



West of Wales Shoreline Management Plan 2
Section 4. Coastal Area E

November 2011

Final

9T9001

Rightwell House
Bretton
Peterborough PE3 8DW
United Kingdom
+44 (0)1733 334455 Telephone
Fax
info@peterborough.royalhaskoning.com E-mail
www.royalhaskoning.com Internet

Document title West of Wales Shoreline Management Plan 2
Section 4. Coastal Area E
Document short title Policy Development Coastal Area E
Status Final
Date November 2011
Project name West of Wales SMP2
Project number 9T9001
Author(s) CS Earlie
Client Pembrokeshire County Council
Reference 9T9001/RSection 4v3/301164/PBor

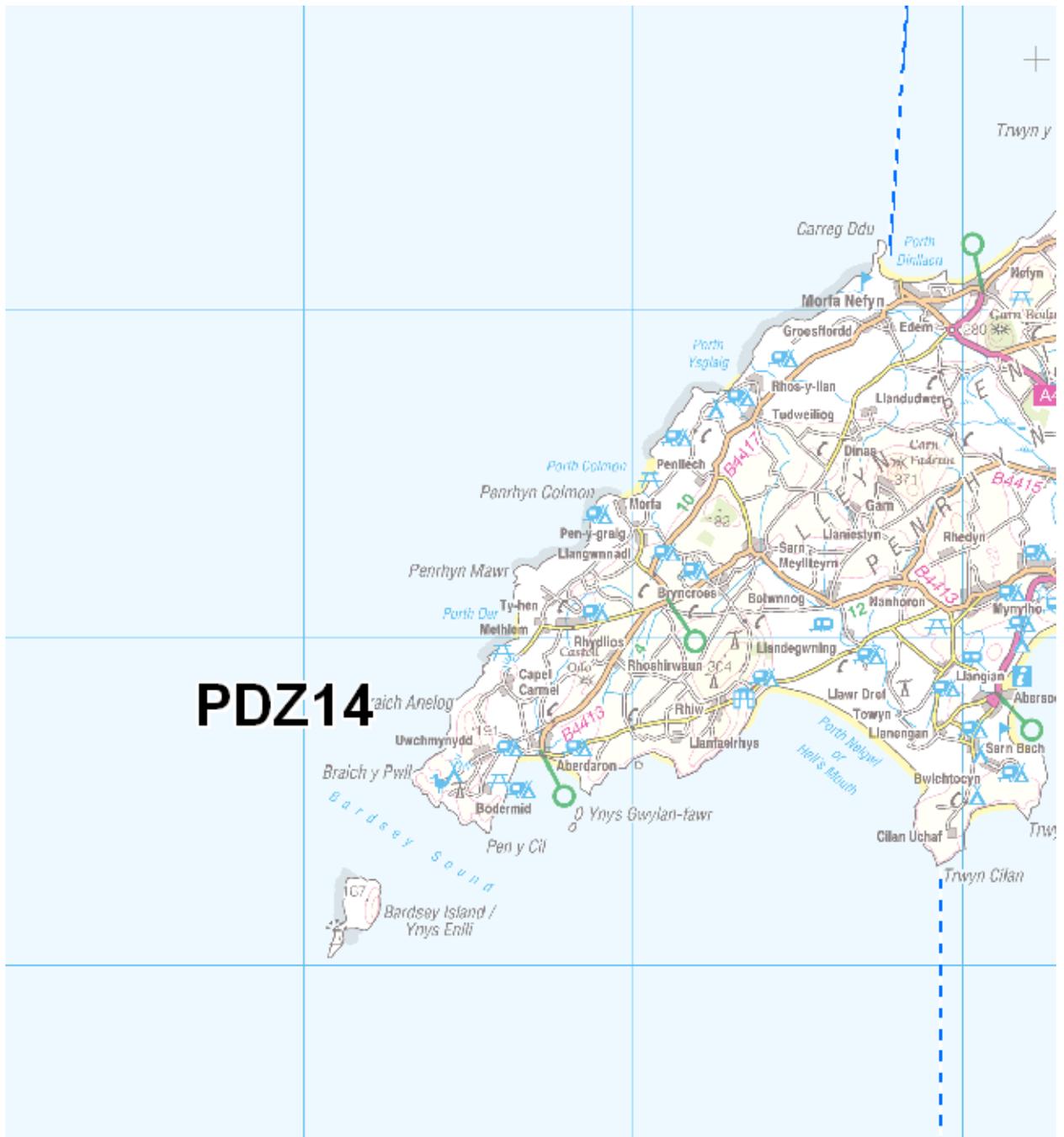
Drafted by Claire Earlie, Gregor Guthrie and Victoria Clipsham
Checked by Gregor Guthrie
Date/initials check 11/11/11
Approved by Client Steering Group
Date/initials approval 29/11/11

West of Wales Shoreline Management Plan 2

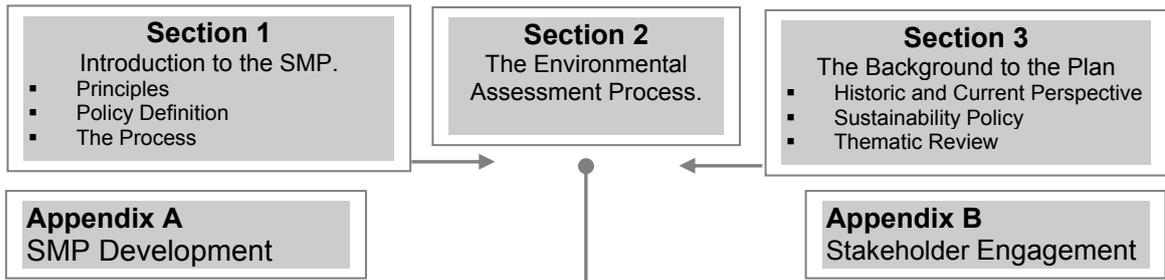
Coastal Area E,

Including Policy Development Zone (PDZ) 14.

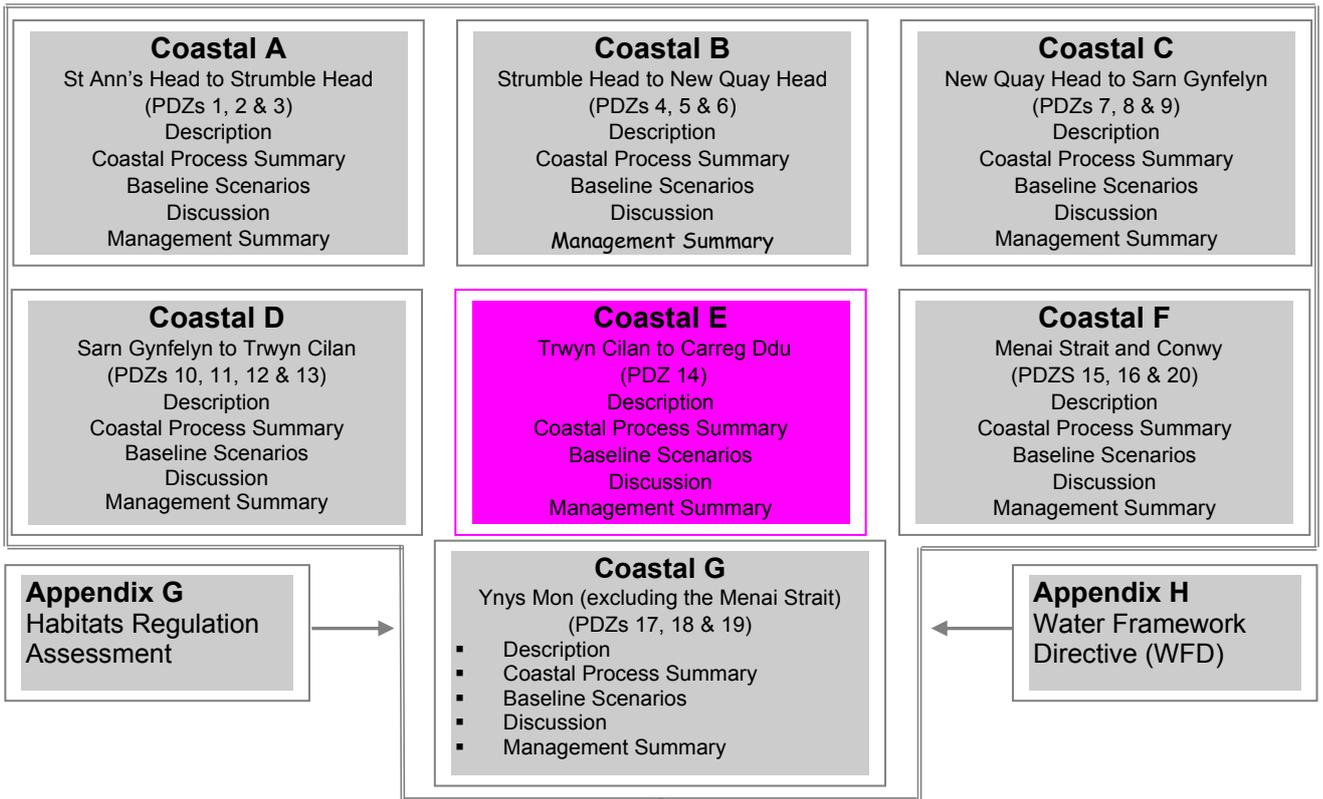
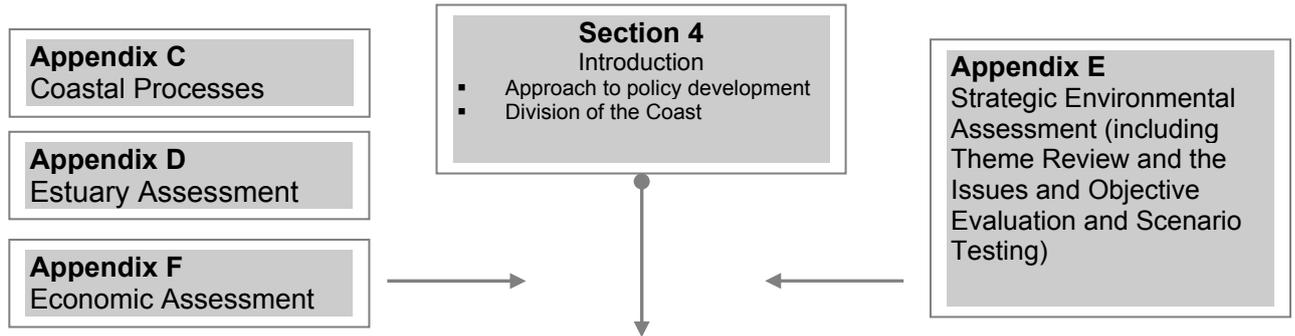
Trwyn Cilan to Carreg Ddu



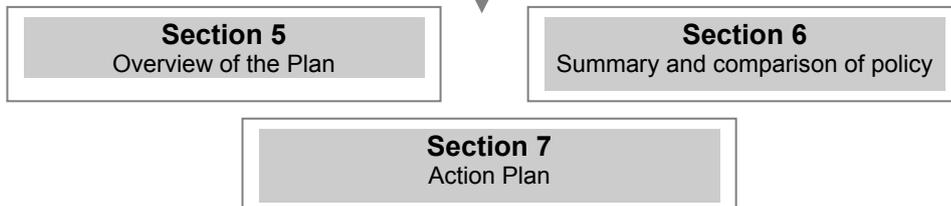
INTRODUCTION AND PROCESS



PLAN AND POLICY DEVELOPMENT



OVERVIEW



CONTENTS

	Page
4E.1 GENERAL DESCRIPTION	1
1.1 Character	1
1.2 Physical Process Overview	3
1.3 Present Management and Key Issues and Objectives	5
PDZ14 TRWYN CILAN TO CARREG DDU	
1 Local Description	11
2 Coastal Processes	14
3 Management Scenarios	18
4 Summary Comparison and Assessment of Baseline scenarios	24
5 Discussion and Detailed Policy Development	27
6 Management Summary	30
Summary Area Statements	32

4E.1 GENERAL DESCRIPTION

1.1 Character

(Further detail for the area is covered in Appendix D with individual features of the coast identified in Appendix E.)

This area is dominated by its rural and natural coastline. Much of the rugged natural rocky shoreline has little human development and infrastructure, and is characterised mainly by its geological and ornithological importance. The shape of the shoreline is controlled by rocky headlands, cliffs and outcrops with rock platforms and occasional shingle beaches forming the intertidal zone. Inlets or bays have formed where softer geological deposits exist and the long stretches of eroding cliffs of Porth Neigwl and Aberdaron are controlled by a dynamic relationship between the south westerly swell direction and the strength of the till cliffs. The lower beaches comprise of sand and the upper beaches are shingle, derived mainly from the eroding cliffs.

The area was heavily influenced during periods of glaciation, when the Irish Sea Ice Sheet flowed across the **Llŷn Peninsula**. This left relatively thin deposits over the northern flank of the peninsula whilst depositing thick layers of glacial sediment on the southern shoreline, in areas such as Aberdaron and Porth Neigwl.



Geology and Geomorphology of West Llŷn Peninsula.

Apart from the village of Aberdaron, there is little major settlement along this coastal area. The majority of the land is given over to agricultural use, with relatively minor roads linking to the nearby villages of Aberdaron, Abersoch and Morfa Nefyn.

The scattered, rural communities located here are sparsely spread over a large stretch of coastline, allowing the coast to maintain its natural character. The rocky cliffs of the coast and the outcrop-formed islands of Ynys Enlli, Ynys Gwylan Fawr and Ynys Gwylan Bach are notified as SSSIs and SPA, mainly for their geologically important Ordovician and Pre Cambrian features, and their abundance of breeding species of birds such as Puffins, Chough, Manx shearwater and also the frequent appearance of Grey seals.

Historically, there has been little human development in this coastal area, apart from the village of Aberdaron and in the 19th century, Ynys Enlli. There is, however, evidence of historical development around the Bay of Porth Ysgo, associated with quarrying and light railway transportation.

Ynys Enlli (Bardsey Island) is an offshore rock outcrop approximately 3km southwest of the tip of the **Llŷn Peninsula**, approximately 1km² in size. The shoreline is comprised of rock cliffs with the mean low water mark at the toe of the cliffs in a number of isolated positions. At the end of the 19th century the island supported a population of approximately 100. Nowadays, however, the only inhabitants are the lighthouse crews and the custodians of the bird observatory.

The overall environmental and historical importance of the area is equally demonstrated by extensive lengths and areas of coastline owned and managed by the National Trust.

In addition to its local rural communities, the area is important for tourism. The tourism and recreational value comes most obviously from the natural landscape; the area is popular for coastal walks and bird watching whilst Aberdaron is a popular summer seaside village. The beach of Aberdaron and the village itself hold significant value to the economic importance of the area. Porth Neigwl, Porth Ysgo and Porth Oer are popular surfing spots and coastal path access to these beaches is of great importance.

There are many locally important roads connecting the farming communities to the larger settlement of Aberdaron and further afield to Abersoch, Llanbedrog and Morfa Nefyn. Apart from a few exposed locations such as the low lying road at Aberdaron and to the North West of Porth Neigwl, these roads face very little risk to coastal erosion or flooding.

1.2 Physical Process Overview

(Further detail on coastal processes and geomorphology is provided in Appendix C).

EXPOSURE								
Water levels:	There is very little variation between St Tudwals Roads and Porth Dinllaen, with tidal ranges of 2.8m and 2.9m respectively. There are relatively strong tidal currents along the steep northern shoreline, but little tidal flow within the bays to the south.							
Location	Tide m AOD				Extreme Levels (return period) m AOD			
	MLWS	MLWN	MHWN	MHWS	10 yr	50 yr	100 yr	200 yr
St Tudwal's Roads	-1.94	-0.64	0.86	2.36	3.63	3.86	4	4.13
Aberdaron	-1.94	-0.54	0.86	2.16				
Porth Ysgaden	-1.80	-0.50	1.00	2.1				
Porth Dinllaen	-1.90	-0.60	1.00	2.2	3.29	3.5	3.63	3.76
Waves:	<p>The wave climate along the southern shoreline is dominated by its direct exposure to waves from the south and southwest, these being the predominant direction for the southern Irish Sea. The SMP1 wave data for Aberdaron shows wave heights from this direction are of the order of 2-3m, although further offshore, wave heights are, as expected, significantly higher. There is significant wave action within Porth Neigwl Bay creating a regular and wide breaker zone. Wave action trapped against the shoreline of the two main bays results in significant rip currents.</p> <p>The S/SW waves diffract around the north of the Llyn, to travel in a more eastward direction in the northern region of this coastal area. In addition, there is a substantial fetch across the Irish Sea from the NW to N.</p>							
GEOMORPHOLOGY:	<p>Porth Neigwl (referred to also as Porth Neigwl) contains a 6km, deeply inset sand and gravel beach, backed by 20m high till cliffs, with a small region of sand dunes at Pentowyn. The rocky cliff line, with its two bays of Aberdaron and Porth Ysgo is characterised by hard cliffs with steep platforms plunging into deep water. The deeply inset bays are the result of the erosion of glacial deposits between the hard rock headlands. To the western end of Aberdaron Bay the glacial deposits form a vegetated coastal slope whilst to the east there are near vertical eroding cliffs up to 30 m high. The Aberdaron frontage is divided by the mouth of the Afon Daron, towards the western side of the bay, which cuts through the glacial deposits. The beach and foreshore is a mix of sand and shingle overlying layers of sand clay and gravel.</p> <p>The development of the rocky stretch of coast from Pen y Cil to Carreg Ddu, on the northern shoreline is dominated by hard rock processes of slow platform down-wearing and cliff retreat. Local, small embayed beaches are the exceptions, and each of these is controlled by the hard rock cliffs that bound them. Generally the bays have formed where softer lithology is exposed. Ynys Enlli is an offshore igneous rock outcrop located to the south of the Llyn Peninsula.</p>							
DRIFT:	<p>Strongly swash aligned within bays, with little evidence of substantial net drift. Particularly within the smaller bays, local wave direction can result in movement of sediment. There is no evidence of coarse material leaving the bays, however there is a loss of finer material. There is believed to be no sediment exchange with the neighbouring units, and negligible sediment interaction between the bays within this area.</p>							

<p><i>EROSION/ ACCRETION:</i></p>	<p>The till cliffs of this coastal area are recessing through agricultural land. Part of Aberdaron is situated on the low lying coastal margin and is vulnerable to erosion. Although the till cliffs within this unit are likely to continue to erode, with the exception of Aberdaron, they will not retreat through developed areas. Ynys Enlli experiences some erosion of the rock faces, however, future shoreline change on this island is very minimal.</p>
<p><i>LONG TERM EVOLUTION: (unconstrained)</i></p>	<p>In all areas the recession rate of the glacial till cliffs and the beaches will increase in the future due to accelerated sea rise. In hard rock areas, shore platforms will narrow. The additional release of beach sediments from till embayments should allow beaches to rise with the sea level, and so little change will be seen in the intertidal area, although the shoreline profile will retreat. In the absence of defences the whole frontage of Aberdaron will retreat inland. The Village frontage would keep pace with the erosion of the cliffs to the east. This would initiate significantly greater slope instability in the area currently defended.</p>
<p><i>FLOOD RISK</i></p>	<p>The only key area of flood risk is Aberdaron, in low lying areas, where the Afon Daron discharges to the sea. This is quite local.</p>

1.3 Present Management and Key Issues and Objectives

Existing management practice

The following table sets out SMP1 policy (developed over a 50 year period); how the coast has been subdivide into management units; and, where relevant, where more recent decisions have been made, or discussion is ongoing, with respect to individual areas.

SMP 1			Subsequent Management Approach
No.	Unit	Policy	
Gwynedd			
12.1	Porth Neigwl	DN	
13.1	Porth Ysgo	DN	
13.2	Aberdaron East	DN	
13.3	Aberdaron	HTL	
13.4	Trwyn y Gwyddel	DN	
Ynys Enlli to Great Orme's Head			
1/1	Ynys Enlli	DN	
1/2	Trwyn y Gwyddell to Port Dinllaen	DN	
1/2a	Porth Oer	DN/DN(MR)	
1/2b	Porth Lago	DN/DN(MR)	
1/2c	Porth Colmon to Porth Melyn	DN/DN(MR)	
1/2d	Porth Tywyn	DN/DN(MR)	

Key: DN – do nothing, HTL – Hold the Line, SHTL – Selectively Hold the Line, R – Retreat, MR- Managed Realignment, deferred – policy deferred subject to further monitoring or study.

Under SMP1 policy much of this area of the coast remains undefended. The local stretch of defence is provided to Aberdaron along the low lying frontage of the village, in the form of a masonry/ concrete wall. To the east and to the western limit of the village, defences prevent erosion and coastal slope instability. The policy for these areas is for continued management. Along the northern section of coast consideration is given to Managed Realignment in the future as defences come under pressure. SMP1 recognised that many of the issues were concerned with a very local area and the attitude was to define a broad scale approach to management, particularly over the northern section of the coast. This attitude defined an overall approach, but then also identified particular local areas where management might be different.

Key Management issues

Only very locally are there significant pressures on the coast due to interaction with defences, these being at Aberdaron. Cliff erosion along much of this coast threatens the agricultural land in places and there are flood issues potentially affecting low lying parts of Aberdaron.

This coastal area is predominantly characterised by its natural coastline, and is a sparsely inhabited, agricultural peninsular. Most of the transport links are narrow roads, connecting the various settlements, most of which are not situated close to the coast. An issue raised at the consultation meetings was the significance of the through road to Aberdaron and beyond, to numerous properties of the Uwchmynydd Headland. The risk to the road would increase in the future, with cliff erosion due to accelerated sea level rise.

Although over much of the area sea level rise would not substantially increase erosion of the harder rock headlands, there is continuing risk to many of the currently eroding, glacial till cliffs and archaeological sites. This will impact both specifically on heritage features and more generally on the historic landscape.

The main management issues are quite specific and local, although they potentially have a broader impact beyond the coastal area. These issues are summarised as:

- The risk to parts of the road network.
- The potential loss of small bays and beaches due to coastal squeeze and the general impact on nature conservation values.
- Local but significant issues of increased flooding and erosion at Aberdaron.
- Impact on and access to water based activities such as boat use and surfing.
- Potential loss of or significant impact on communities at Aberdaron and Plas yn Rhiw, and to a lesser extent Porth Towyn.

The general character and values of the area, with respect to shoreline management, can be brought together in the following statement.

Underpinning the whole area is its important natural and historic landscape, nature conservation and geology. In addition to its inherent value, this provides the context of support for regionally important tourism and the recreational value of the area. This in turn adds important value to and sustains local communities. Important infrastructure such as coastal access, the access to the island of Ynys Enlli and the road network is essential in supporting use and values of the area. Within the regionally important values, the aim must be to support local communities in adapting to increased flood and coastal erosion risk.

Policy Development Zones

Because many of the issues are at a very local scale and because there is little overall interaction in terms of coastal processes along the shoreline, the area is treated as one large Policy Development Zone (PDZ14).

PDZ14 **Lleyn West:**
Trwyn Cilan to Carreg Ddu, including Ynys Enlli.
Chainage: 498km to 561km

Overarching objectives are defined based on the overall principles upon which the SMP is developed and drawing together the various specific detailed objectives set out in the features and issues table contained within Appendix ***. These overarching objectives aim to guide the assessment of different management scenarios and the development of individual SMP policies.

Overall Objectives

Principles	Objectives	Relevant to
To contribute to sustainable communities and development.	<ul style="list-style-type: none"> • Reduce risk to life. • Protect properties from flood and erosion loss. 	All All
To minimise reliance on defence and increase resilience of communities.	<ul style="list-style-type: none"> • Minimise the need for increasing effort and management of coastal defences. • Avoid reliance on defence particularly where there is a risk of catastrophic failure at Aberdaron. 	Aberdaron
To support an integrated approach to spatial planning, in particular recognising the interrelationships between:		
- Centres of development and surrounding communities.	<ul style="list-style-type: none"> • Maintain access to village of Aberdaron and connectivity with Abersoch, Nefyn, and larger settlements further to the east. • Maintain Aberdaron as a support centre for the rural communities. 	All Aberdaron
- Human activity and the natural and historic environment: in being essential for community identity, well being and vitality and in being highly significant for tourism and economic regeneration.	<ul style="list-style-type: none"> • Maintain recreational use of beaches and bays. • Maintain access to the coast including car parking and facilities. • Maintain access for boat use and associated water sport activity. • Maintain access to and character of the Island. 	All All All All
To maintain and support the main centres of economic activity.	Not applicable to this area.	
To sustain the vitality and support adaptation of smaller scale settlements.	<ul style="list-style-type: none"> • Maintain character and integrity of coastal communities. • Maintain agricultural value of rural community. 	All All
To support the cultural heritage and the use of the Welsh language.	<ul style="list-style-type: none"> • Identify risk and reduce risk of loss of heritage features where possible. • Maintain historic landscape. • Prevent disturbance or deterioration to historic sites and their setting. 	All All All
To avoid damage to and seek opportunity to enhance the natural environment.	<ul style="list-style-type: none"> • Maintain or enhance the condition or integrity of the international (SAC, SPA) designated sites and interest features within the context of a dynamic coastal system. • Maintain or enhance the condition or integrity of the national (SSSI) designated sites and interest features within the context of a dynamic coastal system. • Maintain and enhance educational and scientific understanding of geology and geomorphology. 	All All All
To maintain or enhance the high quality landscape.	<ul style="list-style-type: none"> • Avoid damage to and enhance the natural landscape. • Maintain the human landscape and character of communities. 	All All
To sustain sustainable accessibility in terms of maintaining national and regional connectivity.	<ul style="list-style-type: none"> • Maintain access to larger settlements for smaller farming communities. 	All

Note: All objectives would be assessed in each management scenario, not all objectives will necessarily be met.