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Severn Estuary Rapid Coastal Zone Assessment Survey

Updated Project Design for Phase 2 Main Fieldwork

for English Heritage
(HEEP Project No. 3885)

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Version 2 Revised, March 2010

REGISTERED ORGANISATION IfA

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Project details

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Summary

This Updated Project Design is for the main fieldwork phase of the Rapid Coastal Zone Assessment Survey (RCZAS) of the archaeology of the Severn Estuary. It is to be submitted to English Heritage in support of an application for the funding of the project by English Heritage Historic Environment Enabling Programme. The extensive project area includes both the 'right' bank and the 'left' bank of the River Severn in England, extending from Beachley near the First or 'Old' Severn Crossing northwards to Maisemore Weir upstream of Gloucester on the right side of the Severn, and from Maisemore Weir south-west to Gore Point, west of Porlock Weir in Somerset along the left coast. The area investigated includes the intertidal zone and foreshore at Lowest Astronomical Tide (Chart Datum), and extends 1km inland of the Mean High Water level. The total area covered by the survey is approximately 575km².

Phase 1 of the project (Mullin 2008, Mullin, Brunning and Chadwick 2009) comprised a desk-based assessment of information from the Marine and Terrestrial Archaeology Databases in the NMR; the National Hydrographic Office, Taunton; the Maritime and Coastguard Agency's Receiver of Wreck; County SMR/HERs, County Record Offices; aerial photographic collections and academic research papers. The Phase 1 assessment also included the analysis of aerial photographs and LiDAR data to confirm the location of known historical and archaeological features and to identify new ones (Crowther and Dickson 2007, 2008) and a summary of the evidence for past coastal change. Field survey was considered necessary to:

- *Verify identifications made during the desk-based assessment;*
- *Locate and characterise sites and features undetected by the desk-based assessment;*
- *Determine the geomorphological/sedimentary context for features;*
- *Assess whether features are actively eroding;*
- *Selectively sample features;*
- *Test fieldwork methodologies and assess the practicalities and logistics of future fieldwork.*

Phase 2a consisted of an initial pilot fieldwork project, undertaken by a small fieldwork team during April-June 2009 (Catchpole and Chadwick 2009b). In addition to locating known sites and evaluating their current state of preservation, the fieldwork was able to identify and record several new archaeological features and findspots, including possible Neolithic peat deposits and associated faunal remains, and a wooden fish trap with possible contemporaneous early post-medieval pottery. It also provided valuable insights into the efficacy of digital and written record gathering equipment and techniques, and survey methodologies and the use of equipment and vehicles. The Phase 2a work also included an aerial photographic progression study of the early modern hulks and wrecks at Purton in Gloucestershire (Dickson 2009), and an update of the original phase 1 desk-based assessment (Mullin, Brunning and Chadwick 2009).

Phase 2 will be the principal survey phase, and fieldwork will take place from April 2010. For some periods at least it may require two teams of fieldworkers operating simultaneously in order to cover the wide RCZAS project area, and record as many features as possible during optimal tidal and weather conditions. It is anticipated that due to the density of intertidal archaeological features in areas such as Oldbury Flats, Berrow Flats, Stert Point, Stolford Bay, Dunster Beach and Minehead Bay, these areas will require repeated survey visits.

1 Introduction and project background

1.1.1 This Updated Project Design is for the principal Phase 2 fieldwork phase of the Severn Estuary Rapid Coastal Zone Assessment Survey (RCZAS), and has been prepared by the Archaeology Service, Gloucestershire County Council, on behalf of the relevant local authorities. It has been structured according to the framework set out in *Management of Research Projects in the Historic Environment* (MoRPHE: English Heritage 2006), *Commissioned Archaeology Programme Guidance for Applicants* (English Heritage 2002) and *A Brief for Rapid Coastal Zone Assessment Surveys v.10* (Murphy 2007).

1.1.2 Aims and objectives were drawn up with reference to *A Brief for Rapid Coastal Zone Assessment Surveys* (Murphy 2007) and in discussion with Buzz Busby, Vanessa Straker and Peter Murphy of English Heritage.

1.1.3 Phase 1 of the Severn Estuary RCZAS project resulted in an archaeological aerial survey as part of the National Mapping Programme (Crowther and Dickson 2008), an archaeological assessment of Environment Agency lidar data (Truscoe 2007), and a desk-based assessment of all known archaeology within the intertidal zone and its immediate hinterland (Mullin 2008). This was followed by Phase 2a pilot fieldwork undertaken during April-June 2009, and an associated aerial archaeology progression study of the beached and wrecked vessels at Purton and Sharpness in Gloucestershire (Dickson 2009). The report on the Phase 2a pilot fieldwork stage outlined the methodology adopted and the results obtained (Catchpole and Chadwick 2009b), and this has in turn informed the proposed Phase 2 surveying and recording methodologies suggested in section 10 of this report, and the list of areas and sites to be targeted for further fieldwork that are described in section 9 below. The original Phase 1 desk-based assessment (Mullin 2008) was updated in the light of additional information (Mullin, Brunning and Chadwick 2009), including the revised Shoreline Management Plans (SMP2s) for the Severn Estuary and North Devon and Somerset areas (Atkins Ltd 2009; Halcrow Group Ltd 2009), and the publication of the South West Archaeological Research Framework (Webster 2008). It is the proposed SMP2 policy options that have partly driven the suggested programming of Severn Estuary RCZAS work (see section 9 below).

1.1.4 The results of the Phase 2a fieldwork have been outlined in a previous report (Catchpole and Chadwick 2009b). The pilot fieldwork identified serious problems with the digital recording equipment used (Catchpole and Chadwick 2009b: section 9.2). Suggestions for improvements in the equipment and methodology to be used during the main Phase 2 survey programme have therefore been made below (sections 10.4-10.6).

1.1.5 This Updated Project Design comprises a brief summary of the research aims and objectives of the Severn Estuary RCZAS (see section 2 below); a brief summary of Phase 1 and Phase 2a work (section 3); an outline of project interfaces (section 4); details of proposed communications and publications (section 5); a project review (section 6); a review of Health and safety issues, risk management strategies to address these and proposed Health and safety equipment (section 7); likely constraints on fieldwork (section 8); a provisional list of sites and areas to be targeted (section 9); the proposed Phase 2 project surveying and recording methodologies (section 10), and project staffing, training, resources and programming (section 11). Project tasks and costings are outlined in section 12, and ownership and dissemination in section 13. A risk log is provided in section 14, and a bibliography in section 15.

2 Research aims and objectives

2.1 SHAPE compliance

2.1.1 SHAPE (**S**trategic Framework for **H**istoric Environment **A**ctivities and **P**rogrammes in **E**nglish Heritage – April 2008) requires projects seeking English Heritage funding to identify a Primary Driver from those listed in 'Making the Past Part of Our Future' (English Heritage Strategy 2005-10), and an Activity Type, Research Programme and Sub-Programme from those listed in SHAPE.

2.1.2 The **Primary Driver** for the proposed project is Aim 4: "*Help Local Communities to Care for Their Historic Environment*", more specifically Aim 4a: "*Help local authority members and officers develop the skills, knowledge, advice and capacity to make the most of their historic environment*"

2.1.3 The **Activity Type** is 1. Research

2.1.4 The **Research Programme** is A2: "*Spotting the gaps: Analysing poorly understood landscapes, areas and monuments*"

2.1.5 There is a specific **Sub-Programme** detailed in SHAPE for Rapid Coastal Zone Assessment Surveys as reproduced in the table below:

Sub-Programme Name	**Rapid Coastal Zone Assessments: the historic environment in Shoreline Management Plans**			
Sub-programme Number	**41112.110**			
Corporate Objective	4A: Help local authority members and officers develop the skills, knowledge, advice and capacity to make the most of their historic environment			
Activity Type and Programme	RESEARCH A2: Spotting the gaps: Analysing poorly understood landscapes, areas and monuments			
Sub-Programme Description	Specific projects developing coastal and intertidal datasets for inclusion within local authority Shoreline Management Plans.			
Reason for EH Support	Critical requirement to build up evidence-base for littoral landscapes, structures, artefact or ecofact concentrations, and palaeoenvironmental resources to feed in to marine planning.			
Research categories	***NABS***	***SETI Primary purpose***	***Frascati Definition***	***Research Areas***
	1.2	B	Strategic-Applied	Humanities
Similar Sub-Programmes	Distinct from the seabed mapping and characterisation programmes as this specifically relates to audits to building into Shoreline Management Plans			

2.1.6 The fieldwork outlined in this Project Report meets the above through the accurate location and recording of known and new sites and the transmission of updated information to local authority records and SMP teams. This phase also specifically assesses methodologies that might increase knowledge of the archaeological resource in the intertidal zone and coastal hinterland of the Severn Estuary.

2.2 Project specific Aims and Objectives

2.2.1 The overarching aim of the Severn Estuary RCZAS project was outlined in the Phase 1 Project Design (Mullin 2005a: 7):

- To provide an enhanced understanding of the resource in order to develop management and research priorities in respect of specific sites and areas of potential.

2.2.2 A more specific Aim of the Phase 2a pilot fieldwork stage was:

- To formulate and field-test a methodology for a survey-based Phase 2 of the RCZAS.

2.2.3 Following the results of the three Phase 1 assessment reports (Crowther and Dickson 2008; Mullin 2008; Truscoe 2007), and based on the English Heritage Brief for Phase 2 Field Assessment of RCZAS projects (Murphy 2007), the following Objectives were identified for the Phase 2a pilot fieldwork undertaken in 2009 (Catchpole and Chadwick 2009b), and are being retained for the main Phase 2 fieldwork proposed for 2010:

- To verify, characterise and assess archaeological sites or features previously identified as a result of the desk-based assessment reports, lidar survey results and NMP aerial photographic mapping;

- Locate, characterise and assess additional archaeological sites and features previously undetected by the desk-based assessments;

- Determine the geomorphological or sedimentary context for features where possible;

- Assess the degree of preservation of archaeological features, and whether or not they are actively eroding;

- To test fieldwork methodologies and data recording strategies, and assess the practicalities and logistics of future fieldwork.

3 Summary of Phases 1 and 2a

3.1 Introduction

3.1.1 A desk-based Phase 1 of the RCZAS was undertaken during 2006 and 2007 (Mullin 2005a, 2008). Three reports were produced during that phase:

- A Phase 1 report that provided a record of all known archaeology within the intertidal zone and its immediate hinterland, an assessment of current erosion patterns and threats this poses to the archaeological resource, an overview of coastal change from the Palaeolithic to the present day, and a list of sites which require further fieldwork investigation as part of Phase 2 (Mullin 2008). That document has now been updated following the completion of the Phase 2a pilot fieldwork phase (Mullin, Brunning and Chadwick 2009).

- A National Mapping Programme (NMP) report (Crowther and Dickson 2008) covered the entire RCZAS survey area of 575km² (Figs 1-2). A total of 928 new monument records were created in the National Monument Record (NMR) AMIE database and 373 existing records were revised. During the early phases of the preparation of the Stage 2a Updated Project Design, only an interim report on this work was available (Crowther and Dickson 2007), covering areas of the 'left' and 'right' banks near Gloucester, and from Brean Down southwards. These areas formed the focus of the Phase 2a pilot fieldwork.

- An assessment of Environment Agency lidar data was undertaken for two selected sections within the RCZAS survey area (Truscoe 2007), and the technique was recognised as being a useful complementary methodology to aerial photographic mapping and field survey.

3.2 Sites identified as requiring further study in Phase 2a

3.2.1 The Phase 1 reports (Crowther and Dickson 2008; Mullin 2008; Truscoe 2007) listed types of features and some specific sites and areas where fieldwork could be potentially productive, and these were listed in section 3.2 of the Updated Project Design (Catchpole and Chadwick 2009a).

3.2.2 In addition, English Heritage recognised that two areas within the overall Severn Estuary RCZAS project area required further work:

- A short, stand-alone archaeological report should be produced on the wrecked and beached vessels at Purton using aerial photographs and NMP mapping, early maps, navigational charts and other historical sources to examine how this group of vessels developed over time and provide baseline information for any future detailed assessment of these wrecks by English Heritage. This progression study was undertaken in parallel to the Phase 2a fieldwork (Dickson 2009).

- In earlier drafts of the UPD it was proposed that a rapid assessment of aerial photographs could facilitate understanding of the development of Avonmouth during the 20th century. English Heritage decided that this was also beyond the scope of a RCZAS, and would be better accomplished through Environmental Impact Assessments in advance of proposed developments in the Avonmouth area.

3.2.3 The following sites were thus identified in the Phase 2a Project Design (Catchpole and Chadwick 2009a: 29, sections 9.1-9.2) as requiring further investigation where safe to do so and where the appropriate Natural England consents had been obtained:

Gloucestershire

- Areas of salt grazing at Elmore, particularly the 'Great Wall';
- Areas of rocky foreshore at Guscar Rocks;
- Lydney Level and/or Lydney Sands;
- The beached boats/wrecks at Purton;
- The intertidal zone at Oldbury;
- Two specific sites – a possible fish house at Hawkins Pill, south-west of Broadoak, and the barrow or windmill mound identified by lidar survey east of Bays Court, Westbury-on-Severn.

Somerset

- Fishing structures in Blue Anchor/Minehead Bays, and/or Stolford Bays;
- The submerged forest in Porlock Bay and/or Stolford Bay;
- An upland area such as Bossington Hill or North Hill;
- Areas of rocky foreshore at Watchet;
- Portions of St Audrie's Bay;
- Selected fish weirs in parts of Stert Flats or Berrow Flats;
- Areas along the River Parrett.

3.3 The results of the Phase 2a fieldwork

3.3.1 The fieldwork located and/or verified several previously recorded archaeological sites and features, but also identified some new features and deposits. Many of the V-shaped fishing structures previously identified by the NMP aerial photographic studies at Dunster Beach (Crowther and Dickson 2007, 2008) and by pre-Phase 2a survey reconnaissance at Watchet (Catchpole and Chadwick 2009a: 29 section 10.6) proved to be of recent origin, consisting of modern metal scaffolding poles or pipes used to support net lines (Catchpole and Chadwick 2009b: 31 section 10.10, 36 section 10.14). Conversely, however, at Berrow Flats and Dunster Beach additional fishing-related structures were identified and recorded that had not previously been identified, largely due to the small size of the structural elements (timber structures formed by small, eroded stakes), and/or their relatively insubstantial nature (features such as lines of clearance for nets, net weight stones and rings of stone post supports). Overall, it is likely that there are far more previously unrecorded timber and stone features than there are fishing structures that turn out to be modern in date.

3.3.2 As previously recorded (McDonnell 1995), the submerged forest and peat deposits at Porlock Bay were found to have been largely buried by tidal sand deposits. At Berrow Flats and Stert Flats, however, there was evidence that the individual timber elements of wooden fishing structures were being significantly eroded by tidal scouring (Catchpole and

Chadwick 2009b: 31 section 10.10.8, 35 section 10.13.5-6). This indicates that processes and rates of erosion and deposition are highly localised, and may not be easily predictable.

4 Project interfaces

4.1 Other English Heritage NMP and field survey projects

4.1.1 The Severn RCZAS survey area is partly contiguous with the existing Forest of Dean NMP survey (Small and Stoertz 2006), the Leadon Valley ALSF NMP survey (Priest, Crowther and Dickson 2008), the Frampton ALSF NMP survey (Dickson 2006), the Exmoor NMP and field surveys (Hegarty 2006; Riley and Wilson-North 2001), the Quantock Hills NMP and field survey (Riley 2006) and the Mendip Hills AONB NMP and ongoing field survey (Jamieson 2006; Priest and Dickson 2009).

4.1.2 In addition, the Severn RCZAS survey area is close to the Malvern Hills Area of Outstanding Natural Beauty (AONB) NMP survey (Bowden 2005), the Upper Thames Valley NMP survey (Payne 2004), and ongoing projects such as the Beckford NMP survey and the Cotswold Hills NMP survey (Catchpole and Grubb 2007).

4.1.3 Other notable aerial mapping and/or field survey projects within or adjacent to the Severn RCZAS survey area include studies of the submerged forest in Porlock Bay (Canti et al. 1995; Riley 2001), features on North Hill west of Minehead (Riley and Wilson-North 1997) and the field survey of the Exmoor National Park (Riley and Wilson-North 2001), studies of fish traps in the middle Severn (Allen 2005), a survey of the intertidal zone between Porlock Bay and Lilstock (McDonnell 1980), and survey of the intertidal area of Stert Flats and Gore Sands (McDonnell 1995).

4.1.4 An ALSF-funded desk-based and field-based assessment project examined the River Severn between Worcester and Tewkesbury (Hurst, Miller and Noke 2008), and along with the Beckford NMP provides useful archaeological coverage of part of the River Severn above the estuary.

4.1.5 An ALSF funded project has been commissioned for a partnership project to evaluate and enhance archaeological and palaeo-environmental knowledge of the gravel deposits within the lower Severn Valley (Brown et al. 2008). This involves Worcestershire and Gloucestershire County Councils and staff from the Universities of Birmingham and Southampton, and hopes to build upon research priorities highlighted in aggregate resource assessments completed for both counties (Jackson and Dalwood 2007; Mullin 2005b) and an agreed framework for ALSF-funded projects in the Severn Valley and Severn Estuary (English Heritage 2004). These projects would all dovetail with elements of the Severn RCZAS project.

4.1.6 The Severn RCZAS will thus compliment many existing and forthcoming English Heritage-supported survey and mapping projects.

4.2 Regional research agendas and themes

4.2.1 Regional research frameworks also inform the Severn Estuary RCZAS. The South West Archaeological Research Framework (SWARF – Webster 2008) covers the entire survey area. This identified several research themes and chronological periods where archaeological knowledge is limited or requires further investigation. Some of the relevant additional information it contained was added to a final, updated draft of the Phase 1 report (Mullin, Brunning and Chadwick 2009).

5 Communications and project products

5.1 Consultation and discussion

5.1.1 Consultation and discussion sessions will continue to take place with those experts involved in earlier stages of the RCZAS including Dr Vanessa Straker, Dr Richard Brunning, Richard McDonnell, Nigel Nayling and Hazel Riley. Meetings will continue to be arranged for the steering group created for Phase 1 of the RCZAS, comprising local authority curators and English Heritage staff, where results can be presented and the steering group can be consulted.

5.1.2 Other organisations with an interest in the Severn Estuary will continue to be consulted and informed about the project, and the relevant permissions obtained where necessary. These include Environment Agency staff and consultants producing Shoreline Management Plans (SMPs), Natural England, the National Trust, the Ministry of Defence, the Coastguard and the Harbour Masters of Lydney, Watchet and Bridgwater. Other researchers with an interest in the Severn Estuary will continue to be informed, including Professor John Allen, Dr Michael Fulford and Professor Martin Bell of the University of Reading, Steve Rippon of the University of Exeter and Dr Paula Gardiner of the University of Bristol. Dr Sian Rees of Cadw and Deanna Groom of the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) will also be kept informed of progress.

5.1.3 The principle formal method of sharing information with other researchers continues to be via the Severn Estuary and Levels Research Committee (SELRC), through papers delivered to its annual meeting – a summary PowerPoint presentation on the results of the Phase 2a pilot fieldwork was delivered at a SELRC meeting in Chepstow on the 7th November 2009. A paper on the Severn Estuary RCZAS project has been requested for *Fish and Ships*, the 20th anniversary conference of SELRC that will be hosted by the National Museum of Wales in September 2010.

5.2 Dissemination and publication

5.2.1 Copies of this Phase 2 UPD report and of the Phase 2a reports (Catchpole and Chadwick 2009a, 2009b; Dickson 2009) will be circulated to English Heritage, the HER (Historic Environment Record) sections of Gloucestershire, South Gloucestershire, Bristol, Somerset and North Somerset Councils, Exmoor National Park and other relevant stakeholders. Documents will also be submitted to the Archaeological Data Service or another appropriate repository for digital archiving as directed by English Heritage and posted on the Gloucestershire County Council website.

5.2.2 The original Phase 1 desk-based report (Mullin 2008) was amended and updated following the completion of the Phase 2a fieldwork (Mullin, Brunning and Chadwick 2009).

5.2.3 An interim paper on the Phase 1 and Phase 2a RCZAS work will be submitted to the SELRC journal *Archaeology in the Severn Estuary* early in 2010. This paper will comprise an introduction to the project methodology, together with a summary of the results of the NMP work undertaken during Phase 1 and Phase 2a. It will form the main outreach product of the pilot fieldwork, and will comprise an introduction to the project methodology, together with a summary of the results of the NMP work undertaken during Phase 1.

5.2.4 Tabulated MoRPHE-style product descriptions for the main phase 2 stage of the RCZAS can be found at Appendix E. The principal products of the work proposed for 2010 will be a full client report and accompanying ESRI ArcGIS-based survey and record data.

This will be circulated to English Heritage, the NMR and appropriate HERs (Historic Environment Records); and other relevant stakeholders. The report will contain a detailed account of the methods used and constraints experienced during the survey work, to facilitate the development of methodologies amongst RCZAS projects. It will summarise the principal results of the survey, sub-divided in terms of SMP coastal Policy Units, and will include a preliminary assessment of the regional (and where appropriate, national) significance of the sites recorded, and their vulnerability to erosion/sea level changes. It will indicate any areas thought to require further more detailed survey, assessment, recording and monitoring; and will identify sites, structures or buildings potentially meriting legislative protection. It will include an assessment of the archaeological potential of any samples taken and artefacts collected, and the value of their further analysis. It will attempt to broadly classify the archaeological potential of the coast, and will consider the implications of the survey in terms of the relevant Shoreline Management Plans and other strategy documents. The final version will be lodged within the appropriate HERs and submitted to the Archaeological Data Service (ADS). The nature of any SMR/HER enhancements utilising the data recovered during the RCZAS project is to be agreed with English Heritage.

5.2.5 One of the key products of Phase 2 will be a user-friendly executive summary of the results produced for non-archaeologists involved with coastal management, in order to inform future Shoreline and Estuary Management Plans or Strategy documents. This will be produced in a format suitable for electronic dissemination in addition to hard copies.

5.2.6 It is intended that the results of the fieldwork will also be published as a series of shorter interpretative reports for relevant academic archaeological journals, including *Archaeology in the Severn Estuary* and *Landscapes*. It is also possible that the results of the RCZAS may warrant publication in a stand-alone English Heritage style monograph with an associated CD-ROM for photographs and GIS maps. Shorter, more synthetic accounts could be presented in *British Archaeology, The Archaeologist* or *Current Archaeology*. In addition, more popular accounts of the archaeology and changing environment of the Severn Estuary could also be produced as booklets in association with the Severn Estuary Partnership and other relevant stakeholders, and there could also be a wide range of outreach and educational projects.

5.2.7 This wider academic and popular publication and dissemination will be discussed and an appropriate strategy will be agreed with English Heritage on completion of the full client report. Such publications will have to be the subject of a future Updated Project Design, and will not be discussed further here.

5.2.8 Consideration will also be given to an appropriate programme of lectures, exhibitions and publications during and after the main Stage 2 fieldwork phase of the Severn Estuary RCZAS.

6 Project review

6.1 This is the second draft of the Severn Estuary RCZAS Phase 2 UPD. The first draft was circulated to relevant English Heritage and local authority archaeologists for comment and discussion, and this second version produced on the basis of comments received, as required at MoRPHE Review Point R2.

6.2 Progress meetings will be held with the Project Assurance Officer and steering group during the fieldwork as and when determined by English Heritage.

7 Health and safety

7.1 Risk management strategies

7.1.1 A series of working practices will be adopted to minimise the risks from the potential Health and safety hazards identified in the Updated Project Design (Catchpole and Chadwick 2009a), and drawing on experience gained during the Stage 2a pilot fieldwork phase. Dr Richard Brunning, Richard McDonnell; Nigel Nayling and Dr Vanessa Straker will again also be consulted in this regard.

7.1.2 The relevant Coastguard station (Swansea) will again be notified prior to staff entering the intertidal zone, and following their safe return to shore. The relevant Harbour Masters' offices will again be contacted prior to the commencement of any survey work in the intertidal zone of their areas, and they will also be consulted about local tidal stream conditions.

7.1.3 Tide tables will be consulted during the detailed scheduling of fieldwork in order to timetable the optimum periods for access to foreshores and intertidal zones, and survey work usually designed to follow the tides out. Both Arrowsmith printed tide tables and the BBC online tide tables (www.bbc.co.uk/weather/coast/tides) are to be used for this purpose. Local wind and weather conditions will be monitored to ensure the safety of staff.

7.1.4 The time taken to walk to sites is often difficult to predict in advance due to the variability of ground conditions, and the amount of surveying and recording kit being carried. When walking transects parallel to the coast, it is important for fieldworkers to remember that the way back to shore will not necessarily take the same time as the route walked out, and extra time will be allowed for this as a sensible safety precaution. This was the case at Oldbury Flats, for example. Project staff members will also be made aware of the potential threat of headlands cutting off retreat or limiting communications. Local knowledge will be sought wherever possible – for example, there is only one safe route out onto Stert Flats, known to Dr Richard Brunning and Richard McDonnell who led GCCAS staff out onto this area during the Phase 2a pilot fieldwork. The walking conditions at Berrow Flats and Stert Flats vary greatly from firm sand to extremely soft sucking mud, and here the use of a hovercraft or an All Terrain Vehicle (ATV) would prove invaluable.

7.1.5 Access points and rights of way will be clearly identified at a risk assessment stage during preliminary site reconnaissance visits. Risk assessment forms will also note possible hazards, the location of parking, toilet and other welfare facilities, and will identify the nearest Accident and Emergency hospital departments. The type of terrain to be covered will be included in the assessment of each survey location carried out in advance of fieldwork. A 'tick-list' type form drawn up for the Phase 2a pilot fieldwork will be used to ensure that all necessary safety checks are made immediately prior to survey visits, including tide and weather conditions, safe working window times, Coastguard and GCCAS office contact telephone numbers, and relevant landowner permissions and contact details.

7.1.6 Staff will remain in visual and audible contact with at least one other member of staff at all times, and for intertidal survey a team of three will be utilised wherever possible, although a team of two will suffice for riverbank and salt grazing areas. A team of three is considered the *minimum* number of people safe to work in the intertidal zone, for if one member of the team gets into difficulties or injures themselves, there are two other people present to get help and/or to physically evacuate the team member from the intertidal zone. In circumstances where two teams of two are used to increase the speed of recording the two teams will remain in full view of each other. In certain emergency situations it may not be possible to wait for Coastguard assistance, in advance of an incoming tide for example (R. Brunning pers. comm.).

7.2 Health and safety equipment

7.2.1 The following equipment was deemed essential for the Phase 2a pilot field survey, and will again be used during the main Phase 2 survey stage:

- A daily safety plan including tide times and emergency plan with arrangements and contact details;
- A charged satellite telephone and a charged mobile telephone;
- An accurate waterproof watch;
- Paper maps and waterproof map cases in case of IT failure;
- First Aid kit;
- Washing solution/eye wash;
- Antiseptic wipes;
- Clean water and towels, and;
- Access to suitable welfare facilities.

7.2.2 In addition, every team member will have access to the following clothing and equipment:

- Wet weather gear, in a lightweight breathable fabrics;
- Breathable thermal base layers suitable for winter or summer work;
- Safety Wellington boots;
- Self-inflating lifejackets to British Standard EN 394:1994 with a buoyancy of not less than 100 Newtons, and with built-in harnesses suitable for helicopter or boat recovery;
- High-visibility clothing if necessary;
- Sunscreen and hats where necessary;
- Compasses;
- Signal flares;
- Throwing strops (for pulling out stuck team members);
- Whistles.

7.2.4 Most of the Health and safety equipment purchased for the Phase 2a pilot fieldwork is highly recommended for the main Phase 2 survey, along with the suppliers (see Catchpole and Chadwick 2009b: section 6.4). Additional items will have to be purchased for extra survey staff.

7.3 Satellite telephone

7.3.1 As outlined in section 6.3 of the Phase 2a Updated Project Design (Catchpole and Chadwick 2009a), it was found that Ofcom refused to issue licences for handheld Marine VHF radios to be used by land-based operators.

7.3.2 Coastguard staff recommended the use of a handheld satellite telephone, and for the purposes of the Phase 2a pilot project, one was rented from a suitable vendor. It was relatively small and lightweight, although in the event it was found that mobile telephones seemed to work in most areas of the RCZAS project other than Porlock Weir. Nevertheless, a satellite telephone will be a key item of safety equipment for the main Phase 2 survey. Costings for the renting of such equipment are presented in Appendix B.

7.4 Safe working practices

7.4.1 At Berrow Flats, use of the Burnham-on-Sea hovercraft allowed team members to reach with confidence archaeological features far out from the shore such as fish traps and peat deposits, and to progress across mud that was in places very deep and soft. It also saved a tremendous amount of time and effort by greatly reducing the need to walk for long distances (Catchpole and Chadwick 2009b: section 6.4.4). The reassurance provided by the presence of the BARB hovercraft and its trained rescue crew cannot be underestimated. The use of vehicles would thus be particularly advantageous in Phase 2 fieldwork, especially if there was a need to take wood and peat samples for dendrochronological and radiocarbon dating and palaeo-environmental analyses. At Berrow Flats and Stert Flats (environmental constraints permitting), use could be made of ATVs (All Terrain Vehicles; see section 10.7.4 below) progressing outwards from the shoreline. Clearly, the hire of ATVs would have significant cost implications, but would be advantageous and cost-effective over extended periods.

7.4.3 In other sections of the RCZAS area such as Hills Flats, along the riverbanks of the upper Severn and River Parrett, and also for accessing wrecks on Oldbury Sands and along the Parrett, the use of a small boat has been considered. These riverbanks are often steep with deep, sucking mud deposits, and consequently would be extremely hazardous for survey staff to move across. Use of a boat would compliment the methods and results of a survey undertaken along the upper Severn by the Worcestershire Archaeology Service (e.g. Hurst, Miller and Noke 2008), and might detect features at the base of the bank by the waterline not otherwise visible from higher up on dry land. In many areas to be visited, however, the risks of boats becoming grounded at low tide would be a major Health and safety consideration and expense may preclude their use.

7.4.4 As noted in the Phase 2a pilot Updated Project Design (Catchpole and Chadwick 2009a: 21, section 7.2.4), any contractor used to provide boats and operator will be required to abide by the MCA *Use of Small Workboats Code of Practice*, and the vessels will probably need to be MCA coded. Additional staff training would also be required, unless archaeological survey team members already experienced in small boat operations could be recruited with such operations in mind. It is also likely that the cost of boat hire would be beyond the scope of the Phase 2 project. Use of a laser rangefinder coupled with a handheld GPS data logger is therefore suggested as a more economical and safer alternative.

7.4.5 At Hills Flats, an extensive area of the intertidal zone is only accessible from the shoreline via a steeply sloping concrete sea wall, with no convenient steps or other access points. Here, careful consideration will have to be given as to how this area can be accessed safely by a survey team. One possibility is to use an ATV, hovercraft or boat to gain access to the intertidal zone, negating the need to climb down the sea wall (but see discussions above). Alternatively, fixed lines may have to be put in place so that staff members can rappel down the sea wall onto the intertidal zone, but the lines might have to be monitored to make sure that they are not disturbed or vandalised whilst staff are out surveying, and once again, survey staff will have to have suitable training in such work. Another possibility is to use a laser rangefinder coupled to a handheld GPS and data logger. This may allow accurate points to be taken by staff without the need to get

physically next to the features in question. Some smaller archaeological finds or features, however, may not be visible from the top of the sea wall. Despite this, use of a laser rangefinder is the preferred option suggested below due to the rapidity and safety of its use.

7.4.6 Although it was not visited as part of the Phase 2a pilot fieldwork, the island of Steep Holm may have to be surveyed as part of the main RCZAS Phase 2 project, although as much of its archaeology is not under direct threat it will probably remain a low priority. Any work there will obviously involve boat trips to and from the island, and may even require a survey team to spend the night on the island if that is permissible. A detailed risk assessment would be prepared if Steep Holm or any other area requiring the use of boats were to be visited.

7.5 The use of volunteers and 'amateur' groups

7.5.1 It is not recommended that volunteers and amateur archaeological groups assist with the Severn Estuary RCZAS Phase 2 survey work on clifftop or in intertidal areas. Although some individuals may be highly experienced in intertidal work, there are too many Health and safety and insurance and liability issues involved.

7.5.2 It is possible, however, that volunteers and amateur groups could be mobilised to assist with additional, more detailed recording of land-based features (see section 10.9 below).

8 Likely constraints on Phase 2 fieldwork

8.1 Environmental designations

8.1.1 Numerous statutory designations apply within the Severn Estuary, giving it one of the highest levels of protection in the United Kingdom, and these cover most of the Severn RCZAS survey area. The area includes Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Areas of Outstanding Natural Beauty (AONB) and a National Park. These different designated areas were highlighted in the Updated Project Design for pilot fieldwork (Catchpole and Chadwick 2009a), since when the Severn SAC has been confirmed. It was recognised as essential that working methods were employed that minimised any disturbance to plant and animal communities, particularly along the intertidal zone and salt and grazing marshes behind.

8.1.2 Charlotte Pagendam, Natural England Severn Estuary Officer and her colleague Bob Corns were contacted for information and advice regarding fieldwork, and they agreed to issue a blanket permission for the 2009 Phase 2a pilot fieldwork provided that none took place during December and January in the area between Stert Island and Fenning Island, and that details of proposed visits to particular areas were forwarded to them in advance. The same restrictions will apply in 2010, and advice is currently being sought from Natural England regarding access and timings.

8.2 Landowner permissions

8.2.1 The Crown Estate owns approximately 55% of the intertidal foreshore nationally. The Managing Agent for the marine estate over the entire Severn RCZAS survey area is Knight Frank, based in Bristol. Christopher Smith at Knight Frank was contacted and provided permission to access Crown Estate land. The National Trust's Somerset and Devon Archaeology Officer Shirley Blaylock will be consulted regarding future survey work.

8.2.2 Defence Estates own land at Beachley, south of Portishead and at St Thomas' Head, but these areas were not visited during the Phase 2a pilot fieldwork (Fig. 3). They may have to be surveyed during the Phase 2 fieldwork, although access at St Thomas' Head in particular may prove difficult as it is still a live firing range.

8.2.3 Prior to the Phase 2a pilot fieldwork, enquiries were made to the Commercial Services department of the Land Registry in order to try and obtain information concerning the names and address of private landowners within the Severn Estuary RCZAS study area. ESRI ArcMap GIS Shape files of the absolute minimum survey area (comprising the intertidal zone up to the immediate foreshore) were sent to their Merseyside offices, but they quoted a £400 information extraction fee, plus a charge of £2 per record for each separate land title under their Polygons service, rising to £3 per record for their Polygons Plus service – only the latter actually provides the names and addresses of the landowners concerned. These charges were far too great for the Phase 2a pilot fieldwork, and in the event only areas accessible from public rights of way were visited. For the purposes of the main Phase 2 fieldwork, however, individual landowner permissions will be necessary. These costs can only be detailed, however, once the prioritised list of sites and areas to be visited has been agreed. In most instances it is likely to be possible to find landowners through local enquiries and contacts.

8.3 Other constraints

8.3.1 Past or present military bombing or firing ranges are present at Aust, Brean Down, Stert Flats, Lilstock (disused) and between St Thomas' Head and Kingston Seymour in Woodspring Bay (in use). Defence Estates (Michael Russell at Tidworth) provided mapping of their current land holdings in the survey area and were consulted regarding access and hazards represented by former military use. These areas were not visited as part of the pilot Phase 2a fieldwork, but access to disused and live ranges is likely to be an issue for the main Phase 2 fieldwork. Permissions can be sought once the prioritised list of sites and areas to be visited has been agreed.

8.3.2 As outlined in the report on the Stage 2a fieldwork (Catchpole and Chadwick 2009b: 14, section 7.4.4), the revisions of the Phase 1 report took longer than expected, largely because of the many changes to the nomenclature and boundaries of Policy Unit areas introduced as a result of the updated Shoreline Management Plan consultancy documents (SMP2s) (Atkins Ltd 2009; Halcrow Group Ltd 2009). These SMP Policy Units may even be revised for a second time following stakeholder feedback, once the consultancy period ends in January 2010. Any further revisions would clearly require additional time from GCCAS staff to include the relevant changes to the archaeological documentation, so that the historical assets can be compared directly with future preferred policy options. As the nature of any such changes are not currently apparent work required as a result of significant changes is not included in the tasks suggested at this stage.

8.3.3 During the course of the Stage 2a pilot fieldwork, some GGCAS staff time was taken up in dealing with initial enquiries from other organisations regarding strategic projects along the English shoreline, as the dissemination of information regarding the Severn Estuary RCZAS project through the Severn Estuary Forum and other outlets has made GGCAS something of a 'first stop' for general information. There were also many enquiries regarding the Purton hulks. The completion of the Purton progression report (Dickson 2009) and subsequent independent, more detailed survey and excavation at Purton may have slightly reduced the likelihood of further enquiries regarding the vessels beached there. Nevertheless, it is possible that new strategic projects will generate enquiries from organisations undertaking Environmental Impact Assessments and other studies. Some time will therefore have to be budgeted to allow for this.

9 Areas and sites to be targeted in Phase 2

9.1 Introduction

9.1.1 The areas and sites to be targeted in the main Phase 2 survey programme of the Severn Estuary RCZAS will be determined by a range of factors including staff safety, the extent of previous archaeological work, the importance of the historical and archaeological assets in specific locations, the limits of access and coverage during the Phase 2a pilot (Fig. 3), the future threat from erosion and flooding, and the recommendations and preferred policy options of the proposed Shoreline Management Plans. In addition, there are several major infrastructure projects currently proposed within the area covered by the Severn Estuary RCZAS study such as the Bristol Deep Sea Container Terminal at Avonmouth, and proposed new nuclear power stations at Oldbury and Hinkley that will require individual, detailed Environment Impact Assessments (EIAs) to assess the potential impact of these developments upon maritime, intertidal and terrestrial historical and archaeological assets. To avoid duplication of effort, these specific areas will be excluded from RCZAS survey work, although it is still proposed to undertake fieldwork outside of the immediate development footprints.

9.1.2 Only some of the areas that had been covered by the Severn Estuary NMP (Crowther and Dickson 2007, 2008) were targeted for survey visits during the Severn Estuary RCZAS Phase 2a pilot fieldwork (Catchpole and Chadwick 2009b) (Fig. 3). The riverbank, coastline and intertidal areas from Arlingham southwards down to Avonmouth, Portishead, Clevedon and Weston-super-Mare with the exception of an area of Oldbury Flats were not examined at all. Many of these areas will therefore require more work during the main Phase 2 fieldwork. Although previous survey work has been undertaken at Gravel Banks, Severn Beach and Oldbury-on-Severn (Brown 2007a, 2007b; Riley 1998a, 1998b, 1999), and around English Stones/Second Severn Crossing (Allen 2005), where medieval, post-medieval and early modern fish weirs and putcher ranks have been recorded, further fieldwork here would compliment proposed work on fish traps in Blue Anchor and Minehead Bays. At Oldbury Flats, prehistoric peat deposits, Mesolithic and Neolithic artefacts and nationally important human and animal tracks have also been found (Brown 2007a, 2007b; Straker in Riley 1999), as well as Romano-British artefact and structural finds. The archaeological potential of many of these areas is therefore quite high.

9.1.3 There were also some areas that had been planned to be visited during the Phase 2a pilot fieldwork which were not accessible through tracks, paths and other public rights of way. These included Horse Pill, Woolaston Pill and the possible windmill mound or round barrow at Bollow near Westbury-on-Severn. The Defence Estates land holdings at Beachley, south of Portishead and St Thomas' Head were also not visited as part of the Phase 2a pilot fieldwork. For the main Phase 2 fieldwork therefore, landowners' permission will have to be sought in order to gain access to these areas.

9.1.4 It is likely that intertidal or foreshore areas in Beachley, Sedbury, Purton Manor, Gatcombe, Awre, Longney, Arlingham, Sharpness, Oldbury Flats, Old Passage, Gravel Banks, Portishead, Woodspring Bay, St Thomas' Head, Middle Hope, Ker Moor and Porlock Marsh will also require access permission from private landowners and/or firms. These areas will need to be visited early on during the main Phase 2 fieldwork, in order to assess what level of archaeological surveying and recording they may require.

9.2 The role of Shoreline Management Plans (SMPs)

9.2.1 Revised second drafts of Shoreline Management Plans (SMPs) have been produced for the RCZAS area – the North Devon and Somerset SMP2, and the Severn Estuary SMP2, the boundary between the two being at Anchor Head, Weston-super-Mare. Draft consultation versions of these two revised SMPs are now available (Atkins Ltd 2009; Halcrow Group Ltd 2009). These SMPs divide the coastline into a series of Policy Units (PUs), defined according to the character of the coast, and/or the flood or erosion risk (Figs 5-7). It is important to note, however, that these revised Policy Units may themselves change again in 2010 when the consultation process has been completed. Although the Policy Units might change, and there might be some localised changes in preferred management policy, overall the principal long-term trends are liable to remain the same.

9.2.2 Once the final revised SMPs are issued in 2010, heritage assets at risk from coastal change will need to be reassessed. The plans will inform regional and local plans, as well as decisions taken by the Environment Agency on which defence schemes to fund in order to reduce the impact of coastal processes on people and the developed, historical and natural environment. As outlined in the revised Phase 1 desk-based assessment (Mullin, Brunning and Chadwick 2009: section 14.1), the protection of archaeology in the coastal zone is complicated by its physical location between terrestrial and maritime regulatory areas, and the fact that many policy and guidance documents are under revision or consultation, due to proposed legislative changes. These problems were outlined in a recent study covering current and future practices of planning at the coast in England and Wales – *Planning at the Coast* (Entec UK Ltd 2009). This recognised that both land and marine development plans should take into account Shoreline Management Plans (SMPs). A proposed future Marine Management Organisation will have responsibility for preparing Marine Plans in English inshore and offshore marine areas. Based on a draft document (Defra 2009), there is currently a consultation process underway with relevant stakeholders to divide regions into plan areas and identify the appropriate boundaries between them.

9.2.3 The SMPs provide detailed information on the extent of coastal erosion, as well as consideration of the range of feasible coastal management scenarios for each coastal area and their impact in shaping the coastline for short term (0-20 years), medium term (20-50 years) and long term (50-100 years) periods.

9.2.4 The shoreline management policies that will be considered in future consist of:

- Hold the line: Maintain or upgrade the level of protection provided by defences;
- Advance the line: Build new defences seaward of the existing defence line;
- Managed realignment: Allowing retreat of the shoreline, with management to control or limit movement;
- No active intervention: A decision not to invest in providing or maintaining defences.

9.2.5 The rate of erosion and flooding along the Severn Estuary coastline is anticipated to accelerate in the future, as a result of wider sea level rises and climate change (Cassar 2005; Murphy et al. 2009). It is the preferred policies of No active intervention (NAI) or Managed realignment (MR) that have the greatest potential significance for archaeological and heritage assets, as it is in these areas where erosion or flooding will be allowed to continue with little or no future human intervention. In such Policy Units, large areas of low-lying reclaimed salt grazing and other agricultural land may revert to intertidal or salt marsh conditions, with negative impacts upon archaeological remains. Existing salt marsh areas that may preserve buried archaeological and palaeo-environmental deposits may themselves erode away or become permanently inundated by the sea, whilst coastal cliffs

may also erode back at a greater rate in the future, potentially affecting historical assets on or immediately behind the cliff tops. SMP Policy Unit areas with preferred policies of No active intervention or Managed realignment should therefore be considered as priority areas for RCZAS Phase 2 survey work.

9.2.6 Where preferred policies of Managed realignment, Hold the line (HTL) or Advance the line (ATL) are mooted, historical assets may nevertheless still be at risk through the repair or construction of upgraded flood defences, which have the potential to cause considerable below-ground disturbance. Increased water pumping and changes of hydrology in some areas might also have deleterious impacts on peat and alluvium deposits, creating desiccation and shrinkage, causing anaerobic conditions to become aerobic, and leading to a loss of organic material and a concomitant reduction in palaeo-environmental information. 'Coastal squeeze' may be an important phenomenon in some areas, whereby erosion and flooding could increase in front of new or improved hard flood defences such as concrete sea walls and earthen banks. This would lead to a net reduction or narrowing of the intertidal zone, and possibly greater tidal scouring.

9.2.7 The proposed timescale of these preferred policy options is also important. Areas where policies of No active intervention (NAI) or Managed realignment (MR) will be followed in the short-term will obviously be at greater risk than those areas where such policies are being considered for the medium and longer-term. Those archaeological and historical assets under greatest threat in the next 20 years must normally be considered to have the highest priority.

9.2.8 Rather worryingly, the existing consultative documents (Atkins Ltd 2009; Halcrow Group Ltd 2009) only note the potential impact of SMPs on Scheduled Ancient Monuments, Listed Buildings, Historic Parks and Gardens and Registered Battlefields. No other SMR and HER archaeological and historical data were used. Archaeologically 'rich' areas such as Oldbury Flats, Bridgwater, St Audrie's and Minehead Bays, the coast between Minehead and Bossington, and Porlock Bay all appear artificially barren, and the prospective impact of future policies on historical assets is underestimated. Archaeological and historical assets are not currently considered to be a Key Policy Driver of future management decisions. In one document (Atkins Ltd 2009), the only specific section dealing with historical assets is a generalised summary of major chronological changes in the archaeology of the Severn Estuary, but this is actually a somewhat derivative version of a short document produced for the Severn Estuary Partnership (Chadwick 2009).

9.2.98 Details of the two relevant Shoreline Management Plans for the Severn Estuary RCZAS area have been provided in the revised Phase 1 desk-based assessment (Mullin, Brunning and Chadwick 2009: section 14.2). This includes a detailed breakdown of each Policy Unit in the North Devon and Somerset and Severn Estuary SMPs, and the possible impacts of preferred policies upon *all* known archaeological and historical features and deposits in these areas, not just SAMs, Listed Buildings, Historic Parks and Gardens and Registered Battlefields. It is this rather more considered evaluation of the threat to heritage assets that forms the baseline data for this project design.

9.3 Intertidal areas

9.3.1 It is still anticipated that the majority of the Phase 2 RCZAS survey programme will focus on the archaeology present in intertidal areas. It is these areas where historic assets are under the greatest threat from increases in sea level and erosion (Murphy 2007: 10), but which contain some of the oldest archaeological deposits and structures, and which have the greatest palaeo-environmental potential. It is also these areas that require the greatest updating and enhancement of HER/SMR records.

9.3.2 In terms of fishing structures, the Phase 2a pilot survey results (Catchpole and Chadwick 2009b) reinforced the notion that the areas of greatest archaeological potential are Minehead Bay, Blue Anchor Bay and Dunster Beach, St Audrie's Bay, and Bridgwater Bay, including Stolford Beach, Stert Flats and Berrow Flats. In such areas, however, many of the most visible existing features probably date to the early modern and modern periods. At least some of the V-shaped and U-shaped structures mapped by the NMP (Crowther and Dickson 2008) will thus prove to be recent in date. Some of the structures furthest out in the intertidal zone may be the earliest in date, and might have the greatest archaeological significance (Brunning 2008 pers. comm.), perhaps dating to the Anglo-Saxon and medieval periods. These features will only be accessible at the very lowest tides. This has obvious Health and safety and logistical implications. The main priority of work on the fishing structures must be in identifying, characterising and accurately dating the main types, especially those liable to be earliest in date.

9.3.3 Some of the earliest fishing structures will probably only be visible as small, eroded wooden stakes projecting only a few centimetres above the intertidal surface, and any stone equivalents might be dispersed and diffuse banks; and so they will be difficult to identify. Repeated visits may have to be made to some areas, especially following winter and spring storms, to try and assess if drifting silts have buried some structures, or alternatively, if tidal scouring has eroded them altogether. Many will not have been recorded by the NMP as they will not have shown up on aerial photographs, even the relatively small number of oblique images for the RCZAS area. Although the aerial photographic transcription work may thus have *over-recorded* modern fishing structures made of metal pipes and scaffolding, it will have *under-recorded* structures made of small wooden stakes.

9.3.4 Numerous ephemeral fishing-related features were identified at Dunster Beach during the Stage 2a pilot fieldwork, and these included linear zones of stone clearance for net lines, lines of individual stones used as net weights, and 'doughnuts' of stones used to support wooden and metal net posts. In most instances these will have been of early modern or recent date. Two detailed transects of such features were recorded during the Stage 2a pilot fieldwork, and it is not proposed that the main Stage 2 fieldwork should make detailed records of any more such features, although some digital photographic recording of selected features of this type could still take place if time and resources permitted.

9.3.5 There is at present little point in attempting to undertake more detailed survey and sampling work in the middle of Porlock Bay itself, as the movement of sand deposits there has buried much of the submerged forest present (McDonnell 2005), along with any associated Mesolithic lithic scatters. Work along its margins may still be productive, however, and at Porlock Marsh where the shingle ridge was breached. English Heritage comments on the first draft of this UPD specifically requested survey work in the Porlock area and therefore further discussions will be held with Richard McDonnell, Vanessa Straker and others regarding where rapid survey is likely to prove most useful. The fragmentary deposits of submerged forest in Minehead Bay may also require further investigation, but these were not visited during the Phase 2a pilot fieldwork, and their accessibility is currently unknown. Peat deposits in St Audrie's Bay, at Stroat and Woolaston, and on Berrow Flats and Oldbury Flats should be investigated in more detail and survey work there should be accompanied by palaeo-environmental sampling, and the collection of some artefacts and faunal remains. These areas may also potentially preserve prehistoric structures, and the potential for finds of national significance is high. Although areas such as the intertidal zones between Woolaston and Stroat, and at Oldbury Flats, have already been the subject of some research-led investigations, it is nevertheless important that they too are visited during the RCZAS Phase 2 survey programme, due to their high potential for producing prehistoric structures, features and deposits, and/or unexpected finds such as prehistoric footprints (M. Bell pers. comm.; R. Brunning pers. comm., N. Nayling pers. comm.). Regular visits to these areas by many different

fieldworkers are also vital to help monitor the extent of erosion and to identify and record chance finds.

9.3.6 Intertidal areas at Stroat and Woolaston, Aylburton, Sharpness, Hills Flats, Aust, Northwick, Gravel Banks and Avonmouth, Portbury and Portishead, Woodspring Bay, Sand Bay and Weston Bay were not accessed during the Phase 2a pilot (Fig. 3), and remain to be examined. In some instances, as at Portbury and Portishead, Woodspring Bay, Sand Bay and Weston Bay, the SMR/HER searches and NMP studies did not reveal many features other than a few fishing structures. Nevertheless, initial survey visits at least will be required in such locales so that their archaeological potential can be assessed. They may then require further survey later in the Phase 2 programme. Within the intertidal zones of the small coastal bays between Portishead and Clevedon for example, medieval and/or post-medieval fisheries have been documented (La Trobe-Bateman 1999), although no remains were visible on the available aerial photographs (Crowther and Dickson 2008: 238-239). Additional riverbank areas along the Parrett, and the Severn along the upper reaches of the RCZAS survey area, will also have to be examined.

9.3.7 Previous studies of fishing structures at Aust Rock, English Stones and Gravel Banks (e.g. Allen 2005) consisted of aerial photographic analysis alone, without detailed follow-up field survey; those at Berrow Flats, Stert Flats and Minehead Bay (e.g. Brunning 2008), took place in areas with such a dense concentration of features that many/most of could not be recorded in detail. Once again, it is also vital that regular visits are made to these areas, to monitor the erosion/burial of features, and the exposure of any new structures (R. Brunning pers. comm.).

9.3.8 The results of the Phase 2a pilot fieldwork indicate that rocky foreshore areas in the intertidal zone outside Watchet Harbour, in Helwell Bay/Doniford Bay and at Guscar Rocks have very low archaeological potential. This may be true of many such locales, although some caution must be exercised as several fish trap structures are recorded by the Somerset HER on the rocky foreshore near Lilstock. The main Phase 2 fieldwork would nevertheless be better focused on other intertidal areas.

9.3.9 It has been suggested that timber samples should be taken from each shipwreck suspected of being more than 250-300 years old (R. Brunning pers. comm.; N. Nayling pers. comm.). Most of the known shipwrecks in the Severn Estuary RCZAS are not this old, being of 19th or 20th century date. If any known older wrecks in areas such as Oldbury Sands and along the River Parrett were to be prioritised for recording or sampling, however, this would have significant logistical and Health and safety implications.

9.4 Low-lying agricultural land, cliff tops and upland areas

9.4.1 Although the ridge and furrow, rhynes, gripes and other surviving earthworks along the inner Severn in Gloucestershire have been mapped as part of the NMP (Crowther and Dickson 2008), the Phase 2a pilot fieldwork suggested that at certain areas such as Awre there may be greater archaeological complexity visible on the ground than was apparent from the historic aerial photographs alone. Once again, however, the priority must be on areas under the greatest threat from erosion and/or development, or where the SMPs indicate future retreat. The low-lying areas around Awre, Rodley, Elmore, Longney, Upper Framilode, Arlingham, Pawlett Hams and at Ker Moor are all likely to be subject to increased erosion and flooding in the short term future, under SMP preferred policies of No Active intervention or Managed realignment (see Appendix A). If time and resources permitted therefore, some selected areas of earthworks such as those near Awre could be recorded in greater detail through topographic earthwork survey, although this may fall outside the remit of a RCZAS project.

9.4.2 Most of the coastline within the Severn Estuary RCZAS study area is low-lying, but there are several areas where both hard and soft cliffs occur at or near the existing shoreline. In some instances, the SMP2 consultation documents predict that significant erosion of soft cliff lines will occur. East of Watchet, for example, horizontal cliff erosion of 10-50 metres is predicted for the next 100 years. Archaeological and historical assets within these erosional zones should also be prioritised for surveying and recording. Several Second World War structures adjacent to Watchet Harbour are already falling off eroded cliffs. Their locations and brief descriptions are on the Somerset HER, but if these do not have more detailed photographic and written records then this could be undertaken during the main Phase 2 phase, although this should probably remain a lower priority.

9.4.3 Within the Severn Estuary RCZAS area, important heritage assets such as Furzebury Brake hillfort, prehistoric flint scatters, numerous Bronze Age round barrows and the medieval chapels at Kilve and near St Decumans are located on sloping ground behind the existing coastline. Though not directly threatened by coastal erosion or flooding, some of these areas may nevertheless be at risk from long-term climate change causing increased rainfall, runoff and slope erosion, possibly exacerbated by any pressures from livestock (hoofs) or leisure activities (boots of ramblers, mountain bikes). The impact of such processes is largely unknown, but as these are likely to be longer-term processes, this should remain a low priority for the Phase 2 fieldwork.

9.4.4 Although prehistoric, medieval and Second World War archaeological features on upland heath such as Bossington Hill and Quantoxhead have been mapped in some detail (e.g. Riley 2006; Riley and Wilson-North 2001), small bays and areas of foreshore below the steep headlands and at the base of the steep combes at Selworthy Sand and Greenaleigh Point do not appear to have been examined. Flint nodules have been found on Selworthy Sands, but otherwise these areas have not had survey work undertaken on them (R. Wilson-North pers. comm.), probably due to their relative inaccessibility. Some post-medieval or early modern features may, however, survive in these locations.

9.5 Specific survey targets

9.5.1 Several specific survey targets also need to be investigated during the main Phase 2 RCZAS fieldwork. This includes the possible round barrow or windmill mound indicated by lidar during the NMP survey, south-east of Bays Court near Westbury-on-Severn (Catchpole and Chadwick 2009a: 7; Truscoe 2007), which was not accessed during the Phase 2a pilot fieldwork.

9.5.3 In addition, there is a curious feature adjacent to Beacon Sand south-west of Waldings Pill and south-east of Wibdon, at ST 5740 9660. It is visible from the train, and also on aerial photographs on Windows Live and the GCC GIS. It appears as a sub-circular area of reeds on salt grazing land, with a raised earthwork bank around it, but a gently concave, water-retaining centre. On historic tithe maps of the area, the field is called The Wharf, and this might indicate that there was a small landing stage or dock south-west of Waldings Pill. The earthwork feature may have been connected to this.

9.6 Prioritised list of areas and sites for Phase 2

9.6.1 The following list represents the historical and archaeological assets that are proposed to be targeted for survey work during the main Phase 2 fieldwork programme (Fig. 4). This list may be revised depending on comments from English Heritage and other stakeholders, and also to avoid replication of any archaeological work proposed in advance

of major development projects such as tidal or nuclear power. The areas or sites have been grouped into areas/sites of high, medium and low priority, based on a combination of factors as outlined in section 9.1.1 above:

High priority

- Intertidal areas at Hills Flats and Oldbury Flats (peat deposits, prehistoric artefacts and footprints, Romano-British stone structures and associated artefacts, wooden structures, post-medieval shipwrecks and post-medieval fishing structures);
- Intertidal areas at Berrow Flats (prehistoric peat deposits, prehistoric faunal remains and artefacts, wooden structures, post-medieval shipwrecks and medieval/post-medieval/early modern fishing structures);
- Intertidal areas at Stockland Reach, Fenning Island, Stert Point, Stert Island and Stert Flats (wooden structures, post-medieval shipwrecks and medieval/post-medieval/early modern fishing structures);
- Intertidal areas at Stolford Bay/Stolford Beach (prehistoric peat deposits and submerged forest, wooden structures, and medieval/post-medieval/early modern fishing structures);
- Intertidal areas at St Audrie's Bay (prehistoric peat deposits and submerged forest, prehistoric faunal remains and artefacts, wooden structures, and medieval/post-medieval/early modern fishing structures);
- Intertidal areas at Blue Anchor Bay/Dunster Beach (wooden structures, medieval/post-medieval/early modern fishing structures and Second World War structures);
- Intertidal areas at Minehead Bay (prehistoric peat deposits and submerged forest, prehistoric artefacts, wooden structures, and medieval/post-medieval/early modern fishing structures).

Medium priority

- Intertidal and foreshore areas at Beachley (unknown archaeological potential, requires assessment);
- Reclaimed grazing land south-west of Waldings Pill and south-east of Wibdon, and west of Beacon Sand (subcircular earthwork feature of unknown date and archaeological potential, requires assessment);
- Intertidal areas at Woolaston and Stroat (peat deposits, prehistoric wooden structures and post-medieval/early modern fishing structures);
- Reclaimed grazing land at Awre (medieval and post-medieval earthworks);
- Reclaimed grazing land at Rodley (medieval and post-medieval earthworks);
- Reclaimed grazing land at Elmore (Roman?, medieval and post-medieval earthworks);
- Reclaimed grazing land at Longney (medieval and post-medieval earthworks);

- Intertidal areas at Aust Rock and English Stones (Iron Age and Romano-British artefacts, post-medieval/early modern fishing structures and piers and slipways);

- Intertidal areas at Gravel Banks (prehistoric peat deposits and submerged forest, post-medieval/early modern fishing structures);

- Intertidal areas between Royal Portbury Docks and Portishead Pier (largely unknown archaeological potential, requires assessment);

- Intertidal areas at Woodhill Bay and Kilkenny Bay, Portishead (largely unknown archaeological potential, requires assessment);

- Intertidal areas at Redcliff Bay, Portishead and Walton Bay, Farley (largely unknown archaeological potential, requires assessment);

- Intertidal areas at Ladys Bay and Salthouse Bay, Clevedon (unknown archaeological potential, requires assessment);

- Intertidal and foreshore areas at Woodspring Bay and St Thomas' Head (unknown archaeological potential, requires assessment);

- Intertidal areas between St Thomas Head and Middle Hope, subject to further discussion with Defence Estates (unknown archaeological potential, requires assessment);

- Intertidal areas at Sand Bay (unknown archaeological potential, requires assessment);

- Intertidal areas at Weston Bay (unknown archaeological potential, requires assessment);

- Intertidal and foreshore areas at Lilstock (post-medieval or early modern fishing structures, post-medieval and early modern harbour features and Second World War structures);

- Intertidal areas at Greenaleigh Point and Selworthy Sand (unknown archaeological potential, requires assessment);

- Reclaimed grazing land at Porlock Marsh, although this area is currently being monitored by Richard McDonnell (medieval or earlier wooden structures, post-medieval or early modern waterfowl decoy);

- Intertidal areas along the edges of Porlock Bay, although once again this area is currently being monitored by Richard McDonnell (prehistoric features and faunal remains, wooden structures).

- Intertidal areas at Gore Point (medieval/post-medieval/early modern fishing structures).

Low priority

- Sloping agricultural land near Bollow south-east of Bays Court near Westbury-on-Severn (possible round barrow or windmill mound indicated by NMP lidar survey);

- The small intertidal area and cliff tops on the island of Steep Holm (medieval earthworks, early modern fishing structures and early modern/Second World War structures);

- Riverbank areas alongside the River Parrett at Combwich (Romano-British structures, occupation deposits and artefacts, medieval structures);

- Reclaimed grazing land at Steart Peninsula, although the proposed managed realignment at Steart may involve much archaeological work inland of the flood defences (R. Brunning pers. comm.) (medieval and post-medieval earthworks);

- Cliff edge and cliff top features at Watchet (Second World War structures, if not already recorded in detail);

- Reclaimed grazing land at Ker Moor (medieval and post-medieval earthworks);

10 Surveying and recording methodologies

10.1 Methodological guidance

10.1.1 The Phase 2 fieldwork will follow the methodological guidelines outlined in version 10 of the English Heritage Brief for RCZAS projects (Murphy 2007), and reiterated in the Updated Project Design (Catchpole and Chadwick 2009a). It is also informed by the Phase 1 desk-based assessment (Mullin 2008; Mullin and Chadwick 2009), the results of the Severn Estuary National Mapping Programme (Crowther and Dickson 2007, 2008), and the results and experiences of the Phase 2a pilot fieldwork (Catchpole and Chadwick 2009b).

10.2 Updated NMR and HER data

10.2.1 The NMR record for the RCZAS survey area was significantly enhanced by Phase 1 of the Severn Estuary RCZAS, and the HER and SMR data was similarly updated. These updated records were requested from the NMR and HER/SMRs and loaded onto the project GIS prior to the commencement of Phase 2a pilot fieldwork. It is essential that the NMP and RCZAS teams utilise up-to-date NMR/HER data, and this will again be requested in 2010. Due to technical software difficulties, however, it was not possible for the 2009 Stage 2a pilot survey team to upload and/or access most of the data in the field (Catchpole and Chadwick 2009b, section 9.2), although this information was sometimes printed out beforehand, along with colour versions of the GIS mapping with NMP, NMR and HER/SMR features and findspots. The digital recording equipment proposed for 2010 can display NMP and NMR, SMR and HER data, although paper printouts of maps and data will continue to be used as backups.

10.3 Preparatory and desk-based tasks

10.3.1 As in the Phase 2a pilot fieldwork (see section 7.1 above), a risk assessment of each site or area to be surveyed will be undertaken. Preliminary site visits will also be made in areas and at sites that were not visited during the Phase 2a pilot fieldwork. The introductory work will identify access points and rights of way, possible hazards, parking and toilet facilities, and the nearest Accident and Emergency hospital departments. The type of terrain to be covered will be included in the assessment of each survey location carried out in advance of fieldwork, along with the reasons why each area was selected. The actual programming of visits will be carried out once tide timetables for 2010 are available, and the prioritised list of sites and areas to be targeted has been agreed.

10.3.2 Historic charts of the Severn RCZAS area include the 1832 survey of the Severn by Commander Denham, the subsequent resurvey of the Bristol Channel in 1849 by Captain Beechly, and the 1853 survey by Commander Alldridge. These are located in the National Hydrographic Office in Taunton, although Gloucester Record Office holds a duplicate of the Beechly chart. The 1849 Beechly survey recorded fish weirs and other structures, whilst the 1853 Alldridge survey noted fishing features and submerged forest off Stolford. Digitising these charts was a costed task in the Updated Project Design for the pilot fieldwork (Catchpole and Chadwick 2009a: section 3.2.14). In the event it was not undertaken, but will now be carried out whilst comments are awaited on the RCZAS draft reports.

10.3.3 The provisional list of areas or sites to be visited during the Phase 2 fieldwork (see section 9 above) will be circulated in advance to English Heritage staff, local authority archaeologists and other relevant stakeholders for comments, and amendments made following their advice. The finalised programme will be similarly circulated.

10.4 Surveying methodologies

10.4.1 Wherever possible, time constraints permitting, a site record will be generated for each feature or deposit identified or visited during the Phase 2 fieldwork. Each record requires a unique identifier, a feature description, and photographic references. Site conditions and an estimate of stability or vulnerability to erosion also need to be recorded.

10.4.2 As outlined in section 10.14.2 of the Phase 2a pilot fieldwork report (Catchpole and Chadwick 2009b), in areas of dense and complex archaeology it may be easier for one person to use the handheld GPS to survey features, one person to record them (using either written context sheets and notes, or a digital voice recorder), and the third to take digital photographs. A three-person team also provides good coverage when walking parallel to one another across wide expanses of intertidal zone when looking for features, and is considered the *minimum* number of people needed to work safely in the intertidal zone (see section 7.1.6 above; R. Brunning pers. comm.).

10.4.3 A team of two people will suffice, however, for survey work along riverbank and across salt grazing areas, or with any hovercraft work. In extensive intertidal areas with dense concentrations of archaeological features such as Berrow Flats, Stert Flats or Minehead Bay, in order to record as much as possible and to take advantage of particularly low tides, it may be productive to have two two-person teams operating simultaneously, as long as these two teams remain within visual contact of each other at all times.

10.5 Digital recording equipment and methodologies

10.5.1 Following recommendations from the Head of English Heritage Technical Survey Trevor Pearson, the equipment used during the Severn Estuary Phase 2a pilot RCZAS consisted of the Trimble Geo XT handheld data logger and GPS, intended to be loaded with base map, NMP, NMR and HER/SMR data. The Trimble GeoBeacon was used as a differential correction source to provide the necessary accuracy when the Egnos satellite was not available. The Trimble Geo XT, GeoBeacon and MapFlow software were hired from the commercial equipment supply firm KOREC.

10.5.2 A digital recording sheet was created with a series of pull down menus, tick boxes and free text boxes, incorporating many terms derived from the National Monuments Record Thesaurus of Monument Types and INSCRIPTION word lists, and intended to be compatible with NMR, HER and SMR databases. It was originally intended that cell, sub-cell and PMU units were to be added to site identifiers (Mullin 2008: section 14), but in the event the draft revised Shoreline Management Plan 2 Policy Units were not available in time for the Phase 2a fieldwork and had to be added manually before records were disseminated.

10.5.3 A considerable number of problems were experienced with the GPS and data-logger handheld unit and beacon, and with the software and support service provided. These are set out in detail in the report into the Phase 2a pilot fieldwork (Catchpole and Chadwick 2009b).

10.5.4 Two alternative providers of similar recording equipment were contacted and asked to demonstrate their equipment and provide costings for their purchase.

10.5.5 Phoenix Surveying offer Topcon equipment and recommended the GRS-1 loaded with either Topserv or ArcPad software. The selling points of this equipment were that it accessed both GPS and GLONASS satellites and used the Topcon network via a mobile phone chip to provide real time differential correction. Unfortunately when demonstrated at

Sharpness, in open ground in a location near to both Bristol and Gloucester there was no mobile signal and the differential GPS could not be obtained via that method, although the EGNOS satellite was used to achieve sub-metre accuracy. The salesman recommended use of a beacon as backup. The RCZAS team were also keen to explore use of ArcPad as it was felt that this should work well with their office based ArcMap application. When demonstrated, however, it consistently placed the recording device in the wrong location by *c*. 10m due to projection problems. The propriety Topcon Topsurv software had no such issues, but being a survey package not a mapping package it lacked some mapping facilities that the RCZAS would prefer to have available. In particular, the display of relevant NMP and HER mapping would be a potential shortfall. The Topcon equipment appeared to be accurate and sturdy though, and was recommended by Trevor Pearson at English Heritage, who had just purchased an example.

10.5.6 Ormston Technology demonstrated a Magellan Mobile Mapper CX with Digiterra software. This equipment appeared more 'user friendly' than either the Trimble or Topcon alternatives, and no faults were noted on its demonstration, suggesting at the very least a greater level of attention to detail by the selling organisation. It is used by other departments within Gloucestershire County Council so internal IT knowledge and support will be available that was not there for Trimble equipment in 2009 and would not apply to Topcon equipment. Trevor Pearson knew of the equipment but suggested talking to Archaeological Research Services (ARS), who have used identical equipment on the North-east Coast RCZAS. When contacted, ARS staff highly recommended the equipment and software, with a few reservations regarding a need for adequate training and familiarisation with the software due to its translation from Hungarian. Another point in the favour of the Magellan option is that post-processing software was offered to provide differential corrections, and the use of a geo-beacon was not recommended due to the same problems that were encountered by the Severn RCZAS team in 2009. This was the only sales pitch that was honest about the limitations of the beacon, and that recommended a cheaper alternative. In fact ARS had found the basic kit so accurate that they had rarely used the post-processing software, but nonetheless still recommended it as necessary for back up in case of problems. A further major advantage of the Magellan equipment is its price, which is approximately half that of the Topcon equipment, and less than half the price quoted for Trimble equipment in 2009.

10.5.7 A potentially useful function of both Topcon and Magellan handheld data logger equipment demonstrated to GCCAS staff members was its potential linkage to a laser rangefinder in instances where no direct measurements were possible if features were inaccessible, out of safe reach or where satellite coverage was not possible. Through taking 'offset' measurements using a laser linked to the GPS at a position where a clear signal is achievable, it is thus still possible to take accurate georeferenced survey readings. This facility would be extremely useful for surveying features located on riverbanks where deep sucking mud prevents direct access, or for recording shipwrecks from a safe distance to avoid tidally scoured area around them (see section 10.7.2 below). There were several instances during the RCZAS Phase 2a pilot fieldwork where deep sucking mud prevented safe access to archaeological features – this occurred at Guscar Rocks, Lydney Harbour, Berrow Flats and Oldbury Flats, and along the banks of the River Parrett. Sometimes it was possible to predict these conditions in advance – the mud thickening towards the sides of the channel of Grange Pill near Guscar Rocks, for example. Experts such as Dr Richard Brunning and Nigel Nayling confirmed that to actually enter such riverbanks and channels on foot would be foolhardy in the extreme, as the mud is usually at its deepest within them, and there would be considerable difficulties experienced in leaving these areas. In the future, use of a laser rangefinder coupled to a handheld GPS data logger may allow features within 100m of solid ground to be more accurately located The purchase of a laser is therefore recommended in the project costing (Appendix B).

10.5.8 Discussions with English Heritage indicate that rapidity of recording is an essential element of an RCZAS (P. Murphy pers. comm.). It is therefore suggested that the RCZAS team utilise two Magellan Mobile Mapper CX modules and a laser rangefinder. This will allow for doubling up of survey teams in the most extensive areas of intertidal zone with the greatest density of archaeological feature such as Berrow Flats, Stert Flats, Dunster Beach and similar locations. While a minimum team of three is recommended for health and safety, two teams of two working within sight of each other could record considerably more features within each tidal window. Similarly, in less dangerous locations two teams of two could also make use of low tides more effectively. One Magellan Mobile Mapper (MMCX) is to be purchased for the Forest of Dean Survey Phase 3b (project number 5291), and it is proposed that this then used by the RCZAS as well as a further MMCX and a laser rangefinder to be purchased by the RCZAS. To enable the second team to record features it is proposed to also purchase a second Ricoh waterproof GPS camera to complement that bought for the phase 2a pilot fieldwork.

10.6 Recording equipment and methodologies

10.6.1 The Stage 2a pilot survey field tested two paper written context sheets devised for the Severn Estuary RCZAS and based on those of the Norfolk Archaeological Unit (NAU 2005), but incorporating landscape and feature descriptions on the two sheets incorporated terms derived from the NMR Thesaurus of Monument Types and INSCRIPTION word lists (Catchpole and Chadwick 2009b: 16-17, section 8.5). Although generally positive results were achieved with them, they still took time to fill in, and in wet and windy weather it would be extremely difficult to make written records

10.6.2 As suggested in the Phase 2a fieldwork report therefore (Catchpole and Chadwick 2009b: section 12.2.5), survey staff will use digital voice recorders to dictate descriptions and notes concerning the identified features according to a series of written prompts, and this information will later be entered onto a database or digital recording forms held on the RCZAS project laptop. This transcription work can be done at high tide when no intertidal surveying is possible, or on ‘rest days’ in the office. Aquapack waterproof cases similar to those used during the Phase 2a pilot will be purchased to house the recorders. Paper context sheets and GCCAS film planning sheets will also be carried as backup in the event of equipment failure, or in case sketches or rapidly measured plans of more complex features are required.

10.7 The use of hovercraft, ATVs or boats

10.7.1 During the Phase 2a pilot fieldwork at Bridgwater Bay/Berrow Flats, for two days GCCAS survey team members were granted the use of one of the Burnham-on-Sea Area Rescue Boat (BARB) hovercraft. This had been proposed in the Phase 2a Updated Project Design (Catchpole and Chadwick 2009a: 20-21), and the survey work was intended to form part of routine training flights undertaken by the BARB crew. The Phase 2a fieldwork report highlighted a series of disadvantages and advantages with the use of such a vehicle (Catchpole and Chadwick 2009b: section 9.4). The considerable advantages more than outweighed the disadvantages, and make the use of hovercraft or other craft highly desirable in certain parts of the Severn RCZAS area during the main Phase 2 survey programme. The advantages are:

- The hovercraft allowed GCCAS staff to proceed safely to areas far out into Bridgwater Bay and Berrow Flats in a short space of time, and to leave such locales speedily ahead of the incoming tide;

- The reassurance provided by the hovercraft and its trained rescue crew gave the survey team members much greater confidence in carrying out their work in such a potentially dangerous and demanding environment;

- Many more wood, peat and sediment samples, and/or artefacts, could be retrieved and carried than would be possible with staff working on foot. A hovercraft would be particularly useful when taking samples of wooden stakes for dendrochronological and radiocarbon dating, and would significantly reduce the time necessary to undertake such work;

- The time taken to access distant structures and deposits in areas such as Berrow Flats and Stert Flats would be considerably reduced through the use of hovercraft. In may also be possible for two rather than three survey staff to undertake this work. This reduction in time and staff numbers may be cost effective.

10.7.2 Unfortunately, the principal disadvantage of hovercraft is their overall cost. Commercial rates are far too expensive, and even the use of the BARB hovercraft may not be possible for the main Phase 2 fieldwork. Possible collaborative work with rescue services has been investigated but the two hovercraft operated by the Gloucestershire Fire and Rescue Service and that used by the Avon Fire and Rescue Service are not available.

10.7.3 In areas such as Oldbury Sands and at Steep Holm, where accessing the wrecks and archaeology would be physically impossible on foot, and at Hills Flats, where large sea walls impede access to the intertidal zone, then the use of boats has been considered. Suitable inflatable craft could be provided by English Heritage's Maritime Archaeology section, leased from other organisations with maritime survey teams, or rented from private companies. Nevertheless, this option is still likely to be too expensive, and even if a trained coxswain was provided, GCCAS staff would need training in boat use.

10.7.4 An alternative to hovercraft and boats is provided by All Terrain Vehicles (ATVs) such as the Argo or MAX six or eight-wheeled amphibious vehicles (e.g. http://www.argoatv.com/; http://www.maxatvs.com/), or 4x4 Rough Terrain Vehicles (RTVs) such as those manufactured by Kubota and Kawasaki. These are used for fire and rescue, beach maintenance, forestry, wildlife and rural estate management in the United States, Canada, Britain and Europe. Most ATVs and RTVs can carry two to four people with space for transporting equipment or samples, and some ATVs can have flexible caterpillar tracks added for added performance and stability on soft ground. Such vehicles could be driven out onto intertidal areas following the falling tide and would then return with the rising tide. Although even ATVs cannot cope with rough surf or fast tidal flows, they are partly amphibious and can propel themselves through water if necessary with the provision of an outboard motor, and might thus enable access to wrecks on Oldbury Sands. They would also provide valuable Health and safety backup if staff were accidentally cut off by rising tides. Access issues would need to be checked in detail and permission gained from landowners and Natural England (from whom a reply is awaited at the time of writing of this draft of the UPD).

10.7.5 Costings for the hire of an ATV vehicle have been included in this document. Training in their safe use is organised by the hire companies.

10.8 Sampling and artefact retention

10.8.1 The need for dating of different classes of fish weir was highlighted in the Phase 1 reports (Crowther and Dickson 2007, 2008; Mullin 2008, Mullin, Brunning and Chadwick 2009). Dr Richard Brunning and Dr Vanessa Straker have advised that samples for wood

species ID, dendrochronological dating and/or radiocarbon dating should be taken wherever possible. Particularly with remote or rarely accessed sites, those thought to be early in date, and/or those that are poorly preserved and highly susceptible to erosion, sampling for species ID and dating purposes will be undertaken at the same time as recording (R. Brunning pers. comm.; V. Straker pers. comm.), rather than being left to a separate (and as yet unconfirmed) Phase 3 programme, as originally proposed (Catchpole and Chadwick 2009a: 37, section 10.9.3; Murphy 2007). There is no guarantee that wooden features would still survive and/or be accessible in the future – smaller stakes may well be buried by silts or eroded altogether by tidal action. Similarly, although the Project Brief specified that the collection of finds would be minimised (Murphy 2007: section 6.12), some artefacts and faunal remains associated with peat or alluvial deposits will be retained least they erode or disappear following recording, but before they can be sampled in future fieldwork.

10.8.2 It has been suggested that timber samples should be taken from shipwrecks suspected as being more than 250-300 years old (R. Brunning pers. comm.; N. Nayling pers. comm.). Although possibly only applicable in a few specific cases, as known wrecks are almost all early modern in date, this would have implications for the Health and safety, logistics and timescale of fieldwork. Wrecks are prone to tidal scouring, and the sediments surrounding them may be fine silts deposited within scoured basins around the vessel remains, making access to them potentially dangerous. Some known Severn wreck sites lie within areas not accessible on foot. These include wrecks on Oldbury Sands and Slimeroad Sand, just north of the first Severn Crossing road bridge and cut off from the land by channels that are water-filled even at low tide; and several wrecks along the River Parrett, which cannot be accessed from the river banks due to deep sucking mud

10.8.3 Only very limited sampling of wooden structures at Berrow Flats and Stert Flats took place during the Phase 2a pilot fieldwork stage, and the collection of artefacts was also kept to an absolute minimum. The RCZAS brief required that the geomorphological and sedimentary context of features should be recorded. A Van Walt gouge auger was purchased for this, but during Phase 2a the only time this was actually used was at Stert Flats and Oldbury Flats. Quickly-dug spade slots are also an effective method of ascertaining the nature of underlying sediments (Richard Brunning pers. comm.).

10.8.4 Any sampling during the RCZAS Phase 2 programme will increase the amount of time spent in intertidal areas such as Minehead Bay, Blue Anchor Bay and Dunster Beach, St Audrie's Bay, Stert Flats and Berrow Flats. In the long run this could actually be cost effective, as later repeat visits would then not be required to obtain samples. Particularly in Stert Flats and Berrow Flats, the use of hovercraft or ATVs (see section 10.7.4 above) would greatly facilitate the transport of samples from the intertidal zone back to the shore. Dr Richard Brunning of Somerset County Council will assist with sampling during Phase 2, and Nigel Nayling of University of Wales, Lampeter has agreed to receive and store wood samples, and he will seek funding independently for their analysis and publication.

10.9 The use of volunteers and 'amateur' archaeological groups

10.9.1 It is not recommended that volunteers and 'amateur' archaeological groups will assist with the Severn Estuary RCZAS Phase 2 survey on clifftop or in intertidal areas. Even if they were highly experienced in intertidal work (as some undoubtedly are), there are too many health and safety, insurance and liability issues involved (see section 7.5 above).

10.9.2 Volunteers and amateur groups could be mobilised to assist with additional, more detailed recording of land-based features – not GPS-based survey of new and existing features, but rather enhancing available SMR/HER records and information. Such work would be complementary to, rather than a core component of, the main Phase 2 fieldwork.

10.9.3 In a similar manner to the way in which teams of volunteers assisted with the Council for British Archaeology's Defence of Britain project (e.g. Foot 2006; Lowry 1996), members of local archaeological societies could be used to undertake more detailed drawn, topographic or photographic surveys of historical assets such as:

- Second World War structures/remains (if these have not already been recorded in detail during the Defence of Britain project);

- Post-medieval/early modern wharf and dock structures, piers, and waterfront buildings and remains in areas such as Lydney Harbour, Gatcombe, both Purtons, Sharpness, Avonmouth, Portishead and Clevedon, Burnham-on Sea, Combwich and Watchet Harbour;

- Areas of medieval and post-medieval earthworks such as ridge and furrow and rhynes.

10.9.4 Volunteers could also be organised to undertake erosion monitoring surveys on known sites and monuments within the Severn RCZAS area, to assess current levels of erosion and to try and identify future trends or potential problems caused by climate change and increased rainfall and runoff, livestock trampling and the impact of leisure activities such as walking, mountain biking and motorcycle scrambling.

10.9.5 Arranging and co-ordinating any volunteers should not, however, be undertaken by the core GCCAS team employed to undertake the Phase 2 survey, as they will not have the time or resources to do this. Instead, other staff working for the relevant local authority archaeology services could plan and oversee such work. There would also be budget issues, however, and suitable funding may be sought from English Heritage or other bodies such as the Heritage Lottery Fund to cover staff time and materials, after completion of the work proposed in this UPD.

11 Project staffing, training, resources and programming

11.1 Staffing

11.1.1 As outlined in section 12.1 of the report on the Phase 2a pilot fieldwork (Catchpole and Chadwick 2009b), a survey team of three people worked very well. This is the *minimum* safe number of people to work in the intertidal zone (see section 7.1.6 above; R. Brunning pers. comm.). When surveying on heath, salt grazing areas or along river banks, it will be safe to have just two members in a survey team, though only following an appropriate Risk Assessment.

11.1.2 Although a team of three people is considered appropriate for most RCZAS survey work, the sheer quantity of archaeology that will be necessary to survey during Phase 2 project is such that one team of three cannot possibly cover the widespread study area effectively, whilst at the same time making use of optimum low spring tidal conditions. In order to take advantage of the lowest spring tides in Minehead Bay, Blue Anchor Bay/Dunster Beach, St Audrie's Bay, Stert Flats and Berrow Flats, two separate field teams of two people could operate *concurrently* for at least some of this period, as long as it was within the same area and that the two teams remained in constant visual contact.

11.1.3 As recommended in the report on the Phase 2a pilot fieldwork (Catchpole and Chadwick 2009b: section 9.5.2), it would be advisable to have more than one person in each team capable of leading the survey work, with one person in each team as a reserve team leader to provide cover for leave, illness and injury. This would also facilitate more flexible working practices, and might alleviate any problems of long-term fatigue. The Gloucestershire County Council Archaeology Service field team is normally small in size. GCCAS will employ additional staff for the RCZAS Phase 2 for periods when two field teams are required. If possible, it will be advantageous to recruit staff with maritime or intertidal archaeology experience, and/or experience of handheld GPS and data logger equipment.

11.1.4 During periods of optimal low tides, and as long as light conditions were adequate, it might be considered advantageous to make two survey visits to intertidal areas per day. Due to potential problems of fatigue, however, it is not recommended that this should be undertaken by the same team each day, but staff could instead rotate the fieldwork.

11.1.5 Problems of fatigue leading to lapses of concentration and accidents may be a potential problem for staff surveying large areas such as Blue Anchor Bay, Stert Flats and Berrow Flats, with the repeated visits necessary and the difficult physical environments present. This may be exacerbated by staff needing to stay away from their homes. In practice though, the need to process data in the office one day a week and unfavourable tidal regimes should limit this. The use of hovercraft and/or ATVs would also greatly ameliorate such fatigue.

11.2 Training

11.2.1 The report on the Phase 2a fieldwork concluded that further training will be necessary in advance of survey work for the use of handheld GPS survey equipment and data loggers, the associated software, and particularly with regard to trouble shooting (Catchpole and Chadwick 2009b: 21, section 9.3.1). Additional training time has therefore been included in the costing attached to this report.

11.2.2 A training session with Nigel Nayling at the Newport Ship Centre and on the Gwent Levels in Wales proved extremely useful (see Catchpole and Chadwick 2009b). Any new

staff hired by GGCAS for the RCAS Phase 2 survey will have similar training sessions, unless they have previous intertidal and/or maritime experience. If the structural recording and sampling of shipwrecks is going to form part of Phase 2, then additional training in this will have to be provided. Nigel Nayling's time has been costed below. Dr Richard Brunning will train staff in the local context of the Somerset sites. It is also proposed that further training is provided through invitations to Richard McDonnell, Dr Vanessa Straker and others to specific sites or areas.

11.2.3 Any additional health and safety training identified as necessary for the Phase 2 survey for particular tasks or locales will also have to be arranged.

11.3 Personnel and project team structure

11.3.1 The staffing of this project as outlined below assumes that the pilot fieldwork stage will be commissioned during the financial year 2009/2010.

11.3.2 The English Heritage Project Assurance Officer is Buzz Busby. The project will be advised by a Steering Group composed of English Heritage staff and the archaeological curators of the local authorities for the Severn RCZAS survey area.

11.3.3 It is anticipated that the Project Team will be formed of staff from both Somerset and Gloucestershire County Council Archaeology Services, with the majority of work organised from Gloucester. The field team will be staff of GCCAS, with the addition of Dr Richard Brunning for areas of Somerset where extensive intertidal areas will be visited.

11.3.4 Gloucestershire County Council (hereafter referred to as 'GCC') will form the primary financial contact for the project and should be considered as the commissioned body, responsible for the distribution of finances to other parties based on their contribution to the project.

11.3.5 The Project Executive will be Jan Wills, Gloucestershire County Archaeologist. Field survey related tasks will be undertaken by a Project Team comprising a Project Manager (PM) Toby Catchpole and a lead Project Officer (PO) Adrian Chadwick, supported by other Assistant Project Officers (APOs) employed by GCC.

11.3.6 Dr Richard Brunning (RB - Levels and Moors Officer at Somerset County Council) will form part of the core project team to aid with project managing Somerset elements of the fieldwork, training of staff in fieldwork in the intertidal zone, sampling wooden structures and with other tasks where his local knowledge and experience can contribute to the project. For costing purposes, work to be carried out by Richard Brunning has been treated as tasks to be sub-contracted to external specialists.

11.3.7 Dr Vanessa Straker, English Heritage Regional Science Advisor, will assist with the drawing up and implementation of the training programme and other matters as necessary.

11.3.8 Dr Dana Challinor, a freelance palaeoenvironmental specialist, will assist with wood species ID and will also advise on other wood related matters including sampling.

11.3.9 Nigel Nayling, of University of Wales Lampeter will help with staff training and will advise on wreck and timber structure recording. He will be brought in to undertake timber sampling of any wooden wrecks and will advise on the taking of dendrochronological samples.

11.3.10 Richard McDonnell also has extensive experience of the archaeology of the RCZAS project area, and of safe working in the intertidal zone of Bridgwater Bay, including Stert

Flats and the Minehead and Porlock areas. He will assist with training of staff in fieldwork in the intertidal zone and with other tasks where his local knowledge and experience can contribute to the project. He will also be consulted regarding which areas at Porlock will most benefit from RCZAS survey as English Heritage specifically requested further recording at this location in comments on the first draft of this UPD.

11.4 Project monitoring

Project staff will report progress to a Steering Group comprised of representatives of the local authorities, which it is initially suggested should be on two or three occasions during the Phase 2 fieldwork. Monitoring meetings will be held with English Heritage as required to review the progress of the projects against the timescale presented in the Gantt chart (Appendix C).

11.5 Contingency

The Brief for RCZAS projects (Murphy 2007) suggests that a contingency should be included for the fuller recording of small but significant sites in imminent danger of destruction from erosion. As it is proposed that the RCZAS team work full time on the project from April-September 2010, the period where weather conditions will be largely suitable and where over wintering birds will not be disturbed, any further recording will need to be incorporated within the time already costed by modifications to the project programme. Where large or complex sites of significance are found to be eroding rapidly, a separate project design will be produced for further work.

11.6 Input to Shoreline Management Plans (SMPs)

No task involving input to SMPs or other strategic studies was included in the UPD for the Stage 2a pilot fieldwork phase of the RCZAS. In the event, queries and responses to SMP consultants and others such as those undertaking the tidal power surveys took up an appreciable amount of Project Manager and Project Officer time. It is likely that with the SMP process continuing, a tidal power scheme and two proposed nuclear power stations being investigated, and as the RCZAS team becomes known as a source of up to date information regarding the archaeology of the Severn Estuary; this call on time will continue. Provision will therefore be made for staff time to be spent on such enquiries during 2010.

12 Project tasks and basis of costs

12.1 Tasks

12.1.1 Core project team members are detailed at 11.3 above. The following table summarises tasks to be undertaken during the project:

Task No.	Task	Staff member	Days	Total Days
1	**Previous tasks to be completed**			0
1.1	Copying/digitisation of Denham, Beechly and Alldridge charts from National Hydrographic Office	PO	0	
1.2	Assessment of material held by Gloucester Folk Museum **NB** Task 1 was costed and paid for as part of the pilot fieldwork stage but delayed due to illness – work will be undertaken during early 2010.	PO	0	
2	**Requesting and loading updated NMR and HER/SMR data into project GIS**	PM PO	1 2	PM 1 PO 2
3	**General preparatory work and training**			PM 11 PO 12 APO1 6 APO2 6
3.1	Purchase of equipment	PM PO	2 6	
3.2	Training in use of equipment and vehicles and safe systems of work in the Severn Estuary.	PM PO APO1 APO2	3 3 3 3	
3.3	Training in use of digital recording equipment software, installation, down and uploading data, field recording, menus preparation of digital recording sheets	PM PO APO1 APO2	6 3 3 3	
4	**Fieldwork risk assessments** for the 16 high and medium priority sites not visited in 2009. Includes landowner and other access issues.	PO	6	PO 6
5	**Fieldwork**	PM RB	42 21	PM 42 RB 21 PO 105 APO1 105 APO2 105 DC 2 NN 4 RMcD 5
5.1	Field Survey. Will average out as 4 days per week April-September 2010.	PO APO1 APO2 RB	84 84 84 21	
5.2	Downloading, correcting and summarising survey results. Preparation for subsequent survey visits, to average out to 1 day per week for duration of task 5.1.	PO APO1 APO2	21 21 21	

5.3	Specialist advice before and during fieldwork Wood species ID and consultation Training session in wooden structure identification, interpretation and sampling. Advice on wooden structures encountered during fieldwork Advice on dendrochronological sampling during fieldwork Specialist advice and site visits to Bridgewater Bay, Minehead and Porlock.	 DC NN NN NN RMcD	 2 1.5 1.5 1 5	
6 6.1	**Post fieldwork tasks** Finalisation and correction of project records, database and GIS for dispersal to NMR and HER/SMRs	 PM PO APO1 APO2	 5 15 5 5	PM 5 RB 1 PO 17 APO1 7 APO2 5
6.2	Storage and/or dispatch of samples and finds	RB PO APO1	1 2 2	
7 7.1	**Preparation of Phase 2 main report** Review of fieldwork methodology and results	 PM RB PO APO1 APO2	 1 1 5 0.5 0.5	PM 15 RB 2 PO 57 APO1 0.5 APO2 0.5
7.2	Preparation of report text	PM PO	5 25	
7.3	Production of figures	PO	10	
7.4	Internal edit	PM RB PO	4 1 3	
7.5	Circulation of draft report to Steering Group	PO	1	
7.6	Editing of draft report and provision to EH	PO	4	
7.7	Editing final draft UPD based on EH comments	PM PO	5 5	
7.8	Printing, binding and disseminating reports	PO	4	
8 8.1	**Consultation and Outreach** Discussion and consultation with English Heritage, stakeholders and SMP and other researchers and consultants	 PM PO	 10 5	PM 14 PO 11
8.2	Preparation of material for website	PO	2	

8.3	Preparation and presentation at SELRC 20 years 'Fish and Ships' conference.	PM PO	4 4	
9	**Archive** Ordering and storage of the archive for deposition with ADS or other digital repository	PO	2	PO 2
10	**Monitoring and steering group meetings** Preparation for and attendance at English Heritage monitoring and Steering Group meetings (Estimated 2 meetings – assumed held on same day)	 PM RB PO	 2 1 2	PM 2 RB 1 PO 2

For a detailed breakdown of the project costing see Appendix B

12.2 Funding, timetable and basis of cost

12.2.1 The tasks outlined in Section 12.1 above are to be funded by English Heritage through *Historic Environment Enabling Programme* funding.

12.2.2 Staff costs are based on the figures detailed in Appendix A. Figures presented are for the financial years 2009/10 and 2010/11. An increment of 2.5% (compound) is added for each financial year in line with current English Heritage guidelines on inflation calculations on *Historic Environment Enabling Programme* Grants (EH 2002).

12.2.3 The identified key tasks for the project are tabulated at 12.1 above. A Gantt Chart of proposed progress is presented as Appendix C. Within the detailed work programme there is a time allowance of 1 calendar week per 5 calendar weeks per person for annual leave/sickness and sundry absences.

12.2.4 The project will total 57 weeks. The Gantt chart has been drawn up with the assumption that the project commences on 1st March 2010.

13 Ownership and dissemination

13.1 Copyright of all written, graphic, photographic, and digital records remains that of the originator unless otherwise agreed with English Heritage.

13.2 All records, reports and other products of the Severn Estuary RCZAS project will be freely available for distribution in digital format to local authorities, government agencies and any other researcher or stakeholder approved by English Heritage at the end of the project stage. Personal details may have to be removed in line with data protection legislation. Project reports will be posted on-line and digitally archived, as directed by the Project Assurance Officer.

13.3 Gloucestershire County Council Archaeology Service reserves the right to impose charges for complex searches of data produced by the project where requested by commercial organisations such as those undertaking development-led consultancy work. Once data has been disseminated to the NMR and local authority HER/SMRs, enquiries for further information from external sources (i.e. outside English Heritage, the Environment Agency and local authorities within the survey area) will be directed to the curators of the relevant national or local HERs and their normal charging policies will apply.

13.4 Ordnance Survey data copyright is covered by the Local Authority Service Level Agreement. This and any other copyright material will be fully acknowledged and relevant copyright conditions observed.

14 Risk log

14.1 There are a large number of variables and constraints likely to be encountered in surveying such a hazardous and heavily protected environment as the Severn Estuary RCZAS study area. This Updated Project Design has set out to identify, quantify and devise methodologies to mitigate against the known risks both to health and safety and to use of project resources. The paramount concern will of course be the health and safety of staff and others involved in or affected by the project. A major purpose of the Phase 2a pilot fieldwork project (Catchpole and Chadwick 2009b) was to examine the actual impact of the risks, to allow for the most efficient use of resources in the main Phase 2 fieldwork stage. Further risks to the project will inevitably be identified during the assessment of each survey location and it is highly likely that some high archaeological priorities will not be accessible for safety reasons (for example the quicksand in the southern parts of Stert Flats).

Risk Number	1
Description	Lack of staff availability due to long-term illness, new employment or other unplanned absences.
Probability	Low
Impact	High
Countermeasures	Additional APO level staff have already been recruited to ensure added flexibility in scheduling work. It is more difficult to mitigate against the loss or prolonged absence of senior more experienced team members and in this instance delays would be inevitable whilst work programmes are adjusted and revised.
Estimated time/cost	Cost implication low if work is simply postponed. Time implications could be significant as unlike the pilot fieldwork, survey work is due to be continuous from April-September 2010. Work could continue into October but weather conditions would need to be closely monitored for staff safety. Dependant on the stage that the project had reached survey work might have to be postponed until the following spring.
Owner	Toby Catchpole
Date last updated	December 2009

Risk Number	2
Description	Refusal of Forest of Dean Lidar verification project variation request. It is proposed that the Forest of Dean project purchases one set of Magellan GPS/digital recording equipment and that it is subsequently used by the RCZAS project. The amount of recording possible would be reduced by 50%
Probability	Low
Impact	High
Countermeasures	The Forest of Dean variation has been drawn up to save overall costs to English Heritage through the use of the same equipment over two projects rather than incur hire costs (of approximately the same level) to the Forest of Dean project for equipment found to be rather less than successful during the RCZAS phase 2 pilot.
Estimated time/cost	Cost implication to the value of a set of recording equipment (see appendix B). Time implication nil.
Owner	Toby Catchpole/English Heritage
Date last updated	December 2009

Risk Number	3
Description	The Magellan MobileMapper CX GPS data loggers and Digiterra software fail to operate correctly.
Probability	Low
Impact	High
Countermeasures	Significant effort has already been expended (see above) in finding equipment less subject to the failures encountered in 2009, in arranging training for its use, in identification of a reliable supplier and in ensuring adequate technical support is available. Paper back ups will always be available.
Estimated time/cost	Undertaking the project using paper records will affect the duration of survey work and its accuracy. Manual inputting of data would affect the cost and duration of subsequent office tasks. Level of time/cost implications dependant on nature and duration of issues.
Owner	Toby Catchpole/Adrian Chadwick
Date last updated	December 2009

Risk Number	4
Description	Major changes to the Process Units and recommendations in the final versions of updated Shoreline Management Plans
Probability	Medium
Impact	Low
Countermeasures	Targeting of survey areas has been made on the basis of management recommendations and potential threat to historic assets as outlined in the draft SMP2s. It is expected that final versions will be broadly similar but major changes to PUs and recommendations for their future would require this process to be repeated. Some time has been added for dealing with SMP matters (task 8.1) but the level of revision is outside the control of the project team.
Estimated time/cost	Likely to be minimal unless very significant changes are made. The risk is more to the threat based targeting of archaeological survey sites than to the cost and duration of the project.
Owner	Toby Catchpole/Adrian Chadwick
Date last updated	December 2009

Risk Number	5
Description	Intended higher priority survey locations permanently unavailable for reasons of health and safety, landowner permission, live ammunition, environmental designations, or other constraints listed above, or currently unknown constraints.
Probability	High
Impact	Low
Countermeasures	All sites are to be assessed in advance in order to minimise disruption to survey work in the field. Alternative locations will be identified wherever possible. Thus whilst it is highly likely that it will not be possible to visit some of the intended survey locations listed in this Project Design, alternatives will have been identified.
Estimated time/cost	Cost implication nil. Time implications should be nil over the duration of the project.
Owner	Toby Catchpole
Date last updated	December 2009

Risk Number	6
Description	Lack of staff availability – APO level project staff of Gloucestershire County Council Archaeology Service are to be used for both RCZAS and Forest of Dean Lidar validation projects. There may be timetabling conflicts to be resolved between these surveys, at least in the initial few weeks of RCZAS fieldwork.
Probability	Low
Impact	Low
Countermeasures	Commissioning of projects to allow tasks to be undertaken in line with submitted gantts is required. Regular communication with other Project Managers is required, and additional staff have already been recruited. Very low tides will be prioritised for RCZAS survey work and areas safe for two members of staff identified. Flexibility in numbers of days per week spent in the field and advanced planning of timetables will be normal practice for the project.
Estimated time/cost	Cost implication nil. Time implication should be nil over the duration of the project.
Owner	Toby Catchpole/English Heritage
Date last updated	December 2009

Risk Number	6
Description	Impossible to either gain access to sites or undertake fieldwork due to short term factors such as very severe weather conditions affecting safety and tides, wildfowlers, storm effects or other unforeseen problems
Probability	Medium
Impact	Low
Countermeasures	Flexibility in the project programme should allow for fieldwork to be rescheduled in this event.
Estimated time/cost	This should have no impact on the project budget. Unless very severe weather continued for an extremely protracted period, this should not affect the overall timescale of the project.
Owner	Toby Catchpole/Survey supervisor
Date last updated	December 2009

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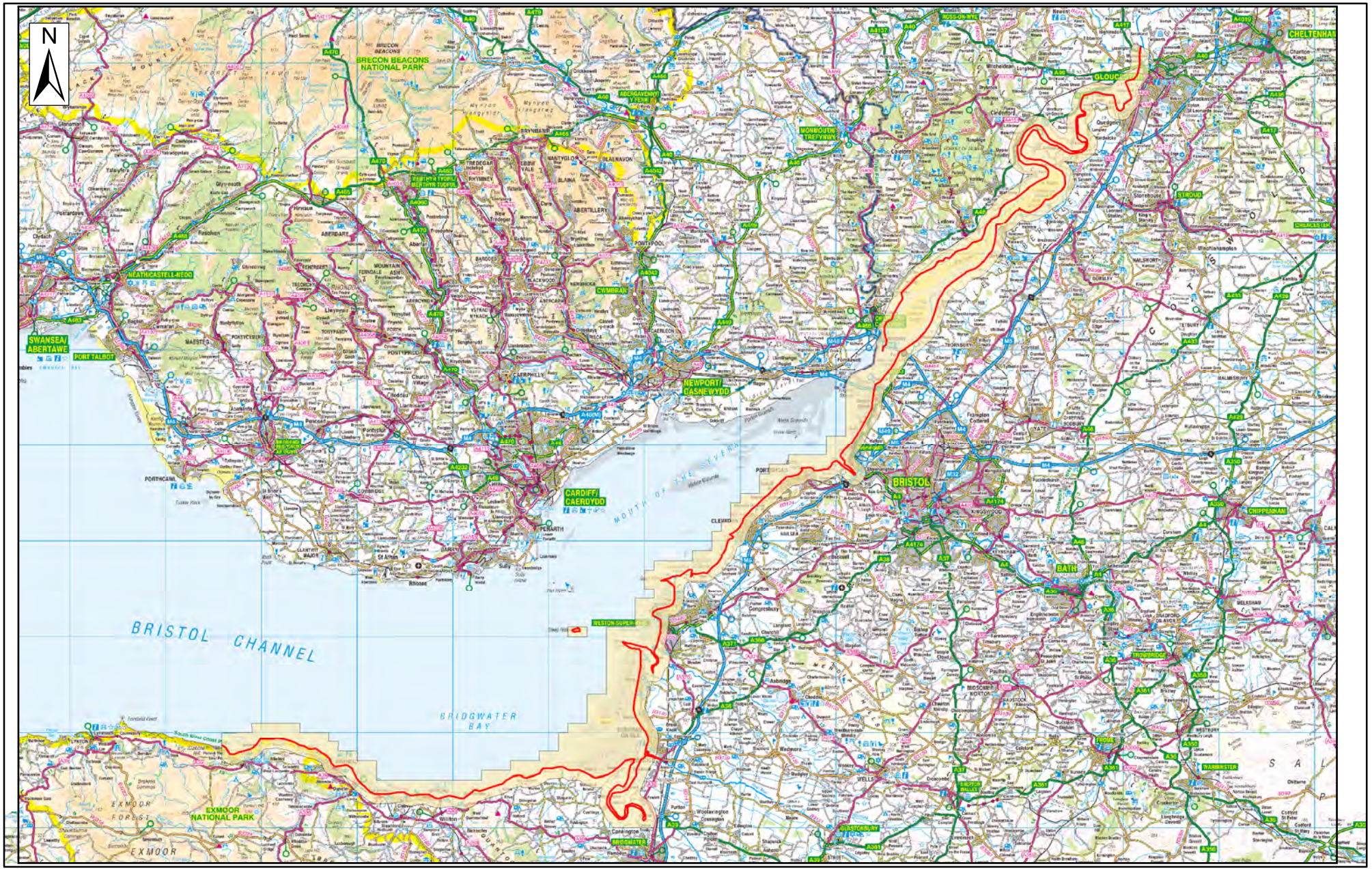

Figure 1: Severn Estuary RCZA Survey Area

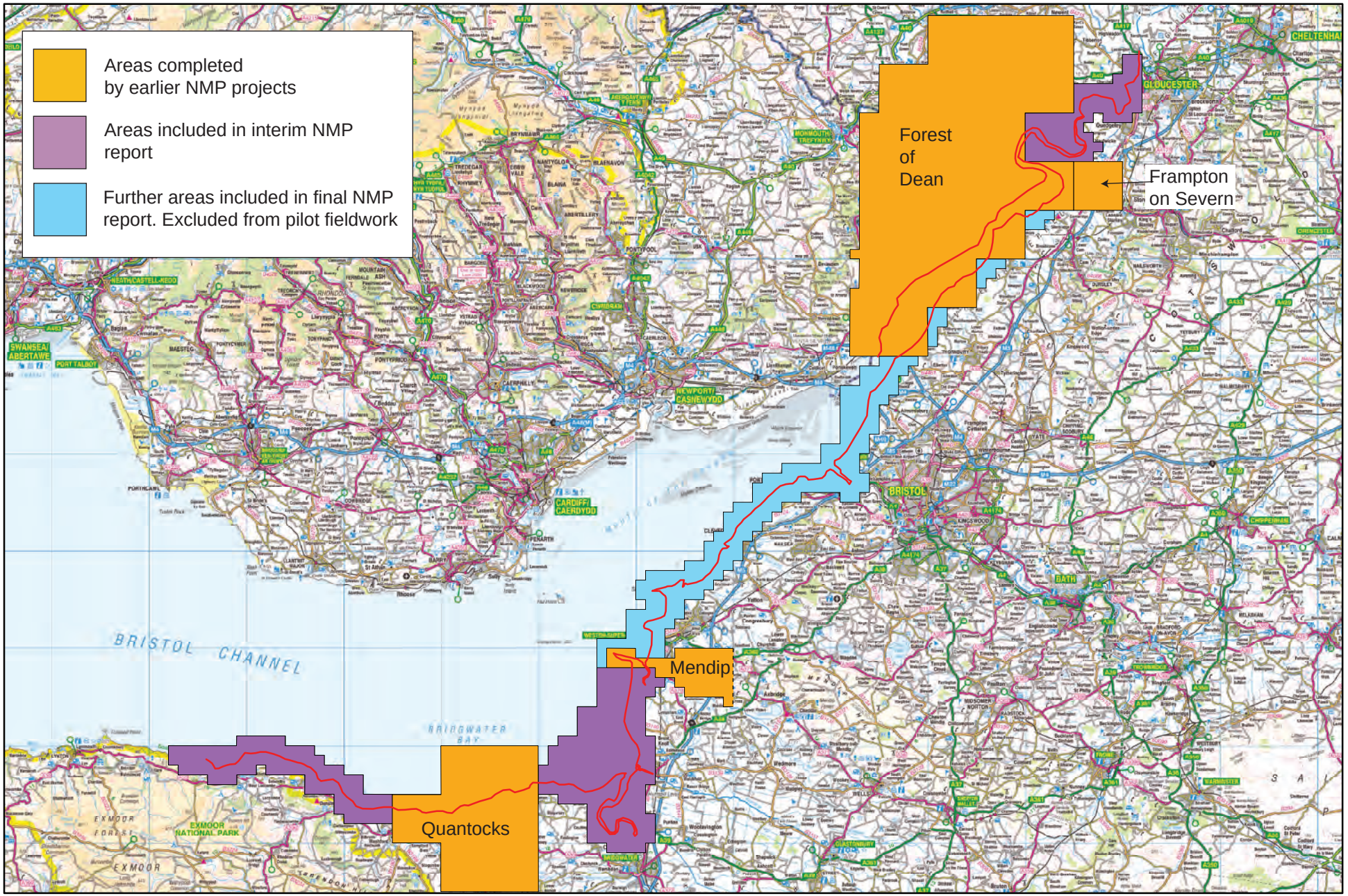

Figure 2: NMP coverage

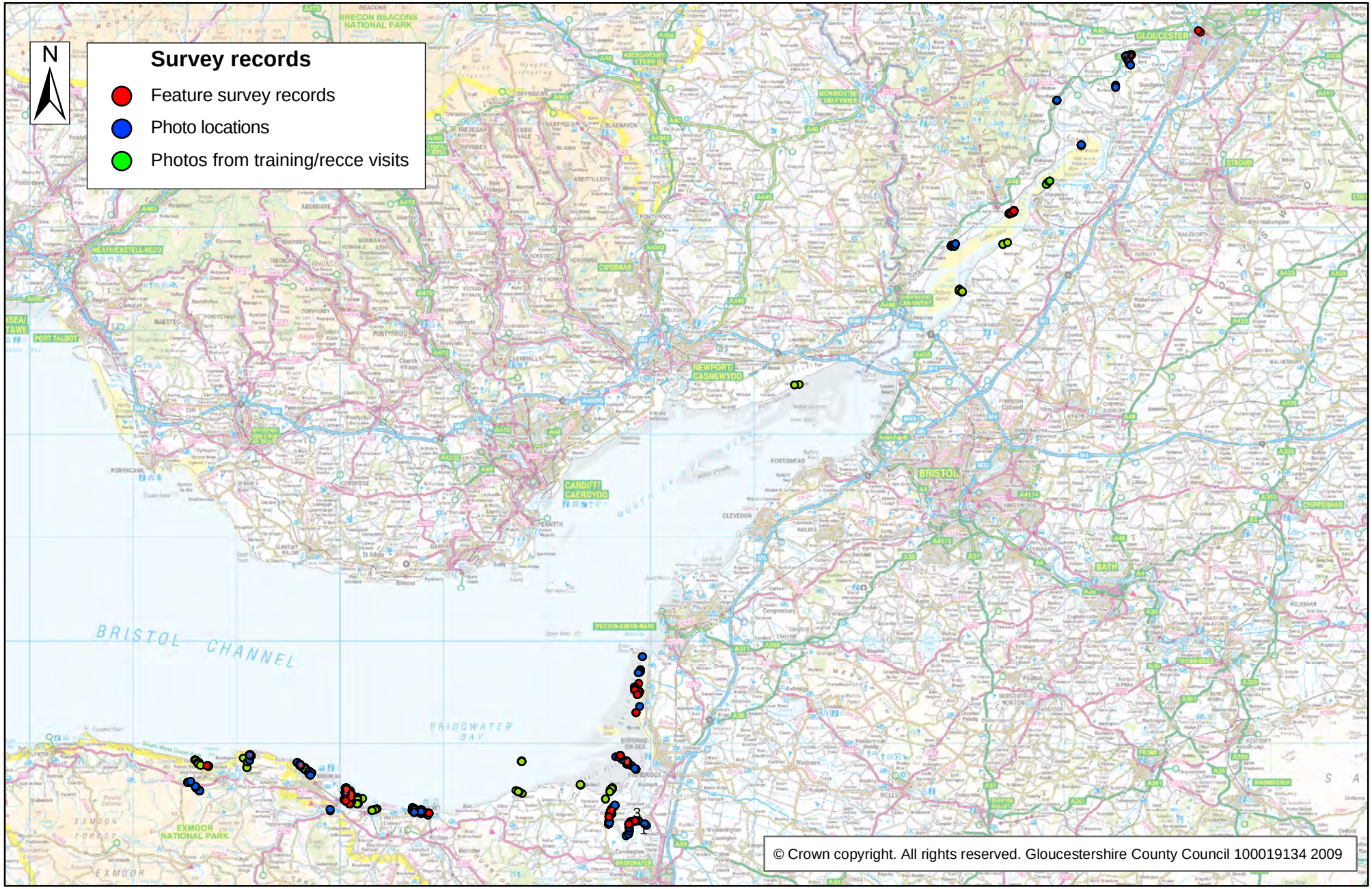

Figure 3: Locations visited and recorded during RCZAS Phase 2a

1:500,000

0 25 km

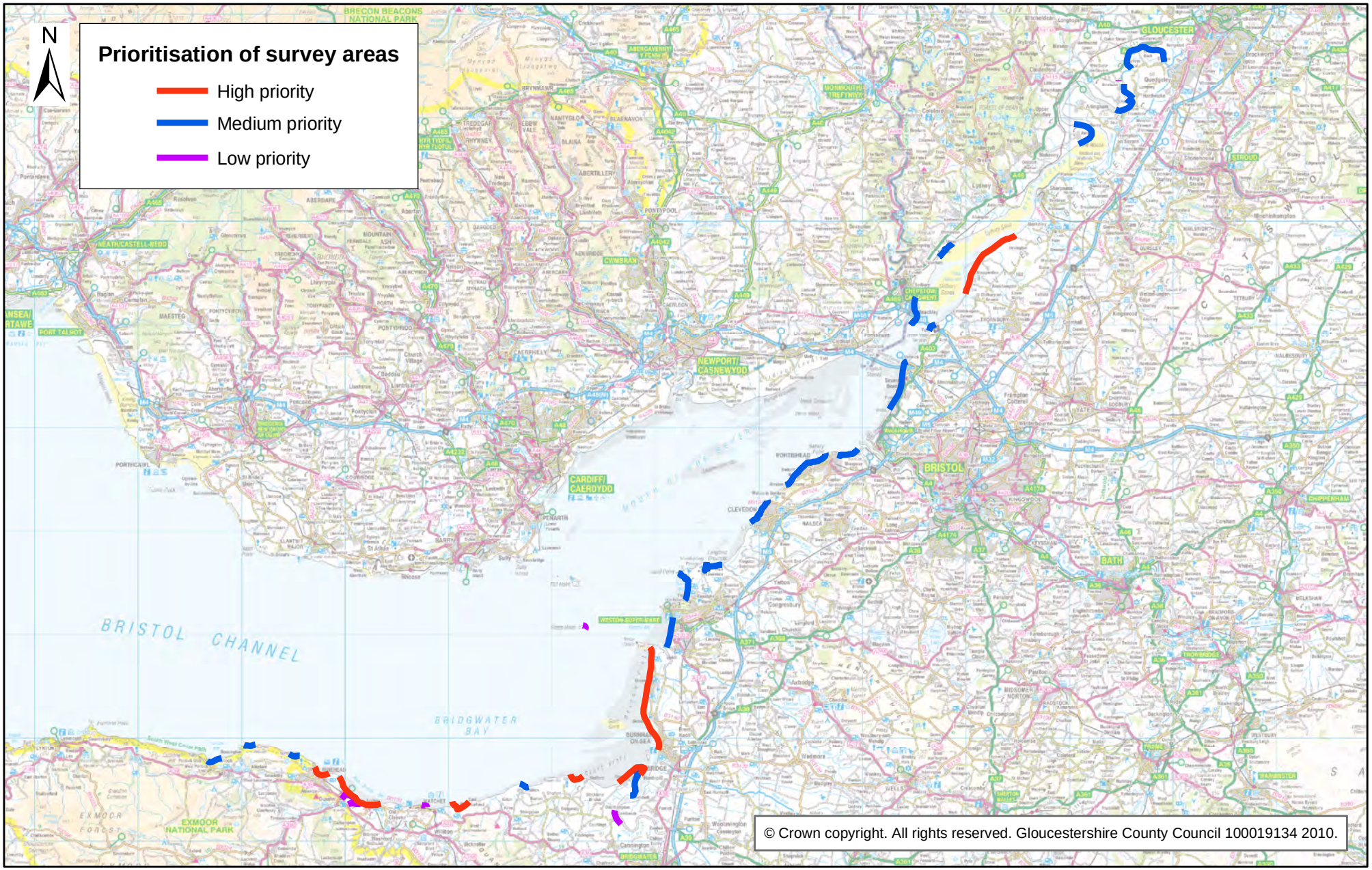

Figure 4: Prioritised areas and sites for main Phase 2 survey

1:500,000

0 25 km

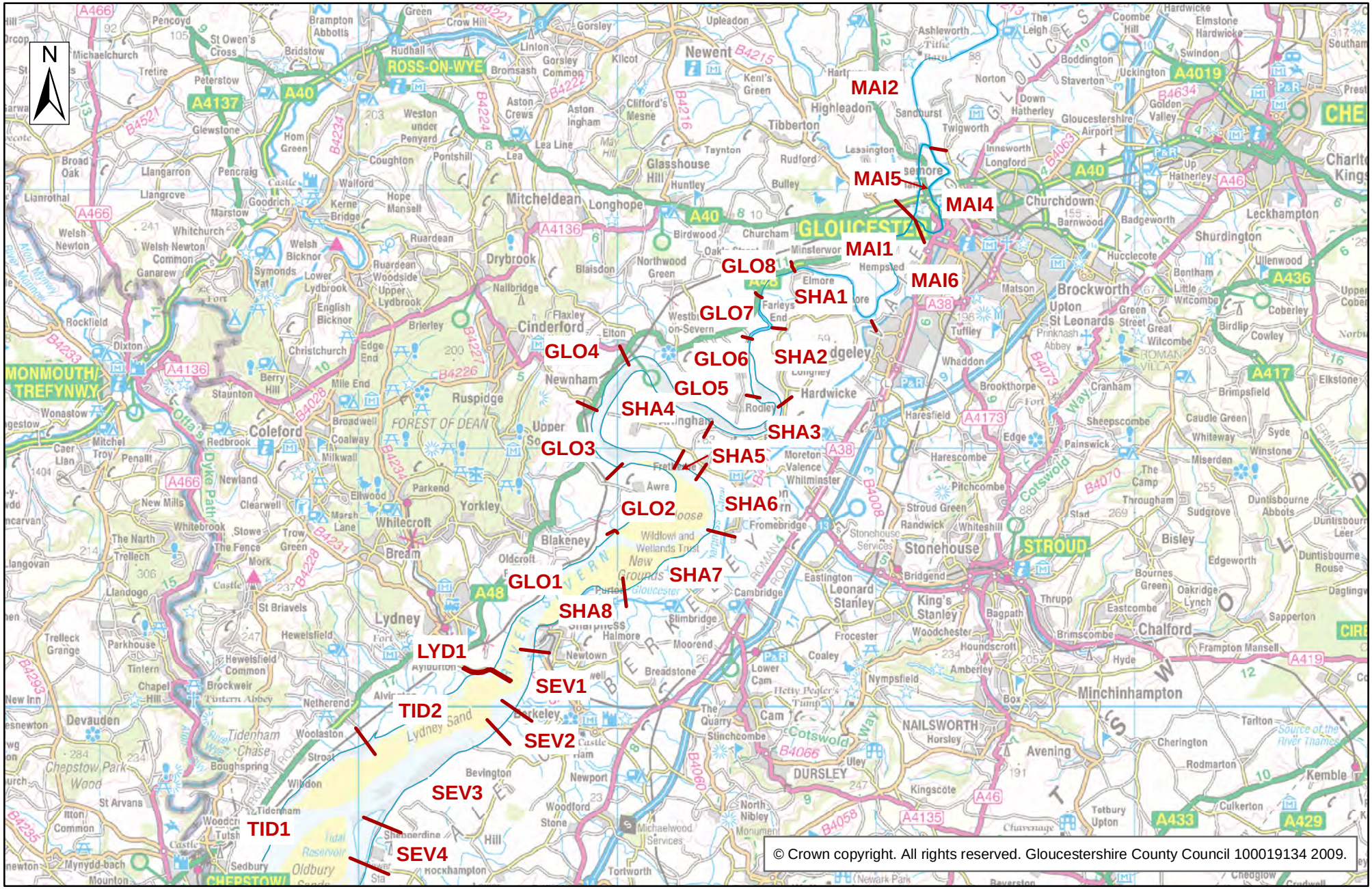

Figure 5: Severn Estuary Shoreline Management Plan 2 (SMP2) Policy Units (north)

1:200,000

0 10 km

Figure 6: Severn Estuary Shoreline Management Plan 2 (SMP2) Policy Units (south)

1:200,000

0 10 km

Figure 7: North Devon and Somerset Shoreline Management Plan 2 (SMP2) Policy Units

1:200,000

0 10 km

Appendix A

A.1 Shoreline Management Plans

A.1.1 The existing Shoreline Management Plan (SMP1) for the Severn Estuary was compiled by the Severn Estuary Coastal Group and Gifford Associated Consultants in 2000. Updated Shoreline Management Plans (SMPs) are now being drafted for the RCZAS area, by consultants acting on behalf of the Environment Agency (North Devon and Somerset) and the lead local authority (Monmouthshire for the Severn). These are the North Devon and Somerset SMP2, and the Severn Estuary SMP2, the boundary between the two being at Anchor Head, Weston-super-Mare. Draft consultation versions of these two revised SMPs are now available (Atkins Ltd 2009; Halcrow Group Ltd 2009). These SMPs divide the coastline into a series of Policy Units (PUs), each characterised by similarities in natural processes, the character of the coast, and/or flood or erosion risk. It is important to note, however, that these revised Policy Units may themselves change again in 2010 when the consultation process has been completed.

A.1.2 Once the final revised SMPs are issued, heritage assets at risk from coastal change will need to be reassessed. The plans will provide the evidence base for the identification of 'Coastal Change Management Areas' in regional and local plans, and they will also inform decisions (taken by the Environment Agency) on which defence schemes to fund. The revised SMPs only provide the policy for management approaches to such defences, however, and will not detail how policies will actually be implemented. The plans for future management will aim to reduce the impact of coastal processes on people and the developed, historical and natural environment. The SMPs will provide detailed information on the extent of coastal erosion, as well as consideration of the range of feasible coastal management scenarios for each coastal area and their impact in shaping the coastline for short term (0-20 years), medium term (20-50 years) and long term (50-100 years) periods. The relevant Coastal Group acts as a steering committee. English Heritage is one of the bodies that advise and comment on progress.

A.1.3 The shoreline management policies that will be considered in future have been defined by Defra (2006). In terms of the management of coastal defences, they consist of:

- Hold the line: Maintain or upgrade the level of protection provided by defences;
- Advance the line: Build new defences seaward of the existing defence line;
- Managed realignment: Allowing retreat of the shoreline, with management to control or limit movement;
- No active intervention: A decision not to invest in providing or maintaining defences.

A.2 The Severn Estuary Shoreline Management Plan 2 (SMP2)

A.2.1 In the Severn Estuary SMP2 (which also covers Wales), the relevant SMP area for the RCZAS extends from Beachley Head to Anchor Head, Weston-super-Mare. There are 42 separate Policy Units (PUs) that fall within the area of the Severn Estuary RCZAS – PUs WYE2, TID1-TID2, LYD1, GLO1-GLO8, MAI1-MAI2, MAI4-MAI6, SHA1-SHA8, SEV1-SEV6, BRIS1-BRIS3, BRIS6, PORT1-PORT4, KIN1-KIN4 and HOL2 (Atkins Ltd 2009: 23-26, part B, section 5.1). PUs BRIS4 and BRIS5 fall outside of the RCZAS study area.

A.2.2 These 42 Policy Units (PUs) are shown in Figures 4-5, and their physical characteristics and proposed future management policies (Atkins Ltd 2009) are summarised as follows:

- **TID1** – Beachley Point to Guscar Rocks. Largely low-lying agricultural grazing land, with cliffs at Sedbury, some residential areas and buildings, the Army Apprentices College, Nature Conservation sites and the Gloucester-Chepstow GWR railway.

  Short term, medium term and long term preferred policy – No Active Intervention. Within 50-100 years, increasingly dominant erosion will result in realignment of the shoreline, whilst sea level rises will increase isolated flooding incidents on agricultural land and the railway line.

  The SMP2 consultation document notes that the flood risk will increase in the long term to Broad Stone and the remains of Woolaston chapel (Atkins Ltd 2009). What is not stated, however, is that the remains of several early modern putcher ranks, other undated wooden structures, the Scheduled Roman villa complex at Chesters, part of the Scheduled Offa's Dyke, medieval structures at Grange Pill, prehistoric and Roman artefact scatters plus important prehistoric peat deposits and prehistoric wooden structures will also all be at much greater risk from erosion and 'coastal squeeze'. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion as part of any future management plans.

- **TID2** – Guscar Rocks to Lydney Harbour. Largely low-lying agricultural grazing land, with some residential areas and buildings, Nature Conservation sites and the line of the Gloucester-Chepstow GWR railway.

  Short term preferred policy – No Active Intervention. Medium and long term preferred policy – Managed Realignment. The likely flood risk to residential areas will be limited wherever possible, but there will be increased flood risk to agricultural land.

  Managed Realignment would most likely involve the construction of setback defences or other actions to regulate tidal exchange, and may include the expansion of existing wetland areas. The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). However, early modern jetties at Cone Pill and Warth Brook, post-medieval deposits, medieval ridge and furrow and various phases of bank defences, potentially dating back to the medieval or Romano-British periods, would all be at much greater risk from erosion and 'coastal squeeze', as would the early modern hulks and wooden revetment and/or fishing structures on the Lydney foreshore. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion as part of any future management plans.

- **LYD1** – Lydney Harbour basin. Modern industrial area and historic harbour structures and other associated features.

  Short term, medium term and long term preferred policy – Hold the Line. The existing defences of the harbour and the harbour gates will be maintained to prevent flooding.

  The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), and the policy of hold the line may mean that there are minimum risks to historical and archaeological assets. There will need to be an archaeological assessment, however, of the impact of hold the line on inter-tidal features in front of defences due to foreshore erosion and 'coastal squeeze'. There will need to be an

archaeological assessment of the impact of intertidal and foreshore erosion as part of any future management plans.

- **GLO1** – Lydney Harbour to Brims Pill. This area is mostly rocky shoreline and steeply sloping wooded riverbank or grazing land, with some residential areas at Purton and Gatcombe in narrow inlets, and low-lying agricultural grazing land around Poulton Court and Brims Pill. Lydney Cliff is a SSSI.

  Short term, medium term and long term preferred policy – No Active Intervention. The high ground should prevent flooding, although the railway line runs close to the shore near Wellhouse Bay and Purton, and some protection may be required in future to limit erosion.

  The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). The remains of several post-medieval or early modern putcher ranks along the foreshore would be at greater risk of erosion, however, and it is possible that any previously unrecorded medieval and post-medieval remains at Purton Pill might be exposed and eroded. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion as part of any future management plans.

- **GLO2** – Brims Pill to Northington Farm. This area mostly consists of low-lying agricultural grazing land.

  Short term preferred policy – No Active Intervention. Medium and long term preferred policy – Managed Realignment. In the medium and longer term a new defence line will be created on higher ground further inland, and this will probably result in the creation of additional intertidal and/or salt marsh habitat in front of it. Much of the low-lying land east of Awre will thus be affected.

  The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but two early modern fish houses and the earthworks of medieval ridge and furrow and post-medieval early modern rhynes would all be destroyed by greater erosion and flooding, along with several putcher ranks, different phases of flood defence banks and other traces of land reclamation of medieval date, perhaps with origins in the Romano-British period. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion as part of any future management plans.

- **GLO3** – Northington Farm to Newnham Church. This area mostly consists of agricultural grazing land, some residential areas, Nature Conservation sites and the line of the Gloucester-Chepstow GWR railway.

  Short term, medium term and long term preferred policy – No Active Intervention. The higher ground and harder geology in this zone should limit flooding and erosion, although in the long term the rate of shoreline erosion will increase as a result of sea level rises. In the long term monitoring and control of this erosion may become necessary.

  The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Ridge and furrow recorded near The Priory possibly associated with the medieval settlement of Boxcliff situated near Box Rock might be at risk from flooding, however. Possible boat building features at Bullo Pill might also be at risk from erosion, and Listed Buildings on low-lying land immediately south of Newnham at Callow Pill may be at greater risk from flooding and ‘coastal squeeze’. There will

need to be an archaeological assessment of the impact of intertidal and foreshore erosion as part of any future management plans.

- **GLO4** – Newnham Church to Pound Farm north of Broadoak. This area consists of the residential areas of Newnham, low-lying agricultural grazing land, the line of the Gloucester-Chepstow GWR railway and the A48 (T) road.

  Short term, medium term and long term preferred policy – Hold the Line. Existing defences will be maintained to protect the A48 road and residential properties, particularly those in the low-lying part of Newnham. In the medium to long term, as sea level rises, erosion and flood risk may increase, and more active management of the existing defences may be required, and/or replacement of the existing defence line.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but this will depend on the active maintenance of defences. Many of the residences in the lower part of Newnham are Listed Buildings, and there are surviving remains of the post-medieval and early modern quay. In addition, some ridge and furrow earthworks on low-lying land east of Broadoak may be at greater risk from flooding, erosion and 'coastal squeeze'. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion as part of any future management plans.

- **GLO5** – Pound Farm to Hill Farm, Rodley. This area consists mainly of low-lying agricultural grazing land, the Garden Cliff SSSI Nature Conservation site and isolated residential properties, along with the moated manor and gardens at Westbury Court.

  Short term, medium term and long term preferred policy – Hold the Line. Existing defences will be maintained to protect the low-lying hinterland behind the Garden Cliff face, but the current earth embankments will probably have to be replaced in 20-50 years time.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but this will depend on the active maintenance of defences. The SMP2 consultation document does note that consideration should be given to Westbury Court Gardens, which currently experiences flood risk from tide locked flap valves. Medieval ridge and furrow, a Scheduled wayside cross socket, post-medieval rhynes and several historical phases of flood defence bank south-east of Rodley would also be at risk if defences were not maintained. The land reclamation and river defences at Rodley are medieval or earlier in origin. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **GLO6** – Hill Farm, Rodley to Goose Lane Farm, north of Bollow. This area consists mainly of low-lying agricultural grazing land, with some orchards and woods on steeper ground, Nature Conservation sites and isolated farms and residential properties.

  Short term, medium term and long term preferred policy – No Active Intervention. The higher ground and harder geology in this zone should limit flooding and erosion, although in the long term the rate of shoreline erosion will increase as a result of sea

level rises. In the long term monitoring and control of this erosion may become necessary to protect residential properties in and around Bollow.

The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Some ridge and furrow and the possible 19th century gamekeeper or fish keeper's cottage on the riverbank south-east of Bollow might be at greater risk from erosion and flooding though. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **GLO7** – Goose Lane Farm, north of Bollow to Ley Road south of Denny Hill. This area consists mainly of low-lying grazing land and orchards, with the Walmore Common RAMSAR Nature Conservation site, isolated residential properties, and the A48 (T) road.

  Short term, medium term and long term preferred policy – Hold the Line. Existing defences will be maintained, but the current earth embankments will probably have to be replaced in 20-50 years time, and in the long term monitoring and control of erosion may become necessary.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). The remains of medieval ridge and furrow, different phases of historic flood defence banks and a Listed Building at The Noards would be under threat if there was increased flooding, erosion and 'coastal squeeze'. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **GLO8** – Ley Road south of Denny Hill to the drain from Long Brook, between Clay Hill and Minsterworth. This area mostly consists of low-lying grazing land and orchards, with some higher ground such as Denny Hill and Clay Hill, Nature Conservation sites, isolated residential properties, and the A48 (T) road and the Gloucester-Chepstow railway.

  Short term, medium term and long term preferred policy – Hold the Line. Existing defences will have to be maintained to prevent flooding of the road and railway. In the long term some monitoring and control of erosion may become necessary.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). The remains of medieval ridge and furrow and a Listed fish house would be under threat if there was increased flooding. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **MAI1** – Drain from Long Brook, between Clay Hill and Minsterworth, to the A40 road bridge. This area consists of low-lying grazing land and orchards, Nature Conservation sites, residential areas such as Minsterworth as well as isolated residential properties, and the A48 (T) road and the Gloucester-Chepstow railway.

  Short term preferred policy – No Active Intervention. Medium and long term preferred policy – Managed Realignment. The current flood defences are expected to fail in the next 20 years, threatening agricultural land, some isolated residential properties, some local infrastructure and the electricity distribution network. The maintenance of some existing defences may take place if funds are available,

although it is not intended to construct new defences. Much of the Minsterworth Ham area would be left to evolve naturally, probably into wetlands, and this offers a potential site for habitat creation. Subject to further studies, in the medium term a new defence line may be constructed, to expand existing wetland areas or replace areas lost by sea level rise, and also to increase flood conveyance to reduce the overall impact of flooding. Once created, these new defences would be maintained over the long term.

The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but any increase in flooding would threaten Listed Buildings in Minsterworth and Calcott's Green, and the Scheduled Telford Bridge and the line of the Roman road. Any expansion of wetlands would also affect many areas of ridge and furrow and earlier phases of flood defence. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **MAI2** – The A40 road bridge to Haw Bridge, north of Bishop's Norton. This Severn Estuary SMP2 Policy Unit extends further north than Maisemore weir, the northernmost boundary of the RCZAS study area. The area consists of the confluence with the River Leadon, generally low-lying agricultural grazing land but also higher ground such as Spring Hill, residential areas such as Maisemore and isolated farms and residential properties, Nature Conservation sites, and the A417 road.

  Short term, medium term and long term preferred policy – Hold the Line. Existing defences will be maintained to prevent flooding, although some may need to be reconstructed and enhanced. In the long term some monitoring and control of erosion may become necessary.

  The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but any increase in flooding would threaten Listed Buildings in Maisemore and Maisemore Court, a Scheduled churchyard cross, the remains of Civil War fortifications at Over, Over Bridge, and two ring ditches between Over and Over Farm. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **MAI4** – Upper Parting to Lower Parting. This area consists of low-lying grazing land, infrastructure, public and government buildings, residential areas, the A417 and A430 roads, the Gloucester-Chepstow railway, and the Scheduled remains of Llanthony Priory.

  Short term, medium term and long term preferred policy – Hold the Line. Existing defences will be maintained to prevent flooding, although where no current defences exist further assessment will be necessary on the future requirement of defences as sea level rises, and some may need to be reconstructed and enhanced. In the long term maintenance of new and existing defences should continue.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but the site of Llanthony Priory will require careful assessment in any future flood defence schemes, as will the many Listed Buildings and buried archaeological remains in this part of Gloucester. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans. The location of the Roman and medieval port facilities at Gloucester is still unknown,

which would be a crucial condition of the assessment of construction of any future flood defences.

- **MAI5** – Alney Island. This area consists of low-lying grazing land, infrastructure such as the electricity transforming station, residential areas, the A417 and A430 roads, the Gloucester-Chepstow railway, and Alney Island Nature Reserve.

  Short term, medium term and long term preferred policy – Hold the Line. Existing defences will be maintained to prevent flooding, although some may need to be reconstructed and enhanced. Where no current defences exist, further assessment will be necessary on the future requirement of defences as sea level rises. In the long term maintenance of new and existing defences should continue.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but the cross by Maisemore Bridge and post-medieval drainage features at Port Ham would be at risk from any flooding. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **MAI6** – Lower Parting to Severn Farm, near Stonebench. This area consists of low-lying agricultural land, a landfill site, infrastructure such as a sewage works, industrial and residential areas, the A430 road and the Gloucester-Sharpness Canal.

  Short term, medium term and long term preferred policy – Hold the Line. Existing defences will be maintained to prevent flooding, although some may need to be reconstructed and enhanced. Where no current defences exist, further assessment will be necessary on the future requirement of defences as sea level rises. In the long term maintenance of new and existing defences should continue.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Areas of medieval ridge and furrow, post-medieval drainage channels, undated early phases of river bank defences, Listed Buildings in Newark and Hempsted, a village cross in Hempsted and the Scheduled earthworks at Lady's Well would all be at risk from any flooding. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SHA1** – Severn Farm, near Stonebench to Wicks Green. This area consists of low-lying agricultural land and orchards, a small higher area (Windmill Hill), isolated farms and residential properties.

  Short term preferred policy – No Active Intervention. Medium and long term preferred policy – Managed Realignment. The current flood defences are expected to fail in the next 20 years, although the maintenance of existing short lengths of defence will continue to allow the implementation of a new defence line, if funds are available. In the medium and long term, much of the Elmore area would be left to evolve naturally, probably into wetlands, and this offers a site for habitat creation. In the medium term a new defence line will be constructed further inland along higher ground. Once created, these new defences would then be maintained over the long term.

  The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but notes that 156ha of land will be subject to frequent flooding. Extensive areas of medieval ridge and furrow and post-medieval land drainage, early phases

of land reclamation, the undated 'Great Wall' of Elmore and other river bank defences that are probably medieval in origin would therefore all be at much greater risk from flooding and an expansion of wetlands or intertidal areas, as would Listed Buildings in Elmore and Elmore Back, and a possible moated site at Wicks Green. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SHA2** – Wicks Green to Longney Green. This area consists of low-lying agricultural land and orchards, residential areas and isolated farms.

  Short term preferred policy – No Active Intervention. Medium and long term preferred policy – Managed Realignment. The current flood defences are expected to fail in the next 20 years. In the medium and long term, the lowest-lying land in the area would be left to evolve naturally, probably into wetlands, and this offers habitat creation. In the medium term a new defence line of earthwork embankments will be constructed along higher ground to try and minimise the impact to people, property and infrastructure, and also to increase flood conveyance. This might leave Downend, Castle End Farm or Longney as islands or peninsulas surrounded by wetlands. Once created, these new defences would then be maintained over the long term.

  The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but notes that 352ha of land will be subject to frequent flooding. Areas of medieval ridge and furrow and post-medieval land drainage, early phases of land reclamation and river bank defences that are probably medieval in origin would thus all be at much greater risk from flooding and an expansion of wetlands or intertidal areas, as would Listed Buildings at Yew Tree Farm, Downend, Bowlane, Longney and Manor Farm. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SHA3** – Longney Green to Overton Lane. This area consists of low-lying agricultural land and orchards, a small higher area (Barrow Hill), residential areas and isolated farms, and infrastructure such as electricity pylons.

  Short term, medium term and long term preferred policy – Hold the Line. The existing flood defences are expected to fail in the next 20-50 years. If this was allowed, a large flood cell would develop and would impact on agricultural land, residential properties, local infrastructure and the electricity, effectively creating an island around Arlingham. To prevent this, existing defences will be reconstructed and enhanced. Where no current defences exist, further assessment will be necessary on the future requirement of defences as sea level rises. In the long term maintenance of new and existing defences will continue.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Areas of medieval ridge and furrow, post-medieval land drainage and early phases of land reclamation and river bank defences that are probably medieval in origin would all be at risk from any flooding, as would Listed Buildings at Epney, Lea Court Farm, Upper Framilode, Framilode, Priding and the moated manor at Wick Court. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SHA4** – Overton Lane to upstream of Hock Cliff. This area consists of low-lying agricultural land and orchards, small higher areas (Barrow Hill), residential areas and isolated farms, Nature Conservation sites and infrastructure such as electricity pylons.

  Short term preferred policy – No Active Intervention. Medium and long term preferred policy – Managed Realignment. The current flood defences are expected to fail in the next 20 years. In the medium and long term, the lowest-lying land in the area would be left to evolve naturally, probably into wetlands, and this offers habitat creation. In the medium term a new defence line of earth embankments will be constructed, the location to be determined by future studies, and to increase flood conveyance. Once created, these new defences would then be maintained over the long term.

  The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but notes that 409ha of land will be subject to frequent flooding. Some of the most well-preserved areas of medieval ridge and furrow in the inner Severn Estuary would thus be threatened by flooding. Post-medieval land drainage and early phases of land reclamation and river bank defences would also be at much greater risk from flooding and an expansion of wetlands or intertidal areas, as would Listed Buildings at Arlingham, Passage Farm, Church Farm, rectory Farm and West End Farm. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SHA5** – Hock Cliff. This area consists of agricultural land, orchards and isolated residential properties behind an elevated cliff of hard geology which is a Nature Conservation site.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the hard geology will limit this, although the area will be monitored and if in the long term erosion should threaten cliff top assets, erosion protection measures will be considered.

  Due to the nature of the geology and the landscape, the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). The Listed Building at The Reddings and a series of stratigraphic units within the section at Hock Cliff might be threatened if erosion accelerated greatly, and prehistoric flint and medieval pottery finds from below the cliff might increase. The medieval settlement site and earthworks immediately west of Fretherne, however, should be safe.

- **SHA6** – Downstream of Hock Cliff to Frampton Pill. This area consists of low-lying agricultural land and orchards, isolated farms and residences, the Gloucester and Sharpness Canal, and infrastructure such as a sewage works.

  Short term, medium term and long term preferred policy – Hold the Line. The existing flood defences are expected to fail in the next 20-50 years. If this was allowed, a large flood cell would develop and would impact on agricultural land, residential properties, local infrastructure and the electricity, effectively creating an island around Arlingham, and threatening Frampton on Severn. To prevent this, existing defences will be reconstructed and enhanced. Where no current defences exist, further assessment will be necessary on the future requirement of defences as sea level rises. In the long term maintenance of new and existing defences will continue.

Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Prehistoric features identified by earlier fieldwork and an NMP survey, areas of medieval ridge and furrow, post-medieval land drainage and earlier phases of land reclamation and river bank defences would all be at risk from any flooding, as would Listed Buildings at Saul Lodge, Manor Farm, Church End and in Frampton on Severn itself. The Fretherne and Splatt swing bridges across the canal are also Listed structures. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SHA7** – Frampton Pill to Royal Drift outfall. This area consists of low-lying agricultural land, isolated farms and residences, the Gloucester and Sharpness Canal, and the Conservation Site of the Wildfowl and Wetlands Trust at Slimbridge.

  Short term preferred policy – No Active Intervention. Medium and long term preferred policy – Managed Realignment. The current flood defences are expected to fail in the next 20 years. In the medium and long term, the lowest-lying land in the area would be left to evolve naturally, probably into wetlands, and this offers habitat creation. In the medium term a new defence line of earth embankments will be constructed. Once created, these new defences would then be maintained over the long term.

  The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009), but notes that 187ha of land will be subject to frequent flooding. Ridge and furrow, post-medieval land drainage and earlier phases of land reclamation and river bank defences would all be at much greater risk from flooding and an expansion of wetlands or intertidal areas, as would an undated brushwood and timber structure that may have been a trackway or a wharf (Price and Spry 2004). There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SHA8** – Royal Drift outfall to Sharpness Docks. This area consists of a mixture of low-lying and more elevated agricultural land, isolated farms and residences, the Gloucester and Sharpness Canal, infrastructure including a water treatment works and reservoirs at Purton, the industrial area and docks at Sharpness, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology and higher ground will limit this, although the area will be monitored and erosion protection measures will be considered if necessary.

  Due to the nature of the geology and the landscape, the SMP2 consultation document states that limited erosion and flood risk will not impact on the historic environment, but that erosion protection may be required to protect the Purton Hulks and the canal (Atkins Ltd 2009). In addition, however, areas of medieval ridge and furrow, post-medieval land drainage, earlier phases of land reclamation and river bank defences would be at risk from any flooding or erosion, as would an early modern wildfowl decoy, and Listed Buildings in Sharpness and Purton. The latter include one of the swing bridges at Purton and a towing horse stable and lock house at Sharpness Docks. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SEV1** – Sharpness Docks to Bull Rock. This area consists of a mixture of low-lying agricultural land, isolated farms and residences, infrastructure including a sewage treatment works and a depot near Newtown, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – Hold the Line. The existing flood defences are expected to fail in the next 20-50 years. If this was allowed, a large flood cell would develop and would threaten Berkeley and Berkeley Power Station. To prevent this, existing defences will be reconstructed and enhanced. Where no current defences exist, further assessment will be necessary on the future requirement of defences as sea level rises. In the long term maintenance of new and existing defences will continue.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Areas of medieval ridge and furrow, post-medieval land drainage and earlier phases of land reclamation and river bank defences would all be at risk from any flooding, as would Listed Buildings at Saniger Farm and Oakhunger Farm. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SEV2** – Bull Rock to the southern boundary of Berkeley Power Station. This area consists of a mixture of low-lying agricultural land, and the infrastructure and buildings associated with Berkeley nuclear power station.

  Short term, medium term and long term preferred policy – Hold the Line. Although the power station itself is situated on higher ground, the existing flood defences in this area are expected to fail in the next 20-50 years. To prevent flooding as sea level rises, existing defences will be reconstructed and enhanced. In the long term maintenance of new and existing defences will continue.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Small areas of medieval ridge and furrow, post-medieval land drainage and earlier phases of river bank defences would all be at risk from any flooding, as would a Grade II Listed former summerhouse. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SEV3** – The southern boundary of Berkeley Power Station to Oldbury Power Station. This area consists of a mixture of low-lying agricultural land, isolated farms and residences, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – Hold the Line. Although the power station itself is situated on higher ground, the existing flood defences in this area are expected to fail in the next 20-50 years. To prevent flooding as sea level rises, existing defences will be reconstructed and enhanced. In the long term maintenance of new and existing defences will continue.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). However, important prehistoric worked flint scatters, stone axes and peat deposits have been found at this locale. An extremely significant Romano-British port site at Hill Pill would also be badly affected by any increased erosion, flooding or 'coastal squeeze', or indeed by any new flood defence works. The Romano-British site includes the remains of stone buildings and substantial surviving archaeological deposits that have produced pottery and other

artefacts, and evidence for iron working. It is already eroding out of the existing riverbank. Further Romano-British artefacts were discovered during groundwork at a pub in Shepperdine. Large areas of ridge and furrow, post-medieval land drainage and earlier phases of river bank defences would also all be at risk from any erosion or flooding, as would post-medieval or early modern fishing structures in the intertidal zone, and Listed Buildings at Shepperdine Farm, Dairy Farmhouse, Manor Farm, Jobsgreen Farm and Worthy Farm. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SEV4** – Oldbury Power Station. This area consists of a mixture of low-lying agricultural land, and the infrastructure and buildings associated with the Oldbury on Severn nuclear power station.

  Short term, medium term and long term preferred policy – Hold the Line. Although the power station itself is situated on higher ground, the existing flood defences in this area are expected to fail in the next 20-50 years. To prevent flooding as sea level rises, existing defences will be reconstructed and enhanced. Oldbury has been selected as a possible site for a new nuclear power station, to be constructed next to the decommissioned old facilities. In the long term maintenance of new and existing defences will continue.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). However, unpublished salvage excavations at the site of the silt lagoon at Oldbury Power Station revealed prehistoric features including ditches and structural remains, worked timbers and flint. Romano-British pottery, slag animal bone and other finds were found at the southern end of the tidal reservoir for the power station, whilst the intertidal zone there has a series of post-medieval or early modern fish traps, possibly of a unique form. All of these features would be affected by any increased erosion, and potentially by any future flood defence schemes or infrastructure work associated with a new power station. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SEV5** – Oldbury Power Station to Littleton Warth. This area consists of a mixture of low-lying agricultural land, with some elevated areas such as Oldbury Camp and Cowhill Wood, an industrial estate with residential areas such as Oldbury on Severn and Cowhill, isolated farms and residences, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – Hold the Line. The existing flood defences are expected to fail in the next 20-50 years. If this was allowed, a large flood cell would develop and would threaten Oldbury Power Station, Oldbury on Severn, Little upon Severn or even Thornbury. To prevent this, existing defences will be reconstructed and enhanced. Where no current defences exist, further assessment will be necessary on the future requirement of defences as sea level rises. In the long term maintenance of new and existing defences will continue.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Any changes caused by increased flooding, erosion and/or the construction of new flood defences, however, could impact upon a series of extremely significant archaeological remains in this locale including prehistoric peat deposits and flint scatters, and nationally important human footprints and animal tracks of Neolithic date. Romano-British finds from Oldbury Pill include a stone shaft, flue tile fragments and *tegulae*, suggesting the presence of a

villa or another form of high-status site. Romano-British pottery, other artefacts and evidence for iron working has also been found at Cowhill, Home Farm and Dayhouse Farm, and at Cowhill part of a minor Roman road has also been found. Medieval artefacts have been recovered from Home Farm, Dayhouse Farm and Nupdown Farm. The reclamation of this area may have occurred in the Romano-British or medieval periods, and other historical assets potentially at risk in this area include areas of ridge and furrow, post-medieval land drainage and earlier phases of river bank defences. In addition, post-medieval or early modern fishing structures are present in the intertidal zone, Oldbury Sands contains the remains of at least 17 known shipwrecks, and there is a Listed Building at Lower Farm. The hill at Oldbury on Severn also features the Scheduled Ancient Monument of an Iron Age hillfort, whose landscape setting might also be at threat, and Listed Buildings in Thornbury itself could be at risk from any flooding. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **SEV6** – Littleton Warth to Aust Ferry. This area consists of a mixture of low-lying agricultural land, with some elevated areas behind a hard geology cliff, a geological SSSI. There is also the M48 Severn Bridge road crossing and associated services, a power line crossing with its pier and an electricity substation, residential areas such as Aust, isolated farms and residences, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology and higher ground will limit this, although the area will be monitored and erosion protection measures will be considered if necessary in the future if the M48 and other infrastructure is threatened.

  Due to the nature of the geology and the landscape, the SMP2 consultation document states that limited erosion and flood risk will not impact on the historic environment (Atkins Ltd 2009). Nevertheless, it would seem that any erosion, flooding and 'coastal squeeze' between Littleton Warth and the higher ground by the M48, and between the southern end of Aust Cliff and Old Passage, could still threaten a variety of archaeological and historical assets. Iron Age and Romano-British finds have been recovered from in and around Aust, including possible votive objects, and Aust was probably a Romano-British settlement or small port. There are remains of medieval ridge and furrow and post-medieval drainage and flood defences, Second World War structures, and Aust and Old Passage contain several Listed Buildings. The intertidal zone in this locale includes post-medieval or early modern fish traps and shipwrecks, and the remains of several piers and slipways, including the old ferry crossing at Old Passage. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **BRIS1** – Aust Ferry to New Passage. This area consists mostly of low-lying agricultural land, the A403, M4 and M48 roads and motorways, isolated farms and residences, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – Hold the Line. Existing flood defences will be maintained for the long-term although there may be some erosion of the coastal salt marsh.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Nevertheless, a Romano-British field

system near Northwick, areas of ridge and furrow, post-medieval land drainage and earlier phases of river bank defences would all be at risk from any erosion, flooding and 'coastal squeeze', as would Listed Buildings at Northwick. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **BRIS2** – New Passage to northern extent of Severnside Works. This area consists of low-lying agricultural land and industrial areas, the A403, M4, M48 and M49 roads and motorways, the Second Severn crossing road bridge, the Severn Tunnel railway and associated infrastructure, residential areas such as Severn Beach, Redwick and Pilning, isolated farms and residences, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – Hold the Line. Existing flood defences will be maintained for the long-term although there may be some erosion of the coastal salt marsh. The existing flood defences are expected to fail in the next 20-50 years, but will be reconstructed and enhanced.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Any increased flooding, erosion and/or the construction of new flood defences, however, could impact upon prehistoric peat and alluvium deposits, important Iron Age inhabitation sites at Hallen, a Romano-British field system at Crook's Marsh, areas of ridge and furrow, post-medieval land drainage and river bank defences. The intertidal zone in this area contains prehistoric peat deposits, submerged forest and post-medieval or early modern fish traps. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **BRIS3** – The northern extent of Severnside Works to Avonmouth Pier. Much of this Policy Unit lies outside the Severn Estuary RCZAS, as it falls within the area covered by the Environmental Impact Assessment for the proposed Bristol Deep Sea Container Terminal (Maritime Archaeology 2007; see section 14.5 below). Nevertheless, there is a narrow strip approximately 1.5km wide between the north-west to south-east railway and the fuel depot and the A403, and extending to the south-east where the railway line crosses the M49 and M5, which is within the Severn Estuary RCZAS area, along with a narrow strip by Shirehampton and the east bank of the River Avon. This area consists mostly of low-lying industrial areas and infrastructure such as the M49 and M5.

  Short term, medium term and long term preferred policy – Hold the Line. Existing flood defences will be maintained for the long-term although there may be some erosion of the coastal salt marsh. The existing flood defences are expected to fail in the next 20-50 years, but existing defences will be reconstructed and enhanced.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Any changes caused by increased flooding, erosion, 'coastal squeeze' and/or the construction of new flood defences, however, could impact upon prehistoric peat and alluvium deposits, prehistoric occupation deposits, areas of ridge and furrow, post-medieval land drainage and phases of river bank defences, and Second World war features. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **BRIS6** – Avon Road (Easton-in-Gordano) to Portishead Pier. This area consists of low-lying salt marsh, dock-related industry and infrastructure at the Royal Portbury Docks, electricity power lines and infrastructure, the M5 motorway, residential areas at Pill, Lodway and Easton-in-Gordano, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – Hold the Line. Existing flood defences will be maintained for the long-term although there may be some erosion of the coastal salt marsh. Existing flood defences will be reconstructed and maintained.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Little archaeological work has been undertaken in the Portishead dockland and intertidal areas, but any changes caused by increased flooding, erosion and/or the construction of new flood defences, however, could impact upon known early modern pier structures and Second World War features. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **PORT1** – Portishead Pier to Battery Point swimming pool. This area consists of hard geology cliffs and a wave-cut platform, with residential and industrial areas on the steep slopes above, and the East Wood Nature Conservation site.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology and higher ground will limit this, although the area will be monitored and erosion protection measures will be considered if necessary in the future.

  Due to the nature of the geology and the landscape, the SMP2 consultation document states that limited erosion and flood risk will not impact on the historic environment (Atkins Ltd 2009). Little archaeological work has been undertaken in this area, but any changes caused by increased flooding, erosion and 'coastal squeeze' could impact upon the early modern pier structure itself and nearby slipways, the early modern lighthouse, post-medieval to Second World War structures and fortifications and several other Listed Buildings. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **PORT2** – Battery Point swimming pool to southern extent of Esplanade Road. This area consists of low-lying, rocky shoreline and salt marsh, a boating lake and residential areas, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology will limit this, although the area will be monitored and erosion protection measures will be considered if necessary in the future.

  Due to the nature of the geology and the landscape, the SMP2 consultation document states that limited erosion and flood risk will not impact on the historic environment (Atkins Ltd 2009). Little archaeological work has been undertaken in the intertidal and foreshore areas of Woodhill Bay and these may have to be targeted in Phase 2 fieldwork, but there will also need to be an archaeological

assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **PORT3** – Southern extent of Esplanade Road to Ladye Point. This area consists of some low-lying salt marsh but is mostly hard cliff geology with sloping agricultural land, residential areas, a golf course and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology will limit this, although the area will be monitored and erosion protection measures will be considered if necessary in the future.

  Due to the nature of the geology and the landscape, the SMP2 consultation document states that limited erosion and flood risk will not impact on the historic environment (Atkins Ltd 2009). Little archaeological work has been undertaken in the intertidal and foreshore areas of Kilkenny Bay, Sugar Loaf Beach, Black Nore, Hang Rock, Redcliff Bay, Charlcombe Bay, Walton Bay, Pigeon House Bay, Margaret's Bay and Backhill Sands, and these may have to be targeted in Phase 2 fieldwork. Scheduled Ancient Monuments such as the Bronze Age barrow, Iron Age 'banjo' enclosure and associated prehistoric field system earthworks at Walton Common, Welton Castle and medieval ridge and furrow at Walton Down may all be at risk from greater degrees of runoff and slope erosion. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **PORT4** – Ladye Point to Old Church Road. This area consists of hard cliff geology with wave-cut platform and low-lying rocky shoreline, residential areas, recreation grounds and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology will limit this, although the area will be monitored and erosion protection measures will be considered if necessary in the future.

  Due to the nature of the geology and the landscape, the SMP2 consultation document states that limited erosion and flood risk will not impact on the historic environment (Atkins Ltd 2009). Little archaeological work has been undertaken in the area, and this may have to be targeted in Phase 2 fieldwork. Nevertheless, any changes caused by increased flooding, erosion and 'coastal squeeze' could impact upon the univallate hillfort and early modern fort at Wain's Hill and medieval pillow mounds, the earthworks and Listed Building on Church Hill, and the early modern pier and many Listed Buildings in Clevedon itself. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **KIN1** – Old Church Road to St Thomas' Head. This area consists mostly of low-lying salt marsh and agricultural grazing land, with some isolated farms and residences, infrastructure such as the M5 motorway and sewage works, and Nature Conservation sites.

Short term, medium term and long term preferred policy – Managed Realignment. The existing defences are expected to fail within the next 20-50 years, resulting in frequent, extensive flooding. The long term plan in this area is, subject to further studies, to encourage the natural development of the estuary as salt marsh and wetlands, whilst reducing the impacts of flooding to people, property and infrastructure. There would thus be opportunities for habitat creation, and managed realignment would most likely involve the construction of set back defences or other actions to regulate tidal exchange. The precise location and type of defence would be determined by more detailed studies.

The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Any expansion of wetlands, increased flooding, erosion and/or the construction of new flood defences, however, could impact upon important prehistoric peat and alluvium deposits in the Gordano valley, prehistoric flint scatters south of Blackstone Rocks, and medieval and post-medieval land drainage and flood defences along the Severn shoreline and the banks of the River Banwell, some associated with the medieval Woodspring Priory (see KIN2 below). The intertidal zone in this area contains post-medieval or early modern fish traps, wooden structures of unknown date and function, and piers and target wrecks associated with the firing range at Langford Grounds off Kingston Seymour. There is also a Listed Building at Dowlais Farm. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **KIN2** – St. Thomas' Head to Middle Hope car park, Sand Point. This area consists of hard cliff geology with sloping agricultural grazing and open heathland, isolated residences and a Nature Conservation site (the Middle Hope SSSI).

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology will limit this, although the area will be monitored and erosion protection measures will be considered if necessary in the future.

  Due to the nature of the geology and the landscape, the SMP2 consultation document states that limited erosion and flood risk will not impact on the historic environment (Atkins Ltd 2009). Nevertheless, the Scheduled Ancient Monuments in the area include Bronze Age barrows, a later prehistoric field system, a medieval motte and bailey castle and the remains of the medieval Woodspring Augustinian Priory. These extremely important heritage sites may all be at risk from greater degrees of surface runoff, and slope and cliff erosion. There will need to be an archaeological assessment of the impact of foreshore and cliff erosion and 'coastal squeeze' as part of any future management plans.

- **KIN3** – Middle Hope car park, Sand Point to southern extent of Beach Road. This area consists mostly of low-lying salt marsh and sand dunes, agricultural grazing land, isolated farms and residences, holiday and caravan parks, the residential areas of Kewstoke, Norton and Worlebury, and a Nature Conservation site.

  Short term, medium term and long term preferred policy – Hold the Line. The existing sand dune defences may be breached in the next 20-50 years. To avoid this, the sand dunes will continue to be managed to provide flood protection, but as sea level rise increases, there will be some realignment in the area to the north of the Policy Unit as erosion increases.

The SMP2 consultation document records little threat to historical assets (Atkins Ltd 2009). Any increased flooding, erosion and/or the construction of new flood defences, however, would impact upon post-medieval or early modern fish traps in the intertidal zone, which has not been extensively surveyed. Listed Buildings on the northern edge of Worlebury might also be at risk. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future management plans.

- **KIN4** – Southern extent of Beach Road to Birnbeck Island, Anchor Head, Weston-super-Mare. This area consists mostly of hard rock headland cliffs, and steeply sloping, open ground with some residential areas, infrastructure such as a water tower and reservoir, a pier and an IRB Lifeboat station, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology will limit this, although the area will be monitored and erosion protection measures will be considered if necessary in the future.

  Due to the nature of the geology and the landscape, the SMP2 consultation document states that limited erosion and flood risk will not impact on the historic environment (Atkins Ltd 2009). Nevertheless, the Scheduled Ancient Monument of Worlebury Camp, a multivallate Iron Age hillfort, may be at risk from greater degrees of runoff, and slope and cliff erosion. Any increased flooding or erosion could, however, impact upon Listed Buildings including the pier and lifeboat station at Birnbeck Island, and in the northern part of Weston-super-Mare. There will need to be an archaeological assessment of the impact of foreshore and headland erosion as part of any future management plans.

- **HOL2** – The island of Steep Holm. This area consists of hard rock steep cliffs, with open heathland above, including Nature Conservation sites, and abandoned military installations.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology will limit this, although the area will be monitored and erosion protection measures will be considered if necessary in the future.

  Due to the nature of the geology and the landscape, the SMP2 consultation document states that limited erosion and flood risk will not impact on the historic environment (Atkins Ltd 2009). Nevertheless, Scheduled Ancient Monuments including a medieval priory, a possible medieval field system and early modern and Second World War defence installations may be at risk from greater degrees of runoff, and slope and cliff erosion. These may all be at risk from greater degrees of surface runoff, and slope and cliff erosion. There will need to be an archaeological assessment of the impact of foreshore and cliff erosion as part of any future management plans.

A.3 The North Devon and Somerset Shoreline Management Plan 2

A.3.1 In the North Devon and Somerset SMP, the SMP area extends from Hartland Point to Anchor Head, Weston-super-Mare. There are 32 separate Policy Units (PUs) that fall within the area of the Severn Estuary RCZAS – PUs 7d145-7d39, 7d42-7d46, and 7e01-7e06 (Halcrow Group Ltd 2009: 4-5, fig. 1, overview maps 2 of 3, 3 of 3). PUs 7d40 and 7d41 lie outside of the RCZAS study area, as they are more than 1km south of Dunball, the southernmost limit of the RCZAS along the River Parrett.

A.3.2 These 32 Policy Units (PUs) are shown in Figure 7, and their physical characteristics and proposed future management policies (Halcrow Ltd 2009) are summarised as follows:

- **7e06** – Birnbeck Island, Anchor Head, Weston-super-Mare to the Club House, Weston-super-Mare. This area consists of some hard rock headland cliffs, but mostly low-lying residential areas with sea front, a pier and infrastructure.

  Short term, medium term and long term preferred policy – Hold the Line. The existing beach and sea front seawall defences (themselves rebuilt and strengthened after the floods of 1981) will continue to be maintained in the short and medium term. Although the rate of erosion will accelerate in the future as a result of sea level changes, the area will be monitored and additional erosion protection measures will be considered if necessary in the future. This may include beach recharge and the construction of additional shoreline control structures such as groynes.

  Due to this policy of hold the line the SMP2 consultation document records little threat to historical assets (Halcrow Group Ltd 2009: Appendix I), although it notes that Listed Buildings in Weston-super-Mare will be protected as a result. Little archaeological work has been undertaken in the area, and this may have to be targeted in Phase 2 fieldwork. Any increased flooding, erosion or 'coastal squeeze' could, however, impact upon known ship wrecks and any unknown wooden structures surviving in Weston Bay, and the remains of Second World War structures at Knightstone and the early modern Grand Pier would also be vulnerable to erosion, or might be affected by the construction of any new flood or beach defences. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion, and 'coastal squeeze', as part of any future management plans.

- **7e05** – The Club House, Weston-super-Mare to Links Road, Uphill. This area consists mostly of low-lying coastal dunes, residential areas, a golf course, infrastructure further inland such as the A38 road and M5 motorway, and the Uphill SSSI Nature Conservation site.

  Short term, medium term and long term preferred policy – No Active Intervention. Natural coastal evolution will be permitted, but with continued monitoring of the sands dunes. In the long term, if the dunes are at risk from being eroded and breached, then a secondary defence embankment will be constructed as part of managed realignment.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) notes that Listed Buildings in Uphill will remain protected. Little archaeological work has been undertaken in the area, and this may have to be targeted in Phase 2 fieldwork. Any increased flooding, erosion or 'coastal squeeze' could, however, impact upon the remains of Second World War structures, or these might be affected by the construction of any future flood defences. There will need to be an archaeological

assessment of the impact of intertidal and foreshore erosion, and 'coastal squeeze', as part of any future management plans.

- **7e04** – Links Road, Uphill to River Axe estuary mouth. This area consists mostly of low-lying coastal dunes, salt marsh and agricultural land, with some isolated farms and residences, infrastructure, and the Walborough SSSI Nature Conservation site.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Managed Realignment. Long term preferred policy – Hold the Line. Short term hold the line will allow time for studies to investigate options for managed realignment and the maintenance or rebuilding of flood defences, which will then be maintained in the long term. There will be habitat creation through an expansion of salt marsh and/or intertidal areas.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) notes that Listed Buildings in Uphill will remain protected. Little archaeological work has been undertaken in the area, and this may have to be targeted in Phase 2 fieldwork. Any increased flooding, erosion or 'coastal squeeze' could, however, impact upon the remains of Second World War features, or these might be affected by the construction of any future flood defences. The Scheduled Ancient Monument of Walborough Bronze Age round barrow and a probable later prehistoric or Romano-British enclosure at Uphill Farm may be at risk from greater degrees of surface runoff and slope erosion. There will need to be an archaeological assessment of the impact of intertidal, foreshore and slope erosion, and 'coastal squeeze', as part of any future management plans.

- **7e03** – River Axe river mouth southwards along east bank southwards to just north of Diamond Farm. This area consists mostly of low-lying salt marsh and agricultural land, with infrastructure such as a marina and further inland such as the A38 road, M5 motorway and a railway line, and Nature Conservation sites.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Managed Realignment. Long term preferred policy – Hold the Line. Short term hold the line will allow time for studies to investigate options for managed realignment and the maintenance or rebuilding of flood defences, which will then be maintained in the long term. There will be habitat creation through an expansion of salt marsh and/or intertidal areas.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records little threat to historical assets. Little archaeological work has been undertaken in the area though, and this may have to be targeted in Phase 2 fieldwork. Any increased flooding, erosion or 'coastal squeeze' could, however, impact upon areas of medieval ridge and furrow, post-medieval drainage, reclamation and early phases of flood defences, several examples of stack stands or refuge mounds on Bleadon Level, and remains of artificial oyster beds or brine pits. There will need to be an archaeological assessment of the impact of intertidal, foreshore and slope erosion, and 'coastal squeeze', as part of any future management plans.

- **7e02** – Just north of Diamond Farm northwards along the west bank of the River Axe to the river mouth and Brean Down Farm. This area consists mostly of low-lying salt marsh and agricultural land, with some isolated farms and residences, infrastructure, and Nature Conservation sites.

Short term preferred policy – Hold the Line. Medium term preferred policy – Hold the Line. Long term preferred policy – Hold the Line, or, No Active Intervention. A short term hold the line policy could cause 'coastal squeeze' and loss of intertidal areas, but in the longer term, if this looked likely then a shift in policy to no active intervention could occur. There would then be habitat creation through an expansion of salt marsh and/or intertidal areas, but a concomitant significant loss of agricultural land. In the very long term future (*c*. 100 years+), the River Axe might even be allowed to alter its course significantly to discharge *south* of Brean Down.

The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records little threat to historical assets. Little archaeological work has been undertaken in the area though, and this may have to be targeted in Phase 2 fieldwork. Any increased flooding, erosion or 'coastal squeeze' could, however, impact upon areas of medieval ridge and furrow, post-medieval drainage, reclamation and early phases of flood defences, and several examples of stack stands or refuge mounds. A ditched enclosure south-east of Brean Farm could also be threatened, especially by any long term realignment of the River Axe, which would also threaten peat deposits and features in Bridgwater Bay on Berrow Flats. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion, 'coastal squeeze' and river realignment as part of any future management plans.

- **7e01** – Brean Down Farm to Howe Rock. This area consists mostly of hard rock headland cliffs with a wave-cut platform and rocky foreshore, open heathland uplands, and the Brean Down SSSI Nature Conservation site.

  Short term, medium term and long term preferred policy – No Active Intervention. Natural coastal evolution will be permitted.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Any increased erosion could, however, impact upon nationally important archaeological remains including Bronze Age round barrows, a later prehistoric field system, and a known ship wreck site off Fiddler's Point. The upland remains may also be at risk from greater degrees of surface runoff and slope erosion. There will need to be an archaeological assessment of the impact of intertidal, foreshore and slope erosion, as part of any future management plans.

- **7d46** – Howe Rock to Brean Down Bird Garden. This area consists mostly of hard rock headland cliffs with a wave-cut platform, some sand dunes on the southern side, open heathland uplands, and the Brean Down SSSI Nature Conservation site.

  Short term, medium term and long term preferred policy – No Active Intervention. Natural coastal evolution will be permitted.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Any increased erosion could, however, impact upon nationally important archaeological remains including Bronze Age round barrows and settlement remains, prehistoric burials, a later prehistoric field system, an Iron Age hillfort and Romano-Celtic temple, early modern and Second World War fortifications, and a known ship wreck site. The upland remains may also be at risk from greater degrees of surface runoff and slope erosion, and prehistoric peat deposits and post-medieval and early modern fish trap structures in the intertidal zone off Black Point would be extremely vulnerable to any increased erosion, as would the prehistoric features eroding out of the sand cliff on the southern side of Brean Down. Any long term realignment of the River Axe so that it discharges south

of Brean Down would also have serious archaeological implications. There will need to be an archaeological assessment of the impact of intertidal, foreshore and slope erosion, and river realignment, as part of any future management plans.

- **7d45** – Brean Down Bird Garden to the northern extent of Brean. This area consists mostly of sand dunes, low-lying agricultural land, isolated farms and residences, and a caravan park.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Hold the Line. Long term preferred policy – Hold the Line, or, No Active Intervention. In the long term, rising sea levels would mean that a hold the line policy would require the replacement and enlargement of the existing coastal defences, and this may not be economically viable (Halcrow Group Ltd 2009: App. I). In the very long term future (*c*. 100 years+), the River Axe might even be allowed to alter its course significantly to discharge *south* of Brean Down, and this would also mean a significant loss of agricultural land, and would threaten access to Brean Down. The constriction of setback defences north of Brean itself may be required to minimise the flood risk to this settlement, but also to the wider Somerset Levels and Moors.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Little archaeological work has been undertaken in the area though, and this locale may have to be targeted in Phase 2 fieldwork. Any increased erosion could, however, impact upon prehistoric peat deposits and faunal remains in the intertidal zone on Berrow Flats, as well as medieval, post-medieval and early modern fish trap structures. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion, and river realignment, as part of any future management plans.

- **7d44** – The northern extent of Brean to northern extent of Berrow. This area consists mostly of sand dunes, low-lying agricultural land, farms and residential areas, camping, caravan and leisure parks, and Nature Conservation sites.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Managed Realignment. Long term preferred policy – Managed Realignment. Short term hold the line will allow time for studies to investigate options for managed realignment and the building of a new line of set-back flood defences, which will then be maintained in the long term. There will be habitat creation through an expansion of intertidal areas and sand dunes, but a concomitant loss of agricultural land and residential and leisure areas.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) notes that Listed Buildings in Brean will remain protected. Little archaeological work has been undertaken in the intertidal zone, and this may have to be targeted in Phase 2 fieldwork. Any increased flooding, erosion or 'coastal squeeze' up against new hard defences could impact upon the remains of medieval ridge and furrow, post-medieval drainage features, Second World War structures and Listed Buildings, and/or these might be affected by the construction of any future set-back flood defences. Increased erosion and 'coastal squeeze' could also severely impact upon important prehistoric peat deposits and faunal remains in the intertidal zone on Berrow Flats, as well as medieval, post-medieval and early modern fish trap structures, and early modern ship wrecks. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion, and 'coastal squeeze', as part of any future management plans.

- **7d43** – The northern extent of Berrow to the mouth of the River Brue. This area consists of sand dunes, low-lying agricultural land, residential areas, caravan and leisure parks, infrastructure including an electricity substation, a pier, the BARB Lifeboat and hovercraft station, and Nature Conservation sites including Stert Island.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Hold the Line. Long term preferred policy – Hold the Line. The existing beach and sea front seawall defences (themselves rebuilt and strengthened after the floods of 1981) will continue to be maintained in the short and medium term. The rate of erosion will accelerate in the future as a result of sea level changes, and the frontal dunes at Berrow may experience overtopping and breaching as a result. There may also be 'coastal squeeze'. The area will be monitored and additional erosion protection measures will be considered if necessary in the future, in order to protect Berrow, Burnham-on-Sea and Highbridge. This work may include dune management at Berrow. The course of the River Parrett may change.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) notes that Conservation Areas (and Listed Buildings) in Berrow, Burnham-on-Sea and Highbridge will remain protected. Little archaeological work has been undertaken in the intertidal zone, and this may have to be targeted in Phase 2 fieldwork. Increased erosion and 'coastal squeeze' could severely impact upon important prehistoric peat deposits in the intertidal zone off Burnham-on-Sea, as well as medieval, post-medieval and early modern fish trap structures, and ship wrecks. Any changes to the mouth of the rivers Parrett and Brue and the course of the Gutterway could also affect intertidal archaeological features. Areas of medieval ridge and furrow, early phases of flood defences, the remains of Second World War structures and Listed Buildings in Berrow and Burnham-on-Sea could also be threatened by any erosion, flooding or the construction of new coastal defences. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion, 'coastal squeeze' and possible long-term river realignments as part of any future management plans.

- **7d42** – The mouth of the River Brue southwards along the east bank of the River Parrett to Dunball. This area consists of low-lying salt marsh and agricultural salt grazing land, isolated farms and residences, residential areas including Stretcholt, Pawlett, Walpole and Dunball, industrial areas, a landfill site, infrastructure including a sewage works, power lines and the M5 motorway, and Nature Conservation sites.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Managed Realignment. Long term preferred policy – Managed Realignment. Short term hold the line will allow time for studies to investigate options for managed realignment and the building of a new line of set-back flood defences, including the construction of a surge barrier to protect Bridgwater. These new defences would then be maintained in the long term. There would be habitat creation through an expansion of salt marsh and/or intertidal areas, but also a significant loss of agricultural land, especially on Pawlett Hams and Huntspill Levels.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Little archaeological work has been undertaken in the area though, and this locale may have to be targeted in Phase 2 fieldwork. Increased erosion, flooding and 'coastal squeeze' could severely impact upon important medieval, post-medieval and early modern fish trap structures, and several known ship wrecks in the intertidal zone and along the banks of the River Parrett. Any changes to the mouth of the Parrett could also severely affect intertidal archaeological features. Areas of possible late prehistoric or Romano-British salt

production, the remains of a possible Roman road, a Scheduled medieval motte and bailey castle at Walpole, medieval ridge and furrow, post-medieval drainage features and river bank revetments, early phases of flood defence banks, stack stands or refuge mounds, artificial oyster beds, the remains of Second World War structures and Listed Buildings at Dodd's Farm, Pawlett and Huntspill could also be threatened by any erosion or flooding. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion, 'coastal squeeze' and possible long-term river realignment as part of any future management plans.

- **7d39** – Bridgwater northwards along the west bank of the River Parrett to the southern edge of Combwich. Part of this Policy Unit (south of Dunball) lies outside of the RCZAS study area. This area consists of low-lying salt marsh and agricultural salt grazing land, isolated farms and residences, residential areas including Rodway and Combwich, and Nature Conservation sites.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Hold the Line. Long term preferred policy – Managed Realignment. In the short term, hold the line will allow time for existing defences to be enlarged and rebuilt, and will also include the construction of a surge barrier to protect Bridgwater. In the long term, these defences will have to be rebuilt in a setback position, and can then be maintained. There would be habitat creation through an expansion of salt marsh and/or intertidal areas, but also a loss of agricultural land.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Little archaeological work has been undertaken in the area though, and it may have to be targeted in Phase 2 fieldwork. Increased erosion, flooding and 'coastal squeeze' could impact upon post-medieval and early modern fish trap structures and known ship wrecks in the intertidal zone and/or along the banks of the River Parrett. Any changes to the mouth of the Parrett could also affect intertidal archaeological features. Areas of possible late prehistoric or Romano-British occupation and salt production, medieval ridge and furrow, post-medieval drainage features and river bank revetments and early phases of flood defence banks could also be threatened by any erosion or flooding. There will need to be an archaeological assessment of the impact of river bank erosion, 'coastal squeeze' and possible long-term river realignment as part of any future management plans.

- **7d38** – The southern edge of Combwich to Riverside Farm, north of Combwich. This area consists of low-lying residential areas and agricultural land, and some infrastructure such as a water treatment plant and sluice gates.

  Short term, medium term and long term preferred policy – Hold the Line. The existing flood defences will be upgraded and maintained in the short to medium term, but may need to be rebuilt and improved in the long term.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) notes that Listed Buildings in Combwich will remain protected. There was probably an important Romano-British settlement and port at Combwich, although its exact extent is unknown, so any increase in erosion, flooding or the construction of new flood defences could impact upon such deposits, as well as early phases of river bank revetments and flood defence banks. The Listed Buildings in Combwich should, however, be protected under the hold the line policy. There will need to be an archaeological assessment of the impact of river bank erosion and flood defence construction as part of any future management plans.

- **7d37** – Riverside Farm, north of Combwich along the west bank of the River Parrett to Fenning Island, Stert Point. This area consists of low-lying salt marsh and agricultural land, isolated farms and residences, and some infrastructure (power lines).

  Short term preferred policy – Hold the Line. Medium term preferred policy – No Active Intervention. Long term preferred policy – No Active Intervention. Short term hold the line will allow time for studies to investigate options for no active intervention. Erosion and flooding will accelerate in the future as a result of sea level changes. Natural coastal evolution of the Steart peninsula will be permitted in the medium term (20-50 years), and this is likely to lead to the loss of Steart village and outlying farms, which will become uneconomic to defend. There will be habitat creation through an expansion of intertidal areas and salt marsh, but a concomitant loss of agricultural land, farms and residential areas. The existing power lines may be offered some protection, but will probably need to be relocated in the long term. In the long term future (*c*. 100 years+), the River Parrett may alter its course significantly.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Little archaeological work has been undertaken in the area though, and it may have to be targeted in Phase 2 fieldwork. Increased erosion, flooding and river realignment could impact upon known ship wrecks along the banks of the River Parrett, along with areas of possible late prehistoric or Romano-British salt production, medieval ridge and furrow, a possible ditched enclosure, a known causeway or river crossing just north of Combwich, post-medieval drainage features, stack stands or refuge mounds, river bank revetments and early phases of flood defence banks. There will need to be an archaeological assessment of the impact of river bank erosion, flooding and possible long-term river realignment as part of any future management plans.

- **7d36** – Fenning Island, Stert Point to Manor Farm, Stert Point. This area consists of low-lying salt marsh and agricultural land, isolated farms and residences, some infrastructure (power lines), and Nature Conservation sites (Stert Point and Bridgwater Bay nature reserves).

  Short term preferred policy – Hold the Line. Medium term preferred policy – No Active Intervention. Long term preferred policy – No Active Intervention. Short term hold the line will allow time for studies to investigate options for no active intervention. Erosion and flooding will accelerate in the future as a result of sea level changes. Natural coastal evolution of the Steart Peninsula will be permitted in the medium term (20-50 years), and this is likely to lead to the loss of Steart village and outlying farms, which will become uneconomic to defend. There will be habitat creation through an expansion of intertidal areas and salt marsh, but a concomitant loss of agricultural land, farms and residential areas. The existing power lines may be offered some protection, but will probably need to be relocated in the long term. In the long term future (*c*. 100 years+), the River Parrett may alter its course significantly.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets, but the area may have to be targeted in Phase 2 fieldwork. Increased erosion, flooding and river realignment will impact upon nationally important groups of medieval, post-medieval and early modern fish weirs and other timber structures, post-medieval drainage features, early phases of sea defences, a wildfowling decoy pond, and some Second World War structures. There

will need to be an archaeological assessment of the impact of erosion, flooding and possible long-term river realignment as part of any future management plans.

- **7d35** – Manor Farm, Stert Point to Wall Common car park, Steart Peninsula. This area consists of low-lying salt marsh and agricultural land, Steart village and outlying farms and residences, some infrastructure (power lines), and a Nature Conservation site (Wall Common).

  Short term preferred policy – Hold the Line. Medium term preferred policy – No Active Intervention. Long term preferred policy – No Active Intervention. Short term hold the line will allow time for studies to investigate options for no active intervention. Erosion and flooding will accelerate in the future as a result of sea level changes. Natural coastal evolution of the Steart Peninsula will be permitted in the medium term (20-50 years), and this is likely to lead to the loss of Steart village and outlying farms, which will become uneconomic to defend. There will be habitat creation through an expansion of intertidal areas and salt marsh, but a concomitant loss of agricultural land, farms and residential areas. The existing power lines may be offered some protection, but will probably need to be relocated in the long term. In the long term future (*c*. 100 years+), the River Parrett may alter its course significantly, possibly cutting through the Steart Peninsula.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Increased erosion, flooding and river realignment will, however, impact upon the remains of the possible Deserted Medieval Village site south of modern Steart village, medieval ridge and furrow, nationally important groups of medieval, post-medieval and early modern fish weirs and other timber structures, post-medieval drainage features, artificial oyster beds, early phases of sea defence banks and groynes, and historic buildings in and around Steart village, including St Andrew's Church and a chapel. There will need to be an archaeological assessment of the impact of erosion, flooding and possible long-term river realignment as part of any future management plans.

- **7d34** – Wall Common car park, Steart Peninsula to Stolford Farm. This area consists of low-lying shingle/gravel ridges, sand dunes, salt marsh and agricultural grazing land, isolated farms and residences, and Nature Conservation sites.

  Short term preferred policy – Managed Realignment. Medium term preferred policy – Hold the Line. Long term preferred policy – Hold the Line, or, No Active Intervention. Erosion and flooding will accelerate in the future as a result of sea level changes. In the short term (0-20 years), the existing sea defences which are in a poor condition will be rebuilt in a realigned setback position, and the previous defence line will then be deliberately breached. There will then be habitat creation through a proposed expansion of intertidal areas and salt marsh (Hamel and Bryant 2008), but a concomitant loss of agricultural land. It is possible that the policy of No Active Intervention on the Steart Peninsula further east may mean that in the long term even the realigned Stolford to Wall Common defences become technically and economically difficult to sustain, and guided by further studies there may then be a move to no active intervention in this area too.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Increased erosion and flooding could, however, impact upon important prehistoric submerged forest and peat deposits in Stolford Bay, prehistoric flint scatters, and nationally important groups of medieval, post-medieval and early modern fish weirs and other timber structures. In addition, medieval ridge and furrow, possible Deserted Medieval Village earthworks east of

Whitewick Farm, post-medieval drainage features, windmill mounds, early phases of sea defence banks and groynes, and Second World War structures could also all be affected by any increased erosion or flooding inland, or by groundwork associated with the creation of ecological habitation. Historic and Listed Buildings in Stockland Bristol, Chalcott Farm and Otterhampton might also be at risk from future flooding. The archaeological assessment of the impact of proposed ecological habitation creation (Hamel and Bryant 2008) has outlined the considerable historic and archaeological potential of this area. Any proposed erosion, flooding or groundwork in the area may require further archaeological evaluation and mitigation.

- **7d33** – Stolford Farm to Great Arch. This area consists of low-lying shingle/gravel ridges, salt marsh and agricultural grazing land, farms and residences, and part of the village of Stolford.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Managed Realignment. Long term preferred policy – Hold the Line. Erosion and flooding will accelerate in the future as a result of sea level changes, and the existing sea defences will be maintained in the short term, but in the medium term (20-50 years) these will be rebuilt in a realigned setback position, and this new defence line will then be maintained.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) notes that Listed Buildings at Stolford Farm will remain protected, but this ignores additional historic and Listed Buildings in Stolford village itself, including a medieval chapel and an early modern Primitive Methodist chapel. Increased erosion, flooding and 'coastal squeeze' could also impact upon important prehistoric submerged forest and peat deposits in Stolford Bay, nationally important groups of medieval, post-medieval and early modern fish weirs, medieval ridge and furrow, post-medieval drainage features, and early phases of sea defence banks and groynes. The archaeological assessment of the impact of proposed ecological habitation creation (Hamel and Bryant 2008) has outlined the considerable historic and archaeological potential of this area. There will need to be an archaeological assessment of erosion, flooding and flood defence construction as part of any future management plans.

- **7d32** – Great Arch to Hinkley Point. This area consists of low-lying shingle/gravel ridges and agricultural grazing land, rocky foreshore, isolated farms and residences, and part of the village of Stolford.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Managed Realignment. Long term preferred policy – Hold the Line. Erosion and flooding will accelerate in the future as a result of sea level changes, and the existing sea defences will be maintained in the short term, but in the medium term (20-50 years) these will be rebuilt in a realigned setback position, and this new defence line will then be maintained.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Increased erosion and flooding could, however, impact upon important prehistoric submerged forest and peat deposits in Stolford Bay, a probable Romano-British settlement north of Idson Farm, nationally important groups of medieval, post-medieval and early modern fish weirs, medieval ridge and furrow, post-medieval drainage features, early phases of sea defence banks and groynes, and historic and Listed Buildings in Stolford village and at Little Dowden's Farm. The archaeological assessment of the impact of proposed ecological habitation creation (Hamel and Bryant 2008) has outlined the considerable historic

and archaeological potential of part of this area. Any proposed erosion, flooding or groundwork in the area may require further archaeological evaluation and mitigation.

- **7d31** – Hinkley Point to north of Knighton. This area consists of low-lying shingle/gravel ridges and agricultural grazing land, low cliffs and rocky foreshore, isolated farms and residences, and infrastructure including Hinkley Point nuclear power station, power lines and sewage works.

  Short term, medium term and long term preferred policy – Hold the Line. The existing flood defences will be upgraded and maintained in the short to medium term, but may need to be rebuilt and improved in the long term. The future expansion of the nuclear power station may mean that upgraded sea defences are also westwards.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) notes that the Scheduled Ancient Monument of Wick round barrow/Pixies' Mound will remain protected due to the hold the line policy. Increased erosion and flooding could, however, also impact upon a possible Romano-British settlement at Hinkley Point, medieval ridge and furrow, St Sidwell's Well, post-medieval water meadow and drainage features, early phases of sea defence banks and groynes, the remains of a lime kiln and a Second World War pillbox, and further inland, historic buildings in Wick and Shurton. There will need to be an archaeological assessment of erosion, flooding and flood defence construction as part of any future management plans. It is likely that the expansion of the Hinkley Point nuclear power station will require detailed Environmental Impact Assessments incorporating historical and archaeological information.

- **7d30** – North of Knighton to Lilstock harbour and Lilstock Farm. This area consists of coastal cliffs, wave-cut platforms and rocky foreshore, with a shingle ridge, sloping agricultural land and isolated farms, and small isolated wooded copses.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology, wave-cut platform and shingle ridge will limit this. In the next 100 years, coastal erosion of 10-50m is predicted (Halcrow Group Ltd 2009: App. G), but any small bays along this section of coast will only be reinforcing the naturally indented nature of this coastline.

  Due to the nature of the geology and the landscape, the SMP2 consultation document indicates that limited erosion and flood risk will not impact on the historic environment (Halcrow Group Ltd 2009: App. I). Nevertheless, a deserted farm and field system north of Knighton may be at risk from increased runoff and/or slope erosion, along with catch-water meadow systems, a possible windmill mound and a Listed barn building. More importantly, along the current coastline the post-medieval and early modern breakwater and harbour remains at Lilstock Harbour would be under serious threat from any future erosion and flooding, along with the remains of associated harbour structures, buildings and lime kilns, and later Second World War structures. Another early modern wharf or quay north of Knighton would also be at risk. There will need to be an archaeological assessment of the impact of foreshore and cliff erosion and flooding as part of any future management plans.

- **7d29** – Lilstock Farm. This area consists of low coastal cliffs, wave-cut platforms and rocky foreshore, with a shingle ridge, sloping agricultural land and an isolated farm.

Short term preferred policy – Hold the Line. Medium and long term preferred policy – No Active Intervention. Short term hold the line will allow time for studies to investigate options for no active intervention. Erosion and flooding will accelerate in the future as a result of sea level changes, but it is thought that the geology and topography will limit this.

Due to the nature of the geology and the landscape, the SMP2 consultation document indicates that limited erosion and flood risk will not impact on the historic environment (Halcrow Group Ltd 2009: App. I). Nevertheless, catch-water meadow systems and field system features north of Lilstock Farm may be at risk from increased runoff and/or slope erosion, and on the existing coast a series of post-medieval or early modern fish weirs and a Second World War marker could be at risk from erosion. Any overbank flooding may threaten the valley floor water meadow systems immediately east of Lilstock Farm. There will need to be an archaeological assessment of the impact of foreshore and cliff erosion and flooding as part of any future management plans.

- **7d28** – Lilstock Farm to St Audrie's Bay holiday village. This area consists mostly of coastal cliffs, wave-cut platforms and rocky foreshore, sloping agricultural land and isolated farms and residences, residential areas such as East Quantoxhead and Kilve, small isolated wooded copses, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology, wave-cut platform and shingle ridge will limit this. In the next 100 years, coastal erosion of 10-50m is predicted (Halcrow Group Ltd 2009: App. G), but it is proposed that any small bays along this section of coast will only be reinforcing the naturally indented nature of this coastline. There is a risk of localised flooding at Kilve Point.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Nevertheless, there are significant historical assets in this area including finds of Palaeolithic and Mesolithic flint tools from the cliffs and foreshore, several other prehistoric flint scatters, Scheduled Bronze Age round barrows, catch-water meadow systems and field system features associated with the Shrunken Medieval Village north of Kilton that may be at risk from increased runoff and/or slope erosion. Other historical and archaeological features at East Quantoxhead include a medieval manor house, deserted farm, fish ponds and a churchyard cross, and nearby slopes preserve windmill mounds, the remains of other medieval field systems and lynchets, and the remains of a Second World War camp and firing range (Riley 2006: 88, 153). Any possible threat to the medieval St Andrew's Church at Lilstock and the medieval chantry chapel north of Kilve needs to be more carefully assessed. The latter in particular lies in a low-lying valley, and is associated with other Listed Buildings and historical remains including a medieval manor house and medieval tombs. On the existing coast a series of little studied post-medieval or early modern fish weirs in the intertidal zone north of Lilstock and East Quantoxhead, several lime kilns and Second World War structures could all be at serious risk from cliff erosion or flooding. Clearly, there will need to be a detailed archaeological assessment of the impact of foreshore, cliff and slope erosion and flooding as part of any future management plans.

- **7d27** – St Audrie's Bay holiday village to Doniford Holiday Park. This area consists mostly of coastal cliffs, wave-cut platforms and rocky foreshore, sloping agricultural land and isolated farms and residences, small isolated wooded copses, and a large camping and caravan park.

Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology, wave-cut platform and shingle ridge will limit this. In the next 100 years, coastal erosion of 10-50m is predicted (Halcrow Group Ltd 2009: App. G), but it is proposed that any small bays along this section of coast will only be reinforcing the naturally indented nature of this coastline.

The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets, other than a potential for the St Audrie's Registered Historic Park and Garden to be flooded. Nevertheless, there are significant historical assets in this area including prehistoric peat deposits in St Audrie's Bay that have produced nationally important Pleistocene faunal remains, but which have not been recorded or surveyed in detail, and an equally little studied but also potentially important group of medieval, post-medieval and early modern fish weirs in the intertidal zone. Medieval field system features, a windmill mound, lime kilns, an early modern slipway, Second World War remains (including the large camp the holiday village is built on) and several Listed Buildings at The Home Farm could all be at risk from future increased cliff erosion or flooding. There will need to be a detailed archaeological assessment of the impact of foreshore and slope erosion and flooding as part of any future management plans.

- **7d26** – Doniford Holiday Park to Doniford Beach Halt. This area consists mostly of low, soft mudstone and shale cliffs and rocky foreshore, low-lying agricultural land alongside The Swill, sloping agricultural land and isolated farms and residences, low-lying residential areas at Doniford itself, small isolated wooded copses, a large holiday park and static caravan site, and infrastructure such as Doniford Beach Halt railway station and the West Somerset Railway.

  Short term preferred policy – Hold the Line. Medium and long term preferred policy – No Active Intervention. Short term hold the line of the rock revetment in front of the holiday park will allow time for studies to investigate options for no active intervention. Erosion and flooding will accelerate in the future as a result of sea level changes, and in the medium to long term coastal erosion of at least 10-50m is predicted (Halcrow Group Ltd 2009: App. G). Given the soft nature of the geology, however, it is possible that a larger embayment might form.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. On exposed slopes, however, a cropmark enclosure on Rydon Hill might be vulnerable to future erosion, whilst finds of Palaeolithic artefacts and faunal remains have come from the cliffs and Doniford river gravels (Norman 1978; Riley 2006: 16). In the low-lying valley of The Swill, prehistoric flint and pottery scatters, a lime kiln, the remains of a Second World War camp and historic and Listed Buildings and a Scheduled wayside cross in Doniford would all potentially be at risk from increased erosion and flooding. There will need to be an archaeological assessment of the impact of foreshore, slope and cliff erosion and flooding as part of any future management plans.

- **7d25** – Doniford Beach Halt to the western edge of Watchet. This area consists mostly of low, soft mudstone and shale cliffs at Helwell Bay and rocky foreshore, with harder cliffs west of Watchet, sloping agricultural land, residential areas at Watchet and St Decumans, and infrastructure such as the B3190 road, Watchet Harbour and the West Somerset Railway.

  Short term, medium term and long term preferred policy – Hold the Line. Existing flood defences will be upgraded and maintained in the short to medium term, but

may need to be rebuilt and improved in the long term to prevent outflanking, especially on the eastern part of the area at Helwell Bay where the cliffs are eroding more rapidly.

The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets, presumably because of the hold the line policy. Nevertheless, finds of Palaeolithic artefacts and faunal remains have come from the cliffs and harbour (Riley 2006: 16), and any increased erosion or flooding could threaten the low-lying areas of historic Watchet. In addition to being an Anglo-Saxon port and coin mint (Riley 2006: 82), the town also contains a number of historic and Listed Buildings, along with lime kilns, the lighthouse and other structures and buildings associated with the harbour, and Second World War structures, several of which are already in grave danger from cliff erosion. There will need to be an archaeological assessment of the impact of foreshore and cliff erosion and flooding as part of any future management plans.

- **7d24** – The western edge of Watchet to Gray Rock, Blue Anchor Bay. This area consists mostly of cliffs and rocky foreshore, sloping agricultural land, residential areas at St Decumans, isolated farms and residences, wooded copses, a camping and caravan site, and infrastructure such as the B3191 road.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology, wave-cut platform and shingle ridge will limit this. In the next 100 years, coastal erosion of 10-50m is predicted (Halcrow Group Ltd 2009: App. G), but it is proposed that any small bays along this section of coast will only be reinforcing the naturally indented nature of this coastline.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Although the intertidal zone in this area has not been subject to much study, other historical assets potentially at risk from future flooding or cliff and/or slope erosion include prehistoric flint scatters, cropmark enclosures north-east of Robinson's Copse, the remains of St Mary's Chapel north of Cridland's Copse, lime kilns, the Scheduled Ancient Monument of Daw's Castle (an Anglo-Saxon *burh*) (McAvoy 1986), and historic and Listed Buildings along the valley of the River Washford at Snailholm Farm and Kentford Farm. There will need to be an archaeological assessment of the impact of foreshore, slope and cliff erosion and flooding as part of any future management plans.

- **7d23** – Gray Rock, Blue Anchor Bay to Blue Anchor. This area consists of low cliffs and rocky foreshore, low-lying sand and shingle beach, gently sloping agricultural land, low-lying residential areas at Home Farm, Chapel Cleeve and Blue Anchor, isolated farms and residences, wooded copses, a caravan site, and infrastructure such as the B3191 road and the West Somerset Railway.

  Short term and medium term preferred policy – Hold the Line. Long term preferred policy – No Active Intervention. The existing sea defences will be upgraded and extended in the short to medium term, but at the eastern end of this area, larger and more expensive defences would be required in the long term, and so here the defences will be allowed to deteriorate and fail. The coastal road and the West Somerset Railway would probably require continued protection.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. The intertidal zone contains important groups of medieval, post-medieval and early modern fish weirs. Other historical assets

potentially at risk from future erosion or flooding include post-medieval drainage features, lime kilns and brick kilns, and a brickyard; a coastguard station, historic and Listed Buildings in Blue Anchor, Chapel Cleeve and at Marshwood Farm, and Second World War structures including many pillboxes. There will need to be an archaeological assessment of the impact of foreshore and cliff erosion and flooding as part of any future management plans.

- **7d22** – Blue Anchor to Sea Lane End, Dunster Beach. This area consists of low-lying rocky foreshore and shingle beach, low-lying or gently sloping agricultural land, isolated farms and residences, wooded copses, and infrastructure such as the West Somerset Railway.

  Short term preferred policy – Managed Realignment. Medium and long term preferred policy – Hold the Line. In order to reduce flooding to the low-lying hinterland of Ker Moor, a secondary defence embankment will be constructed seawards (north of) the railway line. In the medium to long term this new defence line would be maintained, and reinforced and extended if necessary. This could, however, cause 'coastal squeeze' up against the new hard defences.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. The intertidal zone at Dunster Beach contains important groups of medieval, post-medieval and early modern fish weirs, and other fishing related features at risk from erosion. There are coastal Second World War structures, mostly pillboxes; that would also be at serious risk from any future erosion or flooding, and on Ker Moor there are also post-medieval drainage features. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion, 'coastal squeeze' and flooding as part of any future management plans.

- **7d21** – Sea Lane End, Dunster Beach to Lower Marsh Farm. This area consists of low-lying shingle beach and agricultural grazing land, isolated farms and residences, residential areas further inland such as Marsh Street and Dunster, infrastructure such as the A396 road, Dunster railway station and the West Somerset Railway, and a Nature Conservation site (Dunster Beaches Estate Nature Reserve).

  Short and medium term preferred policy – Managed Realignment. Long term preferred policy – Hold the Line. The existing groynes and other defences at Dunster Beach are privately owned and maintained, and will become increasingly difficult to maintain and uneconomical. The rate of erosion and flooding will accelerate in the future as a result of sea level changes, possibly breaching the shingle beach. In order to reduce flooding to the low-lying hinterland and the risk of 'back-door' flooding to Minehead, a secondary defence embankment will be constructed, possibly seawards (north of) the railway line. In the long term this new defence line would be maintained. This could, however, cause 'coastal squeeze' up against the new embanked defences. The outflow of the River Advill at the eastern end of this area might also need to be adapted and altered.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets, other than a need for Dunster Castle and Conservation Areas at Dunster to be protected. In fact, although the low-lying residential areas of Dunster and Marsh Street with their historic and Listed Buildings might be at risk from increased flooding, this would not affect the hilltop castle. The intertidal zone at Dunster Beach contains important groups of medieval, post-medieval and early modern fish weirs, and other fishing related features at risk from erosion. Other historical assets at serious risk from future flooding, erosion and

'coastal squeeze' include prehistoric artefact scatters, post-medieval drainage features, Second World War structures, including many vulnerable pillboxes; and additional Listed Buildings at The Old Manor and Dunster Station. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion, 'coastal squeeze' and flooding as part of any future management plans.

- **7d20** – Lower Marsh Farm to Warren Point. This area consists of low-lying shingle beach and agricultural grazing land, residential areas of Minehead, a golf course and part of a holiday village, and infrastructure such as a sewage works, the A396 road and the West Somerset Railway.

  Short term preferred policy – Hold the Line. Medium term preferred policy – Managed Realignment. Long term preferred policy – Hold the Line. Existing beach management and flood defence maintenance will continue in the short term, allowing time for managed realignment options to be studied. The rate of erosion and flooding will accelerate in the future as a result of sea level changes, possibly causing 'back-door' flooding to Minehead. A secondary defence embankment will thus be constructed, and in the long term this will be maintained as the primary defence line. There could, however, be 'coastal squeeze' up against the new embanked defences.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets, other than a need for Conservation Areas in Minehead to be protected. Nevertheless, any increased erosion or flooding could seriously affect important prehistoric peat deposits and submerged forest in the intertidal zone, associated with finds of early prehistoric flints; nationally important groups of medieval, post-medieval and early modern fish weirs, and other fishing related features; a possible medieval harbour site north of The Old Manor, post-medieval drainage features and older phases of flood defence banks, and Second World War structures. There will need to be an archaeological assessment of the impact of intertidal and foreshore erosion, 'coastal squeeze' and flooding as part of any future management plans.

- **7d19** – Warren Point to near Culver Cliff. This area consists of low-lying sea front and residential areas of Minehead, with high hard geology cliffs to the west of the area; wooded slopes and a coastal leisure park, a holiday village, and urban infrastructure such as roads, Minehead railway station and the West Somerset Railway, Minehead Harbour and an IRB lifeboat station.

  Short term, medium term and long term preferred policy – Hold the Line. Existing flood defences will be upgraded and maintained, but may need to be rebuilt and improved in the long term.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets, other than a need for Conservation Areas in Minehead to be protected. Nevertheless, any increased erosion or flooding could seriously affect nationally important groups of medieval, post-medieval and early modern fish weirs in the intertidal zone of Minehead Bay and also north of the harbour (four of these fish traps are Scheduled Ancient Monuments), and other fishing features such as conger eel traps. Other features vulnerable to any erosion or flooding include the remains of medieval timber piles from a medieval quay in Minehead Bay, a possible platform above the cliff near Beacon, the historic structures and buildings associated with Minehead harbour, historic and Listed Buildings in Minehead, and also many Second World War structures along the seafront. There will need to be an archaeological assessment of the impact of

intertidal and foreshore erosion, 'coastal squeeze' and flooding as part of any future management plans.

- **7d18** – Near Culver Cliff to Hurlstone Point. This extensive Policy Unit consists mostly of hard geology cliffs and steep headlands separated by steeply sloping combes, with occasional narrow gravel beaches below the cliffs (Selworthy Sand and Greenaleigh Sand), open upland heath or steeply sloping agricultural land, isolated farms and residences, the South West Coastal Path and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. Although the rate of erosion will accelerate in the future as a result of sea level changes, it is thought that the harder geology will limit this. In the next 100 years, coastal erosion of *c*. 10m is predicted, although in one area at Minehead Bluff this could be up to 50m (Halcrow Group Ltd 2009: App. G).

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Few intertidal features are known from this Policy Unit area, although at Culver Cliff there is a small and little studied group of fish weir structures. Most of the archaeological and historical assets are on upland areas, and consist of prehistoric lithic scatters, Scheduled Bronze Age cairns, round barrows and later prehistoric field system features, the Scheduled Iron Age hillfort of Furzebury Brake, deserted medieval farms and medieval field system features, the remains of the medieval clifftop Burgundy chapel, the early modern coastguard tower at Hurlstone Point, and a series of Second World War remains including pillboxes and gun emplacements, observation posts, radio antennae bases, and an extensive tank training area. Some of these features are already threatened by cliff erosion, including important sites such as Furzebury Brake and Burgundy chapel, and any increases in rainfall and erosion might exacerbate slope erosion too. There will need to be an archaeological assessment of the impact of slope and cliff erosion as part of any future management plans.

- **7d17** – Hurlstone Point to Porlock Beach. This area consists of some hard cliffs at the eastern end but mostly of low-lying shingle ridge, salt marsh and agricultural grazing land, backed by sloping agricultural land, with isolated farms and residences, residential areas at Bossington, Porlock and West Porlock, and SSSIs and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. The shingle ridge was breached after a large storm in 1996, and the low-lying Porlock Marsh floodplain area behind (between Porlock and Porlock Weir) is reverting to salt marsh, leading to habitat creation, but with a loss of agricultural land. The rate of erosion and flooding will accelerate in the future as a result of sea level changes, and this will also cause 'coastal squeeze'.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets, other than a need for a Conservation Zone in Bossington to be protected. Any increase in erosion or flooding could, however, seriously affect nationally important prehistoric submerged forest deposits in the intertidal zone, associated with finds of early prehistoric flints, along with several post-medieval or early modern fish weirs. The intertidal zone has also produced evidence of palaeochannels and Bronze Age faunal remains. Further to the east behind the breached shingle ridge, medieval and post-medieval timbers and drainage features have been recently excavated, which were once buried by the shingle ridge and alluvial deposits. Prehistoric flint scatters at Hurlstone Point, an

oyster bank, lime kilns, a wildfowl decoy pond, historic and Listed Buildings in Bossington, and Second World War structures could also all be at serious risk in the future. Given the no active intervention policy and the likelihood of coastal rollback, there will need to be a detailed archaeological assessment of the impact of intertidal, foreshore and cliff erosion, and flooding and 'coastal squeeze', as part of any future management plans.

- **7d16** – Porlock Beach to western edge of Porlock Weir. This area consists mostly of low-lying shingle ridge, salt marsh and agricultural grazing land, backed by soft cliffs inland at Porlockford as well as steeply sloping wooded and agricultural land, with some isolated residences, residential areas at Porlock Weir, infrastructure such as the B3225 road and Porlock Harbour, and Nature Conservation sites.

  Short term preferred policy – Hold the Line. Medium term and long term preferred policy – No Active Intervention. Existing flood defences will be maintained in the short term (0-20 years), allowing time for measures to be developed to adapt this area to a policy of no active intervention. In the medium to long term, however, maintaining the defences will prove uneconomic, and they will not be replaced or upgraded, unless there is private funding for this. Properties at Porlock Weir will then be at increased risk from erosion and flooding as a result of sea level changes. It is also likely that the soft cliffs inland at Porlockford at the eastern end of this area will also experience some erosion too, probably at less than 0.50m per year.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets, other than a need for Conservation Areas in Porlock to be protected, and tourist and local infrastructure in Porlock Weir. The latter would, however, appear to be threatened and potentially undermined by the medium and long term no active intervention policy. Any increase in erosion or flooding could seriously affect nationally important prehistoric submerged forest deposits in the intertidal zone, associated with finds of early prehistoric flints, along with medieval, post-medieval or early modern fish weirs, lime kilns, historic and Listed Buildings in Porlock Weir, and Second World War structures. Given the no active intervention policy and the likelihood of coastal rollback, there will need to be a detailed archaeological assessment of the impact of intertidal, foreshore and cliff erosion, and flooding and 'coastal squeeze', as part of any future management plans.

- **7d15** – Western edge of Porlock Weir to Gore Point. This area consists mostly of low-lying shingle ridge, salt marsh and agricultural grazing land, backed steeply sloping wooded and agricultural land, some isolated residences at Worthy, and Nature Conservation sites.

  Short term, medium term and long term preferred policy – No Active Intervention. The shingle beach will not be maintained any further, and is likely to widen and flatten, increasing the risk of overbank flooding. The rate of erosion and flooding will accelerate in the future as a result of sea level changes, and the shingle beach will probably suffer 'coastal squeeze', rolling back to the steeper ground further inland.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Any increase in erosion or flooding could, however, threaten the Listed Buildings of Worthy Manor and its associated outbuildings. There will need to be a detailed archaeological assessment of the impact of foreshore erosion, flooding and 'coastal squeeze', as part of any future management plans.

- **7d14** – Gore Point to Yellow Rocks. Much of the central and western extent of this Policy Unit area lies outside of the RCZAS study area, but there is a small eastern section within it that forms the westernmost end of the RCZAS. This area consists mostly of low-lying shingle ridge and rock-cut platform backed by steep hard geology cliffs, with steep wooded slopes behind.

  Short term, medium term and long term preferred policy – No Active Intervention. Erosion and flooding will accelerate in the future as a result of sea level changes, and the shingle beach will probably suffer overbank flooding and 'coastal squeeze', rolling back to the cliffs behind. The cliffs are thought likely to erode at a relatively slow rate.

  The SMP2 consultation document (Halcrow Group Ltd 2009: App. I) records no implications for historical assets. Any increase in erosion or 'coastal squeeze' could seriously affect a little studied group of medieval, post-medieval or early modern fish weirs off Gore Point, however, along with an early modern slipway; whilst erosion and flooding could threaten a group of historic estate cottage buildings. There will need to be a detailed archaeological assessment of the impact of intertidal, foreshore and cliff erosion, and flooding and 'coastal squeeze', as part of any future management plans.

Appendix E Product Descriptions

Product number:	1
Product title:	Digital records
Purpose of the product:	Detailed records of RCZAS survey work undertaken.
Composition:	Corrected shapefiles, attribute tables and descriptive text as word documents, digital photographs.
Derived from:	Records made on site.
Format and presentation:	Digital records suitable for use in GIS and for inputting to HERs and NMR databases.
Allocated to:	Adrian Chadwick (Project Officer) and other field team members.
Quality criteria and method:	Acceptance by HERs and NMR.
Person/group responsible for quality assurance:	Adrian Chadwick, HER and NMR Officers.
Person/group responsible for approval:	Toby Catchpole (Project Manager).
Planned completion date:	Dissemination by 1 May 2011.

Product number:	2
Product title:	Severn Estuary Rapid Coastal Zone Assessment Survey. Phase 2 Fieldwork Report
Purpose of the product:	Project Report
Composition:	Methods used and constraints experienced. Summary of results of the survey by SMP Coastal Policy Units. Preliminary assessment of the significance and vulnerability of the sites recorded. Areas requiring further investigation and/or potentially meriting legislative protection. Broad classification of the archaeological potential of the coast. Consideration of the implications of the survey in terms of the relevant Shoreline Management Plans and other strategy documents.
Derived from:	Phase 1 work, product 1.
Format and presentation:	Illustrated Word document. Pdf and printed versions will be prepared.
Allocated to:	Adrian Chadwick and Toby Catchpole
Quality criteria and method:	Internal editing. Submission to QAO for circulation and EH comments.
Person/group responsible for quality assurance:	Toby Catchpole and Buzz Busby
Person/group responsible for approval:	Buzz Busby
Planned completion date:	Draft to English Heritage before 7 March 2011

Product number:	3
Product title:	Severn Estuary Rapid Coastal Zone Assessment Survey. Non-technical Summary .
Purpose of the product:	Introduction to the project for non-archaeologists such as coastal managers.
Composition:	Short illustrated report.
Derived from:	Products 1 and 2.
Format and presentation:	Illustrated Word document. Pdf and printed versions will be prepared.
Allocated to:	Adrian Chadwick and Toby Catchpole.
Quality criteria and method:	Internal editing. Submission to QAO for circulation and EH comments.
Person/group responsible for quality assurance:	Toby Catchpole and Buzz Busby.
Person/group responsible for approval:	Buzz Busby.
Planned completion date:	Draft to English Heritage before 7 March 2011.

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