

Baseline Scoping Report – FINAL

Prepared for

Slapton Line
Partnership

April 2017



Ash House
Falcon Road
Sowton
Exeter
EX2 7LB

Contents

Section	Page
Document History	v
Introduction	1
Data Collection Exercise	2
2.1 Project Initiation Meeting.....	2
2.2 Site Visit.....	2
2.3 Data Collation and Recording.....	3
Data Review	7
3.1 Coastal Processes Baseline.....	7
3.2 Defence Baseline.....	10
3.3 Environmental Baseline.....	11
3.4 Economics Baseline.....	11
3.5 Options Appraisal.....	12
What Next?	13
4.1 Data Gaps.....	13
4.2 Critical Issues to Resolve.....	14
4.2.1 Issue 1 – Study Extents BMP.....	14
4.2.2 Issue 2 – Attendance at Workshops/Public Exhibition.....	15
4.2.3 Issue 3 – Quality of Extreme Wave and Water Level Data.....	15
4.2.4 Issue 4 – Nearshore Wave and Current Data.....	16
4.2.5 Issue 5 – Overtopping Assessment.....	20
4.3 Scope of Works.....	20

Table(s)

Table 2.1 Data Log

Table 3.1 Data requirements for the Coastal Processes Baseline

Table 3.2 Data requirements for the Defence Baseline

Table 3.3 Data requirements for the Environmental Baseline

Table 3.4 Data requirements for the Economics Baseline

Table 3.5 Data requirements for the Options Appraisal

Table 4.1 Summary of data gaps

Table 4.2 Proposed changes to scope and fees

Document History

Reference Number: 689979

Client Name: South Hams District Council

This document has been issued and amended as follows:

Version	Date	Description	Created By	Verified By	Approved By
v1, v2, v3	15 th February 2017 – 2 nd March 2017	Draft	Emma Allan Alan Frampton Christopher Stokes Gerd Masselink		
v4	7 th March 2017 – 16 th March 2017	Draft Final	Emma Allan Alan Frampton		
v5	16 th March 2017	Final	Emma Allan Alan Frampton	Alan Frampton	Alan Frampton
v6	05 th April 2017	Final_1	Emma Allan	Alan Frampton	Alan Frampton

Introduction

This Baseline Scoping Report has been prepared as part of the Slapton Sands Beach Management Plan (BMP) project. The Baseline Scoping Report presents the findings of the Stage 1 of the project; the Desktop Review.

The purpose of Stage 1 – Desktop Review is to identify:

- The data required to complete Stage 2 (Technical Updates) of the project, the purpose of which is to update the baseline reporting including; (i) Coastal Processes Understanding; (ii) Defence Assessment; (iii) Economics Baseline; and (iv) Environmental Baseline.
- Particular issues that need to be considered and resolved at an early stage.

A number of tasks were undertaken to complete Stage 1 – Desktop Review, including:

1. Project initiation meeting (5th January 2017);
2. Stakeholder engagement plan;
3. Briefing note and communications with key stakeholders through email communications;
4. Presentation and site visit (7th February 2017);
5. Data collection and review; all data is recorded as received in a data log; and
6. Client workshop meeting (7th March 2017).

The report provides a summary of:

- Section 2 – data collection exercise;
- Section 3 – data review; and
- Section 4 – what next?

Data Collection Exercise

As part of Stage 1, a data collection exercise was undertaken. The purpose of the exercise was first to identify what data is available and collect it from the relevant holder of the data. The following section provides details on the steps taken to collect data and to log the data received, along with a copy of the data log.

2.1 Project Initiation Meeting

At the project outset, a project initiation meeting was held with CH2M project team members (including, Emma Allan, Jonathan Rogers and Alan Frampton) and members of the core client group, including Dan Field (South Hams District Council, SHDC), Alan Denbigh (Slapton Line Partnership, SLP) and Jessica Bott (Devon County Council, DCC). Martin Davies (Environment Agency) was absent from this meeting.

This meeting provided the CH2M project team and the core client team an opportunity to discuss the data (including data, reports and drawings) required to complete the baseline reporting/subsequent tasks and determine the organisations that held that data and who would and could provide the data.

Following the meeting, the core client team provided CH2M with the data held by SHDC, the SLP and DCC. Where necessary, contacts names were given to request data from elsewhere, such as within the Environment Agency.

Key points identified in from this meeting were:

1. Flood modelling data may be insufficient to complete the economics baseline. ABD modelling, flood zone modelling and flood warning modelling data was requested from the Environment Agency via Martin Davies. The data has since been received, recorded in the data log and reviewed.
2. The economic assessment prepared to justify the emergency works at Torcross is required in order to fully understand the benefits and costs already accounted for. This has since been provided by the Environment Agency.

The meeting also provided the project team with the opportunity to identify any potential issues that need to be resolved ahead of commencing stage 2, these include:

1. The study boundaries of the project may need to be extended to the south to include Beesands and Hallsands. This would require additional work to all baselines, the options appraisal and the final BMP document, therefore increasing the scope and fees of the work described in the current tender and contract. Following completion of the draft Baseline Scoping Report, discussions were held in the Client Workshop on how this could be addressed and taken forward; refer to Section 4.2.1 for further information.

2.2 Site Visit

A pre-site visit meeting was held at the Slapton Ley Field Centre with the core client team, CH2M project team and key stakeholders. The meeting commenced with a joint presentation given by members of the core client team and CH2M project team followed by an open discussion, lunch and 'walk-about' over the site. A briefing note was also circulated ahead of the meeting. The meeting, briefing note and 'walk-about' provided the opportunity to seek data from the key stakeholders and wider recipients of the briefing note.

2.3 Data Collation and Recording

Following the data collation exercise, a record of the data received has been made in a data log, managed and updated by CH2M project manager, Emma Allan. A copy of the latest data log is provided in Table 2.1. The data received have been collated and stored on internal servers within CH2M. The data are available for all members of the CH2M project team to view and use throughout the project, and where relevant will be supplied to University of Plymouth (UoP) via a file transfer website or on CD/DVD.

SECTION 2 – DATA COLLECTION

Table 2.1 Data Log

Summary of all data received through the data collection exercise. A master copy is retained and updated by CH2M.

Item #	Data Item	Data Source (organisation/website etc.)	Date Data Received	About the Data (brief description)
1	Atkins_2006_A379 - Proposed Carriageway Realignment Environmental Statement	Devon County Council (DCC), Jessica Bott via CD	17 th January 2017	Environment Statement for A379 - Proposed Carriageway Realignment. Prepared by Atkins for DCC.
2	CH2M_2016-2017_Torcross Emergency Works	CH2M	January 2017	Torcross Emergency Works Site Supervisor weekly site reports and links to weather reports and site visit photos, including February 2016 when beach levels were particularly low.
3	DCC_2006_A379 Planning Documents	South Hams District Council	3 rd January 2017	Planning documents for realignment of the A379.
4	DCC_2016_Wildlife and Ecological Report	Devon County Council	15 th February 2017	Wildlife report for the A379 and SSSI ecological information.
5	EA_Coastal Flood Boundaries Extreme Water Levels and Waves	Environment Agency	28 th February 2017	Design sea levels and swell waves.
6	EA_Flood Mapping and Modelling	Environment Agency	23 rd February 2017	Flood warning areas, flood risk areas and historic flood maps.
7	EA_NCERM Data	Environment Agency	23 rd February 2017	Erosion mapping data. CH2M hold NCERM data and will provide for this project.
8	EA_State of the Nation Wave and Water Level Data	Environment Agency; requested by Ed Hill, CH2M	6 th January 2017	Extreme water levels (Additional information including LiDAR, CCO aerial imagery, EA flood mapping and NCERM) <i>Pending an update on SoN / JBA data and outputs the Environment Agency, including nearshore wave and water levels, wave overtopping calculations and inundation modelling outputs (flood depth grids and hazard data – as GIS files)</i>
9	EA_Torcross Emergency Works	Environment Agency	17 th February 2017	Plans of the works and findings report. Economic analysis.
10	EH_2017_Slapton photos	Emily Hewitt, CH2M	January 2017	Photos taken by ECW (Emily Hewitt) for Torcross emergency works.
11	Halcrow_Durlston Head to Rame Head - 22Jul2011 - FINAL	Halcrow	February 2017	Shoreline Management Plan 2.

SECTION 2 – DATA REVIEW

Item #	Data Item	Data Source (organisation/website etc.)	Date Data Received	About the Data (brief description)
12	Papers	Andy Pratt, Slapton Ley Field Centre	6 th March 2017	Assessment of geomorphological impacts relating to the management of the A379 road
13	JBA_2015_Slapton Line Economic Valuation	South Hams District Council	3 rd January 2017	Quantification of the current economic contribution of the “Slapton Line” road (A379). Prepared by JBA for Slapton Line Partnership.
14	RH_Slapton Ley Flooding	SLP	15 th February 2017	Assessment of sea water penetration through the Slapton barrier.
15	Scott Wilson_2006_Slapton Coastal Zone Management	South Hams District Council	3 rd January 2017	A comprehensive evaluation of the issues relating to coastal processes at Slapton Sands for the purposes of determining an appropriate shoreline management response to the recent erosion and from this, to establish a robust long-term coastal zone management strategy for the area. Prepared by Scott Wilson for Slapton Line Partnership.
16	SHDC&WDBC_2016_Vulnerability of A379 to Storm Damage across Slapton Ley	South Hams District Council	3 rd January 2017	An assessment of the vulnerability of different sections of the A379 to damage.
17	SHDC_Bastion Works (2009)	South Hams District Council	15 th February 2017	Drawings and details of 2009 bastion works.
18	SHDC_Defence Info and Ownership	South Hams District Council	15 th February 2017	Details of defence ownership.
19	SHDC_Shingle and Bastion Replenishment (2014)	South Hams District Council	15 th February 2017	Details of recycling scheme and bastion construction.
20	SLFC_Species Information	Slapton Ley Field Centre, Tom Pinches	20 th February 2017 8 th March 2017	Species information, including dormice, badger locations, fungi, shingle invertebrates, cirl buntings, cettis survey,
21	SLP_2009_Tourism Strategy	SLP	15 th February 2017	Strategy for tourism in Start Bay.
22	SLP_2011_Adaptation Toolkit	Slapton Line Partnership	9 th January 2017	Documents shares experience of various initiatives piloted in the Slapton Line Partnership Adaptation project from 2007 onwards.
23	SLP_2012+2014+2017_Contingency Manual	Slapton Line Partnership	9 th January 2017	Contingency plans for severe weather conditions: 2012: Contingency Manual.doc - a working document to map the various issues covered during the adaptation plan and cross reference to other useful paperwork.

SECTION 2 – DATA COLLECTION

Item #	Data Item	Data Source (organisation/website etc.)	Date Data Received	About the Data (brief description)
				172014: Update of Contingency Plan 14 July - a 2010 DCC document detailing the highways response to flooding incidents, following a number of changes of personnel in DCC and SHDC it has since been effectively split into two new documents: <ul style="list-style-type: none"> • 2017 Slapton Line Contingency Plan Communications Planning Slapton Line Partnership (see below).
24	SLP_2017_Communications Planning	Slapton Line Partnership	9 th January 2017	See above.
25	SLP_Photos	Slapton Line Partnership	14 th March 2017	Photos.
26	SLP_Video Clips	Slapton Line Partnership	9 th February 2017	Video clips.

Data Review

In order to meet the requirement of Stage 1, which is to determine the suitability and availability of data required to; (a) develop the technical baseline understanding reports in Stage 2 of the project, and, (b) inform development of a robust options appraisal in Stage 4 of the project (described in Section 3.5); the data collated and detailed in the data log have been reviewed. A summary of that review is presented in this section of the report.

This summary has been divided into five sub-sections; one for each of the four baseline reports that will be produced in Stage 2 of the project, and one for the options appraisal that will follow in Stage 5 of the project. Each sub-section contains a table, which:

- provides a list of the data that are required to inform each of the technical baseline reports and update the information that already exists in previous work including the 2006 Slapton Coastal Zone Management Study;
- provides an assessment as to whether that data are available by linking back to the data log (refer to Table 2.1); and
- notes where the data may only be partially available or not at all available.

The data gaps and issues identified by this review are summarised in Section 4, along with the ways in which these gaps and issues could be resolved and the project scope amended accordingly.

3.1 Coastal Processes Baseline

The purpose of the coastal processes baseline is to provide an overview of the coastal processes and shoreline evolution operating in Start Bay; the understanding gained from undertaking this work is critical and will be used in Stage 4 (Options Appraisal) of the project to develop sustainable coastal flood and erosion risk management options for the BMP frontage. The report will include a review of existing information taken and provide the results of new analysis of beach profile change and sediment transport. Professor Gerd Masselink and Christopher Stokes at the UoP will produce the coastal processes baseline, drawing on the university latest understanding and research.

Table 3.1 Data requirements for the Coastal Processes Baseline

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
1	Topographic data	Plymouth Coastal Observatory, UoP, and Slapton Ley Field Centre	Beach profile data Note 1) UoP have more than 10 years of monthly profile data at Slapton Sands, including some data at Hallsands, Beesands and Blackpool Sands. Note 2) Slapton Ley Field Centre have older survey data from 1972 to 2003.	UoP to collate data, and download additional data from CCO website	✓
2	Extreme water levels and waves	Environment Agency	State of the Nation	EA_State of the Nation Wave and Water Level Data	Pending May 2017
3	Extreme water levels and waves	Environment Agency	Coastal Flood Boundary Conditions	EA_Coastal Flood Boundaries Extreme	✓

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
				Water Levels and Waves	
4	UKCP09 sea level rise rates	UK Climate Projections Programme	Relative sea level rise projections	UoP to download climate projections from .gov website	✓
5	Nearshore wave and current data (modelled) for longshore sediment transport calculations	Data gap	Data Gap	Data gap	X
6	LiDAR	Plymouth Coastal Observatory	LiDAR data and reports	UoP to download from CCO website	✓
7	Aerial imagery	Plymouth Coastal Observatory	Aerial imagery and reports	UoP to download from CCO website	✓
8	Annual reports	Plymouth Coastal Observatory	Beach monitoring annual reports	UoP to download from CCO website	✓
9	Coastal processes and shoreline evolution	Halcrow	Shoreline Management Plan	Halcrow_Durlston Head to Rame Head	✓
10	Coastal processes and shoreline evolution	Scott Wilson	Coastal Zone Management Study	Scott Wilson_2006_Slapton Coastal Zone Management	✓
11	Coastal processes and shoreline evolution	Royal Haskoning	Slapton Ley Evolution Study Leaflet	RH_Slapton Ley Flooding	✓
12	Geomorphological study	Pethick (2001)	Slapton Sands Proposed Road Realignment	Papers	✓
13	Geomorphological study	Lee (2003)	TBC	Jon Grimes from Natural England sourcing	X
14	Geomorphological study	Massey (2008)	Relative sea-level change and postglacial isostatic adjustment along the coast of south Devon, United Kingdom†	UoP to download	✓
15	Geomorphological study	Chadwick et al. (2005)	A new analysis of the Slapton barrier beach system, UK	UoP to download	✓
16	Geomorphological study	Ruiz de Alegria et al. (2010)	Storm response and seasonal morphological change on a gravel beach, Slapton Sands, UK.	Stored at UoP	✓
17	Geomorphological study	Ruiz de Alegria et al. (2010)	Medium-term shoreline predictions on a gravel beach using Canonical Correlation Analysis.	Stored at UoP	✓
18	Geomorphological study	Ruiz de Alegria et al. (2009)	The Effectiveness of Bastions in Beach Stabilisation over	Stored at UoP	✓

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
			Storm Events at Slapton Sands.		
19	Geomorphological study	Austin et al. (2013)	Groundwater dynamics in coastal gravel barriers backed by freshwater lagoons and the potential for saline intrusion: Two cases from the UK.	Stored at UoP	✓
20	Geomorphological study	Masselink et al. (2015)	The extreme 2013/14 winter storms: hydrodynamic forcing and coastal response along the southwest coast of England.	Stored at UoP	✓
21	Geomorphological study	Scott et al. (2016)	The extreme 2013/2014 winter storms: Beach recovery along the southwest coast of England.	Stored at UoP	✓
22	Flood Mapping data and files	Environment Agency	Flood warning and flood risk mapping	EA_Flood Mapping and Modelling	✓
23	NCERM Erosion mapping data	CH2M / Environment Agency	Erosion mapping data. CH2M hold NCERM data and will provide for this project.	EA_NCERM Data CH2M to download	✓
24	Impacts of breaching	Royal Haskoning	Slapton Ley: A Vision for the Future	RH_Slapton Ley Flooding	✓
25	Coastal processes, geomorphology and beach condition	South Hams District Council	Vulnerability of A379 to Storm Damage across Slapton Ley	SHDC&WDBC_2016_Vulnerability of A379 to Storm Damage across Slapton Ley	✓
26	Sediment sampling report	Buscombe (2008)	Morphodynamics, sedimentation and sediment dynamics of a gravel beach	Stored at UoP	✓
27	Existing defences	Environment Agency	Findings report and supporting information	EA_Torcross Emergency Works	✓
28	Existing defences	DCC	Boulders	SHDC_Defence Info and Ownership	Partial
29	Existing defences	South Hams District Council	2009 bastion works	SHDC_Bastion Works (2009)	✓
30	Recycling volumes and bastion construction	South Hams District Council	2009 beach recycling and bastion works	SHDC_Shingle and Bastion Replenishment (2014)	✓
31	Historical photographs of Slapton Sands	TBC	TBC	UoP – aim to source, possibly online?	X

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
				SHDC / SLP – to provide	
32	Present photos of Slapton Sands	Emily Hewitt (Environmental Clark Works – Torcross) Site visit photos	Photographs of Torcross emergency works and Slapton Sands at various locations	EH_2017_Slapton photos <i>070220017_Site Visit Photos - Shortcut</i> SHDC / SLP – to provide	Partial
33	Local observations	TBC	TBC	SHDC / SLP – to provide	X
34	Unmanned Aerial Vehicle (UAV) data	UoP	Start Bay UAV data, starting 2016	Stored at UoP	✓
35	Single-beam and multi-beam bathymetric data	UoP	Start Bay bathymetric data	Stored at UoP	✓

Note: UoP hold a very extensive bibliography of pre-2000 papers on Slapton Sands as well (too many papers to list here).

3.2 Defence Baseline

The purpose of the defence baseline is to inform the BMP with the latest information on the existing defences along the BMP frontage – this is important to the development of the BMP as it provides a summary of all the existing defences and their condition, which is in turn used to determine the existing and future standard of protection afforded by the defences. The findings of the defence baseline will be used to develop sustainable flood and coastal management options for the BMP frontage in Stage 4 (Options Appraisal).

Table 3.2 Data requirements for the Defence Baseline

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
1	Directory of all defences, including dates of construction	Various	Various	To come from review of data below – all relevant details may not be available, such as date of construction	Partial
2	Existing defences – Torcross emergency works	CH2M	Torcross seawall	CH2M_2016-2017_Torcross Emergency Works	✓
3	Existing defences	Environment Agency	Findings report and supporting information	EA_Torcross Emergency Works	✓
4	Existing defences	DCC	Boulders	SHDC_Defence Info and Ownership	Partial
5	Existing defences	South Hams District Council	2009 bastion works	SHDC_Bastion Works (2009)	✓
6	Recycling volumes and bastion construction	South Hams District Council	2009 beach recycling and bastion works	SHDC_Shingle and Bastion Replenishment (2014)	✓
7	Extreme water levels and waves	Environment Agency	State of the Nation	EA_State of the Nation Wave and Water Level Data	Pending May 2017

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
8	Overtopping data	Environment Agency	State of the Nation from EA/JBA	To come from the Environment Agency May 2017	Pending May 2017

3.3 Environmental Baseline

The environmental baseline provides an overview of key environmental features and social factors relating to the study area, and including them in the baseline will ensure that they are given appropriate consideration when developing management options for the BMP frontage.

Table 3.3 Data requirements for the Environmental Baseline

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
1	Mapping data	Various - TBC	Various - TBC	Available to download from MAGIC / Geostore / Historic England websites	✓ CH2M to download
2	Environmental designations	Devon County Council	Wildlife Report	DCC_2016_Wildlife and Ecological Report	✓
3	Details of wildlife, ecology, fauna and flora	Devon County Council	Review of ecological information	DCC_2016_Wildlife and Ecological Report	✓
4	Species information	Various, supplied by Tom Pinches at Slapton Ley Field Centre	Various	SLFC_Species Information	✓
5	Culture, heritage and tourism	Slapton Line Partnership	Tourism Strategy	SLP_2009_Tourism Strategy	✓

3.4 Economics Baseline

The economics baseline will set out the economic justification for flood and coastal erosion management activities along the BMP frontage.

Table 3.4 Data requirements for the Economics Baseline

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
1	Flood Mapping data and files	Environment Agency	Flood warning and flood risk mapping	EA_Flood Mapping and Modelling	✓
2	NCERM Erosion mapping data	CH2M / Environment Agency	Erosion mapping data. CH2M hold NCERM data and will provide for this project.	EA_NCERM Data	✓ CH2M to download
3	Asset maintenance / capital costs	Environment Agency	TBC	To come from Martin Davies (EA) / SHDC / DCC	X
4	Tourism visitor data	SLP	Tourism strategy	SLP_2009_Tourism Strategy	Partial

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
				SHDC / SLP – to provide	
5	Valuation of benefit provided by A379 road	JBA	Economic contribution of the "Slapton Line" road (A379)	JBA_2015_Slapton Line Economic Valuation	✓
6	Economic assessment completed for the Torcross Emergency works	Environment Agency	Risk, PF calculator, do-nothing damages	EA_Torcross Emergency Works	✓
7	Overtopping data	Environment Agency	State of the Nation from EA/JBA	To come from the Environment Agency May 2017	Pending May 2017

3.5 Options Appraisal

Stage 4 of the BMP is to undertake an options appraisal to identify and assess possible options for managing the coastal flood and erosion risk along the BMP frontage. The baseline reports will first be utilised to define the key issues and objectives relating to coastal processes, the defences, the environment and economics. Then, via a clear and transparent appraisal processes, a long-list of options will be rationalised to a short-list and ultimately a preferred option.

Table 3.5 Data requirements for the Options Appraisal

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
1	Plans for A379 realignment	Devon County Council	Drawings	DCC_2006_A379 Planning Documents	✓
2	Response to events / contingency planning	Slapton Line Partnership	Various contingency manuals / plans	SLP_2012+2014+2017_Contingency Manual	✓
3	Response to events	Slapton Line Partnership	Coastal Adaptation: Community Engagement Toolkit	SLP_2011_Adaptation Toolkit	✓
4	Lines of communications during events	Slapton Line Partnership	Communications planning document	SLP_2017_Communications Planning	✓
5	Environmental assessment of A379 realignment	Atkins	Environmental statement	Atkins_2006_A379 - Proposed Carriageway Realignment Environmental Statement	✓
6	Details of Torcross works in 2016/17	Environment Agency	Documents, drawings and calculations	EA_Torcross Emergency Works	✓

What Next?

Following the data review, all data gaps and issues to resolve were summarised, as in Sections 4.1 and 4.2, in a draft version of the Baseline Scoping Report.

The draft report provided a reference document for discussions at the Client Workshop Meeting, held on the 7th March 2017 with CH2M project team members (including, Emma Allan and Alan Frampton), Christopher Stokes (UoP) and members of the core client group, including Dan Field (South Hams District Council, SHDC), Alan Denbigh (Slapton Line Partnership, SLP) and Martin Davies (Environment Agency). Jessica Bott (Devon County Council, DCC) was absent from this meeting.

The purpose of the meeting was to bottom-out the data gaps and issues ahead of providing the Core Client Team with a Final Baseline Scoping Report, that sets out a scope of works and associated costs to take the BMP forward (refer to Section 4.2 and summary in 4.3).

4.1 Data Gaps

The data review summarised in Section 3 has highlighted the following gaps in data that is required to inform the development of the Slapton Sands BMP. These data gaps are summarised in Table 4.1 below.

Table 4.1 Summary of data gaps

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
Data needed for Coastal Processes Baseline					
2	Extreme water levels and waves	Environment Agency	State of the Nation	EA_State of the Nation Wave and Water Level Data	Pending May 2017
5	Nearshore wave and current data (modelled) for longshore sediment transport calculations	Data gap	Data Gap	Data gap	X
13	Geomorphological study	Lee (2003)	TBC	Jon Grimes from Natural England sourcing	X
28	Existing defences	DCC	Boulders	SHDC_Defence Info and Ownership	Partial
31	Historical photographs of Slapton Sands	TBC	TBC	UoP – aim to source, possibly online? SHDC / SLP – to provide	X
32	Present photos of Slapton Sands	Emily Hewitt (Environmental Clark Works – Torcross) Site visit photos	Photographs of Torcross emergency works and Slapton Sands at various locations	EH_2017_Slapton photos <i>070220017_Site Visit Photos - Shortcut</i> SHDC / SLP –to provide	Partial
33	Local observations	TBC	TBC	SHDC / SLP – to provide	X
Data needed for Defence Assessment Baseline					
1	Directory of all defences, including dates of construction	Various	Various	To come from review of data below – all relevant details may not be available, such as date of construction	Partial

SECTION 4 – DATA REVIEW

Ref	Data Requirement	Author / Owner	Title	Link to Data Log	Available
4	Existing defences	DCC	Boulders	SHDC_Defence Info and Ownership	Partial
7	Extreme water levels and waves	Environment Agency	State of the Nation from EA/JBA	EA_State of the Nation Wave and Water Level Data	Pending May 2017
8	Overtopping data	Environment Agency	State of the Nation from EA/JBA	To come from the Environment Agency May 2017	Pending May 2017
Data needed for Environmental Baseline					
	None to report at this time				
Data needed for Economics Baseline					
3	Asset maintenance / capital costs	Environment Agency	TBC	To come from Martin Davies (EA) / SHDC / DCC	X
4	Tourism visitor data	SLP	Tourism strategy	SLP_2009_Tourism Strategy SHDC / SLP – to provide	Partial
7	Overtopping data	Environment Agency	State of the Nation from EA/JBA	To come from the Environment Agency May 2017	Pending May 2017
Data needed for Options Appraisal					
	None to report at this time				

4.2 Critical Issues to Resolve

4.2.1 Issue 1 – Study Extents BMP

Following discussions held during the project initiation meeting and the site visit presentation meeting, a need to potentially include Beesands and Hallsands within the BMP study area was suggested. To address this, three options were proposed and discussed during the Client Workshop on the 7th March, including;

- *The coastal processes baseline will inherently cover the wider coastal processes operating to the north and south of the study area, but the tendered scope does not specifically allow for any new or specific analysis beyond the present study boundaries. The first solution would be to keep the study area as is, but ensure that all communications going out from the core client team stress that this BMP will only include a wider consideration of the coastal processes to the north and south and not new analysis for Beesands and Hallsands.*
- *The second option would be to extend the coastal processes baseline to include the same level of detailed analysis that will be undertaken for Slapton to be extended to Beesands and Hallsands. This would require additional inputs from CH2M and UoP.*
- *The third option would then be to allow for the additional coastal process analysis, but extend the study area across all four baselines and subsequently undertake additional options appraisal for Beesands and Hallsands. This would require additional inputs from CH2M staff and UoP.*

The outcome of the Client Workshop was to take forward two of those options, including:

1. As per the existing project scope, the coastal processes baseline will inherently cover the wider coastal processes operating to the north and south of the study area. However, to allow for sediment linkages to the north and south, **expand the project scope** to include new high-level trends analysis for the wider coastline at Blackpool Sands, Hallsands and Beesands. The scope and costs are presented in Section 4.2.4.1 and **Error! Reference source not found.**
 - The value of assessing the potential longshore transport was discussed during the Client Workshop and it was agreed that the scope should be expanded to include this for the BMP area, including the additional locations. The level to which this is undertaken will depend on the quality and cost of the available data, which is itself an issue – refer to Section 4.2.4 below where this is discussed in more detail.
2. Economics baseline – **expand the project scope** so that the economics analysis is also extended to include Blackpool Sands, Hallsands and Beesands. The costs are presented in **Error! Reference source not found.**
 - An initial review of available Environment Agency ABD flood mapping data (produced in 2008) suggests little flood risk at Hallsands and Blackpool Sands, now or in the future, as a result of wave overtopping. The economics baseline will therefore focus on erosion risk benefits in these areas. The primary risk at Beesands is flooding, and as we propose to do for all other locations at risk from flooding, we will utilise the JBA modelling data currently being prepared for the Environment Agency, which we understand from our discussions with the Environment Agency will be suitable for this purpose once it is available in May 2017. This approach is discussed in more detail in Section 4.2.3.

A decision was made by the Core Client Team not to extend the defences or environmental baseline to include the additional locations at Blackpool Sands, Hallsands and Beesands.

4.2.2 Issue 2 – Attendance at Workshops/Public Exhibition

Our proposal notes that staff from the UoP / other CH2M specialists could attend stakeholder engagement events if required by SHDC. It was agreed in the Client Workshop meeting on the 7th March 2017 that additional time and costs would be included to allow for Alan Frampton / UoP to attend the following meetings:

- Stage 3a (within Stage 4) – Key Stakeholder Engagement Workshop: + Alan Frampton and UoP;
- Stage 4 – Client Workshop + Alan Frampton;
- Stage 5 – Public Exhibitions + Alan Frampton; and
- Stage 6 – Client Workshop + Alan Frampton.

4.2.3 Issue 3 – Quality of Extreme Wave and Water Level Data

Extreme wave and water level data is needed for the coastal processes, defences and the economics baseline to undertake the following activities:

- Coastal processes baseline – cross-shore modelling to assess beach response to storm events.
- Defences baseline – wave overtopping to assess the Standard of Protection provided by the defences.
- Economics baseline – wave overtopping results from the defences baseline will be used to inform flood modelling, in turn used to determine flood damages.

The latest work to produce extreme wave and water level data is the Environment Agency’s State of the Nation (SoN) project. In the past, there has been some concern about the uncertainty of the SoN extreme data. However, during the Client Workshop Meeting it was brought to the attention of the BMP project team that updates to the SoN project are currently underway and would provide information that can be used when developing the BMP. Following the meeting, advice was sought

SECTION 4 – DATA REVIEW

from the Environment Agency on its status and the potential to use the input data and the latest modelling output, and the outcome is as follows:

- Nearshore wave and water levels have been signed off and are available to use.
- Wave overtopping inputs and results have been signed off and are available to use.
- Results of overtopping modelling are awaiting sign-off and will not be available until the end of the year.
- JBA are in the process of undertaking wave transformation modelling, wave overtopping analysis and flood modelling/mapping study for Start Bay, which refines the SoN modelling. This includes an assessment of coastal flood risk at Torcross and Beesands, which will be available in May 2017.

We believe that this information from the ongoing JBA work will provide sufficient inputs to undertake the wave overtopping analysis required for this project as previously scoped and we do not therefore anticipate change to our proposed scope and fees for this task and therefore the defence baseline.

4.2.4 Issue 4 – Nearshore Wave and Current Data

To have an up-to-date understanding of the beach dynamics on Slapton Sands, it is key to have an up-to-date understanding of the longshore sediment transport. Previous work has been undertaken to assess the potential longshore sediment transport at Slapton Sands for the 2006 Slapton Coastal Zone Management Study, however, it is noted that the analysis makes use of wave and current data that is approximately 15 years old. Therefore, it is suggested that this work is updated as part of the present Slapton Sands BMP.

Our original proposed scope and fees allowed for UoP to prepare a technical update of the Coastal Processes Baseline using existing understanding derived from the 2006 study and previous publications by UoP, and updated considerably through extensive analysis of the wave and morphological data collected over the past eight years. One aspect of this update is to improve the current understanding of longshore sediment transport by undertaking, (i) sediment transport analysis using previous studies, and (ii) beach volumetric change to derive longshore sediment transport rates. This will provide **basic quantitative insights** into the littoral drift rates along Slapton Sands and how spatial changes in this rate (increasing/decreasing trends, convergence/divergence) impact the beach morphology (i.e., beach width).

However, what this approach **does not provide**, is a **detailed quantitative understanding** of how the longshore sediment transport process changes along the whole of Start Bay and the sensitivity of the littoral drift rate and direction, and therefore shoreline change, to variations in the wave conditions (wave, period and direction) and water level (tide level; sea-level rise). This understanding could be achieved through numerical modelling, as follows:

- Initial inshore wave modelling would be required to quantify the inshore wave climate in more detail.
- The inshore wave model could then be combined with expressions for the littoral drift rate (based on computed breaking wave conditions) into a computational longshore transport and shoreline change model to explore different wave and water-level forcing scenarios and the impact they could have on the coastline and sediment transport. Therefore, the model could be used to answer what-if questions such as:
 - What would be the shoreline change if the beaches of Start Bay would experience another 2013/14 winter?
 - What sort of easterly storm condition is required to initiate beach recovery from the 2013/14 winter storms?

- What would be the impact of a 0.5m sea-level rise on the longshore sediment transport processes?
 - How does Skerries Bank control the littoral drift pattern and therefore shoreline orientation?
 - How long would a 100,000m³ beach nourishment placed in front of Torcross last under typical wave conditions?
- The vulnerability of the barrier system, and hence the road ‘Slapton Line’, to overwash and breaching under different wave and sea-level scenarios. To achieve this, new numerical and modelling process-based morphodynamic modelling would be required.

Having assessed the available data and existing models, there are four options to amend our proposed scope to accommodate this work; they are listed below with associated costs.

4.2.4.1 Option 1 - Include high-level trends analysis for Blackpool Sands, Hallsands and Beesands, but do not undertake any coastal processes modelling for the baseline report

The first option is to undertake the baseline studies at Slapton Sands (as per the original project scope), and include Blackpool Sands, Hallsands and Beesands to get the wider picture about sediment movement within Start Bay. No inshore wave modelling/longshore transport modelling/overwash modelling would be undertaken within this option.

Method	Pros	Cons	Cost
The method for this would be as specified in the current proposal for stage 2 of the assessment	It will still be possible to correlate historic changes in beach volumes/profiles along the bay to historic wave conditions, as topographic data and inshore wave buoy data are available.	No quantification of wave conditions at each beach within the bay or understanding of effect of complex local bathymetry (Skerries bank) on inshore wave conditions in the bay.	£2176
Analysis of existing topographic data from Hallsands, Beesands, Slapton Sands, and Blackpool Sands.	Cheapest and quickest option – no additional cost to the project.	No understanding of shoreline change along start bay, or longshore transport rates at Hallsands, Beesands, and Blackpool Sands.	
Existing literature (Chadwick 2005, Ruiz de Alegria 2009, 2010) will be consulted to obtain insights into longshore transport rates along Slapton Sands under a limited range of conditions		Would not provide probability of wave overwashing/breaching of barrier under future scenarios.	
Analysis of still water levels.		Most uncertainty in terms of predicting erosion and overwashing impacts from future wave scenarios, and very limited ability to comment on the long-term (20–50 years) dynamics and sustainability of the barrier system.	

4.2.4.2 Option 2: Option 1 + Undertake Wave Modelling Study

In addition to the work currently specified for stage 2 of the assessment, the second option is to undertake additional and representative computational wave modelling to quantify the inshore wave climate in more detail.

SECTION 4 – DATA REVIEW

Method	Pros	Cons	Cost
This would involve using UoP's existing Start Bay wave model domain and running a representative range of wave scenarios with differing wave angles and return periods in the model. Useful scenarios will need to be decided based on consultation with the client	Increased certainty about which wave conditions present the greatest potential for beach erosion/accretion	Wouldn't quantify actual beach volume gain/loss, or shoreline position during different wave events/ sequences of wave events because the sediment transport rates are not integrated spatially nor temporally, and therefore limited ability to comment on the long-term (20–50 years) dynamics and sustainability of the barrier system.	£6018
The model would be best forced at the model boundary with wave scenarios determined from Met Office's 30 year hindcast data set (which is freely available to the project through the EA – this has now been confirmed).	Understanding of effect of complex local bathymetry on inshore wave conditions in the bay. This is not captured by the wave conditions in the State of the Nation data set, which uses a resolution too coarse to properly resolve the effects of Skerries Bank.	Additional cost to the project.	
The detailed wave climate along the beaches within the bay, and importantly the angle and height of waves along the bay, would be quantified.	Detailed quantification of angle and height of waves along the bay and identification of regions of wave divergence and convergence (wave focusing).		
This could be used to make preliminary quantification of longshore transport rates using a range of empirical longshore sediment transport equation, specific for use with gravel-size sediment.	Quantification of longshore transport rate under a variety of different wave conditions.		
	Uses UoP's pre-existing wave model domain (perhaps 50% cost saving on the modelling exercise)		

4.2.4.3 Option 3: Option 1 + Option 2 + Undertake Longshore Transport Modelling

The third option is to undertake the above wave modelling to quantify the inshore wave climate, and then link the modelled wave conditions to a computational longshore transport model.

Method	Pros	Cons	Cost
Use detailed inshore wave conditions from Option 2 to force a numerical longshore transport model, which simulates changes in shoreline position.	Increased certainty about what beach volumes would be lost/gained in different parts of the bay during different wave events.	Cross-shore sediment transport would not be modelled, only alongshore transport.	£13,872
Predict the actual beach volume gains/losses, and shoreline position along the length of the beach (including at Beesands, Hallsands, Slapton, and Blackpool Sands) under different wave	Understanding of effect of complex local bathymetry on inshore wave conditions in the bay.	Beach profile shape would not be predicted, but shoreline position (and therefore erosion/accretion) would be predicted.	

Method	Pros	Cons	Cost
events/ sequences of wave events. Useful scenarios will need to be decided based on consultation with the client.			
	Quantification of longshore transport rate under a variety of different wave conditions.	Additional cost to the project.	
	Quantification of actual beach volume gain/loss during different wave events/ sequences of wave events.		
	Prediction of shoreline position during different wave events or sequences of wave events, e.g., what would be the shoreline response of another 2013/14 winter?		
	Identification of erosion hot-spots and recession rates during different wave scenarios		
	Some ability to comment on the long-term (20–50 years) dynamics and sustainability of the barrier system, but only with reference to the shoreline position and only as a result of longshore sediment transport processes during extreme events. Provides a ready to go model for the engineering options appraisal stage (saving perhaps 75% of longshore transport modelling costs for that stage). Engineering structures can then easily be added to the model domain (groynes, beach nourishment, breakwaters etc.) and the efficacy determined during stage 4 of the project.		

4.2.4.4 Option 4: Model the Vulnerability of Slapton Sands to Overtopping, Overwashing, And Breaching

This modelling exercise would aim to quantify the probability of overtopping (some gravel on the road), overwashing (a lot of gravel on the road), and breaching (catastrophic failure of road/breaching of the lagoon) of the Slapton barrier under different future wave events, levels of beach depletion and sea level. This will concentrate on the unprotected portion of the barrier/road where sea defences are not present and where the model to be used (XBeach-G) has been developed for.

Method	Pros	Cons	Cost
Determine a selection of extreme (low probability) events from State of the Nation dataset.	Some ability to comment on the long-term (20–50 years) dynamics and sustainability of the barrier system, with reference to the beach profile and crest elevation, only in response to cross-shore	Cannot predict exactly when such an event would occur, can only predict the probability/return period of such an event, and what the characteristics/impacts would be.	£13,260

SECTION 4 – DATA REVIEW

Method	Pros	Cons	Cost
	sediment transport processes during extreme events.		
Apply the effects of sea-level rise to these conditions where suitable.	Would be able to determine critical beach levels for overwash/breach (i.e., those that would be overwashed by 1/1 year, 1/10 year and 1/100 year events).	Cannot model longshore transport at the same time as cross-shore processes/overtopping, as this is not yet possible for gravel beaches with the latest models.	
Create synthetic beach profiles with different levels of denudation		Additional cost to the project.	
Use the process-based morphodynamic model XBeach-G (developed specifically for modelling gravel beaches) to simulate wave overtopping, overwashing, and breaching during extreme events. This will predict morphological change and overwash rates during selected forcing conditions events.			

4.2.5 Issue 5 – Overtopping Assessment

An assessment of overtopping was not completed for the emergency works at Torcross for the reason that the Environment Agency’s work involved stabilising the foundations and the existing defence and not raising or fundamentally changing the purpose of the defence itself. However, it is understood from our discussions with the Environment Agency that JBA are assessing the coastal flood risk at Torcross. We will therefore expect to review the JBA outputs and extract the relevant data, which falls within our existing scope for this task.

4.3 Scope of Works

Our proposed scope of works and fee remains unchanged at present. Should additional tasks be required to be undertaken on the basis of the data gaps and issues identified by this Baseline Scoping Report and the Client Workshop discussions, we will need to amend our scope and fee accordingly. As summary of the suggested changes to scope and associated fees are summarised in **Error! Reference source not found.** below.

Table 4.2 Proposed changes to scope and fees

Relevant Stage of Works	Stage Description	Change to Scope	Fee
Stage 2	Coastal Processes Baseline	Option 1 (refer to Section 4.2.3 for full detail)	£2,176*
Stage 2	Coastal Processes Baseline	Option 2 (refer to Section 4.2.3 for full detail)	£6,018*
Stage 2	Coastal Processes Baseline	Option 3 (refer to Section 4.2.3 for full detail)	£13,872*
Stage 2	Coastal Processes Baseline	Option 4 (refer to Section 4.2.3 for full detail)	£13,260*

Relevant Stage of Works	Stage Description	Change to Scope	Fee
Stage 2	Subcontract management and liaison	Required to manage change in UoP scope and fees	£425
Stage 2	Economics Baseline	Extend economics analysis to include Blackpool Sands, Hallsands and Beesands using existing data.	£1,377
Stage 3a (within Stage 4)	Options Appraisal	Attendance by Alan Frampton at Key Stakeholder Engagement Workshop	£702
Stage 3a (within Stage 4)	Options Appraisal	Attendance by UoP at Key Stakeholder Engagement Workshop	£1,122
Stage 4	Options Appraisal	Attendance by Alan Frampton at Client/Key Stakeholder Engagement Workshop	£457
Stage 5	Community Engagement	Attendance by Alan Frampton at 2no public exhibitions	£1,192
Stage 6	Reporting	Attendance by Alan Frampton at Client Workshop	£519

*Note that the fees provided are for the individual options.