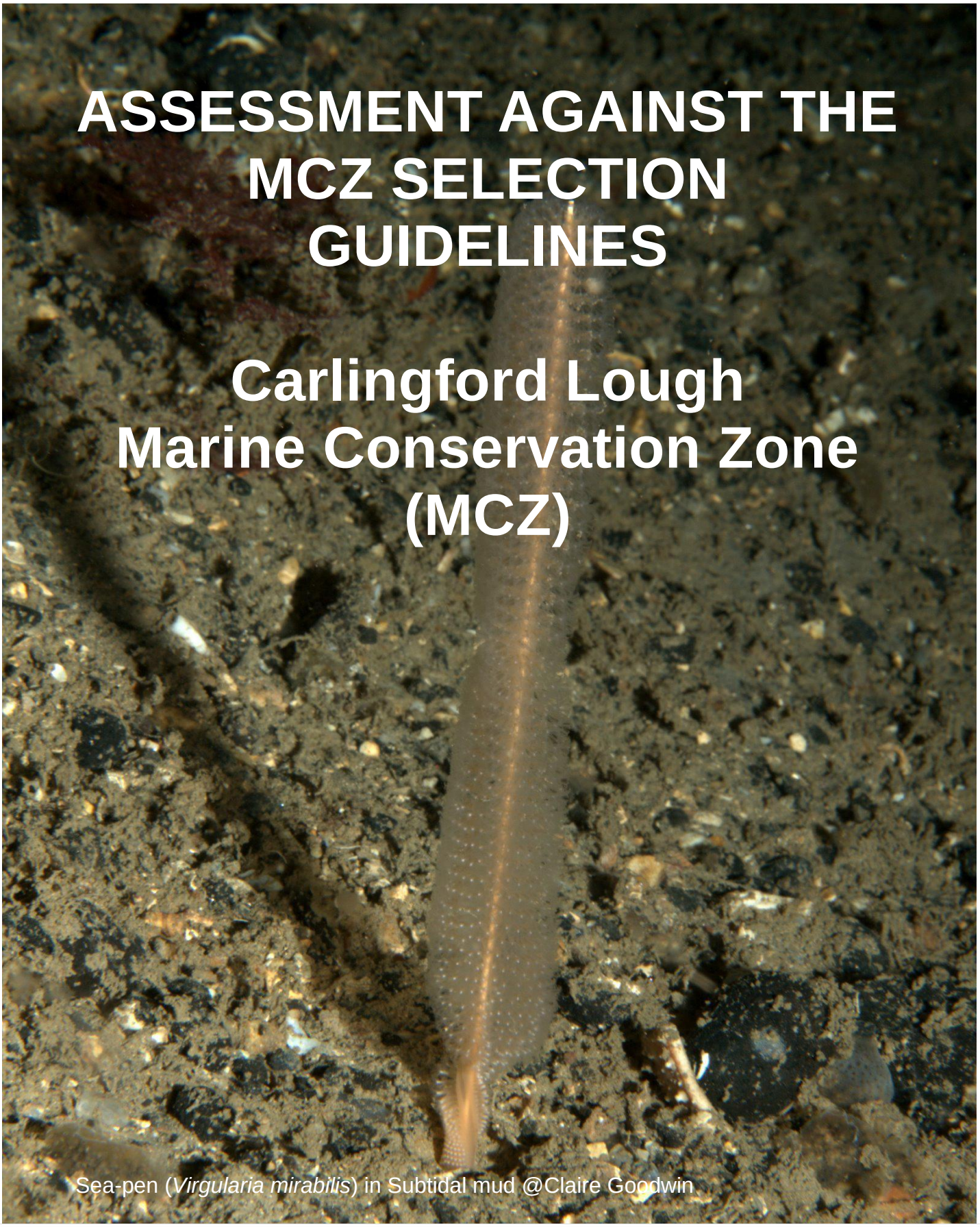
ASSESSMENT AGAINST THE MCZ SELECTION GUIDELINES

Carlingford Lough Marine Conservation Zone (MCZ)



Sea-pen (*Virgularia mirabilis*) in Subtidal mud @Claire Goodwin

Department of Agriculture, Environment and Rural Affairs
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Document version control			
Version	**Date**	**Author**	**Comments**
Version 0.1	27/05/2015	Clara Alvarez Alonso	Carlingford Lough Initial draft
Version 0.2	22/09/2015	Joe Breen, Clara Alvarez Alonso, Liz Pothanikat, Stephanie Bennett and Nuala McQuaid	Amendments
Version 0.3	16/11/2015	Nuala McQuaid & Stephanie Bennett	Amendments
Version 1.0	28/10/2015	DOE Marine Division	Internal Consultation
Version 2.0	14/12/2015	DOE Marine Division	Public Consultation
Version 2.1	01/09/2016	Clara Alvarez Alonso, Liz Pothanikat & Stephanie Bennett	Rebranding, updates & amendments
Version 3.0	24/02/2017	DAERA Marine and Fisheries Division	Designation

Distribution List		
Version	**Issue date**	**Issued to**
Version 1.0	28/10/2015	Internal distribution
Version 2.0	14/12/2015	DOE/DAERA Website
Version 3.0	24/02/2017	DAERA Website

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Summary

The assessment against the Guidance on selection and designation of Marine Conservation Zones (MCZs) in the Northern Ireland Inshore Region (hereafter referred to as the NI Guidance) is a document produced as part of the consultation evidence base, following the OSPAR design principles. This assessment helps to identify Areas of Search (AoS) and determine features proposed for protection within them. It also highlights where additional locations or features are required or when a different size or shape of boundary is needed to develop the Marine Protected Area (MPA) network.

Following the NI Guidance the process includes five stages from the identification of the AoS (Stage 1) to the development of the pMCZs and finally designation as MCZs (Stage 5). Only locations which have passed through all the stages of the assessment are considered for formal designation and inclusion in the MPA network.

This document provides details of the assessment of Carlingford Lough MCZ against the selection criteria.

Additional information on Carlingford Lough MCZ and the MCZ process includes:

- Guidance on selection and designation of Marine Conservation Zones (MCZs) in the Northern Ireland Inshore Region
- Justification report for selection of proposed Marine Conservation Zone (pMCZ) features
- Guidance on the development of Conservation Objectives and potential Management Options
- Conservation Objectives and potential Management Options for Carlingford Lough MCZ
- Data Confidence Assessment for Carlingford Lough MCZ

History of development

Carlingford Lough MCZ has been designated for protection of the MCZ feature *Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud (hereafter referred to as *Philine aperta* and *Virgularia mirabilis* communities).

The Sublittoral Survey Northern Ireland (SSNI, Goodwin *et al*., 2007) and survey work carried out by AFBI (2012) identified exceptionally high densities of *Philine aperta* and *Virgularia mirabilis* communities in the muddy substrata of the Lough over several years. Survey work completed by DOE Marine Division (June 2015) included underwater video and still images, infaunal grab samples and particle size analysis (PSA) which validated the Subtidal mud seabed in the Area of Search (AoS) (classified as slightly gravelly muddy sand). High densities of *Philine aperta* and *Virgularia mirabilis* were also recorded in the inner part of the Lough within the area that was subsequently proposed as an MCZ.

This data, combined with information on the uses and activities in the area and jurisdictional considerations supported the amendment of the initial proposed boundary. The new boundary was drawn following the extent of *Philine aperta* and *Virgularia mirabilis* records. This enables the site integrity of the MCZ to be conserved while representing the range in diversity of Subtidal (Sublittoral) mud habitats within the area. A buffer zone of 100m from aquaculture sites (north to south-east borders) was incorporated into the MCZ boundary following pre-consultation discussion with industry representatives. This will enable shellfish operations to continue without impacting the conservation objectives or the integrity or diversity of the site. For the southern extent of the boundary an administrative mid-line was used.

Details on the supporting evidence are provided in the Carlingford Lough MCZ Data Confidence Assessment.

Glossary of Terms and Acronyms

AoS – Area of Search used to underpin the proposed Marine Conservation Zone

AFBI – Agri-food and Biosciences Institute

Benthic – The ecological region at the lowest level of a body of water such as an ocean or a lake including the sediment surface and some sub-surface layers

Biotope – The region of the habitat associated with a particular ecological community

Conservation objective - A statement of the desired ecological/geological state (quality) of a feature (habitat, species or geological) for which the MCZ is designated

DAERA – Department of Agriculture, Environment and Rural Affairs (also referred to as the Department in the text)

DOE – Department of the Environment (now lies within DAERA)

EUNIS – European Nature Information System, is a habitat classification system used throughout Europe and covers all types of natural and artificial habitats, both aquatic and terrestrial

Infaunal – Aquatic animals such as clams or burrowing worms that live beneath the surface of a sea or lake floor

Infralittoral – Describes the zone from mean low water down to a depth where 1% of light can reach the seabed (JNCC)

MCZ – Marine Conservation Zone designated under section 13 of the Marine Act (Northern Ireland) 2013 in the Northern Ireland inshore region and in section 116 of the Marine and Coastal Access Act 2009 in the Northern Ireland offshore region

MCZ Feature – Marine Conservation Zone feature(s) that underpins the MCZ designation

MPA – As a generic term Marine Protected Areas are a clearly defined geographical space, recognised, dedicated and managed, through legal or other means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. As a specific term it refers to a national designation in Scotland (equivalent to MCZ)

NIEA – Northern Ireland Environment Agency

OSPAR – OSPAR is the mechanism by which fifteen Governments of the western coasts and catchments of Europe, together with the European Union, cooperate to protect the marine environment of the North-East Atlantic

OSPAR T&D – OSPAR List of Threatened and/or Declining Species and Habitats

pMCZ – Proposed Marine Conservation Zone

pMCZ Feature – Proposed Marine Conservation Zone feature(s) that will underpin the MCZ designation

PAVM – *Philine aperta* and *Virgularia mirabilis* communities

PSA – Particle size analysis

RIA – Regulatory Impact Assessment

ROV – Remotely Operated Vehicle

SM – Subtidal (sublittoral) mud

Spyball – Underwater drop camera operated by crew aboard a vessel used to study submerged habitats and species

SSNI – Sublittoral Survey Northern Ireland

VMS – Vessel Monitoring System

Carlingford Lough MCZ – Application of the MCZ selection guidelines

Stage 1 - Identifying the Area of Search	
Summary of assessment	The Carlingford Lough AoS (Figure 1) contains the MCZ feature *Philine aperta* and *Virgularia mirabilis* communities. This habitat is the only known example in Northern Ireland and is one of the few records within the UK (a few more records are reported in the South of Ireland, NBN gateway web and JNCC, 2015). In the UK and Ireland, these communities are limited to the most sheltered sea Loughs with full salinity conditions. This feature appeared to be in good condition within the AoS (Goodwin *et al*. 2011) and confined to the small area proposed as an MCZ (Figure 2). The Sea-pen, *V. mirabilis,* is a Northern Ireland Priority Species and in this area is present in high densities. *Philine aperta* and *Virgularia mirabilis* occurs on Subtidal (sublittoral) mud; this broad scale habitat is representative of Northern Ireland's seas more generally.
	Guideline met

Detailed assessment			
Protected features	**Guideline 1a** *Presence of key features*	**Guideline 1b** *Presence of features at threat and/or decline*	**Guideline 1c** *Presence of ecological resources/geological processes critical to functioning of the ecosystem*
Biodiversity			
Subtidal (sublittoral) mud [1](SM): *Philine aperta* and *Virgularia mirabilis* communities[2] (PAVM)	✓		*Representative feature*

[1] Broad scale habitat. EUNIS Habitat type A5.3 (level 3) that contains infralittoral fine mud (McBreen & Askew, 2011)

[2] SM component (subscale) habitat. Biotope - PAVM (*Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud) SS.SMu.IFiMu.PhiVir – EUNIS A5.343.. This biotope is very similar to Sea-pen and burrowing megafauna communities, with the biotope SS.SMu.CFiMu.SpnMeg (an OSPAR Threatened and/or Declining Species - OSPAR, 2010), but occurs shallower, is less stable, and is not characterised by burrowing megafauna (JNCC, 2014, Hughes, 1998)

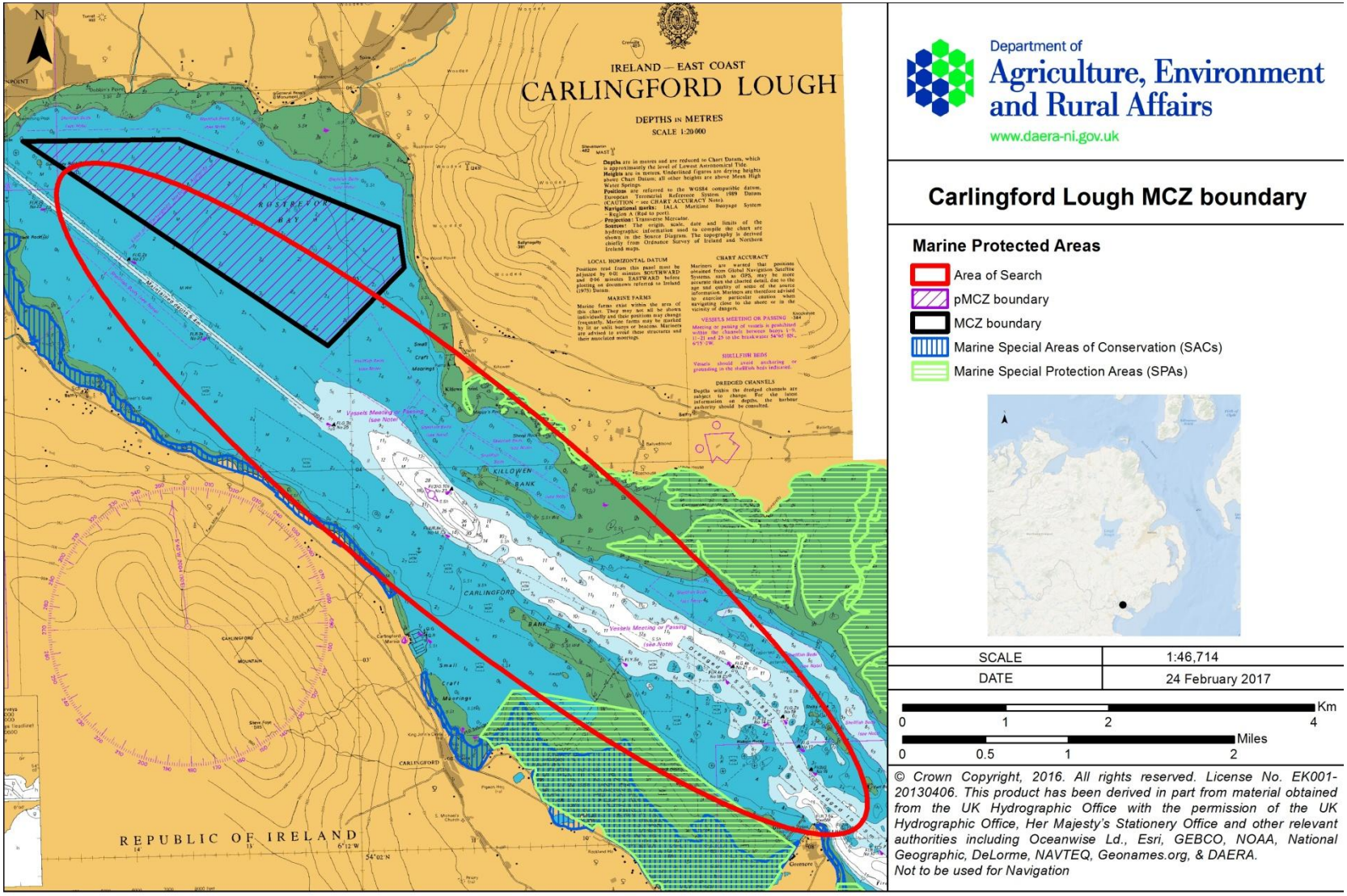

Figure 1 Location of Area of Search, initial proposed (p) boundary and designated boundary of Carlingford Lough MCZ

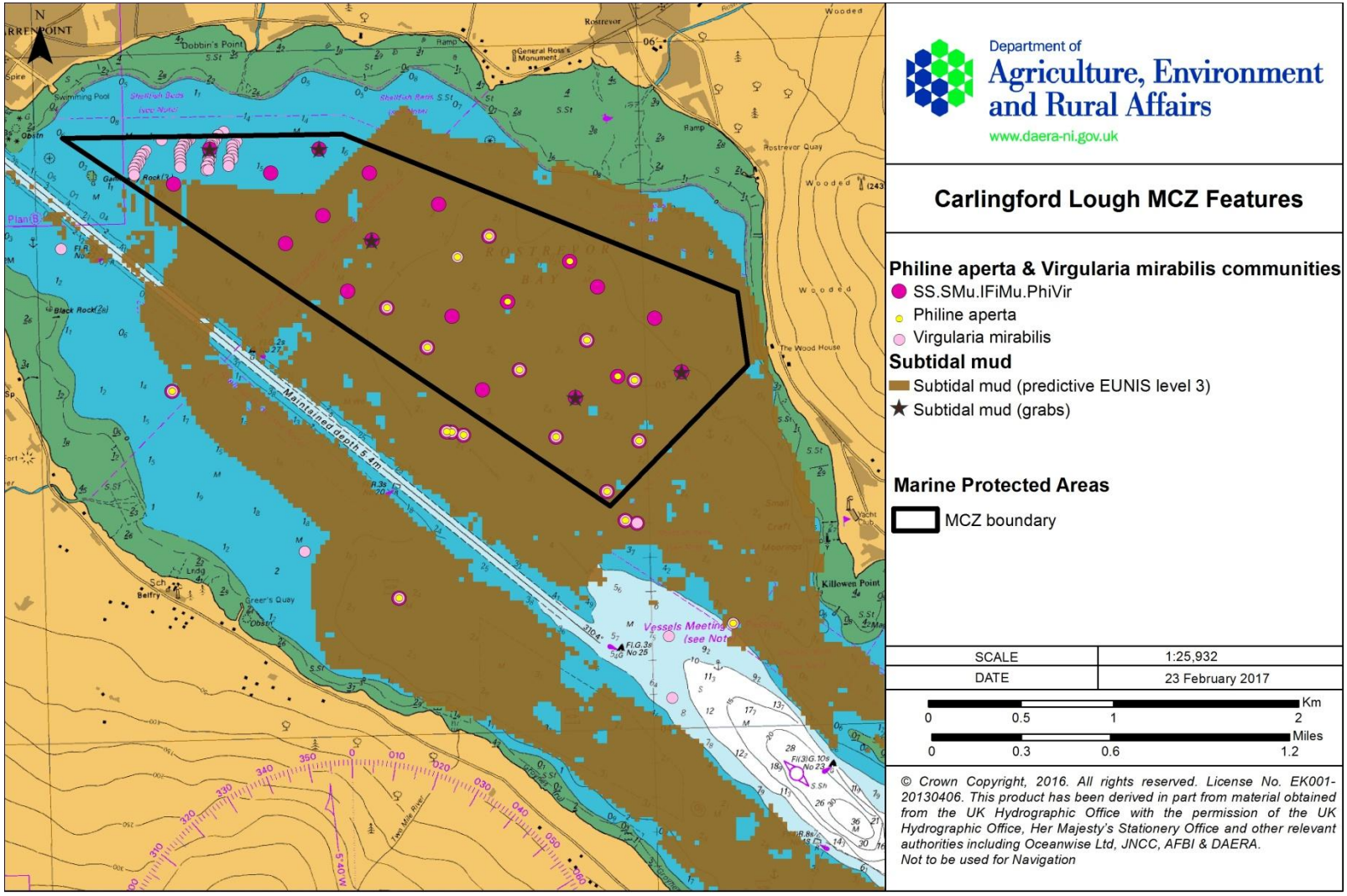

Figure 2 Distribution of the features in Carlingford Lough MCZ

Stage 2 - Prioritise the Area of Search based on quality of MCZ features contained	
Summary of assessment	Subtidal (sublittoral) mud habitats along with PAVM communities are naturally diverse habitats which are spatially and functionally linked. This slightly gravelly mud seabed is inhabited by a dense and undisturbed population of small Sea-pen (*V. mirabilis*) and White lobe shell (*P. aperta*) that represents the only example of this type in Northern Irish waters and one of few in UK and Irish waters (Hughes, 1998). Carlingford Lough is affected by a range of activities (the Lough is a commercial port and significant shellfish aquaculture takes place throughout); however, the inner area proposed as an MCZ remains undisturbed, with limited human activity thus the pMCZ habitat feature is thought to be in a relatively good condition. The pMCZ habitat is vulnerable to a range of pressures in the area associated with shellfish aquaculture farms, fishing (dredging and demersal trawling), navigational dredging, discharges, recreation, moorings and anchoring and infrastructure development. The pMCZ feature is considered to be at moderate risk of future significant damage should the intensity of activities increase or if there are new developments in the area.
	Five of the six Stage 2 Guidelines have been met (2a-2e)
Detailed assessment	
Guideline 2a - The Area of Search contains a combination of features especially those that are functionally linked	
Subtidal (sublittoral) mud: *Philine aperta* and *Virgularia mirabilis* communities	The feature is rare in terms of the shortened height of the individual *Virgularia* and overall density of this population in Northern Ireland. This biotope is confined to the most sheltered sea-loughs in shallow water depths of 12-15m (where significant seasonal variation in temperature may occur) where the sediment has a proportion of fine mud greater than 80% (JNCC, 2015). The slightly gravelly mud sediments in the pMCZ are particularly suitable for *V. mirabilis* as they tend to inhabit environments with low hydrodynamic energy and low-moderate current speeds (Greathead *et al*., 2014). They can tolerate coarser sediments than other species of sea-pen due to their muscular peduncle that allows them to retract fully into the sediment (Greathead *et al*., 2005). As a burrowing species, *V. mirabilis* is dependent on the oxygen content of the substrate therefore sediments with high gravel content will have higher oxygen tensions due to the sediment permeability (Greathead *et al*., 2014). The sea-pen represents a diversity link, enhancing survival of smaller species and increasing the depth of oxygen penetration (Lancaster *et al*, 2014). The bioturbation created by sea slugs

	(or white lobe shells) and other occasional burrowers may increase the food supply for passive suspension feeding organisms such as *V. mirabilis* (Hughes, 1998; Hill *et al*., 2010).
2a Result	**Guideline met**
Guideline 2b - The Area of Search contains features with naturally high biodiversity (for habitats only)	
Subtidal (sublittoral) mud: *Philine aperta* and *Virgularia mirabilis* communities	Within Carlingford Lough pMCZ the SM broad scale habitat incorporates the biotope: SS.SMu.IFiMu.PhiVir – EUNIS A5.343 (PAVM: *P. aperta* and *V. mirabilis* in soft stable infralittoral mud). *P. aperta* is the most characteristic species of this habitat occurring at high densities, although it can be highly variable from year to year (JNCC, 2015). *V. mirabilis* appears in the pMCZ in particularly high numbers. The burrows created by the Sea-pens may offer shelter, food and oxygen to a diverse range of small benthic infaunal organisms. *Ocnus planci*, a very rare sea cucumber has also regularly been observed in the pMCZ. Common epibenthic predators/scavengers occurring in this biotope include Shore crabs (*Carcinus maenas*), Edible crabs (*Cancer pagurus*), Swimming crabs (*Liocarninus depurator*), Hermit crabs (*Pagurus bernhardus*) and Common starfish (*Asterias rubens*). Other species found on this shallow mud are the Spider crab (*Macropodia* sp.), Brittlestars (*Amphiurua filiformis*), Flat fish and Gobies. Sugar kelp (*Saccharina latissima*) is present though in low densities. Burrowing crustacean megafauna, characteristic of deeper mud, are rare but the Norway lobster (*Nephrops norvergicus*) has been occasionally recorded in the MCZ (Hill & Wilson, 2005). The sediment also appears to be covered by a diatom film at certain times of the year.
2b Result	**Guideline met.**
Guideline 2c - The Area of Search contains coherent features not smaller fragmented ones	
Subtidal (sublittoral) mud: *Philine aperta* and *Virgularia mirabilis* communities	There has been very little research on the natural spatial and temporal variability of PAVM communities in SM habitats. Evidence on Sea-pen population dynamics and longevity suggests that they are able to maintain a steady-state population with sporadic recruitment (Hill *et al*., 2010). The Carlingford Lough PAVM communities have been found to be very dense and limited to the inner area of the Lough; this is probably the only remaining part of the Lough not heavily impacted by human activity (refer to the Carlingford Lough Conservation Objectives and potential Management Options document for further details). *Virgularia mirabilis* densities in the pMCZ were recorded by DOE in 2015 as abundant (10-19%) to superabundant (20-39%) on the SACFOR scale

	(JNCC, 2014) while *Philine aperta* abundances ranged from frequent (1-5%) to superabundant (20-39%). Historically, *Virgularia* were probably more widely distributed throughout Carlingford Lough. Spatial patchiness may occur due to localised differences in the sediment characteristics, for example organic enrichment. Camera and grab sample data confirmed the presence of continuous SM habitat in the area and this comprised slightly gravelly mud. The pMCZ is considered to be stable and not fragmented; anthropogenic activities do not appear to have affected the suitability of the sediment for PAVM communities.
2c Result	**Guidelines met**
Guideline 2d - The Area of Search contains features considered least damaged/more natural	
Subtidal (sublittoral) mud: *Philine aperta* and *Virgularia mirabilis* communities	No indication of change or damage to the pMCZ feature has been recorded inside the proposed boundaries from recent camera surveys carried out by AFBI (2012) and DOE (2015) (refer to the Data Confidence Assessment for further details). The feature was assessed to be in a natural good condition within the pMCZ boundary. However, due to insufficient data about the long-tem trends of PAVM in SM it is not clear whether this has been adversely affected by anthropogenic activities in the past. The absence of PAVM in the AoS (outside the pMCZ boundary) suggests that the SM may have been affected or modified by exposure to anthropogenic impacts reducing its suitability for PAVM colonisation. As such, the pMCZ remains the last area with natural undisturbed SM: PAVM habitat (refer to aquaculture licensed areas, shipping routes and 2009-2013 Vessel Monitoring System (VMS) data in the Conservation Objectives and potential Management Options for Carlingford Lough MCZ document).
2d Result	**Guidelines met**

Guideline 2e - The Area of Search contains features at risk[3] of damage by human activity	
Subtidal (sublittoral) mud: *Philine aperta* and *Virgularia mirabilis* communities	The risk assessment (refer to Annex III in Conservation Objectives and Potential Management Options for Carlingford Lough MCZ), undertaken for Carlingford Lough MCZ indicated that the SM:PAVM feature was considered to be at **moderate** risk of significant damage associated with anthropogenic activities occurring in the area. This is potentially as a result of exposure to pressures associated with fishing (both demersal trawling and creeling/potting present a moderate risk) and anchoring and mooring activities (associated with transport and recreation). These pressures can result in physical damage (abrasion), habitat changes or losses, de-oxygenation, smothering and removal of non-target species.
2e Result	**Guidelines met**
Guideline 2f -The Area of Search contains historic sites which could be restored	
2f Result	Restoration of historic biotopes within Carlingford Lough would require revoking existing aquaculture licenses and engaging in subsequent habitat restoration.
	Guideline not met

[3] Risk of damage to the feature(s) is based on the sensitivity of the feature to activities and their associated pressures. The information is organised by the type of activity, and briefly describes potential impacts on the features and potential management options. The grouping of activities was based on the standardised UK pressures-activity matrix (http://jncc.defra.gov.uk/pdf/Final_HBDSEG_P_A_Matrix_Paper_28b_Website_edit%5B1%5D.pdf), as developed by JNCC (2013), which classed similar activities that exerted similar pressures together. Since the public consultation, a new Pressures-Activities Database (PAD) has been developed by Cefas and APBmer (2015). This database and the list of activities are currently under review by JNCC in conjunction with each country agency. The Department has used this database and the improved activities list along with a revised methodology (Marine Evidence based Sensitivity Assessment, MarESA, developed by JNCC and Natural England) to review the vulnerability assessments for the MCZs (where applicable). The degree to which a feature is exposed to activities associated with pressures to which it is sensitive in each MCZ region was assessed to provide a qualitative measure of risk. Risk assessments for the various activities were examined to produce an overall qualitative risk assessment for each MCZ. The management options will only consider those activities assessed as capable of affecting the features of the MCZ, based on the risk of damage assessment. More detailed information on the process can be found on the papers: Guidance on the development of Conservation Objectives and potential Management Options and Carlingford Lough Conservation Objectives and potential Management Options (the latter contains the risk assessment for Carlingford Lough MCZ).

Stage 3 - Assess the size of the Area of Search to ensure this is sufficient to maintain the integrity of features protected	
Summary of assessment	The pMCZ reflects the distribution of PAVM communities and the range of SM suitable for colonisation by the main habitat component species. Although PAVM are present throughout Carlingford Lough, the highest concentration and the greatest continuous expanse within Northern Ireland waters lie within the MCZ boundary. The boundary is suitable for maintaining the integrity of the habitat feature for which the MCZ is designated.
	Guideline met
Detailed assessment	
The size of the area of search should be adapted where necessary to ensure it is suitable for maintaining the integrity of the features for which the MCZ is being considered. Account should also be taken where relevant, of the need for effective management of relevant activities	
Subtidal (sublittoral) mud: *Philine aperta* and *Virgularia mirabilis* communities	The extent of SM: PAVM habitat records in the AoS is supported by the coverage of grab samples and PSA results, predictive habitat mapping (EU SeaMap 2014) and photographic/video evidence from underwater camera surveys (NISS; SSNI; AFBI Carlingford Lough 2012; DOE Carlingford Lough pMCZ support survey 2015; refer to details in the Data Confidence Assessment for Carlingford Lough MCZ). The Carlingford Lough pMCZ boundary, originally drawn around the majority of PAVM in SM records in the inner part of the Lough, was amended to take into account the uses and activities occurring in the area, aiming for effective management within the boundary. The boundary includes a representative range of SM (slightly gravelly mud) supporting dense PAVM communities and takes into account advice from the aquaculture sector for potential management for the pMCZ. A buffer zone of 100m from aquaculture sites (north to south-east borders) was incorporated into the pMCZ boundary following pre-consultation discussion and advice with industry representatives. This will enable shellfish operations to continue without impacting the conservation objectives or the integrity and diversity of the site. For the southern extent of the boundary an administrative mid-line was used.

Stage 4 - Assess the effectiveness of managing features within the proposed Area of Search	
Summary of assessment	There is potential for management measures to be implemented successfully to achieve the conservation objectives of the pMCZ feature.
	Guideline met. As a result the original AoS and subsequent proposed MCZ progresses as potential area for MCZ designation to Stage 5.
Detailed assessment	
There is a high probability that management measures, and the ability to implement them, will deliver the objectives of the MCZ	
Subtidal (sublittoral) mud: *Philine aperta* and *Virgularia mirabilis* communities)	The conservation objective for the Carlingford Lough MCZ feature is to '*maintain the feature in favourable condition*'. The current available evidence indicates that the communities of PAVM are in good condition within the MCZ (see 2d); however, there are a number of activities (present and future) that are capable of adversely affecting the feature and therefore there is a need to consider whether additional management is required. This will aid in the achievement of the conservation objectives for the MCZ feature (see 2e). There are mechanisms through the European Commission under the Fisheries Act (Northern Ireland) 1966 that can be used to support the introduction of spatial fisheries measures to conserve the feature of the MCZ. Under the Marine and Coastal Access Act (2009), the Department has the responsibility for licensing certain activities; in some cases the Environmental Impact Assessment (EIA) process may be applicable. The Department also has the powers to introduce bye-laws if required under the Marine Act (Northern Ireland) 2013. The Conservation Objectives and Potential Management Options for Carlingford Lough MCZ paper details the various activities likely to affect the MCZ feature and suggested management options. The cross border nature of the site may present a risk to the management of the MCZ. This may be controlled through cross-border institutions such as Loughs Agency.

Stage 5 - Assess the ecological coherence to prioritise between different areas based on the contribution to the MPA network			
Summary of assessment	This is the only MCZ put forward for PAVM communities as it is the only known example in Northern Ireland and one of the few records within the British Isles. Therefore, the site contributes significantly to the MPA network. The site also makes a contribution towards the MPA network for the broad scale habitat SM in OSPAR Region III.		
	Guideline met		
Detailed assessment			
The potential area contributes significantly to the coherence of the MPA network in the seas around Northern Ireland			
Feature	**Representation**	**Replication**	**Adequacy**
Subtidal (sublittoral) mud: *Philine aperta* and *Virgularia mirabilis* communities	In the UK and Ireland, PAVM communities are restricted to the most sheltered sea loughs with full salinity conditions. The MCZ is a stronghold as it contains the only known example of these communities in Northern Ireland and one of the few known in UK and Irish waters. The component species Sea-pen, *V. mirabilis,* is a Priority Species in Northern Ireland while the biotope SS.SMu.IFiMu.PhiVir is very similar to SS.SMu.CFiMu.SpnMeg, which is an OSPAR T&D habitat (OSPAR, 2010) but occurs shallower, is less stable, and is not characterised by burrowing megafauna (Hughes, 1998; JNCC, 2014). SM sediments are a key broadscale habitat supporting the PAVM communities. These are	Currently *Philine* biotopes are not afforded direct protection under the existing network within Northern Ireland (some biotopes are afforded indirect protection under the Habitats Directive). There is replication for Sea-pen biotopes within the Irish Sea MPA. Replication of the SM in the network is proposed within OSPAR Region III.	Majority of records of PAVM are included within the MCZ boundary. Also a large proportion of SM in the Lough is included in the MCZ. A minimum regional proportion target of 15% of SM has been suggested for adequacy to support the network of MPAs (A5.3) (Natural England & JNCC, 2010). Currently, 5.2% of SM is protected within Northern Irish MPAs, thus the MCZ would increase this percentage to

	considered to be functionally linked and SM seabed is critical for Sea-pen colonisation.		5.6% (JNCC EU SeaMap 2014). The area of SM in Northern Ireland is 904.85km^2 while 47.0km^2 of this is currently protected in the existing MPA network. The MCZ (3.23km^2) will increase this area to 89.43km^2.
	Viability	**Connectivity**	**Management**
	The precautionary approach has been applied as there is very little information for the size of area required for a viable population of PAVM communities. Sea-pens have a small adult home range and large potential larval dispersal distances (approximately 10- 40km) and so large areas (e.g. 1964km^2) would protect the whole life-cycle (Hill *et al*., 2010). JNCC guidance suggests a minimum viable patch diameter of 1km (Natural England & JNCC, 2010). An area of 500m^2 is thought to be appropriate to protect the viability of most species in the habitat. Additionally, it is	Not applicable[4]. In NI the minimum distance between MPAs containing SM habitats is approximately 14.7km (within the 12nm region). Barnard *et al.* (2014) have stated that for NI where there is the same habitat type occurring in more than one of the MPAs located in the NI 12nm region then the minimum	There is potential for management measures to be implemented successfully to achieve the conservation objectives of the MCZ feature such as fisheries measures, licensing activities and through byelaws.

[4] Connectivity between different regional networks and individual MPAs has only been assessed for some mobile species and large scale features. There is currently little evidence on linkages for low mobility species and sea-bed habitats in UK waters. More modelling work for assessing linkages is needed.

	recommended that where the feature occurs in a restricted location protection of the whole area or patch is required for viability (Hill *et al*., 2010). The MCZ boundary covers almost the entire PAVM extension with an area of 3.23km^2. The minimum diameter in the MCZ is 1.06km.	marine path between MPA centroids is estimated as being less than 32km for all relevant habitats. In the case of PAVM there is limited connectivity with other MPAs in NI as this habitat is not present elsewhere in the NI region.	
	Best available evidence	**Economic, cultural and social issues**	
	Best available evidence has been used to arrive at the decision regarding the feature and boundary development. Refer to Data confidence assessment for Carlingford Lough MCZ for further details.	For further details refer to the Conservation Objectives and potential Management Options for Carlingford Lough MCZ paper and the Regulatory Impact Assessment (RIA).	

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Photos represent Priority Marine Features found throughout the Northern Ireland Inshore Region

ISBN 978-1-84807-702-7

Department of Agriculture, Environment and Rural Affairs

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