

Ecological Network Guidance – a summary

Introduction

This document is a summary of Version 9 of the draft “Ecological Network Guidance to regional stakeholder groups on identifying Marine Conservation Zones”, written by Natural England and the Joint Nature Conservation Committee. It has been produced by the Net Gain team and is intended to be used as a quick reference guide; it should not be used to replace the JNCC/NE guidance.

The Ecological Network Guidance (ENG) sets out seven guiding principles and five further (ecological and practical) areas for consideration when developing the design of a network of Marine Protected Areas. The Marine Conservation Zones (MCZs) that are recommended by the Regional Hubs will form part of this overall (MPA) network and so need to follow the same principles and considerations. Where targets outlined in the ENG are already met by existing MPAs (such as SACs or SPAs) no further MCZs are needed for those particular targets. Further guidance from Natural England and JNCC is expected.

Net Gain Regional Hubs should follow the principles and other guidance outlined within the ENG when identifying locations for potential MCZs. In this way, the MCZs that are recommended by the Regional Hubs should pass any subsequent assessment by the independent Science Advisory Panel (SAP) and will subsequently be submitted to the Secretary of State for formal public consultation and designation.

Since its release as version 8, there have been some changes to the ENG, including revisions to the species of conservation importance and to the minimal recommended sizes of MCZs for habitats or species of conservation importance. These changes have been incorporated in this summary document. At the time of writing (May 2010), the ENG is still subject to change, and should not be considered as being final.

Design principles

1 - Representativity

A number of broad-scale habitats and species and habitats of conservation importance (FOCI) are identified that need to be protected within the overall network of MPAs. Within the NetGain project area there should be:

- **Examples of each of 23 broad-scale habitats, 22 habitats of conservation importance and 29 low or limited mobility species of conservation importance should be protected, where their distribution allows.**
- **Spawning, nursery or foraging grounds for three highly mobile species should be protected, where appropriate areas occur.**
- All relevant habitats and species are listed in Tables 1-4.

2 - Replication

Within the Net Gain project area, and where their distribution allows, there should be:

- **At least 2 separate examples of each broad-scale habitat; and**
- **3 to 5 examples of each habitat or species of conservation importance.**
- No targets for examples of spawning, nursery or foraging grounds for the 3 highly mobile species are given.

3 - Adequacy

The MPAs within the Net Gain project area should collectively protect:

- **A proportion of each broad-scale habitat** (based on the target ranges shown in Table 1); and
- **A proportion of each habitat or species of conservation importance** (based on the other design principles).

4 - Viability

The size of MCZs is important, as sites that are too small may not be sustainable or viable.

- **MCZs for broad-scale habitats should have a minimum diameter of 5km, with the average size being between 10 and 20km in diameter** (these size guidelines apply especially for offshore MCZs).
- **MCZs for habitat or species of conservation importance should exceed specified minimum sizes (based on four classes - 0.5km; 1km; 5km; and ≥ 10 km) or, for small discrete features, should encompass the entire feature; the details are given in Tables 2 and 3.**
- It is likely that MCZs for habitat or species of conservation importance will be identified mainly inshore.

5 - Connectivity

Guidelines on the distance between MPAs state that:

- **MPAs of similar habitat should be separated, where possible, by no more than 40-80km.** This is a rule of thumb, and should carry a lower weight than meeting the other guidelines.
- Where dispersal distances (e.g. for eggs or juveniles) are known this information should be considered in helping determine the spacing between MPAs (it is recognised that, in reality, this level of information is limited).

6 - Protection

- **Each broad-scale habitat and each habitat of conservation importance should have at least one viable* reference area within the Net Gain project area in which all extraction (of living or non-living resources), deposition or human-derived disturbance has been removed/prevented**
 - reference areas should be distributed to take account of the biological or geographic variation of the feature
 - reference areas do not have to make up entire MCZ sites; as long as they are large enough to be viable the reference area can form part of a larger MCZ.
- **For MCZs that are not reference areas, the level of protection will be determined by conservation objectives for the site**, which in turn need to be based on what features the site is meant to protect, and what state those features are in. Minimum ecological quality should be guided by 'Good environmental status' established under the Marine Strategy Framework Directive.
- Conservation objectives for MCZs should be determined by:
 - the current condition of features; and/or
 - best available evidence on pressures to which they are sensitive.

* No specific figures are given for the size or percentage of areas within reference sites. 'Viable' can be interpreted as meaning 'large enough to maintain the integrity of the feature to be protected', and we can use the figures in Tables 2 and 3 for guidance. Feedback from the Science Advisory Panel will further help determine the appropriate size and number of reference sites.

7 - Best available evidence

- **MCZ identification should be based on the best available scientific evidence.** Lack of full scientific certainty should not be a reason for delaying decisions on site **recommendations**.
- **MCZ identification should take account of local and lay knowledge.**

Further design considerations

Areas of additional ecological importance

When selecting MCZs:

- **Particular attention should be given to including important areas for key life stages** of species, such as spawning, nursery or juvenile areas.
- **For mobile species, areas important for foraging, breeding, moulting, loafing, wintering or resting should be prioritised.**
- When selecting MCZs prioritise areas of high natural biodiversity and high natural pelagic productivity.

Impacts and feature vulnerability

- **A feature which has been less impacted by human activities should generally be considered a higher priority for MCZ identification than a more degraded example of the same feature.** However, this should not prevent the selection of areas that have been impacted, if they best contribute to the ecological objectives of the network.

Scientific value

- **When identifying possible MCZs, consider their value for scientific research.** Suitable locations may include areas that have already been subject to long-term research and monitoring (as the conditions before designation will be well-known and change can be measured) and areas located close to research centres or access points that can facilitate regular research and monitoring.

Practical guidelines for drawing MCZ boundaries

- MCZ boundaries should follow feature extent (where appropriate), whilst using a minimum number of straight lines, ensuring as compact and simple a shape as possible and incorporating a margin to ensure appropriate protection of features.
- Where a feature is present in a number of separate but nearby locations, effort should be made to include all discrete occurrences within site boundaries.
- For spatially dynamic habitats, boundaries should, where possible, encompass predicted changes in the feature distribution to ensure their long-term sustainability (e.g. allowing migration features in the medium-term).
- MCZs for species should be drawn around areas of regular/predictable species concentration, using best available data. Where species are known to occur within a defined habitat, the habitat can be used as a basis for site delineation.
- See diagrams A-D, at the end of this document, for practical examples.

Geological and geomorphological features of interest

- Coastal Geological Conservation Review (GCR) sites that have a significant intertidal or subtidal portion, and which are not currently protected within Sites of Special Scientific Interest (SSSIs), should be considered for MCZ designation. There are eight such sites within the Net Gain project area (see Table 5).
- Locations of geological and geomorphological features, especially ones considered to be of the greatest conservation importance, should be considered when identifying MCZs for broad-scale habitats or for features of conservation importance (see Table 6).

Table 1: Broad-scale habitat types

This table shows the broad-scale habitat types believed to be present within the Net Gain project area. The table shows the percentage of the total extent of each broad-scale habitat that should be protected by MPAs within the Net Gain project area.

As outlined in the text, at least two separate examples of each of these broad-scale habitats should be protected within each project area.

Broad-scale habitat type	EUNIS classification code	Total proportion to be protected	Additional notes (overleaf)
High energy inter-tidal rock	A1.1	21-38%	1
Moderate energy inter-tidal rock	A1.2	21-38%	1
Low energy inter-tidal rock	A1.3	22-39%	1
Inter-tidal coarse sediment	A2.1	25-42%	
Inter-tidal sand and muddy sand	A2.2	25-42%	
Inter-tidal mud	A2.3	25-42%	
Inter-tidal mixed sediments	A2.4	25-42%	
Coastal saltmarshes and saline reedbeds	A2.5	-	2
Inter-tidal sediments dominated by aquatic angiosperms	A2.6	-	3
Inter-tidal biogenic reefs	A2.7	-	4
High energy infralittoral rock	A3.1	15-31%	
Moderate energy infralittoral rock	A3.2	17-32%	
Low energy infralittoral rock	A3.3	16-32%	
High energy circalittoral rock	A4.1	11-25%	
Moderate energy circalittoral rock	A4.2	13-28%	
Low energy circalittoral rock	A4.3	16-32%	
Sub-tidal coarse sediment	A5.1	17-32%	
Sub-tidal sand	A5.2	15-30%	
Sub-tidal mud	A5.3	15-30%	
Sub-tidal mixed sediments	A5.4	16-32%	
Sub-tidal macrophyte-dominated sediment	A5.5	-	5
Sub-tidal mixed sediments	A5.6	-	6
Deep-sea bed	A6	-	7

Definitions

- ‘Energy’ - refers to how much the water moves, so areas with strong currents or high wave exposure are ‘high energy’, calm and sheltered areas are ‘low energy’.
- ‘Infralittoral rock’ - includes habitats of bedrock, boulders and cobbles which occur just below low tide and typically support seaweed communities. The upper limit is marked by the top of the kelp zone whilst the lower limit is marked by the lower limit of kelp growth or the lower limit of dense seaweed growth – which means the infralittoral zone coincides with depths that have sufficient light penetration to support dense plant growth. Depending on how clear the water is, the infralittoral zone can extend to very different depths.
- ‘Aquatic angiosperms’ - are flowering plants that live in water – for example eelgrass.
- ‘Biogenic reefs’ - are structures built up by animals or plants, e.g. cold-water coral reefs, mussel beds, and reef structures built by some species of worm.
- ‘Circalittoral rock’ - is characterised by animal dominated communities (a departure from the algae dominated communities in the infralittoral zone). The depth at which the circalittoral zone begins is directly dependent on the intensity of light reaching the seabed; in highly turbid conditions, the circalittoral zone may begin just below water level.
- ‘Macrophytes’ are plants such as seaweeds and vascular plants that are big enough to see without a microscope.

Notes

1. Whilst we have information on the overall distribution of inter-tidal rock within the Net Gain project area, there is currently insufficient information available to differentiate between these three classes.
In some instances, broad-scale habitats overlap significantly with some of the habitats of conservation importance, and they will therefore be covered adequately as long as the appropriate targets for replication, viability and connectivity for specific habitats are met. Specifically:
2. Targets for replication, viability and connectivity for coastal saltmarshes should be used
3. We currently have no information on the distribution of this broad-scale habitat type within the Net Gain project area - it is possible that this broad-scale habitat type is not represented in our area; targets for replication, viability and connectivity for (intertidal) seagrass beds should be used
4. Targets for replication, viability and connectivity for inter-tidal honeycomb (*Sabellaria alveolata*) reefs and blue mussel beds should be used
5. We currently have no information on the distribution of this broad-scale habitat type within the Net Gain project area - it is possible that this broad-scale habitat type is not represented in our area; targets for replication, viability and connectivity for Maerl beds (maerl is a collective term for several species of red seaweed with hard, chalky skeletons) and (sub-tidal) seagrass beds should be used
6. We currently have no information on the distribution of this broad-scale habitat type within the Net Gain project area - it is possible that this broad-scale habitat type is not represented in our area; targets for replication, viability and connectivity for (subtidal) Honeycomb worm (*Sabellaria alveolata*) reefs, Ross worm (*Sabellaria spinulosa*) reefs, Horse mussel (*Modiolus modiolus*) beds, blue mussel beds and cold-water reefs should be used
7. Targets for replication, viability and connectivity for deep-sea bed should be used

Table 2: Habitats of conservation importance

The table shows the minimum viable site size for each habitat FOCI that should be protected by MPAs. This represents the full list of habitat FOCI as given in the ENG and does not reflect the occurrence of these habitats within the Net Gain project area.

As outlined in the text, at least three to five separate examples of each of these habitat FOCI should, where they are present, be protected within the Net Gain project area.

Habitats of conservation importance	Minimum viable patch diameter (km)				Whole feature
	0.5	1	5	>10	
Blue mussel beds	x				
Cold-water coral reefs					x
Coral gardens			No details given		
Deep-sea sponge aggregations			x		
Estuarine rocky habitats	x				
File shell beds	x				
Fragile sponge & anthozoan communities on sub-tidal rocky habitats	x				
Intertidal underboulder communities	x				
Littoral chalk communities		x			
Maërl beds	x				
<i>Modiolus modiolus</i> beds	x				
Mud habitats in deep water		x			
Sea-pen and burrowing megafauna communities		x			
<i>Ostrea edulis</i> beds	x				
Peat and clay exposures	x				
<i>Sabellaria alveolata</i> reefs	x				
<i>Sabellaria spinulosa</i> reefs	x				
Seagrass beds	x				
Sheltered muddy gravels	x				
Subtidal chalk	x				
Subtidal sands and gravels	x			x	
Tide-swept channels	x				

Notes

- Subtidal sands and gravels - the minimum viable size will depend on the specific substrate type. Gravels may have a smaller viable patch size (0.5km diameter) whereas sands require larger patch sizes (10km or greater)
- 'Anthozoans' comes from the Greek for "flower animals". Anthozoans are a class of animals which include sea anemones and corals
- 'Communities' is an ecological term meaning a group of species living together in the same area
- *Modiolus modiolus* is the Latin name for the horse mussel
- Sea pens are types of cnidarians (the group of animals that also includes jellyfish, corals and sea anemones). Sea pens grow in colonies, in the shape of a quill, part-burrowed in sediment. They tend to be quite fragile
- 'Megafauna' - big animals
- *Ostrea edulis* is the latin name for the native oyster, also known as flat oyster
- *Sabellaria alveolata* is the honeycomb worm, a worm that builds hummocks of honeycomb-shaped tubes on the low shore and in the shallow sub-tidal usually on mixed sediment/boulder/rocky shores with plenty of sand churned up by waves
- *Sabellaria spinulosa* is the ross worm, another type of worm that builds small reefs and hummocks out of the tubes that it lives in. It lives on subtidal coarse sediment and cobbly areas

Table 3: Species of conservation importance

The table shows the minimum viable site size for each species FOCI that should be protected by MPAs. This represents the full list of species FOCI as given in the ENG and does not reflect the occurrence of these species within the Net Gain project area.

As outlined in the text, at least three to five separate examples of each of these species FOCI should, where they are present, be protected within the Net Gain project area.

Species of conservation importance	Minimum viable patch diameter (km)				Whole feature
	0.5	1	5	>10	
<i>Alkmaria romijni</i> - Tentacled lagoon-worm	x				
<i>Amphianthus dohrnii</i> - Sea-fan Anemone	x				
<i>Arctica islandica</i> - Ocean quahog	x				
<i>Armandia cirrhosa</i> - Lagoon Sandworm					x
<i>Atrina pectinata</i> - Fan Mussel			x		
<i>Caecum armoricum</i> - Defolin's lagoon snail		x			
<i>Cruoria cruoriaeformis</i> - a red seaweed		x			
<i>Eunicella verrucosa</i> - Pink Sea-fan			x		
<i>Gammarus insensibilis</i> - Lagoon sand shrimp	x				
<i>Gitanopsis bispinosa</i> - an Amphipod shrimp		x			
<i>Gobius cobitis</i> - Giant Goby		x			
<i>Gobius couchi</i> - Couch's Goby		x			
<i>Grateloupia montagnei</i> - a red seaweed		x			
<i>Haliclystus auricula</i> - a stalked jellyfish	x				
<i>Hippocampus guttulatus</i> - Long snouted seahorse	x				
<i>Hippocampus hippocampus</i> - Short snouted seahorse	x				
<i>Leptopsammia pruvoti</i> - Sunset Cup Coral	x				
<i>Lithothamnion corallioides</i> - Coral Maërl	x				
<i>Lucernariopsis campanulata</i> - a stalked jellyfish		x			
<i>Lucernariopsis cruxmelitensis</i> - a stalked jellyfish		x			
<i>Nematostella vectensis</i> - Starlet sea anemone	x				
<i>Ostrea edulis</i> - Native Oyster	x				
<i>Padina pavonica</i> - Peacock's tail (a seaweed)	x				
<i>Palinurus elephas</i> - Crayfish			x		
<i>Paludinella littorina</i> - Sea snail		x			
<i>Phymatolithon calcareum</i> - Common Maërl	x				
<i>Pollicipes pollicipes</i> - Gooseneck Barnacle	x				
<i>Tenellia adspersa</i> - Lagoon sea slug					x
<i>Victorella pavida</i> - Trembling sea mat (a bryozoan)					x

Table 4: Highly mobile species of conservation importance

The table lists the three highly mobile fish species that are included in the range of species FOCI that should be protected by MPAs. This list does not reflect the occurrence of these species within the Net Gain project area.

As outlined in the text, appropriate spawning, nursery and foraging habitats for these species should, where they are present, be protected within the Net Gain project area.

Species

<i>Osmerus eperlanus</i> – Smelt
<i>Anguilla anguilla</i> - European eel
<i>Raja undulata</i> - Undulate ray

Table 5: Coastal Geological Conservation Review (GCR) sites within the Net Gain project area that have a significant intertidal or subtidal portion not currently protected by existing SSSIs

GCR Name	Related SSSIs	Site type
Benacre Ness	Pakefield to Easton Bavents	Coastal geomorphology
Gibraltar Point	Gibraltar Point	Coastal geomorphology
Goswick / Holy Island / Bude Bay	Bamburgh coast and hills	Coastal geomorphology
	Lindisfarne	
	Hunstanton Cliffs	
North Norfolk Coast	Weybourne Cliffs	Coastal geomorphology
	North Norfolk Coast	Coastal geomorphology
	Morston Cliff	Coastal geomorphology
Orfordness	Alder - Ore Estuary	Coastal geomorphology
Spurn Head	Humber flats and marshes: (a) Spurn Head to Saltened Flats	Coastal geomorphology
Trimmingham Cliffs	Sidestrand and Trimmingham Cliffs	Mass movement
Winterton Ness	Winterton to Horsey Dunes	Coastal geomorphology

Table 6: Geological and geomorphological features of importance within the Net Gain project area

Feature name	Type of feature
West Runton submerged forest	Features indicating past change in relative sea level
North Sea glacial tunnel valleys	Glacial process features

Diagrams A-F: guidance for drawing boundaries around MCZs

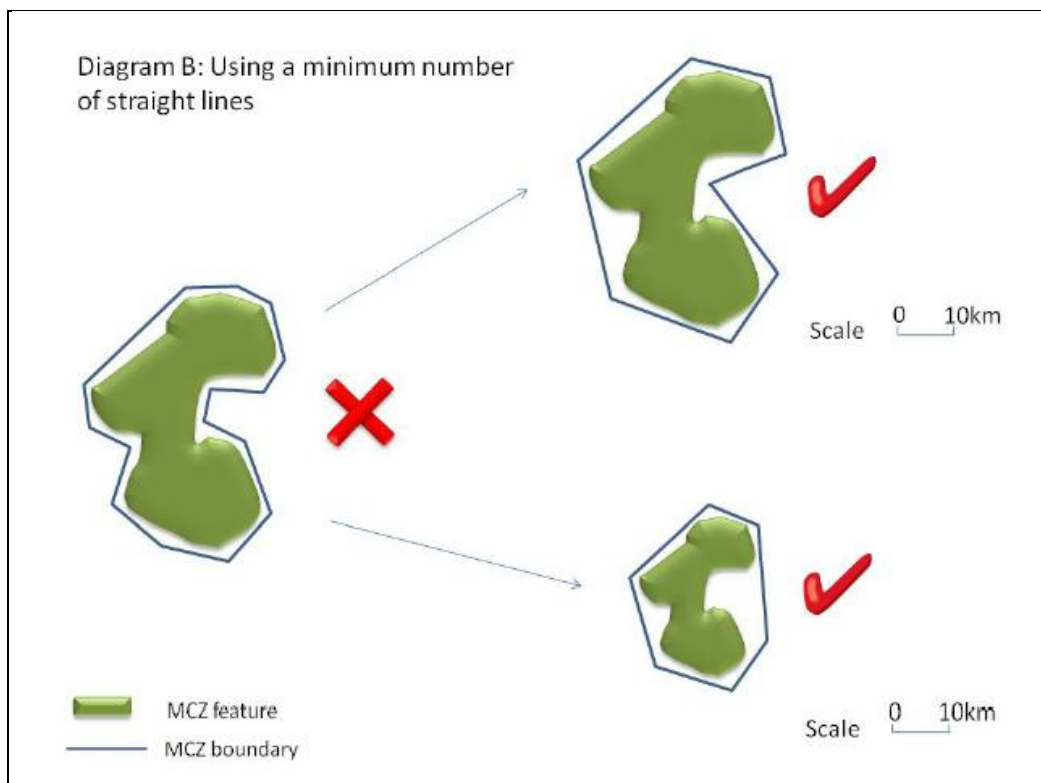
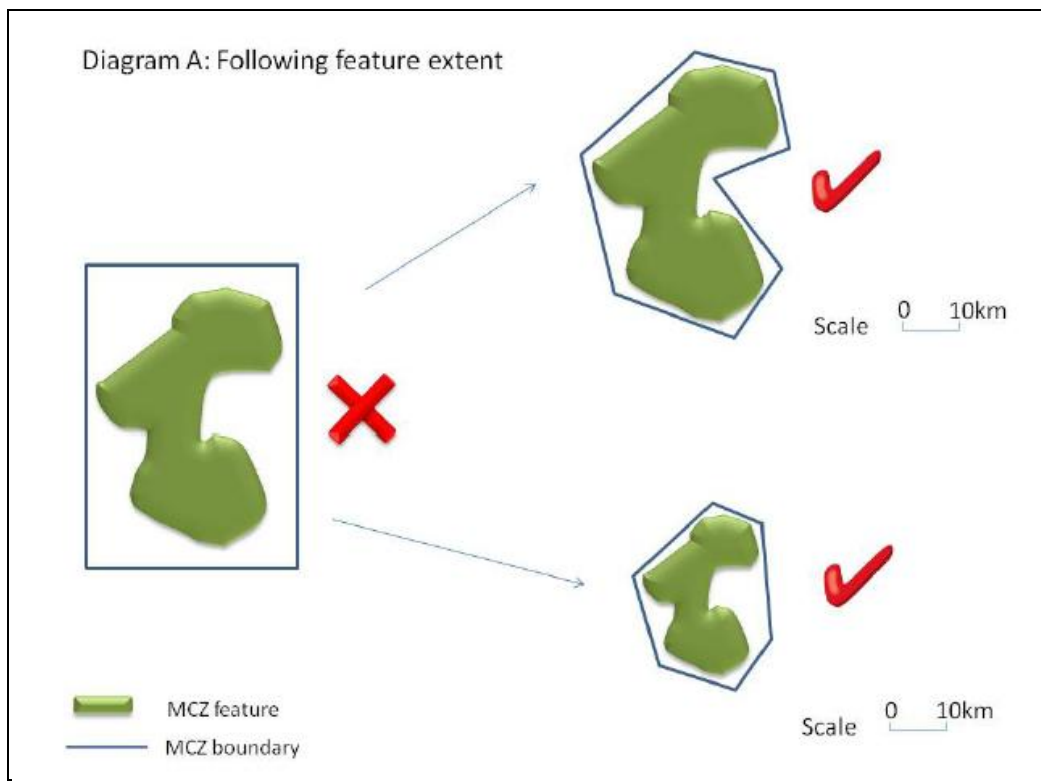


Diagram C: Ensuring a compact site shape

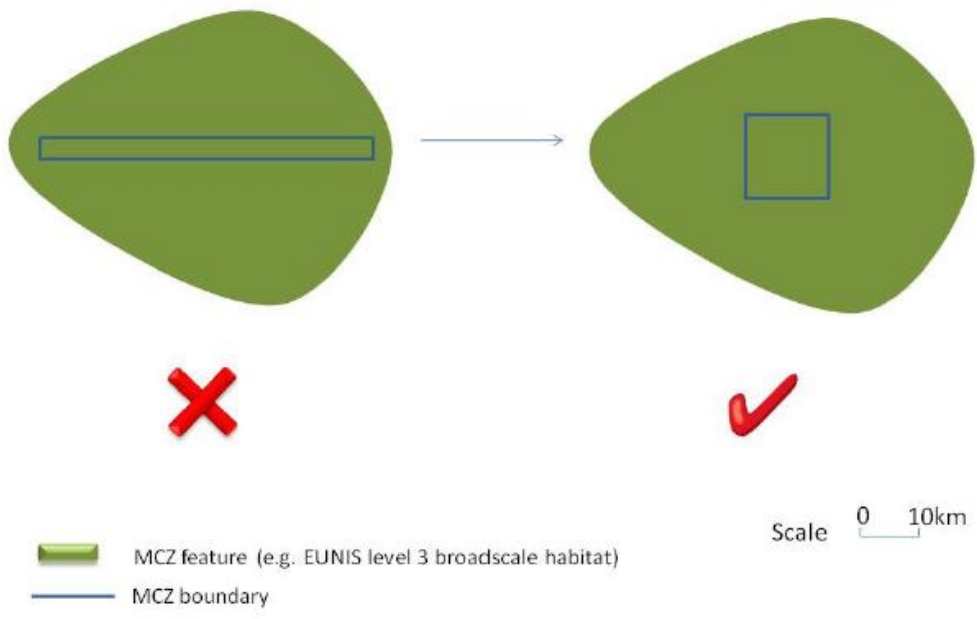


Diagram D: Including all discrete occurrences of a feature within site boundary

Option 1: MCZ with a single boundary

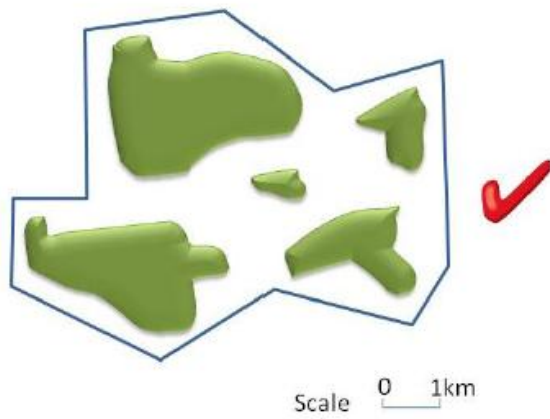


Diagram E: Including all discrete occurrences of a feature within site boundaries
Option 2: Composite MCZ

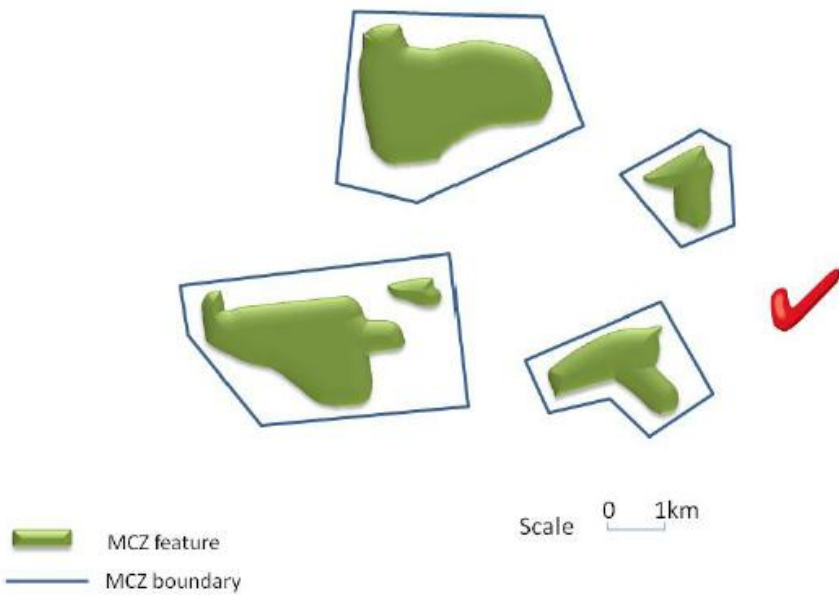


Diagram F: Incorporating a margin to ensure protection of features

