PDZ 6. SOUTH CEREDIGION:

Llangranog

Pencribach to New Quay Head

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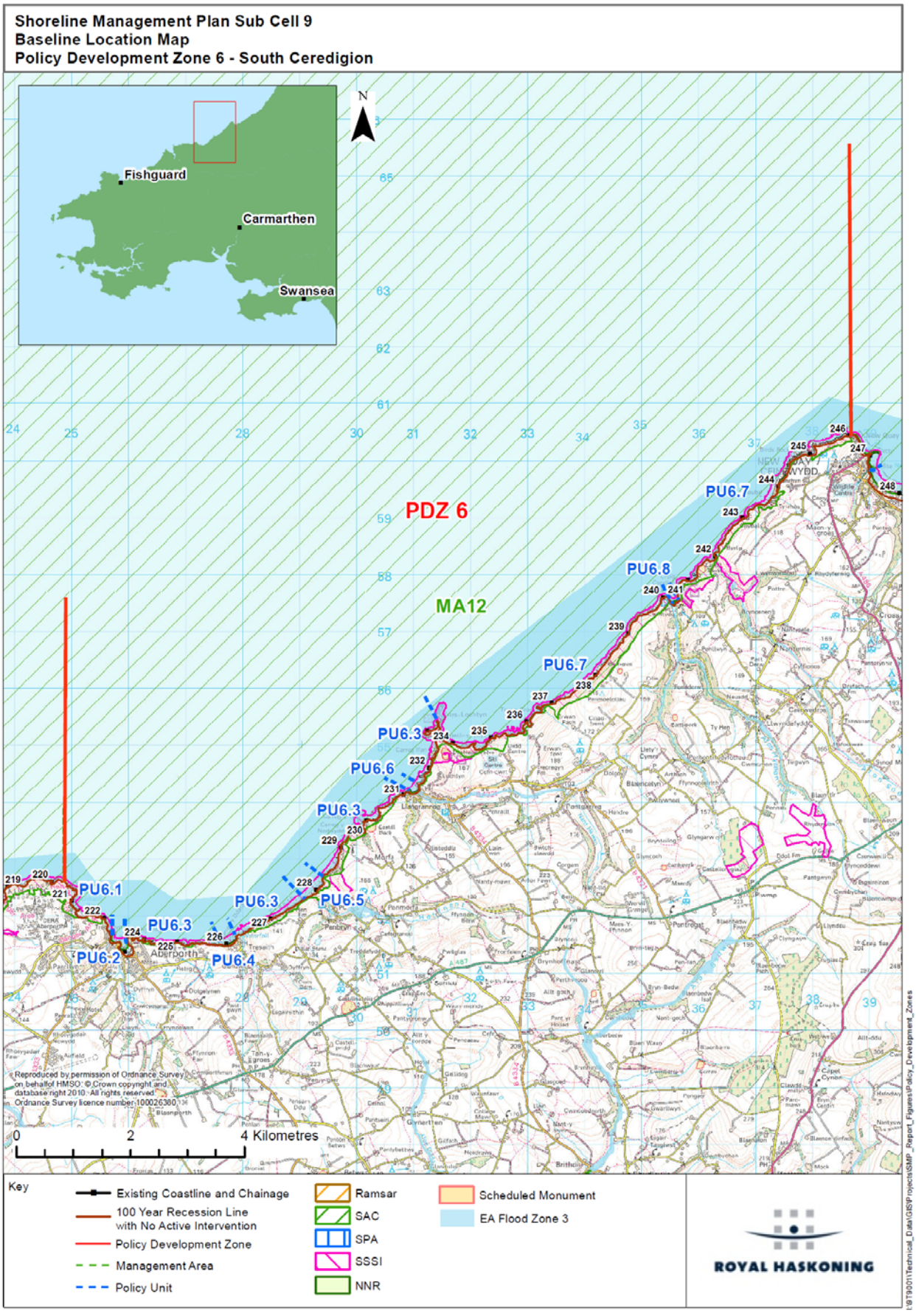
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Definitions of Scenarios Considered in Policy Development

This section defines the various scenarios that are used throughout the discussion of the Policy Development Zone.

Sea Level Rise
It is recognised that there is a continuing uncertainty with respect to Sea Level Rise (SLR). Taking different SLR scenarios may affect the scale of impact or the timing of some changes, either in terms of sustainable management or in terms of impacts. In the discussion below of the baseline and alternative management scenarios, the Defra guidance on SLR has been generally been used. Where, in any specific area, the impact of SLR is felt to be significant and may change the context of management this discussion is held within a separate box, relevant to that section of text.

Management scenarios;

Unconstrained Scenario
Under this scenario, the behaviour of the coast is considered as if there were no man made defences, effectively if they were suddenly not there. Although recognised to be a totally theoretical scenario it does provide a better understanding of how we are influencing the coastal behaviour and therefore the stresses and broader scale impact that are introduced. This assists in assessing first how the coast might wish to change, but also in defining the limits of interaction which the SMP should be considering.

Baseline Scenarios

- ***No Active Intervention (NAI) – Scenario 1****, where* there would be no further work to maintain or replace defences. At the end of their residual life, structures would fail. There would be no raising of defences to improve standards of protection.
- ***With Present Management (WPM)– Scenario* 2**. This scenario applies the policies set in the SMP1 or, where relevant, takes updated or clarified policies, if subsequent work has been undertaken e.g. studies or strategies. In many locations, the approach to management defined by SMP1 only covers a 50 year period. Where this is so, the intent of how the coast is being managed has been assumed to apply into the future. It should be noted that WPM does not necessarily imply a Hold The Line approach throughout the zone, in many areas present management may be for a No Active Intervention approach or one of Managed Realignment.

The aim of the No Active Intervention is to identify what is at risk if defences were not maintained. In a similar way, With Present Management aims to examine how the coast may develop, identifying where there are benefits in this management approach or where there may be issues arising in the future.

At the end of this sub-section a brief summary and comparison of the economic risk for each of the baseline scenarios is provided, based on the MDSF analysis undertaken during the SMP (including other study findings where relevant). The baseline scenarios are also assessed in terms of how they address the overall objectives for the Zone. This comparison between the baseline scenarios sets the scene for discussing possible alternative management scenarios which better address all the issues. This discussion is provided in the subsequent sub-section.

1 Local Description

The zone covers the coast from the Pencribach headland to the south of Aberporth through to New Quay Head. The headland of Ynys-Lochtyn defines a divide in the basic geology of the coast as well as naturally dividing the coast into two quite distinct sections at the shoreline. To the south is Aberporth Bay; with the communities of Aberporth, Tresaith, Penbryn and Llangrannog and to the north there is the small community of Cwmtydu. Aberporth is the largest of the villages and is recognised as an important local centre serving other villages and the surrounding rural countryside. The main road through the area is well set back from the coast, with a maze of local roads running generally towards the coastline, with each village having a principal local road as access from the hinterland. With the exception of Penbryn, where the village is some distance in land, each village has its own distinctive sea front, contained between hard coastal cliffs. There is little interaction in terms of shoreline management or indeed hinterland interaction between villages.

The whole section of coast is designated a Marine SAC and is also covered by specific SSSIs. In many areas these designations extend to cover the area behind the coast, reflecting the naturalness of the coastal area at the crest of the generally high cliffs. There are also several important historic features such as the hill forts (SAMs) north of Cwmtydu and Penbryn and the defended enclosure on Ynys-Lochtyn. There is also the modern Aberporth Range Simulated Ship Firing Platform (SAM) to the south of Aberporth associated with the Royal Aircraft Establishment There are other features further back from the coastline.

There are two major caravan parks between Aberporth and Tresaith but there is only limited development within the active coastal zone. The principal use of the coastal area is agricultural and the villages are important both as residential communities but also as significant tourist centres. At Penbryn there is a coastal path down to the beach but the beach itself is very natural with an important and quite rare section of dunes, for this section of the coast.

Penbryn

SMP1 took a slightly unusual approach in defining the specific community frontages as being sub-units within a larger policy unit encompassing the main area of natural coastline. It seems appropriate from the discussion above to continue this approach.
The zone can be seen, therefore very much as two distinct layers. The more general highly important natural coast with, associated with its natural and changing nature, the nationally important historic resource and at the local scale the individual small communities with quite specific issues and values.

For this reason the format of the SMP document changes slightly from the approach taken in adjacent PDZs, in discussing the general coast initially before going down to appropriate detail for each local area. The same overall format is adopted, however, so that, in each local area, the area is described, the baseline scenarios considered and assessed but then policy is also discussed. The conclusions for the whole area are pulled together at the end of this process.

2 Coastal Processes for the General coastal Area

The southern section of the coast is exposed to the dominant south-westerly offshore wave climate but at the shoreline the direction of these waves approach more typically from the west. There is significant wave energy from the northwest through to north. Aberporth in particular gains significant shelter from the more westerly wave and Ynys-Lochtyn, similarly provides significant shelter to the coast immediately to the north. There would appear to be little sediment movement along the shoreline due in part to the way in which the coast is orientated to the net wave energy but also due to the local interruption of drift by natural features. Within each bay, sediment can be redistributed along the shore locally under specific wave conditions. Monitoring has, however, indicted significant movement cross shore with the capacity for beaches to be drawn down under certain circumstances and for beaches then to rebuild. This has been a significant feature particularly at Aberporth and Llangrannog. In the case of the latter location, this drawn down to leave a shingle at the backshore and then to rebuild is seen as a regular seasonal occurrence.

The main process at the general scale is for very slow erosion of the hard rock, with the potential for more rapid erosion of softer deposits within the bays.

POTENTIAL BASELINE EROSION RATES

A distinction is made between basic erosion of the shoreline and cliff recession, affecting the crest of cliffs and coastal slopes. This is noted in the table below together with other relevant factors. In assessing erosion and recession in the future allowance has been made for sea level rise and this is discussed in appendix C. This is also discussed briefly following the table.

While within local bays, sea level rise (SLR) will be a significant factor in future development of the shoreline. Where there are softer cliffs or shorelines, suffering erosion, the rate of erosion is likely to increase with SLR. This might be by a factor of 1.7 to 2.5 times the existing base erosion rate, over the 100 years. Where there are more stable features, such as fully developed dune of shingle backshore beaches there would be a natural roll back of the beach potentially in the order of 10m to 40m, depending of the nature of beach and the coast behind. As beaches, protecting at present relatively stable coastal slopes, erode or roll back this could result in re-activating landslides and slope instability.

Location	NAI Base Rate (m/yr)	Notes	100yr. Erosion range (m)
Aberporth Cliffs	0.05	Local landslides	5 to 20
Traeth Dolwen	0.1 to 0.3	Landslide potential	15 to 50
Traeth Dyffryn	0.1 to 0.3	Landslide potential	50 to 80
Tresaith	0.2	Landslide potential	20 to 50
Penbryn	0.05	Roll back of dunes	15 to 40
Llangrannog	0.2	Retreat following failure of defences	15 to 40
Cwm Tydu	0.3	Retreat following failure of defences	15 to 50
General cliffs	0.05	Local landslides	5 to 20

Base rates have been assessed from monitoring and historical data. The range of potential erosion is assessed in terms of variation from the base rate and sensitivity in potential sea level rise. Further detail on erosion rates together with erosion maps are provided in Appendix C.

EXISTING DEFENCES

The defences at individual areas are described in the following pages. The general coast is undefended

UNCONSTRAINED SCENARIO

The unconstrained scenario is for continued erosion of the general coastline. This is developed further for each local area.

KEY INTERACTION WITH DEFENCES

This is considered within each local area.

3 Management scenarios for the general Coastal Area

Over the general coast there are no defences and as such the two base line scenarios are the same. The main impact would be on the few historic features. Given the slow rate of erosion generally and the significant cost and severe impact management of this would have on the important naturalness of the coast, a change in policy from No Active intervention would neither be justified nor acceptable. Where there is scope for management at the local level to sustain features of the historic environment then this will be considered. The overarching policy for the whole zone is for No Active Intervention over the three epochs. Within this context the local areas are now considered.

SMP 1 policy is set out in the table below for those areas considered in detail.

SMP 1			Subsequent Management Approach
No.	Management Unit	Policy	
Ceredigion SMP1			
4.2	Aberporth	HTL	
43	Tresaith	R	
4.4	Penbryn	DN	
5.1	Llangrannog Cliffs	DN	
5.2	Llangrannog	HTL	
6.1	Cwmtydu Cliffs	DN	
6.2	Cwmtydu	HTL	

Key: DN – do nothing, HTL – Hold The Line, SHTL – Selectively Hold The Line, R – Retreat, deferred – policy deferred subject to further monitoring or study.

There are significant local streams flowing to the coast at all the villages:

- Nant Aberth at Aberporth Traeth Dyffryn, together with Nant Gilwen in the southern corner of Traeth Dolwen.
- Afon Sath which runs in a valley behind the main coastal area of Tresaith and flows as a waterfall over the cliffs to the north of the village.
- Hoffnant that flows down the valley and access route to the beach at Penbryn
- Nant Hawen and an unnamed stream at Llangrannog.
- Afon Fynnonddewi at Cwmtydu.

The Pembrokeshire and Ceredigion Rivers CFMP Draft Plan does not make reference to these specific water courses, however, like many of the rivers in this area these would be considered to be steep rivers subject to sudden and strong spate flows that are quite difficult to manage in terms of flood risk. It is taken that, as in other similar areas of the CFMP generally, that the policy would be to sustain flood risk management through maintaining but not necessarily improving defences in line with climate change.

3.1 Aberporth

LOCAL DESCRIPTION

The frontage consists of two sub-bays joining to one at lower water, so that the mouth of the bay is narrower, with the overall bay widening in shore. The bays are separated by a substatial rock headland, which extends part way over the the intertidal foreshore. The entrance to the bay faces to the north. To the west is Traeth Dolwen. This sandy bay is backed by a gentle but unstable coastal slope with properties and a road at the crest. There is a small stream at the western end of the bay.

Treath Dolwen

The eastern bay, Traeth Dyffryn, is set back more deeply between rock cliffs and at the head of the bay is an unstable coastal slope rising some 17m to the village behind. The Nant Aberth runs into this bay in its western corner but then is generally forced by the sand beach to run east along the toe of the coastal slope to flow along the eastern cliff to the sea.

A road runs from Traeth Dolwen over the central rock headland, across the Nant Aberth and to the back of the coastal slope. This is the main road to and through the village, although there are alternative routes into the village at the western end. There is a branch road, where the main road enters the village, which runs out to the end of the main eastern headland. This road also runs behind the unstable coastal slope at the back of Traeth Dyffryn.

The seafront forms the main centre of the village with shops to the back of Traeth Dyffryn and at the central rock headland. The headland also provides parking space for use of the beaches. The beaches are very popular for tourism. Where the Nant Aberth flows under the road, there is a small boat hardstanding, which is used by local fishermen.

Aberporth is an important residential centre and support centre to the hinterland as well as being a popular tourist desitination.

EXISTING DEFENCES

There is a small concrete wall to the back of Traeth Dolwen, which is rarely exposed to significant wave action but does act to retain the unstable coastal slope behind. To the back of Traeth Dyffryn there is a concrete wall and rock revetment to the toe of the unstable coastal slope. The wall is founded to rock over its eastern end. The stream generally runs along the base of the revetment and wall. There is a further wall to the road where the road crosses the Nant Aberth valley. All defences are in reasonable condition.

UNCONSTRAINED SCENARIO

If defences were not there, there would be some considerable slope failure behind Traeth Dolwen impacting on the road and potentially properties. To the back of Traeth

Dyffryn the road would be lost where it crosses the stream and the valley would be more open with loss of properties at the western corner. Without the rock armour and the concrete wall the slope behind would slump, cutting back quite severely, with the loss of the road, properties and shops.

Coastal Processes

Aberporth

There has been a programme of on-going monitoring for the frontages. This has shown significant, primarily in terms of cross shore movement of the sand. With the relatively narrow entrance the overall bay, the wave approach angle is quite limited and with the widening of the bays behind there is generally good dissipation of wave energy. The slightly different wave angle can have a significant affect; with waves slightly west of north reflecting across Traeth Dyffryn from the cliffs on the eastern side. More generally waves approach normal to the backshore of the bays. Under certain conditions waves can draw down the beach causing some erosion, under other conditions waves tend to push sediment up the beach as a protective berm. This action in Traeth Dyffryn tends to trap the stream to the back of the beach beneath the defences, and there has been concern over undermining. However, in spate, the stream can cut more directly through the sandy beach berm, relieving pressure on the sea wall. This can then expose the western side of the bay to more wave action.

Overall, the beaches have been remarkably stable in terms of their overall volume and it appears that there is a large sand reservoir in the nearshore area capable of restoring sediment to the beaches.

Under Sea Level Rise, this situation is likely to change little over the first two epochs, even under more rapid rates of sea level rise. With a 1m SLR, it would be anticipated that the berm of the beaches within the bay would move back and increase in height.

Impact of different Sea Level Rise Scenarios

With the 2m SLR scenario, there could be some squeeze of the foreshore against the back defences in the third Epoch.

One potentially significant impact of sea level rise would be that as the beaches are formed higher and pushed back, the pressure of the stream at the toe of the revetment might increase.

Management scenarios

No Active Intervention – Baseline Scenario 1.

Under this scenario, without maintenance the existing defences would begin to fail. The increased pressure along the back of Traeth Dyffryn could cause undermining and there might then be failure of the revetment and wall. This would result in significant loss at the crest of the coastal slope, principally where the road runs out to the eastern headland. There would be direct loss of property and loss of access to large number of

properties. The failure of the road wall across the Nant Aberth would cut the principle access through the village. Only in the long term would there be loss to the wall at the back of Traeth Dolwen and this would also result in re-activation of the coastal slope and further loss of the road.

More generally, there could be loss of beach width and loss of amenity. The small boat hardstanding would be at risk of more regular flooding. These impacts are assessed as being more significant in the third Epoch.

WITH PRESENT MANAGEMENT – BASELINE SCENARIO 2.

Existing defences would be maintained and the losses identified above avoided. There would still be some longer term loss of amenity beaches. There would be no significant impact on natural processes and little impact on the natural environment which underpins the attractiveness of this part of the coast. The only historic feature is the Lime kiln on the eastern head land and this would not be affected.

The intent under this scenario would be to improve defences and if necessary to raise the area of the hardstanding to allow continued use.

DISCUSSION AND DETAILED POLICY DEVELOPMENT

Continued management of existing defences is seen as being sustainable and desirable. In the future there would be a need to consider whether there needs to be better management of the Nant Aberth and whether there needs to be any action taken to reduce the increase of wave action within the bays. The possibility exists for addressing reflection of waves off the cliffs or the local interaction between waves hitting the central headland. This would need to be considered against the evidence provided by continuing monitoring.

The policy for the frontage is to Hold The Line.

SUMMARY COMPARISON AND ASSESSMENT OF BASELINE SCENARIOS.

Table 1 compares the economic damages that might arise under the two baseline scenarios. Table 2 provides a summary comparison in terms of the overall objectives based on the key issues identified in the introduction to this Coastal Area.

The assessment of economic damage is made using a simplified Modelling Decision Support Framework (MDSF). In the case of erosion, this GIS based tool takes the predicted erosion distance for any section of the coast based on the assessment of erosion by the end of each epoch. It is then taken that there would be a linear erosion rate between these timelines (e.g. a property located midway between the epoch 1 timeline (20 years) and that for epoch 2 (50 years) would be taken as being loss in 35 years). Each property is defined by a single point rather than by its full footprint. No account is taken in the assessment of loss of access or loss of services, although this is discussed in the text where critical. The MDSF method then draws information from a property data base, providing general information with respect to that property. The value of the property is discounted in terms of when that property may be lost.

Table 1. Economic Assessment

The following tables provide a brief summary of erosion and flood damages determined by the SMP2 MDSF analysis for the individual area. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios. It must be noted that although the damages for these towns are very minimal, this analysis does not account for the damages to the roads, access issues and overtopping of the defences.

ASSESSMENT OF EROSION DAMAGES

Epoch	0 -20 year			20 – 50 years			50 – 100 years			50 – 100 years (2m SLR)		
Location	No. of properties:		Value	No. of properties:		Value	No. of properties:		Value	No. of properties		PV Damages
	Res.	*Com.*	x £k	*Res.*	*Com.*	x £k	*Res.*	*Com.*	x £k	*Res.*	*Com.*	(£x1000)
NAI	0	0	0	0	0	0	12	0	1452	13	0	176
WPM	0	0	0	0	0	0	2	0	229	3	0	12
Notes: PVD determined for 1m SLR in 100 yrs.												
Other information:												

ASSESSMENT OF POTENTIAL FLOOD RISK

Location	Flood risk tidal 2010			Flood risk tidal 2060			Flood risk tidal 2110			tidal risk 2m SLR		
Solva	No. of properties		AAD	No. of properties		AAD	No. of properties		AAD	No. of properties		PVD
	<1:10	>1:10	x £k	<1:10	>1:10	x £k	<1:10	>1:10	x £k	<1:10 .	>1:10	(£x1000)
NAI	0	0	0	0	0	0	0	0	0	1	0	0
WPM	0	0	0	0	0	0	0	0	0	0	0	0

Table 2. General Assessment of Objectives

The following table provides an overall assessment of how the two baseline scenarios impact upon the overall objectives. Specific objectives are set out in more detail within Appendix E. The table aims to provide an initial high level assessment of the two baseline scenarios, highlighting potential issues of conflict. These issues are discussed in the following section, examining alternative management scenarios from which SMP2 policy is then derived.

OBJECTIVES	NAI			WPM		
Reduce risk to life						
Protect properties from flood and erosion loss						
Minimise the need for increasing effort and management of coastal defences						
Avoid reliance on defence particularly where there is a risk of catastrophic failure						
Maintain access to the communities and villages.						
Maintain Aberporth as an important local centre						
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 character and integrity of coastal communities						
Maintain agricultural based communities						
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						
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.						
Avoid damage to and enhance the natural landscape.						
Maintain the human landscape and character of communities						

3.2 Tresaith

LOCAL DESCRIPTION

The beach to the village is perched on a slight bay between two long sections of hard rock cliff. The bay is not significantly protected by its adjacent headland but formed more within a slight set back of the general alignment for the coast as a whole. Directly behind the shore is the only road into and along the shore, ending as a dead end at the western end. There are various properties behind the road and the main village is built into the coastal slope. There is also a sewage pumping station just to the back of the foreshore.

The western end of the bay comprsies an area of lower flatter land with a more gentle slope behind. To the eastern end the land rises steeply with the main access road to the sea front.

The sea front is an essential part of the village and is important in supporting tourism, recreation and recreational boat use. There is a boat storage area to the western end.

EXISTING DEFENCES

The existing defences comprise various sections of rock and concrete revetment, with a concrete wall supporting the steeply rising coastal slope to the western end.

UNCONSTRAINED SCENARIO

In the absence of defences the backshore would be set back further with the loss of the road. To the western end the coastal slope is likely to be re-activated with loss, eventually of a large section of the village and the road to the sea front. The retreat of the backshore would sustain the beach.

COASTAL PROCESSES

The relative openness of the bay means that there is quite a wide angle of wave exposure. There can therefore be local movement of sediment along the shoreline. The narrow width of the beach, in terms of its setback from the general hard rock shoreline to either side results in beach levels varying to a large degree. This is seen clearly through the on-going monitoring. The beach can change from having a good veneer of sand to one where much of the underlying shingle is exposed. There appears to be a good reservoir of sand in the nearshore area which can

be moved up the beach under certain wave conditions. At present this is seen as very much a natural response to changing wave conditions rather than as being a forced response due to squeeze against the backshore defences. With sea level rise, the shoreline would wish to roll back and this situation could change. At present, particularly at the eastern end, the sea wall would start influencing beach behaviour to a far larger degree. Over the central and western sections this increased interaction is likely to become more significant over the third Epoch.

Impact of different Sea Level Rise Scenarios

With the 2m SLR scenario, the interaction between the beach and the defences would become very apparent within the next 50 years. Through to the 100 years, the eastern sea wall would be regularly subject to wave action on every tide and there is likely to be significant erosion of the beach. Even at the western end, there would be significant pressure for erosion and the whole beach is likely to change to a more consistent steeper shingle bank.

MANAGEMENT SCENARIOS

NO ACTIVE INTERVENTION – BASELINE SCENARIO 1.

Under this scenario and with the increasing pressure for retreat defences would fail, potentially during the second Epoch due to lack of maintenance. There would be the loss of the road and sea front property and potential loss of parts of the village further back due to slope instability. A substantial part of the village could be at risk, there would be no formal beach access and the current use of the foreshore both for family beach use and for water use would no longer exist. There would also be the loss of the sewage pumping station, probably well within the second Epoch.

WITH PRESENT MANAGEMENT – BASELINE SCENARIO 2.

The current policy is for retreat, specifically at the western end and potentially over the centre of the bay. Under this scenario, there would initially be some loss of beach in front of the sea wall to the east and this would be reinforced, typically by a rock revetment. This would maintain access down to the sea front and would support the coastal slope to the village. At the western end the intent is to allow the backshore area to retreat, increasing beach width and allowing the present processes to continue. There would be loss of existing facilities such as the boat park and potentially in the future the buildings closest to the backshore area. Overall this would maintain coastal use but with a need to plan adaptation of this use.

DISCUSSION AND DETAILED POLICY DEVELOPMENT

No Active intervention would result in the substantive loss of the village and its important value to the wider area. The alternative to the present policy of retreat or managed realignment would result in significantly greater effort in defence with a progressive loss of the ability of the foreshore to respond and a subsequent change from a sand beach to that of a steeper shingle bank. This change would most probably occur progressively during the second Epoch. Over Epoch three the sand beach may well be lost.. This would protect the physical assets of the village but not its essential character as a seaside village.

Under the present management policy there would be a need to maintain defence to the eastern end and this section of the foreshore would tend to erode and become lost to coastal use. The use of rock would help to mitigate this loss but only to a degree. However, through maintaining this defence the main area of the village would be protected and the important access road would be maintained. The opportunity would then exist to set back defences or even remove the need for defence to the western end

with the aim to sustain a healthy area of beach and the opportunity to sustain the recreational water use. The SSSI would be affected due the changing nature of the eastern end of the beach; however, there may also be the opportunity to allow a far more natural development of the western end even with the potential to develop a small area of naturally developing dune.

The present management scenario is seen as delivering the best balance of objectives with potential to address the human needs while also supporting nature conservation values.

This change to the defences (but not to policy intent) would need to be planned and developed through community engagement. The aim would be to support but not increase management of defences in the short term. Over the second Epoch to potentially increase and consider options for improving defence performance at the eastern end but to realign, with the intent of continuously retreating the line of the backshore over the western end over the longer term..

SUMMARY COMPARISON AND ASSESSMENT OF BASELINE SCENARIOS.

Table 1 compares the economic damages that might arise under the two baseline scenarios. Table 2 provides a summary comparison in terms of the overall objectives based on the key issues identified in the introduction to this Coastal Area.

The assessment of economic damage is made using a simplified Modelling Decision Support Framework (MDSF). In the case of erosion, this GIS based tool takes the predicted erosion distance for any section of the coast based on the assessment of erosion by the end of each epoch. It is then taken that there would be a linear erosion rate between these timelines (e.g. a property located midway between the epoch 1 timeline (20 years) and that for epoch 2 (50 years) would be taken as being loss in 35 years). Each property is defined by a single point rather than by its full footprint. No account is taken in the assessment of loss of access or loss of services, although this is discussed in the text where critical. The MDSF method then draws information from a property data base, providing general information with respect to that property. The value of the property is discounted in terms of when that property may be lost.

Table 1. Economic Assessment

The following tables provide a brief summary of erosion and flood damages determined by the SMP2 MDSF analysis for the individual area. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios. It must be noted that although the damages for these towns are very minimal, this analysis does not account for the damages to the roads, access issues and overtopping of the defences.

ASSESSMENT OF EROSION DAMAGES

Epoch	0 -20 year			20 – 50 years			50 – 100 years			50 – 100 years (2m SLR)		
Location	No. of properties:		Value	No. of properties:		Value	No. of properties:		Value	No. of properties		PV Damages
	Res.	*Com.*	x £k	*Res.*	*Com.*	x £k	*Res.*	*Com.*	x £k	*Res.*	*Com.*	(£x1000)
NAI	0	0	0	0	0	0	2	0	396	3		44
WPM	0	0	0	0	0	0	2	0	396	3		44
Notes: PVD determined for 1m SLR in 100 yrs.												
Other information: Additional properties are at risk from land instability as the retaining wall fails under NAI. This would also incur loss of the road and access to the amenity beach.												

ASSESSMENT OF POTENTIAL FLOOD RISK

Location	Flood risk tidal 2010			Flood risk tidal 2060			Flood risk tidal 2110			tidal risk 2m SLR		
Solva	No. of properties		AAD	No. of properties		AAD	No. of properties		AAD	No. of properties		PVD
	<1:10	>1:10	x £k	<1:10	>1:10	x £k	<1:10	>1:10	x £k	<1:10 .	>1:10	(£x1000)
NAI	0	0	0	0	0	0	0	0	0	1	0	0
WPM	0	0	0	0	0	0	0	0	0	0	0	0

Table 2. General Assessment of Objectives

The following table provides an overall assessment of how the two baseline scenarios impact upon the overall objectives. Specific objectives are set out in more detail within Appendix E. The table aims to provide an initial high level assessment of the two baseline scenarios, highlighting potential issues of conflict. These issues are discussed in the following section, examining alternative management scenarios from which SMP2 policy is then derived.

OBJECTIVES	NAI			WPM		
Reduce risk to life						
Protect properties from flood and erosion loss						
Minimise the need for increasing effort and management of coastal defences						
Avoid reliance on defence particularly where there is a risk of catastrophic failure						
Maintain access to the communities and villages.						
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 character and integrity of coastal communities						
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						
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.						
Avoid damage to and enhance the natural landscape.						
Maintain the human landscape and character of communities						

3.3 Penbryn

Local Description

The frontage is quite similar to that of Tresaith in that the backshore is just set back sufficiently from the hard coast to either side to allow the development of a wide sandy beach. In the centre of the fronatge is the steep narrow valley of the Hoffnant, and this valley forms the access route to the shore. There is a small road and foot path. It is also over this section of the frontage where there is a small area of dune climbing up the slope behind.

The fronatge is important but remote and natural area of reacreational beach use. Apart from the small turning area for cars at the end of the road there are no hard assets at risk.

Existing defences

There are no defences.

Unconstrained Scenario

The coast is retreating slowly and will continue to do so.

Coastal Processes

There is over the central frontage a good width of beach with a wide sandy berm in front of the access and the dunes. Occasionally the toe of the dunes suffers from erosion. With sea level rise the berm will retreat and the dunes will suffer more erosion as the coast sets back.

Management scenarios

No Active Intervention – Baseline Scenario 1.

Under this scenario there would be some loss of dune area as the dunes area for dune growth is squeezed against the backshore slope. There may be scope for some accretion of the beach in line with sea level rise. The valley will become increasingly important in maintaining areas of dune growth. This would conflict in part with the car turning area and access road.

With Present Management – Baseline Scenario 2.

With Present Management is for No Active Intervention and is described above.

Discussion and Detailed Policy Development

The overriding intent is to maintain the natural function of the area. This will require an approach to retreat the road and access, aiming if possible to create a more informal access that adapts. The policy for No Active Intervention is sensible over the three epochs

SUMMARY COMPARISON AND ASSESSMENT OF BASELINE SCENARIOS.

Economic Assessment

There is no anticipated economic loss.

Table 1. General Assessment of Objectives

The following table provides an overall assessment of how the two baseline scenarios impact upon the overall objectives. Specific objectives are set out in more detail within Appendix E. The table aims to provide an initial high level assessment of the two baseline scenarios, highlighting potential issues of conflict. These issues are discussed in the following section, examining alternative management scenarios from which SMP2 policy is then derived.

OBJECTIVES	NAI			WPM		
Minimise the need for increasing effort and management of coastal defences						
Maintain recreational use of beaches and bays						
Maintain access to the coast including car turning area						
Maintain agricultural based communities						
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.						
Avoid damage to the natural landscape						

3.4 Llangrannog

LOCAL DESCRIPTION

The village is set within a north westerly facing bay protected to the south by the Pen-rhip headland. There is a smaller headland of Carreg Bica to the north of the bay and around this at low water to the bay of Cilborth. The village is developed within the relatievely wide valley with two streams; the Nant Hawen, which runs down through the middle of the village and a smaller stream that flows down to the southern end of the village close up to the cliff of Pen-rhip.

The main road access follows the valley of the Hawen, although the road over Pen-rhip also runs back into the hinterland. The village has developed along the seafront and back within the lower slowly rising Hawen valley. The center of the village is along this valley floor, with a large car park area, pubs and cafes and shops. While the village is very important as a tourist destination it also has a strong local community and culture of its own. The beach and asscoiated facilities are important to the village and tourism and as well as being of regional significance is the mainstay of the economic well being of the village. The bay supports watersport activities with canoeing and surfing.

EXISTING DEFENCES

The main defence is a large stone masonry wall along much of the seafront, with the seafront road and properties immediately behind. The stream to the west is in open culvert and the main stream runs in open culvert beside the car park and flows through a closed culvert through the sea wall. The northern section of the bay is generally protected by a higher shingle bank with local private defences to property behind. The main sea wall is in moderate to poor condition, with the toe of the wall frequently being exposed as beach levels change. Although all walls provide protection against direct sea level flooding, the area is subject to wave overtopping and significant amount of shingle being thrown over the road and into the car park. There is also flooding as a result of spate flows in the main stream.

UNCONSTRAINED SCENARIO

If all defences were removed there would be a substantial set back of the shoreline with loss of much of the core area of the village. In setting back there would however be greater coastal width and there would be a more extensive area of sand beach and a shingle bank to the rear.

COASTAL PROCESSES

The bay is exposed to signifcant wave action from directions from west through to the north west. Ynys-Lochtyn provides a signficant degree of shelter from the more northeasterly wave directions. Varying wave conditions give rise to changes in beach

behaviour in that under more westerly wave conditions there is signficant reflection off the rock cliff that tend to scour along the seawall to southern end of the village, but also tend to build the shingle bank to the northerly corner. Under more northerly conditions, waves approach the southern sea wall at an angle, again scouring the beach along the wall, with a build up of the bank at the southern end. The sea wall, is seen as sitting proud of the natural line of the bay.

On-going photographic monitoring, that is also now supplemented by beach profiles, shows significant beach movement on a seasonal basis. Typical summer beaches have a good sand cover all the way up to the sea wall and covering much of the shingle. Winter beaches have lower levels at the wall and general exposure of the lower shingle foreshore. It has been noted that as beach levels decrease at the shoreline there tends to be development of a low berm in the area of low water. The main stream also impacts on the performance of the beach

The main sea wall interacts quite strongly with the natural beach processes. This interaction will increase quite significantly with Sea Level Rise and the ability of the beach to rebuild during the summer is likely to be lost. There would be significantly greater overtopping and the potential for general erosion to persist. This is likely to become a significant issue during Epoch two affecting the whole beach face profile.

Impact of different Sea Level Rise Scenarios

With the 2m SLR scenario, the interaction between the beach and the defences would become very apparent earlier, becoming quite critical during Epoch 2. However, even with 2m Sea Level Rise the risk of direct water level flooding does not substantially increase but wave overtopping and flooding associated with this would be a very regular occurrence.

MANAGEMENT SCENARIOS

NO ACTIVE INTERVENTION – BASELINE SCENARIO 1.

Under this scenario there would be loss of the main sea wall probably over the next decade, potentially sooner. In any event this sea wall, without improvement, would fail within Epoch two as beach levels drop. The shingle bank in front of the main car park would roll back and defences would fail.

There would be substantial loss of property and areas around the main car park. Access along the sea front would be lost, together with the route through the village. General access to the village would be very congested. The nature of the village would change such that all facilities supporting the seafront use would have to be set back, there would be loss of key buildings such as the shop and pubs and the integrity of the community would disappear. The general nature of the village would change

WITH PRESENT MANAGEMENT – BASELINE SCENARIO 2.

Under this scenario, the walls would be properly and substantially repaired and maintained (or rebuilt) at the present height during the short term (epoch 1), and during this epoch the beach would be expected to remain more or less as it is now.

In the medium to long term (epochs 2 and 3) sea level rise will mean that defences along the frontage and to the stream would have to be raised in height. Whilst protecting property in the village, this would result in some separation of the village from its beach and loss of beach material.

Defending the hard assets would impact on the quality and economic life of the village over the medium to long term. If the community wishes to avoid some or all of these detrimental effects it will need to become involved now in planning an alternative strategy to be implemented in the epoch 2. This is discussed further in the next section.

DISCUSSION AND DETAILED POLICY DEVELOPMENT

The negative impacts of the 'With Present Management' scenario occur mainly over the medium to long term, but the community would need to be involved in forward planning now if it wished to minimise some of these impacts.

The discussion of the 'With Present Management' approach highlights that there are significant issues to be addressed through forward planning, as much by the community as by the Local Authority. If the community wishes to avoid a degraded beach, separated from the village, then the conclusion is that in the future, but starting to be planned now, a more adaptive approach will need to be taken to the management of the seafront. This goes beyond the strict remit of flood and coastal erosion risk management and needs to take into account the full interaction between the community and its shoreline. There could be an opportunity to address issues such as the way in which waves interact with the defences at present, and although this would impact on some users of the beach, it is an option that the community may wish to consider. Another option would be to realign the defences rather than raising them, and this would need the community to be fully involved in the details of this realignment, and careful consideration given to maintaining access through the village.

In terms of basic SMP policy, the intent would be to hold the line over the first epoch (current policy). During this first epoch, sea level rise will be monitored and if it follows the predicted course it may be necessary to develop a different strategy for epochs 2 and 3. This new policy is defined as Managed Realignment. The Community, Highway Authority and Planning Authority may need to be involved in complex discussions and imaginative thinking in order to develop a sustainable approach to shoreline management in the future, and this process should start now, so that plans are already in place if sea level rise is found to be following the predicted curves during epoch 1.

In taking such an approach, consideration has to be given to possible realignment of defences, adapting the present defences to alter their interaction with the waves or some other mechanism for absorbing wave energy. This could involve the potential option to make use of the car park area and setting back defences in this area. A key issue would be consideration of how to sustain the existing community and property and access through the village.

The SMP cannot, at this stage, define a specific approach to defence as this would need to be developed, in detail, through discussion. The SMP cannot exclude the possible loss of some property. However, this would need to be discussed further and a variety of possible detailed options would need to be considered.

SUMMARY COMPARISON AND ASSESSMENT OF BASELINE SCENARIOS.

Table 1 compares the economic damages that might arise under the two baseline scenarios. Table 2 provides a summary comparison in terms of the overall objectives based on the key issues identified in the introduction to this Coastal Area.

Erosion damages and those associated with flooding are identified separately in Table 1. The aim of this table is to demonstrate the potential economic damage that might arise from either flooding or erosion. As such properties that might be lost in the future due to erosion are not discounted from the assessment of flooding. Similarly, properties whose value may have been written off due to regular flood damage are still included within the assessment of erosion. Such an approach is clearly not strictly in line with normal economic appraisal at strategy or scheme level. It is however, considered appropriate at the higher level of the SMP assessment where the essential aim is in identifying potential different forms of risk in assessing different scenarios. Where this is felt to disproportionately distort the economic assessment then this is identified in appendix H and the economic case adjusted accordingly.

The assessment of economic damage is made using a simplified Modelling Decision Support Framework (MDSF). In the case of erosion, this GIS based tool takes the predicted erosion distance for any section of the coast based on the assessment of erosion by the end of each epoch. It is then taken that there would be a linear erosion rate between these timelines (e.g. a property located midway between the epoch 1 timeline (20 years) and that for epoch 2 (50 years) would be taken as being loss in 35 years). Each property is defined by a single point rather than by its full footprint. No account is taken in the assessment of loss of access or loss of services, although this is discussed in the text where critical. The MDSF method then draws information from a property data base, providing general information with respect to that property. The value of the property is discounted in terms of when that property may be lost.

In the case of flooding, the open coast water levels are assessed against threshold levels for individual properties based again on the property point source data base. No detailed modelling has been undertaken to assess flow paths and or possible increase in water levels dues to estuary processes. It is taken that, when a flood defence fails or is overtopped, the whole flood area behind a defence is open to flooding and that flooding would occur to the full extent of the potential flood plain, over a single high water period. Damages are assessed in relation to the depth of flooding that would occur based on the type of property identified in the data base. From this assessment of potential flood damage for any specific water level condition, annual average flood damages are determined during each epoch. An average annual average damage value is taken between the present (2010) and 50 years time (2060) and between 2060 and 2110. This average value is taken in determining an estimate of discounted Present Value (PV) Damages over the period of the SMP. This simplified approach allows consideration of flood risk under different sea level rise predictions for different scenarios.

Table 1. Economic Assessment

The following tables provide a brief summary of erosion and flood damages determined by the SMP2 MDSF analysis for the individual area. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios. It must be noted that although the damages for these towns are very minimal, this analysis does not account for the damages to the roads, access issues and overtopping of the defences.

ASSESSMENT OF EROSION DAMAGES

Epoch	0 -20 year			20 – 50 years			50 – 100 years			50 – 100 years (2m SLR)		
Location	No. of properties:		Value	No. of properties:		Value	No. of properties:		Value	No. of properties		PV Damages
	Res.	*Com.*	x £k	*Res.*	*Com.*	x £k	*Res.*	*Com.*	x £k	*Res.*	*Com.*	(£x1000)
NAI	0	0	0	0	0	0	4	1	563	0	0	52
WPM	0	0	0	0	0	0	0	0	0	0	0	0
Notes: PVD determined for 1m SLR in 100 yrs.												
Other information: Loss of road under NAI												

ASSESSMENT OF POTENTIAL FLOOD RISK

Location	Flood risk tidal 2010			Flood risk tidal 2060			Flood risk tidal 2110			tidal risk 2m SLR		
Solva	No. of properties		AAD	No. of properties		AAD	No. of properties		AAD	No. of properties		PVD
	<1:10	>1:10	x £k	<1:10	>1:10	x £k	<1:10	>1:10	x £k	<1:10 .	>1:10	(£x1000)
NAI	0	0	0	0	0	0	0	0	0	0	4	0
WPM	0	0	0	0	0	0	0	0	0	1	0	0

Does not atke account of wave overtopping.

Table 2. General Assessment of Objectives

The following table provides an overall assessment of how the two baseline scenarios impact upon the overall objectives. Specific objectives are set out in more detail within Appendix E. The table aims to provide an initial high level assessment of the two baseline scenarios, highlighting potential issues of conflict. These issues are discussed in the following section, examining alternative management scenarios from which SMP2 policy is then derived.

OBJECTIVES	NAI			WPM		
Reduce risk to life						
Protect properties from flood and erosion loss						
Minimise the need for increasing effort and management of coastal defences						
Avoid reliance on defence particularly where there is a risk of catastrophic failure						
Maintain access to the communities and villages.						
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 character and integrity of coastal communities						
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						
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.						
Avoid damage to and enhance the natural landscape.						
Maintain the human landscape and character of communities						

3.5 Cwmtydu

Local Description

This small bay comprsies a shingle beach backed by a sea wall and main access road and car park with a low lying valley containing a small row of properties set well back from the existing seafront. Behind the road is the listed lime kiln and the road has viewing points and information boards. The bay is an important aspect of the tourism to the region and is also seen as an educational resource used by schools and field study centres.

Cwmtydu

Existing defences

The road and lime kiln are heavily defended by a sea wall at the crest of the shingle beach.

Unconstrained Scenario

In the absence of the defence the shoreline would cut back, only marginally increasing exposure within the valley but with the loss of the road and the Lime Kiln.

Coastal Processes

Cwmtydu

The bay is well sheltered from the west but is exposed to waves from a north westerly direction. Beach levels can vary and the wall does have a significant local effect in tending to direct wave action into the valley and also along the face of the wall to the north. In effect the eastern end of the wall acts as a small smooth headland dividing and redirecting wave action. With sea level rise, the beach would attempt to roll back and will steepen against the sea wall. There would also be some increased flooding within the valley but only affecting the property on more extreme events. In the longer term beach levels would drop significantly and the wall would be regularly exposed to wave action over all tides.

Management scenarios

No Active Intervention – Baseline Scenario 1.

Under this scenario the wall might be expected to fail sometime in Epoch two. There would be erosion of the backshore, loss of the road and the kiln.

With Present Management – Baseline Scenario 2.

The present policy is to Hold The Line, this is seen as being sustainable over the first two Epochs. With sea level rise the pressure on the defence will increase significantly

and there would need to be increased protection. This might initially be at the south-eastern end of the defence supporting the headland, and this has the potential to allow a more stable shingle beach to be maintained over the rest of the frontage. However, during Epoch three this beach would diminish and the wall would be subject to increased overtopping and would need to be further reinforced. This would impact on the general landscape but would preserve the heritage value of the area. Flood risk management to the properties within the valley could be sustained over the 100 year period. There would be increased risk of flooding on more extreme events under a 2m Sea Level Rise Scenario.

DISCUSSION AND DETAILED POLICY DEVELOPMENT

The main impact of maintaining defences would be on the important natural environment. The main impact of allowing the defences to fail would be in terms of access and the historic environment. It would not be economically justified to maintain defences on the basis purely of the hard assets. However, there remains the potential opportunity of preserving an important heritage and educational feature.

Purely from a flood and coastal erosion risk management perspective the policy would be for holding the line over Epochs one and two, but with joint funding being necessary. The policy would then change to No Active Intervention in Epoch three. This decision would need to be discussed further in relation to the historic environment.

SUMMARY COMPARISON AND ASSESSMENT OF BASELINE SCENARIOS.

Table 1 compares the economic damages that might arise under the two baseline scenarios. Table 2 provides a summary comparison in terms of the overall objectives based on the key issues identified in the introduction to this Coastal Area.

The assessment of economic damage is made using a simplified Modelling Decision Support Framework (MDSF). In the case of erosion, this GIS based tool takes the predicted erosion distance for any section of the coast based on the assessment of erosion by the end of each epoch. It is then taken that there would be a linear erosion rate between these timelines (e.g. a property located midway between the epoch 1 timeline (20 years) and that for epoch 2 (50 years) would be taken as being loss in 35 years). Each property is defined by a single point rather than by its full footprint. No account is taken in the assessment of loss of access or loss of services, although this is discussed in the text where critical. The MDSF method then draws information from a property data base, providing general information with respect to that property. The value of the property is discounted in terms of when that property may be lost.

Table 1. Economic Assessment

The following tables provide a brief summary of erosion and flood damages determined by the SMP2 MDSF analysis for the individual area. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios. It must be noted that although the damages for these towns are very minimal, this analysis does not account for the damages to the roads, access issues and overtopping of the defences.

ASSESSMENT OF EROSION DAMAGES

Epoch	0 -20 year			20 – 50 years			50 – 100 years			50 – 100 years (2m SLR)		
Location	No. of properties:		Value x £k	No. of properties:		Value x £k	No. of properties:		Value x £k	No. of properties		PV Damages
	Res.	*Com.*		*Res.*	*Com.*		*Res.*	*Com.*		*Res.*	*Com.*	(£x1000)
NAI	0	0	0	0	0	0	1	0	128	0	0	16
WPM	0	0	0	0	0	0	0	0	0	0	0	0
Notes: PVD determined for 1m SLR in 100 yrs.												
Other information:												

ASSESSMENT OF POTENTIAL FLOOD RISK

Location	Flood risk tidal 2010			Flood risk tidal 2060			Flood risk tidal 2110			tidal risk 2m SLR		
Solva	No. of properties		AAD x £k	No. of properties		AAD x £k	No. of properties		AAD x £k	No. of properties		PVD (£x1000)
	<1:10	>1:10		<1:10	>1:10		<1:10	>1:10		<1:10 .	>1:10	
NAI	0	0	0	0	0	0	0	0	0	0	4	0
WPM	0	0	0	0	0	0	0	0	0	0	4	0

Table 2. General Assessment of Objectives

The following table provides an overall assessment of how the two baseline scenarios impact upon the overall objectives. Specific objectives are set out in more detail within Appendix E. The table aims to provide an initial high level assessment of the two baseline scenarios, highlighting potential issues of conflict. These issues are discussed in the following section, examining alternative management scenarios from which SMP2 policy is then derived.

OBJECTIVES	NAI			WPM		
Reduce risk to life						
Protect properties from flood and erosion loss						
Minimise the need for increasing effort and management of coastal defences						
Avoid reliance on defence particularly where there is a risk of catastrophic failure						
Maintain access to the communities and villages.						
Maintain recreational use of beaches and bays						
Maintain access to the coast including car parking and facilities						
Maintain character and integrity of coastal communities						
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						
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.						
Avoid damage to and enhance the natural landscape.						
Maintain the human landscape and character of communities						

4 Management Summary.

The overall intent for managing this area of the coast is to allow the natural development of the shore and cliffs. There are specific local areas where such an approach would have potentially significant consequences and these have been examined separately in the discussion above. Because of the significant natural value of the area, the whole zone is seen as one Management Area with the overarching policy of No Active Intervention. Within this local policy units are then defined. The policies are summaries below.

M.A.12 ABERPORTH CLIFFS TO NEW QUAY HEAD: From Pencribach to New Quay Head

Policy Unit		**Policy Plan**			
		2025	**2055**	**2105**	**Comment**
6.1	Aberporth Cliffs	NAI	NAI	NAI	Overarching policy setting the base intent for the zone.
6.2	Aberporth	HTL	HTL	HTL	
6.3	Aberporth to Ynys – Lochtyn, cliffs	NAI	NAI	NAI	Overarching policy setting the base intent for the zone.
6.4	Tresaith	HTL	MR	MR	Potential removal of defences to southern end.
6.5	Penbryn	NAI	NAI	NAI	Adapt access
6.6	Llangrannog	HTL	MR	MR	Integrated approach to re-development of the village sea front
6.7	Ynys-Lochtyn to New Quay Head	NAI	NAI	NAI	Overarching policy setting the base intent for the zone.
6.8	Cwmtydu	HTL	HTL	NAI	Further discussion with respect to historic environment.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

PDZ6
Management Area Statements

Aberporth and Villages
Craig Filain to New Quay Head

Location reference:	**Aberporth and Villages**
Management Area reference:	**M.A. 12**
Policy Development Zone:	PDZ6

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data.

The following descriptions are provided to assist interpretation of the map shown overleaf.

100 year shoreline position:
The following maps aim to summarise the anticipated position of the shoreline in 100 years under the two scenarios of "With Present Management" and under the "Draft Preferred Policy" being put forward through the Shoreline Management Plan.

- In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Draft Preferred Policy this distinction is made in showing two different lines:

  With Present Management.
  Draft Preferred Policy.

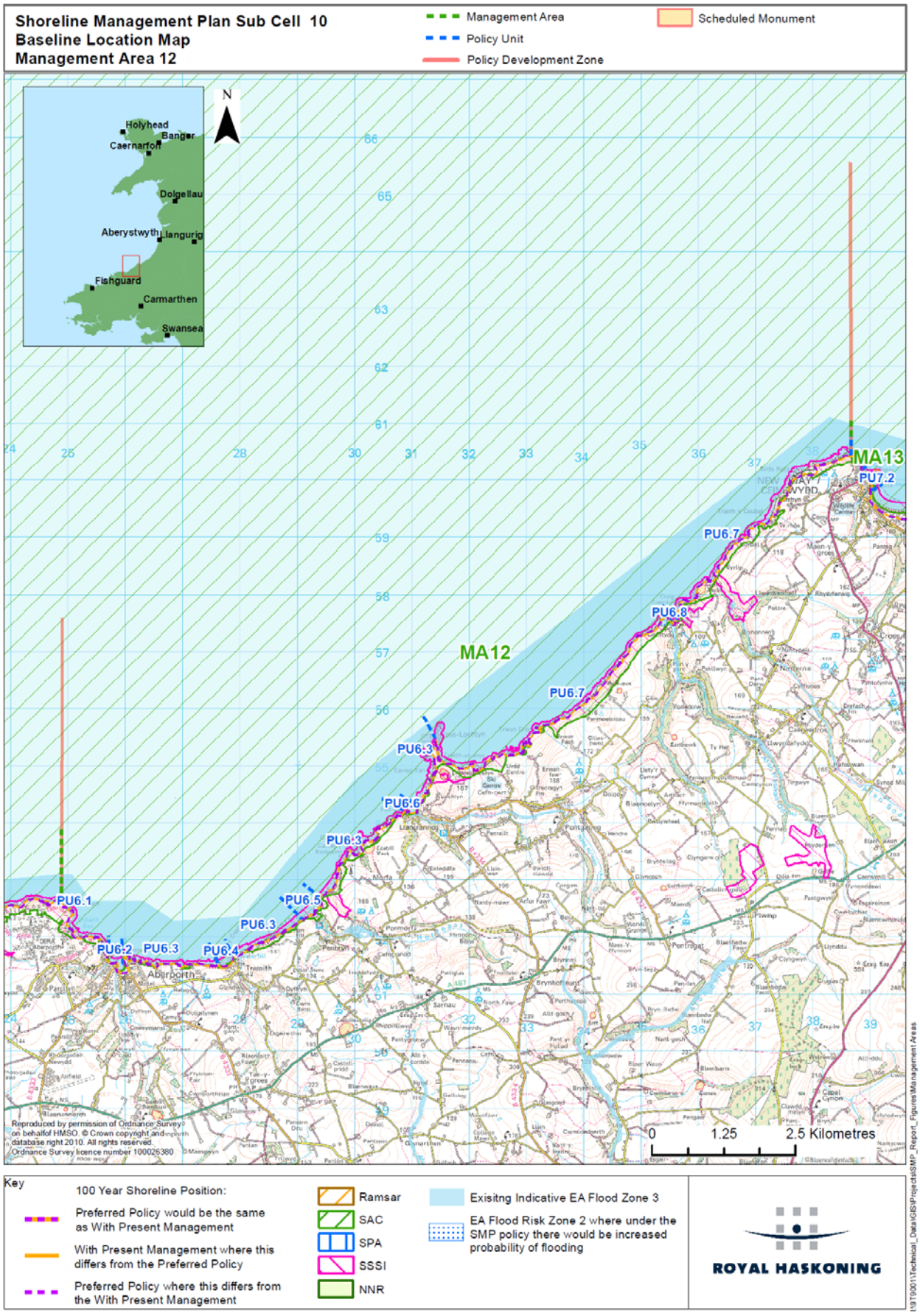
Flood Risk Zones

General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this Draft SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP draft policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

The maps should be read in conjunction with the text within the Draft SMP document.


Shoreline Management Plan Sub Cell 10
Baseline Location Map
Management Area 12
Management Area
Policy Unit
Policy Development Zone
Scheduled Monument
N
Holyhead
Bangor
Caernarfon
Dolgellau
Aberystwyth
Aberporth
Fishguard
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PU6.8
PU6.3
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PU6.1
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0
1.25
2.5 Kilometres
Key
100 Year Shoreline Position:
Preferred Policy would be the same as With Present Management
With Present Management where this differs from the Preferred Policy
Preferred Policy where this differs from the With Present Management
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EA Flood Risk Zone 2 where under the SMP policy there would be increased probability of flooding
ROYAL HASKONING
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SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

INTENT OF THE PLAN:

The intent of the plan over much of the frontage is to allow the natural development of the shoreline, supporting both the nature conservation and landscape values and also the important setting for the various communities. Within this is the intent to sustain the communities of Aberporth, Tresaith and Llangrannog. At Cwm Tydu the row of properties is not considered to be at significant risk.

The defence at Aberporth is essential to maintain direct protection to properties but also to maintain the integrity of the centre and seafront of the village. The defences also act to retain the coastal unstable coastal slope. The proposed plan is to continue to maintain defences.

At Tresaith the defences support the important access road and retain the coastal slope, failure of which could result in significant loss of property. There is, however, a risk that maintaining defence over the whole frontage would result in beach loss, which would result in damage to both the character and use of the area. The intent of the plan is to manage realignment of the southern half of the frontage to address this, which will include relocation of property and the sailing club.

At Llangrannog there are similar concerns that increasing the height and strength of defences along the whole frontage would cause damage to the landscape and amenity value of the village seafront. To address this, defences would need to be realigned as part of future re-planning activities in the area, but with the intent to continue to defend along the road to the south. This would support the village and the main seafront access. To achieve a sustainable approach, could result in loss of some properties, although alternative approaches to defence must also to be considered. The approach needs to be developed with the community.

At Cwm Tydu, there is little economic justification for maintaining the sea wall beyond epoch 2. It is recognised that this would have significant impact on the historic environment. It may be possible to continue to defend this area but to do so would require large investment and would impact of the beach. The SMP policy in epoch 3 is for NAI, but this would need to be confirmed in relation to the acceptability of loss of the historic feature.

KEY ISSUES/RISK AND UNCERTAINTY:

There are uncertainties in terms of timing of impacts and the need for change. However, there is a need for a detailed planned response to change and as such be developed over epoch 1. It will be important to relate this to national monitoring of sea level rise and more general climate change.

Funding of defence is indicated to be quite borderline in the assessment carried out by the SMP. However, there are significant additional damages not taken into account. There would also be severe impact on the important rural communities. There may, therefore, be a need for collaborative funding from other sources. Despite this, sustaining these communities would be in line with the intent of the spatial planning for the region.

ACTIONS:	
ACTION	PARTNERS
Shoreline monitoring	**CSC**
Adaption planning ▪ Tresaith ▪ Llangrannog	**CSC** **Communities** **Highways**
Re-assess policy at Cwm Tydu with respect to historic assets.	
Plan relocation of coastal path	**CSC**

DELIVERY OF THE PLAN

SUMMARY OF SPECIFIC POLICIES

Policy Unit		**Policy Plan**			
		2025	**2055**	**2105**	**Comment**
6.1	Aberporth Cliffs	NAI	NAI	NAI	Overarching policy setting the base intent for the zone.
6.2	Aberporth	HTL	HTL	HTL	
6.3	Aberporth to Ynys – Lochtyn, cliffs	NAI	NAI	NAI	Overarching policy setting the base intent for the zone.
6.4	Tresaith	HTL	MR	MR	Potential removal of defences to southern end.
6.5	Penbryn	NAI	NAI	NAI	Adapt access
6.6	Llangrannog	HTL	MR	MR	Integrated approach to re-development of the village sea front
6.7	Ynys-Lochtyn to New Quay Head	NAI	NAI	NAI	Overarching policy setting the base intent for the zone.
6.8	Cwmtydu	HTL	HTL	NAI	Further discussion with respect to historic environment.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain existing defences. Plan for realignment, considering redevelopment of frontages at Tresaith and Llangrannog and potential for collaborative funding. Re-assess management of historic features at Cwm Tydu.
Medium term	Maintain defences while moving towards adaptive management at Tresaith and Llangrannog. Develop and implement realignment policy.
Long term	Maintain realigned defences, with the exception of Cwm Tydu (subject to issues raised by historic features).

IMPLICATIONS OF THE PLAN

CHANGES FROM PRESENT MANAGEMENT

The policy at Aberporth and Tresaith remain the same. The plan confirms the need to consider managed realignment at Tresaith and highlights the need for adaptive change at Llangrannog from Holding the Line to Managed Realignment. The policy changes to No Active Intervention at Cwm Tydu in epoch 3, subject to further consideration of historic features.

ECONOMIC SUMMARY

Economics (£k PV)	by 2025	by 2055	by 2105	Total £k PV
NAI Damages	0.0	0.0	288.8	288.8
Preferred Plan Damages	0.0	0.0	56.0	56.0
Benefits	0.0	0.0	232.9	232.9
Costs	9.4	174.3	218.9	402.6

FLOOD AND EROSION RISK MANAGMENT

POTENTIAL LOSS

As part of the realignment at Tresaith and Llangrannog there could be loss of properties and the need for relocation of facilities such as the sailing club.

BENEFITS OF THE PLAN

The plan provides a longer term sustainable approach to defence to the villages while still sustaining the integrity of the villages and their important use of the sea front. There are some 20 properties identified at risk due to erosion. The plan could result in loss of 4 properties in the medium to long term. This would need to be considered in detail. The plan provides continued protection to 16 properties as well as essential services and access.

SUMMARY OF STRATEGIC ENVIRONMENTAL ASSESSMENT (INCLUDING HRA)

PDZ 6				
SEA Objective	**Impact of Preferred Policy for each Epoch**			
	1	**2**	**3**	**Mitigation**
Policy Units 6.1 to 6.8				
To support natural processes, maintain and enhance the integrity of internationally designated nature conservation sites. Maintain / achieve favourable condition of their interest features (habitats and species).				
To avoid adverse impacts on, conserve and where practical enhance the designated interest of nationally designated nature conservation sites. Maintain/achieve favourable condition.				
To avoid adverse impacts on, conserve and where practical enhance national and local BAP habitats.				Habitat creation
To support natural processes and maintain geological exposures throughout nationally designated geological sites.				
To conserve and enhance nationally designated landscapes in relation to risks from coastal flooding and erosion and avoid conflict with AONB and National Park Management Plan Objectives.				
To minimise coastal flood and erosion risk to scheduled and other internationally and nationally important cultural heritage assets, sites and their setting.				Excavation and recording
To minimise the impact of policies on marine operations and activities.				
To minimise coastal flood and erosion risk to critical infrastructure and maintain critical services.				Relocation or realignment
To minimise coastal flood and erosion risk to agricultural land and horticultural activities.				
To minimise coastal flood and erosion risk to people and residential property.				
To minimise coastal flood and erosion risk to key community, recreational and amenity facilities.				Realignment of coastal path (PU 6.3)
To minimise coastal flood and erosion risk to industrial, commercial, economic and tourism assets and activities.				

Mitigation associated with the impacted features of the historic environment may include excavation and recording and monitoring of erosion rates.

This table provides a summary of the SEA (appendix E) and reference should be made to the Appendix for full details of the assessment.

These next two sections provide a headline summary of the findings of the HRA (Appendix G) and the WFA (Appendix H). Reference should be made as appropriate to these Appendices for full details.

HRA SUMMARY

The SMP policy in this PDZ provides a range of policies along the coastline including NAI, HTL and MR. PDZ 6 includes interest features of the Cardigan Bay / Bae Ceredigion SAC.

Cardigan Bay/ Bae Ceredigion SAC: HTL at PUs 6.2, 6.4, 6.6, and 6.8 could result in constraint to the intertidal habitats, however, as these are not a qualifying feature of the Cardigan Bay SAC it can be concluded that there will **no adverse effect on the integrity of the SAC**.

SUMMARY CONCLUSION FROM THE WATER FRAMEWORK ASSESSMENT

This area was scoped out of the assessment. The assessment below, relevant to this management area highlights potential impacts to sections of coast outside this management area.

Water body (and relevant PDZ)	**Environmental Objectives met?**				**WFD Summary Statement required?**	**Achievement of Any South East RBMP Mitigation Measures?**	**Details on how the specific South East RBMP Mitigation Measures have been attained** (dark green = achieved; light green = partly achieved & red = not achieved)
	WFD 1	**WFD2**	**WFD3**	**WFD4**			
Cardigan Bay Central (Coastal) (PDZs 6, 7 and 8) (MAN 12,13,14,15 and 16)	N/A	✓	**x** (PDZ 8)	✓	**Yes** – Environmental Objective WFD3 may not be met because of the SMPs policy in PDZ 8 (MAN 15).	**There were no relevant measures to the SMP2 for this water body.**	N/A