene uniflora	*Spergularia rupicola*	
Typical coastal heath species		
Calluna vulgaris	*Daboecia cantabrica*	*Empetrum nigrum*
Erica cinerea	*Erica tetralix*	*Scilla verna*
Ulex gallii	*Vaccinium myrtillus*	

Typical maritime grassland species on hard cliffs		
Anthyllis vulneraria	*Armeria maritima*	*Crithmum maritimum*
Daucus carota	*Festuca rubra*	*Hyacinthoides non-scripta*
Plantago coronopus	*Plantago maritima*	*Scilla verna*
Sedum anglicum	*Silene uniflora*	*Spergularia rupicola*

The target for this attribute is to ensure that the typical flora of vegetated sea cliffs is maintained, as are the range of sub-communities within the different zones.

5.4.5 Vegetation composition: negative indicator species

Negative indicator species can include non-native species (e.g. *Hebe* sp.,*Carpobrotus edulis, Gunnera tinctoria*), species indicative of changes in nutrient status (e.g. *Urtica dioica*) and species not considered to be typical of the habitat (e.g. *Pteridium aquilinum*).

The target for this attribute is that negative indicator species (including non-native species) should make up less than 5% of the vegetation cover.

5.4.6 Vegetation composition: bracken and woody species

Encroachment of bracken (*Pteridium aquilinum*) and woody/scrub species on cliffs, particularly the maritime grasslands and coastal heath leads to a reduction in species diversity.

The target for this attribute is that in the case of maritime grassland and/or heath, bracken should make up less than 10% of the vegetation cover, while woody species should make up no more than 20% of the vegetation cover.

6 References

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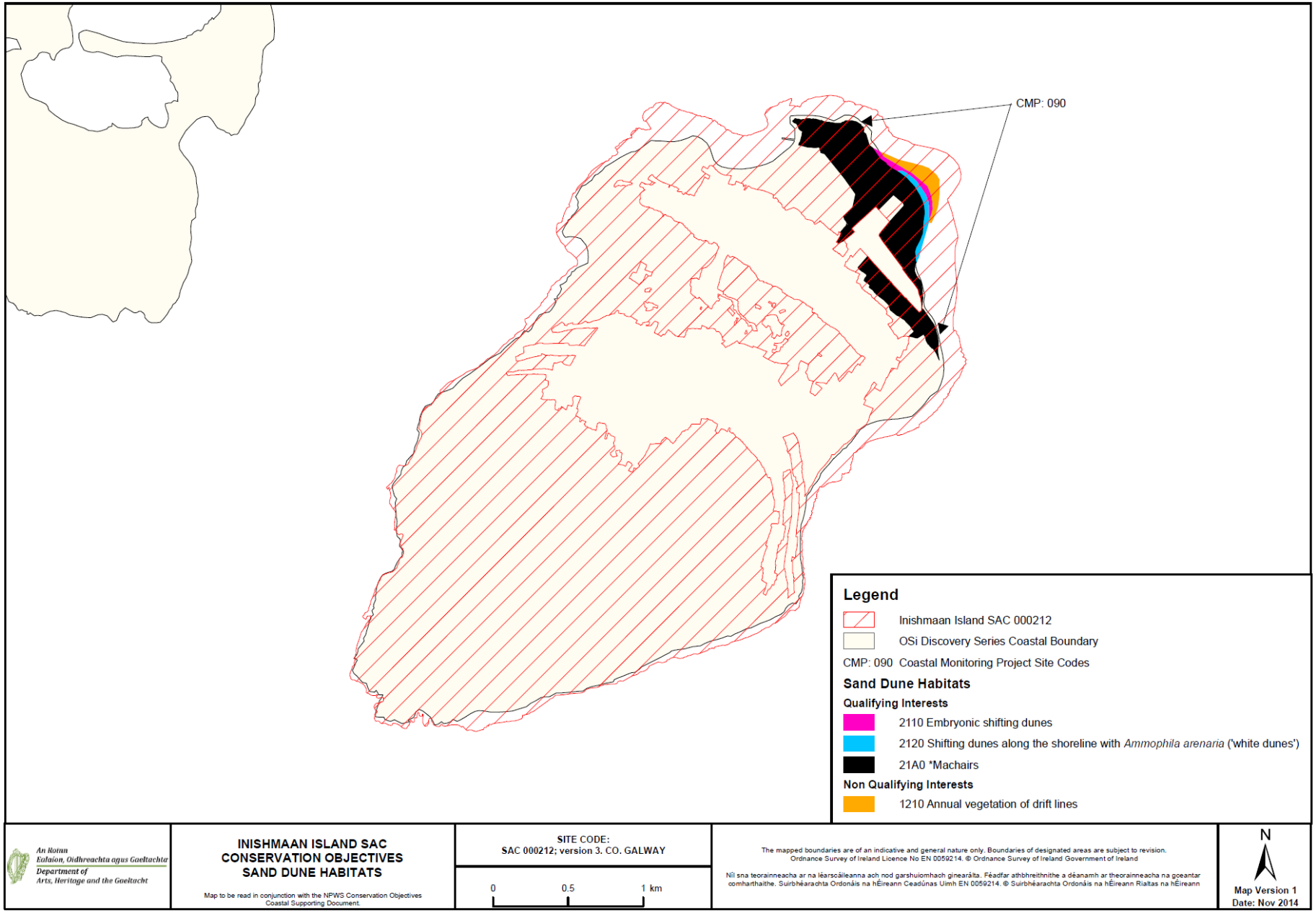
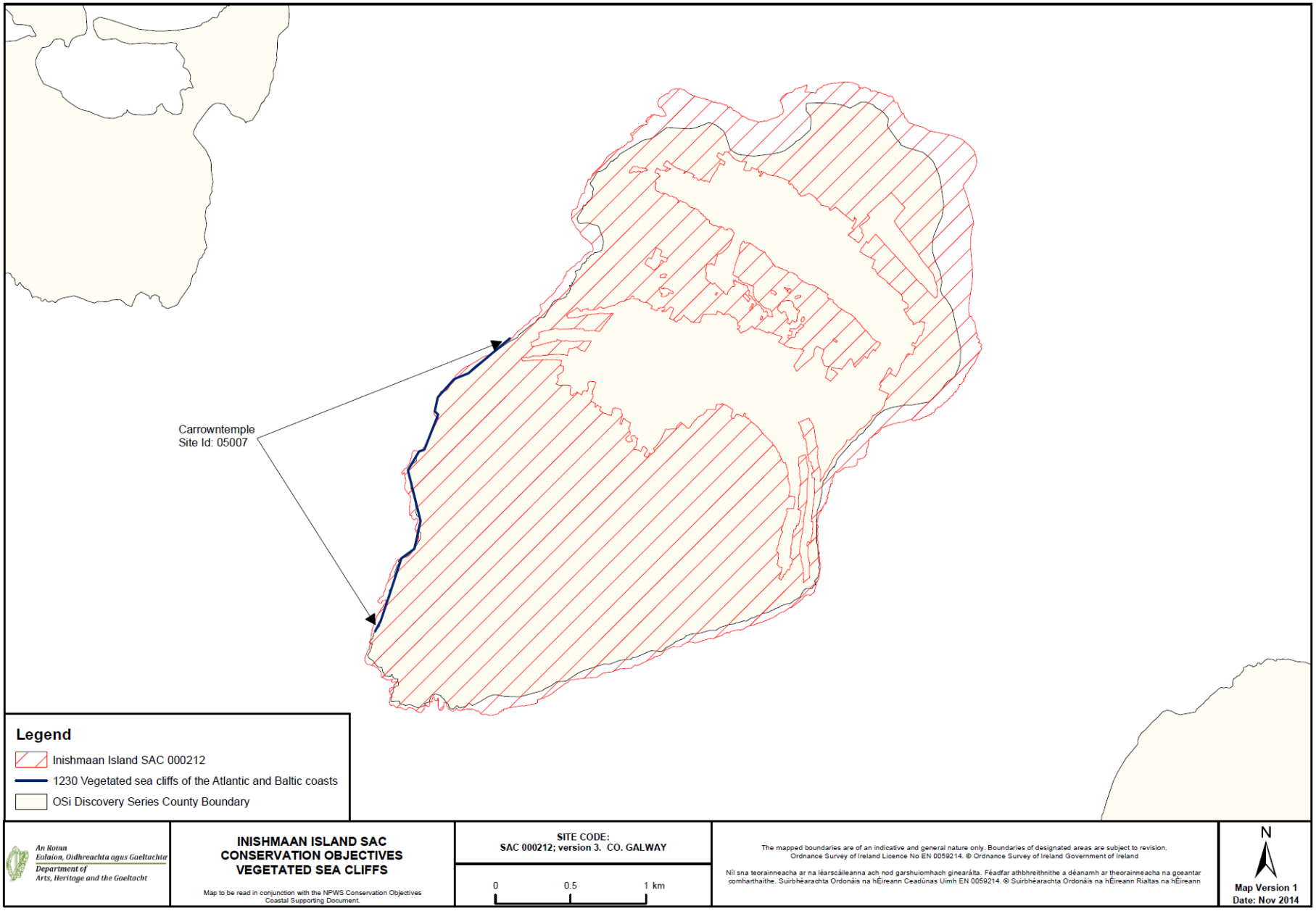
Appendix I: Distribution map of sand dune habitats within Inishmaan Islands SAC



Appendix II – Distribution map of vegetated sea cliffs within Inishmaan Islands SAC



Appendix III – Inishmaan site report and habitat map from the CMP (Ryle *et al*., 2009)

SITE DETAILS

CMP06 site name: Inishmaan CMP06 site code: **090** CMP Map No.: **88**

County: **Galway** Discovery map: **51** Grid Reference: **L 072 900**

6 inch Map No.: **Ga 111 & 119**

Aerial photographs (2000 series): **O 3735 A,B,C,D; 03791 B**

NPWS Site Name: **Inishmaan Island**

NPWS designation: pNHA: **213** cSAC: **213**

Ranger Area**: Galway**

MPSU Plan**: Draft II-Consultation**

Report Author: **Anne Murray**

SITE DESCRIPTION

Inishmaan is one of the Aran islands which are situated off the western coast of Ireland, at the mouth of Galway Bay. It is the middle island of the three Aran islands, both in size and location. Inishmaan cSAC is designated for the priority EU Annex I habitats - Fixed dunes and Machair. Other priority EU Annex I habitats for which the site is designated include: Limestone pavement, Orchid rich calcareous grassland, Turlough and Lagoon.

The site also supports 12 Red Data Book plant species, three of which are listed in the Flora Protection Order (1987). Those recorded on the sand dune and machair habitat are the rare species *Orchis apifera* (Bee Orchid) and the protected species *Viola hirta* (Hairy violet) and *Astragalus danicus* (Purple milk vetch). The latter species is confined to Inishmore and Inishmaan.

Sand dune and machair habitat is confined to the northeastern corner of the island at Sandhead (Ceann Gainimh). The machair comprises a wide flat plain with underlying limestone, it is fringed by foredunes and annual strandline vegetation along its central section at Sandhead beach, the largest stretch of sandy beach on the island. The large amount of sand is apparent from the intense glare on the aerial photograph (2000).

The annual strandline vegetation occurs over a very wide band of beach reaching 100m in width in places. To the north the machair is fringed by a rocky headland at Carrickmore (An Charraig Mhór) and a cobble beach at Calamore (An Caladh Mór). The landward edge of the machair grades into wet grassland.

Sandhead Lake (Loch Ceann Gainimh) is indicated on the 6'' map (1900s), behind the foredunes at Sandhead. It is also indicated on the more recent MPSU maps and is described as a sedimentary lagoon. However, a large part of the lake was infilled and part of surrounding machair was taken during the development of Inishmaan Airport in the recent past. The airport boundary was mapped during this survey and the extent is 10ha. An estimated area of two hectares of Sandhead Lake has been taken by the airport, there is no previous detailed information regarding the lake and its environs. The total area of remaining sand dune and machair habitat at Inishmaan is 54ha (Table 90A). The total sand dune and machair area including the area of machair taken by the airport is 76ha.

The Annex I sand dune and machair habitats recorded at Inishmaan during this project are; Machair, Mobile dunes, Embryonic dunes and Annual vegetation of driftlines. The machair habitat occurs in a mosaic with limestone pavement.

Machair (H21A0)

Machair habitat was noted at Sandhead on the gross habitat map (MPSU) and the Biomar Survey of Irish Machair Sites (Crawford et al., 1996).

Table 90A Areas of EU Annex I habitats mapped at Inishmaan

EU Code	EU Habitat	Area (ha)
H1210	Annual vegetation of driftlines	3.596
H2110	Embryonic shifting dunes	1.563
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	1.611
H21A0	Machair	46.954
	Total sand dune habitat excluding developments/modifications	**53.724**
	Total sand dune habitat including developments/modifications	**76**

Machair was also identified at Sandhead during the survey. This area is highly representative of machair in terms of flora and topography. This is based on visual assessment of a) the presence of sandy substrate, b) species composition and c) flat/level topography.

The total area of machair comprises approximately 47ha (Table 90A). Due to time constraints on the day of survey not all of the machair was mapped. Part of the machair was mapped from the aerial photograph. The total area of 47ha includes both survey and unsurveyed area of machair.

The eastern part of the machair occurs over a rock promontory, it is very exposed, with few typical species, the ground is compacted and it is eroding down close to the underlying limestone. The area is very dry and unstable consisting mainly of *Erygnium maritima* (Sea holly), *Calystegia soldonella* (Sea bindweed) and *Festuca rubra* (Red fescue). It is flanked on the seaward edge by mobile dunes and a wide area of embryonic dunes and annual strandline vegetation. The north and northwestern part of the machair is of good quality, it is edged by rock and cobble shoreline. Grazed mainly by cattle, there is very little agricultural improvement of the machair.

Information regarding the unsurveyed southeastern part of the machair is taken from the Biomar Survey of Irish Machair Sites (Crawford *et al*., 1996). The area is described under the NVC classification as MG11d- *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland (*Carex nigra* subcommunity). This community is considered part of machair habitat in the EU Interpetation Manual.

The presence of the airport has fragmented the machair and *Ammophila arenaria* (Marram grass) dominates the machair area edging the airport. The development of a football pitch has partially modified the machair in the southern part of the site, it lies within the cSAC, next to the airport. This pitch contains a high cover of *Lolium perenne* (Pyrennial rye-grass) but still contains a diverse machair flora. There are currently plans to extend the football pitch eastwards, into the adjacent machair fields.

Typical machair species diversity is low at Inishmaan compared to most other west coast sites but similar to Na Muirbhigh machair on Inishmore Island, those recorded are *Achillea millefolium* (Yarrow), *Bellis perennis* (Daisy), *Carex arenaria* (Sand sedge), *Cerastium fontanum* (Common mouse-ear), *Euphrasia officinalis* agg. (Eyebright), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Bird's foot trefoil), *Pilosella officinarum* (Mouse-ear hawkweed), *Plantago lanceolata* (Ribwort plantain), *Thymus polytrichus* (Wild Thyme) and *Trifolium repens* (White clover).

Other species that occur in the machair include: *Anthyllis vulneraria* (Kidney vetch), *Agrostis stolonifera* (Creeping bent), *Asperula cynanchica* (Squinancywort), *Campanula rotundifolia* (Harebell), *Daucus carota* (Wild carrot), *Festuca rubra* (Red fescue), *Geranium sanguineum* (Bloody crane's-bill) *Hypochaeris radicata* (Cat's ear), *Leontodon saxatilis* (Lesser Hawkbit), *Spiranthes spiralis* (Autumn lady's-tresses) and *Taraxacum* agg. (Dandelion).

Moss cover is very high with the following species occurring throughout the machair- *Calliergonella cuspidata, Homalothecium lutescens, Rhytidiadelphus squarrosus, Pleurozium schreberi* and *Tortula ruraliformis.*

The negative indicator species *Senecio jacobaea* (Common ragwort) occurs on the machair but is rare.

Mobile Dunes (H2120)

A short stretch of mobile dune borders the eastern edge of the machair. The front slope of the mobile dunes is steep and is naturally eroding, in this highly dynamic part of the site. The total mobile dune area is 1.6ha (Table 90A).

The typical species *Ammophila arenaria* (Marram grass) dominates with other species present – *Calystegia soldanella* (Sea bindweed), *Euphorbia paralias* (Sea spurge), *Eryngium maritimum* (Sea holly) and *Hypochaeris radicata* (Cat's ear).

No negative indicator species were recorded in the mobile dunes.

Embryonic Dunes (H1220)

A wide band of embryonic dune fronts the mobile dunes and machair. It extends along the beach at Sandhead northward to the rocky headland at Carrickmore. The total embryonic dune area is 1.6ha (Table 90A).

The embryonic habitat is dominated by *Elytrigia juncea* (Sand couch) interspersed with some strandline species of *Cakile maritima* (Sea rocket) and *Atriplex laciniata* (Frosted orache) towards the front of the dunes. No negative indicator species were recorded in the embryonic dunes.

Perennial vegetation of stony banks (H1220)

Perennial vegetation of stony banks is noted in the Conservation Plan (MPSU), these are not associated with sand dune or machair and are not assessed in this survey

Annual Strandline (H1210)

A very wide band of annual vegetation of driftlines has developed along the largest stretch of sandy beach on Inishmaan, at Sandhead. This habitat comprises just under 3.6ha in area (Table 90A). The strandline is dominated by the typical species *Cakile maritima* (Sea rocket) along with *Atriplex laciniata* (Frosted orache) and *Atriplex* spp. (Orache spp.). No negative indicator species were recorded in this habitat and there are no apparent threats at present.

IMPACTS

The activities impacting the machair and sand dunes at Inishmaan are relatively few and are given in Table 90B. The machair appears to be largely unaffected by any activities with the exception of the presence of the airport (code 505) and the football pitch (code 607).

The airport has reduced the extent of the machair area and fragmented this habitat. The airport is excluded from the cSAC, however the negative impact of the airport is reflected in the poor quality of the adjacent machair. The development of the airport has also partially destroyed Sandhead Lake.

Table 90B Intensity and impact of various activities on sand dune habitats at Inishmaan

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H21A0	140	A	+1	40	Inside
H21A0	505	A	-2	8	Outside
H21A0	607	A	-1	0.8	Inside
H21A0	900	B	0	Unknown	Inside
H2120	900	B	0	Unknown	Inside
H2110	900	C	0	Unknown	Inside
H1210	900	C	0	Unknown	Inside

[1]EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.
[2] Description of activity codes are found in Appendix 3
[3] Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.
[4] Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence
[5] Location of activity: Inside = activities recorded within and directly impacting the cSAC. Outside = activities recorded outside but adjacent to the cSAC.

The football pitch is located in the southwest of the airport buildings and close to the main entrance to the airport. The ground has been levelled and reseeded. The pitch lies within the cSAC and therefore it should be managed in a way that minimises its impact on the priority machair habitat. Grazing (140) is light and concentrated to the west of the airport, it is impacting positively on the machair.

Natural erosion (900) is impacting the sand dune and machair habitat along the coastline at Sandhead, but it does not appear to be significant. Without a sediment budget for the coastal cell, it is difficult to determine the area of each habitat affected and whether the system is in dynamic balance or if there is a net loss of sediment. Therefore, the area impacted is given in Table 90B as 'unknown'.

CONSERVATION STATUS

The conservation status of a site is assessed on the current condition of the site and on baseline information. The main source of baseline information for this site was from the ASI survey, NATURA 2000 report, the most recent Conservation Plan for the site (MPSU) and the Biomar Survey of Irish Machair Sites (Crawford *et al*., 1996).

Details of the numbers and pass/failure rates of monitoring stops used to assess habitat structure & functions are shown in Table 90D. Due to time constraints on the day of survey, no monitoring stops were place in the mobile, embryonic and annual strandline habitats. The overall condition of each of these habitats was assessed visually.

Machair (H21A0)

The conservation status of extent is rated as *favourable* (Table 90C). Comparisons with the Biomar Survey of Irish Machair Sites (Crawford *et al*., 1996) indicate that the extent of the machair has remained unchanged.

The conservation status of structure and functions is rated as *unfavourable-inadequate*. Eight monitoring stops were placed in the machair area during this survey and two of these failed (Table 90D). The two stops that failed were located on machair north of the airport. This area consists of wind eroded sands overlying limestone rock. The stops failed to pass the attributes of typical species and bare ground. Two of the relevés of the Irish Machair Survey (Crawford *et al*., 1996) were located in the vicinity of these two monitoring stops. The assessment criteria used for monitoring stops of the current survey were applied to the data contained in these relevés. The relevés also failed to pass the same attributes of typical species and bare ground indicating that the habitat condition has not changed since 1996.

Table 90C Conservation status of Annex I sand dune habitats at Inishmaan

Habitat[1]	**EU Conservation Status Assessment**				
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**	**Overall EU conservation status assessment**	**Proposed Irish conservation status system**[2]
Machair (H21A0)	Extent,	Structure & Functions/ Future Prospects		**Unfavourable-inadequate**	**Unfavourable-unchanged**
Mobile Dunes (H2120)	Extent, Structure & Functions, Future Prospects			**Favourable**	**Favourable-maintained**
Embryonic Dunes (H2110)	Extent, Structure & Functions, Future Prospects			**Favourable**	**Favourable-maintained**
Annual vegetation of driftlines(H1210)	Extent, Structure & Functions, Future Prospects			**Favourable**	**Favourable-maintained**

[1]EU Codes as per Interpretation Manual
[2] Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

Table 90D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Inishmaan

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (H21A0)	6	2	**Unfavourable-inadequate**

The future prospects for this site are considered *unfavourable-inadequate.* Inishmaan is the least developed of the Aran Islands where tourism is concerned. Almost all the places of interest to visitors are located in the central area of the island outside the boundaries of the cSAC. However, the presence of a sports pitch within the site and its future development into fields adjacent, poses a threat to the extent and future condition of the machair.

The conservation status of the machair in the NATURA 2000 survey is rated as *good*. Currently the overall EU conservation status of the machair is considered *unfavourable-inadequate* (Table 90C).

The Irish conservation status is rated as *unfavourable-unchanged*.

Mobile Dunes (H2120)

The mobile habitat is not delineated from the other sand dune habitats at Inishmaan on the MPSU map, however it is indicated on the Machair maps (Crawford *et al*., 1996). The extent of the mobile habitat appears to have remained intact overall with some change at the seaward edge where natural erosion appears to have removed some of the habitat.

The structure and functions parameter is given a *favourable* conservation status and this is based on best scientific judgement. The mobile habitat is functioning well and is dominated by the typical species *Ammophila arenaria* (Marram grass) and there is a plentiful supply of sand from the wide beach.

Future prospects are considered *favourable* due to the absence of amenity and other negative pressures on the mobile dunes. Natural erosion appears to be the only ongoing impact to this habitat and this is not considered unfavourable.

The mobile dunes are considered *good* in the conservation status assessment in the NATURA 2000 form. The mobile dunes are currently regarded as *favourable* under the overall EU conservation status and *favourable-maintained* under the Irish conservation status system (Table 90C).

Embryonic Dunes (H2110)

The extent of the embryonic habitat appears *favourable* (Table 90C), as the area is accreting and displays good zonation, it is fronted by a wide band of annual strandline.

The structure and function parameter is also rated as *favourable*, as there are healthy plant species dominating the accreting dunes. Accreting embryonic habitat is rare, given the more exposed nature of the west of Ireland and this is one of the few good examples of this habitat.

The future prospects of this accreting zone are considered *favourable*, as it does not appear to be under threat from any activities.

The overall EU conservation status for embryonic dunes is *favourable* as it the extent is increasing, the habitat is in good condition and there are currently no apparent threats to this habitat.

The overall Irish conservation status is *favourable-maintained*

Perennial vegetation of stony banks (H1220)

An estimated total area of 8ha for Perennial vegetation of stony banks is given in the NATURA notes for this cSAC. This includes areas of this habitat throughout the cSAC not directly associated with sand dune and machair. There is no conservation status assigned to this habitat for this survey as the habitat was not recorded at Sandhead.

Annual Strandline (H1210)

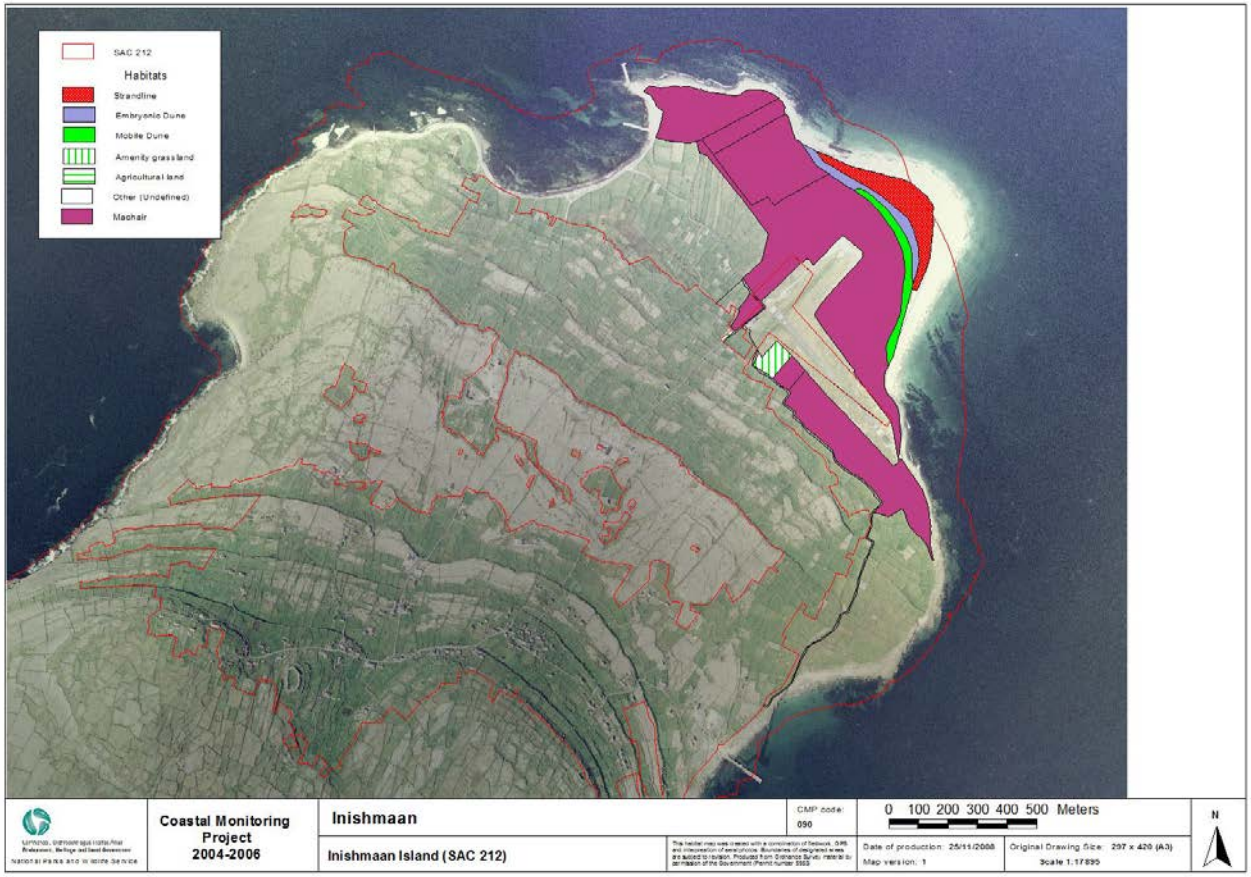
The annual vegetation of the strandline at Sandhead covers a wide area of beach and appears to have no negative pressures restricting its extent. Therefore, the extent is

rated as *favourable*. There is no previous data on this habitat at Inishmaan and so this rating is based on best scientific judgement.

The structure and functions parameter is given a *favourable* conservation status and this is based on best scientific judgement. The annual strandline appears to be functioning with a wide band of healthy flowering typical species dominated by *Cakile maritima* (Sea rocket).

Future prospects are considered *favourable* due to the absence of amenity and other negative pressures on this habitat.

The annual vegetation of strandlines is currently regarded as *favourable* under the overall EU conservation status and *favourable-maintained* under the Irish conservation status system (Table 90C).


SAC 212
Habitats
Strandline
Embryonic Dune
Mobile Dune
Amenity grassland
Agricultural land
Other (Undefined)
Mashair
Coastal Monitoring Project 2004-2006
Inishmaan
CMP code: 090
Inishmaan Island (SAC 212)
0 100 200 300 400 500 Meters
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:17895
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