Report No: 2011R014

Historic Seascape Characterisation
Bristol Channel and Severn Estuary

Section 1
Implementing the Method

Historic Environment Projects

ENGLISH HERITAGE

SeaZone

Historic Seascape Characterisation Bristol Channel and Severn Estuary

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Implementing the Method

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Report Structure

The Project Report for 'Historic Seascape Characterisation: Bristol Channel and Severn Estuary' is divided into three sections for ease of use. The first section outlines the project's method implementation, the second section outlines an applications review and case studies, and the third section contains printed versions of the Character Type text descriptions from national and regional perspectives.

This document comprises Section 1 of the 'Historic Seascape Characterisation: Bristol Channel and Severn Estuary' Report: Implementing the Method'.

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The Project Manager for SeaZone Solutions Ltd was Olivia Merritt and the Project Manager for HE Projects was Charles Johns. The Project Officer was Sean Taylor and the HSC Advisor was Bryn Tapper.

The views and recommendations expressed in this report are those of Historic Environment Projects and are presented in good faith on the basis of professional judgement and on information currently available.

Freedom of Information Act

As Cornwall Council is a public authority it is subject to the terms of the Freedom of Information Act 2000, which came into effect from 1st January 2005.

Historic Environment, Cornwall Council is a Registered Organisation with the Institute for Archaeologists

Cover illustration

Lundy Island (Devon Perspectives)

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Executive summary

The *Bristol Channel and Severn Estuary Historic Seascape (HSC) Project*, funded by the Aggregates Levy Sustainability Fund (ALSF), is one of four projects commissioned to implement the national HSC Method (Tapper 2008 and 2010), extending and applying the principles already underpinning Historic Landscape Characterisation (HLC) to a range of areas of the English coast, seas and adjacent waters. This project successfully extends the initial implementation of the national HSC Method by the *HSC: Demonstrating the Method Project* (SeaZone Solutions Ltd 2009).

The robust national method for HSC is attribute-led, assessing and defining areas that share similar and repeating historic character as Historic Seascape Character 'Types', allowing historic trends and processes to inform and frame the broader sustainable management of change through marine spatial planning, outreach and research projects.

The HSC approach takes a holistic view of the historic seascape which, among many other benefits, facilitates comparison with other comprehensive environmental databases, gives it greater meaning and connectivity with the landscape and seascape perceptions of others, and allows it to provide context for the often 'point-based' datasets available for the marine zone. The resulting product is designed to enable more culturally-informed management of the marine environment and raise public awareness of the historic cultural dimension of the sea.

This project successfully reiterates the implementation of the national HSC Method (Tapper 2008 and 2010), across a sufficiently substantial area to provide effective practical demonstration of the method's operation and capabilities.

1 1Introduction

The *Bristol Channel and Severn Estuary Historic Seascape (HSC) Project*, funded by the Aggregates Levy Sustainability Fund (ALSF), is one of four projects commissioned towards the end of 2009 to implement England's national method for Historic Seascape Characterisation (HSC) across a range of areas in English waters. Together with an initial implementation project across north eastern coasts and seas in 2008-9 (SeaZone Solutions Ltd 2009), these projects' outputs form contributions towards an eventual national HSC database for England to be held by English Heritage.

Throughout this Report, 'landscape' is defined, in accordance with the European Landscape Convention as: 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'(Council of Europe 2000, Article 1). 'Seascape' is defined here as a subset of landscape which includes the sea, and/or areas of land whose character is perceived to be distinctly maritime.

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The robust national method for HSC is attribute-led, defining areas that share similar and repeating historic character as Historic Seascape Character 'Types', allowing historic trends and processes to inform and frame the broader sustainable management of change through marine spatial planning, outreach and research projects.

This report has been compiled to comply with MoRPHE guidelines (English Heritage 2006), and aims to 1) implement that national HSC method (Tapper 2008) in close communication with the English Heritage Characterisation Team, across the project area and 2) review present and potential applications for HSC in the area with particular reference to English Heritage's curatorial responsibilities and the need to raise awareness of the character of the marine historic environment.

2 Background

2.1 Historic Landscape Characterisation and Historic Seascape Characterisation

HLC is a method of assessing and classifying an archaeologist's view of the historic cultural landscape as an aid to inform the management of the historic environment. The approach brings together historic and natural environmental datasets in a GIS format to enable the interpretation of 'Types' of landscape character and the areas in which they are expressed. This method encourages the interpretation of data in a manner transcending their isolated expressions to encourage the identification of recurring trends which characterise the historical and cultural landscape.

The landscape is characterised by HLC according to a series of recurring 'Types' reflecting the dominant historic cultural processes which shape our perceptions of an area's present character. It is designed to inform a broad range of applications including spatial planning, conservation and wider approaches to heritage management

which emphasise the positive contributions to be gained for everyone's quality of life in understanding and maintaining the cultural legibility of the world we inhabit.

HLC has being applied across England in a breadth of contexts, including county based HLC, urban HLC, AONBs and National Parks. To date HLC has been completed across over 75% of England's land area.

HSC draws on the same core principles as underpin HLC (Tapper 2008) to produce a characterisation of the marine and coastal historic landscape.

2.2 Characterising the marine zone

The HSC Method, while maintaining the historic characterisation principles also used in HLC, recognises the need for different expressions of those principles in the coastal and marine environment.

The coastal zone to landward and seaward of mean sea level is an area of overlapping, not abutting, terrestrial and maritime perceptions, demanding assessment of both landward and seaward perspectives, and requiring interoperability between the overlapping HSC and HLC coverage.

The marine environment provides a number of distinct differences from land for historic character assessment. Methods developed and used to apply characterisation principles in terrestrial and near-shore HLC have required adjustment in order to apply the principles effectively to offshore areas. Some of the key aspects of the coastal and marine landscape relevant to this include:

- Understanding the way marine landscape is perceived in contrast with that of terrestrial landscapes

- The sea has multiple vertical levels which can vary greatly for any given area in their historic character: the character of the sub-sea floor, sea floor, water column and sea surface all need to be understood in their own right.

- Dynamic marine environment: the inter-tidal and marine zone is dynamic and often changing due to physical processes such as currents, tidal range and sediment mobility. One of the knock-on effects of that, combined with the tiered three-dimensionality, is to produce complex spatial relationships within and across marine levels, between the sites of cultural activity and their material imprints.

With a rapidly increasing pace and range of coastal and marine development, and with the Marine and Coastal Access Act 2009 (Defra 2009) providing the legislative framework for forward-looking, plan-led sustainable management of the marine and coastal zone, the benefits of having HSC in place are clear.

The application of HSC to the coastal and marine environment was piloted by English Heritage through the ALSF-funded 'England's Historic Seascapes Programme', first in Liverpool Bay and waters off the Fylde (Wessex Archaeology, 2006), then in four further areas extending seawards from: Scarborough to Hartlepool; Withernsea to Skegness; Southwold to Clacton, and the Solent and the Isle of Wight (see http://ads.ahds.ac.uk/catalogue/projArch/alsf/seascapes.cfm). The experience from the five pilot projects was brought together and appraised in 2007-8, eventually consolidated to give the national HSC method published in 2007-8 (Tapper 2008).

Recognising the seascape character variation potentially present at differing levels in the marine environment, and the presence of HSC on land, the HSC Method Statement

provides the following classification has been prescribed within the recorded attributes (Tapper 2008 and 2010):

- Sub-sea floor HSC: identifying the dominant historic character beneath the sea floor veneer;
- Sea floor HSC: identifying the dominant historic character within or directly on the sea floor veneer;
- Water column HSC: identifying the dominant historic character across the vertical height of the water column;
- Sea surface HSC: identifying the dominant historic character of the surface of the water
- Coastal land HSC: identifying those areas of coastal land above MLW which have a distinctly maritime historic character, whether in common with, or differing from, their dominant character from a land-based perspective.
- Previous historic character (recorded where information bearing on it is available)

The time depth of the assessed marine historic character is recorded in the attributes in two main ways in the national HSC Methodology: by recording in the 'Period' attribute the date at which an area adopted its present character, and by recording multiple expressions of 'Previous HSC' for a given area where available evidence bears on that (Tapper 2008, 3.3.2).

Similarly, the contrast between the spatial expressions of Character Types and the available and appropriate mapping frameworks for the coastal, intertidal and marine zones has been recognised and accommodated within the national HSC Methodology (Tapper 2008) by mapping expressions of coastal and intertidal Character Types using polygons, whereas below MLW, Character Type expressions are held in a vector grid mesh. This approach has also encouraged a more seamless transition between HLC and HSC by matching the extents of character polygons between the two datasets above MLW where possible.

3 Aims and objectives

The HSC: Bristol Channel and Severn Estuary project Aims and Objectives as specified by English Heritage to meet the requirements of the project brief (English Heritage 2009) are outlined below.

3.1 Project aims

The overall aim of the project was to carry out, using the national method for HSC, a GIS-based characterisation of the area of the Bristol Channel and Severn Estuary as defined by English Heritage (2009, section 4), for England's coastal and marine zones to the limit of UK Controlled Waters.

The overall aim of the project has been broken down by English Heritage in the project brief (English Heritage 2009) into more specific aims as follows:

- To follow the national HSC method to create a GIS-based characterisation of the historic and archaeological dimension of present seascapes across the full extent of the project area, at a scale appropriate to national strategic level applications,

in a manner and using a GIS compatible with other projects contributing to a national HSC database, thereby forming an exemplar for future HSC projects;

- To demonstrate how the application of HSC produces a framework of understanding which will structure and promote well-informed decision-making relating to the sustainable management of change and conservation planning affecting the historic environment in the coastal and marine zones, with particular reference to impacts from marine aggregates extraction;
- To ensure that application of HSC produces a GIS-database fully compliant with the principles of HLC, with the present and anticipated user-needs of English Heritage and with available standards for data content, management, inter-operability and accessibility developed to meet the implications of the Marine and Coastal Access Bill;
- To structure, inform and stimulate future research programmes and agendas relating to the coastal and marine historic environment; and
- To improve the awareness, understanding and appreciation of the historic dimension of the coastal and marine environment to its professional and non-professional users.

3.2 Project objectives

The objectives for the project have been defined by English Heritage in the project Brief (English Heritage 2009) as follows:

- To produce a GIS-based characterisation of the historic and archaeological dimension of the present seascapes across the full extent of the specified project area, using the established national HSC method, adopting at least a national perspective for its descriptions, and coordinating its marine HSC with a national data framework to be advised by English Heritage;
- To analyse and interpret the project's HSC database to identify contexts and applications in the project area typifying those which the HSC approach is designed to inform, as noted in the national HSC Method Statement (Tapper 2008), with particular reference to English Heritage's curatorial responsibilities and influences for the sustainable management of change, the provisions of the Marine and Coastal Access Bill, and UK commitments arising from the European Landscape Convention;
- To document those HSC contexts and applications in the project area by description, including scenario examples as appropriate. Those contexts will include the role of HSC in informing the marine aggregates extraction licensing process;
- To document from the project area, by description and by case study, the close inter-relationships between historic and natural environment character and the advantages of inter-operability between historic and natural environment spatial datasets;
- To document from the project area the potential of the HSC for raising public awareness and understanding of the coastal and marine historic environment;

- To produce a database of referenced structured texts relating to Character Types assessed during the characterisation and supplemented by imagery from the Project Area.
- To produce an Archive and a Project Report documenting all aspects of the project's application of the national HSC method. Included within the Project Report will be: a project method statement detailing the project's practical implementation of the national HSC methodology; documentation of the project area's contexts and applications, current and potential, which HSC can advantageously inform; the relationships between the project area's historic and natural environment character, and the potential of the project's HSC for raising public awareness and understanding of the coastal and marine historic environment;
- To detail in the Project Report's method statement the specific tasks and aspects of implementing the national HSC methodology across the project area, including records of the sources and data-sets supporting each stage of the characterisation and noting the inter-relationship between HSC and HLC where the latter has been undertaken within the project area, to meet the needs of transparency and to assist future updates against the initial benchmark characterisation; and
- To disseminate information on the progress and results of the project through the internet and through professional and popular publications and other media.

4 Study area

The overall area to which the national HSC Methodology has relevance comprises England's coastal zone and its share of UK territorial waters and adjacent UK Continental Shelf to the limit of UK Controlled Waters.

Within that overall area, this project was limited to the English sector of the Bristol Channel and Severn Estuary and adjacent coastal zones. This Project Area enabled this project to complete coverage of all licensed and application areas for marine aggregates dredging in the English part of the Crown Estate's South West Region (www.thecrownestate.co.uk/dredge_areas_statistics). It was recognised that the boundaries of this project area reflect administrative and practical constraints, and did not reflect any division in the continuum of the historic environment.

The western lateral extent of this project area is defined by a line from Hartland Point, Devon, at N51.02165, W4.524873 and extending due north-west to the point where it intersects with the seaward boundary defined below. Note that this extent includes Lundy Island within the project area. Across the inter-tidal zone and land behind the coast, the project area is delimited by a south-eastward extension of that same alignment.

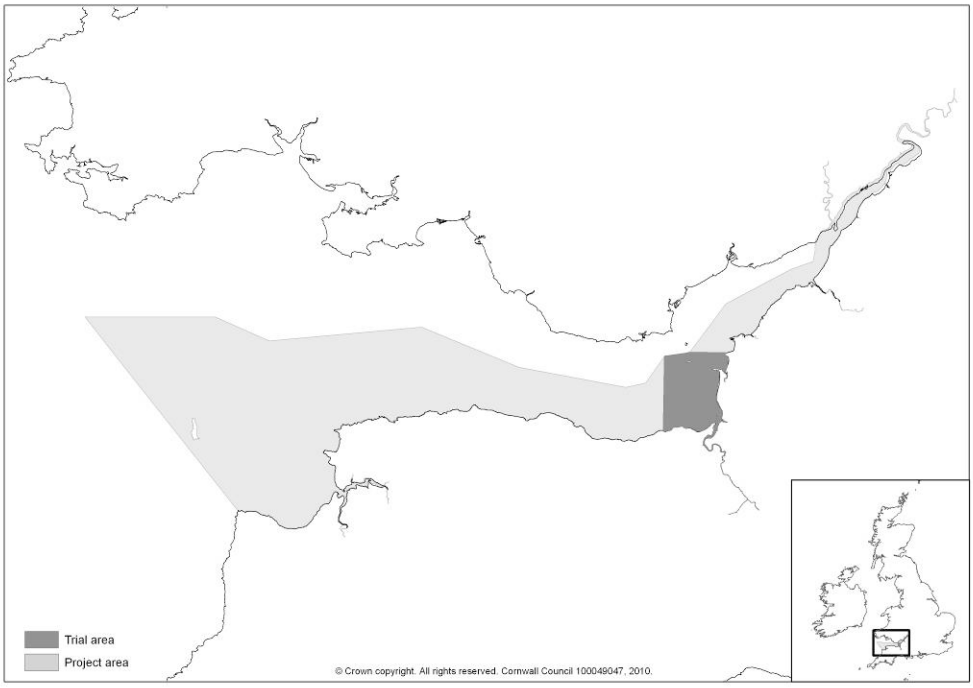

Fig 1 The Bristol Channel and Severn Estuary HSC project area and initial trial area

To seaward along the Bristol Channel and Severn Estuary, this project area extends from the English coastline to the boundary with Welsh Assembly functions as defined in Schedule 3 of The National Assembly for Wales (Transfer of Functions) Order 1999. West from that Order's boundary limit, the project extends seaward to a line extending due west from the western tip of the boundary with Welsh Assembly functions to the point where it intersects with the project area's western limit defined above. East from that Order's boundary limit, the project area is defined by the Anglo-Welsh national boundary, as mapped on OS MasterMap, as it passes along and across the Severn Estuary and continues along the estuary of the River Wye, to its Normal Tidal Limit at Bigsweir Bridge on the A466.

Upstream along the River Severn from the Anglo-Welsh national boundary, the project area encompasses the river's full extent to its Normal Tidal Limits to the west of Gloucester.

The landward extent of the project area reaches at least the OS-mapped line of Mean High Water (MHW) but, in accordance with the national HSC methodology, it continues landward beyond that line to avoid any arbitrary truncation of HSC polygons and to accommodate inland areas perceived, from a maritime perspective, as possessing distinctively maritime character. This may have resulted in the inclusion of some areas on land that are discontinuous with MHW, for example to accommodate prominent inland areas serving as navigational daymarks, producing HSC polygons separate from the main body of the characterisation. The landward extent of the project area is confined to areas lying within England.

Subject to accommodation of inland areas perceived as possessing distinctive maritime character and the extent that they lie within England, all estuaries within the project area are included to their rivers' and tributaries' Normal Tidal Limits.

5 Implementing the method

5.1 Introduction

The methodology compiled from the consolidation of five previous Seascapes projects has been applied as specified in the National HSC Method Statement (Tapper 2008) to meet the requirements of English Heritage to implement the method across the Bristol Channel and Severn Estuary.

A revised working draft of the HSC Method Statement (Tapper 2010), building on the practical experience from the initial HSC implementation project, was used as the basis for applying the national HSC methodology in this project, while working in close communication with staff from the English Heritage Characterisation Team.

The characterisation phase of the project has been broken down to reflect individual tasks within the method, as described in the Method Statement (Tapper 2008 and 2010). Additional phases in the method development such as the development of GIS tools have also been described. The characterisation phase of the project, divided in the project brief between its application to (1) an initial trial area in Stage 2 and (2) the full project area in Stage 3, is described under the following sub-headings:

- Data Collation
- Data Preparation
- GIS Development
- Database Development
- Character Assessment
- Development of Character-type Text Descriptions

5.2 Data collation

The emphasis during collation of core data for the project has been placed on datasets that currently or will, when completed, have consistent national coverage. Emphasis was also placed on those available in digital formats, treating more localised or hard-copy source data available as supplementary.

The information gathered to produce text description for character types has been based on a strategy of desk-based research.

The basic requirements for data collated were that:

- Sources were relevant and consistent;
- Core dataset coverage was national (or at least regional);
- Sources were treated in a consistent manner and even-handed way, following a clearly stated workflow, and were used to reflect time-depth and past change;
- Standard terminologies were used to maintain clarity meeting MIDAS/INSCRIPTION requirements;
- Consistent assessment and capture of historic seascape character was deployed;
- Common 'perception scale(s)' were established – that is, the scale at which characterisation is expected to be read and applied

Data issues such as limited coverage, accuracy, and recording biases were taken into account during the collation of data and application of the method. Marine data and records of archaeological evidence tend to be concentrated towards shallow, intertidal, and coastal areas. The level of accuracy and degree of bias is variable, dependent on the method used to gather the data and the purpose for which the data was gathered. Finally, the integration of non-digital resources may be time consuming so data was therefore gathered in a digital format where possible.

A list of core data sources was identified for the purpose of the project (Fig 2), based on Tapper (2008) and English Heritage (2008). These are datasets which are available on a national scale and provided the core data on which the Seascapes Demonstration has previously been applied.

Data group	Format	Feature Types	Datasets	Supplier
Admiralty charts	Digital	Points, polygons, polylines	Bathymetry, navigational hazards, navigational channels	SeaZone Hydrospatial
Historical charts, views and sailing directions	Paper based/digital	Raster images	Navigational features, offshore development, intertidal peat beds, fish traps	UKHO archives, NMM, local museums
Ordnance Survey maps	Digital	Points, polygons, polylines		English Heritage, Ordnance Survey
Historic maps	Digital	Raster images	1st Edition, 2nd Edition and modern Ordnance Survey maps	English Heritage, Landmark, Ordnance Survey
SeaZone Hydrospatial	Digital	Points, polygons, polylines	- Bathymetry & elevation (BE),☐ - Natural & physical features (NP) - Structures & obstructions (SO) - Socio-economic & marine use (SE) - Conservation & environment (CE) - Climate & oceanography (CO) - Wrecks (W)	SeaZone Solutions Ltd.
Adjacent County HLCs	Digital	polygons	Devon, Somerset, South Gloucestershire and Gloucestershire Authorities provided usable copies of their HLC. Data from the former CUBA area was used in areas that did not provide data in a usable form. Data west of the Parrett was missing from the Somerset HLC.	Local Authorities
Fisheries data	Digital	Points, polygons, raster images, paper charts	Fishing grounds, fishing snags	CEFAS (outside 6nm) Finding Sanctuary
Offshore Industry	Digital	Points, polygons, polylines	Aggregate extraction areas, oil and gas installations	UK Deal, JNCC, SeaZone Hydrospatial
Environmental data and land	Digital			Natural England/ JNCC/ MAGIC

Data group	Format	Feature Types	Datasets	Supplier
classifications				database, CEFAS, BGS (www.searchmesh.net/webGIS.)

Fig 2 Core Data identified for the Project

English Heritage supplied OS MasterMap and historic Landmark data where possible. HER data, HLCs, and the Severn Estuary RCZA, were requested from local authorities where available.

Supplementary datasets identified included local and regional datasets, point data, and data that is not currently available in a digital format (Table 2). These are datasets which are not consistently available nationally to inform all historic landscape and seascape characterisation, but which provide fine-tuning to local and regional character variation during the interpretation of character and, later, the compilation of text descriptions.

Data group	Format	Feature Types	Datasets	Supplier
NMR	Digital	Points, polygons	Monument records, maritime records	English Heritage
HER and SMRs	Digital	Points, polygons	Monument records, maritime records	Local Authorities
Palaeo-environmental data	Digital/paper	various	Peat beds, palaeo-channels,	ABPmer, HER/SMR, BGS
Geomorphology	Digital	raster	Coastal geomorphology	FutureCoast (DEFRA)
Seabed sediments	digital	polygons	Sediment type	SeaZone Hydrospatial
Offshore solid geology	digital	polygons	Bedrock type	SeaZone Hydrospatial
Morphology	Digital	raster	Coastal morphology	FutureCoast
Tidal range	Digital	Raster Images	Sea level model	DTI
Sea level index points	various	various	Sea level model	Various
Tides & Currents	Digital	Points, polygons, polylines	Tides and currents	SeaZone Hydrospatial
Shipping Data and Navigational Hazards	Digital	Polygons, Raster	Navigational hazards, England's Shipping, ANATEC, DfT	Bournemouth University, English Heritage, ANATEC, DfT
Documentary sources	Hard copy, Digital	various		Various: libraries, Record Offices, Museum libraries

Fig 3 Supplementary Data identified for the Project

The collation of documentary resources played a key role in the contextualisation of the character assessment and the development of character-type text descriptions. A wide range of documentary sources was assessed. Data gathering was streamlined using the design of the database structure to guide the assessor in the level of information required. Data was entered directly into the database during desk-based research.

The responsibility for gathering data for the project was divided between SeaZone and HE Projects to optimise efficiency during the early stages of the project. SeaZone used

in-house knowledge of data management and experience gained during previous HSC projects to gather core and secondary digital datasets which are available on a national scale, allowing HE Projects to focus on collating regional scale information while seeking support from local Authorities and interest groups in informing the HSC process. The datasets collated by SeaZone are highlighted in Tables 1 and 2.

5.3 Additional datasets deployed not previously used in HSC

The absence of field visits and NMR aerial photographs necessitated substantial use of internet resources. The use of Google Earth for aerial photo cover and Google Street View for land-based characterisation in particular, proved fruitful. Individual websites are referenced in the Sources field of the Attribute Table but sources used to good and regular effect include those of the South West Regional MCZ project 'Finding Sanctuary', the Severn Estuary Partnership, and Wikipedia.

5.4 Data preparation

Data preparation was undertaken as outlined in the National HSC Methodology (Tapper 2008 and 2010).

A digital geographic dataset containing extent polygons was produced to define 'Location' areas for the coastal and intertidal, inshore, and offshore zones. These are delineated as specified by the UK Hydrographic Office (UKHO) for the intertidal and marine zone, and the Ordnance Survey (OS) for the coastal zone. The coastal zone is defined as the area topographically lying above MHW. The intertidal zone is defined using the intertidal area represented in OS MasterMap which reflects the area from Mean High Water (MHW) to Mean Low Water (MLW) as defined by the Ordnance Survey. Inshore waters are defined between MLW and the 12nm limit and 'offshore' reflects the area beyond the 12nm limit to the outer extent of the project study area. This dataset was used to attribute the Location field [LCTN] of HSC polygons using their centroids, as specified in the HSC Method Statement. Although the representation of the intertidal zone is more detailed in UKHO chart data than it is for OS MasterMap, the inconsistencies between the definition of MHW and MLW between the two made the use of UKHO data above MLW impractical in the context of this project without the undertaking extensive feature deconfliction between two datasets.

Before the data processing was initiated, a vector grid of cells (polygons) covering the marine zone below Lowest Astronomical Tide (LAT), as reflected in Admiralty charts, was created to provide a basis for the offshore HSC polygon layer. The resolution of the grid cell size was decided on the basis of the resolution, licensing conditions, and intended application of the character assessment, in this case 250m. The grid was clipped to reflect the full extent of the study area below MLW.

The project methodology specifies that all data will be referenced to British National Grid co-ordinates (OSGB36) as it is comparable with English land-based data including HLC projects. However SeaZone consider the use of a WGS84 compliant datum below MLW as best practice for marine GIS, at least in the vicinity of the coast of the UK, because, strictly speaking, the OSGB36 datum does not exist offshore. The project work was therefore undertaken using a WGS84 based and Transverse Mercator projected Coordinate Reference System (CRS). The WGS84 / UTM Zone 31N CRS (EPSG: 32631) was suitable for this project. Data is delivered referenced to British National Grid as required by the project terms of reference. Datum transformations between OSGB36 and WGS84 were undertaken using a version of the OSTN02

transformation that has been extended for use beyond its normal 10km offshore limit. All marine datasets were therefore transformed in this way for processing below MLW and were converted back to British National Grid, as required by the project terms of reference, before integration with the character areas above MLW.

Paper maps and charts were georeferenced using graticules and taking account of projections and co-ordinate systems where possible. Those containing limited information of the co-ordinate reference system were digitised by rubber-sheeting the charts using recognisable static reference points along the coastline.

All data has been compiled into a standardised format and CRS as defined above to make it interoperable during the GIS development. The data has been collated to meet English Heritage standards of best practice. The resolution for data capture was determined by the scale at which the data will be viewed and the scale at which it was originally displayed. All newly digitised data was captured at a scale of at least 1:25,000 as recommended in the "Guidelines for English Heritage Projects Involving GIS" (English Heritage 2004) and the AHDS GIS guide to Good Practice (http://ads.ahds.ac.uk/project/goodguides/gis/)

MIDAS Heritage complies with this data standard which is used by the GIgateway™ metadata service run by the Association for Geographic Information (AGI) and also to the UK e-Government Metadata Standard (e-GMS) which is based on Dublin Core. It is designed for use in GIgateway™, and for other metadata applications in the UK. All output GIS files were documented using the UK GEMINI Discovery Metadata Standard, and are encoded according to ISO 19139.

5.5 GIS development

The methodology applied to the project area was applied as outlined in the national HSC Method Statement (Tapper 2008 and 2010).

The development of the project GIS was supported where necessary by the tools produced by SeaZone. These included a vector grid creation tool, and a standard technique to re-interpret and transfer attributes from source datasets to final HSC dataset fields.

The use of the grid creation tool ensured that output grids between HSC project areas will be interoperable, whether they are generated for different areas or for different sizes of grid cell.

5.6 Interpretive character assessment

5.6.1 Multi-Mode Characterisation

The need for a multi-mode approach during the development of HSC was demonstrated as being highly effective during the consolidation of the national HSC Method (Tapper 2008 and 2010) and during its initial implementation (SeaZone Solutions 2010).

Based on the HSC Method Statement (Tapper 2008 and 2010), the topological requirements for the project are as follows:

- Polygons were to be discrete (no overlaps);
- Polygons were to be contiguous (no gaps);
- All attributes were to be filled in where possible with 'NA' used for empty entries as appropriate;

- Every feature (point, arc, polygon, region, etc) should have at least one attribute record;
- There should be no slivers, dangles, knots or cross-overs;
- Multi-part polygons are acceptable; they should have one set of attributes associated with them

The character assessment has been undertaken following the GIS workflow diagram published in the HSC National Method (Tapper 2008 and 2010).

SeaZone provided HE Projects with a standardised GIS attribute table template which was employed to facilitate the derivation of numerous 'intermediate' GIS datasets from the original source data. The attributes of the standardised table matched those set out in the revised working draft of the HSC Method Statement (Tapper 2010). The derived datasets were then reclassified according to an interpretation of their HSC.

The reclassified datasets were then grouped according to the HSC hierarchy so that numerous datasets from various sources could be compared. This allowed datasets to be used together in order to identify aspects such as time depth, resolution of character type, etc. For example, the extents of commercial shipping routes were identified from DfT data although their time depth was ascertained from navigation channels displayed on historic charts and surveys. The output of this phase was a series of layers that have been reclassified to reflect a single sub-character type for each level in the marine tier (see 5.6.3 for more detail).

The next stage involved applying the datasets to their relevant level(s) in the marine tier (Coastal, Sea surface, Water column, Sea floor, Sub-sea floor) where the dominant HSC Type attributes were used to populate in the marine grid mesh. Data within the coastal and intertidal areas was reclassified to construct the attribute structure required to meet the HSC methodological requirements.

Where a suitable Sub-character Type was not already available, a new Sub-type and definition was circulated to the English Heritage Characterisation Team and the other concurrent HSC project teams for comment and approval for addition to the HSC Character Type list.

During Stage 4, the HSC assessor identified the dominant character between the different marine levels in order to populate the (conflated level) Present Sub-Character Type. A prescriptive attribution process, supported by the purpose-built GIS tools produced by SeaZone, was then applied to automatically populate the character type and broad character type based on the classification hierarchy structured around the Sub-character Types. Historic seascape character was then ascribed based on the attributes within the marine tiers.

The project GIS used the following Attribute Structure, in line with the amendments made to the HSC Method Statement following the HSC Demonstrating the Method project (Tapper 2010) (Fig 5).

Attribute Name	GIS database alias	Description and guidance, terminology	Population Method	Format	Width
ObjectID	FID	Unique reference number for HSC polygon/grid cell	Automated by GIS software	Numeric	10
Name	NAME	Name of area or topographic identifier, local or popular name	manual	string	100

Attribute Name	GIS database alias	Description and guidance, terminology	Population Method	Format	Width
Coastal and Conflated Broad Character Type	CC_BDTY	Broad Character Type (present, dominant; national strategic level). Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	automated	string	100
Coastal and Conflated Character Type	CC_TY	Character type (present, dominant; regional level). Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	automated	string	100
Coastal and Conflated Sub Character Type	CC_SBTY	Sub-character type (present, dominant; local level). Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	manual	string	100
Coastal and Conflated HSC Period	CC_PRD,	Benchmark period of origin of the area represented in the polygon or cell. Recorded for present historic character. Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	manual	string	50
Coastal and Conflated HSC Source	CC_SRC	Sources used to identify present and previous historic character. Attribute values to record supplier, date, precise GIS file name. To include reference to the scale of original data used. Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	manual	string	250
Coastal and Conflated HSC Confidence	CC_CNF	Degree of certainty/confidence of HSC interpretation of present historic character. Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	manual	string	25
Coastal and Conflated t HSC Notes	CC_NTS	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	manual	string	250
Coastal and Conflated HSC Link	CC_LINK	URL hyperlink to **Character Type** texts and multi-media. Landward (above MHW) this will record coastal land HSC, whereas seaward it will record the 'conflated' HSC as derived from the marine levels.	manual	string	250
Sea-surface HSC sub- type	SSRFC_SBTY,	Present and dominant historic character of the sea-surface (recorded at sub-character, character and broad character levels)	manual	string	100
Sea-surface HSC type	SSRFC_TY,		manual	string	100
Sea-surface HSC broad- type	SSRFC_BDTY		manual	string	100
Sea-surface HSC Period	SSRFC_PRD	Benchmark period of origin of the area represented in the polygon. Recorded for present historic character levels and previous historic character	manual	string	50
Sea-surface HSC Source	SSRFC_SRC	Sources used to identify historic character. Attribute values to record Supplier, Date, precise GIS file name. To include reference to the scale of original data used.	manual	string	250
Sea-surface HSC Confidence	SSRFC_CNF	Degree of certainty/confidence of HSC interpretation of present historic character.	manual	string	25
Sea-surface HSC Notes	SSRFC_NTS	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	manual	string	250
Sea-surface HSC Link	SSRFC_LINK	URL hyperlink to **Character Type** texts and multi-media	manual	string	250
Water Column HSC sub- type	WTRCL_SBTY	Present and dominant historic character of the water-column (recorded at sub-character, character and broad character levels)	manual	string	100
Water Column HSC type	WTRCL_TY		manual	string	100
Water Column HSC broad-type	WTRCL_BDTY		manual	string	100
Water Column HSC Period	WTRCL_PRD	Benchmark period of origin of the area represented in the polygon cell.	manual	string	50
Water Column HSC Source	WTRCL_SRC	Sources used to identify historic character. Attribute values to record Supplier, Date, precise GIS file name. To include reference to the scale of original data used.	manual	string	250
Water Column HSC Confidence	WTRCL_CNF	Degree of certainty/confidence of HSC interpretation of present historic character.	manual	string	25
Water Column HSC Notes	WTRCL_NTS	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	manual	string	250
Water Column HSC Link	WTRCL_LINK	URL hyperlink to **Character Type** texts and multi-media	manual	string	250
Sea-floor HSC sub-type	SFLR_SBTY,	Present and dominant historic character of the sea-floor (recorded at sub-character, character and broad character levels	manual	string	100
Sea-floor HSC type	SFLR_TY,		manual	string	100

Attribute Name	GIS database alias	Description and guidance, terminology	Population Method	Format	Width
Sea-floor HSC broad- type	SFLR_BDTY		manual	string	100
Sea-floor HSC Period	SFLR_PRD	Benchmark period of origin of the area represented in the polygon cell.	manual	string	50
Sea-floor HSC Source	SFLR_SRC	Sources used to identify historic character. Attribute values to record Supplier, Date, precise GIS file name. To include reference to the scale of original data used.	manual	string	250
Sea-floor HSC Confidence	SFLR_CNF	Degree of certainty/confidence of HSC interpretation of present historic character.	manual	string	25
Sea-floor HSC Notes	SFLR_NTS	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	manual	string	250
Sea-floor HSC Link	SFLR_LINK	URL hyperlink to **Character Type** texts and multi-media	manual	string	250
Sub sea-floor HSC sub- type	SBFLR_SBTY,	Present and dominant historic character of the sea-bed (recorded at sub-character, character and broad character levels)	manual	string	100
Sub sea-floor HSC type	SBFLR_TY		manual	string	100
Sub sea-floor HSC broad- type	SBFLR_BDTY		manual	string	100
Sub-sea floor HSC Period	SBFLR_PRD	Benchmark period of origin of the area represented in the polygon cell.	manual	string	50
Sub-sea floor HSC Source	SBFLR_SRC	Sources used to identify historic character. Attribute values to record Supplier, Date, precise GIS file name. To include reference to the scale of original data used.	manual	string	250
Sub-sea floor HSC Confidence	SBFLR_CNF	Degree of certainty/confidence of HSC interpretation of present historic character.	manual	string	25
Sub-sea floor HSC Notes	SBFLR_NTS	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	manual	string	250
Sub-sea floor HSC Link	SBFLR_LINK	URL hyperlink to **Character Type** texts and multi-media	manual	string	250
Previous HSC Type	PRVS_SBTY1, 2 etc	Previous historic character for which evidence is available. Recorded for multiple time-slices on basis of source dataset.	manual	string	100
Previous HSC Period	PRVS_PRD1, 2 etc	Benchmark period of origin of the area represented in the polygon. Recorded for present historic character levels and previous historic character	manual	string	50
Previous HSC Source	PRVS_SRC1, 2 etc	Sources used to identify previous historic character. Attribute values to record Supplier, Date, precise GIS file name. To include reference to the scale of original data used.	manual	string	250
Previous HSC Confidence	PRVS_CNF1, 2 etc	Degree of certainty/confidence of HSC interpretation of previous historic character.	manual	string	25
Previous HSC Notes	PRVS_NTS1, 2 etc	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	manual	string	250
Previous HSC Link	PRVS_LINK1, 2 etc	URL hyperlink to **Character Type** texts and multi-media	manual	string	250
Character Area	CA1, CA2 etc	Unique character area	manual	string	100
Location	LCTN	General location (e.g. Offshore marine, inshore marine, estuary, coast etc)	manual	string	50
Shape_Area	AREA	Area in map units (usually metres square) covered by polygon.	automated	string	9.9
Cell/grid size	CELL_SZ	Size of grid used for marine zone (e.g. 100mx100m, 500mx500m etc)	manual	numeric	5
Creation Date	CRT_DT	Date of dataset /polygon creation/completion	manual	string	10
Creator	CRTR	Name of the person/organisation who compiled the HSC	automated	string	250

Fig 5 Attribute field structure outlined in the National HSC Method Statement (Tapper 2010)

Time depth is reflected in the character assessment through the differentiation between present HSC (reflected in Coastal and Conflated attributes and within each marine tier) and previous HSC within the attributes, and the recording of a benchmark period reflecting the origin of the activity represented for each of the tiers and the conflated character groups. All HSC polygons will be given a confidence rating as specified in the Method Statement (Tapper 2008 and 2010).

5.6.2 Descriptive Attribution

This section expands upon the overview provided above (5.6.1.)

To reiterate, the first stage of data assessment was a considered interpretation of the data gathered. The methodology applied to the project area has been applied in line with the HSC Method Statement which describes the requirements for descriptive attribution (Tapper, 2008 and 2010):

- Record attributes (i.e. use descriptive criteria) rather than attributing predefined types
- Use computer analysis of attributes to derive HSC models and types
- Create explicit data structures

Each dataset was reviewed upon its delivery and assessed individually in the early stages of GIS development to determine the suitability of its contents based on its coverage, resolution, date of publication, comparison with other similar data sources and relationship to defining historic character. In the first instance each data source was assessed individually. All data of potential value to the project was extracted, as 'intermediate layers', into themed sub-groups to simplify the number of datasets being viewed.

The sub-groups identified generally reflect the broad character classification to some degree, due to logical division between different types of human activities already employed by the national HSC Method. However, the descriptions employed to populate the attributes of each feature or area were not prescribed using HSC character types, but instead reflected the perception of the HSC assessor: that is a defining aspect of a descriptive, rather than prescriptive, approach. For instance, all data relating to navigation, including navigational aids, hazards, and channels were extracted from their respective sources, grouped within a separate data frame and given a series of preliminary attribute fields.

The same preliminary attribute structure was applied to all datasets upon their extraction from source data and was designed as follows:

- A temporary feature type field [CHAR_SBTY]

- A temporary source field [SOURCE]

- A temporary period field [PERIOD]

- A temporary notes field [NOTES]

- A temporary creator field [CRTR]

- A temporary date field [CRTR_DT]

These fields were created alongside the baseline attributes required to populate core information on each feature or area. The fields for each dataset in each data group were then populated as far as possible, reflecting the attribute-led stage of characterisation described in the national HSC Method, to produce a range of datasets with matching fields, enabling features from different sources to eventually be brought together in a cohesive single dataset and given a definitive Sub-character Type. During this stage, the field [CHAR_SBTY] was populated in a way that most closely described the features, enabling a considered approach to classification of the final selection of character areas produced from a selection of different sources.

Data collated from non-digital sources such as georeferenced paper maps and charts were digitised during this phase using the same descriptive attribute structure, to enable the data collated manually to be conflated with digital sources. Duplicate records between datasets were removed during this stage of the GIS development.

The methodology described follows the thought processes employed to organise the data in the first instance to facilitate the description of features and areas, in preparation for the assigning of character sub-types during the classification of contiguous areas of shared character. The approach to each group of data has been described below to inform English Heritage and future HSC projects. The ordering of the Character Types follows the hierarchy laid out by the national HSC Method (Tapper 2008 and 2010) as subsequently revised and amended by EH Characterisation Team.

5.6.2.1 Navigation

Data relating to navigational activities was collated from a broad range of sources including the RYA, Anatec, SeaZone Hydrospatial, historic maps and charts, HLC, OS MasterMap and 1:25000, sailing directions, the ALSF *England's Shipping* database (Wessex Archaeology 2003), and DfT Shipping Density data (the RYA data was later discarded due to copyright issues). Once extracted, data from each source was divided between the following groups of information as follows:

Navigation feature

Navigation channels, both active and disused, were identified, extracted, and reclassified from the ALSF *England's Shipping* database, a representation of main shipping routes compiled from pre-1730 documentary evidence (Wessex Archaeology 2003), SeaZone Hydrospatial data, and OS 1:25000 and historic mapping and charts.

Modern defined navigation channels are recorded under S-57 charting standards and are therefore provided as part of SeaZone Hydrospatial data. All channel-related data including channel marker buoys, navigational lines, recommended route centrelines, and traffic separation zones were extracted from Hydrospatial so that they could be viewed as a group. The features defining the outlines of modern navigational channels and dredged channel areas were separated out, compiled into a single dataset and reattributed. Historic charts were reviewed to identify areas where previous channels could be identified. Where possible, channel outlines were digitised from historic charts or extracted from Hydrospatial depth areas using historic data and documentary evidence as a guide in order to define their extent.

Navigation activity

Anchorages are recorded on modern and historic charts. The anchorage areas recorded in S-57 were extracted from SeaZone Hydrospatial while ALSF Navigational Hazards and historic charts were used as sources for gathering historical records of anchorages. The data gathered as point data in the first instance was given a 500m buffer, before those below MHW were fed through the grid.

Ferry routes recorded in Hydrospatial were extracted and reclassified. The ferry routes from North Devon to Lundy were digitised from the OS 1:25000 as far as coverage allowed and extrapolated where no coverage existed. Ferry routes no longer in use were digitised from historic charts using modern charting as a reference to accurately reflect the route. Historic records of ferry routes were used in the interpretation of previous historic seascape character. Proposed new ferry routes for the Bristol Channel

(http://www.severnlink.com/) were not considered since they were yet to be launched at the time of going to press.

Navigation hazards

Information on navigational hazards was sourced from a broad range of resources including SeaZone Hydrospatial, ALSF *Navigational Hazards* (Merritt, 2007) data, historic charts and sailing directions, NMR wrecks and obstructions, HER data, and OS MasterMap and 1:25000.

The UKHO and NMR both hold extensive wreck data repositories. The hold a separate list of wrecks in the UKHO wrecks database, as well as a list of sites recorded in S-57. The NMR hold records of known wrecks, fishermen' fastenings, and reported losses. In addition, local authorities hold some wreck data while some sites are also depicted on historic charts. SeaZone Hydrospatial contains both the S-57 records and UKHO records, many of which are duplicates of each other. Further duplicates exist between SeaZone Hydrospatial and the NMR Wrecks Database. All wreck data therefore had to be viewed together and compared to isolate as many duplicates as possible. First, the 'Hydrospatial' wrecks were separated into two layers, one for S-57, the other for 'UKHO' wrecks. Duplicates were removed from SeaZone Hydrospatial by looking at the distances between 'S-57' and 'UKHO' wrecks identified as the same. All wrecks identified as likely were then removed. The remaining 'S-57' wrecks were combined with the 'UKHO' wrecks to form a single dataset. The 'NMR' wrecks include numerous 'obstructions'. These had to be isolated as a separate dataset using LIKE queries such as "Desc LIKE "%Unidentified seabed obstruction%". This remains a process which is to some degree manual and required considerable rechecking of the description field for the NMR data to ensure all obstructions have been removed. SeaZone Hydrospatial and NMR wrecks were then compared to identify sites which were not duplicates. This is a difficult process as records often do not contain enough information to accurately match them. The same method employed to remove duplicates between UKHO and S-57 wrecks within Hydrospatial was therefore repeated to minimise the duplicates between the UKHO and NMR. Additional wreck sources such as wrecks on historic charts which were accurate enough for geo-referencing, and HER wrecks were then reviewed in light of the resulting datasets.

These issues are inherent within projects dealing with wreck data on this scale. Work currently (March 2011) being taken forward by English Heritage along with ongoing enhancement of SeaZone's Hydrospatial data should eventually minimise these issues. However, no immediate solution exists to produce a coverage of wrecks in which no duplicate geometries can be guaranteed to exist.

The methodology used to clean the wreck data was repeated to deal with obstructions. The 'S-57' and 'UKHO' obstructions were first compared, followed by the integration of the fishermen's fastenings and obstruction data from the NMR and isolated records of obstructions in historical charts.

Once a cleaned, single layer of points had been produced for wrecks and obstructions respectively, the Density Analysis tool in the ArcGIS Spatial Analyst extension was used to identify areas where densities in wrecks existed. The raster image on which the density scatters was based were produced using a search radius of 2000m, and an output cell size of 250m in line with the output cell size of the project grid. The output raster was then saved as a floating grid raster and reclassified using the no value field

in order to put the data in a format which enabled the use of the Convert raster to vector tool, to produce character polygons which could be attributed.

Dangerous wrecks and protected wrecks were extracted from SeaZone Hydrospatial using 'NMR' wrecks as a reference to ensure all sites were identified. UKHO and NMR wrecks which are duplicated are often represented by points or polygons which have been given different spatial locations. The 'UKHO' wrecks are recognised as displaying the definitive locations as recorded in S-57 and are regularly updated as new surveys are undertaken. The geometries for protected wrecks and dangerous wrecks were therefore drawn from SeaZone Hydrospatial and attributed using information drawn from the NMR, documentary sources and HERs.

As rock outcrops and drying areas are defined by the fact that they lie above LAT and MLW, these were identified by comparing rocky and sandy foreshore areas recorded in OS MasterMap and 1:25000, and depth areas in SeaZone Hydrospatial. The ALSF *Navigational Hazards* project GIS contains a series of historically mapped hazards which have been related to their modern equivalents (Merritt, 2007). The project reviewed a broad range of historical charts for the entire English coast and was therefore considered to sufficiently comprehensive to cover historic records of navigational hazards for the purposes of this HSC project. The characterisation of navigational hazards and the original point data collated from georeferenced historical maps and charts during the development of the project output were used to support the characterisation.

Submerged rocks were identified using a combination of querying out shallow depth areas and comparing the results to attribute queries on rocks in Hydrospatial, OS MasterMap, ALSF *England's Shipping* points, and historical maps and charts.

Rock outcrops, defined as areas within the intertidal zone which are permanently exposed or visible at low water are represented on Ordnance Survey maps and were therefore drawn from OS MasterMap and 1:25000.

Maritime Safety

Safety areas are provided as part of SeaZone Hydrospatial data and are mapped by the UKHO under S-57 charting standards. The features were therefore extracted from SeaZone Hydrospatial and given descriptive attributes. However, since these areas represented other activities they were more likely to be characterised with these activities in mind.

Maritime safety features comprise an aspect where the perception of seascape character overlaps strongly with, yet often differs, from perception of landscape character. Features such as churches, hills, and windmills, are, where justified, characterised as maritime safety features, daymarks, used to assist navigation when interpreted from a maritime perspective, frequently contrasting with their land-based interpretation depicted on OS mapping. OS MasterMap and 1:25000, sailing directions and coastal views, historic charts, maps and coastal profiles, and SeaZone Hydrospatial data were used in combination to identify maritime safety features along the coast such as daymarks, lighthouses and beacons, and coastguard and lifeguard stations. The features were digitised from the georeferenced historic charts and maps and extracted from SeaZone Hydrospatial. The resulting datasets were then compared to remove duplicates and given descriptive attributes in preparation for the prescriptive phase of the analysis. Where necessary, points were buffered following the scale prescribed in the HSC National Method (Tapper 2008 and 2010). Buoys and beacons offshore were

extracted from SeaZone Hydrospatial and used in some cases to demarcate the features they marked such as the edges of navigational channels or navigational hazards.

5.6.2.2 Industry

Data was collated from a range of sources including SeaZone Hydrospatial, JNCC, and OS 1:25000 and historical mapping. As each dataset contains a range of industrial features, all features of potential relevance to the character of the coastal and marine landscape were extracted into separate datasets. For instance, pipelines displayed as polylines were extracted into one shapefile. This approach enabled features displayed as points or polylines to be buffered to produce polygons in order to integrate them with equivalent datasets from other sources.

Extractive industry (minerals)

Licensed aggregate dredging areas were extracted from SeaZone Hydrospatial. The features were compared with areas supplied by the Crown Estate, UKDEAL, and BMAPA and found to be up-to-date. Four active and one proposed license areas were present within the project area.

Mines and quarries were mapped on land, where a maritime character was identified, using OS MasterMap and 1:25000, supported by historical maps, HER and NMR records, documentary sources, and HLC where available.

Energy Industry

Only one hydrocarbon pipeline was identified within the project area and this was depicted as a polyline and given a 200m buffer.

Hydrocarbon refineries and power stations and nuclear power stations were identified along the coastline using a combination of OS MasterMap, 1:25000, and historic mapping, HLC where available, and SeaZone Hydrospatial to identify the sites. Their extent was then defined using an HLC polygon where possible. Where necessary that extent was defined by extracting and dissolving OS MasterMap polygons, before giving them a set of preliminary attributes.

Renewable energy installations were identified from OS 1:25000 and proposed new offshore installations were identified from S-57. The latter were not used to inform HSC since they are indeed proposed rather than built but a case study scenario of HSC's applications to informing offshore energy development proposals forms part of Section 2 of this report.

A new Sub-character Type, 'Overhead power cable', was generated by this project, since it was felt that such structures can have a dominant imprint upon seascape character where present. Several structures, across the Rivers Severn and Wye, were identified, from OS 1:25000.

Processing industry

The same approach used for refineries and power stations was used to define all industrial areas along the coastal zone, including chemical works, production areas, and sewage works. Spoil dumping grounds are recorded on modern navigational charts to indicate areas where spoil resulting from dredging, drilling or waste has been deposited on the seabed. These areas recorded in S-57 and were therefore extracted from SeaZone Hydrospatial.

New Sub-character Types 'Lime production' and 'Salt production' have also been generated, informing assessments of Previous HSC only, at least in this project area.

Shipping industry

The assessments of shipping routes drew on information from the Anatec, *England's Shipping*, and DfT Shipping Densities datasets, which were viewed together to assess the degree to which they overlapped and agreed with each other. These were superimposed with the DfT polygons. Where the routes from multiple sources coincided, centre lines were drawn through the middle of routes and buffered to match the breadth of routes displayed in the DfT data.

5.6.2.3 Fishing

Data on fishing activities was drawn from a range of sources, some directly bearing on the extent and character of the fishing industry, others providing proxy information. These included regional Sea Fishery Committee (SFC) fishing sightings, JNCC, CEFAS, historic charts and documentary sources. Named fishing grounds were extracted from historical and modern charts but a general paucity of data within the project area appears to reflect the low density of present-day fishing within the project area, in part a consequence of the high density of commercial shipping in the area. Some historic fishing activities, in particular fish trapping, were identified from HERs and from bibliographic sources as a result of recent work in the Severn Estuary and Bridgwater Bay in particular.

The most valuable source of current fishing data proved to be the website of the 'Finding Sanctuary' project (http://www.finding-sanctuary.org/), set up to define and recommend areas for Marine Conservation Zone (MCZ) designation by the end of 2012, The website contains large grained maps of fishing activity within the project area. These were printed off, scanned and digitised, and the resulting polygons used to inform the character of the western end of the project area. Fishing evidence for the eastern end of the estuary and the higher reaches of the Severn was generalised from bibliographic sources (see associated 'Fishing' HSC Character Type texts).

Aquaculture

Areas of shellfish farming were identified from various HER data and bibliographic sources and predominately informed Previous HSC character within the project area.

5.6.2.4 Ports, Docks and Harbours

Ports, Docks and Harbours

Formal 'harbour areas' reflect the water on the approaches to a harbour or dock and are essentially an administrative area. These are defined in Hydrospatial under S-57 and were therefore extracted and reclassified. Coastal features relating to the shipping industry, such as docks, dockyards, shipyards, boat yards, etc were defined using a combination of modern and historic OS mapping to identify the extents and ages of different parts of ports and harbours.

5.6.2.5 Coastal infrastructure

Flood and Erosion defence

Many aspects of sea and flood defences are difficult to disentangle from the areas and landscapes that they protect. Lines of defences were extracted from OS MasterMap by

queries such as "Descript_2" = 'Top Of Slope' AND "Make" = 'Manmade'. Features were then checked, and, if appropriate, deleted from the dataset until only relevant features remained. To avoid thin polygons that would not have been visible at the appropriate viewing scale only areas that were extensive were characterised as these Sub-Character Types.

5.6.2.6 Communications

Transport

Transport systems were documented through their extraction from OS MasterMap, SeaZone Hydrospatial and the review of HLC, NMR, and HER records, and documentary sources. Where possible, polygons were isolated.

Features relating to transport systems were extracted from NMR and HER records using "Like" queries such as "DESCRIPTIO" LIKE '%Canal%' which identify all records containing the word "Canal". The only railways considered to have a maritime aspect occurred in areas whose HLC provided polygons for that character and these were used in this instance.

Roads were only defined for this project where they were found to dominate the maritime character of an area, though in most cases, roads fell well below the threshold for depiction in this strategic level HSC. Otherwise the HLC characterisations within the project area were used to guide the assessment of the dominance of major roads over their surrounding character types.

Civilian airfields were extracted from the OS 1:25000 and HLCs. Although these may be sited away from the coast in many instances it was felt that since much of the air traffic over the project area originated from these sites that this gave them a maritime character.

Telecommunications

The project area contains a number of important submarine telecommunications cables and these were extracted from SeaZone Hydrospatial, UKHO and S-57 data.

5.6.2.7 Military

Character areas relating to military activity were drawn from a wide range of sources including OS MasterMap, SeaZone Hydrospatial, historic maps and charts, NMR, HER and HLC data and documentary sources.

Military defence and fortification

Military coastal defences and fortifications areas were assessed from HLCs and HERs, and from the OS 1:25000. These were used to assess suitable extents reflecting both present and previous historic character.

Military facility

Ordnance Dumping grounds and military practice areas in inshore and offshore areas were extracted from SeaZone Hydrospatial. Military practice areas include a range of activities. These were extracted as a single group and differentiated during the descriptive attribution of the areas. Detailed information about the functions of these sites proved difficult to obtain.

Coastal and intertidal military areas such as airfields, military bases, firing ranges, etc were assessed using OS MasterMap and HLC polygons were available. SeaZone

Hydrospatial, HER and NMR data and historical maps were used to assess suitable extents reflecting both present and previous historic character.

5.6.2.8 Settlement

Settlement

The extents of towns and villages were defined by extracting information from County HLCs. The concentration in settlement around harbours, estuaries, and industrial or recreational centres along the coast is a significant indicator of the scale of human activity activities within an area.

5.6.2.9 Recreation

Recreation

Recreational areas on land such as golf courses, holiday parks, or parks and gardens, where a maritime character was assessed, were identified and defined using HLC polygons and OS 1:25000 as the primary resource, supported by SeaZone Hydrospatial, historical maps, and HER and NMR data.

Offshore recreational types were identified from a combination of SeaZone Hydrospatial and 'Finding Sanctuary' data in the case of 'Recreational dive areas' and 'Finding Sanctuary' for Leisure fishing. Sadly, copyright issues prevented the use of RYA data for identifying areas of Leisure sailing.

5.6.2.10 Cultural topography

Cultural topography covers a range of areas whose form appears largely the product of natural processes, where the physical imprint of man's activity is subtle and easily overlooked, but which are also made cultural, and perceived as such, by people to varying extents.

Various environmental and other datasets inform the characterisation of areas of cultural topography which although employing natural environment terminologies for ease of popular recognition and simplicity, have clearly definable human dimensions, often in their evolution to their present expressions but also in their management, uses and perception by people. An indication of those cultural dimensions can be gained from the Character Type texts accompanying this project (see Section 3 of this report).

Palaeolandscape component

Palaeoenvironmental data for coastal areas can be drawn from historic maps and charts which in some cases record submerged forests or peat deposits. However, the majority of data was drawn from HER and NMR records and from references in documentary sources.

Research into modelling palaeochannels, sea level change and coastline development, and submerged prehistoric land surfaces is currently (March 2011) being undertaken by ABPmer, who kindly offered some of their preliminary results for use in the project.

The scale and scope of research into palaeo-environments is growing rapidly with the increase in data available from offshore surveys and Regional Environmental Characterisation (REC). Future reviews of HSC will benefit enormously from incorporating the results of such future research.

Cultural topography (landward)

In coastal areas, character areas such as cliff, dunes, etc, were identified using a range of sources including Natural England GIS datasets, OS MasterMap and 1:25000, historic maps and charts, and Google Earth. Google Earth proved particularly useful in identifying current cultural topography, along with the use of desk-based research into place names and the review of such areas as defined by Natural England.

Cultural topography (inter-tidal)

In inter-tidal areas character areas such as saltmarsh, mudflats, etc were identified using a range of sources including Natural England GIS datasets, OS MasterMap and 1:25000, historic maps and charts, and Google Earth.

Cultural topography (marine)

Cultural topography for inshore and offshore areas was assessed primarily from examination of BGS seabed sediments (SBS250) and JNCC data. UK SeaMap is "an interpreted broad scale map of the dominant seabed and coastal features (termed "*Marine Landscapes*") based on geological, physical and hydrographical data" produced by JNCC. These datasets were brought together in a single data frame and assessed to identify areas where patterns of human activity have impacted in various ways to create the distinct cultural topography that we perceive today.

5.6.2.11 Woodland

Woodland

Areas of woodland were derived from HLCs and OS 1:25000 and historical mapping. Although it is often difficult to ascribe a maritime character to individual woodlands it can be assumed that most woodland in coastal areas has and does contribute to maritime character, either from a cultural seascape perspective (not least in its patterning contributing to mariners' ability to distinguish one part of the coast from another) or from its use within industries associated with the sea.

5.6.2.12 Enclosed land

Reclaimed land

Much of the land bordering the Bristol Channel and Severn Estuary has been the subject of a long process of reclamation stretching back to the Roman period and beyond. Successive reclamation, abandonment, and further reclamation have left a landscape palimpsest which may be difficult to interpret on a large scale. Data from HLCs and HERs was combined with documentary evidence, OS 1:25000 contours, and Google Earth to characterise present and previous HSC character. A series of period maps provided by Richard Brunning of Somerset County Council proved extremely useful in characterising the large extent of the Somerset Levels. Previous HSC character was automatically generated on the basis of, for instance, the 'Reclamation from wetland' Sub-character Type having previously been 'Wetland'.

5.6.2.13 Unimproved grazing

Coastal rough ground

Parts of the more exposed coastline of the project area could be classified as Rough grassland or Scrub. This information was extracted from HLCs and OS 1:25000 and verified using Google Earth.

5.6.3 Prescriptive Classification

This section expands upon the overview provided above (6.6.1).

Earlier coverage by HSC projects will have generated a list of Broad/Character/Sub-character Type terms which, where applicable or required by needs for consistency, may be appropriate to use for its polygons of shared character. This is especially true when, as here, the HSC project is contributing to a larger database which requires internal consistency: in this instance a national HSC database. Used with care to ensure their applicability, such available terms will be applied prescriptively once the outcome from the descriptive analysis indicates to the HSC assessor that they are indeed appropriate for the polygons in question.

Driven by the descriptive assessment, data was reviewed in groups of related features, and, based on the comparison and interpretation of the descriptive attributes, it was accorded a Sub-character type, either from an appropriate term previously used in HSC or, if none was felt appropriate, a new term was created as described earlier (5.6.1), a process combining descriptive and prescriptive classification. The higher level classifications in the hierarchy, Character Type and Broad Character Type, were assigned prescriptively and auto-populated in accordance with the HSC Method Statement (Tapper 2008 and 2010).

The characterisation process above LAT and below LAT required slightly different approaches due to the differences in data processing required. Both approaches were undertaken following the national HSC Method Statement and treatment of sources remained the same. Once grouped into Sub-character types, the datasets were then divided between coastal and intertidal or inshore and offshore datasets for the following stages of characterisation. The results were then re-united following the characterisation of the inshore and offshore areas for each marine level.

5.6.3.1 Coastal and Inter-tidal Areas

Characterisation in the coastal and intertidal areas used OS MasterMap and HLC polygons as baseline data from which polygons were created, using a broad range of data sources to identify and interpret character and then define the extent of an area through the identification of significant boundaries. The HSC assessor worked along the coastal and intertidal areas, reviewing historic and modern mapping and charting in the same data frame, while referring to aerial photographs, HER and NMR records and the sub-groups of features collated during the descriptive phase of characterisation. Data was selected out to assess the character, time depth, and extent of each polygon.

Once the boundary to a polygon had been defined, OS MasterMap polygons which made up the area were selected and dissolved into a single polygon and a character sub-type term was sought, whether from the existing HSC terminology or an entirely new term was generated as most appropriately matched the polygon's collated features (see below). The selection of a series of MasterMap polygons often included unwanted branches of road where polygons did not end at the boundary required.

Where features overlapped, an assessment of dominance was made for the intersecting areas. Where possible, areas identified as having a distinct marine or maritime character through the review of a wide range of sources were defined using MasterMap or HLC polygons. However, where features were not identifiable from these sources, such as some instances of coastal wind farms, these character sub-types were defined by integrating features from other sources.

Where a suitable sub-type could not be ascribed based on those listed in the HSC Method Statement, addition character sub-types were determined by the descriptive attributes and added to the list in consultation with English Heritage and the other concurrent HSC projects.

5.6.3.2 Inshore and Offshore Areas

Once the data had been digitised, consolidated into a single data layer, gridded where necessary and classified using Sub-character Types, data groups reflecting individual Sub-character types were consolidated into the marine levels reflecting the different levels of the marine tier.

The baseline data for inshore and offshore areas was diverse but, in many cases, the extent of features was already relatively clearly defined and required interpretation to define the nature and scale of character for each feature.

Firstly, the data for inshore and offshore areas was grouped to reflect the appropriate level(s) of the marine seascape (Coastal land, Sea surface, Water column, Sea-floor, Sub-seafloor) to which they relate. The data was then overlain onto the marine grid mesh using a spatial join (a manual process achieved by using the ESRI Select by Location and Select by Attributes tools), allowing the attributes of the 'intermediate' character polygons to be fed into the grid. Where conflicts existed between data, a decision was made as to the dominance of one feature over another.

An output grid of 250m² was chosen, in common with the other HSC projects contributing towards English Heritage's national HSC database, producing 52,375 cells to be processed across the area. Although this was much less than the cells required for the North East HSC project (SeaZone 2010) the processing required led to a considerably slow redrawing of the grid in the GIS.

Once all datasets had been treated in this way, they were unioned, bringing each layer in at a time applying Sub-character Type attribution based on the descriptive attributes, and making an assessment of dominance wherever overlaps occurred. In instances where a Character type or Sub-character Type was not recorded in the list provided in the national HSC Method, a Sub-character Type term was added, defined in communication with English Heritage and the other concurrent HSC projects.

The HSC Method Statement highlighted the problem of gridding data along boundaries between polygons, where more than one polygon overlaps with a vector cell. It states that, "where the boundaries between two or more polygons in the underlying data source are encompassed by grid square, a decision has to be made by the assessor with regard to which is predominant (this may be achieved automatically by assuming that any cell 'intersected' by underlying dataset is included or by manual selection on the part of the assessor)" (Tapper 2008 and 2010)

All data relating to a marine level was unioned and interpreted to create a single set of discrete polygons. Data reflecting the historic character of areas within each marine level was then integrated through a combination of spatial joins, unions and spatial queries (where the boundaries of areas of distinct historic character had already been defined).

Time depth is reflected in the character assessment through the differentiation between Present HSC and Previous HSC within the attributes, and the recording of a benchmark period reflecting the origin of the activity represented for each of the levels and the

conflated character groups. The fields were populated using a series of unions of historic seascape character polygons with the completed characterisation of Present Sub-character Types.

Once the interpretation for each marine level was completed, HSC polygons for the intertidal and coastal areas were unioned with the inshore and offshore character polygons.

To ensure that the geometries produced were as clean as possible, slivers were removed and the polygons for each marine level were dissolved by HSC attribute fields to ensure that all polygons with identical attributes were brought together in a single polygon.

During Stage 4 of the HSC workflow, the four marine levels were brought together as a single set of polygons for the final characterisation, using the same process of unions used to construct each level. The HSC assessor identified the dominant character between or across the different marine levels in order to populate the Present Sub-Character Type used to display the 'conflated' layer. A prescriptive attribution process was then applied to automatically populate the Character Type and Broad Character Type based on the classification hierarchy structured around the Sub-character Types.

The final attribute structure for the HSC was drawn from the national HSC Method Statement (Tapper 2008 and 2010) (Fig 5). Each level contains the attributes relevant to that level in order to reduce the number of empty fields where possible, while the conflated level contains the full set of field as shown in Figure 5.

5.7 Predominance Assessment

The assessment of predominance is a subjective process, reflecting the fact that landscape and its 'seascape' subset are matters of perception and interpretation: they are pluralistic. In the final analysis the decisions on dominant character were made by the HSC Assessor.

5.8 Development of Character Type Text Descriptions

The analysis and interpretation of historic cultural seascape character from patterns and trends in features in the marine zone is fundamentally a perceptual process whose outcome is captured in the HSC assessment in the GIS and further enlarged upon within Character Type descriptions. The characterisation of shared trends in the definition, their expression in the GIS, the regional and national understanding of Character Types, and their inter-relationships with the natural environment, represent fundamental outputs of HSC projects.

Regional and National perspective text-based descriptions have been developed for each Character Type, each description consistently subdivided according to the following sub-headings:

- Introduction: defining/distinguishing attributes and principal locations;
- Historical processes; components, features and variability;
- Values and perceptions;
- Research, amenity and education;
- Condition and forces for change;
- Rarity and vulnerability;

- Sources

The National and Regional text descriptions compiled by MA Ltd for the 'HSC: Demonstrating the Method' project for North East England were used as an initial guide. The Regional texts from this project cover an HSC 'South West England region', which encompasses the project area, from the Severn Estuary, then continues around the South West peninsula to the eastern boundary of Dorset at Highcliffe. Information collected for the Regional Texts was then used to complement the content of the National Texts where deemed appropriate.

The text descriptions have been structured to facilitate their use as .html pages which can be hyperlinked either directly to polygons within the GIS or to interactive mapping within a future stand-alone multimedia package.

6 Results

6.1 Applying the HSC method

6.1.1 Introduction

The HSC Method Statement is designed to provide general guidelines on creating and compiling an HSC while maintaining the necessary flexibility to allow for implementation at a range of scales, for a range of purposes and using a range of software options.

The key areas where this project felt interpretation beyond the generalities of the method was required in the manipulation and interpretation of data during the application of the method are as follows:

- Developing an approach for descriptive characterisation
- Processing of individual sources e.g. integration of point data such as wrecks to represent scatters
- Consolidation of data from different sources into a single dataset
- Creation of vector grid cells
- Using vector grid cells for marine data
- Defining inland extent
- Method for deriving character polygons on land from OS MasterMap
- Application of the attribute structure prescribed in the method to individual marine levels

6.1.2 Multi-mode Characterisation

The HSC Methodology describes the descriptive or attribute-led element of characterisation as the first stage of a multi-mode approach where descriptive character attributes are analysed using a bottom-up approach. This process takes place during the data capture stage of the project when information is being processed to create source based layers for use in the character assessment process (Tapper 2008 and 2010).

The method describes the attribute-led method but leaves the approach for implementing these rules down to the assessor. The approach adopted for this project,

described in section 6.6.2, where a standard set of descriptive fields has been applied to all data during the descriptive phase of characterisation, facilitated the application of the method during several stages of the methodology:

It enables multiple datasets from different sources to be brought together within a single dataset. The format for attribution used during the descriptive phase of characterisation is not covered by the national HSC Method (although it suggests that any formats should be guided by EH's 'Area' based attribution standard as set out in English Heritage 2007 and Tapper 2008). Therefore, a consistent integrated approach to processing the data to allow integration of points, polygons and lines from different sources needed to be decided upon. It also simplifies the integration of attributes from multiple datasets during the unioning process and the processing required to resolve overlaps between character polygons.

6.1.3 Data Processing

The collation of the core and supplementary datasets was not without issue. The piecemeal supply of OS base mapping and other key data sources during the early stages of the project meant that some tasks of the HSC were delayed. It is appreciated that for HSC projects the sheer range of data, their extent and the preparation time required is a challenge in itself - however future projects would benefit if all requested mapping and data was made available as early a stage in the project as possible.

For purely practical GIS reasons, future projects may also benefit by prioritising the preparation of specific datasets for character assessment so that those informing HSC Character Types which are known to be extensive and wide ranging (e.g. fishing grounds, navigation routes) are prepared and mapped first and those which are more precisely located, mapped second. This ensures that during the population of the marine grid, the extensive and diffuse HSC types serve as the broad canvas onto which the more restricted HSC types are overlain. Undertaken in sequence in GIS, it prevents the larger and more diffuse datasets obscuring or overwriting the smaller and detailed ones in any given cells. Although only a matter of GIS technique, as applied by the assessor during the attribution process, the problem can arise and in some instances lead to mistakes and the loss of the finer resolution HSC types. These then require the assessor to re-run many of the initial marine cell attribute population routines.

6.1.3.1 Individual Datasets

The processing of individual datasets for incorporation into the character assessment is described in the HSC Method Statement (section 3.1.); although in some cases this does not specify how the data should be processed to produce character polygons. If the search areas selected and algorithms employed differ between projects, the results will not be consistent. For HSC projects contributing to a particular application therefore, a method for representing scatters of features would need to be consolidated between HSC projects for the representation to be meaningful. Communication between future HSC projects and reference back to earlier HSC practice, in reports such as this one, should be encouraged to ensure that the approaches used for interpreting point data are comparable.

6.1.3.2 Consolidating Data

A broad range of Sub-character Types are interpreted from a numerous sources, within which exist considerable overlaps. A key part of the characterisation process is the integration of features from different sources during the descriptive element of characterisation. Although the sources available will differ to some degree between regions, the majority of data sourced for HSC are available on a national scale. For HSC projects contributing to a particular application therefore, the processing applied to national datasets between different HSC project areas should be co-ordinated to ensure that the results are comparable.

Different interpretations in the grain of HSC would lead to differences in the display of these datasets. Therefore, most data for this project was gridded using a 250m² grid following discussions with English Heritage to reflect the output cell size for the project. All the concurrent 2009-2011 HSC projects contributing to the national HSC database used the same grid size, with conformity in their vector grid alignments and axes also ensured by use of the vector grid tool supplied by SeaZone for that purpose. Each marine dataset was gridded once the data from multiple sources had been characterised and consolidated into a single layer. Future HSC projects contributing to a particular application would benefit from continued communication between HSC assessors regarding the nature, scale and reliability of sources employed and their approach to managing data for character sub-types such as those relating to fisheries and mariculture, navigational hazards (particularly wreck and obstruction scatters), or palaeolandscapes, where boundaries may be more difficult to define.

6.1.4 Using Vector Grid Cells

The HSC Method recommends the combination of two approaches to produce a single layer of discrete polygons for each level of the characterisation (Tapper, 2008, section 3.2.3.1).

- The use of a vector grid to combine data below MLW, and
- The use of vector polygons above MLW

The creation of a set of vector cells was facilitated by the grid creation tool produced by SeaZone. The tool ensures that grids created at different scales and in different areas of England will remain interoperable by ensuring that they relate to the same datum.

The project highlighted potential challenges for future HSC projects where the study area is equivalent or greater that the one selected for this project. With the software and hardware used by the project team, the processing of data through the grid using a spatial join was however only possible when working on the trial area due to the large number of cells in the full project area. The solution identified was to select only the cells required to feed each dataset through from the grid. The HSC Methodology can then be implemented by using a spatial join to ascribe the descriptive attributes to the cells, then dissolving the cells back to polygons, during the dominance assessment.

6.2 Project outputs

6.2.1 Introduction

The output of the project outlined in the project Brief is described below to include the products specific to the tender submitted by SeaZone Solutions Ltd and HE Projects.

- Project Report, deliverable in three parts:

  - HSC Demonstration Project Report
  - HSC Application Review
  - Character Type Texts
- Mapped GIS, Project Database and Linked Texts
- GIS Tools
- Archive

The Project Report will be delivered as five hard copies and five CDs to English Heritage on completion of the project. Any additional copies requested will be available at an additional cost per copy in line with standard SeaZone fees. The report will be divided into two sections as specified in the project brief (English Heritage 2009); the first documenting the project's implementation and the second outlining the System's application review and case-studies.

The project archive, comprising the Project Brief, Project Design, Project Report, the GIS and associated structure, and relevant correspondence will be delivered to the NMR. All digital reports will be sent by English Heritage to the Archaeological Data Service (ADS) for dissemination online after the close of the project.

6.2.2 Project GIS

The HSC GIS generated by this project covers many Character Types, Sub-types and their attributes, expressed across a large physical area. A series of images have been included below to illustrate the expression of Character Types at each marine level and in a conflated map. However, as for any GIS, the database can be queried on a multiplicity of combinations of the attributes and generate a range of mapping tailored to suit the needs of the enquirer. The mapping below cannot convey that flexibility or the use of the mapping in conjunction with the linked text descriptions produced by the project.

Five copies of the GIS and its associated database will be delivered as an ESRI Personal Geodatabase alongside linked character text descriptions, providing a "ready-to-load" format for viewing the data. The GIS will be delivered as specified in section 6.2.2 (English Heritage, 2008):

- Spatial data will be delivered as a digital geographic format agreed with English Heritage, such as a shapefile or personal geodatabase (PGD)
- All data will be delivered in an agreed format
- Spatial data will be referenced to British National Grid
- All non spatial data recorded about any features will be recorded as attributes in line with the recommendations made in English Heritages Guidelines for English Heritage Project involving GIS (Froggatt, 2004).
- All spatial relationships will be topologically clean and correct and will follow the guidelines defined in English Heritages Guidelines for English Heritage Project involving GIS (Froggatt, 2004).
- Data will be supplied to be viewed at 1:50,000
- All data will be compliant with MIDAS standards
- All metadata will be UK Gemini compliant, and encoded according to ISO 19139

Software developed under the contract shall be made available under licence for unlimited use by EH (or its contractors, agents etc). The intellectual property rights to the software remain with SeaZone Solutions Ltd unless otherwise negotiated. SeaZone will provide support to EH for the use of the software by email and telephone during normal office hours for a period of 3 months after completion of the contract.

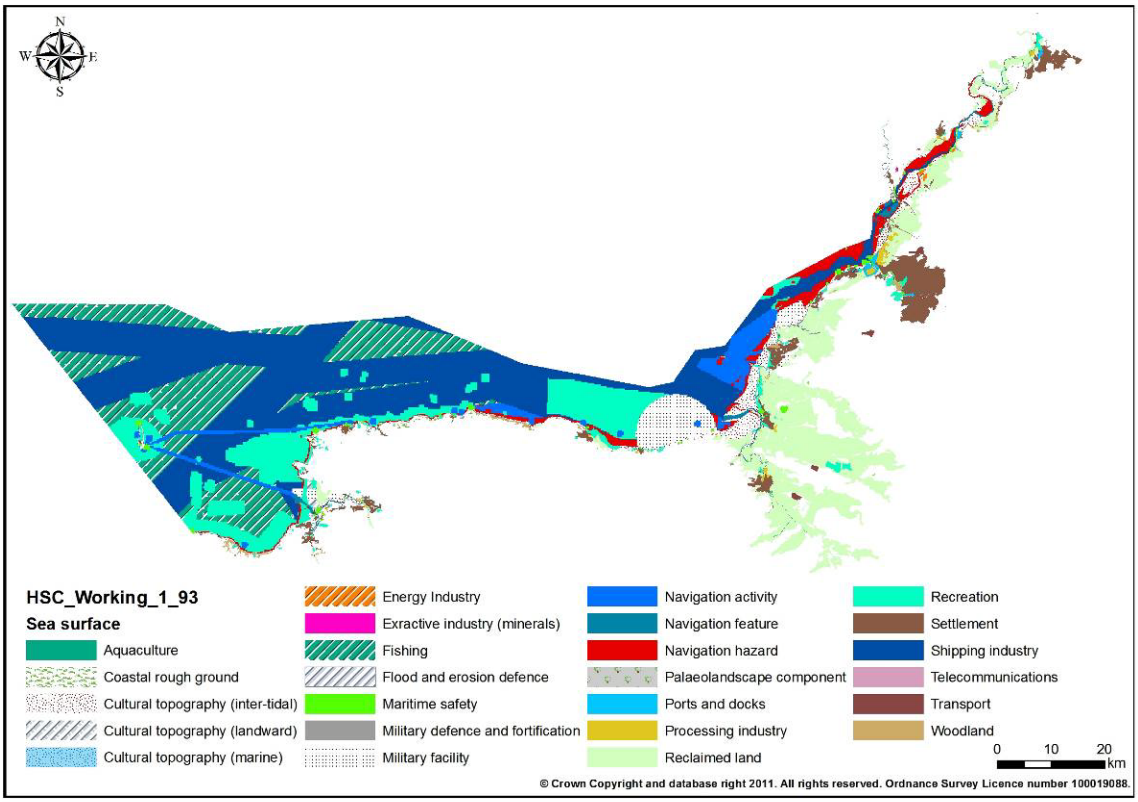

Fig 6 HSC showing Character Types on the Sea surface and Coast

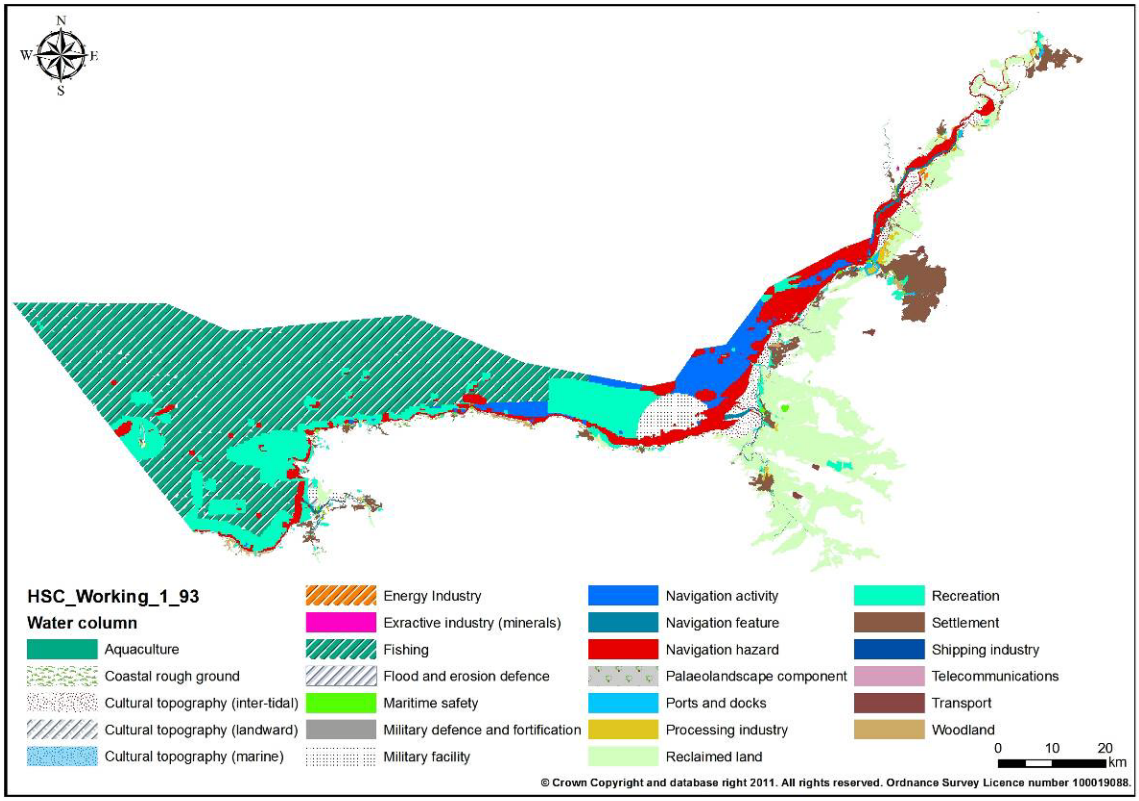

Fig7 HSC showing Character Types in the Water column and Coast

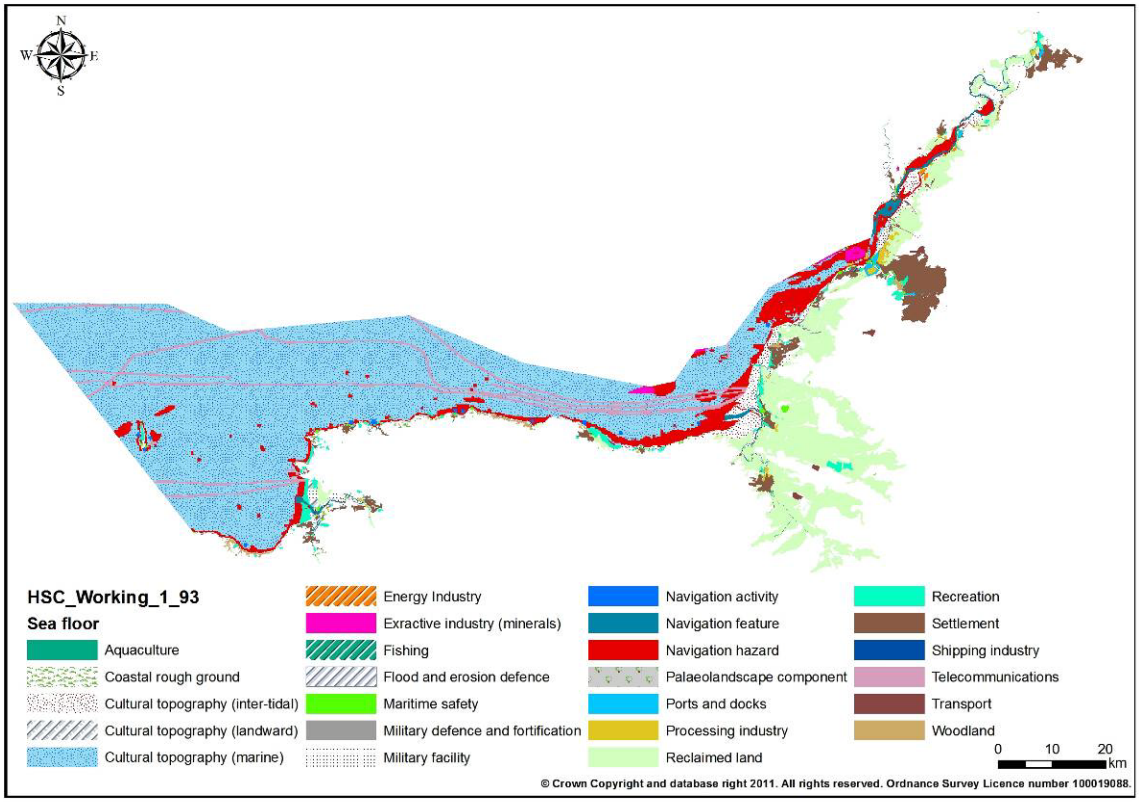

Fig 8 HSC showing Character Types on the Sea floor and Coast

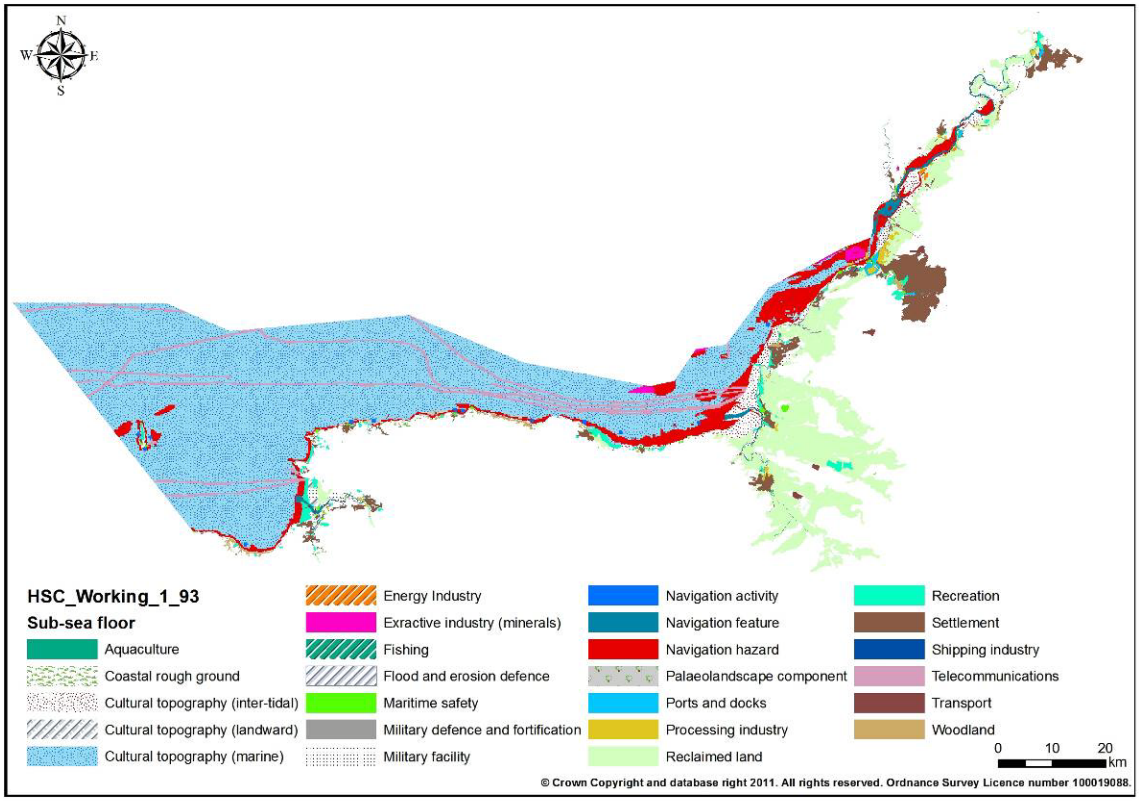

Fig 9 HSC showing Character Types on the Sub-sea floor and Coast

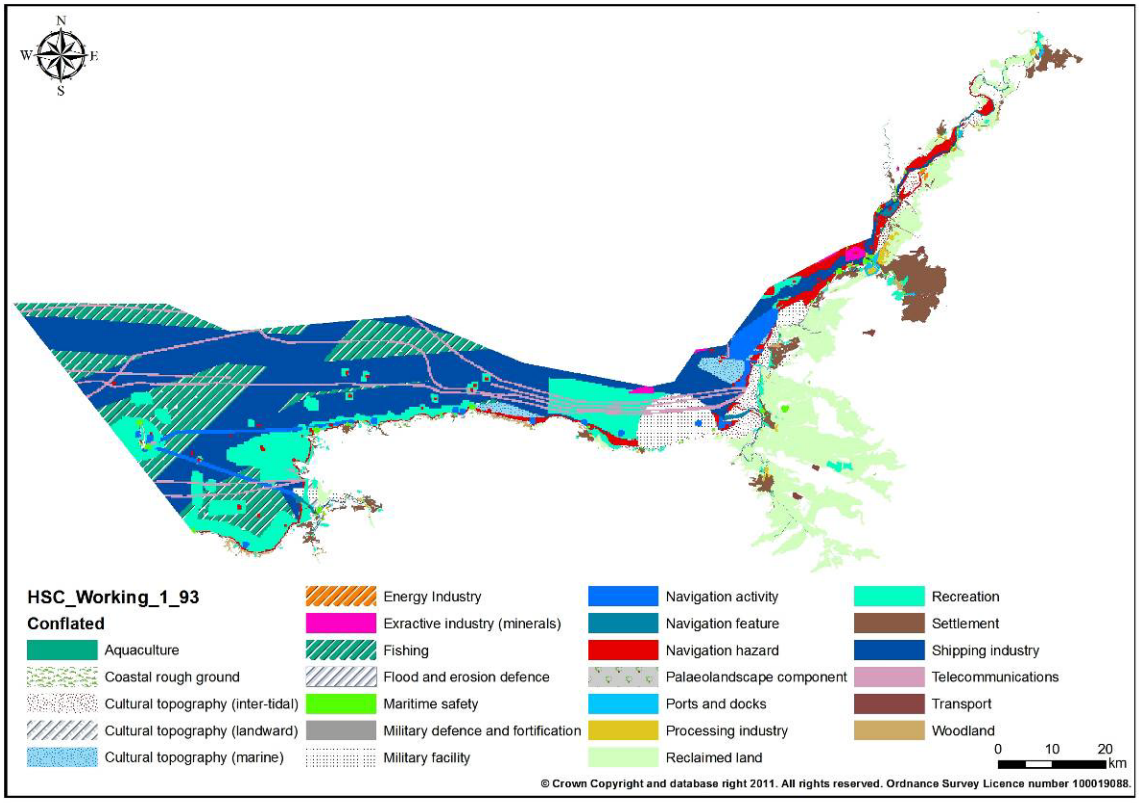

Fig 10 HSC showing Coastal and Conflated Character Types

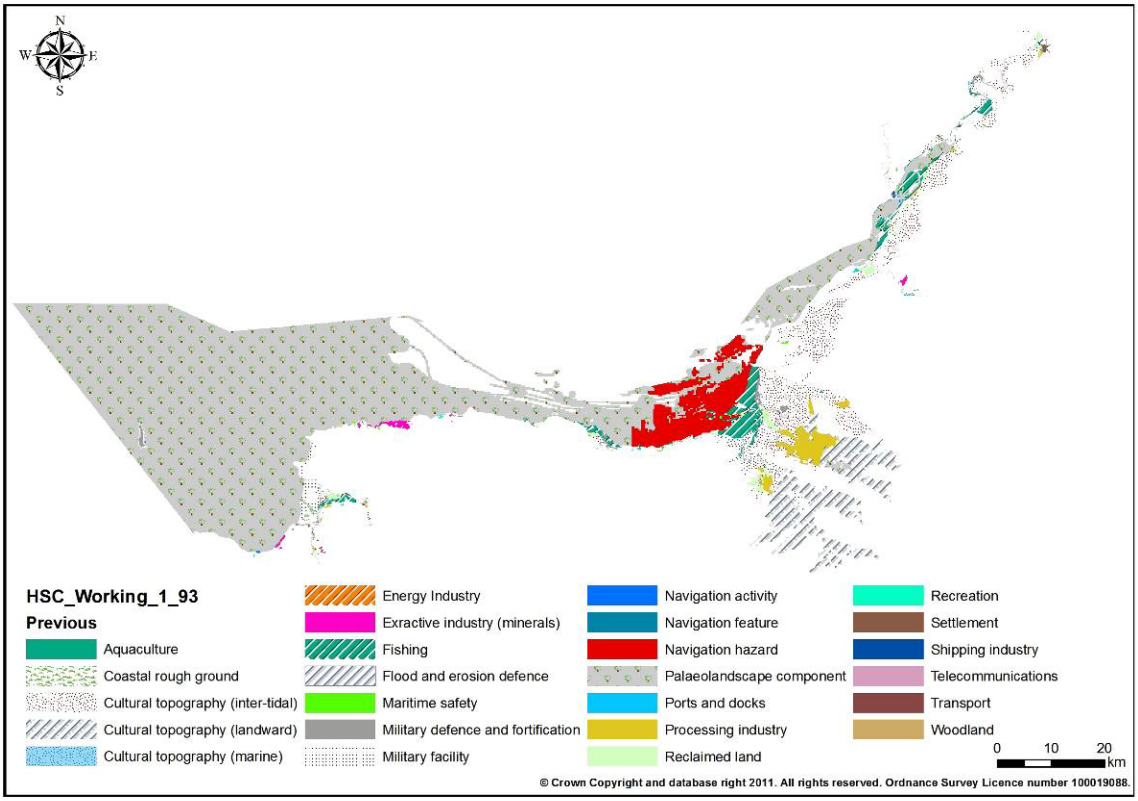

Fig 11 Previous HSC Character Types where information was available

6.2.3 Text Descriptions

Text based descriptions were developed for each character type, based on the interpretation of the following research areas defined in the national HSC Method (Tapper 2008 and 2010):

- Introduction: defining/distinguishing attributes and principal locations
- Historical processes; components, features and variability
- Values and perceptions.
- Research, amenity and education
- Condition and forces for change
- Rarity and vulnerability
- Sources

Each sub-heading has been divided to reflect historic character from a national perspective and from a regional perspective. The term 'national' refers to a 'whole nation' perspective, including England and adjacent waters out to the limit of UK Controlled Waters. The 'regional' scale of the project was explicitly defined in this instance as the South West of England, to the extent to which regional trends in character are perceived by the HSC assessor to extend to that region. In this case, the name of the region encompasses the project area, and then continues around the South West peninsula to the eastern boundary of Dorset at Highcliffe. The perception and definition of the region will undoubtedly vary between HSC assessors in future HSC projects compiled in differing future contexts.

6.2.4 Project Report

The project report is divided into three sections to facilitate access to different parts of the document. Section 1 outlines the different stages in the methodology employed in the application of the national HSC Method and the results of the project. Section 2 describes the results of an application review of HSC with case-study scenarios drawn from the Project Area. Section 3 contains the national and regional perspective Character Type texts.

6.2.5 Dissemination and Outreach

The project has been promoted via the SeaZone website through the development of an HSC project page. The webpage contains a hyperlink to the English Heritage HSC webpage. A flyer was developed for distribution at appropriate events and for inclusion in invitations to the stakeholder seminar. Opportunities were taken where appropriate to disseminate the progress and results of the project at seminars or conferences, primarily through the distribution of project fliers and promotion of the project in SeaZone newsletters and documentation.

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Abbreviations

ADS	Archaeological Data Service, York
ALSF	Aggregates Levy Sustainability Fund
AONB	Area of Outstanding Natural Beauty
ASA	Archaeological Study Area
CPA	Coast Protection Act 1949
DCMS	Department for Culture, Media and Sport
Defra	Department for the Environment and Rural Affairs
DTLR	Department for Transport, Local Government and the Regions
ELC	European Landscape Convention
EH	English Heritage
FEPA	Food and Environment Protection Act 1985
GIS	Geographic information System
HER	Historic Environment Record
HLC	Historic Landscape Characterisation
HSC	Historic Seascape Characterisation
ICZM	Integrated Coastal Zone Management
IPC	Infrastructure Planning Commission
JNAPC	Joint Nautical Archaeology Policy Committee
MCZ	Marine Conservation Zone
MMO	Marine Management Organisation
MoU	Memorandum of Understanding

MPA	Marine Protected Area
MPS	Marine Policy Statement
nm	nautical mile
RCZAS	Rapid Coastal Zone Assessment Surveys
SMP	Shoreline Management Plan
SSSI	Site of Special Scientific Interest