Archaeological assessment

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ACKNOWLEDGEMENTS

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FIGURES (Appendix 1)

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1 Introduction

1.1 Location and status of study area

The study encompasses the Severn Estuaries landward limit stated as Chart Datum (LAT) from Gore point in the south west on west side of Porlock Bay to Gloucester in the north east. The landward limit upon the welsh side is defined as mean low Water (MLW) to Nash Point near Llantwit Major in the north west, an area roughly analogous to the Bristol Channel Marine Aggregates and Constraints Project (BCMACP), Severn Estuary and Inner Bristol Channel zones. (See fig 1) The study area is set within a highly dynamic estuarine environment, with its current form being largely influenced by Holocene sea level change, erosion and sediments deposition.

1.2 Project description

The project involves the:

- identification, collection and appraisal of data sets for the marine archaeological resources within the Severn Estuary and Inner Bristol Channel
- assessment of the marine archaeological resource
- assessment of the potential impact upon the resource by current and future marine aggregate extraction.

The project is perceived to be an integral modular part of a series of projects relating to the historic environment of the Severn estuary in including a potential a rapid Coastal Zone Assessment and as such constant discussion will be held with the organisations involved.

The project's strategic role recognises the value and importance of the marine archaeological resource within the estuary and aims to pull together the disparate archaeological sources for the area. The study's importance is heightened by the fact that the study area lies between England and Wales and encompasses several unitary planning authorities, with no one agency having overall responsibility for the archaeological resource within the estuary.

1.3 Aims and objectives

- To assess the current state of knowledge relevant to the historic environment in relation to aggregate extraction in the Severn estuary up to chart datum and to make recommendations for further work.

1.4 Methodology

1.5 Introduction

As stated in the project brief, the project was undertaken in 3 stages: Data collection and assessment, GIS mapping and the assessment report, and dissemination.

1.6 Stage 1a - sourcing of relevant marine archaeological and environmental data sets

The assessment was based upon a disparate series of data sets in terms of both spatial coverage and quality. It was therefore essential that the primary phase of the project is targeted on identifying potential sources and types of data. Data sources consulted will fall into 3 main categories:

- sources relating to the historic environment
- data relating to aggregate availability and accessibility
- geotechnical, sedimentological and environmental data relating to the present river regime and its sediments in relation to the potential for archaeological survival and pre-existing environmental constraint maps

1.7 Stage 1b - collection of data

After the initial phase of the project all available data will be obtained and collated into one of three main data groups:

- point data (SMR/ wreck points etc)
- polygonised area data (constraint/policy areas, sedimentary zones, aggregate licenses, prehistoric landscapes etc)
- data with no spatial components (academic estuary-wide studies etc)

It is envisaged that all digital sources would be easily obtained from the relevant bodies (Table 1). Where digital data is not available dedicated members of the core team will visit the relevant repositories and enter data on Excel via laptop computers. Copies will also be made of all relevant published and unpublished material. A number of the sources listed below will make a charge for data searches and this charge is reflected in the costings prepared by MoLAS. As part of the proposal the British Geological Survey (Table 2) has agreed to carry out and provide a full index-level search on all bathymetry, seabed sediment data, and geological borehole and sample data, along with a bibliography of published literature.

Table 1: Stage 1b - summary of MOLAS data collection

Source	Data
British Geological Survey	Geological data – geology maps and borehole data
English Heritage	Information on protected wrecks
National Monuments Record, Swindon	NMR maritime database of England
National Monuments	NMR maritime database for Wales

Record, Aberystwyth	
UK Hydrographic Office, Portsmouth	Wreck database
UK Hydrographic Office, Portsmouth	Admiralty charts from 17th century onwards, published sources
Receiver of Wreck, Southampton	Information on wrecks identified/received after 1993
HM Customs and Excise, Cardiff	Information on wrecks identified/received after 1993
Naval Staff Directorate, MOD	Military remains (i.e. wrecks)
DCMS	Possible military remains
Lloyd's Register of Shipping 1734 onwards. Held by Lloyds Fairplay and/or the PRO?	Records of shipping losses
Cardiff City	Specified in brief but not sure the city has its own SMR – nothing on website
Exmoor National Park	Specified in brief but not sure if the National Park has its own SMR – nothing on website. Contact Archaeology Officer Rob Wilson North
Glamorgan-Gwent Archaeological Trust	SMR data for coastal waters (if any) and intertidal zone*
North Somerset	SMR data for coastal waters (if any) and intertidal zone*
Somerset CC	SMR data for coastal waters (if any) and intertidal zone*
City of Bristol	SMR data for coastal waters (if any) and intertidal zone*
South Gloucestershire CC (previously Avon)	SMR data for coastal waters (if any) and intertidal zone*
Gloucestershire CC	SMR data for coastal waters (if any) and intertidal zone*
Glamorgan Record Office, Cardiff	Historic maps showing coastal zone
Gwent Record Office, Gwent	Historic maps showing coastal zone
Gloucestershire Record Office, Gloucester	Historic maps showing coastal zone (includes former Monmouthshire?)
Bristol Record Office, Bristol	Historic maps showing coastal zone for Bristol/Avon
Somerset Record Office, Taunton	Historic maps showing coastal zone
Severn Estuary Partnership	Potential Marine threats
Strategy for the Severn Estuary	Planning strategy info
Aggregates industries (various)	Info on the nature of maritime aggregate extraction
Wessex Archaeology	
National Maritime	Maritime collection, including charts and

Museum, Greenwich	published material
National Museum of Wales	Any relevant maritime information
British Library, London	Published material on sea level change, relevant archaeological/historical publications, information on marine aggregate extraction.
Severn Estuary Levels Research Committee	Info on sea level change etc., annual journal reports
UK Marine Special Areas of Conservation (SACs) project	
Consultations (various)	See brief
Wessex Archaeology	Marine environmental work
Internet	Web-published material, websites
Bristol Channel Marine Aggregates (ABP mer/ABP research and consultancy)	Sediment zones boundaries constraints(digital GIS)
British Marine aggregates association	Details of Scope of aggregate work resolution etc
Academic libraries	Published sources on archaeology the sediment regime
South west Maritime History society	Survey details
UK Crown estates	GIS and Sea bed management licensing monitoring etc
MAGIS (Marine aggregates GIS)	Current extraction sites
Joint nautical archaeology policy committee (JNAPC)	Policies associated bodies etc
DCMS ADU (Archaeological Diving Unit)	Designations under the protection of wrecks act 1973
Archaeological Data Service	Deposition of data with OASIS
Defence of Britain Survey	WWII wrecks and sites
Advisory committee on historic wreck sites	
MOD Hydrographic section, Taunton	Charts plans wrecks, aerial photographs
Gloucester Harbour trustees	
Port of Bristol authority	

Hanson marine aggregates	Sediment study very good
(ABP mer/ABP research and consultancy)	
The National Archive	Receiver of wrecks data

1.8 Stage 1c - assessment of quality and validity of data sources

Once all available material was acquired a programme of work will be undertaken to assess the quality, validity and spatial coverage of the data sources. This stage of the project will include the development of a robust methodology to characterise the value of the data. Each source will then be given a qualitative rating, which will be transferred to the GIS-based project.

1.9 Stage 1d - summary assessment of potential threats

In addition to the threat to the marine archaeological resource from aggregate extraction, a summary of all other major threats will be undertaken with a view to integrating them within the overall project GIS and its recommendations. These threats may include (Oxley and O'Regan 2001):

- Maintenance, dredging and extraction
- Marinas and fish farms
- Port facilities
- Outfalls
- Anchoring and recreational diving

1.10 Stage 2a - creation of project data base and GIS

The project database will primarily revolve around the creation of an archaeological database in Excel and a bibliography of all available sources. All digital data sources will be compiled with associated metadata to Dublin core and ADS standards (ADS 1998).

1.10.1 Archaeological gazetteer

The principal component to the project GIS was the production of an archaeological gazetteer. The gazetteer was produce in Microsoft Excel and transferred to a Microsoft Access database (i.e. GIS compatible). The following fields were completed for each known site (heritage resource and palaeoenvironmental remains) where the information is known:

- Unique project ID no.
- SMR no. (if any)
- NMR no. (if any)
- UKHO no. (if any)
- Type (wreck, obstruction etc)
- Location (eastings and northings, centred for polygons)
- Geology type
- Period
- Summary description
- Detailed description
- Survival
- Condition
- Vulnerability
- Discovery date

- Sources
- Aggregate deposit type
- Licence (past, current and possible future)

1.10.2 The GIS Project

The GIS essentially attempted to pull together and analyse all spatial aspects of the sources identified during Stage 1. Mapping includes GIS layers of the data themes listed below. It is envisaged that a good quality digital base map will be provided by one of the beneficiary bodies, as the purchase of this data at the initial stage of the project would be prohibitively expensive and is not included in the project costs.

1.10.2.1 Outline of study area:

The boundary of the study area is defined in the tender brief as chart datum. This is not an easily mapped entity. It is therefore proposed that Low Mean Tide is used as a more easily defined entity, although the Ordnance Survey is currently producing guidelines as to the integration of marine and terrestrial mapping (Integrated Coastal Zone Mapping-Data Research Project (ICZMap). The boundary of the study area will be defined in association with both English Heritage and Cadw.

1.10.2.2 Underlying mapping Admiralty Charts / Hydrography charts/ SeaZone digital mapping:

These provide the underlying base mapping for the project.

1.10.2.3 Underlying solid and drift geology:

Digital data obtained from the British Geological Survey.

1.10.2.4 Map showing statutory bodies and interest group territories:

Illustrating conflicting responsibilities of the various bodies involved.

1.10.2.5 Polygonised outlining of the spatial extent and quality of the sources consulted:

These will provide invaluable assistance in summarising data coverage and outline gaps in current knowledge.

1.10.2.6 Environmental constraint maps:

A series of maps showing known environmental constraints as defined by the various local regional and national authorities.

1.10.2.7 Map of potential threats:

This map will provide details of the location type and extent of potential threats to the marine archaeological resource.

1.10.2.8 Sedimentary areas:

A suitable sedimentary study, such as the Bristol Channel Marine Aggregates Assessment Policy and Constraints Project (BCMAPC), will be selected in order characterise seabed characteristics, sediment type and sedimentary and water movements.

1.10.2.9 Real and potential extraction area licenses:

As derived from BGS and aggregates industry data

1.10.2.10 Map showing archaeological site, find and deposit data:

Archaeological site and deposit data derived from the archaeological gazetteer (see above)

1.10.2.11 Map showing digitised copies of any published sea level maps:

Digitised sea level maps

1.10.2.12 Map showing ranking of archaeological survey coverage for each zone as an chloropleth map:

This map will be derived from the data source coverage map and ranking produced during the Assessment of Data stage, giving an overall indicative survey coverage rating for each zone. This will be based upon weighting the quality of each data set, giving a numeric value for each. The number of coverages for each point will then be added, giving an overall score from low to high for all archaeological coverages.

1.10.2.13 Map identifying areas of high potential/low coverage, highlighting further work:

Derived from the archaeological survey coverage map and archaeological sites map.

1.10.2.14 Distribution maps of resource type, period and importance:

Derived from assessment of the archaeological sites map

1.10.2.15 Map showing final impacts map/restraint:

Combined map showing the final conclusions and recommendations of the project.

1.10.2.16 Other technical data:

The GIS project will be created upon ESRI's ArcGIS software and will be accompanied by supporting metadata created to an appropriate international standard i.e. Dublin Core Metadata standard. It is envisage that future phase of the project will allow the GIS project along with supporting documentation to be deposited with The Archaeological Data Service in York. As part of the GIS and mapping the project will include British Geological Survey surveys 3D modelling capabilities using GSI3D, coastal and marine surveying techniques and (sampling and geophysical measuring) and Integrated Coastal Zone Mapping (ICZM) techniques and SeaZone data covering the area east of Gore Point and Barry for the Bristol Channel and River Severn, as requested.

2 Planning and legislative framework

2.1 Introduction

This study was complicated by the fact it involved the analysis of a terrestrial and a marine study area. The planning framework in both environments will, therefore, be outlined. An attempt has been made to include the most up to date and relevant sections for each of the Counties and legislative bodies concerned with the environs of the Severn Estuary, however England and Wales's heritage related planning guidance and legislation is currently going through a period of major review. As a consequence, changes to both legislation and the planning process are likely to be made over the next 3–5 years. What is set out in the sections that follow reflects the currently available information on the situation.

2.2 Terrestrial guidance

2.2.1 Planning Policy Guidance (PPG 16)

The then Department of the Environment published its *Archaeology and planning: a consultative document*, Planning Policy Guidance Note 16 (PPG 16), in November 1990. This set out the Secretary of State's policy on archaeological remains on land, and provided recommendations many of which have been integrated into local development plans. The key points in PPG16 are the following:

> Archaeological remains should be seen as a finite and non-renewable resource, and in many cases highly fragile and vulnerable to damage and destruction. Appropriate management is therefore essential to ensure that they survive in good condition. In particular, care must be taken to ensure that archaeological remains are not needlessly or thoughtlessly destroyed. They can contain irreplaceable information about our past and the potential for an increase in future knowledge. They are part of our sense of national identity and are valuable both for their own sake and for their role in education, leisure and tourism.
>
> Where nationally important archaeological remains, whether scheduled or not, and their settings, are affected by a proposed development there should be a presumption in favour of their physical preservation.
>
> The key to informed and reasonable planning decisions is for consideration to be given early, before formal planning applications are made, to the question of whether archaeological remains are known to exist on a site where development is planned and the implications for the development proposal.
>
> When important remains are known to exist, or when archaeologists have good reason to believe that important remains exist, developers will be able to help by preparing sympathetic designs using, for example, foundations which avoid disturbing the remains altogether or minimise damage by raising ground levels under a proposed new structure, or by careful siting of landscaped or open areas. There are techniques available for sealing archaeological remains underneath buildings or landscaping, thus securing their preservation for the future even though they remain inaccessible for the time being.
>
> If physical preservation *in situ* is not feasible, an archaeological excavation for the purposes of 'preservation by record' may be an acceptable alternative. From an archaeological point

> of view, this should be regarded as a second-best option. Agreements should also provide for the subsequent publication of the results of any excavation programme.
>
> Decisions by planning authorities on whether to preserve archaeological remains *in situ*, in the face of proposed development, have to be taken on merit, taking account of development plan policies and all other material considerations – including the importance of the remains – and weighing these against the need for development.
>
> Planning authorities, when they propose to allow development which is damaging to archaeological remains, must ensure that the developer has satisfactorily provided for excavation and recording, either through voluntary agreement with the archaeologists or, in the absence of agreement, by imposing an appropriate condition on the planning permission.

PPG16 itself forms part of an emerging European framework which recognises the importance of the archaeological and historic heritage in consideration of development proposals. This has recently been formulated in the *Code of good practice on archaeological heritage in urban development policies* established by the Cultural Heritage Committee of the Council of Europe, and adopted at the 15th plenary session in Strasbourg on 8–10 March 2000 (CC-PAT [99] 18 rev 3). As stated at the beginning of that document however, 'a balance must be struck between the desire to conserve the past and the need to renew for the future'.

2.2.2 Archaeology and planning in Gloucestershire

The Structure Plan for Gloucestershire County Council is currently undergoing its 3rd review which may include changes to the archaeological and environmental guidance notes for the Severn Estuary. At present the Council is operating under the Structure Plan: 2nd Review, Adopted Version (1999). The appropriate sections of which are presented here.

2.2.2.1 Gloucestershire County Council Structure Plan (Second Review, Adopted Version) 1999

Policy NHE.2

Development will be required to protect and, wherever possible, enhance the biodiversity, including wildlife and habitats, of the County. Potential and classified SPAs, candidate and designated SACs, and Ramsar sites will be protected from development that is likely to affect their integrity. SSSIs and NNRs will be protected from development which would have a significant effect on their nature conservation interest.

Local Plans should identify:

> sites of nature conservation importance including unfragmented and linear features such as small woods, traditional field boundaries, ponds and disused railways which act as wildlife corridors or stepping stones; and
>
> appropriate targets for the enhancement of biodiversity.

14.2.6 Planning Policy Guidance Note.9 "*Nature Conservation*" (PPG.9, October 1994) advises that sites designated for their nature conservation importance should be afforded differential levels of protection based on their position in the hierarchy of international, national and local importance. This is reflected in Policy NHE.2.

International sites

14.2.7 Gloucestershire's international sites are of three types:

Ramsar sites - wetlands of international importance (The Severn Estuary, Upper Severn Estuary and adjacent Walmore Common);

Special Protection Areas (SPAs) – sites of European importance under the Wild Birds Directive (Severn Estuary); and

Special Areas of Conservation (SACs) – sites of European importance under the Habitats Directive (5 Candidate SACs in Gloucestershire).

Policy NHE.6
The distinctive historic environment of the County will be conserved and enhanced.

Scheduled Ancient Monuments, Listed Buildings, Conservation Areas, and their settings will be preserved. Historic settlements and landscape, historic parks and gardens, and sites of archaeological importance will be protected from the adverse effects of development.

14.2.28 The physical survivals of the past are to be valued and protected for their own sake, as a central part of cultural heritage and a sense of national identity. Their presence adds to the quality of life, by enhancing the familiar and cherished local scene and sustaining the sense of local distinctiveness which is so important an aspect of the character and appearance of Gloucestershire's towns, villages and countryside. The historic environment is also of immense importance for leisure and recreation.

14.2.29 Planning Policy Guidance Note 15 "*Planning and the Historic Environment*" (PPG.15, September 1994) states that effective protection of all aspects of the historic environment is fundamental to the Government's policies for environmental stewardship. Planning Policy Guidance Note 16 "*Archaeology and Planning*" (PPG.16, November 1990) identifies the importance of archaeological remains as the source of information about our society's past, and stresses their finite nature and their vulnerability to damage and destruction. Their protection through the planning system is essential to their survival.

14.2.30 The historic environment of the County has been formed from the activities of human communities over many thousands of years in clearing, farming and settling the landscape. There is extensive evidence of the past in the form of prehistoric settlement and burial sites, Roman towns and villas, medieval churches and villages, and industrial landscapes of national importance. There are many other archaeological sites, historic buildings and other features of more local importance. Local plans should protect the historic environment, preserving the important elements and its general historic character.

14.2.31 Characterisation of the historic landscape of the County is currently in progress. The landscape character areas and descriptions that will result from this project will assist in local plan preparation and in the conservation of the locally distinctive landscapes within the County.

14.2.32 Similarly, for the small historic towns of the County, the Gloucestershire Historic Towns Survey will provide information on the historic urban character of these settlements and their archaeological potential. This will assist in local plan preparation and in guiding the location of development.

14.2.33 Historic parks and gardens may be included within English Heritage's Register of Parks and Gardens of Special Historic Interest. Whilst this confers no additional statutory controls, development proposals affecting them are subject to statutory consultation procedures. Similarly, a Register of Historic Battlefields has been prepared by English Heritage. These include the battlefield sites at Tewkesbury [1471] and Stow-on-the-Wold [1646]. Again the effects of development proposals on them should be a material consideration in determining planning applications.

14.2.34 Local Planning Authorities are under a duty to designate as conservation areas any 'areas of special architectural or historic interest the character or appearance of which is desirable to preserve or enhance'. Whilst many of these areas are of local significance, cumulatively they contribute to Gloucestershire's diverse historical character. This is different to the conservation of individual buildings. Individual historic buildings and other structures of special historical or architectural interest may be given protection as Listed Buildings. However, where works may affect a listed building, special regard should be had for the desirability of preserving its setting, as this is often an essential part of the building's character.

14.2.35 About 18,000 archaeological sites are currently recorded in the Gloucestershire Sites and Monuments Records (SMR) which is maintained by the County Council. Approximately 400 of these are Scheduled Ancient Monuments of national importance, protected under the Ancient Monuments and Archaeological Areas Act (1979). Not all nationally important monuments are scheduled. There is a presumption in favour of the preservation of nationally important sites and their settings, whether scheduled or not. In addition, the SMR records many sites of more local significance, and will contain archaeological information about local areas. Local plans should contain policies which will protect significant archaeological sites and which set out how the archaeological implications of development will be assessed and mitigated through the development control process.

Policy NHE.7

Development will not be permitted which has a detrimental impact on the scientific value, landscape setting and character, and the archaeological remains of the Severn Estuary. The integrated management of the estuary will be essential to the protection of its special qualities.

14.2.36 The Severn Estuary includes nationally and internationally important habitats and communities in the marine, intertidal and landward areas. The estuary is an important fish nursery area. The intertidal areas support internationally significant numbers of wintering waders and wildfowl. The low-lying reclaimed grazing marshes and ditches host important floral and faunal communities. Large areas are protected by international designations.

14.2.37 The wildlife value of the Severn Estuary is reflected in its national nature conservation designations and accorded a commensurate level of protection by Policy NHE.2. The Severn Estuary has been identified as an internationally important Wetland and as an EC Habitats Special Area of Conservation; it has been designated a Ramsar site and classified as an EC Wild Birds Special Protection Area. These designations ensure that the estuary is protected by international, European and national legislation. Other protected areas include Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and the local Wildlife and Wetland Trust Reserve.

14.2.38 The value of the low-lying landscape of the Severn Levels also requires protection. Several landscape assessments have been carried out and zones of landscape character have been identified. Landscape characterisation and descriptions will be detailed in the relevant local plans. Planning Policy Guidance Note 20 "*Coastal Planning*" (PPG.20, September 1992) advises that local planning authorities should define coastal zones, within which development not requiring a coastal location should not generally be permitted. Estuaries and surrounding areas of land are also mentioned in PPG.20 as potentially benefiting from this approach. The Severn Estuary is a large area of such vital importance that close attention must be paid to the safeguarding of its setting.

14.2.39 The tidal range of the Estuary, the historic ports of Gloucester, extensive intertidal areas and soft sediments make the Severn Estuary an area of great archaeological significance including, for example, evidence of previous human exploitation and management of the area, ranging from prehistoric and Roman land reclamation to post- medieval ports. The particular environment of the Severn Estuary enables a very high rate of survival of archaeological evidence.

14.2.40 In recognition of both the importance of the Severn Estuary and the wide variety of interests associated with it, local plan policies to safeguard and manage these interests should be informed by a wide range of sources such as: "*The Shoreline Management Plan*", "*The Local Environment Action Plan*" (LEAP) and guidance produced by the Association of Severn Estuary Relevant Authorities (ASERA).

2.2.3 Archaeology and planning in Glamorgan

2.2.3.1 Vale of Glamorgan Unitary Development Plan

On the 18th April 2005, the Vale of Glamorgan Council formally adopted its Unitary Development Plan. The Vale of Glamorgan Council Adopted Unitary Development Plan 1996 - 2011 constitutes the development plan for the Vale of Glamorgan and supersedes all adopted / approved structure and local plans that were previously in force.

1.1 THE DEVELOPMENT PLAN CONTEXT

1.1.1 Section 54A of the Town and Country Planning Act 1990 (as amended) requires that:

" *Where, in making any determination under the planning Acts, regard is to be had to the development plan, the determination shall be made in accordance with the plan unless material considerations indicate otherwise.* "

1.1.2 As a result of the provisions in the Local Government (Wales) Act 1994 each Local Planning Authority in Wales is now required to prepare a Unitary Development Plan (UDP) for its administrative area. The Welsh Office has produced "Planning Guidance (Wales): Unitary Development Plans" (1996) and "Planning Guidance (Wales) Planning Policy" (1996) which will be taken into account in the formulation of the UDP's policies and proposals. The Guidance expects UDPs to be adopted by the year 2000.

1.2 THE FORMAT OF THE VALE OF GLAMORGAN UNITARY DEVELOPMENT PLAN

1.2.1 This UDP provides the strategic and detailed policy framework within which provision will be made for development and conservation needs. It guides development for 15 years and comprises two parts.

PART I *indicates the overall provision to be made for housing, employment and other major land uses in the area as a whole, identifying the broad locations for development, and areas where policies for restraint are necessary.*

PART II - *consists of a justification of these strategic policies and contains more detailed policies, proposals and guidance. A Proposals Map illustrates the Plan's policies and proposals on an Ordnance Survey base.*

1.2.2 The written statement is divided into 9 chapters. These cover the main topic areas of the Environment, Housing, Economic Development and Tourism, Transportation, Retail, Sport and Recreation, Minerals, Waste Management and Community and Utility Services.
1.2.3 This Plan concentrates on the issues that the Council consider necessary to address in order to protect and enhance the environment of the Vale of Glamorgan whilst providing detailed guidance for future development proposals. More detailed issues, however, will be considered through the publication of Supplementary Planning Guidance which should be read in conjunction with this UDP.

Policy ENV 15 - protection of Built and Historic environment
The environmental qualities of the built and historic environment will be protected. Development which has a detrimental effect on the special character appearance or setting of:
(i) a building or group of buildings, structure or site of architectural or historic interest, including listed buildings and conservation areas;
(ii) scheduled ancient monuments and sites of archaeological and/or historic interest;
(iii) designed landscapes, park or gardens of historic, cultural or aesthetic importance will not be permitted.

3.4.65 Planning Guidance (Wales) "Planning Policy" (1996) paragraph 114 defines the historic environment as encompassing ancient monuments, listed buildings, conservation areas and historic parks, gardens and landscapes all of which should be protected and enhanced. The Vale of Glamorgan has a wealth of significant architectural and townscape features, well demonstrated by the many designations previously described. In collaboration with the International Council on monuments and sites (ICOMOS) and the Countryside Council for Wales, Cadw is preparing a Register of Landscapes, Parks and Gardens of Special Historic Interest in Wales attached as Appendix 2. This is expected to include fourteen parks and gardens within the Vale of Glamorgan and two outstanding landscapes. No additional statutory controls will follow from the inclusion of a site on the Register, but guidance is contained within Welsh Office Circular 61/96.
3.4.66 Policy ENV 15 seeks to ensure that this unique built and historic environment of the Vale of Glamorgan is protected and enhanced. Development which is unsympathetic or out of character with the locality or features of acknowledged importance will not be permitted. Facilities to enhance and increase the public

enjoyment of these historic environments will be encouraged provided that the facilities do not conflict with their conservation.

ARCHAEOLOGICAL SITES

3.4.67 The ancient history of human settlements in the Vale of Glamorgan gives the area considerable archaeological interest. The increasing number of Bronze Age, Romano-British and Medieval finds add to the knowledge of these periods and the historical significance of the area. It is important that the potential insight into local history which the study of areas of archaeological interest can provide is not unnecessarily lost by modern interference.

3.4.68 Planning Guidance (Wales) "Planning Policy" (1996) requires that Plans contain policies for the protection, enhancement and preservation of sites of archaeological interest and of their setting. It is envisaged that these policies will perform an important function in establishing a framework within which development proposals which affect archaeological remains can be assessed thus aiding developers in the preparation of planning applications and Local Authorities in the decision making process.

Policy ENV 16 - Archaeological field evaluation

Where development is likely to affect a known or suspected site of archaeological significance, an archaeological field evaluation may be required before the proposal is determined. Detailed plans would need to reflect the conclusions of the evaluation.

Policy ENV 17 - preservation of archaeological remains

Where development is permitted which affects a site of archaeological importance, archaeological mitigation measures may be required to ensure preservation on site or adequate recording prior to disturbance.

3.4.69 The curatorial section of the Glamorgan-Gwent Archaeological Trust holds The Vale of Glamorgan Sites and Monuments Records. A list of all planning applications will be referred to the Trust for comment. Where archaeological remains are known or believed to be present, prospective developers may be required to arrange an archaeological field evaluation to the satisfaction of the Council, prior to the determination of any application. Where development is permitted, remains should be preserved and sensitively incorporated into the development scheme. Where remains are to be lost a detailed programme of investigations and recording will be required to be undertaken prior to the commencement of construction.

Supplementary Policy Guidance "Design in the Landscape"

DG2 Coast - Integration of Development
AIMS
• To conserve or recreate a strong coastal landscape strip without development near the water edge.
• To maintain / create continuous access to and along the coast.
• To minimise the impact of development.
DESIGN PRINCIPLES
• Carry out a comprehensive environmental impact appraisal before development due to the very sensitive nature of the coastal strip.
• Retain site features such as watercourses, woodland and hedgerows and ensure that they form the basis for landscape infrastructure.
• Locate buildings and infrastructure in the location with the least visual, ecological and archaeological impact.
• Set buildings and infrastructure back from the coast to retain a substantial coastal strip for nature conservation.
• Buildings should always address the sea with no servicing or parking visible from the coastal elevation.
• Improve the coastal path and provide access in perpetuity ensuring allowance is made for coastal erosion over time.
• Prevent general vehicular access to the sea.
• Manage sites to accommodate visitor pressure ensuring sensitive sites such as ecological sensitive habitats or archaeological sites are protected from wear.
• Use natural features and new planting in external spaces to optimise shelter from prevailing winds.
• Ensure development responds to the site's sense of place and use coastal palette of materials.

Policy ENV 17 – protection of Built and Historic environment
The environmental qualities of the built and historic environment will be protected. Development which has a detrimental effect on the special character, appearance or setting of:
(i) a building or group of buildings, structure or site of architectural or historic interest, including listed buildings and conservation areas;
(ii) scheduled ancient monuments and sites of archaeological and / or historic interest;
(iii) designated landscapes, park or gardens of historic, cultural or aesthetic importance will not be permitted.

2.2.4 Archaeology and planning in Cardiff

2.2.4.1 Cardiff's Unitary Development Plan

The Cardiff Unitary Development Plan was placed on deposit in October 2003. Over 650 organisations and individuals made representations to the plan.

Following the introduction of the European Strategic Environmental Assessment (SEA) directive in 2004 and new guidance from the Welsh Assembly on development planning, the council sought the agreement of the Welsh Assembly to cease preparation of the Cardiff UDP and start work on the new Local Development Plan (LDP).

In May 2005, the council formally resolved to cease work on the Cardiff UDP and begin work on the LDP.

Draft Welsh Assembly guidance on local development plans states that where a UDP has been put on deposit it may remain a consideration in development control decisions until an LDP has been placed on deposit.

Generally, the weight to be attached to policies in emerging UDPs depends on the stage of plan preparation, the degree of any conflict with adopted plans, and the number and nature of any objections and/or representations in support of the policy.

1.3 THE POLICY CONTEXT FOR THE UDP

Cardiff is located on the Severn Estuary and the Council is a key member of a number of regional organisations dealing with estuary-related matters. These include the Standing Conference of Severnside Local Authorities and the Severn Estuary Partnership which also includes the Environment Agency, the Countryside Council for Wales, English Nature and partners from universities, industries and specialist interest groups and prepares and implements integrated coastal zone management. The Partnership has produced detailed estuary management guidance, including guidance for development plan preparation on both banks of the estuary (the ***Strategy for the Severn Estuary***, published in 2001). The Council is also a member of the Severn Estuary Coastal Group, which comprises the Coastal Defence Authorities and operating authorities that have major responsibility for management of the Estuary coastline. With the encouragement of the National Assembly, the Group has deprivation, discrimination and social exclusion.

1.3.16 The Strategy focuses on the need: initiated preparation of a ***Severn Estuary Shoreline Management Plan*** to provide the basis for sustainable coastal defence policies within the Estuary and to develop objectives for the future management of the shoreline.

POLICY 1.I: THE HISTORIC ENVIRONMENT

The historic environment of Cardiff will be protected and, where appropriate, enhanced, including:

a). ancient monuments and other important archaeological remains;

b). listed buildings;

c). conservation areas;

d). historic parks and gardens.

2.I.1 Policy 1.I affords overall strategic policy protection to the historic environment of Cardiff as required by legislation and ***Planning Policy Wales (2002)***. The historic environment enriches people's lives and the attractiveness of the city and reflects the diversity of the communities that have formed the city over time. It provides evidence of Cardiff's past and helps define its present identity and character. An understanding of the historic and cultural significance of the city can provide a context for managing change and development.

2.I.2 The Council's responsibilities in respect of the historic environment are set out in the ***Planning (Listed Buildings and Conservation Areas) Act 1990*** and in subordinate Acts, Orders, Circulars and policy guidance. The Council works with the Assembly, CADW (the Welsh Historic Monuments Executive Agency of the Assembly) and other agencies in protecting the historic environment.
2.I.3 There are currently 25 scheduled **ancient monuments** in Cardiff, identified on *Map 17*. *Policy 2.50* affords appropriate protection to these ancient monuments and others that may be scheduled over the plan period, as well as **other important archaeological remains**.
2.I.4 There are currently over 1,000 buildings in Cardiff on the statutory List of Buildings of Special Architectural or Historic Interest, designated by Cadw on behalf of the Assembly. *Policy 2.51* affords appropriate protection to these **statutory listed buildings** and others that may be added to the list by Cadw over the plan period.
2.I.5 The Council also maintains a Local List of buildings of merit. *Policy 2.52* affords appropriate protection to these **locally listed buildings** and others that may be added to the list by the Council over the plan period.
2.I.6 There are currently 25 **conservation areas** in Cardiff identified on *Map 18*. *Policy 2.53* affords appropriate protection to these and other areas that may be designated by the Council over the plan period.
2.I.7 Finally, there are 13 **historic parks and gardens** included on the Cadw/ICOMOS 'Register of Historic Parks, Gardens and Landscapes' and identified on *Map 19*. *Policy 2.54* affords appropriate protection to these and other historic gardens and parks that may be added to the register by Cadw/ICOMOS over the plan period.
2.I.8 In seeking to address the requirements of these Part 2 policies, developers are encouraged to follow a sequence of investigation and assessment to identify the cultural significance of a place before developing proposals for change or alteration. In this way, proposals can be well informed and strategies developed to protect the historic environment. The process follows advice within ***Welsh Office Circular 61/96*** and draws on principles set out within the ***ICOMOS Charter (1988)*** and advice within ***BS Standard 7913, 1998***.
2.I.9 The Council intends to prepare a Local Heritage Strategy that will provide a wider framework for the protection and enhancement of the city's historic environment. Together with supplementary planning guidance, this strategy should enhance the understanding of the built heritage and provide opportunity for community involvement in the preparation of a framework for its protection and enjoyment.

POLICY 2.42: THE UNDEVELOPED COASTLINE

Development will not be permitted that would cause unacceptable harm to the character of the undeveloped coastline east of the Rhymney River.

2.42.1 The purpose of Policy 2.42 is to protect the undeveloped coastline east of the Rhymney River from unnecessary development that would cause unacceptable harm its character. ***Planning Policy Wales (2002)*** states that UDPs should normally only propose coastal locations for development that needs to be on the coast.
2.42.2 Development that does not require a coastal location will be strongly resisted within the undeveloped coastline. Wherever possible, development that requires a coastal location will be located in areas that are presently developed. Otherwise, development will only be permitted on the undeveloped coastline if:

- the need for the proposed development is considered to outweigh the importance of the undeveloped coastline and any harm likely to be caused to it; and
- the development cannot be more satisfactorily accommodated elsewhere having regard to other plan policies.

2.42.3 Proposals on the undeveloped coastline will also be assessed against other relevant policies, including those relevant to the countryside, notably:

- *Policy 2.39: General Countryside Protection*
- *Policy 2.40: Agricultural Land*
- *Policy 2.43: General Landscape Protection*
- *Policy 2.44: Special Landscape Areas*
- *Policy 2.45: Trees, Woodlands and Hedgerows*
- *Policy 2.46: Sites of International and National Importance for Nature Conservation Importance*
- *Conservation*
- *Policy 2.47: Sites of Local Importance for Nature*
- *Policy 2.48: Biodiversity*
- *Policy 2.50: Ancient Monuments and Other Archaeological Remains*.

2.42.4 The whole of Cardiff's coast, the Severn Estuary, which is internationally designated under the Convention on Wetlands of International Importance (as a Ramsar site), is a European Marine Site, classified under the Birds Directive as a Special Protection Area (SPA) and is under consideration as a possible Special Area Of Conservation (pSAC) under the Habitats Directive.

POLICY 2.50: ANCIENT MONUMENTS AND OTHER ARCHAEOLOGICAL REMAINS

Development will not be permitted that would harm an ancient monument or other nationally important archaeological remains, whether scheduled or not, or unacceptably harm the setting of such a monument or remains. Where development would affect locally important archaeological remains, satisfactory arrangements will be sought for their preservation on site wherever possible, or for their excavation and recording.

2.50.1 Policy 2.50 affords appropriate protection to ancient monuments and other archaeological remains as required by legislation and ***Planning Policy Wales (2002)***.

2.50.2 Archaeological remains provide important, often irreplaceable, information about the past. Their investigation and, where appropriate, preservation is important in its own right and can provide an invaluable educational and tourism resource. It is important to preserve and enhance those significant remains that are known to exist and to ensure that remains that may still exist are not destroyed through ignorance of their location and importance. ***Planning Policy Wales (2002)*** affirms that the preservation of ancient monuments is a material planning consideration and that where nationally important archaeological remains, whether scheduled or not, and their settings are affected by proposed development, there should be a presumption in favour of their physical preservation.

2.50.3 The Ancient Monuments and Archaeological Areas Act 1979, requires the Assembly to compile and maintain a schedule of ancient monuments of national importance. There are currently 25 scheduled ancient monuments within Cardiff, identified on *Map 17*.

2.50.4 Cadw, the Welsh Historic Monuments Executive Agency of the Assembly, undertakes the Assembly's responsibilities for monuments. Responsibility for the care

and maintenance of monuments rests with individual owners. Where development proposals are likely to affect the site or setting of a scheduled monument, Cadw must be consulted and its consent obtained.

2.50.5 Scheduled ancient monuments represent only a small proportion of the total number of known archaeological sites in Cardiff. There are many others, of varying importance, recorded on the County Sites and Monuments Record (SMR), held by the Glamorgan-Gwent Archaeological Trust (GGAT). The SMR indicates whether archaeological remains are known or likely to exist on a particular site. Absence of a reference on the SMR does not necessarily indicate that no archaeological interest exists and GGAT will continue to monitor planning applications and update the SMR where appropriate.

2.50.6 The GGAT has identified four archaeologically sensitive areas in Cardiff :

- the city centre;
- Wentlooge Levels;
- St Fagans/Michaelstone-super-Ely; and
- Llandaff.

These areas are identified on *Map 17.* They represent the most likely areas where the effect of development on the archaeological resource may be an issue during the determination of a planning application. Further information on the extent, justification and implications of these areas will be provided in supplementary planning guidance.

2.50.7 Where remains are known to exist, or where there is known to be a likelihood of remains existing, developers will be required to provide for an archaeological field evaluation to be carried out, prior to determination of a planning application. This will assist determination of whether an interest exists and, if so, whether the remains merit preservation or merely recording/rescue.

2.50.8 Wherever possible, the preservation of important archaeological remains *in situ* will be sought. This will depend on the merits of the case, taking account of the importance of the remains and other material considerations. In exceptional circumstances, this may mean that development is inappropriate on a site. Elsewhere, detailed proposals may need to pay regard to the findings of the evaluation and mitigate the effects of development. Where the remains or their setting are not particularly important, it may be sufficient for developers to provide for the remains to be properly recorded and/or rescued prior to development commencing.

2.50.9 The Council will continue to work with Cadw on matters affecting the condition and treatment of ancient monuments and will encourage owners to keep them in good order. It will continue to maintain those monuments that are in its ownership and, where possible, will allow public access to them.

POLICY 2.72: DREDGED AGGREGATE LANDING AND DISTRIBUTION FACILITIES

Proposals for the provision and improvement of landing and distribution facilities for dredged aggregates will be favoured where there will be no unacceptable harm to the environment, nearby residential areas or future regeneration prospects of the waterfront area.

2.72.1 Currently marine sources supply over 80% of the fine aggregate construction needs for South Wales. Although marine dredging is outside the control of the Council, it is necessary to ensure appropriate landing and distribution facilities are provided to ensure this important source of construction materials remains available. Without it, the County would have to accept greater demands on land-based sources

and more costly imports. However in response to concerns about the long-term effects of dredging on coastal erosion recent Wales Assembly guidance proposes a more cautious approach to dredging and seeks a more balanced approach to the sourcing of supplies for fine aggregates in South Wales. Although this may lead to long-term changes in supply patterns, in the short term the present pattern of supply is likely to continue and it is therefore prudent to ensure current levels of supply are maintained. Policy 2.72 (which continues adopted Structure Plan and Minerals Local Plan policy) therefore provides a framework for the assessment of applications for improved or new sand and gravel wharves and related facilities.
2.72.2 Operations involving the trans-shipment of minerals do not normally need specific planning permission within the operational area of the port. However, secondary processes including manufacture or treatment of mineral products usually need permission. Where proposals are submitted they will need to demonstrate minimal impact on the environment and nearby residential areas and demonstrate they will not prejudice any future regeneration proposals in the waterfront area of Cardiff Bay.
2.72.3 Specific proposals are likely to need to be assessed against a range of relevant plan policies.

2.2.5 Archaeology and planning in Gwent

2.2.5.1 Gwent Structure Plan 1991-2006 (1996) – excerpts

C8 Development which has a significant adverse effect on sites where the nature conservation interest is of international, national, regional or county importance will not normally be permitted. Wetlands and ancient meadows will be given particular protection.

C9 The creation of habitats of nature conservation interest will be encouraged, particularly wetlands, grasslands and heathlands.

5.21 These policies give strategic support to the statutory designations of National Nature Reserves, Sites of Special Scientific Interest (SSSIs) and other special protection areas for flora, fauna, geology or geomorphology. Many of these are small in area but the Severn Estuary and large tracts of the Gwent Levels, together with substantial areas of water, upland and woodland are protected in this way. Support is also given to the protection of sites of similar value by local authorities and voluntary groups. In practice the protection of nationally designated sites and areas will receive the strongest protection and Policy C8 accords particular priority to wetlands and ancient meadows, particularly scarce habitats in a national and international context.

5.22 The body mainly responsible for advice on the protection of the statutory sites is the Countryside Council for Wales. Subject to consultation with that body, any development within or beyond the sites which will have a significantly damaging impact on the special features will normally be resisted. However, there may be circumstances where development can be allowed on terms which adequately protect or even enhance the essential nature conservation interests.

General Mineral Development

Ml proposals for mineral development will be considered against the following criteria as appropriate:

i) the acceptability of the impact upon neighbouring communities of the operations and associated works, paying particular attention to noise, vibration, dust and safety;

ii) the consequences of traffic movements likely to be generated by the proposal;

iii) the effect on the landscape of the area in both the near and long term;

iv) the effect on surface and subsurface drainage and water supplies in both the near and long term;

v) the effect on the nature conservation interests of the site and adjoining areas in both the near and long term, paying particular regard to areas designated for nature conservation purposes;

vi) the effect on agricultural interests in the area in both the near and long term;

vii) the effect on archaeological interests in the area in both the near and long term;

viii) the duration of the operations, restoration and after care works;

ix) the economic contribution of the proposals including the need for the mineral, alternative sources of supply, alternative materials and the employment opportunities likely to be provided;

x) the existing nature and condition of the proposed site and extent and nature of any improvements that will result from the operations;

xi) the likelihood of minerals being sterilised by other forms of development;

Aggregates: Sand

M10 the need for fine aggregates will normally be met by marine dredged sand from the Severn estuary. planning applications will be considered against the criteria of policy Ml.

M11 proposals for land-won sand and gravel will be subject to the most careful examination against the criteria of policy M1 particularly in areas of sensitive landscapes.

11.14 Construction frequently requires fine aggregates, sand, as well as coarse aggregates and crushed rock. Traditionally in South Wales such materials have been sea-dredged from the Severn Estuary rather than land-won and this material has to date proved adequate in amount and suitable in quality for all purposes. A study of the extent and contribution of sand and gravel resources within the Bristol Channel is to begin very shortly. It is considered that at present marine dredging generally causes less damage to the environment and less disturbance to local communities than land based operations and for this reason is to be preferred. However, the extent of environmental damage caused by marine dredging is currently the subject of investigation and the situation may need to be reviewed.

2.2.6 Archaeology and planning in Somerset

2.2.6.1 Bath and North East Somerset, Bristol, North Somerset, South Gloucestershire Joint Replacement Structure Plan, Adopted September 2002

POLICY 19

Local Plans will, through existing national/international designations, and other policies and initiatives:

- protect that part of the cultural heritage that consists of the built and historic environment of the area and manage development and land use change in a manner that respects local character and distinctiveness, ensuring that new development and other land use changes respect and enhance local character through good design and conform with any local character statement / guidance produced locally;
- protect Scheduled Ancient Monuments and other nationally important archaeological remains, which should be preserved in situ and their settings maintained and enhanced; and
- require development proposals affecting archaeological sites of local importance to demonstrate an overriding need for the development, to provide for a mitigation strategy where necessary, and to provide for appropriate prior investigation and recording of the site.

The Coast

3.17 The Severn Estuary and Bristol Channel present a unique combination of resources, constraints and opportunities, which need to be taken into account in both management and policy terms. The Severn Estuary is designated a Site of Special Scientific Interest; a Special Protection Area and NATURA 2000 site under EU Directives; and a Ramsar site under the Convention on Wetlands of International Importance. It is also a possible Special Area of Conservation. Further south, the coastline of the Bristol Channel has important features and habitats that require careful management at the local level. As well as landscape and natural environmental importance, the area as a whole has terrestrial and marine archaeological significance and is also important for the amenity of local residents, for recreation, for the tourist industry, for the minerals and waste management industries, and in terms of water resources. The Port of Bristol is of growing national and regional economic importance, and is now established as a premier car import/export facility. A management strategy for the Severn Estuary and part of the Bristol Channel has been published by a consortium of organisations under the umbrella of the Severn Estuary Strategy.

3.18 Government guidance sets out a clear policy context for the coastal zone. In particular it emphasises that the undeveloped coast should not be expected to accommodate any new development that does not require a coastal location. A co-ordinated and integrated approach for the estuary is essential, to set out a clear context for the future of the coastline, with particular emphasis on securing conservation objectives along the undeveloped coast whilst safeguarding the commercial interests of those activities requiring a coastal location.

POLICY 22
Local Plans covering the coastline should define a coastal zone based on the following broad criteria:

a. both off-shore and near-shore natural processes, in particular, areas of potential tidal flooding and erosion;
b. natural habitats that are characteristic of a coastal location, in particular, inter-tidal mudflats, salt marshes and wetlands;
c. the areas that are directly visible from the coast;
d. the extent of direct maritime influences and coast related activities; and

e. a landscape character assessment.

Along the undeveloped coast, provision will not be made for development, unless is it is necessary for habitat/landscape management. Along the currently developed coast, provision for new development, including redevelopment, will be restricted to those areas not liable to flooding or erosion during the lifetime of the development and to those activities requiring a coastal location.

Provision for development will be made in areas liable to marine or tidal flooding only where such development is needed in that location; where there is no adequate alternative; and where adequate protection measures which can be sustained for the lifetime of the development can be introduced, without those measures themselves having an adverse impact on the character or nature conservation value of the coastal zone.

Water resources

3.20 River corridors and coastal margins are particularly fragile ecosystems, of great importance not only for the water resource itself, but also nature conservation, fisheries and recreation. In addition, they often make a significant contribution to the landscape character of a locality. Although development or redevelopment within river corridors and coastal margins can result in an enhanced environment by, for instance, improving water related habitats, landscape or water quality, improving public access or the restoration of natural and man-made features, new development should not place existing assets at risk.

2.2.6.2 The Somerset And Exmoor National Park Joint Structure Plan

Somerset County Council and the Exmoor National Park Authority adopted the policies and proposals in this document on 20 April 2000. The individual sections and policies pertaining to the heritage resource have been selected from the full document.

1.1 The Joint Structure Plan Review provides the strategic base for all land use planning in the combined area covered by Somerset and the Exmoor National Park for the period up to 2011. The Plan has been prepared as a joint Structure Plan between Somerset County Council and the Exmoor National Park Authority.

1.2 The Joint Structure Plan covers the administrative county of Somerset and the Exmoor National Park. The former Somerset Structure Plan Alteration No.2, covered the whole of Somerset including that part of the Exmoor National Park within Somerset. The strategic planning policy for the part of the National Park that is within Devon was previously provided through the Devon Structure Plan (incorporating the Third Alteration).

POLICY 1
NATURE CONSERVATION
The biodiversity of Somerset and the Exmoor National Park should be maintained and enhanced. The greatest protection will be afforded to nature conservation sites of international and national importance. In addition, Local Plans should include policies to maintain and enhance sites and features of local nature conservation importance including landscape features which provide wildlife corridors, links or stepping stones between habitats.

4.12 It is of vital importance to the proper planning of Somerset and Exmoor that the value of its biodiversity is recognised, protected and enhanced. In Somerset alone, some habitats have been recognised as being of international importance, for example, the Severn Estuary is designated as a Ramsar site, Special Protection Area and a possible Special Area of Conservation and parts of the Somerset Levels and Moors are a Special Protection Area and a Ramsar site. A number of important sites are being reviewed, to identify whether they should be designated as sites of international importance. Table 4.1 explains the different site designations.

TABLE 4.1

Table 4.1
Nature Conservation : Site Designations

Importance	Designation	UK Designation
Sites of *international* importance	Ramsar Sites (Convention on Wetlands Importance - Ramsar Convention, 1971)	SSS1
	Special Protection Areas (SPA's) - EC Directive on the Conservation of Wild Birds, 1979	SSS1; SPA
	Special Areas of Conservation (SAC's) - EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Floral, 1992	SSSI; SAC
Sites of *national* importance	National Nature Reserves (NNR's) - Section 19 of the National Parks and Access to the Countryside Act 1949 or, Section 35 of the Wildlife and Countryside Act 1981	SSSI
	Sites of Special Scientific Interest (SSSI's) - Section 28 of the Wildlife and Countryside Act 1981	SSSI
Sites of *local* importance	Local Nature Reserves (LNR's) Section 21 of the National Parks and Access to the Countryside Act 1949	LNR
	Non-Statutory Nature Reserves - established by a variety of nature conservation and related bodies	-
	County Wildlife and Geological Sites - Identified by the Somerset Wildlife Trust and the Devon Wildlife Trust in partnership with the appropriate Local Authorities	-

(Based on Planning Policy Guidance: Nature Conservation (PPG 9))

POLICY 7
AGRICULTURAL LAND
Subject to the overall aims of the strategy, provision should not be made for permanent development, excluding forestry and agriculture, involving the best and most versatile agricultural land (Grades 1, 2 & 3a) unless there are no alternative sites on lower quality agricultural land and there is an overriding need for the development in that location. Where land in Grades 1, 2 & 3a does need to be developed and there is a choice between different grades, development should be directed towards land of the lowest grade.

HISTORIC ENVIRONMENT
4.37 Government guidance contained in PPG 15: Planning and the Historic Environment (1994), defines the historic environment, in its broadest sense, as embracing all aspects of the environment that reflect human history. Somerset and Exmoor have a varied historic and architectural heritage that provides local distinctiveness and contributes to our identity. It is recognised that such valued assets represent a finite cultural resource, which requires innovative and sensitive planning. The historic environment policies seek to conserve the historic landscapes, buildings and archaeological remains within the area covered by the Joint Structure Plan for

future generations. As part of the Joint Structure Plan's wider environmental responsibilities, this objective for the historic environment reflects the County Council and the National Park Authority's commitment towards environmental stewardship and desire to protect such irreplaceable assets.

POLICY 9
THE BUILT HISTORIC ENVIRONMENT
The setting, local distinctiveness and variety of buildings and structures of architectural or historic interest should be maintained and where possible be enhanced. The character or appearance of Conservation Areas should be preserved or enhanced.

4.40 Somerset and Exmoor have a rich built historic environment, which represents an irreplaceable record of the past. Such historic assets provide our settlements with local distinctiveness and contribute to the overall environmental quality and character within the plan area. Policy 9 provides strategic guidance for the historic built environment, which includes both statutory and non-statutory protected buildings and structures. This enables the formation of comprehensive and coordinated policies, which will encourage the sensitive planning of the building stock and their overall settings.

4.41 Our growing appreciation of the historic environment includes the recognition that the spaces and layout of our built environment are an integral part of the overall character of the area covered by the Joint Structure Plan. The protection of the settings of historic buildings and structures is essential if the integrity of these areas is to be preserved.

4.42 There are numerous Conservation Areas throughout Somerset and Exmoor and these are designated on an assessment of an areas character and appearance, which includes groups of historic buildings, walls, trees, archaeological sites and monuments, and historic street patterns. Development within Conservation Areas within the plan area should have regard to the preservation or enhancement of these features. This will require sympathetic development in terms of scale, design and materials.

POLICY 10
HISTORIC LANDSCAPES
Development proposals which affect a registered historic landscape (historic parks, gardens and battlefields) should take account of their impact on the character of that landscape.

4.48 The protection of registered landscapes from intrusive development will ensure that the setting of many of the most valued historic buildings, structures and archaeological remains are preserved.

POLICY 11
AREAS OF HIGH ARCHAEOLOGICAL POTENTIAL
Development proposals should take account of identified Areas of High Archaeological Potential or, elsewhere where there is reason to believe that important remains exist, so that appropriate assessment and necessary protection can be afforded to any archaeological remains identified.

4.49 Areas of High Archaeological Potential or AHAPs are identified in local plans as areas most likely to contain important archaeological features. The boundaries of these areas will be up-dated as further research is completed and new areas defined.

The importance of Policy 11 lies in the protection it offers to known Areas of High Archaeological Potential, and other areas where there is reason to believe remains exist, whose archaeological value have yet to be assessed. This may lead to formal designation, by the English Heritage Board and Strategic Planning Authorities, as a Scheduled Monument or other Site of National or County Importance. Local Planning Authorities, through district-wide local plan policies, will be expected to request an archaeological evaluation to be undertaken where development proposals affect an AHAP. This is to ensure that the potential archaeological importance of an area is highlighted and allow appropriate protection to be given to the remains. Similarly this will provide a framework to guide and inform developers. The strategic aim of Policy 11 is to provide guidance and ensure that evaluation is sought prior to the determination of a planning application in order to promote early consultation between developers and Local Planning Authorities.

POLICY 12
NATIONALLY IMPORTANT ARCHAEOLOGICAL REMAINS
There should be a presumption in favour of the physical preservation in situ of nationally important archaeological remains. The setting and amenity value of the archaeological remains should be protected.

4.50 Our archaeological heritage represents a finite and non-renewable resource, which, in many cases, is highly fragile and vulnerable to damage. Archaeological remains, including; buried deposits, buildings and structures, require comprehensive protection. This requires the establishment of strategic guidance to ensure that the future of the most important archaeological remains are safeguarded.

4.51 PPG 16: Archaeology and Planning (1990), provides that archaeological remains, identified and scheduled as being of national importance, should normally be identified in development plans for preservation. Other unscheduled archaeological remains of more than local importance, may also be identified in development plans as being particularly worthy of preservation. Policy 12 provides that nationally important remains, whether scheduled or not, should be preserved in situ. This reflects the importance attached to the preservation of such remains and their settings. The significance of protecting the setting lies with the valuable contribution they make to the overall historic significance of the area.

POLICY 13
LOCALLY IMPORTANT ARCHAEOLOGICAL REMAINS
Development proposals which affect locally important archaeological remains should take account of the relative importance of the remains. If the preservation in situ of the archaeological remains cannot be justified, arrangements should be sought to record those parts of the site that would be destroyed or altered.

4.52 Whilst it is recognised that the preservation in situ of important archaeological remains is nearly always preferred, it is not feasible to protect all archaeological sites. In such circumstances the planning authorities will need to weigh the relative importance of the archaeological remains against other factors, such as the need for the development. This decision will be informed by an assessment of the significance and extent of the remains, as identified in Policy 13. If their preservation in situ cannot be justified appropriate arrangements should be sought by the local planning authority to record those parts of the site which will be affected by the proposed development.

4.53 The Strategic Planning Authorities maintain records of national and locally important remains within the area covered by the Joint Structure Plan. In Somerset alone, the Sites and Monuments Record (SMR) currently identifies over 12,000 known archaeological sites, monuments and finds. This information ensures that identified archaeological remains are an integral consideration during the determination of planning applications. The guidance emphasises the importance of early consultation between local planning authorities and developers to reconcile potential conflicts. This process will be aided by referring to the SMR at the earliest instance. It is planned that direct access and remote access to the SMR will improve during the life of this Plan.

COAST

4.56 The Somerset and Exmoor coastline has considerable landscape variety that makes an important contribution to the character of the plan area. PPG 20: Coastal Planning (1992), endorses sustainable policies and practices for the coast and stipulates that any need for development should be reconciled with the need for environmental protection, conservation and, where appropriate, enhancement for increased recreational use. At the strategic level a consistent policy approach to coastal areas must be provided, the environment protected and a framework for local plan strategies set up.

4.57 Much of coast in Somerset and Exmoor has existing protection through international, national and local designations, such as the Exmoor National Park, Areas of Outstanding Natural Beauty, the Exmoor Heritage Coast, Ramsar site, Sites of Special Scientific Interest and Special Landscape Areas. The coastal zone therefore enjoys a comprehensive protection through existing designations and additionally by development plan policies. For planning purposes the coastal zone is defined as the area above the mean low water mark. The limits of which are determined by the geographical extent of the natural processes and human activities that take place. This could include areas of potential marine and tidal flooding and erosion, enclosed tidal waters such as estuaries and areas directly visible from the coast.

4.58 RPG 10: Regional Planning Guidance for the South West (1994), states that development plan policies should generally safeguard the whole of the regions undeveloped coast. The Heritage Coast designation is a management tool by which the conservation, protection and enhancement of the undeveloped coastline can be promoted. In these areas the requirements of conservation and access must be balanced to ensure the flexible planning and management of the coastal zone.

POLICY 15
COASTAL DEVELOPMENT

Provision for any development along the coast, including the Exmoor Heritage Coast, should be made within Towns, Rural Centres and Villages. Where development requires an undeveloped coastal location it should respect the natural beauty, biodiversity and geology of the coast and be essential in that location. New coastal developments should minimise the risk of flooding, erosion and landslip.

4.63 The coast's natural processes operate over extensive areas, which do not respect administrative boundaries. The effective management of the coastal zone therefore requires co-operation and co-ordination between adjacent planning authorities. At the international level the European Habitats Directive (Council Directive of 21st May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora), provides

protection to certain rare and endangered habitats, plants and animals, on land and in the marine environment. At sea, this will provide a major new opportunity for protecting marine habitats through the designation of Marine Special Areas of Conservation. The Severn Estuary is designated as a Special Area of Conservation under the European Birds Directive (Council Directive of 2nd April 1979 on the Conservation of Wild Birds), and as a Ramsar wetland of international importance. These international designations reflect the importance of the estuary for winter waterfowl.

4.64 Somerset County Council and the Exmoor National Park Authority will actively encourage and, where appropriate, participate in initiatives such as the Severn Estuary Strategy partnership project to develop an Estuary Management Plan, English Nature's Sensitive Marine Areas, the Environment Agency's Local Environment Agency Plans and the Bridgwater Bay to Bideford Bay Shoreline Management Plan to ensure that the coastline is preserved and enhanced.

2.3 Marine guidance

2.3.1 Planning Policy Guidance (PPG16 and MMG1)

Planning law applies within the territory of local authorities which, as a general rule, extends only to the low water mark. English Heritage and RCHME, however, included the following statement in *England's Coastal Heritage* (see below):

Although it remains government policy not to extend the Town and Country Planning system to the territorial sea, the principles set out in Planning policy guidance note 16: archaeology and planning should be applied to the treatment of sub-tidal archaeological remains in order to secure best practice.

Additionally, Marine Minerals Guidance Note 1 (MMG1); Guidance on the Extraction by Dredging of Sand, Gravel and Other Minerals from the English Seabed (2002) notes that the *JNAPC Code of Practice for Seabed Developers* recommends procedures for consultation and co-operation between seabed developers and archaeologists. This is consistent with the Government's policy on archaeology as stated in PPG16, and should continue to be followed by the dredging industry.

England's Coastal Heritage: a statement on the management of coastal archaeology was published in 1996 by English Heritage and the Royal Commission on the Historical Monuments of England (RCHME). The statement set out a number of principles for managing coastal archaeology:

- The coastal zone of England includes a finite, irreplaceable, and, in many cases, highly fragile archaeological resource which by virtue of its value, variety, and vulnerability justifies a presumption in favour of the physical preservation *in situ* of the most important sites, buildings, and remains.
- Although archaeological remains situated within inter-tidal and sub-tidal areas may be less visible and accessible than remains on dry land, this does not affect their relative importance and they should be managed in accordance with the principles which apply to terrestrial archaeological remains.
- As historic landscapes can extend seamlessly from dry land, through the inter-tidal zone, and into sub-tidal areas, effective management of the coastal

archaeological resource cannot be achieved without due consideration of marine as well as terrestrial archaeological remains.

The statement also included a number of detailed recommendations, which include the following:

Development control and environmental assessment:

Coastal archaeological interests should be adequately reflected in structure and local plans, and consistently and comprehensively included in Environmental Assessment procedures for coastal and marine developments (including harbour works, mineral extraction, oil and gas related projects, capital dredging projects, cable projects, and waste water treatment and disposal) and other activities requiring sectoral consent.

Minerals:

Pending the outcome of the review of marine minerals licensing procedures, adequate consultation procedures for archaeological interests during the granting or renewal of licenses should be promoted and, where appropriate, local authorities should consider the use of their powers under Section 18 of the Coastal Protection Act 1949 to prohibit or license extraction of aggregate from the foreshore and seabed in order to secure the preservation of important archaeological remains.

Identifying and Protecting Palaeolithic Remains; archaeological guidance for planning authorities and developers (English Heritage May 1998) draws attention to the importance of Palaeolithic remains and states that they must be considered in line with PPG 16 when potentially affected by development proposals. Palaeolithic archaeological sites are defined as any land where artefacts or traces of a human presence of Pleistocene date have been found. The document notes that Palaeolithic remains have particular importance if:

- Any human bone is present in relevant deposits
- The remains are in an undisturbed, primary context
- The remains belong to a period or geographic area where evidence of a human presence is particularly rare or was unknown
- Organic artefacts are present
- Well-preserved indicators of the contemporary environment (floral, faunal, sedimentological) can be directly related to the remains
- There is evidence of lifestyle (such as interference with animal remains)
- One deposit containing Palaeolithic remains has a clear stratigraphic relationship with another
- Any artistic representation, no matter how simple, is present
- Any structure, such as a hearth, shelter, floor, securing device etc. survives The site can be related to the exploitation of a resource, such as a raw material
- Artefacts are abundant

The document goes on to note that sites containing any of these features are so rare in Britain that they should be regarded as of national importance and whenever possible should remain undisturbed.

The advice offered to developers and planning officers includes the following:

- It is advisable for prospective developers to research the archaeological potential of their sites (including that for Palaeolithic remains) at an early stage
- It is the responsibility of developers to supply the relevant planning authority on the archaeology of their sites, with proposals for the way in which this will be accommodated within the development scheme, so that an informed planning decision can be reached. Information on the Palaeolithic remains or the potential for such remains within a certain site may be acquired from a desk-based assessment but when this is inadequate it may be necessary to obtain further information from a limited field evaluation by suitably qualified archaeologists
- Planning authorities may apply a condition to a consent which prohibits the start of development until the applicant has ensured appropriate provision has been made for an adequate record of the site's archaeological remains.

Marine Aggregate Dredging and the Historic Environment produced by the British Marine Aggregate Producers Association (BMAPA) and English Heritage aims to ensure the effective and practical consideration of the historic environment in the licensing of marine aggregate extraction (BMAPA / English Heritage 2003).

It includes practical guidelines on assessing, evaluating, mitigating and monitoring archaeological impacts of marine aggregate dredging. It also elaborates on the Code of Practice for Seabed Developers produced by the Joint Nautical Archaeology Policy Committee.

2.3.2 Protection of Wrecks Act 1973

Under the 1973 Act, wrecks and wreckage of historical, archaeological or artistic importance can be protected by way of designation. It is an offence to carry out certain activities in a defined area surrounding a wreck that has been designated, unless a licence for those activities has been obtained from the Government. Generally, the relevant Secretary of State must consult appropriate advisors prior to designation, though it is also possible to designate a wreck in an emergency without first seeking advice. There are no sites presently designated under this legislation within the study area. If any important wreck or ship borne artefact is discovered during the dredging operations, however, the designation of an area around the find remains a possibility.

2.3.3 Merchant Shipping Act 1995

Within the context of the Merchant Shipping Act 1995, 'wreck' refers to flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes a ship, aircraft or hovercraft, parts of these, their cargo or equipment. It may be of antique or archaeological value such as gold coins, or a yacht or dinghy abandoned at sea or items such as drums of chemicals or crates of foodstuffs (Definition from the Receiver of Wreck (ROW)). The ownership of underwater finds that turn out to be 'wreck' is decided according to procedures set out in the Merchant Shipping Act 1995. If any such finds are brought ashore the salvor is required to give notice to the ROW that he has found or taken possession of it and, as directed by the ROW, either hold it to the Receiver's order or deliver it to the Receiver. This applies whether material has been recovered from within or outside UK Territorial Waters, unless the salvor can prove that title to the property has been vested in him (e.g. by

assignment to him of rights devolving from the owner of the vessel or its contents at the time of loss). Even if ownership can be proved the salvor is still required to notify the ROW.

The Crown makes no claim on wreck found outside UK Territorial Waters, which remains unclaimed at the end of the statutory one-year, and the property is returned to the salvor. Ownership of unclaimed wreck from within Territorial Waters lies in the Crown or in a person to whom rights of wreck have been granted. The Receiver of Wreck has a duty to ensure that finders who report their finds as required receive an appropriate salvage payment. In the case of material considered being of historic or archaeological importance, a suitable museum is asked to buy the material at the current valuation and the finder receives the net proceeds of the sale as a salvage payment. If the right to, or the amount of, salvage cannot be agreed, either between owner and finder or between competing salvors, the Receiver of Wreck will hold the wreck until the matter is settled, either through amicable agreement or by court judgement.

2.3.4 Protection of Military Remains Act 1986

Under the Protection of Military Remains Act 1986, all aircraft that have crashed in military service are protected, and the Ministry of Defence has powers to protect vessels that were in military service when they were wrecked. The Ministry of Defence can designate named vessels as 'protected places' even if the position of the wreck is not known. In addition, the Ministry of Defence can designate 'controlled sites' around wrecks whose position is known. In the case of 'protected places', the vessel must have been lost after 4 August 1914, whereas in the case of a wreck protected as a 'controlled site' no more than 200 years must have elapsed since loss. In neither case is it necessary to demonstrate the presence of human remains. Diving is not prohibited at a 'protected place' but it is an offence to tamper with, damage, move or remove sensitive remains. Diving, salvage and excavation are all prohibited on 'controlled sites', however, though licenses for restricted activities can be sought from the Ministry of Defence. Additionally, it is an offence carry out unauthorised excavations for the purpose of discovering whether any place in UK waters comprises any remains of an aircraft or vessel which has crashed, sunk or been stranded while in military service.

In November 2001, the MoD reported on the Public Consultation on Military Maritime Graves and the Protection of Military Remains Act 1986. The report recommended that a rolling programme of identification and assessment of vessels against the criteria be established to designate all other British vessels in military service when lost, as Protected Places. The records of vessels lost during both World Wars whilst on active service do not always give an exact location.

2.3.5 Protecting our Marine Historic Environment: making the System work better

In March 2004, a consultation document was circulated setting out the key issues and questions in relation to legislation and the management of the marine historic environment. The document includes various suggestions for change including a more unified designation scheme (combining the Protection of Wrecks Act 1973 and the Ancient Monuments and Archaeological Areas Act 1979). The document also includes provision for publishing the criteria that marine cultural heritage sites will need to satisfy in order to be designated. Standardised restrictions are also proposed,

so that all sea-users can broadly anticipate what activities are allowed. The consultation process was due for completion at the end of July 2004.

2.3.6 "A review of marine aggregate extraction in England and Wales, 1970-2005" By: Dr Sue Gubbay, July 2005

2.3.6.1 Government Policy, The Consenting Process, And The Licensing Of Marine Aggregate Extraction

Government policies, the consenting regime and the licensing process for marine aggregate extraction have changed significantly in the last 30 years. The current situation is also in flux as an interim licensing system is operating. This is due to become formalised into a statutory process in the near future although the timing of the change has still to be decided (see below).

The Policy context

Government policy on aggregate extraction can be found in Mineral Planning Guidance Note 6 (MPG6) which was first published in 1994[32]. This sets out principles for identifying areas where aggregates extraction might be appropriate, and criteria for assessing the suitability of policies as well as site specific proposals. The use of marine aggregate was advocated in this guidance and it was a key influence in the growth of the industry.

Guidance specific to marine aggregate extraction in the territorial waters around England can be found in Marine Mineral Guidance Note 1 (MMG) which was issued in August 2002[33]. This recognises that marine sands and gravel make an important contribution to demand for aggregates, and notes the benefits of using marine aggregate, particularly in reducing the pressure to take minerals from land, where there are many constraints due to existing land use. When dredged material can be landed near where it will be used, there may also be an additional environmental advantage from reducing the need for transport by road. The continued use of marine dredged sand and gravel is favoured where this is consistent with sustainable development. The Government believes this can be achieved by;

- minimising the total area licensed/permitted for dredging;
- the careful location of new dredging areas;
- considering all new applications in relation to the findings of an Environmental Impact Assessment (EIA) where such an assessment is required;
- adopting dredging practices that minimise the impact of dredging;
- requiring operators to monitor, as appropriate, the environmental impacts of their activities during, and on completion of, dredging; and
- controlling dredging operations through the use of conditions attached to the dredging licence or dredging permission.

Government policy is to take a precautionary approach when considering applications for new permissions and for a presumption against permitting new areas unless the issues relating to environmental and coastal impacts are satisfactorily resolved. This is being tested with applications for aggregate extraction in the Eastern Channel Region where the regional policy is for action to be taken to increase the supply of construction aggregates from marine dredged sand and gravel[34].

In Wales, the Welsh Assembly Government (WAG) policy on aggregate extraction is set out in its Minerals Planning Policy[35] and a Minerals Technical Advice Note[36] which advocates ensuring that the supply is managed in a sustainable way and maximising the use of secondary and recycled aggregate. The WAG recognised the need for a strategy to deal with applications for licensing in the Bristol Channel and an Interim Policy for this area has recently been published[37]. This specifies that while other sources of fine aggregates will continue to be investigated, the use of marine dredged sand will continue for the foreseeable future but only where this remains consistent with the principles of sustainable development. There is also a policy for dredging to become focused in areas offshore and to the west of the Bristol Channel over the next 10 years. The acceptance and encouragement of the sourcing of aggregate from the marine environment has probably been the most significant Government policy change to affect the industry in the last 30 years. This, together with the provision of some guidance on aspects such as site selection and operational practices, has enabled the industry to grow and establish itself in the market.

The Consenting Process and Licensing System

Companies require *consent* from Government and a *licence* from The Crown Estate before they can extract marine aggregate from the UK Continental Shelf. In both cases the type and detail of the required supporting documentation and the procedures which have to be followed have changed significantly in the last 30 years. The current arrangements are also set to change from an interim "Government View Procedure" to a statutory system. The proposals for England and Wales have been set out in the Draft *Environmental Impact Assessment and Habitats (Extraction of Minerals by Marine Dredging) Regulations* which embodies the requirements of the EC EIA Directive (85/337/EEC) and the EC Habitats Directive (92/43/EEC) that are relevant to marine aggregate extraction. The draft Regulations were drawn up in 1998. They have been subject to consultation, and were waiting for an opportunity to be considered in the legislative agenda of Parliament however given the time which has passed there may be another draft and consultation stage before the Regulations reach the statute books. Since 1968, exploitation of marine aggregates has been controlled through a non-statutory consultation process known as the 'Government View' Procedure (GV). Under this system, companies sought extraction licences from The Crown Estate who acted as a "clearing house" for the process and the application was assessed by the (former) Department of the Environment (DoE) who consulted with a number of organisations including the Ministry of Agriculture Fisheries & Food (MAFF) in relation to the potential effect on the marine environment, commercial fisheries and fishing operations. A Coastal Impact Study was also prepared by HR Wallingford. Consent to seek a license from The Crown Estate was given if DoE were satisfied that the issues under its responsibility were protected, and that there was no likelihood of coastal erosion. This consent was described as "a positive Government View". The environmental information supporting applications made in the 1970s an early 80s was limited but this changed following adoption of the 1985 EC Environmental Assessment Directive (EIA Directive), which came into force in July 1988[38]. The exploitation of mineral resources was listed in the Directive as an activity that might require a supporting Environmental Assessment. The requirements of the Directive were therefore incorporated in the GV and MAFF issued guidance on the information they would need to carry out an adequate assessment[39]. Companies were also required to summarise potential consequences by providing an "impact hypothesis" with any application for licenses, which included consideration of steps

that might be taken to mitigate the effects of extraction activities, and to provide details of a proposed monitoring programme. In response to the EIA Directive the industry and The Crown Estate gave a voluntary commitment to undertake EIA on all new applications. Many concerns were expressed about this process. For example, the industry were concerned about the lengthy consultation periods required to review licence applications, the absence of a right of appeal, and the lack of Government guidance about the nature and level of information required to support licence applications[40]. Environmental non-governmental organisations were concerned about the lack of transparency and the role of The Crown Estate who were seen as being part of the decision-making process as well as benefiting financially from the issuing of licenses. A number of changes were made as a result, and an Interim Government View Procedure, administered by the Department of Environment, Transport and the Regions (DETR) and now by the Minerals and Waste Planning Division of the Office of the Deputy Prime Minister (ODPM) was introduced in 1998[41]. The main elements of this procedure are as follows:

- Companies must submit an Environmental Statement incorporating a Scoping Study, EIA and Coastal Impact Study with their application for an extraction licence
- The First Secretary of State is consulted and gives a Government View on the proposals, including specifying any restrictions and limitations which may be necessary if a licence is issued. The Crown Estate is kept informed but is not directly involved in the Government View process.
- The onus is on the developer to undertaken the necessary studies, identify concerns, undertake consultation and resolve any outstanding issues
- The process is characterised by many phases of public consultation

A development plan approach to marine minerals planning is another idea which has been raised as a possibility for the future. The issues around it have been discussed in a recent study for ODPM which includes recommendations for a national scale plan for marine minerals, a clear national framework and regional policies on marine aggregate[42]. Other factors, such as the interest in marine spatial planning, which are described below will influence what, if any, steps might be taken in this direction.

It is apparent that many aspects of the consents and licensing system have changed in the last 30 years. One of the most obvious is the significant increase in the amount, detail and type of information required to support applications. At the same time the assessment process has developed into a more clearly stated formal procedure with consultation stages to be undertaken by the industry as well as within Government Departments through the Government View Procedure. Consideration of impacts on the interests of other parties was largely confined to the fisheries sector and coastal processes, whereas today the interests of many more groups are considered, from archaeology to tourism. There is also a requirement for a formal Environmental Statement which includes an Environmental Impact Assessment (EIA) and Coastal Impact Study. The process has become more public and transparent enabling other interest groups, such as environmental NGOs, to become more involved, and as a result they are taking the opportunity to comment on licence applications. The timescale for Government Views has also changed from a situation where no cut off point was specified, to limits of perhaps 15 years with 5 yearly reviews.

Once the arrangements become statutory “Dredging Permissions” will replace the Government View Procedure. These will be issued to The Crown Estate as landowner

rather than the applicant. The Crown Estate may then issue a legal contract with an operator to carry out the dredging. The new regime will mean that any commercial licence issued by the Crown Estate will become distinct from the dredging permission issued by the ODPM. This separation of the decision making body and the permission to proceed is also important in order to comply with Human Rights legislation.

[Footnote numbers taken directly from Sue Gubbay's Paper]

31 Parrish & Murray (2001) Dredging – Marine Aggregates- The Facts. Coastal Futures 2001. Vol 8: Paper No. 0117
32 MPG6: Planning Policy For The Supply of Aggregates in England
33 DETR (2002) Marine Mineral Guidance 1: Guidance on the extraction by dredging of sand, gravel and other minerals
from the English seabed.
34 South-East Regional Minerals Strategy
35 NAW(2000) Minerals Planning Policy Wales. National Assembly of Wales.
36 Minerals Technical Advice Note MTAN (Wales) 1: Aggregates 2004
37 Welsh Assembly Government (2004) Interim Marine Aggregates Dredging Policy South Wales
38 EC Directive 'The Assessment of the Effects of Certain Public and Private Projects on the Environment (85/337/EEC).
39 Campbell, J.A. (1993) Guidelines for assessing marine aggregate extraction. MAFF Laboratory Leaflet No.73
40 DoE (1993) Coastal Planning and Management: A Review.
41 DETR (1998) Government View: New Arrangements for the Licensing of Minerals Dredging
42 ODPM (2004) A Development Plan for Marine Aggregate Extraction in England. A Scoping Study.

2.3.7 Marine Aggregates Dredging Policy (South Wales) - Summary Document

Introduction

1. Draft Marine Aggregates Dredging Policy, South Wales (MADP), sets out the National Assembly for Wales's (the Assembly) strategic level policy in relation to the extraction of marine sand, gravel and coal (hereafter referred to generically as marine aggregates) from the Bristol Channel, Severn Estuary and River Severn (see **Map 1**). It will be taken into account in all future decisions regarding the activity, from being material to individual Dredging License Applications to guiding marine dredging towards more preferred areas.

2. In steering industry towards areas where dredging for marine aggregates is likely to be acceptable and away from those areas where dredging is less likely to be acceptable, MADP will provide the industry with greater certainty. MADP should also assist with: medium to long-term planning and investment decisions; and, scoping of Environmental Impact Studies (EIA) and Coastal Impact Studies (CIS).

3. The objective of the MADP is "to develop strategic level policy that enables objective and transparent decisions to be taken about the most appropriate locations for dredging marine aggregates in Welsh waters of the Bristol Channel, Severn Estuary and River Severn."

4. The MADP is specific to dredging for marine sand though gravel and coal may be of limited commercial interest. MADP does not apply to land-won aggregates (Minerals Planning Policy Wales (MPPW), December 2000) or harbour and navigation channel capital and maintenance dredging.

5. MADP will support the Assembly in forming the Government View for marine dredging Licence Applications by providing broader strategic policy. MADP does not

replace the Interim Arrangements nor the new Statutory Regulations when they come into force.

6. The results of the Bristol Channel Marine Aggregates Study (BCMA Study), which was completed by ABP Research & Consultancy and Posford Duvivier Environment in 2000, formed much of the scientific baseline of data and / or information for policy. The MADP study area is sub-divided into 49 sediment environments (see **Map 2**), which are sub-areas of the Bristol Channel, Severn Estuary and River Severn system that exhibit similarity in the components of the sediment regime (BCMA Study, 2000) including:

• The prevailing processes of water movement and sediment transport;
• Geology and geomorphology i.e. geological origin of underlying rocks;
• Sedimentology including the processes of sediment transport and the characteristics of the sediment located within each sediment environment;
• The degree of consensus over published scientific data, information and prediction techniques.

7. MADP is a new approach for the UK coastal and maritime environment because it provides strategic policy (see Strategic Policy 1 and paragraphs 8 – 19, and 25 - 37), and area-based policy for each sediment environment (see Strategic Policy 2 and paragraphs 20 - 24).

8. MADP is based on five principles, to:

• Provide mineral resources to meet society's needs and to safeguard resources from sterilisation;
• Provide industry with a clear policy steer about where dredging for marine aggregates is likely to be acceptable;
• Protect environmental resources;
• Limit any adverse environmental and other impacts of dredging for marine aggregates e.g. leisure and tourism;
• Encourage efficient and appropriate use of minerals and the re-use and recycling of suitable materials.

9. MADP applies to:

• All areas below the mean low water mark in Wales's inland waters in the Bristol Channel, Severn Estuary and River Severn as defined in the National Assembly for Wales (Transfer of Function) Order (1999) with the exception of the City of Bristol Area and a small part of Pembrokeshire in Milford Haven;
• All areas below the mean low water mark in Wales's territorial waters in the Bristol Channel that are seaward of the limit of inland waters;
• All other areas in Wales (as defined by the National Assembly of Wales (Transfer of Functions) Order 1999 that are outside the jurisdiction of Local Authorities, including offshore intertidal banks that are not contiguous with the foreshore mean low water mark.

10. Harbour Authorities and Local Authorities in Wales (whose boundaries extend to the mean low water mark or, have marine aggregates resources that are otherwise within their jurisdiction), and have an interest in marine aggregates should take MADP into account when licensing dredging for marine aggregates and determining planning applications.

11. MADP should assist the Assembly and DETR in adopting complementary approaches to dredging policy for marine aggregates in the study area.

Legislative Background And Industry Regulation (Section 2)

12. **Section 2** defines the legal and institutional framework governing dredging marine aggregates in the Bristol Channel, Severn Estuary and River Severn. It makes a clear distinction between two fundamental issues. First, the legal ownership of the bed and foreshore of the Channel, Estuary and River Severn and the creation of rights to remove minerals from it. Second, the administrative regulation of the exercise of those property rights in the public interest.

13. The Interim Arrangements for the Government View will continue to be used as the procedure for Licensing of Minerals Dredging until such time as the new statutory Regulations come into force (expected later in 2001). There is little practical difference between the new statutory procedures and Interim Arrangements with the exception that the new statutory Regulations transpose into UK law the requirements of the European Community Directives on Environmental Impact Assessment and, The Conservation (Natural Habitats &c.) Regulations 1994, for this type of dredging activity.

14. CIS and EIA will always be required for new Dredging Applications and for applications for a renewal of a Dredging Licence in an existing active production area in Welsh waters (see Strategic Policies 1 and 9). Potential developers should consult widely on the scope and content of proposed research and monitoring studies and, EIA and CIS to improve accountability and confidence in the findings.

15. Dredging Applications - MADP provides strategic level policy context for all new Dredging Applications and for Dredging Applications already submitted for a Government View under the Interim Arrangements (Strategic Policy 2). The Assembly will ensure that the longer-term objectives of MADP are taken into account when issuing Government Views (Strategic Policy 3).

16. In recognition of industry lead-in times and the time it can take to for an Applicant to complete the required studies and undertake consultation and then, for the Assembly to issue a Government View, decisions over the next five years will form part of an Interim Strategy.

17. The Assembly will prepare an Interim Strategy statement to accompany Government View decisions during the next five years that will provide a structured approach to the implementation of MADP and to minimise dredging for marine aggregates in the most environmentally sensitive areas where it is economically feasible to be so and, subject to appropriate environmental safeguards (Strategic Policies 3, 7 and 29).

18. For sediment environments within Local Government boundaries or harbour areas, the Assembly will require Local Authorities and Harbour Authorities to:

• Adopt the same process as the Interim Arrangements for the Government View and the new statutory Regulations (when they come into force);

• Use MADP as the strategic policy context for decision taking;

• Periodically review mineral planning permissions at least every five years (Strategic Policy 4).

Production and Uses of Marine Dredged Aggregates from the Bristol Channel and Severn Estuary (Section 3)

19. The Assembly has taken due account of the issues affecting marine aggregate production and uses including:

• The origin of marine aggregates;

• A commitment to continue to satisfy market demand in South Wales and South West England subject to appropriate environmental safeguards and an assessment of sources of supply (Strategic Policy 5);

• Uses of marine aggregates and the economic and employment benefits of the industry;
• A commitment to the efficient and appropriate use of marine aggregate (Strategic Policy 6);
• Key economic characteristics of the marine aggregates industry including what is technically, environmentally, socially and economically acceptable. The Assembly recognises that the industry has developed to fit the unique characteristics of the study area.

The Assembly also wishes to see the industry locate marine dredging further offshore into areas proven to be less environmentally sensitive and where the potential for coastal impact is minimal (Strategic Policies 2 and 9). Any adverse impacts should be minimised through Dredging Conditions (Strategic Policies 8 and 20).

Policy for Each Sediment Environment (Section 4)
20. The Assembly provides policy for 27 sediment environments in Welsh waters, and six that cross the boundary between England and Wales. Two sediment environments in England are also considered because they have particularly strong sediment transport linkages and exchanges with adjacent sediment environments in Welsh waters' (see **Map 2**).
21. Four policy options have been identified for each sediment environment:
• **Policy 1** – The Assembly will look favourably (i.e. a positive GV is likely) on dredging for marine aggregates in sediment environments where few constraints have been identified. CIS and EIA are mandatory and should confirm that there are no significant constraints to commercial exploitation. An Appropriate Assessment (under the Habitats Regulations) will normally be required if the sediment environment or part thereof is within a European Marine site. Dredging Permissions will include Dredging Conditions to prevent or mitigate all impacts identified in the CIS and EIA.
• **Policy 2** – The Assembly will adopt a precautionary approach to policy until research and / or monitoring can reduce the level of uncertainty over the actual or potential effects of marine dredging to acceptable levels. Monitoring will be required prior to issuing a Dredging Permission. CIS and EIA are mandatory and an Appropriate Assessment (under the Habitats Regulations) is likely to be required if the sediment environment or part thereof is within a European Marine site. Dredging Conditions will prevent or mitigate all the significant impacts identified and may be used to limit the licensed duration and tonnages. Where uncertainty exists with existing active production areas, Dredging Conditions will be used and the duration of the licence will be limited to the five-year Interim Strategy period. Annual monitoring will always be required. Where additional data and information becomes available that significantly changes the understanding of the impacts of marine dredging; any one of Policies 1, 3 or 4 can replace the precautionary approach.
• **Policy 3 –** The Assembly will not look favourably (i.e. the GV is likely to be negative) on dredging for marine aggregates due to the significance of constraints identified. Applications for Dredging Permission can still be submitted but the Government View decision is likely to be negative for this activity.
• **Policy 4** – The Assembly will safeguard marine aggregate resources from sterilisation by seabed development and other activities at sea so that it may be available for marine dredging in the future. A policy to safeguard may be used to ensure that other activities or development at sea do not permanently sterilise an

actual or potential marine aggregates resource. Where additional data and information becomes available that significantly changes the understanding of the impacts of marine dredging; the presumption to safeguard can be replaced by any one of Policies 1, 2 or 3.

22. The selection of the policy for each sediment environment is made on the basis of best available scientific data and / or information available. However, Assembly officials have paid due regard to the degree to which consensus has been achieved through the BCMA Study, within the Technical Advisory Group, levels of uncertainty where known and also other considerations.

23. Tables 4.1 – 4.35 in the main draft MADP Consultation Document contain a reasoned justification and analysis for the adopted policy for each sediment environment. The Assembly adopted this approach to provide an "audit trail" in the spirit of openess and transparency.

24. The table below identifies the policy options for each sediment environment and should be used in conjunction with **Map 3**.

Policy Summary

Policy	**Sediment Environments**
Policy 1 - The Assembly will look favourably on dredging for marine aggregates in sediment environments where few constraints have been identified (a positive GV is likely).	IBC2, IBC 6, CBC 13 and OBC 10
Policy 2 - The Assembly will adopt a precautionary approach to policy until research and / or monitoring can reduce uncertainty of the actual or potential effects of marine dredging to acceptable levels. (Use Dredging Conditions to limit duration and tonnage of licence, review at end of 5-year Interim Strategy period).	SE 2, SE 3, SE 4, SE7, IBC 3, CBC 1, CBC 12, OBC 11, OBC 19, OBC 20 and OBC 21
Policy 3 - The Assembly will not look favourably on dredging for marine aggregates in the sediment, environments due to significant of constraints identified (that a negative GV is likely).	SE 6, IBC 4, CBC 2, CBC 3, CBC 5 CBC 6, CBC 7, CBC 9, CBC 10, CBC 11, OBC 12, OBC 13, OBC 14, OBC 15, OBC 16, OBC 17 and OBC 18.
Policy 4 - The Assembly will safeguard marine aggregate resources in these sediment environments from sterilisation by seabed development and other activities at sea for dredging in the future.	CBC 4, CBC 8

Impacts of Dredging Marine Aggregates (Section 5)

25. MADW provides policy guidance on the predicted or actual effects of dredging for marine aggregates including:

• Adopting a precautionary approach by using monitoring as Conditions of Dredging Permission to confirm or otherwise the findings of CIS and EIA (Strategic Policies 8 and 15);

• Minimising the impacts of dredging marine aggregates on environmental resources including designated areas of nature conservation importance including a requirement for an EIA to accompany all Dredging Applications in Welsh waters (Strategic Policy 9);
• A commitment to subject Marine Dredging applications to rigorous examination when in or adjacent to sites of designated nature conservation importance (Strategic Policies 10, 11 and 12);
• The Assembly's role as a Competent Authority under the Habitats Regulations where an Appropriate Assessment will normally be required for marine dredging proposals outside the boundary of a European Marine site **if** the Assembly considers marine dredging is likely to affect site integrity and sediment transport processes (Strategic Policies 10 and 11);
• **Section 5.6** recognises the importance of the leisure and tourism to the local communities and economy of South Wales, and provides policy commitments to safeguard the key environmental resources upon which they depend (Strategic Policies 13 and 14).
• Support is also given for the beneficial use of marine dredged material where appropriate (Strategic Policy 19) and, the Assembly will require a sustainability appraisal to be completed for beach nourishment schemes (Strategic Policy 20).
26. Section 5.7 promotes the precautionary approach being adopted by the Assembly to take account of uncertainty and poor consensus in scientific data and/or information (Strategic Policy 15). Marine aggregate resources will be safeguarded until such time that research and monitoring has reduced the uncertainty to acceptable levels (Strategic Policy 16 and policy 2).
27. There is a firm commitment to the continued use of Dredging Conditions including monitoring, to reduce or prevent actual and potential adverse environmental impact. Annual reviews of Dredging Permissions will be used to implement a precautionary approach to policy because the Assembly has the power to revoke, temporarily suspend or vary Dredging Permissions on the basis of monitoring reports or other significant information brought to the attention of the Assembly (Strategic Policy 20).
28. In **Section 5.9** the Assembly also recognises that there is a need to develop a technique of Strategic Environmental Assessment, and is commissioning new research to develop a method to assess the effects of different sources of aggregate supply (see also Strategic Policy 22). This research will lead, in the longer-term, to more integrated aggregates policy for South Wales.

Sustainable Development and Best Practical Environmental Option (Section 6)
29. Section 6.5 provides a policy commitment to minimise the sterilisation of marine aggregate resources from other uses of the seabed and sea surface (Strategic Policies 16, 19 and 21).
30. The Assembly is committed to work towards the goal of sustainable development and translates this commitment for marine aggregates policy into using the best practical environmental option available (Strategic Policy 17), including:
• A policy which addresses the potential interactions between dredging for marine aggregates and MAFF FEPA licences for the disposal of capital and maintenance dredging (Strategic Policy 18);
• Using the MADP to provide a strategic overview of proposed developments and activities in the study area (Strategic Policies 19, 20 and 21);

• Policy commitments for conditions of consent for marine development relating to seabed structures and the objective of avoiding the sterilisation of seabed (Strategic Policies 20 and 21).

31. Strategic Policy 22 relates to the development of an integrated strategy of marine aggregate supply to South Wales. Strategic Policy 23 relates to the need to interpret and communicate coastal change.

32. Section 6.7 encourages industry to use marine aggregates appropriately and efficiently (Strategic Policy 24). Whilst Strategic Policy 25 details the requirement for a sustainability appraisal of sources of aggregate supply for beach nourishment.

Research, Information Management and Dissemination (Section 7)

33. The Assembly will refuse or discourage dredging for marine aggregates that significantly effects the natural processes of water movement and sediment transport. The Assembly's vision for improving research, information management and dissemination, includes:

• Recognition of the importance of database and information management. The promotion of a comprehensive and accessible database to support planning and decision taking (Strategic Policy 26);

• Support for the need to improve co-ordination, communication and dissemination of information over issues affecting dredging for marine aggregates (Strategic Policies 27 and 28).

MADP Development, Consultation and Review (Section 8)

34. The Assembly has adopted a consultative approach during policy development process. This approach has been used to support the scientific data and/or information available. Informal consultation with a Technical Advisory Group (TAG), external organisations, Assembly officials and DETR was undertaken as part of an inclusive policy development process.

35. The Assembly will review the MADP to take account of new information, policy and legislation in due course (Strategic Policy 29). The Assembly will put in place systems to monitor and audit the performance of the MADP and, where necessary, revise the policy.

36. The draft MADP document will be subject to a ten-week consultation period. At the end of that period Assembly officials will consider all consultation responses and make revisions where appropriate. The final MADP should be issued by the end of 2001.

37. The consultation period on draft MADP ends on 20 July 2001 and responses should be sent to Linda Scott, P4, Planning Division, National Assembly for Wales, Cathay's Park, Cardiff, CF10 3NQ and a Summary is available on the Assembly's web site: http://www/assembly/committees?

2.3.8 The Severn Estuary Partnership, 2001, Strategy for the Severn Estuary

1.2 The Severn Estuary Partnership

The Severn Estuary Partnership (SEP), originally called the Severn Estuary Strategy, is an independent estuary-wide project set up in 1995 by Local Authorities, the Environment Agency and the countryside agencies. It is a partnership of all organisations and individuals who have declared their interest in caring for the

Estuary and want to encourage a more coordinated approach between organisations and agencies and their management activities. The key aim of the project to date has been to develop a strategic management framework to guide and support the sustainable development and wise use of the Estuary.

9. Aggregates and other minerals

Aim:
To meet society's need for minerals by maximising the use of secondary and recycled materials and encouraging the use of marine and land based sources in a way that least harms the Estuary's off-shore and on-shore environments.

Government Policy

9.1. The Government aims to ensure the sustainable provision of marine dredged aggregates for construction and beach management, consistent with the limit of the resource and the potential environmental impact. It also aims to encourage exploration to discover new oil and gas fields and extend existing fields whilst safeguarding navigation through the grant of DTLR and NAW consents for the location of offshore installations.

Background

9.2. Sand and gravel has been dredged from the Severn Estuary since the early part of this century. The Estuary bed is an important source of aggregates (sand) and some other minerals. Mineral extraction is licensed at five sites on the Estuary and there are applications for new and renewed licences (two of these are outside the SES area, but are of relevance to the strategy). Marine dredged aggregates make a significant contribution to the local economy of the region, providing the major sources of fine aggregates for the construction industry, for example, 80-90% of the sand used for construction in South Wales comes from the Bristol Channel area. Aggregates are landed at ports on both sides of the Estuary. Dredging license areas are shown in Map 11 (see Appendix 8).

9.3. Using marine-derived minerals helps to reduce the pressure on land-based sources around the Estuary and beyond, thus avoiding impacts on local residents and the landscape, and minimising loss of land valued for agriculture and nature conservation. Marine extraction also reduces transport and environmental impacts associated with terrestrial sources since minerals are landed at ports near to centres of demand, require little processing and produce few if any waste products. However, this must be assessed against the environmental impacts that may be associated with extraction from marine-based sources for example on adjacent shorelines, habitats and marine wildlife, fishing and fisheries, archaeological sites, water quality and more localised impacts arising from landing, processing and distribution of material.

The 'Government View' procedure

9.4. At the time of writing (summer 2001) depending on where the proposal lies within the Estuary, marine extraction is licensed in the light of formal views from either the NAW or DTLR, in conjunction with other Government departments. The Crown Estate, as landowner of most of the Estuary sea-bed, licenses dredging operations and also monitors the location of dredging via an electronic monitoring system. The Crown Estate will only issue a license subject to a favourable Government View, so ultimately, it is the DTLR/NAW that determines whether or not

a dredging licence is given. However draft Marine Minerals Dredging Regulations are in an advanced stage of preparation to replace the licensing system with a system of dredging permissions administered directly by NAW/DTLR. In addition much of the SES area is within Local Authority jurisdiction, in particular the majority of the tidal areas upstream of the Second Severn crossing and the marine extent of Bristol as far as Flat Holm and Steep Holm. Proposals for dredging in these parts of the Estuary require planning permission rather than a licence or dredging permission. In addition licences to dredge may be required from other agencies.

9.5. Under the informal Government View procedure applications must be made to DTLR or NAW as appropriate and an Environmental Impact Assessment and coastal impact study is required for this type of proposal. In reaching its decision, DTLR/NAW considers all the information submitted with the application, including reports on the environmental effects of the proposed dredging and the results of public consultation .Where an inquiry or hearing is held into an application, the recommendation of the Planning Inspector will also be taken into account. In addition, as the majority of the Severn Estuary is designated as a European marine site (both a SPA and a SAC) an "appropriate assessment" may be required under the Conservation (Natural Habitats &c) Regulations 1994.

9.6. In those parts of the SES area within Local Authority jurisdiction any proposals for mineral extraction should be made through a planning application to the relevant Local Planning Authority who in consultation with relevant agencies will advise whether an Environmental Impact Assessment is required. In reaching its decision the Local Planning Authority will consider all the information submitted with the application together with the results of public consultation. Such applications may be called in by the NAW or DTLR if they raise issues of more than local significance or depart fundamentally from the Development Plan. Again since the majority of the Severn Estuary is designated as a European marine site an "appropriate assessment" may be required under the *Conservation (Natural Habitats &c) Regulations 1994*.

Research

9.7. The size and complexity of the Severn Estuary and the larger Bristol Channel area means it has been difficult to gain an understanding of the links between different aggregate deposits and the potential effects from exploiting them. As a result, it is increasingly difficult to decide where the most appropriate extraction sources are and which minerals resources should be left alone for environmental or any other reasons.

9.8. In response to this the former DETR, NAW and The Crown Estate commissioned the *Bristol Channel Marine Aggregates Resources and Constraints Research Project* (BCMAP) which also covers the Severn Estuary. This recently published research has addressed some of the difficulties and uncertainties currently surrounding assessing dredging proposals. The BCMAP has identified and reviewed existing information on the aggregates resource, ecological, archaeological and economic factors; undertaken primary research and modelling to cover identified information gaps and also developed a conceptual sediment transport model. The model breaks the Bristol Channel up into four main compartments or 'cells' – one of which is the Severn Estuary. The outputs from the project are held by the NAW and DTLR on databases and accessed through a Geographical Information System (GIS).

9.9. Due to the size and complexity of the study area, the project provides strategic/coarse scale rather than detailed site-specific information. However, as new information becomes available from any further research or specific studies, this could be fed into the BCMAP system. The BCMAP has also devised a methodology

for identifying suitable areas for dredging and assessing future proposals. The final report and a summary of the study have been produced and disseminated.
9.10. Other relevant data was also collected, such as the location of archaeological interests, seabed ownership and fishing areas. The study results do not provide site-specific evidence that would substantiate or disprove links between dredging activities and erosion of the foreshore.
9.11. The Bristol Channel study is being taken forward through a follow-on project called MARMPS (Marine Aggregate Resources Management and Planning System). The information derived from this study will be plotted on a GIS database and will provide policy makers with information tools to assist with decisions on marine dredging proposals in relation to marine, land-based and secondary minerals resources. The study will last two years (from February 2000) and is being undertaken by Cardiff University for NAW and DTLR.
9.12. In relation to improving environmental protection associated with marine minerals dredging, a consultation draft of *Mineral Planning Guidance (Wales) Planning Policy* was published in November 2000. Paragraph 22 states
"the use of marine dredged material should be considered when there will be no significant effects on the marine and coastal environment."
In addition DTLR and NAW have published for consultation draft marine guidance for the English and Welsh Seabed respectively, entitled *Marine Mineral Guidance note 2* (MMG2) and *Marine Aggregate Dredging Policy South Wales* (MADP).
9.13. The National Assembly for Wales has recently commissioned two further projects related to the future of dredging in the Estuary:
9.14. The first of these projects is an appraisal of the potential for land-based sand and gravel extraction in South East Wales (by Symonds Group Limited), the aims of which are:-

- To analyse the commercial potential for land-based sand and gravel extraction in South East Wales in relation to planning and environmental designations, markets and relative accessibility
- To make recommendations on how the planning system should operate to safeguard the resources for future working.

9.15. The above report concludes that potential land-based resources could yield up to 393 million tonnes of sand and gravel, though planning constraints or environmental designations affect three-quarters of these. However, the report's economic analysis shows that the existing supply scenario, currently dominated by marine sources, is unlikely to change unless triggered by environmental or political concerns. In the meantime the study recommends that identified land-based resources should be protected from unnecessary sterilisation by other development.
9.16. For the second of these projects British Geological Survey (BGS) have undertaken a study of the feasibility of using crushed rock sand in South East Wales as a substitute for marine won sand. The study concludes that crushed rock sand produced from certain rock samples of Carboniferous sandstones could possibly be used as fine aggregate for concrete, subject to further research and trials. However, even if crushed rock sands were produced in large quantities, there would still be a need for natural sands for supplementation to achieve acceptable workability in concrete. The study recommends that additional hard rock resources will need to be identified and protected for the future, particularly in those rock types better suited for crushing as rock sand.
9.17. The minerals dredging industry is committed to supporting research, by providing its own research data and advising and supporting other research projects.

The use of recycled materials in place of primary aggregates
9.18. The Government is to place a tax on newly extracted aggregates to encourage the use of recycled materials for construction purposes.

14. Archaeology and the historic environment

Aim: To conserve and enhance the Estuary's archaeological and cultural heritage, and to secure its sensitive management and promotion.

Government aims
14.1. The Government aim is to identify and protect nationally significant aspects of the historic environment, on land and sea, and to improve access to them.

Background
14.2. Archaeological remains in and around the Estuary are a finite resource, an irreplaceable record that contributes to our understanding of the past and present. However, there is a lack of awareness of the Estuary's historical heritage. The Severn Estuary has a wealth of features of archaeological importance and historic interest. Its archaeological potential is not fully understood or represented by the number of nationally designated Scheduled Ancient Monuments or sites recorded in the region's Sites and Monuments Records. Many sites survive in a way that is rare elsewhere, sealed within the accumulation of marine sediments and peats which make up the Severn Levels and areas of alluvium around the Estuary, still awaiting discovery. The Severn Levels are an area where historic landscapes and alluvial deposits still survive in a way which is rare elsewhere, and the historic landscape is far better preserved than on most other UK reclaimed coastal wetlands. In the permanently waterlogged conditions that lead to an excellent preservation of archaeological remains, there are also well preserved remains of the natural flora and fauna. Scheduled Ancient Monuments are shown in Map 15 (see Appendix 8).
14.3. The area below the intertidal zone also contains significant archaeological remains relating to the early prehistoric landscape that once covered the whole of the present Estuary, before later becoming submerged by rising sea level. Many historic wrecks are known in the subtidal zone, as well as an uncertain number of earlier unrecorded wrecks. The area demonstrates the greatest concentration of coastal archaeology in Britain and this great archaeological potential, and the threats to it, are summarised in the document produced by English Heritage, 'England's Coastal Heritage', and research reports grant-aided by Cadw. The *Bristol Channel Marine Aggregates (August 2000)* mapped limited existing data for the subtidal archaeological resource in the Bristol Channel and Severn Estuary. The study indicated the likely archaeological and heritage importance and susceptibility of specific areas.
14.4. The Estuary is particularly important for our archaeological heritage because many of the deposits are waterlogged, preserving organic evidence such as wood and evidence of past environments. Palaeolithic hand axes, Mesolithic footprints and stone tool scatters recovered from the foreshore, indicate the presence of hunter gatherer groups before the introduction of farming. Later prehistoric sites include the Bronze Age settlement at Brean Down, roundhouses recorded on intertidal peats of the Gwent Levels and a concentration of rectangular buildings connected by a system of trackways in the intertidal area near Goldcliff, dating back to the Iron Age. Settlement

during the Romano-British period saw the construction of drainage systems and sea defences though during the centuries after the collapse of that administration the sea defences broke down. Most of the Estuary's remaining seabanks are currently unrecorded and unscheduled. Much of the present landscape owes its origins to the ecclesiastical and secular landowners and tenants of the medieval period, and reflects the efforts of successive generations of farmers to manage and exploit the coastal margins of the Estuary. The Estuary also has an industrial history closely linked to navigation that began in prehistoric times. This is partly expressed in the wide geographical distribution of a range of artefacts to be found at archaeological sites in the area.

Development pressures

14.5. Due to development pressures in the coastal area, including brownfield sites, the archaeological resource is under threat and features are being fragmented or lost. As it is likely that many sites of archaeological importance and historic interest remain undiscovered, the potential for loss and disturbance caused by all kinds of development is great. Increasing development pressure makes the loss of substantial areas of this landscape a certainty. However, Planning Policy Guidance Notes 15 and 16, and Planning Guidance (Wales) Technical Advice Notes 6, together provide support for the assessment of the impact on the historic environment including the wider historic landscape. Development plan policies can be developed which give explicit support to such assessment.

14.6. Preserving an ancient monument and its setting is a material consideration in determining planning applications, whether or not the monument is 'scheduled' under *the Ancient Monuments and Archaeological Areas Act (1979)*. Planning authorities, via development plans, face the task of reconciling the need for development with the interests of conservation.

14.7. Most development plans already require appraisal and recording work to be carried out on sites where there is proven archaeological importance. However, they vary in the extent to which they acknowledge the archaeological importance of the Estuary and seek to reduce the conflict between development and conservation in the area.

3 Geological, archaeological and historical background

3.1 Introduction

3.2 Geology and topography

The Inner Bristol Channel and Severn Estuary is situated between the coastlines of South Wales and North Devon and Somerset. The coastline surrounds a major submarine valley system that connects the estuary of the River Severn to the Celtic Sea. In the outer Bristol Channel depths reach 50-60m, shallowing eastwards to 10-20m in the inner Bristol Channel. The present day morphology of the Bristol Channel and Severn Estuary formed following marine inundation of a former river valley system, incised into the Triassic and Jurassic rocks. This inundation is thought to have occurred 25000 years ago. (Long et al 2002) The Severn estuary and inner Bristol channel did not however develop am ore orderly course until 20,000BP(Pannett 1989). The Severn has undergone substantial water level changes, during Ipswichian inter glacial sea levels higher than today. However Devesian water levels were 100m below present day with the river being confined to what is now the deeply incised central channel. Around 13-14 thousand years bp the entire Bristol channel would have been above sea level (Rippon 1986). This has resulted in with the deeply buried channels of Wye, Mathern Pill, Redfern, Usk and Rhymney, which were cut during last glaciation many of these channels have subsequently been sealed by sands and gravels(Rippon 1986).

The Severn Estuary and inner Bristol Channel broadly conform in shape and position to the Severn Estuary Fault Zone, which is known to have been active (dextral strike-slip) in early Carboniferous times (Wilson et al., 1988). The bedrock outcropping on the floor of the inner Bristol Channel and Severn Estuary, and that underlying the post-glacial estuarine sediments, is dominated by the soft, gypsiferous mudrocks with thin sandstones of the late Trias, and by the weak, shallow marine shales thinly interbedded with concretionary limestones of the Lias (Lower Jurassic) (Allen, 1990). Palaeozoic sediments only outcrop locally. Well-lithified sandstones and mudrocks of the Old Red Sandstone (Devonian) occur in the Minehead-Porlock are, along the coast of Clevedon, near Cardiff (with some Silurian rocks), and along each bank of the inner estuary at Lydney and Sharpness. The many small outcrops of strong, well-jointed Carboniferous Limestone mainly represent hills on the sub-Triassic unconformity surface (Allen, 1990). The remnants of four fluvial terraces (Kidderminster, Main, Worcester, Power House) of Devensian age (Mitchell et al., 1973) border the Severn Estuary. Gradually descending downstream, the Main and younger terrace deposits are closely associated stratigraphically with the post-glacial estuarine sediments, especially in the outer and middle estuary (Allen, 1990). The bedrock surface supporting the estuarine sediments has the general morphology of a broad, flat-floored, outer valley into which the Severn and its tributaries have cut narrow gorges during a probably late Devensian low-stand of the sea. Periglacial features (ice-wedge casts, involutions, rubble fields) are extensively preserved on the

bedrock floor (with local terrace remnants) of the outer valley in the middle and inner estuary and may have arisen during the fluvial incision (Allen, 1990).

The complicated outcrop of the post-glacial estuarine alluvium is determined by the intricate form of the underlying bedrock surface, with its many undulations, hills, valleys and spurs. On average the total sequence is 10-15m thick. The bedrock surface is directly overlain either by a soil and rooted peat with mature trees (basal peat) or by thin gravels and sands. These are overlain by much thicker, green to brown estuarine silts and clays which include a widespread and important development at about the middle of further rooted peats Allen, 1990). The Holocene development of the Severn Estuary and Inner Bristol Channel can be characterized by rapidly rising sea levels where glacial, fluviatile, littoral and estuarine head erosion has taken precedence over deposition. During the Mesolithic whole area inundated with tidally accumulating silts and clays some of which are covered with footprints(Bell and Walker 1992). This postglacial sea level rise has resulted in the formation of the Gwent and Somerset Levels(Rippon 1986). Two principal inter tidal alluvial deposits from these areas on either side of the Severn estuary clearly show a similar sequence of marine transgressions and regressions(Long et al 2002).

The wentlooge sequence of peats and alluvial deposits from the Gwent Levels have been classified into upper middle and lower deposits. After rapid post glacial sea level rise a marine regression occurred reaching its maximum around 4400 years bp. (Heyworth and Kidson 1976). The middle wentlooge formation has indicted a marine transgression between 2500 and 4000bp (Rippon 1996). A similar tripartite of Holocene deposits division has been recorded on the Somerset Level these are lower (silty clay), Middle (peat dominated) upper (silty clay)(Long et al 2002). Similar peat sequences identified at Uskmouth, Goldcliffe, Caldicot Moor, Rhymney Great Wharf show marine transgressions around 3200BP(Ibid) . These deposits have shown that current patterns of erosion accretion are not constant through time (Long et al 2002). Residual circulation currents in the Bristol Channel have led to the formation of three major ‘banner’ sandbanks; Helwick, Scarweather Sands and Nash Sands, which lie along the South Wales coast. The banks are all orientated with the dominant tidal streams, with an approximately west-east orientation. Holm Sand is derived from material transported into the channel by the Irish Sea and local ice masses during the last glaciation (Davies, 1980). The alignment of sand waves on the banks suggests that sediments were transported from channels to the northwest and southeast.

Geology type	Area (hectares)	Percent of total area
Mercian mudstone group	450.29408	3.6%
Salt marsh	126.0450	0.1%
Mud	1659.125958	13.4%
Oolitic limestone	60.70389	0.5%
Gravel	1483.970667	12.0%
Hangmans sandstone formation	2.810199	0.1%
Lower lias	1371.441112	11.1%
Middle lias	52.41847	0.4%
Mercian Mudstone and Penarth Group	186.40757	1.5%
Penarth Group	85.42149	0.7%
Sand	3840.439469	31.1%

Upper Lias	249.6523299	2.0%
Made Ground	16.44724	0.1%
Lower middle lias	3224.731707	26.1%
Study area	12344.569437	100%

Table 1 Geology by area

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The remnants of four fluvial terraces (Kidderminster, Main, Worcester, Power House) of Devensian age (Mitchell et al., 1973) border the Severn Estuary. Gradually descending downstream, the Main and younger terrace deposits are closely associated stratigraphically with the post-glacial estuarine sediments, especially in the outer and middle estuary (Allen, 1990).

3.3 Sediment Transport in the Bristol Channel & Severn Estuary

The Bristol Channel and Severn Estuary are areas of strong tidal currents. The area is severely macrotidal with an extreme tidal range of 14.8m at Avonmouth, and a mean springs range of 12.3m (Allen, 1990). In the outer Bristol Channel, around the Nobel Banks area, the mean spring range is about 8m, but on exceptional tides it may be as large as 10m (Environmental Resources Management, 2002). Tidal currents exceed 1m s^{-1} over wide areas and for long periods, consequently the waters of the system are very well stirred. The size and west to southwest-facing aspect of the Bristol Channel and Severn Estuary means that the area is very windy (Smith, 1983), frequently affected by powerful waves (Shuttler, 1982), and subject to substantial storm surges (Lennon, 1963).

Extensive research has taken place on the sedimentology and sediment transport in the Severn Estuary and Bristol Channel over the past 30 years, including investigations by the Severn Tidal Power Group, the IOS SKER project in Swansea Bay, and numerous scientific papers. The majority of studies have been focused on investigating sediment transport in the Central Bristol Channel, Inner Bristol Channel and lower Severn Estuary.

A bedload parting zone has been proposed to exist between Barry and Bridgwater Bay (Kenyon & Stride, 1970, BGS, 1986, Stride & Belderson, 1990). This is an area where bedload transport vectors appear to diverge. However this model is an over-simplification of the transport regime in this region, and does not fit with the Holocene infilling of the Severn Estuary outlined by Allen (1990) where the mineralogy and texture of sands in the Severn Estuary conclusively point to a source largely in the Celtic Sea. It also does not take into account residual currents in numerical models, which when included, show a better correlation with physical evidence for the directions of bedload transport (Harris and Collins, 1988).

The sediment regime of the Bristol Channel and Severn Estuary is best described by Harris and Collins (1991). They propose a system of “mutually evasive transport pathways” whereby tidal conditions have varying effects on sediment transport

pathways. The hydraulic regime (and thus sediment transport) mid channel is ebb dominated, with westerly flows maintained for a time after low tide by virtue of momentum of the water mass from the River Severn. Along the sides of the estuary, frictional drag results in the early establishment of inshore flood currents, soon after the time of low water. These form narrow zones of flood dominant sediment transport adjacent to the coastline along both the northern and southern margins of the Bristol Channel. Local circulation eddies exist around the larger sandbanks (Helwick, Nash and Scarweather). These sandbanks play an important role in sediment circulation, by interacting with the tidal flow and wave propagation.

In the Outer Bristol Channel, in the area off St. Govan's Head, tracer studies have shown that the area is an active transport environment for fine, medium and coarse sands. Thus there is potential for the exchange of these sediment types between the Celtic Sea and the Bristol Channel in this area, with a net easterly transport direction into the Bristol Channel. Mobilisation of coarser sediments (very coarse sand and gravel) is feasible during periods of strong wind and wave conditions. However, the frequency of events stronger than Force 5/6 from westerly directions equates to only a 2.4% occurrence. It is therefore unlikely that this location is an active transport environment for very coarse sand and gravel (Ponsford Duvivier, 2000).

Sediment Zone	Name	Description
IBC6	Inner Bristol Channel	Veneer of sediment, sandy gravel in Breaksea Valley. Area of sandwaves to Western limit of sediment environment. (Ref: BMAPA).
IBC5	Minehead	
IBC4	Vale coastline	Flood dominant during westerly wind and waves, ebb dominant residual transport during calm weather. Important in the transport of sediment into the Severn Estuary along the coast.
IBC3	Holm Sands	Ebb dominant flow shown by bedform shapes and modelling, but contradicted by sediment trends analysis. Proximate to bedload parting zone. BGS data suggests flood dominance north of bank and ebb dominance south, some minor tidally driven replenishment on Mackenzie Shoal (Ref: Llanelli Sand Dredging). No obvious links to other SEs, generally coast parallel transport (Ref: BMAPA).

IBC2	Culver Sands	Bedload parting zone with ebb transport and limited cover of sediment over bedrock. Rapid physical change in the form of the bank and channels. Sandbank topography changes significant, particularly during 1970's and 1980's (Ref: Llanelli Sand Dredging). Mobile sediment transport to the west on Culver does not supply the coast (Ref: BMAPA). Sediment source (Ref: RCL) Close relationship between Chilver Sand and Watchet and Minehead. Culver Sand has long been alleged to supply sand to Minehead. (Environment Agency Wales)
IBC1	Bridgewater Bay	
SE8	Sand Bay and Weston Bay	
SE7	Cardiff Grounds	Flood dominant sand transport with up-estuary transport of sand from Flat Holm. Local circulation patterns around Cardiff Grounds indicated by seabed megaripples and sandwave asymmetry. (Ref: BMCA study, Llanelli Sand Dredging). Western limit associated with bedload parting zone.
SE6	Uskmouth	Shallow inter-tidal area cut through by dredged channel into River Usk. Local sink for mud, movement of mud away from River Usk due to ebb dominant transport and fluvial transport. Links to SE4 and SE7.
SE5	English Grounds	Shallow inter-tidal area cut through by dredged channel into River Usk. Local sink for mud, movement of mud away from River Usk due to ebb dominant transport and fluvial transport. Links to SE4 and SE7.
SE4	Severn Estuary	Transport upstream in flood direction

		by tidal asymmetry due to the shallow environment, with local medium and fine sand accumulations in offshore sediment sinks. Large volume banks constantly showing morphological change e.g. Middle Ground, Welsh Hook, Usk Patch (Ref: Llanelli Sand Dredging). Sand ribbons W of English Grounds (Ref:BCMA). High dispersion for muds. (RCL)
SE3	The Crossings (Severn Bridges)	Maximum tidal influences with over-deepened channels. Net sand transport in an up-estuary direction due to tidal asymmetry. Local large accumulations of fine sand in balance between erosion and accretion. Mud lines the margins with net mud transport downstream due to ebb residual flows.
SE2	Upper Severn Estuary	Net sand transport in an up-estuary direction due to tidal asymmetry. Local. large accumulations of fine sand in balance between erosion and accretion. Strong linkages with the rest of the Severn Estuary, particularly SE1 and SE3.

Table 2 Sediment Zones (from BMAPA)

3.4 History of Aggregate extraction in the Severn estuary

Marine aggregate extraction has had a long history, by the 16th century extraction would have been carried out on a small scale in order to provide ballast for merchant ships. Historical records have also shown that dredging activities were being carried out along the Thames by the 1550's and there is no reason to presume the Severn estuary would have been any different.

The Severn Estuary and Inner Bristol Channel saw the United Kingdoms earliest commercial marine aggregate extraction with a few million tonnes of aggregate being landed in Bristol channel in early 1920's. Several wrecks of dredgers have been recorded from the 1930's and 40's in the study area these include the Redvers Buller lost in 1932 travelling from Sandholm to Swansea and the Durdham lost in 1940.

The marine aggregate industry remain at this level until the 1970's when continuing issues over the quality of marine aggregates were finally resolved. The area has seen an overall a major growth in seabed extraction has occurred since the mid 1980's. Since this time the area has become one of Britain's four main extraction areas with the others being the Southern North Sea, the English channel and Liverpool Bay. Nash bank is currently main source of marine dredged sand in the Bristol Channel supplying up to 900000 tonnes each year.

4 Past investigations

4.1 Summary of past investigations and surveys

There have been various investigations carried out along within the study area, and more beyond, into the inland areas of the Severn Estuary (which are not recorded within the GIS as they are outside the designated study area). Many of the reports on these investigations exist as client reports of individual archaeological investigations ('grey' literature) and are not necessarily directly available. The reports and papers that are available are mainly focussed on single sites, or at most small areas, and as such represent a patchwork of areas of intense scrutiny that has then been used to inform on the wider situation.

The marine nature of the study area has restricted the number of investigation recorded within the gazetteer as little work to date has been done in the marine environment of the Severn Estuary. Of the 14 investigation recorded in the gazetteer four are recorded on the south (English) side of the Estuary with three of the four to be found on the south west coast (Bridgewater Bay area). The other English example is the Severn Bridge Flood Defence Scheme Investigation, north of Bristol.

The investigations on the southwest coast involved combined archaeological and palaeo-environmental assessment of the area and the Bridgwater Bay assessment identified 77 potential archaeological sites. The English heritage NMR records a substantial number of sites and points along the English and Welsh coasts that are not directly linked to the investigations listed in the Gazetteer which are the result of field walking or previous excavations not recorded in the NMR.

The investigations recorded on the north side of the Severn Estuary include reports of specific archaeological investigations including watching briefs and excavations. There is also an environmental report from Hunger Pill - Park Redding (south of Chepstow).

Not all of the records furnished by the local SMRs relating to previous investigations included bibliographical information and consequently this information cannot be provided for all these entries.

4.2 Gaps and limitations in current knowledge

It is evident from the distribution map produced from the gazetteer (Fig 6) that there is only sporadically reported examination of the foreshore and mudflats of the Severn

Estuary. Some assessments and surveys have been conducted in England and Wales but there are still substantial areas that would benefit from rigorous systematic examination, recording and dissemination.

The gazetteer for the study area presents the concentration of data from within the study area available from the combination of the two NMRs and the various SMRs. Only those reports that information has been provided on have been included. The information pertaining to the investigations was provided by:

- English Heritage NMR,
- Gloucestershire SMR,
- GGAT

This combination of sources provides a sound basis for an appraisal of the investigations that have taken place in the study area, as recorded by the national and regional bodies responsible for retaining archaeological data.

As noted in the archaeological and historical overview there is a large body of information concerning the Severn Estuary and the wider surroundings but there is a lack of an overview and synthesis of the available information. For example extensive work has been done on the Severn Levels and the Caldicot Levels providing a great deal of information on the use of the Severn Estuary from the Mesolithic hunter gatherer period through to the 19th and 20th-century. However the focii of these investigations are outside the prescribed study area and so are not included in this appraisal. By opening up the analysis to the wider context the nature and potential of the Severn Estuary historical resource could be better understood and utilised. Extensive work has been published by the Severn Estuary Levels Research Committee (SELRC), amongst others, which is not referenced by the local SMRs or in the NMR records.

The body of investigations presented in the gazetteer paints an image of sporadic, largely developer led, research and intervention clustered around the main construction events. The archaeological and palaeoenvironmental surveys undertaken in Bridgwater Bay and Porlock Bay and Marsh represent the beginnings of an investigative strategy that would be most informative if extend around the coastline of the Severn Estuary.

5 Known resources within study area: summary of known maritime heritage resources and palaeoenvironmental resources.

5.1 Maritime heritage resources

The Severn Estuary holds a varied range of maritime heritage resources. The gazetteer has references to jetties, quays, harbours, ports, ferry crossings, lightships and various fishing structures to name but a few of the maritime heritage features which are contained within the study area. Out of the 823 points recorded in the gazetteer the vast majority are wreck points (Table 3). There are 712 points identified as wrecks recorded in the Gazetteer. There are other points that may represent wrecks in the Gazetteer, such as the eight obstructions. For the purposes of appraising the maritime heritage resources with reference to wreck sites, only those directly described as wrecks will be considered.

Point Type	Count
Wreck	712
Aircraft	15
Investigations	13
Obstruction	8
Fish weir	4
Bridge	3
Everything else	68

Table 3 Count of gazetteer point types

5.1.1 Wreck sites

The majority of the wrecks are dated to the post-medieval period (1500-1899) (see Table 4). In order to counter the biases in the data it must be considered that the recording of wrecks and losses was primarily a post-medieval activity, with the invention of marine insurance and stricter controls through customs houses and the rise of merchant houses ensuring that there were more rigorous and substantial records of the ships moving thought the Severn Estuary. The fact that the majority of the wreck sites recorded date from the post-medieval and modern periods can therefore be taken as a product of the enhanced record keeping practices as much as it is a product of the increase in maritime traffic within the Severn Estuary.

As can be seen from Fig 9 there is a concentration of wrecks along the south coast of Wales, clustered around Cardiff and Barry. 434 of the 712 wreck sites are in this area (61% of the total). This clustering may be a result of the location of the deepwater channel that runs through the northern half of the Estuary, with the majority of the Bridgwater Bay area being much shallower with only a few deep navigable channels (which are the sites of smaller clusters of wreck sites).

For the purposes of this appraisal the build date of each ship has been used as the temporal identifier (where recorded) and if not recorded then the date of sinking is taken as the temporal identifier.

Period	Count
Medieval (1000-1499 AD)	5
Post-medieval (1500-1899 AD)	639
Modern (1900 - Present)	66
Unknown	2

Table 4 Count of wrecks by period

Precision in metres	Count	Percent
1	17	2
10	49	6
31	62	8
100	22	3
309	204	25
1000	467	56
5000	1	N/A

Table 5 Distribution by number recorded precision of sites.

The recorded clustering of wrecks on sandbars and in shipping cannels may be a product of both occurrence and recording. Those wrecks which lie far from the main shipping channels may not have been recorded, as they would not present a hazard to shipping.

The very low number of wrecks directly attributed to the Medieval period is most likely a product of the few surviving records from this period compounded by poor recognition of medieval wrecks and potentially the physical dissolution of the wooden ships themselves. Analysis of the records in the gazetteer shows that of the 5 medieval wreck sites recorded there are two sets of duplicates (The Magor Pill wreck is reported by both Coflein and the Receiver of Wrecks; The 14th century wreck in Bridgwater Bay has two very similar entries in the English Heritage NMR), reducing the real number of wreck sites to 3.

There are instances of duplication of records for all the periods. The duplications are identifiable by the duplication of the ship's name and elements of the detailed description. Often the ship's captain and owner are recorded, and in some cases further evidence such as the route, cargo and casualty numbers. If enough duplicate identifiers exist within the detailed description then the two wreck sites should be considered as duplicates, even when their locations are different (as is often the case with imprecisely located marine sites). This duplication is in part due to overlap in the recorded areas of the various different bodies that provided data for this appraisal. A common source of the duplication has been found between the English Heritage NMR and Coflein. However there are also duplicates within individual data sources, often with the location details and some of the elements of the detailed description entered differ between the duplicates. The name of the wreck cannot be taken as the sole characteristic for identification as a duplicate as there are several examples of the same name for wrecks which have completely different detailed descriptions.

The produced figures from the GIS project do not show the totality of the numbers of wrecks within the Severn Estuary as many of the wrecks are recorded as occurring at the same location due to the low level of accuracy used to locate the sites and

consequently the cluster of wrecks is displayed as a single point. Many of the wrecks are located through named locations (in historical documents or local reportage) rather than direct observation and as such their locations should be considered to have an inherent inaccuracy, which has been recorded, where possible, in the GIS gazetteer. A direct interrogation of the GIS project will provide direct and detailed information on the numbers of wrecks present at each location.

5.1.2 Non wreck sites

There are 98 gazetteer points which are neither wreck sites nor investigations (Fig 8). The vast majority are located along the coast of the Severn Estuary or associated with the chain of islands at the Mouth of the Severn. The exceptions are made up of lightships, aircraft and unidentified obstructions (which are most likely unidentified wreck sites). The identification of these sites is directly linked to the level of examination that the foreshore has received in the past, whether that be through directed research, excavation, developer led archaeological mitigation or interested parties reporting their discoveries. There is also a bias towards the visible and existing, with perceivable and identifiable structures being more widely recognised than flint artefacts and prehistoric settlements, although these too have been recorded in the peats and alluvium of the banks of the Severn Estuary.

5.2 Palaeoenvironmental resources

There are two instances of submerged forests and one Wentlooge peat formation in the gazetteer. These are the only directly identified palaeoenvironmental points within the gazetteer. The recording of the Wentlooge peat levels can be taken as a direct result of the environmental assessment which was undertaken along the coast south of Chepstow. One of the recorded submerged forests is north of the identified peat, demonstrating that there is a high potential for the preservation of a wide variety of environmental deposits preserved within the peat and alluvium. These submerged forest can provide information on the ecology of the past as well as informing on changes in climate and usage of the land areas. The palaeoenvironmental evidence that was no doubt preserved along with the evidence for human habitation at the several encampments and settlements recorded in the gazetteer can also serve to indicate the details of human activity, diet and ecological resource utilisation, vital details in the task of reconstructing the past. Physically the build up of peats and alluvium on the banks of the Severn Estuary represents an effective storage medium for palaeoenvironmental evidence and as long as those deposits remain waterlogged the level of preservation of information should remain high.

6 Introduction

The nature and size of the Bristol Channel/Severn Estuary makes a detailed appraisal of its history and thematic usage a task whose scale exceeds the capability of this report to contain it. Consequently broad generalisations across the Estuary and across the periods will be employed in order to create a holistic overview of the potentiality of the region, with specific cases picked out to illustrate salient points. While a

comprehensive and complete report would be extremely useful and important to the understanding of the Severn Estuary it is beyond the remit of this project. At present no overview of the Severn Estuary exists in the available literature although there is an abundance of detailed and specific studies from all around the coast of the Severn Estuary which could be utilised in a more detailed study.

For the purposes of this report, the Inner Bristol Channel and the Severn Estuary will be collectively termed the Severn Estuary.

7 The Levels through time

7.1 Natural state of the Severn Estuary Levels

In their natural state, before any human alteration, the Severn estuary Levels were vast expanses of marshland which occurred along the coastline due largely to the ongoing deposition of tidal mud. Branching networks of tidal creeks dissected these marshes. This process of formation has been ongoing for the last *c*10,000 years in response to fluctuating rise in sea levels. During the occasional periods of sea level fall the normal formation of tidal mud deposits has been interrupted by the growth of peat marshes encouraged by the freshwater conditions prevalent at those times.

7.2 The Levels in prehistory

The waterlogged landscape of the Welsh Severn Estuary contains many prehistoric artefacts. The prehistoric archaeological resource is largely composed of wooden structures and objects preserved by the sediments, especially by the peats. A wide range of palaeoenvironmental evidence also survives, including pollen, plant microfossils and insects. The sediment sequence itself is one of the most complete Holocene records in Britain and is easily viewable in any of the areas where human endeavour or coastal erosion has cut into the topography (Bell 2000, 1).

The preservation of wooden artefacts and structures and the detailed ecological evidence available through the preservation of pollen, plant remains, snails and beetles makes these sites very important for the understanding of the prehistory not only of the Severn Estuary but also in the wider context of Wales and England.

Palaeolithic handaxes over 10,000 years old were recovered from near the second Severn Crossing. Mesolithic (10,000 –5,500 BP [Before Present]) footprints preserved in the Wentlooge formation have been observed in Gwent, along with scatters of stone tools such as those found at Goldcliff where the solid rock plunges beneath the sedimentary beds. Neolithic (5,500 – 4,100 BP) and Bronze-Age (4,100-2,600 BP) tool making evidence has recently been discovered at Oldbury-on-Severn and Hill in Avon. At Brean Down in Somerset Bronze Age settlement evidence points towards the earliest sea-salt extraction known in Western Europe. Further inland on the Somerset Levels many Neolithic and Bronze Age wooden trackways have been discovered, which would have allowed for easier access around the salt and peat marshes. Roundhouses with distinctive pottery have been found on the foreshore at Rumney and Magor in Gwent. Rectangular wooden buildings dated to the Bronze Age and Iron Age (3,000 – 1,950 BP) which are unique to Britain have been found at

Goldcliff and Redwick in Gwent, some linked by wooden trackways. There is also evidence that these sites were used for the seasonal grazing of animals.

The use of the marine environment is also attested at sites such as Caldicot in Gwent where Bronze Age fishtraps and a bridge have been excavated. At Goldcliff, wood from sewn plank boats has been found, exemplifying the importance and use of the waterways to the prehistoric inhabitants of the Levels.

7.3 The Roman Severn Levels

The Roman period of the Severn Estuary begins with the advance of the Roman army under the command of Ostorius Scapula, Roman Britain's second governor (47-52 AD). By 49 AD the Twentieth Legion had established itself at Gloucester and Roman vessels were soon plying the Severn Estuary and Bristol Channel. The use and command of the sea was of high importance to the Roman occupiers as evidenced by the signal stations constructed along the Devon Coast and on Steep Holm at the mouth of the Estuary. Tidewater fortresses were also constructed at Usk in *c* 55 AD and Caerleon (*c* 75 AD). Small ports arose at advantageous positions along the Estuary, often at the mouths of the rivers that poured in to it, such as Sea Mill on the Avon and Crandon Bridge on the River Parrett. The widespread occupation and trading across the Severn Estuary is well attested through the pottery evidence. Distinctive black burnished wares from southeast Dorset were shipped from north Somerset to many settlements on the Levels and upriver to Gloucester and beyond. The Forest of Dean was exploited for its high-grade iron ore, which was transported to many settlements for smelting and further processing. The production of refined iron ore and iron products at Woolaston in Gloucestershire and Oldbury-on-Severn was considerable in scale. A Roman nailed plank boat, originally 12 metres in length was found at Magor Pill (a tidal creek in Roman times).

The Romans were not only concerned with the Severn Estuary as a transportation route. They also embarked on a vast program of construction of sea defences and river floodbanks, draining the waterlogged levels to produce rich, fertile farmland. There is evidence from an inscription found at Goldcliff in 1878 that the legionaries of the Second Legion stationed at Caerleon played their part in the construction of drainage ditches and sea banks, transforming the landscape. The regular field and ditch patterns that crisscross the Wentlooge Levels in Gwent are Roman in origin.

The Severn Estuary, the levels on either side and the Forest of Dean remained economically and strategically important into late Roman times.

7.4 Post Roman deterioration

The late Roman/early post Roman period of the late 4th/ early 5th century saw large areas of the Severn Levels flooded and the sea defences and the land drained during the Roman period inundated with sea water. These events appears to be caused by a period of general climatic deterioration in northern Europe between the 5th and 7th centuries AD rather than the breakdown of the market economy fostered by the Roman presence. During this period the sea defences constructed by the Romans suffered from a lack of maintenance and many of the drainage ditches and sea walls deteriorated to the point that marshy conditions and tidal silts returned and buried some of the Roman settlements and field systems.

7.5 The Saxon recolonisation of the Levels

The late Saxon period saw profound physical changes around the Severn estuary. The climatic deterioration had ameliorated by the beginning of the 7th century, with milder and drier conditions existing until the 9th century, with another warm and dry period from the 10th to the 14th century. The low-lying coastal lands enjoyed a period of stability during these periods. The recolonisation of the Levels began in the Saxon period, with definite evidence showing a restart of use by the 9th century (Rippon 1997, 16). Droveways were established in Somerset, allowing for the movement of animals between settlements and pastures, along with some cultivation of the land. The monastic community of Glastonbury Abbey were major landowners at the time and actively pursued a policy of drainage and improvement of their wetlands. By the Norman Conquest (1066) most of the Levels in Gloucestershire and Avon were being cultivated in open fields divided into strips, which has left the distinctive ridge-and-furrow formation in today's landscape.

7.6 Norman Lords and Monastic communities

The late 11th-13th centuries saw the recolonisation of the Gwent Levels, driven by the new Norman lords and the monastic communities at Goldcliff Priory and Tintern Abbey. The monks built flood defences and excavated ditches. There is also the suggestion that the monks operated or controlled the now lost port of Abergwaitha near Magor, where the wreck of a Medieval boat transporting iron ore was found on the foreshore. The Norman landlords on the Welsh side had a profound effect on the landscape, restructuring it to create a system of manors, villages and open fields, matching that on the English side.

7.7 Medieval to Post Medieval changes

The declining population and worsening climatic conditions (increased storminess and coastal erosion) led to distinct changes in the Levels between the 14th and 17th centuries. Many of the sea defences were set back inland, as at Oldbury-on-Severn, Hill and throughout Gwent. The open field system that had been in use was enclosed, divided by hedges and converted to pasture, producing the pattern of small irregular fields that can be seen today. During the last century the use of the levels has changed again, with an increase in the level of arable farming and the growth of industrial applications and industries.

7.8 Shipping trade in the Estuary

The shipping trade in the Bristol Channel and Severn Estuary has become increasingly important over the last 500 years which has had an impact on the utilisation of the Severn Estuary Levels as well as providing a plethora of archaeological artefacts and sites that are distinctly maritime in origin and nature. The maritime aspects of the Severn Estuary will be considered later in this chapter in Section 9.

8 Wetland exploitation around the Severn Levels

8.1.1 Roman

Reclamation of the coastal salt marshes and freshwater peat lands was first undertaken during the early Roman period. There is evidence that from the Mesolithic onwards the areas had been exploited in their natural state (Rippon 1997, 262). There is evidence of tool making, hunting and gathering on the Severn Levels and prehistoric settlements covering the Mesolithic to Iron Age periods. The earliest reclamation undertaken was on the Gwent Levels by the legionaries stationed at Caerleon and later reclamation projects were initiated by the villa estate owners in Somerset and Gloucestershire. Considerable effort was put into the construction of seawalls, river floodbanks and the digging of drainage ditches. The investment of time and labour was worthwhile as the reclaimed land was fertile and there was an increase in agricultural output.

The Roman engineers left the Brue Valley (an area of approx. 75 square kilometres) in central Somerset, south of the abandoned River *Siger*, in its natural condition, retaining this area as a tidal wetland which was subsequently used for salt production, seasonal grazing and possibly clay extraction, demonstrating that the natural resources supplied by the coastal wetlands were deemed too vital to lose completely.

8.1.2 Saxon and Medieval reclamation of land

The Levels were recolonised during the late Saxon and Medieval periods, which heralded a period of intensification of the exploitation of rural resources. Much of the English side of the Severn Estuary was protected from tidal inundation by the construction of sea walls and river flood banks during the Saxon period. On the Welsh side, the Gwent levels were most likely reclaimed in the late 11th century/ early 12th century. Once protected, it was the work of several centuries before the areas were fully enclosed and drained. In Somerset important estate centres were often situated on the bedrock islands within the reclaimed land.

8.1.3 Late Medieval further enclosure and drainage

During the late Medieval period further drainage and enclosure resulted in continued improvement (from an agricultural point of view) of the Severn levels. There was also an intensification of the use of natural resources such as pastoral land and fishing. The Medieval communities pursued a largely agricultural economy, with some mixed resource utilisation to start with and then specialising in pastoralism. This shift to animal husbandry can be seen as part of the wider socio-economic changes that were occurring in the late Medieval period. The increased demand for meat, coupled with the transportational potential of the towns and villages on the Severn Estuary allowed for a specialisation in pastoral production, joining the flourishing trade routes centred on Bristol. It is these various factors that have led to the formation of the Severn Estuary Levels as they survive today, a distinctive and pastoral-dominated landscape.

9 Maritime aspects of the Severn Estuary

9.1 Tidal range

The Bristol Channel is probably one of the most dangerous shipping lanes in the world. Over the centuries many ships have been lost whilst navigating it. The Channel has one of the highest tidal ranges in the world and many dangerous sand bars and rocks.

The Severn Estuary has the second highest tidal range in the world, at 14.8m at Avonmouth (Bell 2000, 2) and the highest tides are often exceeded by 3 to 4 metres during storm surges. The amplitude of the tidal range and the topography of the marine deposits of the Severn Estuary mean that a very wide intertidal area is exposed at low tide. On the Welsh side of the estuary this intertidal zone is on average one kilometre wide at mean low water and much wider during low water spring tides. Before the reclamation of the Levels it is highly likely that during the periods of greatest marine influence the intertidal area could have been four to six kilometres wide, providing a vast transient landscape offering a diversity of resources consequent to the frequency and level of marine inundation.

9.2 Trade on the Severn in the Romano British period

The evidence for trade along and across the Severn Estuary for the Romano-British period is represented by the movement of iron ore and blooms as well as distinctive pottery. The analysis of RB pottery finds has identified two trading areas, one focused on the upper estuary above the Wye and the second taking in the Bristol Channel and the Severn estuary up to Gloucester. The distribution of Dorset Black Burnished ware indicates that Gloucester was the major port for incoming coastal traffic (Allen & Fulford 1987, 283).

9.3 Roman transportation of Forest of Dean iron ore

The iron ores worked on the margins of the inner Bristol Channel-Severn Estuary, especially those from the Forest of Dean were high grade, predominantly composed of goethite and some haematite. The ores were exploited during the Roman period, often on a semi-industrial scale. The ore was not normally smelted on site, but was instead transported some distance (in the case of Worcester over 40 to 50 kilometres) before being processed at villas, settlements and towns. The River Wye and the Severn Estuary were essential to the transportation of the unworked ore, which is reflected in the occurrence of smelting sites on both sides of the Severn Estuary (Allen 1996, 226).

9.4 Medieval transportation of iron ore

There was comparable transportation of iron ore during the later Medieval period on the coasts of the Severn Estuary. At Hill Flats, an extensive intertidal rock platform on the southeast bank of the Severn halfway between Bristol and Gloucester a landing place has been uncovered with substantial evidence for the iron ore trade. Clusters of dark brown ore in a pristine, just mined condition have been excavated, along with

14th century pottery alongside a large concentration of stone blocks which have been interpreted as a landing place.

At Woolaston Grange on the northwest bank of the Severn (part of the possessions of Tintern Abbey from 1131 to Dissolution), iron ore closely similar in form and metallurgy to that found at Hill Flats has been found in close association with 12th to 15th century pottery (Allen 1996, 228). The metallurgical composition of both examples is very similar to the ore mined in the Forest of Dean.

The tidal stream Magor Pill on the Gwent coast southwest of Chepstow was the site of the landing facilities of Abergwaitha (although it is not known on which bank the main landing place was) in the 12th to 14th centuries and in early modern times. There is an abundant amount of mainly imported pottery to be found loose in the gravels of the shore. A clinker built boat, dendrochronologically dated to AD 1240 (Bell 2000, 5), was found preserved in the silts close by Abergwaitha, containing a substantial amount of iron ore, which presented a much greater metallurgical variety than either Hill Flats or Woolaston Grange. This ore has been identified as closest to those produced from the Bristol Mendips area (Allen 1996, 229) demonstrating transportation and trade across the Severn estuary.

9.5 Monastic iron ore production

During the later medieval period many British monastic communities included mining, smelting and forging amongst their economic activities. Tintern Abbey had forges and an iron mine in the Forest of Dean. By 1138 Tintern had established a daughter house on the other side of the Severn Estuary at Kingswood, 25 kilometres northeast of Bristol and came to own several properties within Bristol as well. The monks are known to have operated ships and traded with Bristol (for a long period free of tolls).

9.6 Smuggling and piracy

The first English smugglers came into existence when Edward I undertook to tax the exportation of wool (England at the time was a major wool exporter) in 1275. Before this time England had operated a policy of complete free trade and as such smuggling was unnecessary. Bristol appears to have been the first port in England with a Customs cutter to patrol the estuary. It was specially constructed in 1421 at a cost of £22 6s 7d (*c* £10,500 in modern money). By 1575 vast frauds were being perpetrated in the wine trade at Bristol. It is judged that duty was being paid on less than half the wine unloaded. Principal customs officers were pocketing £30/ship coming in and also underhandedly trading in wine themselves. Piracy was also occurring in the 1570s "working largely from harbours in South Wales and the West country pirates preyed on the regular trade routes." (Williams 1959, 53). Privateers and the like plied their trade within the Bristol Channel and were often financed by syndicates of merchants and squires based in Bristol. By 1580s there was also a growing illegal trade in the exportation of ordnance cast in the numerous small foundries in the forest of Dean. Bristol merchants sent out guns made in foundries in the Forest of Dean and as many as nine shiploads of culverins- the light-shotted long-range guns which the Spanish Admiral needed so badly – as well as powder, shot and muskets went from Bristol to Spain in 1587. In the mid 19th century Britain returned to a mostly Free Trade economy and as a consequence smuggling as it had existed became relatively

unimportant. The 1st Annual Report commissioned by the Customs board in 1857 found that:

"Smuggling has greatly diminished and public sentiments with regard to it have undergone a very considerable change. The smuggler is no longer an object of general sympathy or a hero of romance; and people are beginning to awaken to the fact that his offence is less a fraud on the Revenue than a robbing of the fair trader" (Williams 1959, 204)

9.7 Warfare in the Bristol Channel

The ships that sailed the Bristol Channel were often used in times of war as warships and incorporated into the Navy. In fact the owners of the ships often relied on this practice and deliberately built larger ships so as to avail themselves of the financial incentives for building potentially powerful warships. The ships on the longer trade routes would have needed to be heavily armed in order to protect their valuable cargo.

During the Second World War the application of naval violence took a more covert form with the use by the Germans of underwater mines. The worth of mines had been proved during the First World War, when the German navy successfully deployed them, disrupting British coastal trade. Technical advances in the early 1930s ensured that they would become an even more effective weapon in World War II. The basic contact mines of the early 1900s had become much more sophisticated with various developments in explosives and fuses and methods of delivering them to their target areas. Chief amongst the developments was that of the magnetic mine.

The magnetic mine was only effective in depths of 25 to 30 metres (i.e. coastal waters) and it was best suited to narrow approach channels and areas of high activity. In order to allow subsequent U-boats to enter mined areas for further missions, most submarine laid mines were fitted with an 80 day clock fuse, at the end of this period the mine rendered itself inert.

Due to the specific requirements of the magnetic mine coupled with the pattern of shipping activity in the Bristol Channel it was the clear choice for German mine operations. Accordingly, several U-boats were given missions to both lay mines and operate with torpedoes in the Channel. U 28, U 29, and U 33 each carrying 12 mines and six torpedoes were despatched to mine Swansea, Milford Haven and The Foreland in December, 1939. The magnetic mine used for these early operations was the TMB mine (Admiralty designation 'Type GS'). The wreck lists for the Bristol Channel are a testament to how effective these mines were.

9.8 Regional specialism and the role of Bristol

In their unaltered states the coastal wetlands of the Severn Estuary would have been physically marginal with respect to settled agriculture. However when they were protected and reclaimed through embankment and drainage they provided fertile soils. However, although the crop yields were potentially high the soils were heavy and there was an ever present risk of flooding due to fresh water runoff from the surrounding uplands, rising sea levels and storm surges. The excellent transport potential of the coastal reclaimed land and proximity to major centres of consumption helped to offset the physical and environmental marginality of these areas. During the Roman period the Gwent Levels were close to the legionary fortress at Caerleon, and

from the Medieval period onwards the whole area fell within the economic hinterland of the international port of Bristol. During both of these periods specialised patterns of agriculture developed, with the Levels transitioning from arable to pastoral lands by the Post-Medieval period.

In order for the region to successfully specialise in one particular type of landuse (in this case pastoralism) there needed to be a suitable consumer and a system to deliver the produce. In the Medieval period Monmouthshire (including the Gwent area) lacked major urban populations to motivate trade. For example in 1550 Cardiff held little over one thousand residents. Bristol at this time was expanding rapidly as it burgeoned into a major port, thus providing a market for agricultural surplus. This growth and development of Bristol affected the whole Severn Estuary region, including Gloucestershire and Somerset. The reclaimed soils, in additions to being ideal for pasture were also, by their very nature, convenient for water borne transport; elsewhere on both sides of the Estuary only those areas close to turnpike roads were able to trade with Bristol.

9.9 The history of Bristol as a maritime city

The Medieval town of Bristol was incorporated in 1155. The harbour was improved in 1247 by diverting the Frome to the west and building a stone bridge at the point of its former confluence with the Avon. During the reign of Edward III (1327–77) Bristol imported raw wool from Ireland and manufactured woollen cloth, which it sold to Spain and Portugal in return for sherry and port wine. By the 16th century Bristol had become a major port, a manufacturing town, and a distribution centre for both overseas and inland trade.

The city also played a notable part in maritime history: from its port John Cabot sailed in 1497 on his voyage to North America. John Cabot (*c* 1450–98) was an experienced Italian seafarer who came to live in England during the reign of Henry VII. Struck by the success of Christopher Columbus and backed by King Henry VII and the wealthy merchants of Bristol, Cabot intended to find a new way to the riches of the Orient by sailing northwest. He sailed from Bristol in the *Matthew*, a square-rigged caravel in 1497. Instead of China or Japan, he discovered what he called “New Founde Landes”, modern day Newfoundland, Canada, and claimed it for the King. On the way back the crew discovered the enormously rich cod fishing grounds known as the Grand Banks, which led directly to the development of the great Newfoundland cod fishery. On his return Cabot was rewarded with the sum of £10 (worth *c* £5,000 today) by the king, for discovering a new island off the coast of China. Doubtless the king would have been more generous if Cabot had brought home spices.

In 1552 the Society of Merchant Venturers was incorporated in the city; its hall, along with a number of other historic buildings, was destroyed by World War II bombing.

During the later 17th and the 18th century Bristol prospered as a processing centre for sugar and tobacco imported from Britain's colonies in the Americas, to whom it supplied textiles, pottery, glass, and other manufactured goods. The importing of Jamaican sugar and cocoa from West Africa led to the creation of the “sugar houses” of Bristol and to chocolate manufacture. By the 19th century, however, the rise of the Lancashire cotton industry, together with the limitation on shipping imposed by the Avon Gorge below Clifton, led to the loss of much of Bristol's trade to Liverpool. In

1809 tidal waters of the Avon and the Frome were diverted to create a floating, or tideless, harbour with a constant depth of water.

The Medieval port and city of Bristol grew rich exporting English wool and woollen cloth to Europe. The principal import was wine from France. By the mid 18th century, the patterns of trade had changed and Bristol was prospering on trade with West Africa, the West Indies and North America. Brassware produced in the Bristol area, as well as other goods, were traded in Africa for 'enslaved' people. They were taken across the Atlantic to work on the sugar, cotton and tobacco plantations of the New World. These commodities had a ready market in Europe. But the narrow, tidal harbour that made Bristol England's second port began a slow decline. Ships grew larger and trade was lost to other ports. The opening of the Floating Harbour in 1810 extended the life of the port, but it would never regain its former status. The port declined rapidly in the late 1960s and closed in 1977. The docks area is now mainly used for recreation and housing.

The engineer John Loudon McAdam improved Bristol's roads (c. 1815) with his technique of laying raised-stone surfaces (macadamizing), and the Bristol roads became a model for road improvements throughout Great Britain. Bristol served as the launching point in 1838 for Isambard Kingdom Brunel's Great Western, the second steamship to cross the Atlantic.

The coming of the railway in 1841, followed by dock extensions at Avonmouth and Portishead, led to a revival of Bristol's trade, and a suspension bridge across the Avon Gorge, designed by Brunel and completed in 1864, further encouraged traffic.

The Royal Portbury Dock has been added to the port complex, whose imports now include refined petroleum products, animal foodstuffs, and forest products. Bristol's exports consist mainly of manufactured goods from the West Midlands, notably automobiles, tractors, and machinery. Local industries include the refining of sugar, cocoa and chocolate making, wine bottling, and the making of fine glass (Bristol "blue"), porcelain, and pottery. The locality's most notable industry today is aircraft design and construction at Filton.

9.10 History of cross-Severn trade

There is substantial evidence for cross-Severn trade predating the Norman conquest, with numerous landing places being referred to in early Medieval charters (i.e. Caldicot, Mathern, Pwllmeurig and Bishton/Redwick). Several farmhouses in the Gwent Levels and in the fen edge villages have no direct parallels in Wales, but have close architectural parallels in Gloucestershire.

The main body of literary evidence for cross-Severn trade comes from the sources of the post medieval period. Evidence of the trading potential of the Welsh coast has been provided by a survey undertaken in 1578 to record all the havens and creeks in the County of Newport which recorded a substantial list of small landing places and tidal creeks utilised in transporting goods up the coastline and across the estuary. Many of these smaller landing places declined as the major ports of Cardiff, Chepstow and Newport developed, with few examples surviving into the 18th century (although St Pierre Pill was still active as a landing place for 'ships, barges, boats and water vessels' in 1711 and St Pierre had a warehouse and wharf in 1781

9.11 The systems of trade

9.11.1 Coasting links in the Severn Estuary.

By the late 17th century the Severn Estuary was in use as a major commercial route, with small ships passing up and down the Channel. From small harbours and inlets to large corporate towns and river ports, a fleet of coastal craft, ketches, coal hoys, trows, barges, woodbrushes and open boats carried a wide variety goods ranging from the mundane to the exotic. For many regional ports, servicing these coastal vessels formed the principal maritime experience and provided the backbone to the local economy. At the Somerset port of Watchet, for example, over 97% of the 1,729 craft paying quay and keelage duties between 1709 and 1719 were active coasters, mainly engaged in the coal trade with south Wales and the regular Bristol run (Hussey 2000, 22).

9.11.2 Bristol Channel Pilots

Bristol Channel pilot cutters were tough, fast ships designed to be handled by a man and a boy capable of dealing with the fearsome tides and winning the race to put pilots aboard incoming merchant ships in mid channel.

In 1611 the Corporation of Bristol delegated the control of pilotage to the Merchant Ventures of Bristol. They were to retain control for 250 years. The Bristol pilots were mainly based at Pill near the mouth of the river Avon. Bristol for many years was the main port on the Channel but as the Welsh ports grew larger due to the coal and iron exported, these ports needed to control their own pilots. Bristol tried to put a block on this and tried to keep its monopoly. In 1861 the ports of Cardiff, Newport and Gloucester were granted the right to appoint their own pilots.

Before WW1 most of the pilots owned their own boats, normally cutters or yawls. Sturdy and fast sailing boats that were ideal for the conditions on the channel. The pilots would sail westward in search of ships heading for the ports along the channel. The crew was usually an experienced sailor and a boy or apprentice. Competition was fierce and the fastest boats got the most work.

9.12 Cardiff

Cardiff earned its reputation as an international trading port of worth through the coal trade in the 19th century when it fed the trade routes of the world with the finest Welsh steaming coal, while ships from Swansea carried copper and tin plate to the four corners of the globe.

9.13 The major exports of Welsh ports

The Welsh Port Books of the 16th and 17th centuries describe the goods that formed the major exports from Newport and Chepstow. These included iron, millstones, oatmeal, wheat, beans, peas, butter and cheese (Rippon 1996, 102).

In the 18th and 19th centuries Monmouthshire continued to export a range of produce, including coal, iron and wheat. The county also exported apples for the important Bristol cider trade. Both oxen and fish were exported from the Gwent Levels during the late 18th and early 19th century.

The major trade specialism from the Gwent Levels appears to have been live cattle and diary produce. In 1561 Magor Pill was described as a great landing for small boats carrying butter and cheese; Goldcliff was also recorded as another pill used by small vessels to land and take onboard goods destined initially for Bristol. Rumney and Peterstone were also noted as ports for small boats.

Cross Estuary trade between Gwent and Somerset is reflected in the pottery assemblages as a number of 16th century fabrics derived from North Devon are found frequently along the South Wales coastline and almost not at all away from the coast.

9.14 Gloucester

Gloucester was given the formal status of a port by letters patent from Queen Elizabeth I in 1580. From that time, the coastline of the Severn Estuary northeast of the Aust/Beachley area came under the jurisdiction of a new custom house at Gloucester. This meant that vessels could trade directly between Gloucester and foreign ports without having to call in at Bristol's custom house, which had previously been responsible for the area. Gloucester Corporation hoped to benefit from the new status because they collected dues on goods handled at Gloucester's riverside Quay. In practice, however, few foreign-going vessels were seen at the Quay because of the difficulties of navigating the shallow tidal stretch of the River Severn approaching the city.

9.14.1 Gloucester & Sharpness Canal

The opening of the Gloucester & Sharpness Canal in 1827 allowed ships to bypass the difficult stretch of river, and so considerable trade developed with foreign ports. To supervise this better, a new custom house was built in the docks area in 1845.

In the early days of the canal, most of the vessels bringing cargoes to Gloucester were sloops, schooners and brigs in the coastal trade with an occasional brig or barque from more distant ports. At Gloucester, most of the imports were loaded into canal boats to be taken further inland to the growing industrial towns in the Midlands. The canal was also used by trows and barges trading direct between Bristol and riverside towns in the Midlands. As the size of ships became so big that most had to discharge at Sharpness, the traffic on the canal changed to being mainly barges and lighters carrying the cargoes on to Gloucester and further inland.

Sharpness Docks developed in the later nineteenth century after a new dock was built in 1874 to accommodate the larger ships then coming into service that were too big to pass up the canal. Cargo handling activities gradually declined at Gloucester, and in due course customs administration moved to Sharpness. Sharpness Docks continues as a working port, but most of the old warehouses have been replaced by modern facilities.

9.15 The Islands in the Severn

The island of Steep Holm in the Severn Estuary has seen a remarkable amount of activity over the course of its existence. There are Celtic carvings of a pagan shrine; an old Roman signal station; the twelfth century St Michael's Priory which housed a community of Augustian Canons; and remains of more recent military occupation.

Steep Holm was fortified during the 1860s, along with Flat Holm, Brean Down and Lavernock Point. These fortifications effectively covered the Mouth of the Severn, providing a defensive line from just south of Cardiff (Lavernock Point) across the Estuary to just west of Weston-Super-Mare (Brean Down). These island forts protected the principal ports of Bristol, Cardiff and Newport. The fortifications on all of the islands were refortified and upgraded during the Second World War.

A defensive installation was constructed in 1899-1900 on Barry Island, at Nell's Point in order to provide protection for Barry port.

This string of islands was also to play another part in history as on the 11th of May 1897 Marconi and Kemp exchanged the first message by wireless telegraphy between Lavernock, Brean Down and Flat Holm.

10 Archaeological potential of The Severn Estuary and Inner Bristol Channel

10.1 Palaeolithic

Very little evidence survives for Palaeolithic activity in the study area. The notable exceptions to this are a series of Palaeolithic implements found at Sudbrook just outside of the study area. These implements included Levallois flakes and ovate handaxes dating to between *c.* 260,000-200,000 yrs bp. Given the scarcity of Palaeolithic artefacts in and around the study area it is unlikely that much Palaeolithic evidence exist within the study area.

10.2 Mesolithic

A number of Mesolithic sites exist within the study area these include 5 Mesolithic site from Porlock and Goldcliffe and comprised flint scatters and implements evidence substantial for Mesolithic footprints has also been recovered with the intertidal estuarine muds. Given that it was only this period that significant marine transgressions occurred there is a high potential for Mesolithic archaeology across the entire study with the exception of the centrally incised channel.

10.3 Neolithic

By the Neolithic most of the estuary would have been underwater as such the potential for Neolithic remains. However there is likely to be limited potential for Neolithic remains within the littoral zone.

10.4 Bronze Age

The marine regression culminating around 3200 years bp meant that much of the area now regarded as subtidal would have been dry land or inter tidal zones during the

Bronze age as such these areas have a moderate potential for the survival of archaeological and palaeoenvironmental evidence of Bronze age date is moderate to high.

10.5 Iron Age

The potential for Iron Age material occurring along the edges of the study area is high given the trackway and structures identified at Goldcliffe, within the sub-tidal areas the potential is likely to be low.

10.6 Roman

Given the development of sea defences and land reclamation on the Severn during this period it is unlikely that terrestrial Roman remains will be present in the study area. Given the know high level of Roman trade along the Severn and the discovery of the Roman vessel at Magor Pill just outside the study area there is potential for Roman maritime remains to exist in the study area.

10.7 Early medieval

There is low potential for early medieval remains within the study area although as yet undiscovered wrecks may survive.

10.8 Medieval

Four 13th and 14th century medieval wreck have been identified within the study area There is there a high potential for further maritime remains in the area.

10.9 Post-medieval

The level of recording of Wrecks in the post medieval period has given a somewhat biased impression of the relative numbers of post medieval wrecks compared with wrecks of other dates. There is however a very high potential for post-medieval maritime remains throughout the study area.

10.10 Modern

As with post medieval vessels improved recording of wreck sites during this period has led to a comparative over representation of vessels of this date.

11 Aggregate areas

There are six license areas however only four have active dredging zones within them. The two non-active dredge zones do not contain any known site or wrecks. The total area licensed for aggregate extraction in the study area is approximately 9,710,8575 square metres this accounts for 7.9% of the entire study area and 25% of by area of sand deposits. Active dredge areas account total 34,616,012 square metres some 36% of the total licensed areas. Active dredge areas account for 2.8% of the total study area and 9% of the total area covered by sand.

11.1 Active dredge areas

11.1.1 389HAML

This active dredge area covers an area of 15,675,800 square metres or 16%of the total license areas in the study area and accounts for 1.3% of the study area. The dredging operations are currently being carried out by Hanson Aggregates Marine Ltd. This zone is located toward the south west of the study area. 389HAML contains no recorded sites or wrecks. The surrounding licence area does not contain any known wrecks or sites.

11.1.2 377HAML, 379BDL, 38 1UMD

This active dredge area covers an area of 9,862,775 square metres or 10% of the total license areas in the study area and accounts for 0.8% of the study area. The dredging operations are currently being carried out by Hanson Aggregates Marine Ltd, United Marine Dredging Ltd and British Marine Aggregate British Dredging Ltd. This zone is located centrally within the study area. This area contains 6 wrecks of post medieval and modern date including wreck no.637 the Redvers Buller a sand dredger that sunk in 1932.
The surrounding non-active license zone contains a further three known post-medieval wrecks.

11.1.3 385BDL

This active dredge area covers an area of 2,622,158 square metres or 2.7% of the total license areas in the study area and accounts for 0.2% of the study area. The dredging operations are currently being carried out British Marine Aggregate British Dredging Ltd. This zone is located toward the north east of the study area. This area contains four known wrecks of post medieval date.

11.1.4 391HAML

This active dredge area covers an area of 6,455,273square metres or 6.7% of the total license areas in the study area and accounts for 0.5% of the study area. The dredging

operations are currently being carried out Hanson Aggregates Marine Ltd. This zone is located toward the north east of the study area. This area contains fourteen known wrecks. Thirteen of these are of post-medieval date and one medieval wreck. This ship the Mariote is the wreck of French cargo vessel which stranded at Goldcliff en route from Bordeaux to Bristol with wine and other cargo this ship sunk in 1331.The active dredge zone also contains a British military aircraft site no.831 making it a protected place. The non-active license area contains a further 33 known wreck sites.

12 Recommendations and research aims

This study has indicated that the Severn Estuary region contains a rich archaeological and palaeoenvironmental record that broadly similar in character across the study area however to date no estuary wide research framework has ever been implemented. This is in part due to the many disparate unitary authorities involved, the division of the study area across a national boundary and the terrestrial marine division. The problem is further exacerbated by the lack of a unified dataset covering the entire area.

Overall it is felt that the study area needed to be extended further inland to allow for a more integrated study of the Severn Estuary. The current studies boundaries raise some significant issues with regard to the historic environment and future planning strategies. Firstly the littoral zone is not a historical entity given past sea level rise and past land reclamation. Additionally given current trends in sea level rise it is probable that in the future land that is either terrestrial or drying zone may in the future become seascapes i.e. subtidal. Given this an exact boundary based upon MHW, CD or an OD height is unlikely to adequately encompass these issues perhaps the most appropriate study area would be something similar to that used by the Severn Strategy document.

Another crucial issue that has been raised by this study is the lack of accurate locational data for the majority of sites. Survey should be undertaken on the most important sites in the most vulnerable areas. These surveys could involve more detailed desk based research or be more field orientated such as the archaeological Diving Units (ADU) Rapid Archaeological Site Survey and Evaluation project (RASSE)(http://www.st-andrews.ac.uk/rasse/results/index.html).

However critically there is no current criteria for defining the importance of maritime sites other than that of protected wreck there is also no regional framework within which to examine importance. It is therefore proposed that a regional research Framework is developed for the region. This should draw together disparate themes and issues such as archaeological/historical periods, past environments, human exploitation, marine transgression/regression, shipping hazards, land reclamation, ports and trade and warfare. Such a regional research framework would enable a regional research strategy to be developed and issues such as importance to be addressed.

Additionally there is a need converse and actively engage with relevant stakeholders within the region from aggregates industry, fishing, port facilities and heritage groups. Such a discourse could lead to the development of initiatives such educational booklets illustrating the artefacts and importance of different schemes additionally this kind of initiative could lead to an informal reporting process for stray finds from the seabed.

Other initiatives may include the extension of the Nautical Archaeology Societies ‘Adopt-a-Wreck’(http://www.nasportsmouth.org.uk/) scheme to involve local heritage and diving groups.

12.1 The principal recommendation of this study is however the implementation of a Historic Seascapes Characterisation Study based on the methodology proposed by Wessex Archaeology from the Liverpool Bay study. The proposed aims and objectives are given below.

12.1.1 Proposed Aims:

• To apply and, develop the new Liverpool Bay methodology in a different type of coastal and marine environment (The Inner Bristol Channel and Severn Estuary).
• To create a GIS-based characterisation of the historic and archaeological dimension in the present landscape of the inter-tidal and marine zones of the project area to the limit of the UK Continental Shelf
• To ensure that the historic environment GIS-database for the project area can be readily integrated with analogous databases for the natural environment
• To create 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 inter-tidal and marine zones
• To enhance and contextualise the Maritime Record of the National Monuments Record and those County HERs impinging upon the project area, with particular regard to providing landscape-scale contextualisation of results from the Rapid Coastal Zone Assessment programme where available
• To structure, inform and stimulate future research programmes and agendas relating to the project area
• To improve the awareness, understanding and appreciation of the historic dimension of the project area to professional and non-professional users of the database
• To be a demonstration project in the development of a methodology for extending HLC to the breadth of environmental and management conditions in England's inter-tidal estuarine and marine zones.

12.2 Project objectives

12.2.1 Objectives: DEFRA Objective 2:

The Historic Seascapes objectives are specifically focused on the aim to provide enhanced data sets for future heritage management of coastal and marine zones and will include:
• analysis to enhance understanding of the scale and character of the historic environment by HLC in the whole of the study area in order to provide the baseline information necessary for effective future management.
• the archaeology of the Quaternary and Holocene Period: research to characterise the subsurface offshore resource in the marine and coastal zone and especially in licensed extraction areas within the study area.
• To develop evaluation frameworks, predictive tools and mitigation strategies by integrating these datasets with existing DEFRA and EA management units.

• Provide contextual information (to Local Authority HER Officers and the National Monuments Record Centre).

12.2.2 Objectives: Project Specific:

• To deploy, assess and, as appropriate, develop the GIS-database structure created for the Liverpool Bay pilot area to enable it effectively to accommodate the distinctive qualities of the Inner Bristol Channel and Severn Estuary
• To produce a GIS-based HLC characterising the project area's landscapes in historic and archaeological terms, by means of:

- identifying and gaining access to the range of data sources relevant to understanding the historic and archaeological dimension of the project area, placing greatest emphasis on sources with consistent national coverage
- using GIS polygons to define areas sharing similar historic character defining polygons on the basis of combined shared values of dominant character attributes, with secondary attributes recorded in a consistent, structured manner
- Identifying trends and recurrent groupings among the attributes to define historic landscape types which will, together, encompass all of the polygons and reflect the differing historical processes in their formation

• To record the sources and data-sets supporting each stage of the characterisation, to meet the needs of transparency and assist future updates against the initial benchmark characterisation
• To analyse and interpret the HLC to produce preliminary syntheses from it
• To assess present uses and potential for the HLC in informing sustainable management of change and spatial planning issues surrounding marine aggregates extraction in the project area
• To assess present uses and potential for the HLC in informing broader sustainable management of change, spatial planning, outreach and research programmes
• To produce an archive and a report reviewing the methodological validation, development and practical application of HLC in this project area and assessing the benefits of extending such characterisation more widely to the historic environment in the inter-tidal and marine zones to the limit of the UK Continental Shelf
• To disseminate information on the progress and results of the project through professional and popular publications and other media

13 Conclusions

This Study has reviewed all the reasonably accessible sources of data and has shown that:

- There is a low level of recorded location precision for the majority of wreck sites
- The data are skewed toward post-medieval shipping losses.
- No central body responsible for the collation of HER records for the region
- No central body responsible for heritage policy within the study area.
- There has been no baseline survey of data.
- Lack of regional framework/strategy.
- Lack of integration between the marine and terrestrial historic environment.

The study has shown that there is potential for remains of all date in particular there is:

- Limited potential for Palaeolithic material
- Mesolithic material outside the central channel
- Limited potential for Neolithic material
- Some potential for Bronze Age material particularly toward the edges of the study area.
- Low potential for Iron Age remains although if such remains do exist they are likely to be present around the edges of the study area.
- Low to moderate potential for remain of Roman date.
- Low potential for Early medieval remains
- Moderate to high potential of medieval remains across the entire study area.
- Moderate to high potential of post-medieval and modern remains across the entire study area.

The study has shown that:

- Most aggregate areas are outside the most important heritage areas
- Extraction Zone HAML391 does however contain two medieval wrecks and a number of Protected Military Places.
- The limited precision of many of the wreck sites location means that sites cannot be clearly identified as being within or without extraction license zones.
- There is likely to be an unquantifiable amount of unknown archaeological remains within the study area and extraction areas.

The study has recommended that the following further work may be applicable:

- Regional framework and strategy.
- Locational and condition surveys of the most important wreck in vulnerable areas.
- That there should be engagement with the stakeholders leading to educational leaflets and the development of an informal finds reporting scheme.
- Historic seascape characterisation project based upon the Liverpool Bay methodology.

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