Cyfoeth Naturiol Cymru
Natural Resources Wales

National Seascape Assessment for Wales

LUC

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We work to support Wales' economy by enabling the sustainable use of natural resources to support jobs and enterprise. We help businesses and developers to understand and consider environmental limits when they make important decisions.

We work to maintain and improve the quality of the environment for everyone and we work towards making the environment and our natural resources more resilient to climate change and other pressures.

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- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
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Mae'r gwaith hwn yn darparu sail strategol o dystiolaeth ar gyfer morweddau, ac fe'i comisiynwyd gan Gyfoeth Naturiol Cymru ar ran Llywodraeth Cymru er mwyn bwydo i Gynllun Morol Cenedlaethol Cymru. Y canlyniad yw dynodi a disgrifio 29 o Ardaloedd Cymeriad Morol Cenedlaethol i Gymru, ynghyd â mapiau adnodd gweledol ar wahân i gyd-fynd â nhw. Paratowyd yr Ardaloedd Cymeriad Morol i'w defnyddio wrth ddatblygu'r cynllun morol drafft ac i roi cyfle a ffocws i drafodaeth gyhoeddus am yr ardaloedd hyn a'u hunaniaeth.

Mae ein hymagwedd tuag at ddynodi Ardaloedd Cymeriad Morol Cenedlaethol i Gymru yn gyson â'r hyn a ddatblygwyd yn Lloegr gan y Sefydliad Rheoli Morol i fwydo i'r drefn o gynllunio morol, a thrwy hynny hwyluso cysondeb a chynllunio traws-ffiniol. Mae'r cysyniad o gymeriad morwedd yn estyniad o gysyniad arall sydd wedi sefydlu ei hun bellach, o adnabod tirweddau yn ôl eu cymeriad fel “ardaloedd sydd – yn ôl dirnadaeth pobl – yn ffurfio cymeriad o ganlyniad i weithredu a chydweithredu gan natur a/neu ffactorau dynol” (Confensiwn Tirweddau Ewropeaidd, 2000).

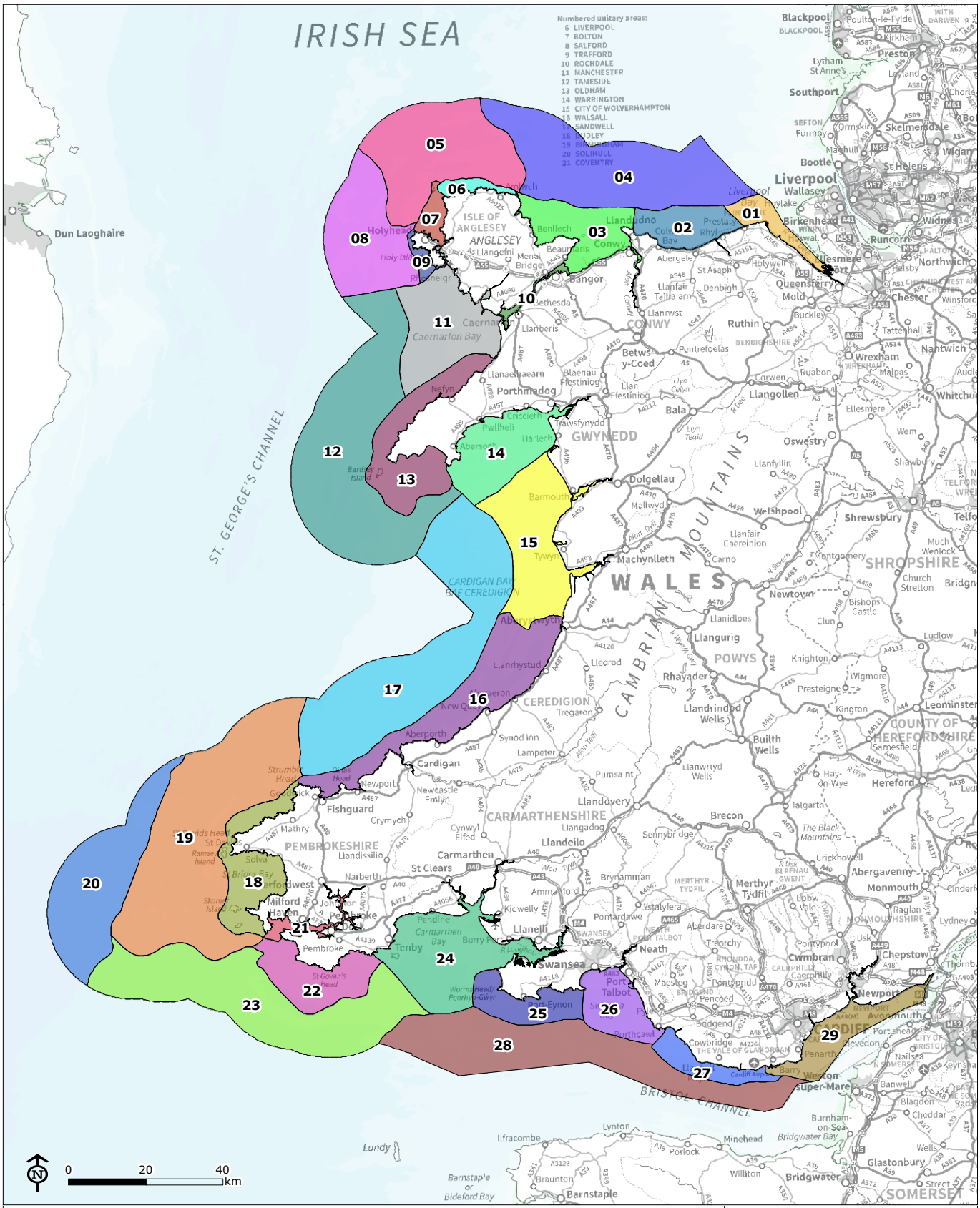
Mae ein hymagwedd tuag at fapiau adnodd gweledol yn cydnabod mor bwysig yw hi i ddeall y ffyrdd o weld morweddau, yn unol â Datganiad Polisi Morol y DU, sy'n cyfeirio at forweddau fel “tirweddau sydd â golygfeydd o'r arfordir a'r môr, a'r arfordir a'r amgylchedd morol cyfagos a chanddynt gysylltiadau diwylliannol, hanesyddol ac archaeolegol â'i gilydd”. Eto, er mwyn hwyluso cysondeb ac ystyriaethau traws-ffiniol, dilynwyd yr un dull o fapio adnodd gweledol yng Nghymru â'r un a weithredwyd yn Lloegr.

Mae asesiadau cymeriad yn cynnwys gwaith wrth y ddesg a gwaith archwilio yn y maes, ac maen nhw'n ystyried amrywiaeth a chyfuniadau o ddylanwadau naturiol, diwylliannol a chanfyddiadol sy'n gwahaniaethu ac yn nodweddu un lle oddi wrth un arall. 'Bro' yw'r enw am y cysyniad hwn ar y tir yng Nghymru. Felly, mae Ardaloedd Cymeriad Morol yn cynnig fframwaith gofodol integredig sydd wedi'i seilio ar le i fwydo i'r dull ymarferol o weithredu'r cynllun morol, a hynny fel rhan o'r dull sy'n seiliedig ar ecosystemau. Mae ein gwaith ni'n dilyn cyfarwyddyd a gyhoeddwyd gan Natural England, *An approach to seascape character assessment* (NECR105), sy'n cydnabod y cysylltiadau rhwng tir a môr a dylanwadau a ddaw o uwchben arwyneb y môr ac oddi tano.

Mae ein hastudiaeth yn cwmpasu pob rhan o ddyfroedd glannau Cymru (rhwng y marc penllanw a 12 milltir forol allan i'r môr), h.y. canolbwynt y rhyngweithiadau rhwng tir a môr. Mae ein Hardaloedd Cymeriad Morol Cenedlaethol yn cyd-fynd â'r Ardaloedd Cymeriad Tirweddol Cenedlaethol sy'n bodoli eisoes, sy'n ymestyn i farc y distyll fel bod modd asesu cymeriad yn ddi-dor rhwng tir a môr.

Bydd yr Ardaloedd Cymeriad Morol yn cynnig cyd-destun gofodol cenedlaethol er mwyn ystyried morweddau wrth gynllunio'n strategol a chreu polisïau. Byddant yn cynnig cyd-destun ar gyfer cynnal asesiadau ar raddfa leol lle mae angen rhagor o fanylder er mwyn bwydo i'r broses o wneud penderfyniadau yn lleol ar ddatblygiadau, gweithgareddau, ac asesiadau effaith amgylcheddol unigol. Mae'r cwmpas daearyddol lleol hyd yn hyn yn cynnwys Sir Benfro, Ynys Môn, a rhannau o Wynedd. Mae asesiadau lleol yn cynnwys adrannau ar rymoedd newid, gwasanaethau diwylliannol ecosystemaidd, a sensitifrwydd cynhenid. Disgwylir y bydd rhagor o waith lleol yn digwydd pan fydd yr adnoddau'n galluogi hynny.

Mae hwn yn waith newydd ar gyfer system newydd o gynllunio morol yng Nghymru, a dynodi a disgrifio Ardaloedd Cymeriad Morol Cenedlaethol yw'r cam cyntaf tuag at gywain tystiolaeth strategol i fwydo i'r system newydd hon. Bydd yr ardaloedd cymeriad yn cael eu hadolygu a'u diwygio, os oes angen, yng ngoleuni'r adborth a ddaw o ymgynghoriad y cynllun morol drafft.



- 01: Aber Dyfrdwy (Cymru)
- 02: Gwastadeddau Bae Colwyn a'r Rhyl
- 03: Bae Conwy a Thraeth Coch
- 04: Dyfroedd Agored Gogledd Cymru
- 05: Dyfroedd Alltraeth Gogledd-orllewin Môn
- 06: Dyfroedd Glannau Gogledd Môn
- 07: Bae Caergybi ac Ynysoedd y Moelrhoniaid
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- 21: Aberdaugleddau
- 22: Dyfroedd Alltraeth a Glannau De Sir Benfro
- 23: Dyfroedd Agored De Sir Benfro
- 24: Bae Caerfyrddin a'i Aberoedd
- 25: Dyfroedd Arfordirol Gŵyr a Helwick
- 26: Bae Abertawe a Phorth-cawl
- 27: Traeth yr As a Dyfroedd Glannau Morgannwg
- 28: Môr Hafren (Cymru)
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Map Scale @ A4: 1:1,400,000

Wales National Seascape Assessment

Ardaloedd Cymeriad Morol (ACM)

Source: LUC

LUC

Cyfoeth Naturiol Cymru / Natural Resources Wales

Executive Summary

This work provides a strategic evidence base for seascapes and was commissioned by Natural Resources Wales on behalf of Welsh Government to inform the Welsh National Marine Plan. The result is the identification and description of 29 National Marine Character Areas (MCAs) for Wales, together with separate but complimentary Visual Resource Mapping. The MCAs were prepared for use in developing the draft marine plan and to provide opportunity and focus for public discussion about these areas and their identity.

Our approach for identifying National Marine Character Areas for Wales is consistent with that developed in England by the Marine Management Organisation (MMO) to inform marine planning, thereby aiding consistency and cross-border planning. The concept of seascape character is an extension of the already established concept for recognising landscapes through their character, as “areas, as perceived by people, whose character results from the action and interaction of natural and/or human factors” (European Landscape Convention, 2000).

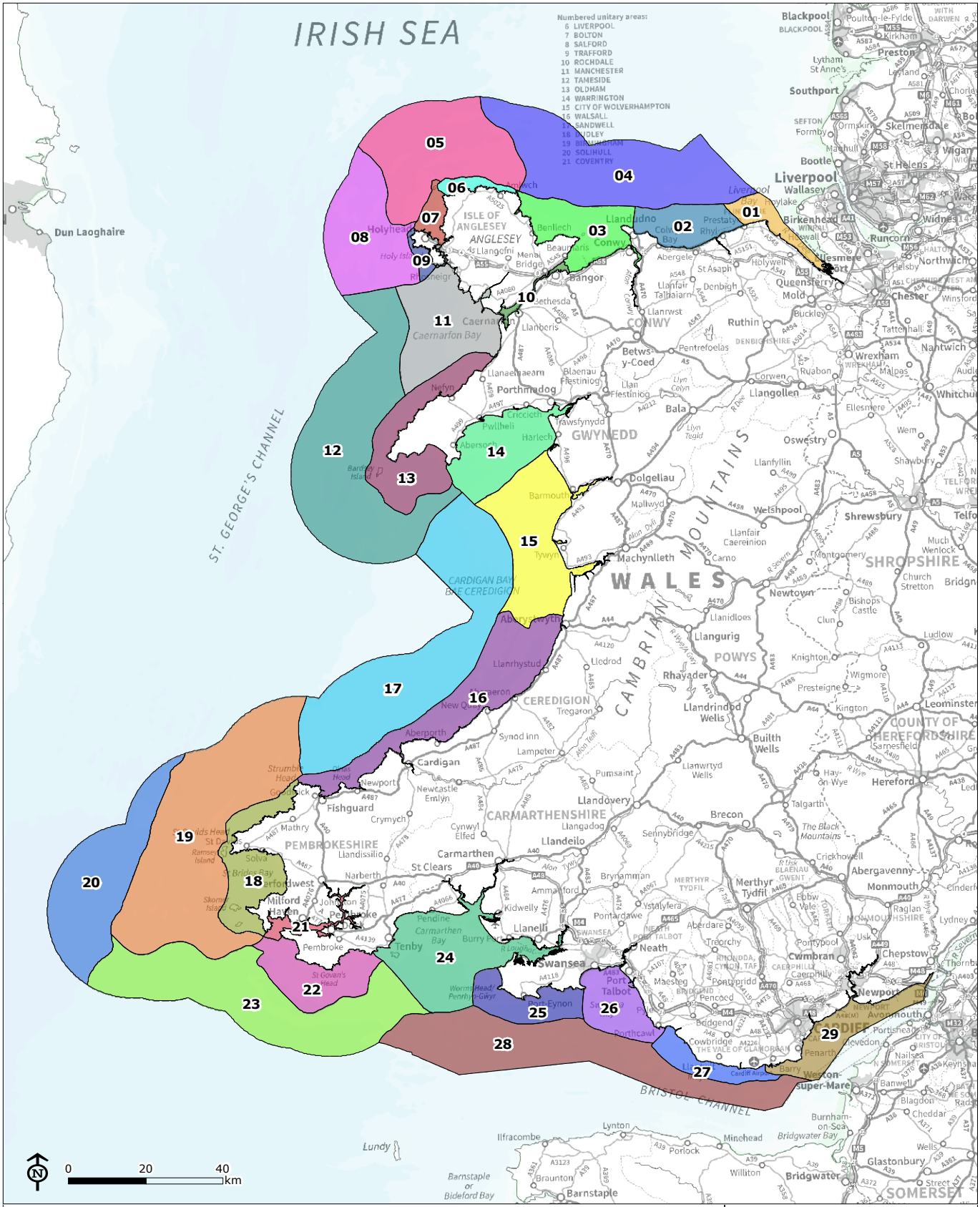
Our approach to Visual Resource Mapping recognises the importance of understanding how seascapes can be seen, in line with the UK Marine Policy Statement, which refers to seascapes as “landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other”. Again, to aid consistency and cross-border considerations, the same Visual Resource Mapping method was followed in Wales as has been applied in England.

Character assessment involves desk-based stages and field verification, considering the variety and combination of natural, cultural and perceptual influences that make one place distinct and recognisable from another. In Wales on land we know this as the concept of ‘*bro*’. Marine Character Areas therefore provide an integrated place-based spatial framework to inform the practical implementation of the marine plan, as part of the ecosystem approach. Our work follows Natural England’s published guidance “An approach to seascape character assessment” (NECR105), which recognises both links between land and sea and influences from above and below the sea surface.

Our study covers all parts of Welsh inshore waters (between the high water mark and 12 nautical miles out to sea), i.e. the area where land-sea interactions are focussed. Our National Marine Character Areas are complimented by our existing National Landscape Character Areas, which extend to the low water mark to provide seamless character assessment coverage between land and sea.

The Marine Character Areas will provide a national spatial context for considering seascapes in strategic plan and policy-making situations. They will provide context for nesting local scale assessments where more detail is needed to inform local decision-making for individual developments, activities and environmental impact assessments. Local coverage to date includes Pembrokeshire, Anglesey and parts of Gwynedd. Local assessments include sections on forces for change, ecosystem cultural services and inherent sensitivities. Further local work is anticipated as resources enable.

This is new work for a new marine planning system for Wales and the identification and description of National Marine Character Areas represents a first tranche of strategic evidence to inform that new system. The character areas will be reviewed and amended if necessary in light of feedback from the draft marine plan consultation.



- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
- 03: Red Wharf and Conwy Bays
- 04: North Wales Open Waters
- 05: North-West Anglesey Open Waters
- 06: North Anglesey Coastal Waters
- 07: Holyhead Bay and The Skerries
- 08: West Anglesey Open Waters
- 09: Holy Island West and Penrhos Bay
- 10: Menai Strait
- 11: Caernarfon Bay
- 12: Llŷn and South West Anglesey Open Waters
- 13: Llŷn and Bardsey Island
- 14: Tremadog Bay and Dwyryd Estuary
- 15: Cardigan Bay (north) and Estuaries
- 16: Cardigan Bay (south)
- 17: Outer Cardigan Bay
- 18: West Pembrokeshire Coastal Waters and Islands
- 19: West Pembrokeshire Islands, Bars and Inshore Waters
- 20: Irish Sea Open Waters
- 21: Milford Haven
- 22: South Pembrokeshire Coastal and Inshore Waters
- 23: South Pembrokeshire Open Waters
- 24: Carmarthen Bay and Estuaries
- 25: Gower and Helwick Coastal Waters
- 26: Swansea Bay and Porthcawl
- 27: Glamorgan Coastal Waters and Nash Sands
- 28: Bristol Channel (Wales)
- 29: Severn Estuary (Wales)

Wales National Seascape Assessment

National Marine Character Areas for Wales

Source: LUC

Map Scale @ A4: 1:1,400,000

1 Introduction

1.1 Background to the National Seascape Assessment for Wales

Welsh Government (WG) and Natural Resources Wales (NRW) commissioned LUC in October 2014 to undertake a Seascape Assessment for the Welsh Inshore Waters. The Inshore Waters extend 12 nautical miles from the High Water Mark, shown in Figure 1.1.

The National Seascape Assessment comprises two complementary and linked elements: a **marine character assessment**; and a **visual resource mapping (VRM)** element. The information produced by this assessment work will provide an important evidence base to inform the development of the Wales National Marine Plan. The evidence will also help integrate the Marine Plan with the land use planning system, as well as the plans and processes outlined in the Planning (Wales) Bill and the Area Based Approach to natural resource management in the forthcoming Environment Bill.

As marine planning develops and the national plan is implemented, the spatial framework and information provided by this work will be used to understand local opportunities to support blue growth and the transition to a low carbon economy.

The National Seascape Assessment for Wales complements similar studies undertaken elsewhere in the UK and builds upon existing local seascape character assessment studies already completed for coastal and marine areas off Pembrokeshire, Anglesey and parts of Gwynedd.

1.2 Policy context

Planning for the use of the marine area at the scale of Wales requires a strategic understanding of the distribution and interaction of marine natural resources, the way that people perceive them and the changes that may result from ongoing and changing use.

The **European Landscape Convention (ELC)**, to which the UK has been has been a signatory since 2006, forms the context for our understanding and working with landscapes and seascapes. The ELC is *"concerned to achieve sustainable development based on a balanced and harmonious relationship between social needs, economic activity and the environment",* noting that:

- landscape plays an important public interest role
- it contributes to human well-being and identity
- all landscapes [including seascapes] matter
- landscapes and seascapes are dynamic and evolve over time
- they are shaped by both nature and people and therefore involve everyone.

The **UK Marine Policy Statement (MPS)** (2011, HM Government, Northern Ireland Executive, Scottish Government, Welsh Assembly Government) provides the current policy framework for the preparation of marine plans in accordance with the powers and requirements set out in the Marine and Coastal Access Act (2009). The MPS sets out that marine planning will:

- Promote sustainable economic development
- Enable the UK's move towards a low-carbon economy, in order to mitigate the causes of climate change and ocean acidification and adapt to their effects

Wales National Seascape Assessment

Figure 1.1: Study Area for the National Seascape Assessment

Wales Inshore Marine Plan Area

Map Scale @ A3: 1:1,000,000

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Source: LUC, NRW, OceanWise

- Ensure a sustainable marine environment which promotes healthy, functioning marine ecosystems and protects marine habitats, species and our heritage assets
- Contribute to the societal benefits of the marine area, including the sustainable use of marine resources to address local social and economic issues.

Marine Plans for Welsh inshore and offshore waters will be prepared in accordance with the MPS.

1.3 Main study outputs

The main outputs of the national Seascape Assessment are threefold:

- A map and individual descriptions for 29 Marine Character Areas (MCAs) identified for Wales, representing areas of distinct character at a broad strategic scale.
- Visual resource mapping (VRM) showing key patterns of inter-visibility between Wales' Inshore Waters and the adjacent coast – presented at both the national and MCA scale.
- Draft outline areas to form a starting point when undertaking future local Seascape Character Assessment work in Wales, the aim being to achieve full coverage of character information at the local scale (Appendix 1).
- The results of initial exploration into the potential for developing a national Marine Character Typology for Wales (Appendix 2).

2 Key definitions and conceptual background

2.1 Key definitions

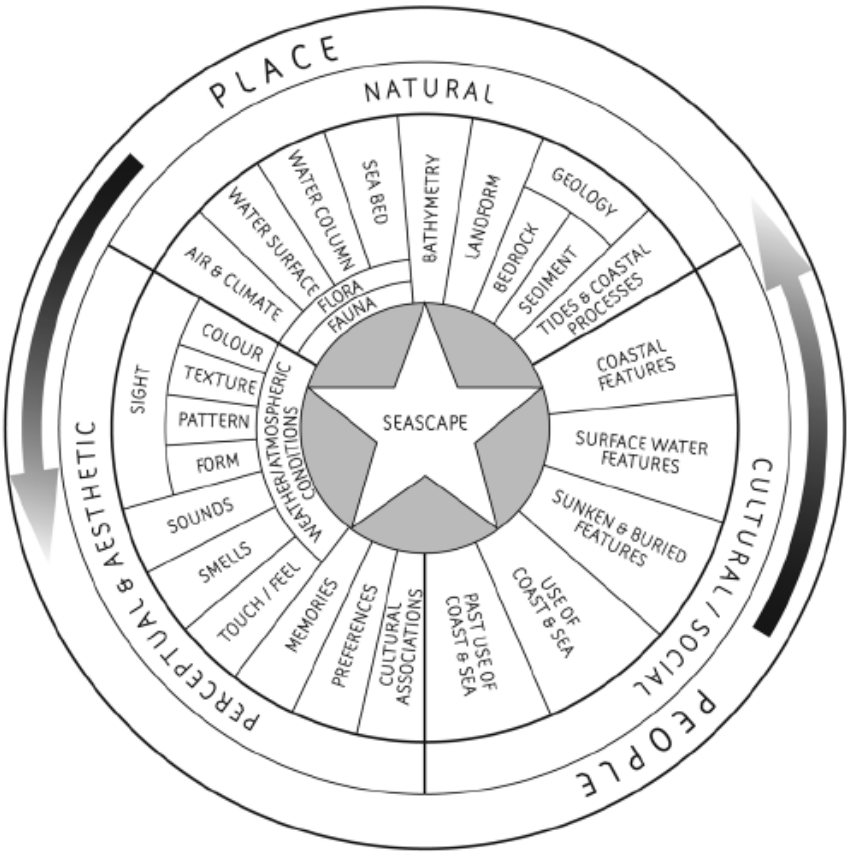
2.1.1 'Seascape'

The MPS states the ELC definition of landscape (which includes marine areas) as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*". It adds that in the context of the UK Marine Policy Statement, "*references to seascape should be taken as meaning landscapes with views of the coast or seas, and coasts and* the *adjacent marine environment with cultural, historical and archaeological links with each other*."

The character assessment and VRM elements of this study have been guided by the Marine Policy Statement's umbrella definition of 'seascape'. Although the geographical scope of the national study (Figure 1.1) does not extend inland beyond the High Water Mark, understanding the complex relationships with the adjacent coastline has played a fundamental part in both elements of the project.

The various interactions between 'people' and 'place' which combine to influence character are depicted in the 'seascape wheel' (Natural England, 2012) shown in Figure 2.1. The structure provided by the wheel has provided a helpful framework for the character assessment, both in terms of organising and presenting the information that has informed and been generated from the work, and ensuring that complex relationships between different influences are acknowledged.

Figure 2.1: The Seascape Wheel (Natural England, 2012)



2.1.2 Marine Character Areas (MCAs)

The 29 Marine Character Areas (MCAs) identified for Wales are mapped at Figure 5.1 in Chapter 5 and a descriptive profile is available for each. . A definition for MCAs for the purposes of this study is included in the box below. The use of the word 'marine', rather than 'seascape', reflects the definition of spatial units offshore beyond the mean high water mark to cover the marine area. It also responds to the MPS definition for 'seascape'; the MCAs are defined by their character, not their visual attributes (although it is recognised that visual aspects contribute to character). The visual element of this Seascape Assessment is dealt with specifically by the VRM element of this study.

Definition of Marine Character Areas (adapted from Natural England, 2012)

Each MCA has its own individual character and identity, even though it can share the same generic characteristics as other areas. The use of MCAs provides a good framework within which to draw out patterns of local distinctiveness and those factors influencing sense of place. They can be used to develop more tailored policies or strategies, reflecting the things that make a particular area different, distinctive or special. Character areas may also be more recognisable and identifiable for non-specialists (than 'character types').

It is important to note that MCAs are not a designation and do not provide a ranking of some areas being more valued or special than others. Instead the MCAs convey the fact that all parts of Wales' inshore waters have character and all areas matter in planning terms. Boundary lines are included for mapping purposes, but it should be understood that these only represent approximate, generalised zones of transition between one area and the next.

2.2 National guidance in seascape assessment

The method for undertaking this study has paid particular attention to 'An approach to Seascape Character Assessment' developed by Natural England (2012) and draws on existing best practice across the UK. In particular, it is consistent with the method applied by the Marine Management Organisation (MMO) in England to produce the strategic-scale Seascape Assessment for the South Marine Plan Areas[1]. It is the aim of both the MMO and WG to ensure that complementary marine character assessments will eventually cover the entire English and Welsh marine planning regions to facilitate effective cross-border planning between the two organisations. In Wales, it should be noted that this study has focused on the Inshore Waters as this part of the marine zone was considered to be where the main seascape related planning issues would arise. However this does not preclude further work beyond inshore waters in the future to provide complete coverage of the Welsh National Marine Plan area.

2.3 Other seascape assessment work in Wales

In Wales, this study also benefits from previous work led by NRW (previously CCW) and others which has explored how seascape assessment can play a role in informing coastal and marine planning. This includes pioneering work in 2009 to describe 50 visually-defined 'Regional Seascape Units' along the full length of the

[1] LUC (2014) *Seascape Assessment for the South Marine Plan Areas*. Published by the MMO.

Welsh coastline. These linear units correlate to stretches of coast and their linked visual envelopes extending out to 24 kilometres offshore. Further work led by CCW in 2012 piloted an approach to coastal and marine character assessment at a variety of scales, based on a study area in north-west Anglesey. This study included a recommended methodology for undertaking further work in Wales, developed at the local level in 2013 through published studies in Pembrokeshire, Anglesey and parts of Gwynedd.

Further details on how the existing seascape assessment information in Wales has informed the National Seascape Assessment is discussed in Chapter 3 and explored further (in terms of 'filling the gaps' at a local level) in Appendix 1.

2.4 Link to landscape character assessment work

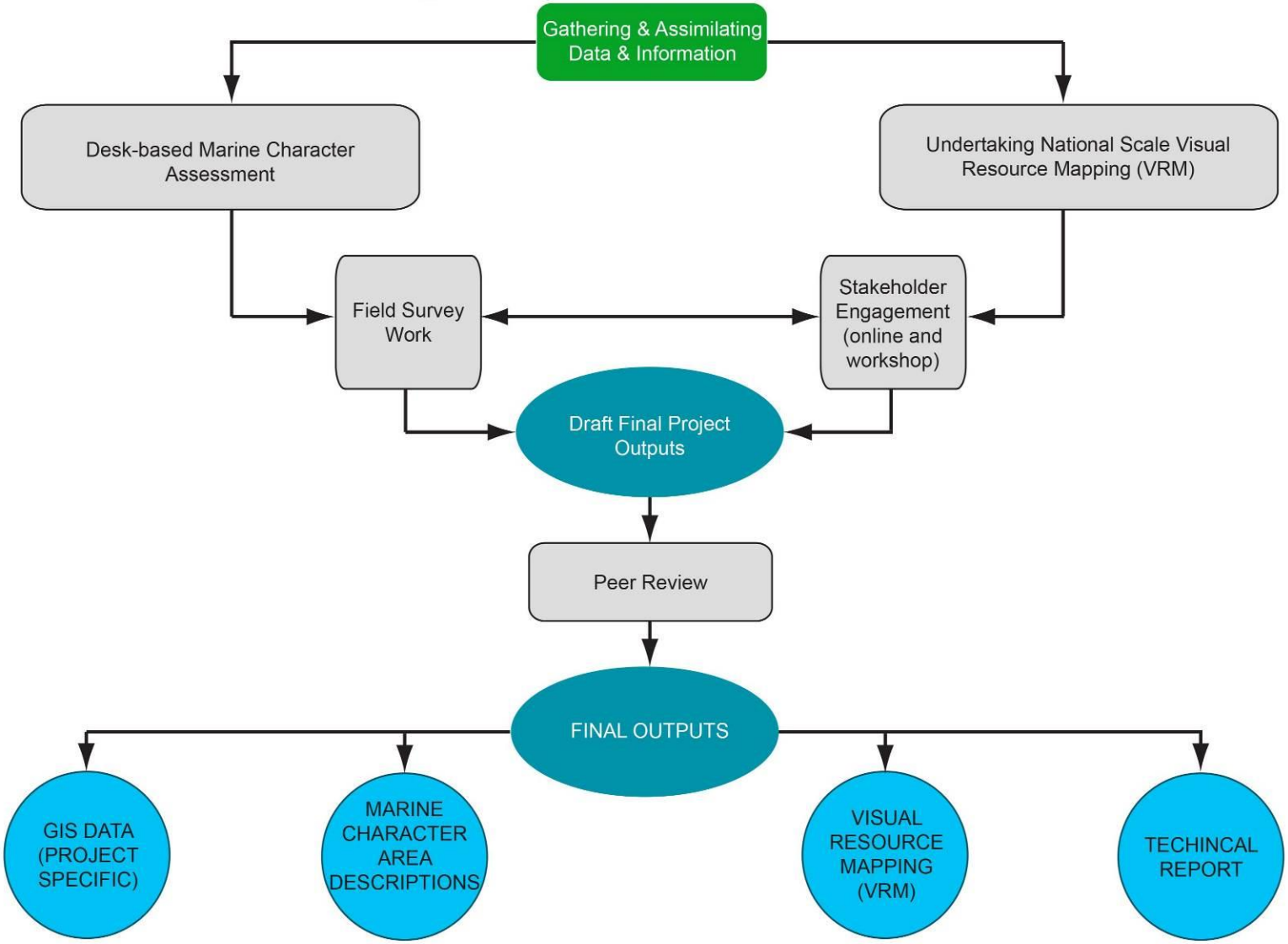
Landscape character assessment has become standard practice in terrestrial planning, whilst seascape (or marine) character assessment is a relatively new concept. Both landscape and seascape character assessment methodologies embody a consistent approach founded on common principles that promote the integration of marine and terrestrial planning. In Wales, a national framework of 48 National Landscape Character Areas has been produced by NRW and provides a terrestrial equivalent to the new 29 National Marine Character Areas identified by this study. Together, the compendium of strategic scale character information helps promote and facilitate an holistic approach to terrestrial and marine planning and management. An overview map showing the national MCAs and national LCAs together is shown at Figure 5.5 of Chapter 5.

As well as the national-scale landscape character information produced by NRW, many local authorities have their own published local landscape character assessments, which are underpinned by information from LANDMAP – Wales' national programme of landscape assessment. The country therefore has a well-developed landscape character resource at a variety of scales.

2.5 Study flowchart

A flowchart which illustrates the key steps in undertaking the National Seascape Assessment for Wales is included at Figure 2.2.

Figure 2.2: Project Flow Chart



3 Method for producing the Marine Character Assessment

3.1 Key steps in producing the national marine character assessment

This chapter outlines the key steps taken in producing the marine character assessment element of the National Seascape Assessment for Wales. A descriptive and mapped national overview of the results is provided in Chapter 5. This includes a map of the 29 Marine Character Areas (MCAs) identified for Wales at Figure 5.1.

3.2 Gathering and assimilating data and information

A first stage in the development of the project involved gathering and assimilating the range of GIS datasets available to inform the work, checking their relevance and understanding how they might best inform the character assessment. Spatial data was provided by a number of organisations, including NRW and WG, and organised in a GIS database, structured according to the key themes of the 'Seascape Wheel' (Natural, Cultural/Social and Perceptual/Aesthetic) as well as general layers such as for basemapping and administrative boundaries. Oceanwise marine raster charts and themes vector data supplied by NRW provided the backdrop onto which numerous other GIS layers (geology, bathymetry, designated sites etc) were overlain.

Particular attention was paid by LUC's GIS specialist to aligning the coordinate systems of onshore and offshore datasets to ensure a seamless transition between the marine and terrestrial data, drawing on the experience of previous studies. A screenshot of the GIS mapping is provided in Figure 3.1 below and data list included at Appendix 4.

Figure 3.1: Screenshot of the GIS database used for the marine character assessment

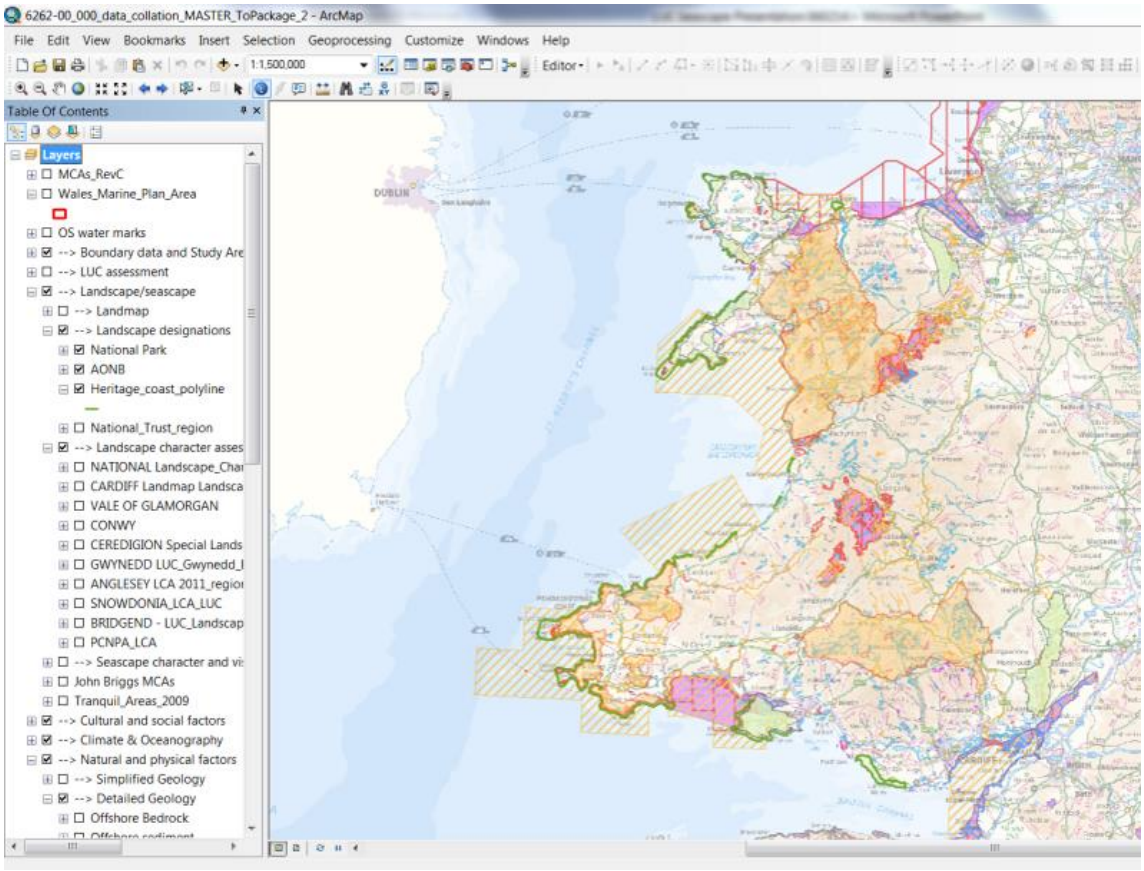
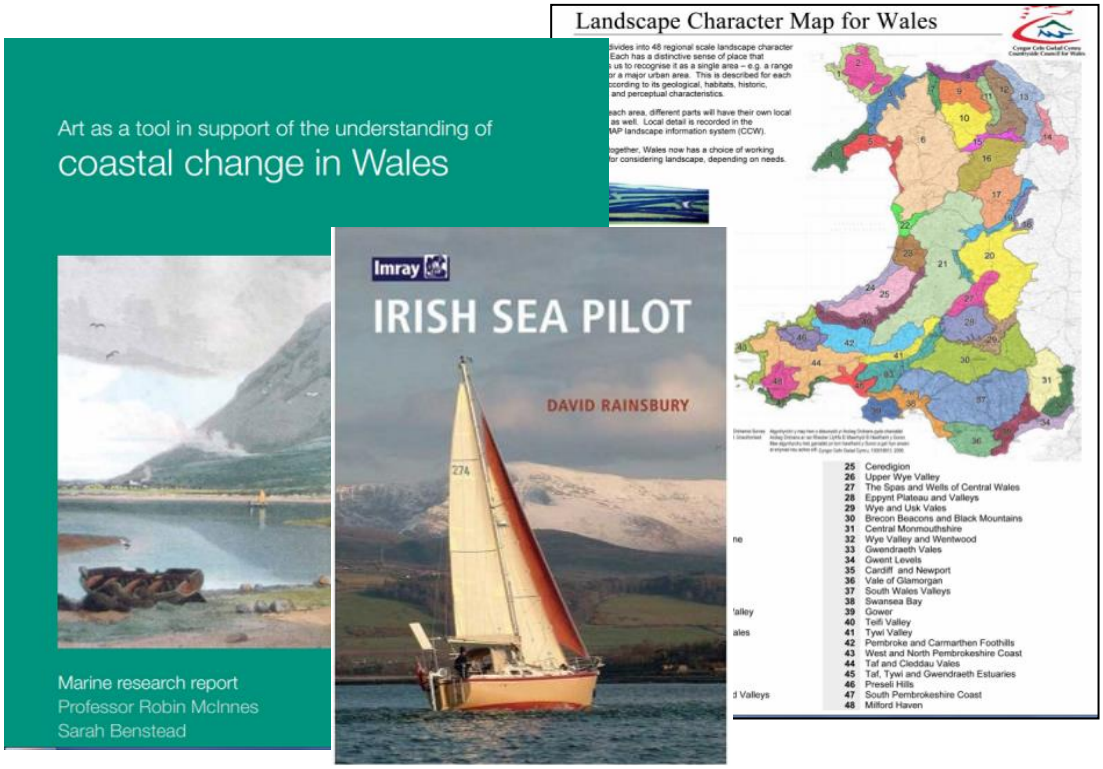


Figure 3.2: Examples of published literature used to inform the marine character assessment



Relevant non-GIS literature and references were also collected, with examples shown at Figure 3.2 above. Of particular use in understanding sea conditions and interpretating information on marine navigation were the relevant sea pilots and cruising guides published by Imray. These were used to gain a further understanding of character from the perspective of the sea and sea users, along with an interpretation of information on sea conditions (e.g. tides and currents) and landmarks visible in views from the sea. This particularly helped in the interpretation of information marked on the marine charts available in the GIS database. A reference list is provided in Appendix 5.

3.3 Desk-based marine character assessment: draft MCA boundaries

3.3.1 Study area and cross-boundary links with England

At the outset it was important to establish the geographical limits of the study. The inland extent of all MCAs with an adjacent coastline always follows the High Water Mark, with all MCAs forming the edge of the study area following the 12 nautical mile limit – collectively representing the full extent of the Welsh Inshore Waters. The parts of the study area that are on the boundary with English Inshore Waters – specifically Marine Plan Areas 8 (SW Inshore) and 10 (NW Inshore) – have been considered in this wider context. At the same time as this contract was running, LUC had been working with the MMO to draft MCAs for the two adjoining English Marine Plan Areas, allowing consideration of how the assessments link together spatially. The separate MCA descriptions for those Welsh MCAs affected (01, 04, 28 and 29) include individual maps showing the relationship with the areas within the adjacent English Inshore Waters.

3.3.2 Overall summary of the boundary drafting process

Aspects of key relevance to character at a strategic level were identified in GIS through interrogating the various spatial layers of information held for the project. A

tabular record was kept of decisions made in relation to the MCA boundaries (including reference to any specific data sources used to inform them). This information is summarised at the start of the individual MCA description documents under the 'Location and boundaries' section.

Because the strength and influence of different aspects relevant to character varies from area to area, there is no set 'rule of thumb' that can generalise the boundary drawing process for all MCAs. For example, human activities such as the offshore wind farms, oil/gas fields and dredging are strongly associated with the character of an area such the North Wales Open Waters (MCA 4), whilst an area like Holy Island West and Penrhos Bay (MCA 9) is greatly influenced by its physical orientation and the natural forces of the sea and prevailing weather conditions. Notwithstanding this, it is important to note that all MCAs are affected to varying degrees by all strands of the Seascape Wheel (Figure 2.1), which combine to produce 'character'.

It was also of fundamental importance to ensure that the Marine Character Areas identified respond to how the different parts of the Welsh coast and Inshore Waters are recognised by people. These often less tangible – and therefore more subjective – aspects of character, key to understanding sense of place (or 'broydd'), were given strong consideration in the process. Making the areas and their names recognisable at a national level also assists in furthering the relevance of this work to a range of audiences and end uses.

3.3.3 Key datasets used to inform boundaries

In all cases the UK Hydrographic Office's Marine Charts and Ordnance Survey basemapping (for where the MCAs meet the coast) were used as the primary reference points to guide the boundary drawing process, which was digitised in GIS at a scale of 1:250,000. The Marine Charts depict information such as water depth (bathymetry), the presence of natural features such as sand banks, shoals, rocks and islets, areas of strong tidal streams and overfalls, human activities such as dredging, offshore developments and military practice, as well as the location of marine and coastal navigational features and obstructions such as wrecks. As such they are a key source of integrated mapped information for the sea that helps further an understanding of marine character from a navigational (sea user) perspective.

Other key datasets used to inform the boundaries, in combination with the above mapping, related to natural and physical influences on character. These included:

- Bathymetry (water depth and seabed topography)
- Bedrock geology
- Sediment geology
- Wave climate
- Marine and intertidal habitats

The reason the key datasets used for boundary drafting related to natural and physical factors is because these aspects underpin the cultural and social layers of character (as they respond to the underlying physical environment). A good example is an area of sea bed characterised by gravel and sand banks – often attracting rich marine biodiversity (potentially reflected in conservation designations), human activities such as dredging and fishing activity, along with cultural associations like a long history of ship wrecks due to their often shallow, shifting nature and hazard to

navigation. The full picture of marine character is pulled together in the key characteristics and descriptions provided in each MCA profile – discussed below.

Figures 5.1 to 5.10 in Chapter 5 show the relationships between the MCAs and the key natural/physical datasets at a national level. Two MCA examples illustrating how key data sources guided their identification are shown at Figures 3.3 and 3.4 below.

Please note that the mapped lines forming the MCA boundaries should not be interpreted as representing a sudden and immediate break in character. These lines represent broad transitions in character, taking a smooth course to reflect this.

Figure 3.3: MCA 09 showing use of information on Marine Charts (left) and wave climate (right)

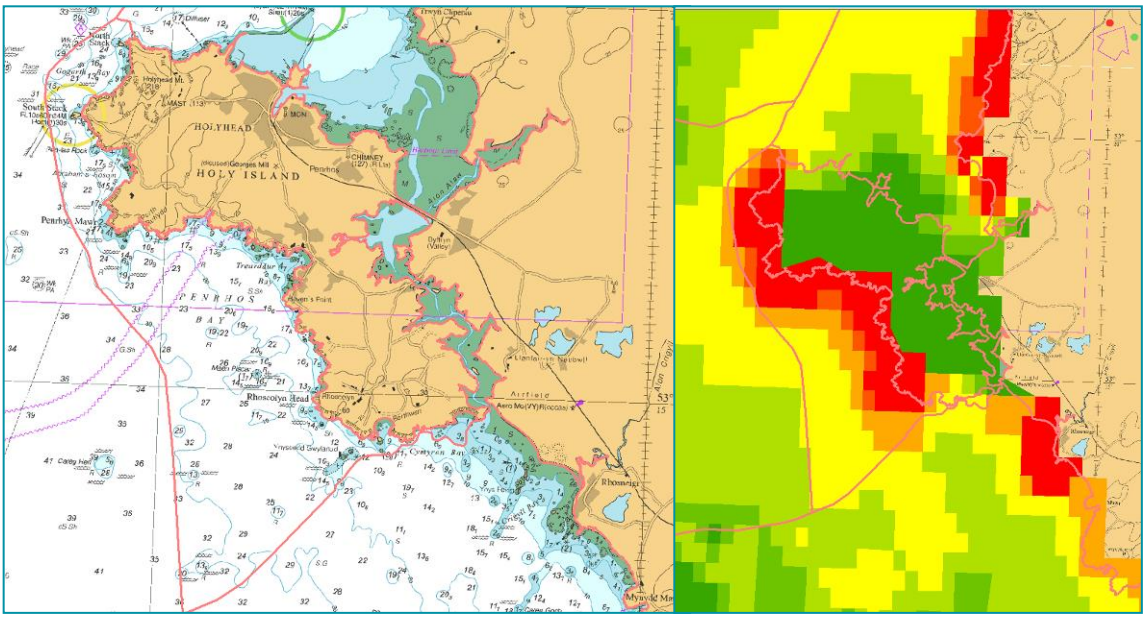
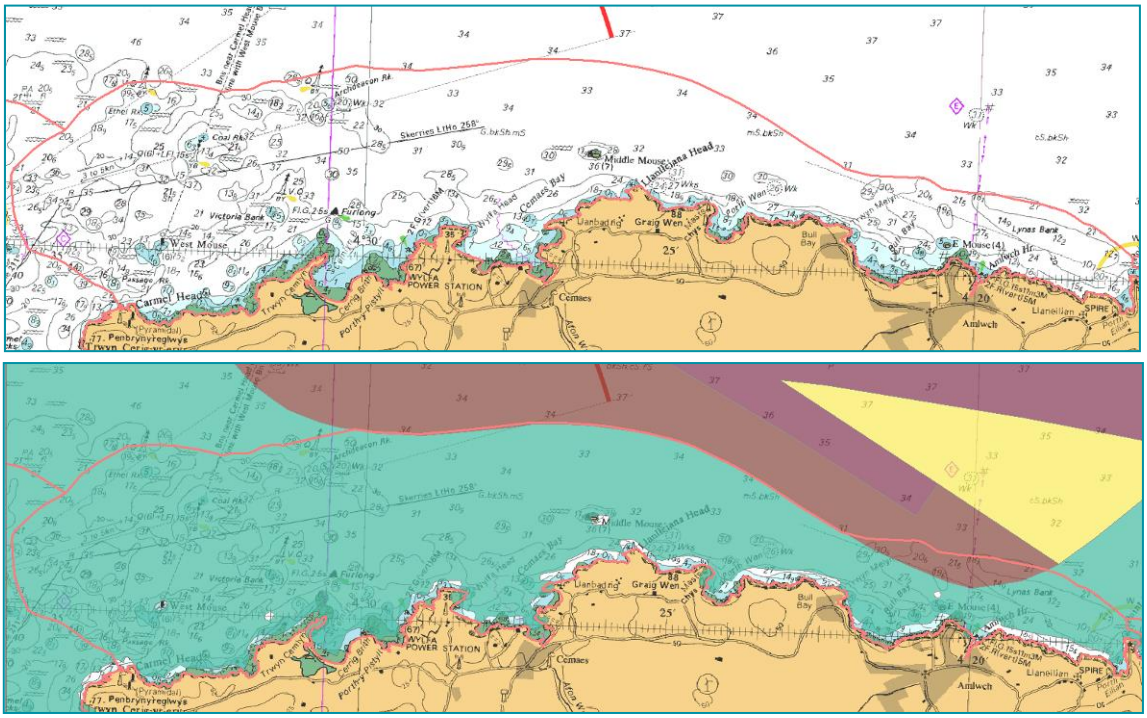


Figure 3.4: MCA 06 showing use of information on Marine Charts (above) and bedrock geology (below)



3.3.4 Link to local Seascape Character Areas

Around 50% of the Welsh coastline and Inshore Waters has been characterised at a local level through Seascape Character Assessments published in 2013 for Pembrokeshire, Anglesey and parts of Gwynedd. Where appropriate and consistent with the national approach, the objective was to achieve a 'nesting' of MCAs as a tier above the local-scale units. The relationships between the MCAs and the local Seascape Character Areas (which also encompass an area of coastline) are shown in Figures 3.5 and 3.6. These illustrate, for example, that some of the boundaries identified by the local studies are more intricate than the smoother MCA lines. This reflects the decision made for this study – also consistent with the national approach taken in England – to create smooth boundary lines that represent broad character transitions between MCAs. Appendix 1 provides outline thoughts on furthering the work of the published local Seascape Character Assessments to 'fill the gaps' in the Welsh classification at a local (1:50,000 or 1:25,000) scale.

3.3.5 Link to National Landscape Character Areas

NRW's National Landscape Character Areas (NLCAs) form the terrestrial equivalent to the National Marine Character Areas – both applied at a 1:250,000 scale. The relationship between the two national character assessments is shown at Figure 5.5 in Chapter 5. Where appropriate to marine character, the coastal boundaries of the MCAs seek to adjoin the NLCA boundaries as they extend towards the coast. Because of the different aims of the two studies, this was not possible to achieve across the entire length of the Welsh coast. One such example is Anglesey. From a landward perspective, the whole of the isle's coast is defined at the national level as one NLCA – 1: Anglesey Coast. From the perspective of the sea, however, variations in character merit the further sub-division of its surrounding waters into a larger number of MCAs.

3.4 Desk-based marine character assessment: draft key characteristics

The GIS data held by the project along with a selection of key written information sources were interrogated at this early stage to help inform the compilation of draft key characteristics. This included existing local and regional Seascape Character Assessments, NRW's national Landscape Character Area descriptions, Imray's sea pilot and cruising guides, and the JNCC regional Coastal Directories. Please note that the full range of descriptive literature was used to inform the complete descriptive profiles compiled at later project stages.

The desk-based classification of MCAs and their draft key characteristics were shared with the Steering Group, comprising NRW, WG and the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW). Key comments received were accounted for prior to commencing the field survey verification and engagement phases under the next project tasks.

3.5 Field survey verification

A targeted exercise of field survey verification was undertaken the week commencing 26 January 2015. This was used to gather information to supplement the desk-based assessment, take photographs, view the sea conditions / experience the perceptual qualities and understand relationships between MCAs and with the surrounding coastline. Due to adverse sea conditions during the winter period of the contract, planned boat survey work could not take place, meaning a focus on coast-

Figure 3.5: Links between MCAs and Anglesey/Snowdonia local SCAs

Marine Character Areas

- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
- 03: Red Wharf and Conwy Bays
- 04: North Wales Open Waters
- 05: North-West Anglesey Open Waters
- 06: North Anglesey Coastal Waters
- 07: Holyhead Bay and The Skerries
- 08: West Anglesey Open Waters
- 09: Holy Island West and Penrhos Bay
- 10: Menai Strait
- 11: Caernarfon Bay
- 12: Llŷn and South West Anglesey Open Waters
- 13: Llŷn and Bardsey Island
- 14: Tremadog Bay and Dwyryd Estuary
- 15: Cardigan Bay (north) and Estuaries
- 16: Cardigan Bay (south)
- 17: Outer Cardigan Bay

SCAs (Snowdonia & Anglesey Seascape Character Assessment, Fiona Fyfe Associates, August 2013)

- 1. Conwy Estuary
- 2. Conwy Bay
- 3. TraethLafan
- 4. Menai Strait
- 5. Penmon
- 6. Red Wharf Bay to Moelfre
- 7. Dulas Bay
- 8. Amlwch and Cemaes
- 9. Cemlyn Bay
- 10. Carmel Head to Penrhyn
- 11. Holyhead
- 12. Inland Sea
- 13. Holyhead Mountain
- 14. Rhoscolyn
- 15. Rhosneigr
- 16. Malltraeth
- 17. Caernarfon
- 18. Abermenai
- 19. Criccieth toMochras
- 20. Porthmadog and Glaslyn Estuary
- 21. Dwyryd Estuary and MorfaHarlech
- 22. Mochrasto Fairbourne and SarnBadrig
- 23. Mawddach Estuary
- 24. Fairbourne to Tonfanau
- 25. Tywyn and Sarn-y-bwch
- 26. Borth
- 27. Dyfi Estuary
- 28. North-east of Anglesey
- 29. North of Anglesey
- 30. North-west of Anglesey
- 31. West of Anglesey
- 32. Caernafon Bay
- 33. TremadogBay
- 34. Barmouth Bay
- 35. Aberdyfi Bay
- 36. Cardigan Bay

Map Scale @ A3: 1:540,000

0 20 40 km

CB:VG EB:Goosen_V LUCLON 6262-00_025_RPT_Fig3_5_MCAs_AngleseySnowdonia 31/03/2015

Source: LUC, Fiona Fyfe Associates

Wales National Seascape Assessment

Figure 3.6: Links between MCAs and Pembrokeshire local SCAs

Marine Character Areas

- 16: Cardigan Bay (south)
- 17: Outer Cardigan Bay
- 18: West Pembrokeshire Coastal Waters and Islands
- 19: West Pembrokeshire Islands, Bars and Inshore Waters
- 20: Irish Sea Offshore
- 21: Milford Haven
- 22: South Pembrokeshire Coastal and Inshore Waters
- 23: South Pembrokeshire Open Waters
- 24: Carmarthen Bay and Estuaries
- 25: Gower and Helwick Coastal Waters
- 28: Bristol Channel (Wales)

SCAs (Pembrokeshire Seascape Character Assessment, PCNP, December 2013)

- 1: Teifi Estuary
- 2: Cardigan Island and Cemmaes Head
- 3: Pen y Afr to Pen y Bal
- 4: Newport Bay
- 5: Dinas Island
- 6: Fishguard Bay east
- 7: Fishguard and Goodwick Harbours
- 8: North open sea
- 9: Newport and Fishguard outer sand bar
- 10: Crincoed Point and Strumble Head
- 11: Strumble Head to Penbwchdy
- 12: Strumble Head deep water
- 13: Penbwchdy to Penllechwen
- 14: Western sand and gravel bars
- 15: St Davids Head
- 16: Whitesands Bay
- 17: Ramsey Sound
- 18: Ramsey Island coastal waters
- 19: Bishops and Clerks
- 20: St Brides Bay coastal waters north
- 21: St Brides Bay coastal waters east
- 22: St Brides Bay coastal waters south - Borough Head
- 23: St Brides Bay south coastal waters - The Nab Head
- 24: St Brides Bay
- 25: Skomer Island and Marloes Peninsula
- 26: Skokholm and Gateholm coastal waters
- 27: Grassholm and the Smalls
- 28: West open sea
- 29: Southern inshore waters
- 30: Southern offshore waters
- 31: Outer Milford Haven
- 32: Inner Milford Haven
- 33: Daugleddau
- 34: Freshwater West
- 35: Castlemartin coastal waters
- 36: Stackpole coastal waters
- 37: Freshwater East and Manorbier
- 38: Lydstep Haven coastal waters
- 39: Tenby and Caldey Island
- 40: Carmarthen Bay west
- 41: Carmarthen Bay north - Pendine Sands
- 42: Carmarthen Bay
- 43: Bristol Channel offshore
- 44: Western offshore - very deep water

Map Scale @ A3: 1:440,000

0 20 40 km

CB:VG EB:Goosen_V LUCLON 6262-00_024_RPT_Fig3_6_MCAs_Pembrokeshire 31/03/2015

Source: LUC, Pembrokeshire Coast National Park Authority.

based fieldwork. However, long periods of clear atmospheric visibility during the fieldwork week meant that opportunities to view parts of the MCAs further away from the coast were maximised.

The field survey work focused primarily on parts of the Welsh coast not already covered by the local Seascape Character Assessments, which have been subject to their own thorough field verification exercises. However, survey viewpoints were included within all areas of the coastline travelled through during the field survey week. The draft key characteristics and MCA boundaries were used as a basis for the field survey work, adding additional information. Changes to MCA boundaries as a result of the field survey exercise were considered in tandem with the views from stakeholders engaged with during the next project stage.

Figure 3.7: LUC surveyor at Newgale in January 2015 showing clear visibility (but high winds out to sea)

3.6 Stakeholder engagement

3.6.1 Online stakeholder engagement

A specific online stakeholder engagement period ran from 27 January to 16 February 2015, hosted on a publicly accessible webpage on the NRW website. The information provided included background information on the Marine Character Assessment written by NRW and WG, a map of the draft MCAs for Wales, draft key characteristics for each MCA, and a selection of contextual maps. The draft MCA boundaries were also made available on WG's Marine Planning Portal, to allow users to interrogate them against other data held on the portal.

Consultees were asked to answer the following specific questions:

- Do you feel that the MCAs identified for Wales adequately reflect key areas of distinct character at a strategic (national) scale? Do you have any comments on their names?

- Would you like to suggest any boundary amendments to the draft MCAs? Please provide reasoning for any suggested changes.
- Do the key characteristics for the Marine Character Areas provide a good overall summary of their character?
- Can you suggest additional or more relevant key characteristics?

A wide selection of individuals representing relevant public, private and third sector organisations were invited to take part in the stakeholder engagement, emailing their comments through to a specific email address set up by NRW. The NRW Project Officer compiled all comments received into a spreadsheet, organised by draft MCA for ease of reference.

A list of respondents to the online consultation is included in Appendix 3.

3.6.2 Workshop held on 6 February 2015, Aberystwyth

To supplement the online stakeholder engagement exercise, a workshop was held at Welsh Government's Aberystwyth offices on 6 February 2015. The day comprised the following:

- Introductory/contextual presentations given by NRW, WG and LUC.
- A breakout workshop session dividing the delegates into four smaller groups to discuss the draft map of MCAs and their names in the national context.
- A roving workshop session allowing delegates to contribute thoughts and ideas on key characteristics for the draft MCAs. The MCAs were split into four regional groupings (one per table), with delegates invited to visit each table or stay at the table representing the area of Wales they know best.
- A whole-group session summarising the day's discussions with an opportunity for asking questions.

A list of workshop delegates is included in Appendix 3.

3.6.3 Key messages from the stakeholder engagement exercises

The online exercise and thoughts/ideas gathered at the workshop generated a large amount of information to feed into the study. These can be summarised into the following headline subject areas:

- **MCA names and boundaries**. The exercises were particularly valuable in suggesting MCA names are recognisable to people and reflect sense of place at the national scale. Suggestions for amendments to the names were considered in the round at the draft final character assessment stage and summarised in section 3.7 below. Stakeholders also put forward useful thoughts on how the MCAs could be improved spatially, including suggested boundary changes (though none significant). These changes are also summarised at section 3.7 below.
- **Additional information on character** people felt important to consider in the MCA descriptions. Stakeholders contributed a wide range of information based on their specialist and local knowledge of the Welsh coast and seas, which was considered and verified along with further information at the draft final stage. It is important to note that the strategic scale of the study meant that professional judgement was needed to consider how detailed facts and information from all sources (including consultation) was best disseminated and presented in the national context.

- **Improved cross-reference to designated landscapes including in England**, namely National Parks, AONBs and Heritage Coasts. This information is clearly referenced in each MCA profile (including on its own contextual map) and also shown on the national maps included in Chapter 5.
- **More information included on time depth,** including reference to coastal landscapes included on the National Register of Historic Landscapes. The map at Figure 5.10 shows spatial relationships between the MCAs and the registered historic landscapes, with cross-reference also provided, where relevant, in the individual MCA profiles.
- **Higher level thoughts on the purpose of the Seascape Assessment and its future applications** for further consideration by NRW and WG. Particular comments related to the terminology of 'Marine' versus 'Seascape' character (addressed in Chapter 2), how to address MCAs which logically continue into England (discussed at para 3.3) and potential applications/further information that stakeholders would like to be considered at a future date, such as sensitivity analysis. Stakeholders were also keen to fully understand how the information from the Seascape Assessment will be used in both marine and terrestrial planning.

All comments received at the workshop and via the online exercise were compiled into one internal document by LUC to consider during the next draft final report stage.

3.7 Draft final character assessment and descriptions

Following the field survey verification and stakeholder engagement stages, the national map of MCAs was finalised (Figure 5.1 in Chapter 5), full descriptive profiles completed and a draft final technical report produced.

A summary of the key changes to the MCA boundaries and names undertaken at this stage is included below.

3.7.1 Summary of key changes to MCA boundaries

The main changes made to the draft MCA map used during the stakeholder engagement phases were:

- **MCA 01 Dee Estuary (Wales):** A separate MCA representing the Welsh part of the Dee Estuary was created as a result of stakeholder comments. Previously the Dee Estuary was included within the adjoining MCA 02. Work by the MMO to draft MCAs for the North West Inshore Waters is likely to result in the Dee Estuary being combined with its English half as well as the Mersey Estuary.
- **MCA 03: Red Wharf and Conwy Bays**: The outer (offshore) boundary more closely follows bathymetry as well as sediment geology, extending further beyond Great Orme's Head to take in associated waters.
- **MCA 07 Holyhead Bay and The Skerries:** The eastern boundary of the MCA around The Skerries was slightly amended to take in the associated waters, guided by bathymetry and sediment geology.
- **MCA 09 Holy Island West and Penrhos Bay:** The outer (offshore) boundary was slightly amended to be more closely guided by bathymetry and to ensure that the characteristically turbulent seas and submerged natural hazards within the coastal waters were included.

- **MCA 10 Menai Strait:** Previously the western approaches to the Strait, including Llanddwyn Island and the inner waters of Caernarfon Bay, were included with the main channel as a larger MCA. As a result of consultation the western MCA boundary was pulled eastwards to begin at Abermenai Point, and the area to the west more appropriately merged with MCA 11: Caernarfon Bay.
- **MCA 15 Cardigan Bay (north) and Estuaries:** The boundary with MCA 16 to the south was more closely guided by the bathymetry and marine chart information to ensure full coverage of Sarn Cynfelyn and its related shallows.
- **MCA 18 West Pembrokeshire Coastal Waters and Islands:** Previously the section from St David's Head to Strumble Head was a separate smaller MCA. Guided by consultation comments, it was agreed to merge this section into the wider MCA to the west as an appropriately scaled national unit.
- **MCA 24: Carmarthen Bay and Estuaries:** Guided by marine chart information, the south western boundary was extended further around Caldey Island to ensure related waters and submerged rocks were included, as well as the nearby shoal and shallows formed by the Offing Patches.
- **MCA 25 Gower and Helwick Coastal Waters:** The eastern MCA boundary was extended to Tutt Head to take in Bracelet Bay, the southern Mumbles coastline and the Mixon Shoal, located just off The Mumbles. This also ensures that much of the southern coastal extent of the Gower AONB backs the MCA.

In addition to the above, a further overall review of MCA boundaries informed by the Pembrokeshire and Anglesey/Gwynedd local Seascape Character Areas was undertaken to ensure they were 'smoothed' appropriately to be consistent to the approach taken for all MCAs across Wales (i.e. MCA boundaries representing gradual transitions rather than intricate boundaries suggesting sudden breaks in character).

3.7.2 Summary of key changes to MCA numbers and names

To be consistent with similar national work produced by NRW, it was agreed that the 29 MCAs be numbered anti-clockwise from north to south, starting from the Dee Estuary (MCA 1).

Table 3.1 below shows the changes made to MCA names as a result of consultation comments.

Table 3.1: Changes to MCA names following the stakeholder engagement exercises

Draft MCA name	Final MCA name
Severn Estuary and Cardiff Bay	Severn Estuary (Wales)
Nash Sands and Glamorgan Coastal Waters	Glamorgan Coastal Waters and Nash Sands
Helwick Channel and The Gower	Gower and Helwick Coastal Waters
Bristol Channel	Bristol Channel (Wales)
Western Bays and Coastal Islands	West Pembrokeshire Coastal Waters and Islands
Llŷn and South West Anglesey Offshore Waters	Llŷn and South West Anglesey Open Waters
Conwy and Red Wharf Bays	Red Wharf and Conwy Bays

Draft MCA name	Final MCA name
Rhyl Flats and Dee Estuary	*Split into two MCAs:* Dee Estuary (Wales) Colwyn Bay and Rhyl Flats
Outer Liverpool and Conwy Bays	North Wales Open Waters

3.8 Peer review

During April and May 2015 the client steering group (NRW, WG and RCAHMW) as well as Cadw examined the draft MCA profiles and passed comment back to provide a technical review of the proposed MCA profiles. The earlier stakeholder engagement work clearly benefitted the drafting process, making the peer review stage more straightforward.

3.9 Final reporting

The MCA profiles are published on the NRW website, and interactive map portals on both NRW and Welsh Government websites provide a spatial browser to link to the profiles. It is understood that most users will be online, however a number of paper copies are distributed to key libraries as set out at the start of this document.

4 Summary of the approach to the Visual Resource Mapping (VRM) undertaken for Wales

4.1 Introduction to the Visual Resource Mapping (VRM)

The aim of this element of the Seascape Assessment was provide an objective assessment of the visual resource that the sea provides within Wales. This seeks in particular to account for the definition of 'seascape', as set out in the UK Marine Policy Statement 2011, which states that *"…references to seascape should be taken as meaning landscapes with* ***views of the coast or seas, and coasts and the adjacent marine environment****…"* (emphasis added).

The approach taken to the VRM replicates the method developed by the MMO in England for the Seascape Assessment for the South Marine Plan Areas (2014). NRW and WG would like to acknowledge the assistance of the MMO in producing the national overview maps for this study shown at Figures 5.2 and 5.3 in Chapter 5. These were produced to ensure full cross-border compatibility with VRM mapping the MMO has recently rolled out across England. It is therefore important to note when interpreting the Welsh overview maps that the results are presented on a Wales plus England scale.

A technical explanation of the methodology employed to generate the VRM for Wales is included in this chapter. This is taken in summary form from Chapter 3 of the technical report produced by LUC for the Seascape Assessment of the South Marine Plan Areas (MMO, 2014). The full chapter in the MMO's report includes contextual background on development of the VRM approach which may be of additional interest to readers.

This chapter includes technical descriptions of the GIS tools and processes used in generating the VRM outputs. This is to enable an understanding of the process by GIS specialists.

4.2 Key limitations

The following key limitations should be borne in mind when interpreting the VRM outputs:

- They do not include any judgements of the quality (or 'amenity') of views or viewpoints. Similarly the location of centres of population has not been added into the model.
- The maps represent a bareground scenario, so the results will be an over-representation of views, as many could in reality be blocked by surface features (such as buildings and vegetation) not included in the model.
- The maps do not represent a particular development scenario; instead indicating key patterns of the visibility of Wales' Inshore Waters at a strategic scale.

4.3 Data and software used

Viewshed analysis was used to identify the following:

- Land with sea views
- Sea surface visibility from land

ESRI ArcMap with spatial analyst extension was used as the tool to explore intervisibility in more detail. It should be noted that other GIS software was not tested

as part of this study. A brief explanation of the viewshed tool is useful to understand what is possible and the various user defined parameters that can be selected to shape the analysis.

4.4 How does viewshed tool work?

ESRI spatial analyst's viewshed tool identifies the cells in an input raster[2] that can be seen from one or more observation points or lines. Each cell in the output raster receives a value that indicates how many observer points can be seen from each location. If you have only one observer point, each cell that can see that observer point is given a value of one. Cells that cannot see the observer point are given a value of zero.

The visibility of each cell centre is determined by comparing the altitude angle to the cell centre with the altitude angle to the local horizon. The local horizon is computed by considering the intervening terrain between the point of observation and the current cell centre. If the point lies above the local horizon, it is considered visible.

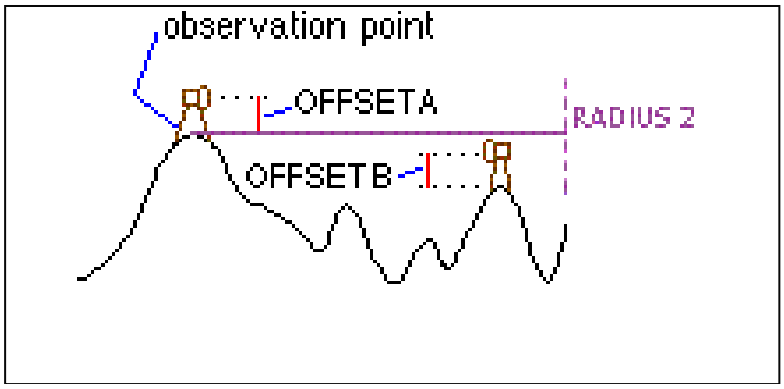
The following elements are required to run a viewshed:

- a Digital Elevation Model
- observation points (A)
- cells (locations on the DEM) to be considered for visibility (B)

There are many characteristics of the viewshed that can be controlled – the relevant ones are described below and illustrated in Figure 4.1 below:

- OFFSET A: The vertical distance in surface units (metres) to be added to the elevation of the observation points at (A).
- OFFSET B: The vertical distance in surface units (metres) to add to the elevation of each cell as it is considered for visibility (B).
- RADIUS 2: The outer radius that limits the search distance when identifying areas visible from each observation point - ultimately applying a distance limit beyond which visibility is assumed to be nil.

Figure 4.1: Parameters that can be controlled in the Viewshed Tool



The viewshed tool additionally allows for the inclusion or exclusion of earth curvature and atmospheric refraction in the calculation. For small distances, these can be

[2] A raster is a data format consisting of a grid of cells where each cell contains a value representing information. The cell size of the raster is the spatial resolution.

excluded, but it was important that these options are included in viewshed mapping at the strategic scale provided by this study.

4.5 Selection of observation points

Selection of observation points is an important consideration. Visual impact assessments will normally select viewing locations or viewpoints based on the quality or value of the view experienced from that location. In order to remain completely objective for the purposes of this study, viewers/observation points remained free of any judgement of the quality of the view, acting merely as a location from which visibility is assessed.

To this end, a grid of points both onshore and offshore has been generated at 500m intervals. On the sea surface, the grid of points extends throughout the Wales Inshore areas. On land, the grid of points extends 20km inland from the High Water Mark (including into England where relevant).

If the observation points are people (viewers), then the viewshed identifies locations on the surrounding surface where an object or objects (with an OFFSET B = the object height) can be seen by people (at specific observation points with a height of =OFFSET A). If the observation point is the object (a location with OFFSET A = height of the object), then the viewshed will identify all locations on the surrounding surface where a viewer (with OFFSET B = height of the viewer) can see the object.

4.6 Applying limits to visibility

The RADIUS 2 parameter can be applied in order to apply a theoretical limit to visibility. As discussed earlier, a horizon at a distance of 35 kilometres implies a viewer at approximately 100 metres elevation. Whilst there are locations onshore where a viewer would have an elevation above this level, their contribution to the overall visibility patterns are low and the assessment is not diminished by applying a theoretical limit on visibility of 35km. This also reduces the processing resources required significantly (from days to hours).

4.7 National mapping of land with sea views

Figure 5.2 maps areas of land in terms of their views of the sea surface. Observation points were placed on the sea surface (with an OFFSET A value of 0m), and set at an OFFSET B value of 2m. A viewshed calculation therefore identified (for every location on the DEM) where a viewer at 2m height above ground level would see the observation points (i.e. the sea surface). This generates a raster layer where the higher the value of the raster cell, the greater the number of observation points it can see and therefore, the greater the extent of sea views. Table 4.1 below sets out the parameters that have been applied to this mapping.

Table 4.1 Parameters used in generating the land with sea views national overview maps

Parameter	Value
Observation point height	0m
Height above ground level added to each cell considered for visibility	2m
Resolution of DEM and resultant output	500m
Grid spacing between observation points	500m
Theoretical limit to visibility	35km
Location of observation points	Spread across the Wales Inshore Marine Plan Area

The data has been classified into percentiles in order to highlight those areas on land that have the most extensive views of the sea surface in the marine plan areas (as shown in Figure 5.2). The darker blues indicate locations within the highest percentile of views of the sea and the yellows indicate locations that have views of the sea, but they are not very extensive relative to other locations.

4.8 National mapping of sea surface visibility from the land

Figure 5.3 maps areas of sea surface in terms of their visibility from land. Observation points were placed on land above the HWM at 500m intervals and up to 20km inland. These represent theoretical viewers with an OFFSET A value of 2m above ground level. The OFFSET B value was set to 0m, and the viewshed analysis was run. The resultant raster grid showed a count of the number of observation points on land that each grid cell in the sea can 'see'. Put another way, this means that grid cells with high values in the sea can be seen by many viewers on land and are therefore more 'visible' to viewers on land. Table 4.2 sets out the parameters that have been applied to this mapping.

Table 4.2: Parameters used in generating the sea visibility national overview maps

Parameter	Value
Observation point height	2m
Height above ground level added to each cell considered for visibility	0m
Resolution of DEM and resultant output	500m
Grid spacing between observation points	500m
Theoretical limit to visibility	35km
Location of observation points	Located above High Water Mark (HWM) up to 20km inland

The data has been classified into percentiles in order to highlight those locations on the sea surface within the marine plan area that are most visible from land. The darker reds indicate locations on the sea surface that can be seen from the most locations on land within the study area, and the darker blues indicate parts of the sea surface that are visible from the least number of locations on land within the study area.

4.9 Visual resource mapping at the Marine Character Area scale

In order to add some localised intelligence to the national maps produced by the MMO, further GIS analysis was undertaken using the spatial framework provided by the 29 Marine Character Areas, as described below. The specific mapped outputs are included at the end of each separate MCA profile.

Please note that all rocky outcrops and islands (approximately less than three square kilometres in size) that are detached from the Welsh mainland were treated as being part of the Inshore Waters for the purposes of the detailed VRM mapping. As not to misrepresent the final results, the outputs from the analysis that coincide with these very small areas of offshore land out at sea were then masked out of the final results. This is consistent with the Marine Character Assessment element of the project – which considered these offshore islands, islets and rocks as part of the MCA itself despite them lying above the High Water Mark.

4.9.1 Land with sea views mapping at the individual MCA level

Whilst the national overview maps shown at Figures 5.2 and 5.3 provide a general picture of the locations on land which have sea views, further mapping was undertaken to explore which locations on land have views of each of the Marine Character Areas. For each MCA, viewshed analysis has been undertaken to examine which locations have views of the sea surface within it.

The data has been classified into percentiles to identify where on land the most extensive views (i.e. top 20 percent) of each MCA can be found. This analysis has been undertaken at a finer resolution using a 50m DEM. It is also possible to establish the percentage of each MCA that can be seen from each location on land. The following parameters set out in Table 4.3 have been used to generate the finer grained data at the MCA level.

Table 4.3: Parameters used in generating land with sea views mapping at the MCA level

Parameter	Value
Observation point height	0m
Height above ground level added to each cell considered for visibility	2m
Resolution of DEM and resultant output	50m
Grid spacing between observation points	500m
Theoretical limit to visibility	35km
Location of observation points	Spread throughout each MCA

4.9.2 Sea surface visibility mapping at the individual MCA level

To enable more detailed sea surface visibility mapping at the MCA level, observation points on land were banded into the following distances from the High Water Mark and mapped outputs produced for each:

- 0-1km above the HWM
- 1-5km above the HWM
- 5-10km above the HWM
- 10-20km above the HWM

The resultant maps provide a better understanding of where the most extensive views of the MCA can be found on land (e.g. do viewers immediately adjacent to the coast (0-1km from the High Water Mark) have more extensive views of an MCA than those further inland (10-20km away)?).

Table 4.4: Parameters used to generate the detailed sea visibility maps

Parameter	Value
Observation point height	2m
Height above ground level added to each cell considered for visibility	0m
Resolution of DEM and resultant output	50m
Grid spacing between observation points	500m
Theoretical limit to visibility	35km
Location of observation points	Located above HWM in bands related to distance offshore (as detailed in the text above)

4.10 Application and uses of the VRM results for Wales

The VRM maps produced for Wales will form part of a suite of information used to enable decision makers to get a better understanding of the visual resource that Wales' Inshore Waters provide. **It is not appropriate for these maps to be used to assess the visual impacts of particular developments.** It would be expected that any offshore development applications be accompanied by development-specific visibility mapping. The data behind the maps is intended to be used as a GIS resource that can be interrogated and viewed alongside other GIS information layers, including those held on the Welsh Government's Marine Planning Portal.

The VRM mapping has also informed the descriptions of the Marine Character Areas in terms of the contribution that views to and from the sea make to sense of place.

5 National overview

5.1 An overview of the character of Wales' coasts and seas

Wales is a maritime nation, with the coast and marine environment having a profound influence on the identity, culture and character of Wales. The length of the coast of Wales totals 1,680 miles (2,740 km), including the islands of Anglesey and Holyhead3. 15 out of 22 local authority areas in Wales have an area of coastline, and the three most populous cities in Wales; Cardiff, Swansea and Newport, are all coastal. As a result, much of the Welsh population resides within 10km of the sea.

The coastal and marine environment contributes significantly to the prosperity and economy of Wales, including supporting 92,600 jobs and producing a total income of £6.8 billion4. The Wales Coast Path was opened in 2012, providing access to the majority of the coastline via 870 miles of footpaths. It is estimated that spending associated with visitors to the Wales Coast Path is around £33 million5.

Numerous areas of the Welsh coastline are designated for their natural beauty, including the Pembrokeshire Coast National Park (primarily designated for its coastline), Snowdonia National Park and the Gower, Llŷn and Anglesey AONBs. The southern waters and coastline fringing the Bristol Channel also provide a unique seascape setting to the protected landscapes of North Devon and Somerset; namely the Mendip Hills AONB, Quantock Hills AONB and Exmoor National Park.

The country is also host to a number of outstanding beaches; the beaches at Rhossili Bay and Barafundle Bay are frequently voted as some of the best beaches in the United Kingdom. Additionally, around one third of the coastline is designated as Heritage Coast.

The nature of the coastline varies greatly, with sandy beaches and bays, dramatic rugged cliffs, dunes and estuarine mudflats, which support a wealth of habitats and associated species. There are also valued natural history artefacts in the form of ancient submerged forests at Borth Bay.

The historic importance of the coast as a defensive boundary and vantage point is evidenced through the many castles and forts dotted along the coastline. Characteristic and distinctive lighthouses, beacons and places of worship are also common features, including St. David's Cathedral.

The shore and the sea are frequently celebrated in art and literature, and have historically provided a departure and entry point for people and trade but also a place of quiet and tranquillity drawing people in from the rest of the United Kingdom and beyond.

Wales is bounded by coastline from the north, west and south, with large variations of character occurring between these areas – a flavour of which is provided below:

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[3] http://www.cartography.org.uk/default.asp?contentID=749

[4] National Trust (2006) Valuing our Environment: the Economic Impact of the Coastal and Marine Environment of Wales. The Valuing Our Environment Partnership, Wales.

[5] Welsh Economy Research Unit (2012) The Economic Impact of Wales Coast Path Visitor Spending on Wales 2012

- The Dee Estuary forms a natural border between England and Wales resulting in a shared character, and has supported maritime trade between the two countries.
- Along the north coast are numerous Victorian seaside towns, which were a traditional 'bucket and spade' holiday destination for people from the large industrial cities of northern England including Liverpool and Manchester.
- There has been a long relationship between the north west of Wales and Ireland, separated by St George's Channel and the Irish Sea. Holyhead is a classic boarding point for those travelling to Ireland by sea, with rail connections afforded to the north of England and London, developed as a major engineering feat in the 19th century.
- Cardigan Bay is the largest bay in Wales, and its more sheltered waters have historically supported a strong maritime industry.
- The westerly facing coast and offshore islands of Pembrokeshire is often exposed to dramatic weather systems from the Atlantic, often with strong winds.
- A distinctive natural port formed during the last Ice Age at Milford Haven and is one of the deepest natural harbours in the world.
- The Industrial Revolution helped to shape the character of some areas of the coast, particularly in the south with industrial ports and infrastructure dominating the character of certain areas, such as Neath Port Talbot. Numerous large cities have grown around ports, including Swansea and Cardiff. Elsewhere, traditional fishing villages remain a common feature on less developed areas of coast.
- The open expanse of the Bristol Channel to the south is a busy transport and trade route, and narrows to the east into the Severn Estuary which has the second highest tidal range in the world and forms another boundary between England and Wales.

Offshore, marine character is also varied and influenced by the orientation and aspect of the adjacent landmass. Tidal streams and races are frequent around Anglesey and the Llŷn Peninsula, and have caused numerous shipwrecks, whereas relatively calmer areas of sea in the south generally support larger ports which developed rapidly following the Industrial Revolution; exploiting the rich mineral and food resources provided by the country's land and marine assets.

The sea historically provided a key communication, trade and transport route from Wales in contrast to the mountainous divide between Wales and England. Trans-Atlantic telegraph and telephone cables run ashore on the Welsh coast, and there are frequent ferries crossing between Wales and Ireland.

The individual descriptions for the 29 Marine Character Areas identified for Wales provide a more detailed picture of each area's unique character in the national context.

5.2 Overview mapping

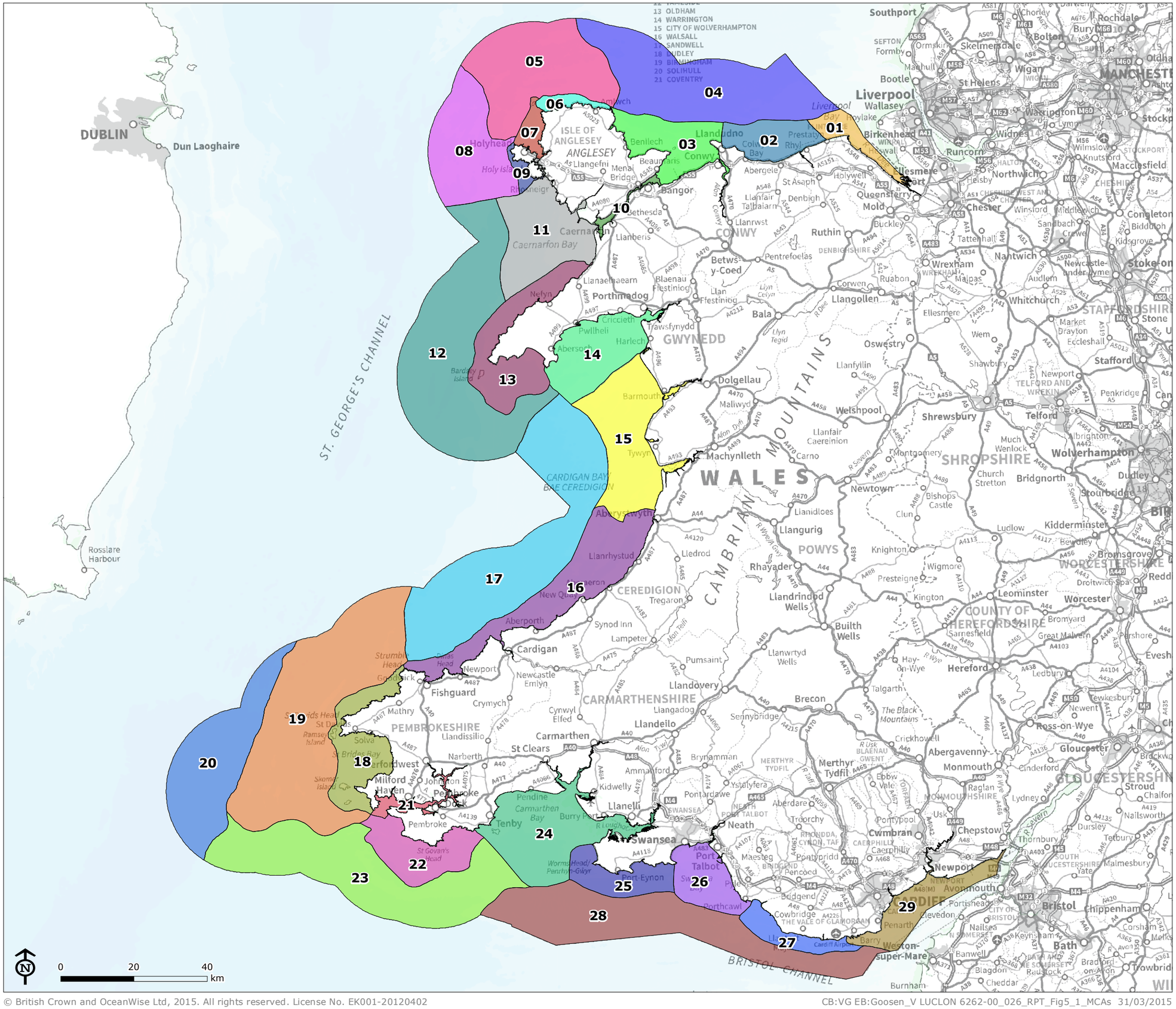
Figures 5.1 to 5.10 present a series of national overview maps for the National Seascape Assessment, including the classification of national Marine Character Areas (Figure 5.1) and the national results of the Visual Resource Mapping (Figures 5.2 and 5.3).

Maps displaying a selection of the key sources of GIS data used to identify and/or describe the MCAs are also included from Figures 5.4 to 5.10. These help to illustrate the type of physical and cultural influences shaping character at a national scale.

A brief summary of each map follows after Figure 5.10.

Wales National Seascape Assessment

Figure 5.1: National Marine Character Areas for Wales



- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
- 03: Red Wharf and Conwy Bays
- 04: North Wales Open Waters
- 05: North-West Anglesey Open Waters
- 06: North Anglesey Coastal Waters
- 07: Holyhead Bay and The Skerries
- 08: West Anglesey Open Waters
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- 22: South Pembrokeshire Coastal and Inshore Waters
- 23: South Pembrokeshire Open Waters
- 24: Carmarthen Bay and Estuaries
- 25: Gower and Helwick Coastal Waters
- 26: Swansea Bay and Porthcawl
- 27: Glamorgan Coastal Waters and Nash Sands
- 28: Bristol Channel (Wales)
- 29: Severn Estuary (Wales)

Map Scale @ A3: 1:1,000,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_026_RPT_Fig5_1_MCAs 31/03/2015

Source: LUC

Figure 5.2: National mapping of land with sea views

Percentile (%) - relative to England (Marine Management Organisation, 2015)

- 1-10% (lowest)
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- 81-90
- 91-100 (highest)

Map Scale @ A3: 1:900,000

0 20 40 km

CB:VG EB:Goosen_V LUCLON 6262-00_027_RPT_Fig5_2_MMO_land_with_sea_views 31/03/2015

Source: Marine Management Organisation

Marine Character Areas

- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
- 03: Red Wharf and Conwy Bays
- 04: North Wales Open Waters
- 05: North-West Anglesey Open Waters
- 06: North Anglesey Coastal Waters
- 07: Holyhead Bay and The Skerries
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- 26: Swansea Bay and Porthcawl
- 27: Glamorgan Coastal Waters and Nash Sands
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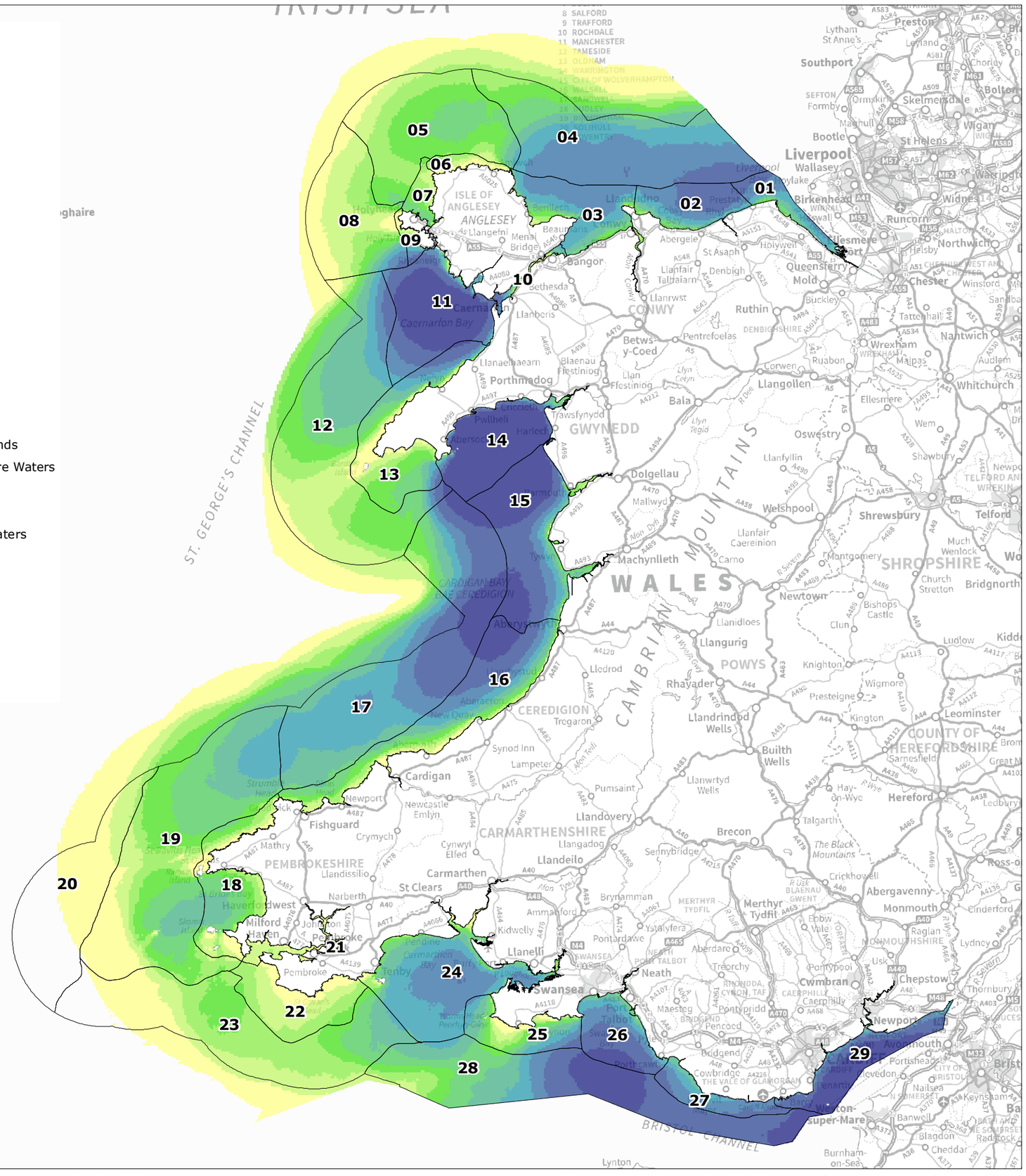
- 29: Severn Estuary (Wales)



Wales National Seascape Assessment

Figure 5.3: National mapping of sea visibility from land

Percentile (%) - (Marine Management Organisation, 2015)

- 1-10 (lowest)
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- 81-90
- 91-100 (highest)

Map Scale @ A3: 1:1,050,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_028_RPT_Fig5_3_MMO_sea_visibility 31/03/2015

Source: Marine Management Organisation, LUC

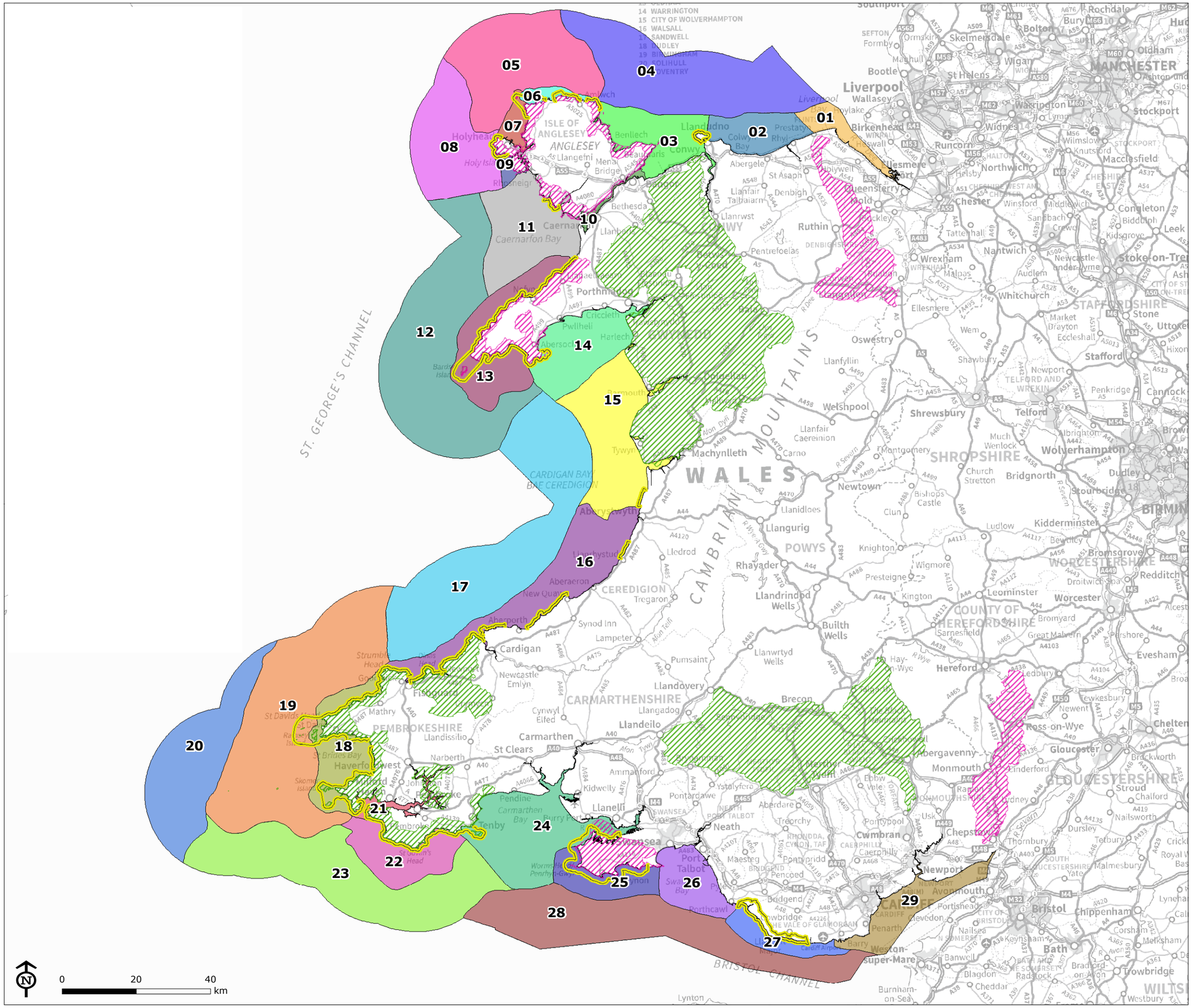


Figure 5.4: Relationship between Marine Character Areas and Protected Landscapes

- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
- 03: Red Wharf and Conwy Bays
- 04: North Wales Open Waters
- 05: North-West Anglesey Open Waters
- 06: North Anglesey Coastal Waters
- 07: Holyhead Bay and The Skerries
- 08: West Anglesey Open Waters
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- 27: Glamorgan Coastal Waters and Nash Sands
- 28: Bristol Channel (Wales)
- 29: Severn Estuary (Wales)

Protected Landscapes

- Area of Outstanding Natural Beauty
- National Park
- Heritage Coast

Map Scale @ A3: 1:1,000,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_029_RPT_Fig5_4_MCAs_and_protected_landscapes 31/03/2015

Source: LUC, Countryside Council for Wales, Ordnance Survey

Wales National Seascape Assessment

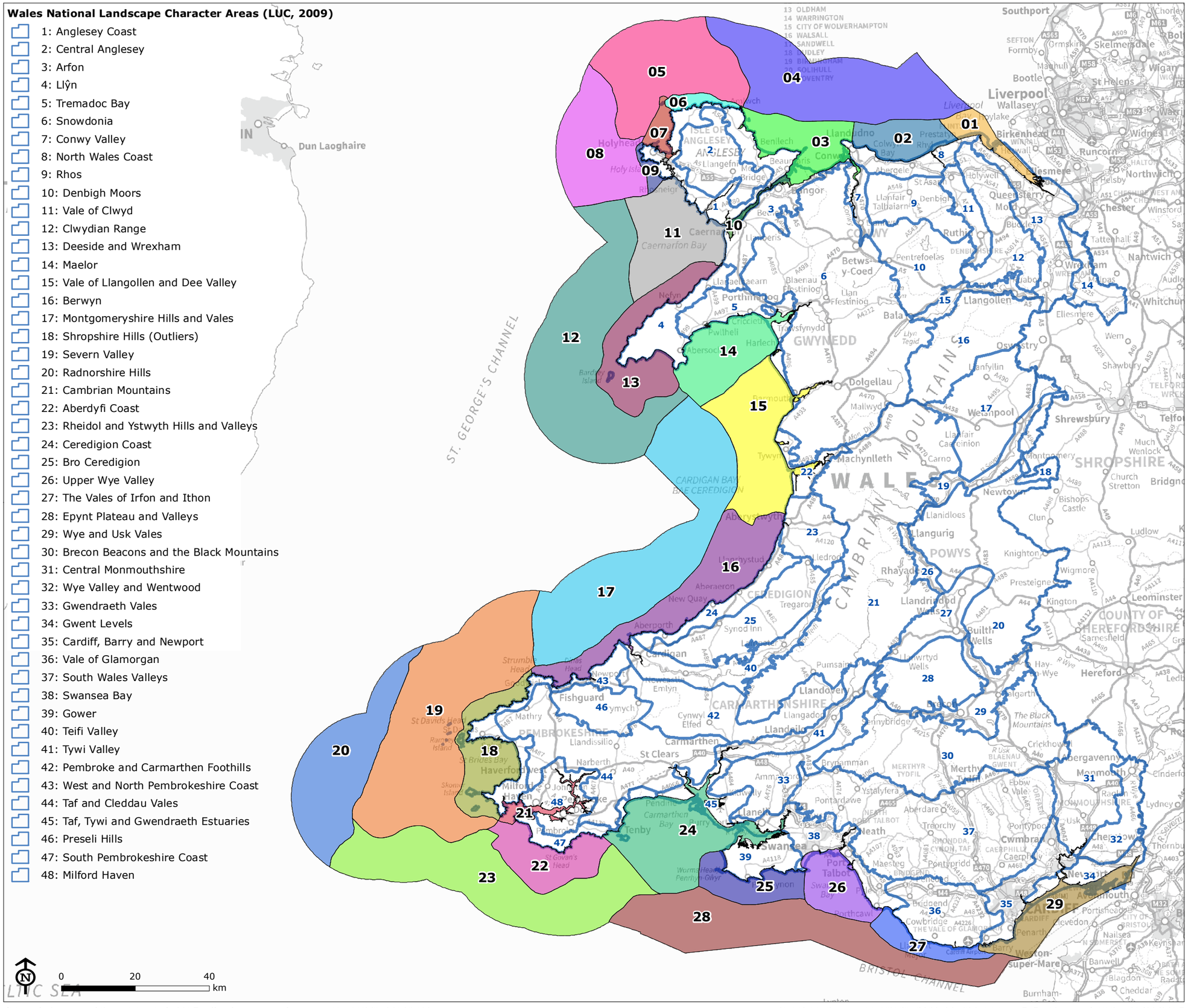

Figure 5.5: Relationship between Marine Character Areas and National Landscape Character Areas

Map Scale @ A3: 1:1,000,000

LUC

Cyfoeth Naturiol Cymru
Natural Resources Wales

Source: LUC, Countryside Council for Wales, Ordnance Survey

CB:VG EB:Goosen_V LUCLON 6262-00_030_RPT_Fig5_5_MCAs_and_NLCA 31/03/2015

Marine Character Areas for Wales

- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
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- 27: Glamorgan Coastal Waters and Nash Sands
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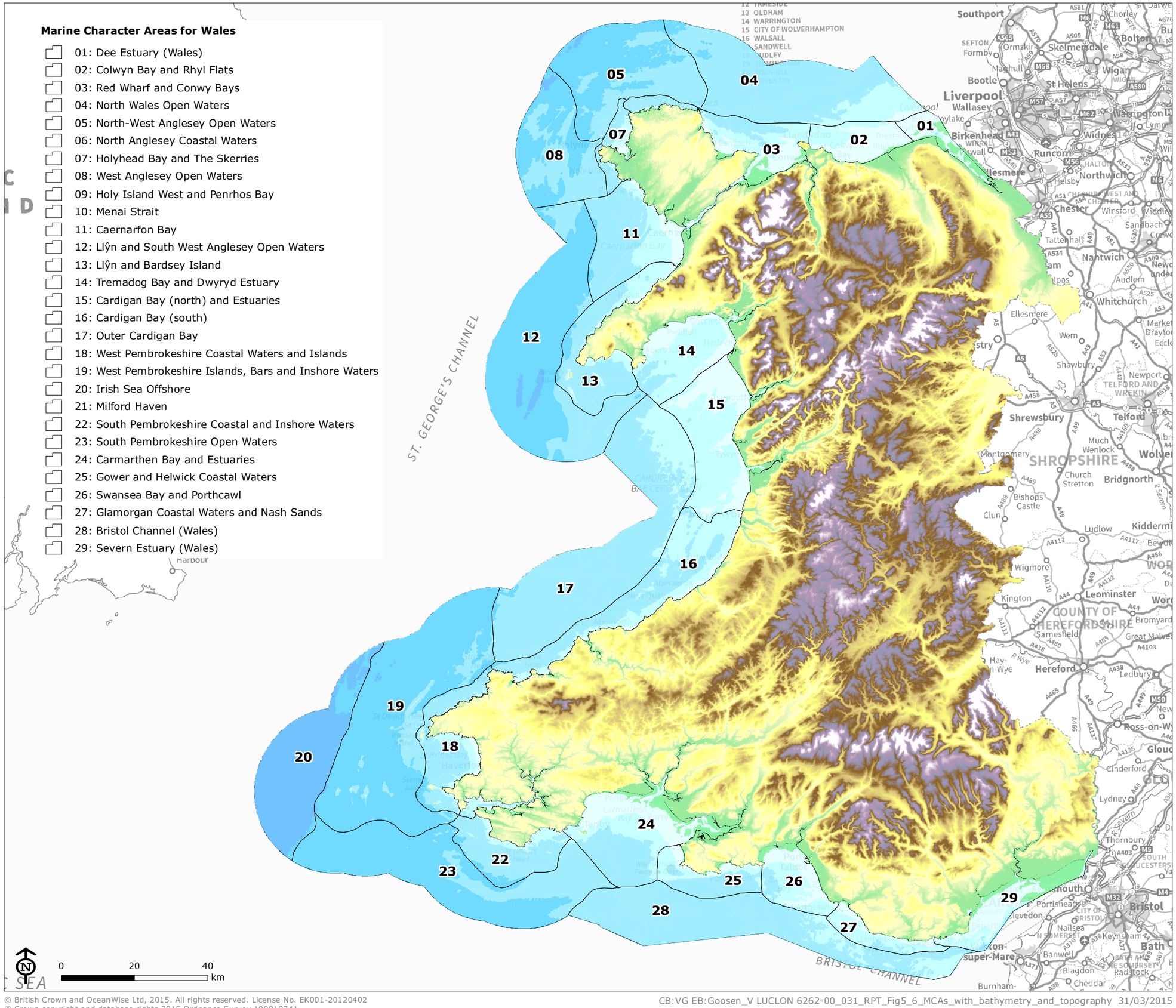
- 29: Severn Estuary (Wales)



Wales National Seascape Assessment

Figure 5.6: Marine Character Areas with bathymetry and inland topography

Topography

Value (m)

High : 1080.5

Low : -34.7

Bathymetry Depth Areas

- Drying
- <=10m
- <=20m
- <=50m
- <=100m
- <=500m

Map Scale @ A3: 1:1,000,000

LUC

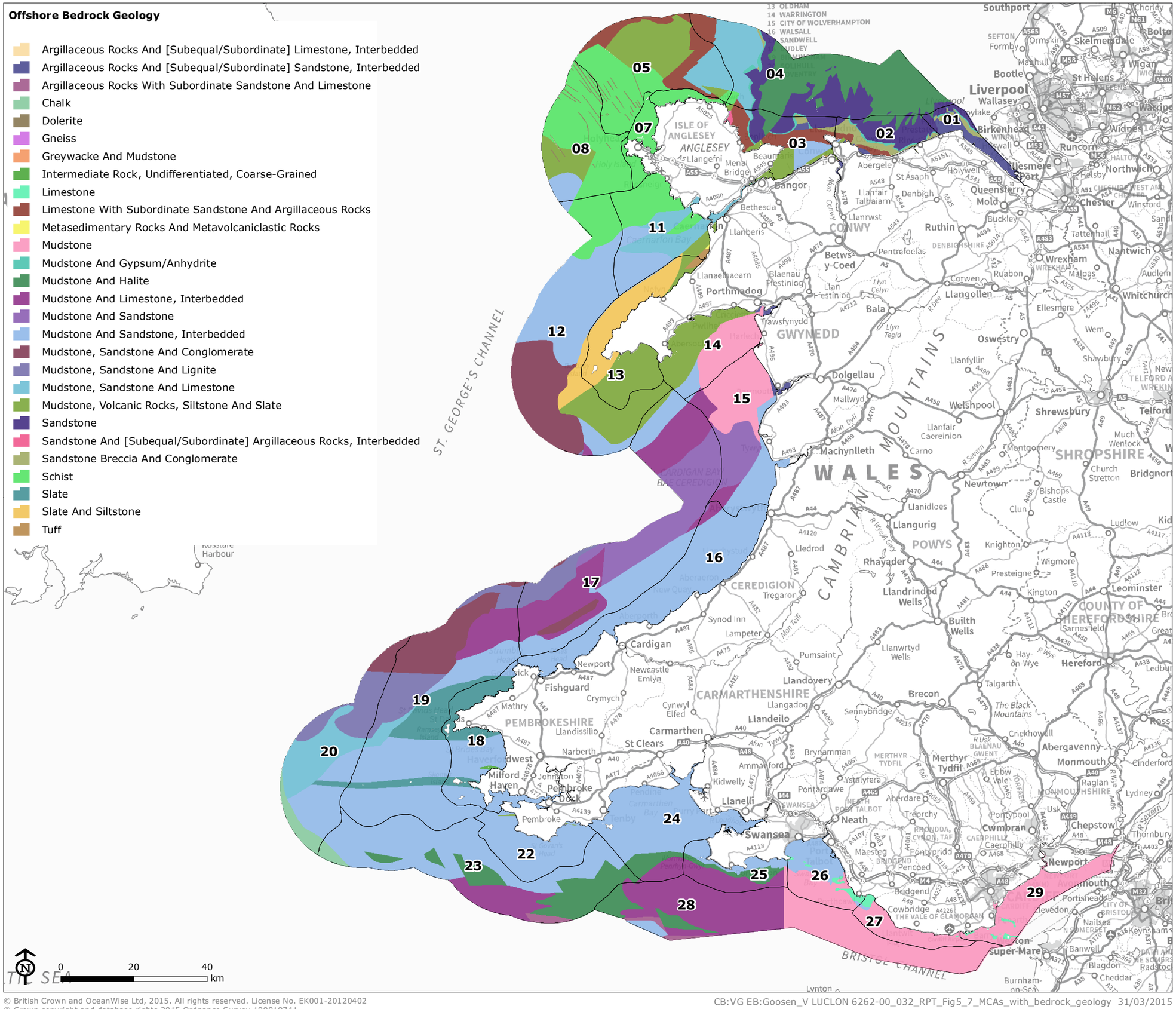
Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_031_RPT_Fig5_6_MCAs_with_bathymetry_and_topography 31/03/2015

Source: LUC, Natural Resources Wales, OceanWise, Ordnance Survey.

Offshore Bedrock Geology

- Argillaceous Rocks And [Subequal/Subordinate] Limestone, Interbedded
- Argillaceous Rocks And [Subequal/Subordinate] Sandstone, Interbedded
- Argillaceous Rocks With Subordinate Sandstone And Limestone
- Chalk
- Dolerite
- Gneiss
- Greywacke And Mudstone
- Intermediate Rock, Undifferentiated, Coarse-Grained
- Limestone
- Limestone With Subordinate Sandstone And Argillaceous Rocks
- Metasedimentary Rocks And Metavolcaniclastic Rocks
- Mudstone
- Mudstone And Gypsum/Anhydrite
- Mudstone And Halite
- Mudstone And Limestone, Interbedded
- Mudstone And Sandstone
- Mudstone And Sandstone, Interbedded
- Mudstone, Sandstone And Conglomerate
- Mudstone, Sandstone And Lignite
- Mudstone, Sandstone And Limestone
- Mudstone, Volcanic Rocks, Siltstone And Slate
- Sandstone
- Sandstone And [Subequal/Subordinate] Argillaceous Rocks, Interbedded
- Sandstone Breccia And Conglomerate
- Schist
- Slate
- Slate And Siltstone
- Tuff



Wales National Seascape Assessment

Figure 5.7: Marine Character Areas showing relationship with bedrock geology

- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
- 03: Red Wharf and Conwy Bays
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- 26: Swansea Bay and Porthcawl
- 27: Glamorgan Coastal Waters and Nash Sands
- 28: Bristol Channel (Wales)
- 29: Severn Estuary (Wales)

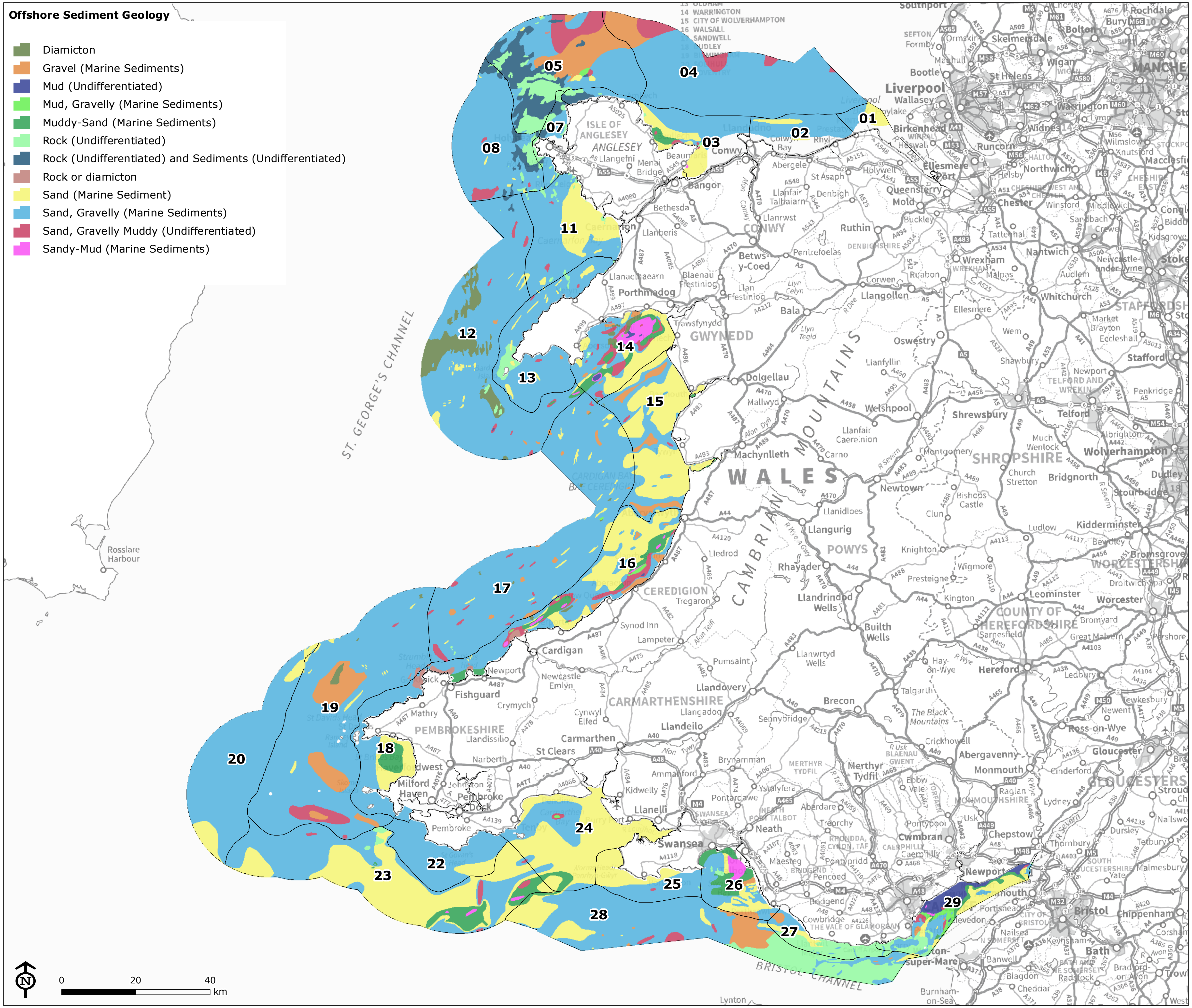
Map Scale @ A3: 1:1,000,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_032_RPT_Fig5_7_MCAs_with_bedrock_geology 31/03/2015

Source: LUC, British Geological Survey, Ordnance Survey



Wales National Seascape Assessment

Figure 5.8: Marine Character Areas showing relationship with sediment geology

- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
- 03: Red Wharf and Conwy Bays
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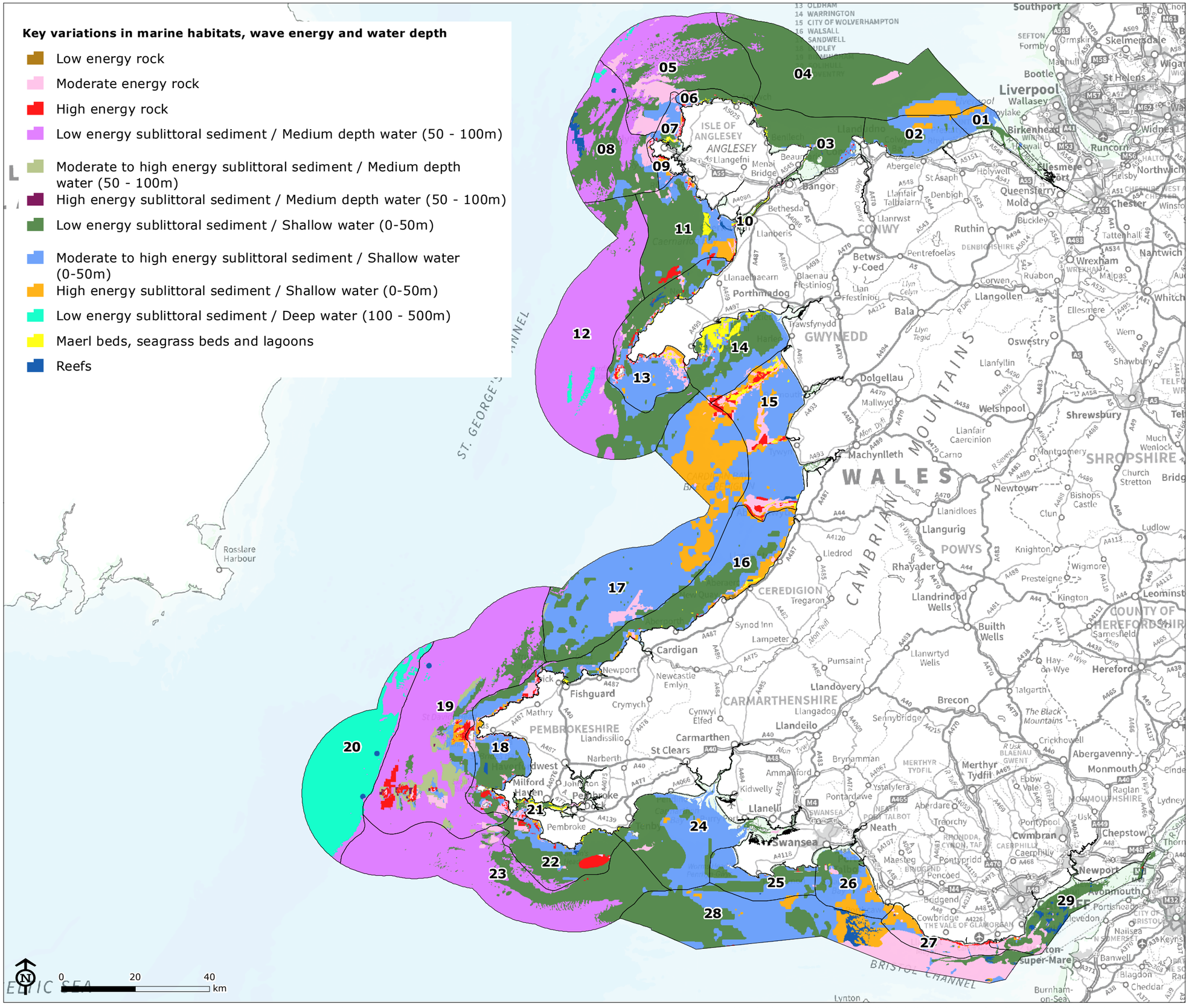
- 29: Severn Estuary (Wales)

Map Scale @ A3: 1:1,000,000

LUC
Cyfoeth Naturiol Cymru
Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_033_RPT_Fig5_8_MCAs_with_sediment_geology 31/03/2015

Source: LUC, British Geological Survey, Ordnance Survey



Wales National Seascape Assessment

Figure 5.9: Marine Character Areas with key variations in Marine Habitats, Wave Energy and Water Depth

- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
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- 25: Gower and Helwick Coastal Waters
- 26: Swansea Bay and Porthcawl
- 27: Glamorgan Coastal Waters and Nash Sands
- 28: Bristol Channel (Wales)
- 29: Severn Estuary (Wales)

Map Scale @ A3: 1:1,000,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_034_RPT_Fig5_9_MCAs_key_variations_RevA 07/05/2015

Source: LUC, Natural Resources Wales, SeaZone, Ordnance Survey

Wales National Seascape Assessment

Figure 5.10: Marine Character Areas with Registered Historic Landscapes and wrecks

Registered Historic Landscapes

1: Vale of Clwyd
2: Holywell Common & Halkyn Mountain
3: Black Mountain & Mynydd Myddfai
4: Upland Ceredigion
5: Milford Haven Waterway
6: St Davids Peninsula and Ramsey Island
7: Tywi Valley
8: Skomer Island
9: Preseli
10: Dolaucothi
11: Taf and Tywi Estuary
12: Merthyr Mawr, Kenfig & Margam Burrows
13: Merthyr Tydfil
14: Llancarfan, Vale of Glamorgan
15: Gower
16: Blaenavon
17: Gwent Levels
18: The Lower Wye Valley
19: Amlwch and Parys Mountain
20: Ardudwy
21: Blaenau Ffestiniog
22: Lower Conwy Valley
23: Creyddyn and Conwy
24: Dinorwig
25: Aberglaslyn
26: Lleyn and Bardsey Island
27: Nantlle Valley
28: Ogwen Valley
29: Trawsfynydd Basin and Cwm Prysor
30: North Arllechwedd
31: Vale of Dolgellau
32: Mawddach
33: Penmon
34: Tanat Valley
35: Vale of Montgomery
36: Middle Wye Valley
37: Berwyn
38: Lower Elwy Valley
39: Denbigh Moors
40: Vale of Llangollen and Eglwyseg
41: Maelor
42: Drefach and Felindre
44: Stackpole Warren
45: Manorbier
46: Lower Teifi Valley
47: Newport and Carningli
48: East Fforest Fawr and Mynydd-y-Glog
49: Gelli-gaer Common
50: The Rhondda
51: Margam Mountain
52: Clydach Gorge
53: Bala and Bala Lakesides
54: Dysynni Valley
55: Elan Valley
56: Caersws Basin
57: Clywedog Valley

Wreck

Marine Character Area

- 01: Dee Estuary (Wales)
- 02: Colwyn Bay and Rhyl Flats
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- 06: North Anglesey Coastal Waters
- 07: Holyhead Bay and The Skerries
- 08: West Anglesey Open Waters
- 09: Holy Island West and Penrhos Bay
- 10: Menai Strait
- 11: Caernarfon Bay
- 12: Llŷn and South West Anglesey Open Waters
- 13: Llŷn and Bardsey Island
- 14: Tremadog Bay and Dwyryd Estuary
- 15: Cardigan Bay (north) and Estuaries
- 16: Cardigan Bay (south)
- 17: Outer Cardigan Bay
- 18: West Pembrokeshire Coastal Waters and Islands
- 19: West Pembrokeshire Islands, Bars and Inshore Waters
- 20: Irish Sea Offshore
- 21: Milford Haven
- 22: South Pembrokeshire Coastal and Inshore Waters
- 23: South Pembrokeshire Open Waters
- 24: Carmarthen Bay and Estuaries
- 25: Gower and Helwick Coastal Waters
- 26: Swansea Bay and Porthcawl
- 27: Glamorgan Coastal Waters and Nash Sands
- 28: Bristol Channel (Wales)
- 29: Severn Estuary (Wales)

Map Scale @ A3: 1:1,000,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_035_RPT_Fig5_10_MCAs_with_registered_hist_landsc_and_wrecks 31/03/2015

Source: LUC,Ordnance Survey,UKHO, NRW

5.3 Brief summaries of the overview maps

5.3.1 Map of the national Marine Character Areas for Wales (Figure 5.1)

This map provides the national classification of Marine Character Areas for Wales. Note that for the purposes of presentation, bridges that cross intertidal areas (such as estuaries), and therefore fall above the High Water Mark, have been merged into the relevant MCA to create a single unit. Similarly, all islands or rocks in the Inshore Waters with land above the High Water Mark have been included as important component features of the MCAs.

5.3.2 National mapping of land with sea views (Figure 5.2)

Differing distances from the sea, as well as the elevation and shape of the land, can result in variations in the extent of sea views obtained across the landscape. This map, produced by the MMO, gives a general indication of which parts of Wales have the most extensive views of the sea. Refer to previous Chapter 4 for a full explanation of this map, including key limitations that will assist in its interpretation as set out in paragraph 4.2.

5.3.3 National mapping of sea visibility from land (Figure 5.3)

Views to the sea are often key to a coastal landscape's sense of place. This map, produced by the MMO, shows the differing levels of sea surface visibility across Wales' Inshore Waters, with reference to the national MCA framework. It gives a general idea of which parts of the sea surface are more visible from the land than others. Refer to previous Chapter 4 for a full explanation of this map, including key limitations that will assist in its interpretation as set out in paragraph 4.2.

5.3.4 Relationship between MCAs and protected landscapes (Figure 5.4)

The map shows the relationship between the MCAs and terrestrial protected landscapes (National Parks, AONBs and Heritage Coast). Often the visual and cultural relationships between the protected landscapes and the surrounding seas are key to their setting and special qualities. Equally, the role of the protected landscapes in providing a backdrop to the MCAs can be important to character. This information is brought out further in the relevant individual MCA descriptions.

5.3.5 Relationship between MCAs and national Landscape Character Areas (Figure 5.5)

The Marine Character Areas provide a similarly scaled marine equivalent to the framework of national Landscape Character Areas (NLCAs) produced by NRW for Wales. Together, the MCAs and NLCAs form a complete suite of information on national character spanning both land and sea.

5.3.6 Marine Character Areas with bathymetry and inland topography (Figure 5.6)

Patterns of bathymetry (sea depth) have a key influence on marine character, for example shaping the strength and direction of water currents. This is in the same way as the topography of the land (also showing on this map) – including the presence of mountains or areas of lower-lying land – influences landscape character. The MCAs are overlaid onto this map to show the key patterns of bathymetry across the character area framework.

5.3.7 Marine Character Areas with bedrock geology (Figure 5.7)

The underlying bedrock of the sea floor is an important natural and physical influence on character, in turn affecting aspects such as navigational conditions (e.g. the presence of rock outcrops or reefs) as well as marine ecology. Often the bedrock of the sea floor is a continuation of the geology that outcrops along the adjacent coast, including in cliffs which display the different rock types. The MCAs are overlaid onto this map to show the key patterns of bathymetry across the character area framework.

5.3.8 Marine Character Areas with sediment geology (Figure 5.8)

The type and distribution of marine sediments also gives rise to variations in navigational conditions (e.g. the presence of sand banks as specific physical hazards) and can provide unique habitats for marine wildlife. The pattern and origin of the sediments can also build a picture of past environmental conditions and landscapes, such as the deposition of glacial material after the last Ice Age and the course of ancient palaeochannels. The MCAs are overlaid onto this map to show the key patterns of bathymetry across the character area framework.

5.3.9 Marine Character Areas with key variations in marine habitats, wave energy and water depth (Figure 5.9)

The map provides a combined strategic overview of key natural and physical influences on character. An explanation for how this map was created, through exploring steps to produce a national marine typology for Wales, is included in Appendix 2.

5.3.10 Marine Character Areas with Registered Historic Landscapes and Wrecks (Figure 5.10)

The map shows just two examples of the wide range of cultural information that has helped inform the Marine Character Assessment (with many other sources taking a non-GIS format). The location of wrecks can often help paint a picture of an MCA's past and present functions for trade and defence, as well as reinforce an understanding of how physical factors can influence sea and navigational conditions.

Appendix 1: Links to current and future local-scale seascape character assessments

Initial ideas for developing a nesting of local-scale 'Seascape Character Area' units within the national-scale Marine Character Areas have been explored as part of this study. Approximately 50% of Wales has already been characterised at the local scale, as shown at Figure A1.1, which also depicts their relationship with the MCAs. The spatial links between the MCAs and the existing local units was considered as part of the process for the national assessment, as explained at paragraph 3.3.4. In turn, when considering 'filling the gaps' at the local scale, the existing Seascape Character Areas were also taken into account – both in terms of the location of their boundaries, and their size.

Figure A1.2 provides a national overview of initial ideas for completing a classification of local Seascape Character Areas for Wales, showing the relationship with the MCAs and the existing assessments. The blurred coloured edges show transitions into the study areas already covered by the local assessments – where outer study area boundaries are currently marked by straight edges. Future work will need to explore rationalising the links across the study area boundaries to reflect transitions in character, rather than study area limits, as indicated on this map. Further 'zooms' of these initial ideas for local Seascape Character Areas are provided for North Wales (Figure A1-3), Llŷn (Figure A1-4) and Ceredigion (Figure A1-5) and Gower & Severn (Figure A1-6).

The table at the end of this appendix provides a brief rationale for the indicative local Seascape Character Area boundaries, relating to the numbered units showing on Figure A1.2. Names have not been included on the maps due to the likelihood of them changing at a future date, though suggestions have been made in the table where possible. Recommendations for how to rationalise the existing local Seascape Character Area boundaries to achieve nesting within the MCA framework and character transitions beyond their original study area extents, are also included in this table (indicated with an asterisk).

At the present time the indicative SCAs sit within the MCA framework – therefore ending at the High Water Mark in their landward extent. As is the case for the existing studies, future work should define an appropriate inland extension for local scale work, recognising the important interactions between land and sea. This is discussed further in the recommendations below.

Key recommendations for future local seascape character assessment work in Wales

The information in this Appendix is intended to be a 'first step' in characterising Wales at the local (1:25,000) scale; to be further refined by future studies commissioned at the local level. Key steps that will need to be taken into account to further develop these initial ideas are as follows:

- **Following the approach taken by the existing studies, future work should explore seascape units that take in an appropriate section of coastline** – representing areas with the closest visual and functional relationships with the adjacent marine area. This can be assisted by the VRM mapping produced by this study (in terms of visual relationships), review of local landscape assessments which describe relationships with the sea, and the use of LANDMAP, for example

guided by aspect areas with a clear intertidal or coastal character/location. Examples from the 'Landscape Habitats' Level 2 aspect include 'marine' and 'coastland'. The use of aerial imagery and field survey is also valuable in verifying any desk-based results, wherever possible.

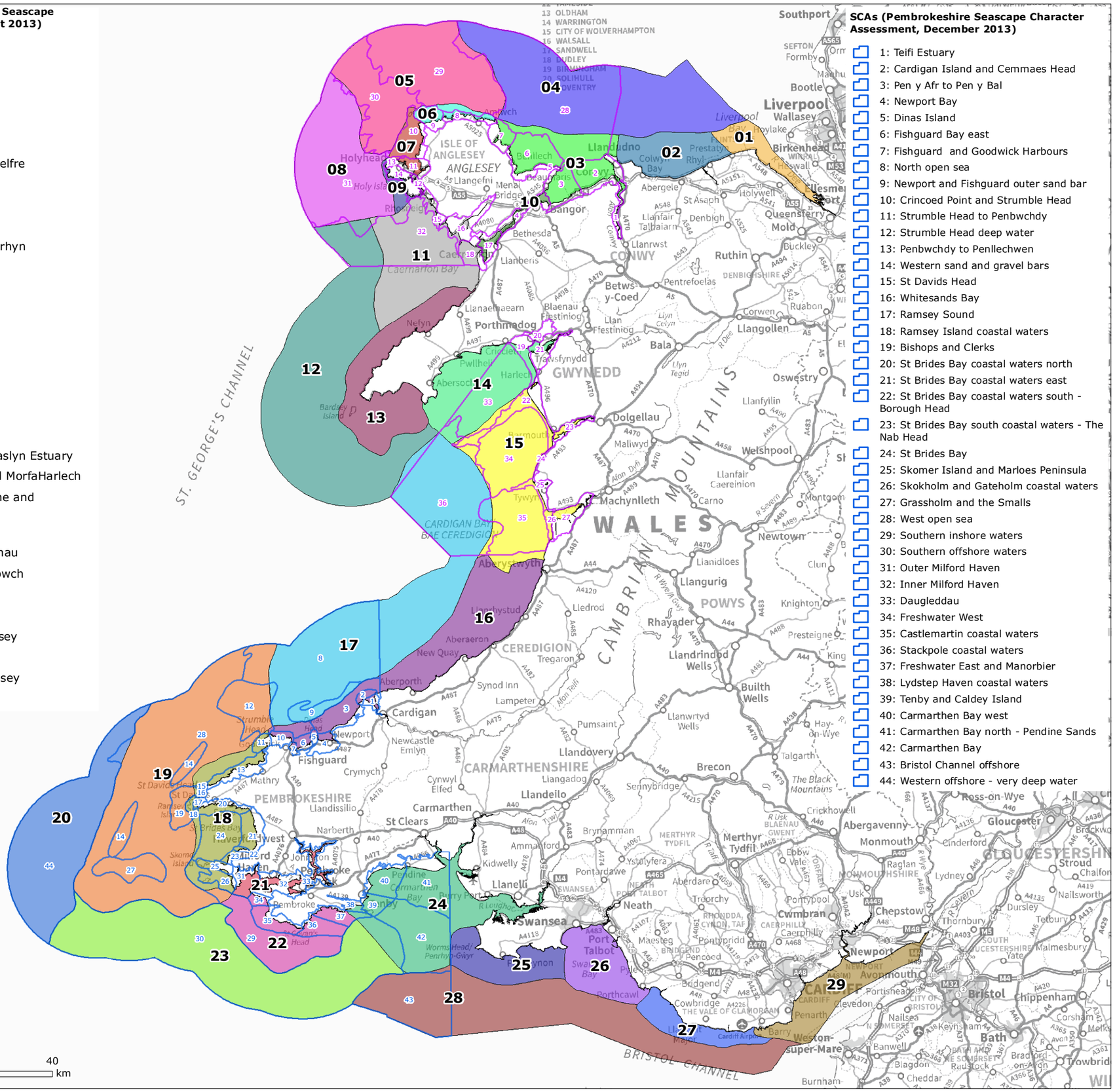
- **Consider relationships with local landscape character assessments –** where appropriate to seascape character, coastal landscape character assessment units should be referred to (and boundaries followed) when defining coastal seascape character units. This will allow for a seamless landscape, seascape and marine characterisation to promote integrated planning and management.
- **Avoid using 'straight edges' to local study area extents, with character information used to inform all seascape character area boundaries.** The straight-edged boundaries of the existing local study area extents are shown at Figure A1.2. Future work will need to rationalise these study area edges to reflect character as it continues beyond, with a desired end result of a seamless local Seascape Character Assessment for Wales as a whole. Future studies should be aware of the links with adjacent coasts and seas when their characterisation work is drafted; including when considering the names of any cross-boundary Seascape Character Areas.
- **Involve those with local knowledge in the process** – this is invaluable in ensuring the character assessment reflects sense of place, reflects the knowledge of people that live and work in the area, and furthers the principles of the European Landscape Convention (ELC). This will be important in choosing recognisable names for the Seascape Character Areas and recording valuable information on character (and potentially condition, forces for change and guidelines).

Wales National Seascape Assessment

Figure A1.1: National MCA map showing links to existing local SCAs in Pembrokeshire and Anglesey/Gwynedd

SCAs (Snowdonia & Anglesey Seascape Character Assessment, August 2013)

1. Conwy Estuary
2. Conwy Bay
3. TraethLafan
4. Menai Strait
5. Penmon
6. Red Wharf Bay to Moelfre
7. Dulas Bay
8. Amlwch and Cemaes
9. Cemlyn Bay
10. Carmel Head to Penrhyn
11. Holyhead
12. Inland Sea
13. Holyhead Mountain
14. Rhoscolyn
15. Rhosneigr
16. Malltraeth
17. Caernarfon
18. Abermenai
19. Criccieth toMochras
20. Porthmadog and Glaslyn Estuary
21. Dwyryd Estuary and MorfaHarlech
22. Mochrasto Fairbourne and SarnBadrig
23. Mawddach Estuary
24. Fairbourne to Tonfanau
25. Tywyn and Sarn-y-bwch
26. Borth
27. Dyfi Estuary
28. North-east of Anglesey
29. North of Anglesey
30. North-west of Anglesey
31. West of Anglesey
32. Caernafon Bay
33. TremadogBay
34. Barmouth Bay
35. Aberdyfi Bay
36. Cardigan Bay



SCAs (Pembrokeshire Seascape Character Assessment, December 2013)

1: Teifi Estuary
2: Cardigan Island and Cemmaes Head
3: Pen y Afr to Pen y Bal
4: Newport Bay
5: Dinas Island
6: Fishguard Bay east
7: Fishguard and Goodwick Harbours
8: North open sea
9: Newport and Fishguard outer sand bar
10: Crincoed Point and Strumble Head
11: Strumble Head to Penbwchdy
12: Strumble Head deep water
13: Penbwchdy to Penllechwen
14: Western sand and gravel bars
15: St Davids Head
16: Whitesands Bay
17: Ramsey Sound
18: Ramsey Island coastal waters
19: Bishops and Clerks
20: St Brides Bay coastal waters north
21: St Brides Bay coastal waters east
22: St Brides Bay coastal waters south - Borough Head
23: St Brides Bay south coastal waters - The Nab Head
24: St Brides Bay
25: Skomer Island and Marloes Peninsula
26: Skokholm and Gateholm coastal waters
27: Grassholm and the Smalls
28: West open sea
29: Southern inshore waters
30: Southern offshore waters
31: Outer Milford Haven
32: Inner Milford Haven
33: Daugleddau
34: Freshwater West
35: Castlemartin coastal waters
36: Stackpole coastal waters
37: Freshwater East and Manorbier
38: Lydstep Haven coastal waters
39: Tenby and Caldey Island
40: Carmarthen Bay west
41: Carmarthen Bay north - Pendine Sands
42: Carmarthen Bay
43: Bristol Channel offshore
44: Western offshore - very deep water

01: Dee Estuary (Wales)
02: Colwyn Bay and Rhyl Flats
03: Red Wharf and Conwy Bays
04: North Wales Open Waters
05: North-West Anglesey Open Waters
06: North Anglesey Coastal Waters
07: Holyhead Bay and The Skerries
08: West Anglesey Open Waters
09: Holy Island West and Penrhos Bay
10: Menai Strait
11: Caernarfon Bay
12: Llŷn and South West Anglesey Open Waters
13: Llŷn and Bardsey Island
14: Tremadog Bay and Dwyryd Estuary
15: Cardigan Bay (north) and Estuaries
16: Cardigan Bay (south)
17: Outer Cardigan Bay
18: West Pembrokeshire Coastal Waters and Islands
19: West Pembrokeshire Islands, Bars and Inshore Waters
20: Irish Sea Offshore
21: Milford Haven
22: South Pembrokeshire Coastal and Inshore Waters
23: South Pembrokeshire Open Waters
24: Carmarthen Bay and Estuaries
25: Gower and Helwick Coastal Waters
26: Swansea Bay and Porthcawl
27: Glamorgan Coastal Waters and Nash Sands
28: Bristol Channel (Wales)
29: Severn Estuary (Wales)

Map Scale @ A3: 1:1,000,000

LUC

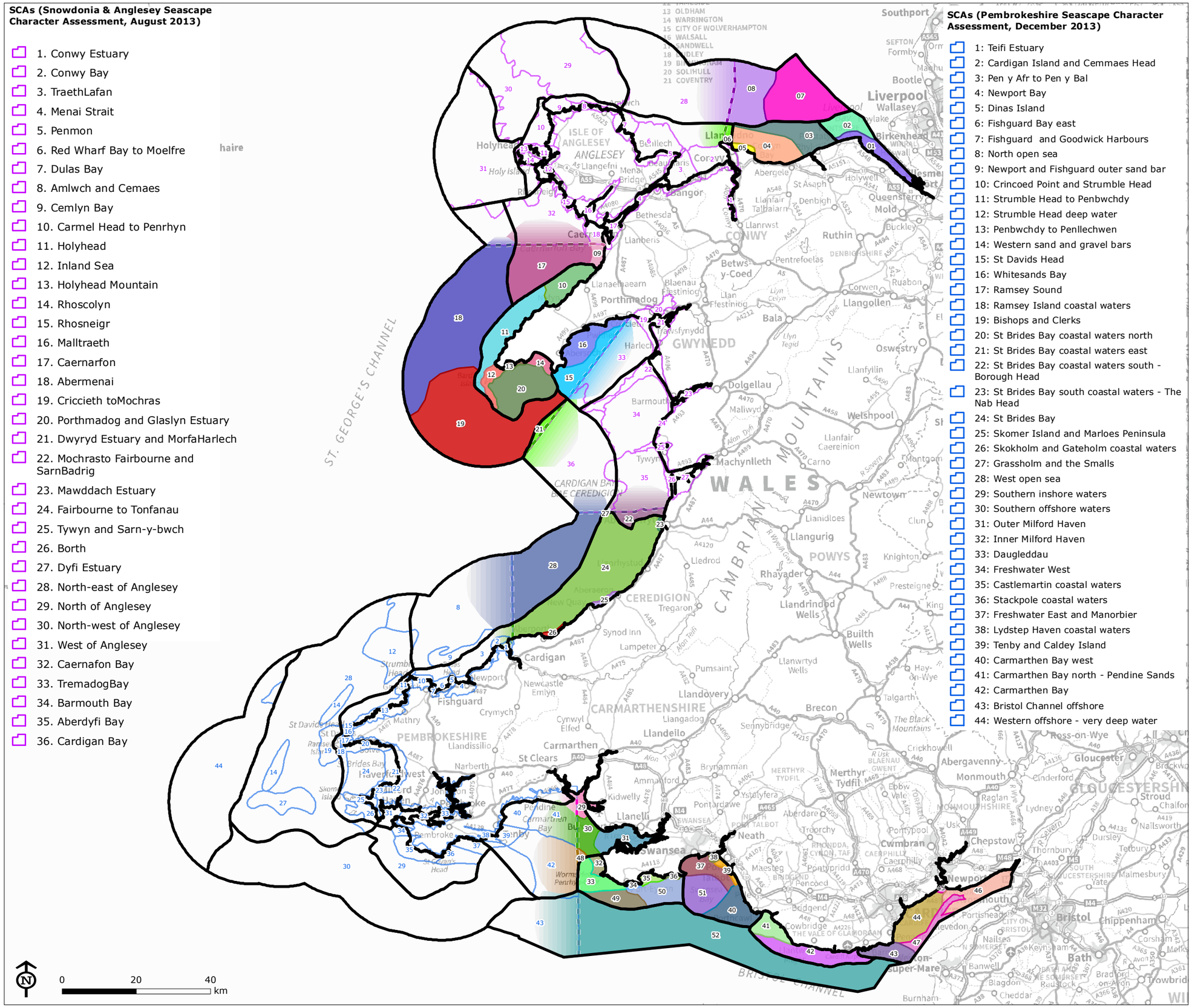
Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_036_RPT_FigA1_1_MCAs_LocalSCAs_Overview_Rev1 29/04/2015

Source: LUC, Ordnance Survey, UKHO

Wales National Seascape Assessment

Figure A1.2: Early ideas for future Local Seascape Character Areas



SCAs (Snowdonia & Anglesey Seascape Character Assessment, August 2013)

1. Conwy Estuary
2. Conwy Bay
3. TraethLafan
4. Menai Strait
5. Penmon
6. Red Wharf Bay to Moelfre
7. Dulas Bay
8. Amlwch and Cemaes
9. Cemlyn Bay
10. Carmel Head to Penrhyn
11. Holyhead
12. Inland Sea
13. Holyhead Mountain
14. Rhoscolyn
15. Rhosneigr
16. Malltraeth
17. Caernarfon
18. Abermenai
19. Criccieth toMochras
20. Porthmadog and Glaslyn Estuary
21. Dwyryd Estuary and MorfaHarlech
22. Mochrasto Fairbourne and SarnBadrig
23. Mawddach Estuary
24. Fairbourne to Tonfanau
25. Tywyn and Sarn-y-bwch
26. Borth
27. Dyfi Estuary
28. North-east of Anglesey
29. North of Anglesey
30. North-west of Anglesey
31. West of Anglesey
32. Caernafon Bay
33. TremadogBay
34. Barmouth Bay
35. Aberdyfi Bay
36. Cardigan Bay

SCAs (Pembrokeshire Seascape Character Assessment, December 2013)

1: Teifi Estuary
2: Cardigan Island and Cemmaes Head
3: Pen y Afr to Pen y Bal
4: Newport Bay
5: Dinas Island
6: Fishguard Bay east
7: Fishguard and Goodwick Harbours
8: North open sea
9: Newport and Fishguard outer sand bar
10: Crincoed Point and Strumble Head
11: Strumble Head to Penbwchdy
12: Strumble Head deep water
13: Penbwchdy to Penllechwen
14: Western sand and gravel bars
15: St Davids Head
16: Whitesands Bay
17: Ramsey Sound
18: Ramsey Island coastal waters
19: Bishops and Clerks
20: St Brides Bay coastal waters north
21: St Brides Bay coastal waters east
22: St Brides Bay coastal waters south - Borough Head
23: St Brides Bay south coastal waters - The Nab Head
24: St Brides Bay
25: Skomer Island and Marloes Peninsula
26: Skokholm and Gateholm coastal waters
27: Grassholm and the Smalls
28: West open sea
29: Southern inshore waters
30: Southern offshore waters
31: Outer Milford Haven
32: Inner Milford Haven
33: Daugleddau
34: Freshwater West
35: Castlemartin coastal waters
36: Stackpole coastal waters
37: Freshwater East and Manorbier
38: Lydstep Haven coastal waters
39: Tenby and Caldey Island
40: Carmarthen Bay west
41: Carmarthen Bay north - Pendine Sands
42: Carmarthen Bay
43: Bristol Channel offshore
44: Western offshore - very deep water

Wales Marine Character Areas (LUC, 2015)

Extent of existing Local SCA study areas

Early ideas for future Local Seascape Character Areas (LUC,2015)

01		27	
02		28	
03		29	
04		30	
05		31	
06		32	
07		33	
08		34	
09		35	
10		36	
11		37	
12		38	
13		39	
14		40	
15		41	
16		42	
17		43	
18		44	
19		45	
20		46	
21		47	
22		48	
23		49	
24		50	
25		51	
26		52	

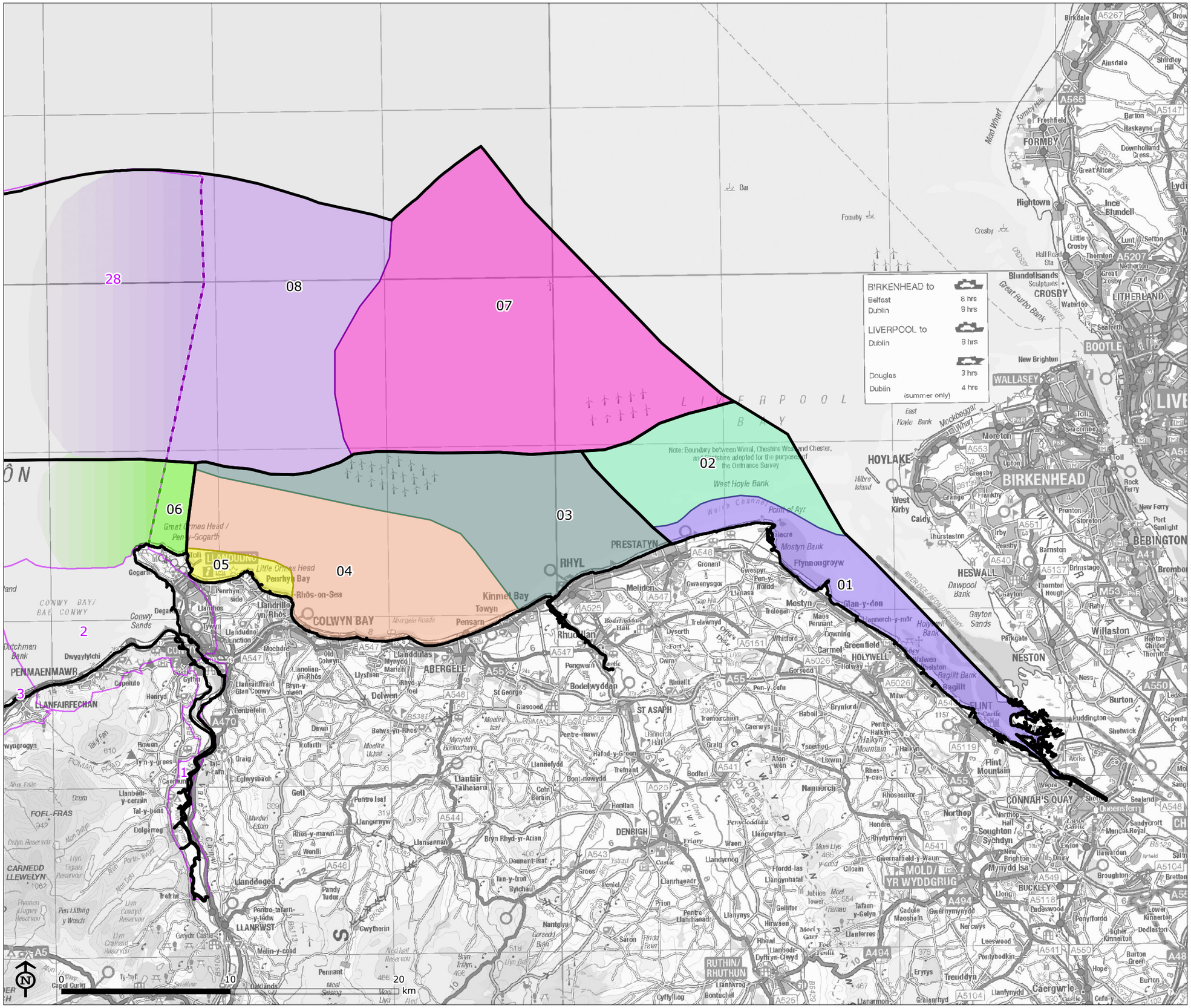
Map Scale @ A3: 1:1,000,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_038_LUC_MCAs_and_LocalSCAs 08/05/2015

Source: LUC, Ordnance Survey, UKHO



CB:VG EB:Goosen_V LUCLON 6262-00_038a_LUC_MCAs_and_LocalSCAs_NORTH_WALES_COAST_RevA 05/11/2015

Source: LUC, Ordnance Survey, UKHO

Wales National Seascape Assessment

Figure A1.3: Early ideas for future Local Seascape Character Areas (North Wales Coast)

- Wales Marine Character Areas (LUC, 2015)
- Extent of existing Local SCA study areas

Early ideas for future Local Seascape Character Areas (LUC,2015)

- 01
- 02
- 03
- 04
- 05
- 06
- 07
- 08

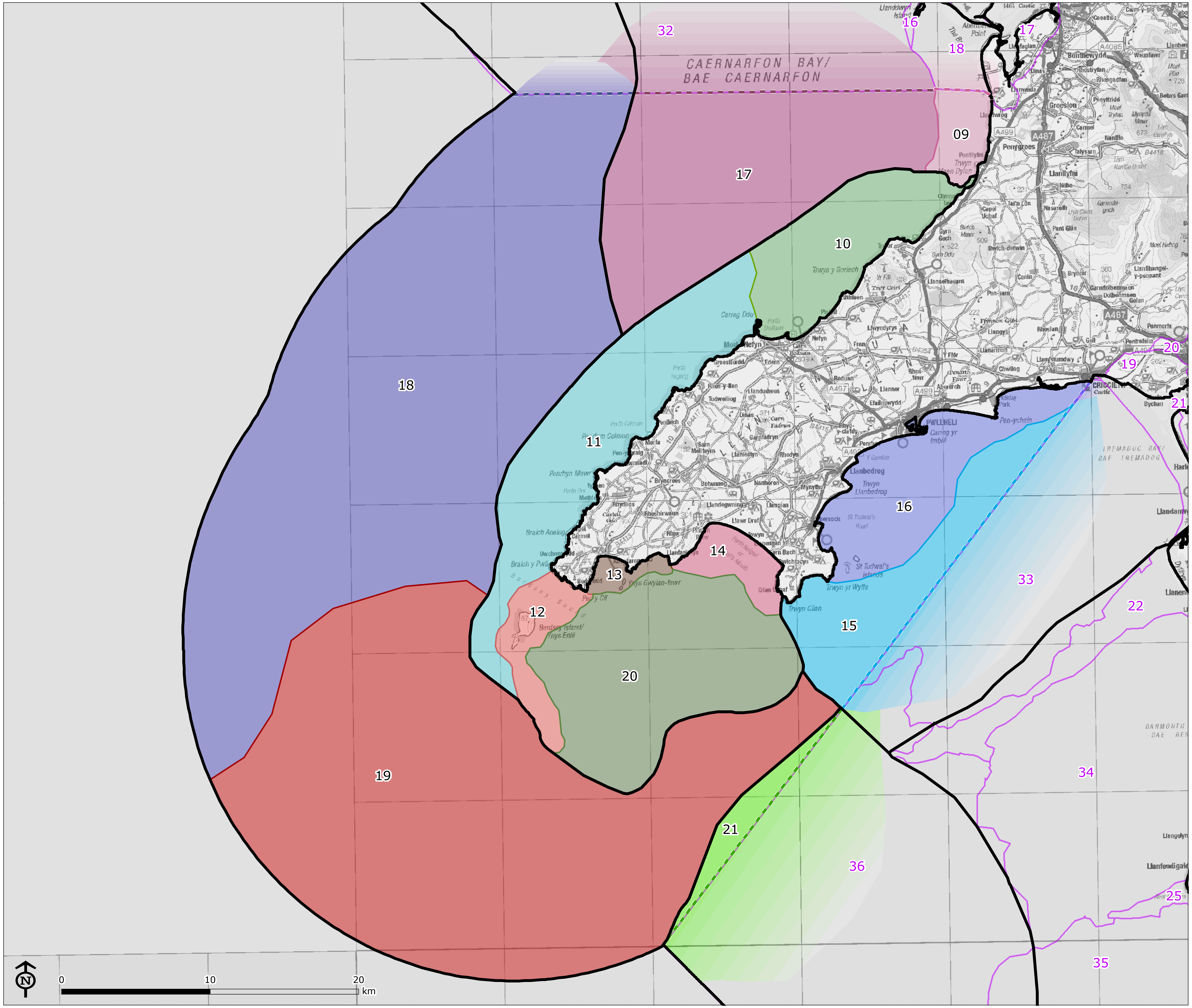
SCAs (Snowdonia & Anglesey Seascape Character Assessment, August 2013)

- 1, Conwy Estuary
- 2, Conwy Bay
- 3, TraethLafan
- 28, North-east of Anglesey

Map Scale @ A3: 1:220,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales



Wales National Seascape Assessment

Figure A1.4: Early ideas for future Local Seascape Character Areas (Llŷn)

Wales Marine Character Areas (LUC, 2015)

Extent of existing Local SCA study areas

Early ideas for future Local Seascape Character Areas (LUC,2015)

09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21

SCAs (Snowdonia & Anglesey Seascape Character Assessment, August 2013)

16, Malltraeth

17, Caernarfon

18, Abermenai

19, Criccieth toMochras

20, Porthmadog and Glaslyn Estuary

21, Dwyryd Estuary and MorfaHarlech

22, Mochrasto Fairbourne and SarnBadrig

25, Tywyn and Sarn-y-bwch

32, Caernafon Bay

33, TremadogBay

34, Barmouth Bay

35, Aberdyfi Bay

36, Cardigan Bay

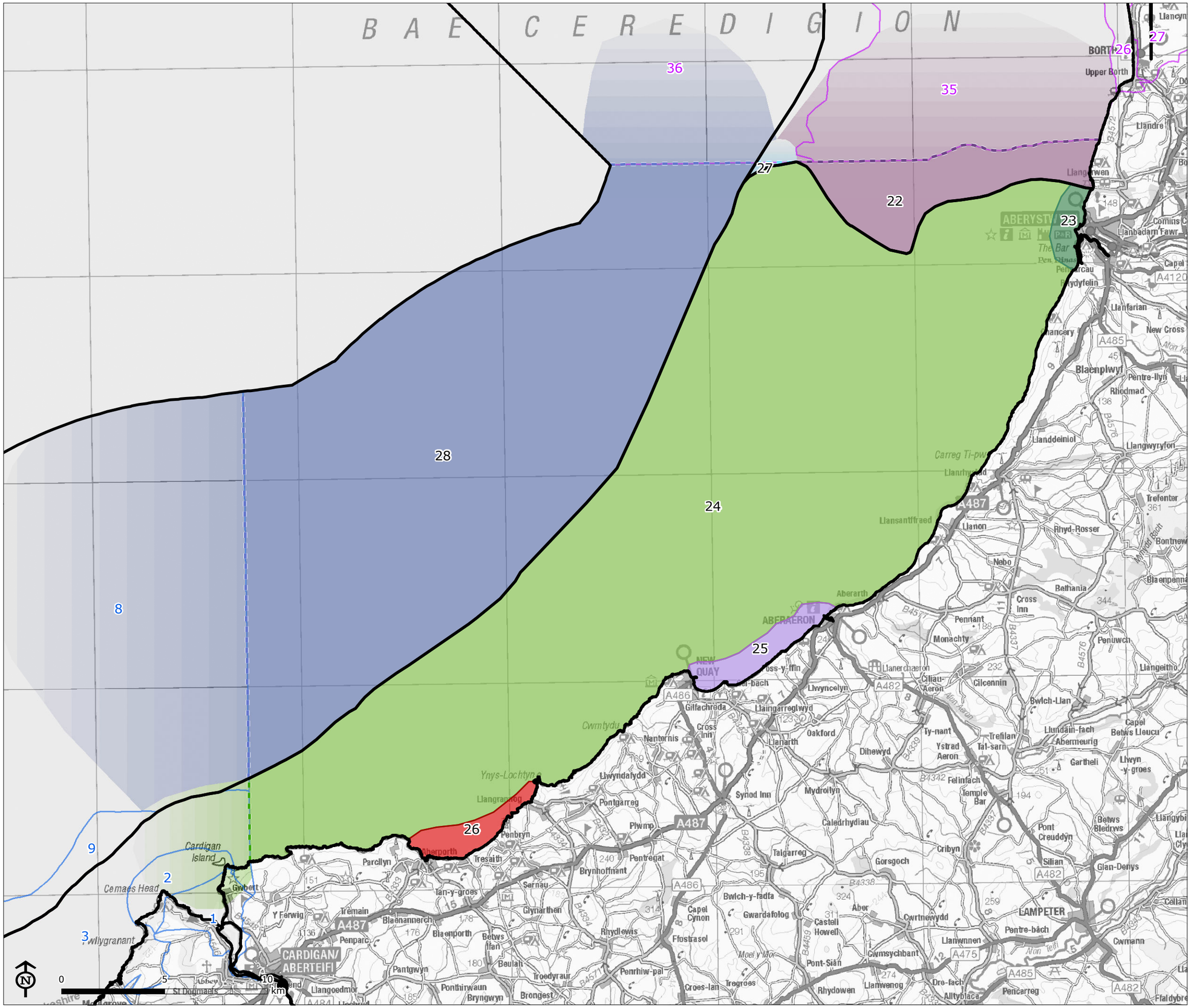
Map Scale @ A3: 1:250,000

LUC

Cyfoeth Naturiol Cymru
Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_038b_LUC_MCAs_and_LocalSCAs_LLYN_RevA 05/11/2015

Source: LUC, Ordnance Survey, UKHO



Wales National Seascape Assessment

Figure A1.5: Early ideas for future Local Seascape Character Areas (Ceredigion)

Wales Marine Character Areas (LUC, 2015)

Extent of existing Local SCA study areas

Early ideas for future Local Seascape Character Areas (LUC,2015)

22
23
24
25
26
27
28

SCAs (Snowdonia & Anglesey Seascape Character Assessment, August 2013)

26, Borth

27, Dyfi Estuary

35, Aberdyfi Bay

36, Cardigan Bay

SCAs (Pembrokeshire Seascape Character Assessment, December 2013)

1: Teifi Estuary

2: Cardigan Island and Cemmaes Head

3: Pen y Afr to Pen y Bal

8: North open sea

9: Newport and Fishguard outer sand bar

Map Scale @ A3: 1:180,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_038c_LUC_MCAs_and_LocalSCAs_CEREDIGION_RevA 05/11/2015

Source: LUC, Ordnance Survey, UKHO

Wales National Seascape Assessment

Figure A1.6: Early ideas for future Local Seascape Character Areas (Gower and Severn)

Wales Marine Character Areas (LUC, 2015)

Extent of existing Local SCA study areas

Early ideas for future Local Seascape Character Areas (LUC,2015)

29	41
30	42
31	43
32	44
33	45
34	46
35	47
36	48
37	49
38	50
39	51
40	52

SCAs (Pembrokeshire Seascape Character Assessment, December 2013)

1: Teifi Estuary

30: Southern offshore waters

37: Freshwater East and Manorbier

38: Lydstep Haven coastal waters

39: Tenby and Caldey Island

40: Carmarthen Bay west

41: Carmarthen Bay north - Pendine Sands

42: Carmarthen Bay

43: Bristol Channel offshore

Map Scale @ A3: 1:450,000

LUC

Cyfoeth Naturiol Cymru Natural Resources Wales

CB:VG EB:Goosen_V LUCLON 6262-00_038D_LUC_MCAs_and_LocalSCAs_GOWER_SEVERN_RevA 05/11/2015

Source: LUC, Ordnance Survey, UKHO

Ideas for future Local Seascape Character Areas, suggested names and boundary rationale

SCA No.	Suggested SCA name	Notes on SCA boundary rationale
1	Dee Estuary (Wales)	The eastern boundary within the Dee estuary itself follows the England/Wales boundary (but note that the local SCA should extend into English waters, as is the case with the MCA). The northern boundary follows the outer extent of Welsh Channel – the main entry channel into the estuary.
2	Outer Dee Estuary and West Hoyle Bank	West, north and east boundaries same as MCA 1, southern boundary follows outer extent of Welsh Channel, with West Hoyle Bank and associated sandbanks/sand flats as the defining features of this SCA.
3	Rhyl Flats	Southern, northern and eastern boundaries match those of MCA 2, western boundary follows the extent of Constable Bank and the sand bank system within the coastal waters at Rhyl.
4	Colwyn Bay	Western boundary same as MCA 2. Northern and eastern boundaries defined by Constable Bank and Rhyl Flats.
5	Llandudno Bay and Little Ormes Head	Northern and Eastern boundary defined by bathymetry and offshore limestone geology. Southern boundary same as MCA 2.
6*	North-east of Anglesey*	This represents a small sliver between the eastern extent of the Anglesey study (SCA 28) and the eastern boundary MCA 3. It is suggested that the Anglesey SCA boundary is extended to include this small area to achieve nesting within the MCA framework.
7	Gwynt-y-Môr Industrial Waters	North, east and south boundaries follow that of MCA 4, western boundary defined by extent of Gwynt-y-Môr offshore wind farm, as marked on the marine charts.
8*	North-east of Anglesey (open waters)*	Like 6 above, this represents a section of marine area sandwiched between the eastern extent of the Anglesey study area (SCA 28) and the eastern extent of MCA 4. North and southern boundaries same as MCA. It is suggested that the Anglesey SCA boundary is extended to include this small area to achieve nesting within the MCA framework.
9*	Pontllyfni*	This unit is proposed as a southerly extension to existing SCA 18: Abermenai, following bathymetry and the presence of sediments relating to flow from the Menai Strait.
10	Porth Dinllaen Coastal Waters	This proposed SCA forms an eastern unit within MCA 13. Western boundary extends from the end of Trwyn Porth Dinllaen; defining the change in bathymetry between the shallow waters of this SCA and the deeper waters to the west.
11	North Llŷn and the Tripods	This proposed SCA forms a western unit within MCA 13. The northern boundary extends

SCA No.	Suggested SCA name	Notes on SCA boundary rationale
	Shoals	from end of Trwyn Porth Dinllaen defining the change in bathymetry between the deeper waters of this SCA and the shallower waters to the east. The southern boundary marks the change in character associated with the shallower and more exposed waters around Bardsey Island.
12	Bardsey Island and Bastram Shoal	Western and eastern boundaries define the waters around Bardsey Island and the rough deep waters associated with Bastram Shoal.
13	Aberdaron Bay	Southern (seaward) boundary follows bathymetry defining the shallow waters within the bay.
14	Hell's Mouth Bay	Southern (seaward) boundary defines the shallow waters within the bay, informed by bathymetry.
15*	Tremadog Bay	Northern (landward) boundary follows bathymetry marking the change between the deeper waters of this SCA and the shallower waters within the coastal bay. The south-eastern (seaward) boundary is only indicative, it is suggested that the boundary for existing SCA 33: Tremadog Bay is extended to include this area to nest within MCA 14.
16	Tremadog Bay and St Tudwal Islands	Southern boundary is defined by bathymetry marking the change between the shallow waters of this SCA and the deeper waters to the south within the wider Tremadog Bay.
17*	Caernarfon Bay (south)*	West and south boundaries nest within MCA 11. The northern boundary is indicative, it is suggested that the boundary for existing SCA 32: Caernarfon Bay is extended to include this area.
18*	South West Anglesey Open Waters*	West and east boundaries same as MCA 12. Northern boundary is indicative, it is suggested that existing boundary for SCA 32: Caernarfon Bay is extended to include this area to achieve nesting within the MCA framework. Southern boundary defines change in character between shallow waters within this SCA and deeper trenches to the south.
19	Llŷn Open Waters	South-west, east and north-east boundaries nest within MCA 12. Northern boundary defines change in character between deeper trenches within this SCA and shallow waters to the north.
20	South Llŷn Coastal Waters	Southern boundary follows that of MCA 13. The landward boundaries are defined by coastal SCAs and follow bathymetry.
21*	Cardigan Bay (north)*	This represents a small sliver between the north-western extent of existing SCA 36: Cardigan Bay and the outer edge of MCA 19. It is suggested that SCA 36 be extended

SCA No.	Suggested SCA name	Notes on SCA boundary rationale
		to cover this small area to achieve nesting within the MCA framework.
22*	Aberdyfi Bay*	This represents a small area between the northern extent of MCA 16 and the southern extent of existing SCA 35: Aberdyfi Bay. It is suggested that SCA 35 be extended to cover this small area to achieve nesting within the MCA framework.
23	Aberystwyth	This potential SCA is associated with the developed coastal town and harbour of Aberystwyth.
24*	Cardigan Bay Coastal Waters*	This proposed SCA forms the eastern half of MCA 16. The shallow waters and developed coasts around Aberporth, New Quay, Aberaeron and Aberdyfi mark the change in character along this otherwise undeveloped coastline – brought out as separate SCAs. The western boundary is indicative, marking the transition to the Pembrokeshire Coast National Park coastline west of Cardigan.
25	Aberaeron and New Quay	This proposed SCA represents the more sheltered and busier waters and coast around Aberaeron and New Quay.
26	Aberporth Bay	This proposed SCA represents the more sheltered and busier waters and coast around Aberporth.
27	Cardigan Bay (south)	This is a very small area which is recommended to include within existing SCA 36: Cardigan Bay, to provide nesting within the MCA framework (MCA 16).
28*	Outer Cardigan Bay*	It is suggested that existing SCAs 36: Cardigan Bay and SCA 8: North Open Sea both extend into this area – further detailed study is required to rationalise these links between the two existing local studies.
29*	Taf and Tywi Estuary*	It is suggested that the estuary system should be one SCA separate from the existing SCA 41: Carmarthen Bay north – Pendine Sands. Southern boundary is defined by bathymetry.
30*	Carmarthen Bay north – Pendine Sands*	It is suggested that this area form an eastwards continuation of the existing SCA 41: Carmarthen Bay north – Pendine Sands. Its proposed eastern extent is marked by the transition to the outer Lougher Estuary.
31	Loughor Estuary and Burry Inlet	Western boundary defines the outer extent of the Loughor estuary system and associated sand bars.

SCA No.	Suggested SCA name	Notes on SCA boundary rationale
32	Rhossilli Bay	Southern and western boundaries define the shallower waters within the bay and include the headland of Worms Head.
33	Helwick Coastal Waters	Northern boundaries define the shallow waters of the surrounding bays. Western boundary is same as MCA 25. The southern boundary defines the area of shallow water associated with the West Helwick and East Helwick bar.
34	Port-Eynon Bay	Southern (seaward) boundary follows bathymetry and the shallow calmer waters within the bay.
35	Oxwich Bay	Southern (seaward) boundary follows bathymetry and the shallow calmer waters within the bay.
36	Pwlldu, Caswell and Langland Bays	Southern (seaward) boundary follows bathymetry and the shallow calmer waters within the bay.
37	Swansea Bay	Southern boundary marks the shallower water within the bay including the developments of Swansea Bay.
38	Neath Estuary	Southern boundary defined by the shallow waters and navigation channel associated with the estuary.
39	Port Talbot Industrial Coast and Waters	Boundaries marks the industrial character associated with Port Talbot.
40	Kenfig and Porthcawl	Southern and eastern boundaries same as MCA 26. Western boundary marks the change in bathymetry and the shallower waters associated with Scarweather Sands, Hugo Bank and Kenfig Patches.
41	Nash Sands	Western boundary same as MCA 27. Southern boundary is defined by the shallow waters associated with Nash Sands.
42	Glamorgan Coastal Waters	North-western boundary is defined by the shallow waters associated with Nash Sands. North, east and south boundaries same as MCA 27.
43	Barry and Flat Holm	South and west boundaries same as MCA 29. North-eastern boundary partially marks the change in character between Cardiff Bay to the north and the waters surrounding Flat Holm island.
44	Cardiff Bay	South, east and north-eastern boundaries define the extent of the shallow waters associated with Cardiff Bay and the deeper waters to the south within the neighbouring Severn Estuary Channel.

SCA No.	Suggested SCA name	Notes on SCA boundary rationale
45	Newport and the Usk Estuary	The southern boundary marks the southern extent of the Usk estuary and the Newport navigation channel.
46	Gwent Levels and Welsh Grounds	North, east and southern boundaries same as MCA 29. Western boundary marks the change in bathymetry between the shallow waters and tidal mudflats of Middle Grounds, Welsh Hook and Welsh Grounds and the deeper waters within Newport Deep and the Severn Estuary Channel.
47	Severn Estuary Channel	Eastern boundary is same as MCA 29 and marks the boundary between England and Wales. Southern boundary marks the change in character of the waters surrounding Flat Holm Island. Western boundary defines the extent of the shallow waters associated with the neighbouring Cardiff Bay and the deeper waters within this SCA. The northern boundary marks the change in bathymetry and the shallow waters to the north.
48*	Carmarthen Bay*	Southern boundary follows that of MCA 24. Northern boundary is a continuation of the existing SCA 42: Carmarthen Bay. Western boundary is only indicative, it is suggested that the Pembrokeshire SCA 42 Carmarthen Bay extends into this area.
49	Gower Coastal Waters (west)	The northern boundary defines the area of shallow water associated with the West Helwick and East Helwick bar. Southern boundary is same as MCA 25. Eastern boundary marks the change in bathymetry between the deeper waters of this SCA and the shallow waters to the east.
50	Gower Coastal Waters (east)	The northern boundary defines the area of shallow water associated with the coastal bays. Southern boundary is same as MCA 25. Western boundary marks the change in bathymetry between the shallow waters of this SCA and the deeper waters to the west.
51	Outer Swansea Bay	Western and southern boundaries are same as MCA 26 and along with the eastern boundary define the outer extent of Swansea Bay. The northern boundary marks the change in bathymetry and the deeper waters within the outer bay.
52*	Bristol Channel offshore*	North, east and south boundaries same as MCA 28. Western boundary is only indicative, it is suggested that the existing SCA 43: Bristol Channel offshore should extend into this area to represent the Bristol Channel as a whole.

* indicates where there is a transitional boundary between the suggested units outlined above, and those already defined by the local studies in Pembrokeshire and Anglesey/Snowdonia. The table includes suggestions for rationalising the links through future work, subject to more detailed research.

Appendix 2: Exploring a national marine/seascape typology

Part of this study explored initial steps in defining a national classification of marine/seascape character types for Wales – collectively known as a 'typology'. The mapped outputs of this task are presented at Figure 5.9 in Chapter 5.

Marine/Seascape Character types are defined as follows, consistent with Natural England's definition for Seascape Character Types as set out in their national approach document to Seascape Character Assessment (2012):

Definition of Marine/Seascape Character Types (adapted from Natural England, 2012)

These are distinct types of seascape that are relatively homogeneous in character. They are generic in nature in that they may occur in different locations but wherever they occur they share broadly similar combinations of geology, bathymetry, ecology, human influences and perceptual and aesthetic attributes. For example, sheltered bays, rocky coves, sandy beaches or harbours are recognisable and distinct seascape character types.

Establishing a typology can provide a character-based framework for analysing change since many influences and pressures affect similar types of seascapes in similar ways. Analysis of types can also provide a foundation upon which to develop coastal or marine planning or management strategies. Reference to geographically discrete character areas, as defined as paragraph 2.12, can provide locational definition to information presented for the character types as a whole. Both character areas and types can be defined at a variety of scales to inform different levels of marine planning and management – from the national scale to shape overarching policy and strategic planning – to the more local level to assist in the planning and management of specific parts of our coasts and seas.

Method undertaken for this study

The study explored the use of existing national proxy datasets, namely those relating to the 'natural/physical' influences on marine character, to begin to identify a marine/seascape typology for Wales. This work also drew upon the methods undertaken by the existing local Seascape Character Assessments in Wales (for Pembrokeshire and Anglesey/Gwynedd, both 2013) to define local Seascape Character Types.

It is important to note that the work undertaken as part of this study was limited to a data-driven task to identify key patterns in natural/physical influence which will form a sound starting point for more detailed future work. Key recommendations for building on this initial work are included at the end of this Appendix.

The steps taken to produce the mapping illustrated at Figure 5.9, using a combination of three key datasets, are summarised below. The Metadata accompanying the GIS shapefile produced from these steps also provides a summary of the data processes followed for the benefit of GIS specialists.

Step 1: Mapping general patterns of subtidal and intertidal marine habitats

NRW provided LUC with broad-scale subtidal and intertidal marine habitat mapping derived from HABMAP dating from 2011, which is in the process of being updated through a joint project with the JNCC (including adding survey data to improve its

accuracy). The data is based on the HABMAP model which takes into consideration physical parameters such as bathymetry, sediment/rock type, light attenuation, bed sheer stress and then links these to the biology from real data. Polygons are drawn according to those physical parameters and the biological communities predicted (therefore the spatial information can only be interpreted as broad patterns of habitat variation).

For this study, to enable broad patterns to be made and understood by non-specialist audiences, the more detailed habitat classifications showing in the data were simplified down further, using the JNCC's marine habitat classification as a guide. The simplified categories chosen for this study, with links back to the Level 2 hierarchy described on the JNCC website, are as follows:

Table showing simplified marine habitat categories developed for this study

JNCC category (Level 2)	Simplified category defined for this study
High energy circalittoral rock	High energy rock
High energy infralittoral rock	
High energy littoral rock	
Sublittoral mixed sediment	Sublittoral sediment
Sublittoral sands and muddy sands	
Sublittoral coarse sediment (unstable cobbles and pebbles, gravels and coarse sands)	
Sublittoral cohesive mud and sandy mud communities	
Sublittoral macrophyte-dominated communities on sediments	Maerl beds, seagrass beds and lagoons
Moderate energy circalittoral rock	Moderate energy rock
Moderate energy infralittoral rock	
Moderate energy littoral rock	
Littoral biogenic reefs	Reefs
Sublittoral biogenic reefs on sediment	

Note the above categories are limited to those found in Wales' Inshore Waters.

Step 2: Addition of wave climate data to the sublittoral sediment category

As the 'sublittoral sediment' category defined above was found to cover a significant proportion of the study area, it was felt it would benefit from further definition provided by the addition of two other national-scale 'physical' datasets. The first was wave climate data supplied by NRW; used to help understand the habitat's differing levels of exposure to the energy of the sea (as is already incorporated into the 'rock' habitats in the table above). The wave climate categories applied to the simplified 'sublittoral sediment' category are set out in the table below:

Table showing wave climate categories applied to the 'sublittoral sediment' habitat category

Wave climate data value	Category defined for this study
1, 2 and 3	Low energy
4 and 5	Moderate to high energy
6 and 7	High energy

Step 3: Further addition of bathymetry (depth) data to the sublittoral sediment category

The second additional national dataset applied to the sublittoral sediment category was SeaZone's bathymetry depth area layer. Three different bandings were defined for the purposes of reflecting variations at the national scale, as set out in the table below.

Table showing bathymetry categories applied ot the 'sublittoral sediment' habitat category

Depth range (metres)	Category defined for this study
0-50	Shallow water
50-100	Medium depth water
100-500	Deep water

Final physical typology categories applied mapped across the Wales Inshore Waters study area

Figure 5.9 in Chapter 5 of this report provides the national results from the above steps. The final 12 categories showing on the map, which could form the starting point for future, more detailed work to define a character typology for Wales, are as follows:

- Low energy rock
- Moderate energy rock
- High energy rock
- Low energy sublittoral sediment / Medium depth water (50 - 100m)
- Moderate to high energy sublittoral sediment / Medium depth water (50 – 100m)
- High energy sublittoral sediment / Medium depth water (50 – 100m)
- Low energy sublittoral sediment / Shallow water (0-50m)
- Moderate to high energy sublittoral sediment / Shallow water (0-50m)
- High energy sublittoral sediment/ Shallow water (0-50m)
- Low energy sublittoral sediment / Deep water (100 - 500m)
- Maerl beds, seagrass beds and lagoons
- Reefs

Recommendations for future work on a national marine/seascape typology

The following points should be considered in any future work to define a national typology:

- **Seek to define a typology that is fit for purpose at the national scale**; understood by a range of audiences and decision-makers and able to be used as a spatial planning tool.
- **Incorporate information on cultural and social factors** (including functions – e.g. marine transportation, anchorage, recreation, resource exploitation) in ensuring a balanced typology is defined for Wales.
- **Do not limit the definition of types to available data** which can be predictive /approximate (as in the case of the marine habitat data as set out above) – further verification should be sought from other sources, including the marine charts, sea pilots, consultation – and wherever possible – field/boat survey work.

- **Explore the identification of appropriately scaled coastal types** (i.e. units extending an appropriate distance inland beyond the High Water Mark), aiming for a full typology that straddles land and sea.
- **Seek compatibility with the Seascape Character Types defined by the existing local studies**, but ensure the national types remain fit for purpose at the strategic scale and for their intended end use(s).
- **Once a national typology has been spatially defined, explore the development of accompanying descriptive and evaluative information** which could cover aspects such as current condition, forces for change and sensitivity, and planning/ management guidelines. The types could also form the framework for specific studies, such as sensitivity assessments to particular development scenarios.
- **Once a consistent approach is developed at a national scale, consider a subsequent roll-out of component Seascape Character Types** and accompanying descriptive/evaluative information at a local level across Wales. This should form part of future local Seascape Character Assessments, which will also define geographically distinct character areas at a tier below the national Marine Character Areas, as outlined in Appendix 1.

Appendix 3: Consultees

Steering Group members

This contract has been guided by a Steering Group comprising:

- John Briggs, NRW (Project Lead)
- John Hamer, WG
- Deanna Groom, Royal Commission (RCAHMW)

Further specialist input/peer review was provided by:

- Polly Groom, Cadw

Participants at the workshop held on 6 February 2015, Aberystwyth

Name	Organisation
Engr Klaus Armstrong-Braun	Envirowatch.eu
Henry Aron	NRW
John Briggs	NRW
Roger Cook	Marine Planning
Peter Davies	NRW
John Eddington	Royal Yachting Association
Jim Evans	Welsh Fisherman's Association
Scott Fryer	WTW
Deanna Groom	RCAHMW
David Harding	Marine Planning
Dr Philip Hollington	Bangor University
Rebeca Jones	SNPA
Catrin Jones	Tidal Power
Arwel Jones	
Peter Ogden	CPRW
Marion Page	Welsh Archaeological Trust
John Pearson	National Trust
David Reed	Mariteam Association
Clare Reed	Marine Conservation Society
Michel Regelous	PCNPA
Neville Rookes	WLGA
Ben Sampson	Ceredigion County Council
Lucy Taylor	Severn Estuary Partnership
Trevor Theobald	PCC
Paula Whitfield	WG

Participants in the online engagement exercise

Name	Organisation
Engr Klaus Armstrong-Braun	Envirowatch.eu
Jill Bullen	NRW
Dr Mark Charlesworth	NRW
Jenny Elliott	NRW
Dr Edith Evans	Glamorgan-Gwent Archaeological Trust
Charlotte Gjerlov	Regional Ecologist – South Wales NRW
Polly Groom	Cadw
Edward Holdaway	Friends of Pembrokeshire Coast National Park
Edward Holdaway (second response)	Alliance for National Parks Cymru
Phil Hollington	Vice-Chair, Cragen Llyn a Mon
Catrin Jones	Tidal Lagoon Power
Vanessa Lang	NRW
Emily La-Trobe-Bateman	Gwynedd Archaeological Trust
Gareth Lloyd	Snowdonia National Park Authority
Robert Lowe	
Olwen Maidment	NRW
Chris Martin	Clwyd-Powys Archaeological Trust
Rhys Morgan	NRW
Peter Ogden	Campaign for the Protection of Rural Wales
Michel Regelous	Pembrokeshire Coast National Park Authority
Malcolm and Ruth Ridge	The Gower Society
Euryn Roberts	NRW
Raymond Roberts	NRW
Karen Robinson	NRW
Simon White	White Consultants

Appendix 4: Data outputs and data list

Project data outputs

The main data outputs generated by this project are:

- An Esri shapefile for the national Marine Character Areas for Wales
- File Geodatabase Rasters for the Visual Resource Mapping for Wales

More detailed information on metadata has been provided to NRW in support of the above data. This includes data processing logs for the VRM mapping.

GIS data used to inform the Seascape Assessment

A full data list is provided on the following pages.

Requesting data produced by this contract

GIS files produced by this contract can be requested from accesstoinformationteam@naturalresourceswales.gov.uk

Data list

Data Layers	Original source	Projection	Obtained from
Baseline Information			
Hydrospatial Charted Rasters	OceanWise	WGS84	NRW / eMapsite
Hydrospatial Charted Vector Features	OceanWise	WGS84	NRW
OS map - 1:250,000	Ordnance Survey	BNG	NRW
OS map - 1:50,000	Ordnance Survey	BNG	NRW
OS map - 1:25,000	Ordnance Survey	BNG	NRW
Mean High Water	Ordnance Survey	BNG	NRW
Mean Low Water	Ordnance Survey	BNG	NRW
12 Nautical Mile Territorial Sea limit	UKHO	BNG	NRW
Unitart Authority Boundaries	Ordnance Survey	BNG	NRW
Harbour Limits	Wales Marine Resource Atlas	WGS84	NRW
National Marine Plan Areas for Wales	Welsh Government	BNG	WG
Shoreline Management Plan	Councils (various)	BNG	NRW / Pembrokeshire City Council
Landscape/Seascape Character Assessment			
National Landscape Character Areas	LUC	BNG	LUC
Cardiff LCA	Cardiff County Council	BNG	Cardiff County Council
Vale of Glamorgan LCA	Vale of Glamorgan Council	BNG	VoGC
Conwy LCA	Conwy Council	BNG	CC
Ceredigion SLA	Ceredigion County Council	BNG	Ceredigion County Council
Gwynedd LCA	LUC	BNG	LUC
Anglesey LCA	NRW	BNG	NRW
Snowdonia LCA	LUC	BNG	LUC
Bridgend LCA	LUC	BNG	LUC
Pembokeshire Coast National Park LCA	PCNPA	BNG	PCNPA
Monmouthshire LCA	Monmouthshire County Council	BNG	MCC

Data Layers	Original source	Projection	Obtained from
Neath Port Talbot LCA	Swansea County Council	BNG	SCC
Landmap (all aspects)	NRW	BNG	NRW
AONB	NRW	BNG	NRW
National Parks	NRW	BNG	NRW
Heritage Coast	NRW	BNG	NRW
National Trust areas	NRW	BNG	NRW
Regional Seascape Units	NRW	BNG	NRW
Pembrokeshire SCA	PCNP	BNG	NRW
Anglesey & Snowdonia SCA	Fiona Fyfe & Associates	BNG	NRW
Registered Historic Landscapes	CADW	BNG	NRW
Historic Landscape Sub Areas	CADW	BNG	NRW
Natural Features			
OS Terrain 50	Ordnance Survey	BNG	OS
Bathymetry and Elevation	OceanWise	WGS84	NRW
Wave Climate	NRW	WGS83	NRW
Offshore bedrock geology	OceanWise	WGS84	NRW
Onshore bedrock geology	BGS	BNG	BGS
Offshore sediment geology	OceanWise	WGS84	NRW
Onshore sediment geology	BGS	BNG	BGS
Tides & currents	OceanWise	WGS84	NRW
Intertidal Phase 1 Habitat Survey	NRW	BNG	NRW
Terrestrial Phase1 Habitat Survey	NRW	BNG	NRW
Habmap Subtidal broad scale habitats	NRW	BNG	NRW
Sea birds	Wales Marine Resource Atlas	BNG	NRW
Marine mammals	Wales Marine Resource Atlas	BNG	NRW
Marine Conservation Zones	Natural England	BNG	NE
Local Nature Reserve	NRW	BNG	NRW
Marine Nature Reserve	NRW	BNG	NRW

Data Layers	Original source	Projection	Obtained from
National Nature Reserve	NRW	BNG	NRW
Ramsar site	NRW	BNG	NRW
Special Areas of Conservation	NRW	BNG	NRW
Special Protection Areas	NRW	BNG	NRW
SSSI	NRW	BNG	NRW
RSPB Reserves (UK)	RSPB	BNG	RSPB
Important Bird Area (GB)	RSPB	BNG	RSPB
Tidal Power	Renewable Energy Atlas	WGS84 UTMZone 31N	ABPmer
Tidal Flow	Renewable Energy Atlas	WGS84 UTMZone 31N	ABPmer
Cultural/Social Factors			
Wales Coastal Path	NRW	BNG	NRW
Common land	NRW	BNG	NRW
Wrecks & obstructions	UKHO	WGS84	NRW
Scheduled Monuments	CADW	BNG	NRW
Listed buildings	CADW	BNG	NRW
Historic Parks & Gardens	CADW	BNG	NRW
Sea Fishing Atlas of Wales	NRW	BNG	NRW
World Heritage Sites	CADW	BNG	NRW
Offshore and Coastal Archaeological sites	RCAHMW	WGS84 UTMZone 30N	RCAHMW
Historic Seascape features	RCAHMW	WGS84 UTMZone 30N	RCAHMW
Palaeolandscapes Character Areas for Liverpool Bay & Bristol Channel	RCAHMW	WGS84 UTMZone 30N	RCAHMW
Navigation, installations, obstructions & constructions	OceanWise	WGS84	NRW
Transportation & Activity licence areas	OceanWise	WGS85	NRW
MOD Areas	NRW	BNG	NRW
Historic Parks & Gardens	CADW	BNG	NRW

Data Layers	Original source	Projection	Obtained from
Listed Buildings	CADW	BNG	NRW
Protected Wreck Sites	CADW	BNG	NRW
Scheduled Monuments	CADW	BNG	NRW
Wave Climate	NRW	WGS83	NRW
Perceptual/experiential factors & Visual Resource Mapping			
Night skies (2000)	LUC	BNG	CPRE
Tranquil areas (2009)	NRW	BNG	NRW
National mapping of land with sea views	Marine Management Organisation	ETRS1989 UTM Zone 30N	MMO
National mapping of sea visibility	Marine Management Organisation	ETRS1989 UTM Zone 30N	MMO

Appendix 5: References

In addition to the data listed in Appendix 4, this study drew on a range of published reports and web-based information. The main sources are listed below.

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NRW Designated Sites Website Pages. Accessible at http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/designated-sites-search.aspx

Divernet website. Accessible at http://www.divernet.com/UK_Diving/

JNCC Marine Website Pages: http://jncc.defra.gov.uk/default.aspx?page=3

JNCC UK European Protected Sites Website Pages: http://jncc.defra.gov.uk/page-4

National Coastwatch Worm's Head website. Accessible at http://nciwormshead.org.uk/

South Wales Ports website. Accessible at http://www.southwalesports.co.uk/

Trinity House website. Accessible at http://www.trinityhouse.co.uk/

Visit My Harbour website. Accessible at http://www.visitmyharbour.com/

Visit Wales website. Accessible at http://www.visitwales.com/

Wales Marine Planning Portal Website. Accessible at http://lle.wales.gov.uk/apps/marineportal/#lat=52.5145&lon=-3.9111&z=8

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