PDZ 4. FISHGUARD BAY AND NEWPORT BAY:


Newport Parrog

Strumble Head to Pen y Bal (including the Nyfer Estuary).

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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 area of the two bays between Pen Anglas and Pen y Bal, separated by the major headland of Dinas Head. The main settlements within Fishguard Bay are at the western end: at Goodwick, Fishguard and Lower Town Fishguard. The only other development is at Penrhyn Ychen, where there is a small caravan park on the headland, and at Pwllgwaelod, where there is local road and a few properties at the western end of the valley through to Cwm-yr-Eglwys. Dinas Head is undeveloped with agricultural land use at Dinas Island.

Within Newport Bay there is the small village of Cwm-yr-Eglwys, sheltered by Dinas Head, and the two very small deeply indented bays of Aber Fforest and Aber Rhigian, before the coast changes from hard rock cliffs to the open sandy mouth of the Nyfer Estuary. At the entrance to this estuary is the village of Newport, which extends down to the shoreline as the Newport Parrog. On the far side of the estuary is the sand spit of the Bennet and the main beach of Newport Sands. There is a road bridge across the estuary and the small community of Llwyngwair further upstream at the normal tidal limit. A more detailed description of each area is given below.

Fishguard Bay

Fishguard Bay

The bay is dominated by the large North Breakwater of the harbour, stretching out across nearly a third of the width of the bay. The breakwater extends out from the small rock headland of Pen-cw and at the root of the breakwater is a sewage works. The coast going north from here comprises undeveloped cliffs.

Within the direct shelter of the breakwater the main quay of Fishguard Harbour runs along the narrow platform of land beneath the high cliffs of Goodwick. This strip of land has been redesigned over the last decade and contains the main port facilities, storage areas, railway, and road traffic reception area to the port. The head of the bay within the harbour area contains the access to the port. To the east are the redeveloped car park, tourism centre, boating facility and main public slipway, all of which are on a raised ridge of land running through to the East Breakwater. The main town of Goodwick sits upon the cliffs that extend in land on the western flank of the Goodwick Moor valley. The main area of the town is designated as a conservation area whilst the lower lying land to the edge of the moor has been the main area of more recent industrial and commercial development. There is further planned development within this area including a new sports and recreation centre.

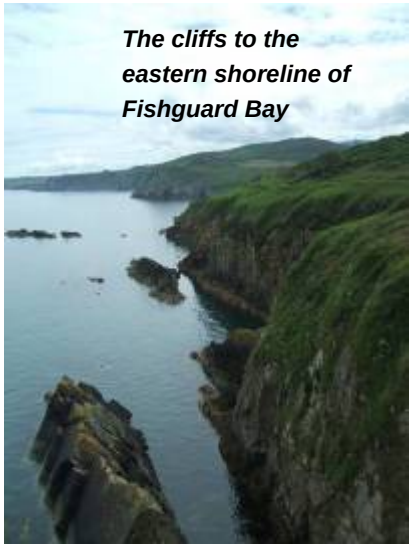
Goodwick

The main access to the harbour (the A40) runs along the backshore ridge of the Parrog, enclosing the flat sediment infilled area of Goodwick Moor. The road and the ridge are fronted on their

seaward side by a shingle beach with old timber groynes. The ridge has been developed as a narrow recreation area with a walkway and timber features (locally known as Wood Henge) and the Goodwick Brook runs in-culvert through the ridge. To the southern end of the Parrog are a small collection of properties on slightly higher ground. The road rises up to the old coastal slope into the main town of Fishguard and also back along the valley side towards Haverfordwest. Prior to improvements being made to the A40, the main access route to the port was across the valley through Dyffryn and the lower part of Goodwick.

The main town of Fishguard sits high up on the Penyraber Headland, with its steep rock cliffs extending around into the small ria of the Afon Gwaun. This infilled valley cuts in land some 1km from the open coast of Fishguard Bay. Principally along its southern side lies the village of Lower Town. Much of the village sits on the upper slopes of the valley, but the working quay of the small harbour and main tourism centre of this archetypical Welsh coastal port is located along a narrow platform of land over the eastern side of the valley. The main road crosses the valley at the southern end of the quay, before climbing steeply out of the village to the east. The village and both sides of the outer part of the valley are designated as a conservation area. The harbour is protected by a small breakwater narrowing the entrance to the wider muddy inner harbour. There is an active fishing fleet as well as sailing boats and a boating centre.

Lower Town



The cliffs to the eastern shoreline of Fishguard Bay

To the east of Castle Point, upon which sits an old fort (SAM) overlooking the bay, the coast is largely undeveloped high rocky cliffed coastline.

Dinas Head at the eastern limit of Fishguard Bay is virtually an island, but linked to the main coast by a narrow valley. At the western end of the valley is Pwllgwaelod, which comprises a popular sandy bay, backed by a road and access to Island Farm, a small car park and some properties.

Newport Bay

Cwm-yr Eglwys

At the eastern end of the Pwllgwaelod valley is the small village of Cwm-yr Eglwys. Much of the village is set back within the higher part of the valley, the exception being the remains of the old Brynach's Church and its graveyard, which are right to the back of the small sandy bay. To the northern end of the bay there are also a small group of properties and a small breakwater built out on the Careg y Defaid rock outcrop. There are two roads into the village,

one along the valley and one running east to the crest of the protected coastal slope.

Further to the east is the small bay of Aber Fforest; here there is a Lime Kiln and short section of sea wall at the point where a stream enters the back of the sandy bay. The small agricultural community of Aber Fforest lies well back up the valley. The coast to the back of Newport bay is relatively low with rock outcrops along much of the foreshore area. At Carreg Germain the main, sandy bay of the Nyfer Estuary begins. The collection of properties making up the Parrog area of Newport run as a narrow strip of development on the crest and back of an area of rock outcrop, through to the main area of the Parrog further inside the estuary mouth. Between the two areas is an area where properties are close up to the sea wall at the back of the muddy foreshore. The main Parrog area extends out into the estuary as a low headland behind which there has been a significant accretion of saltmarsh. The main channel to the estuary tends to run hard up against the whole of the southern side of the estuary, running hard against the small headland before meandering to the north side of the estuary behind the large sand dune spit; the Bennet. This dune spit is an extension of the wide, open dune backed shoreline of the main Newport Sands.

The Newport Parrog

The Parrog is an important tourist feature of the main village as well as an important element of the village itself. The small headland has a car park and facilities as well as housing the sailing club building. There are also several listed buildings associated with the old Lime Kiln.

The valley of the Nyfer narrows quite sharply upstream of the Parrog, with a steep sided earth bank to the northern side, and lower lying saltmarsh to the south. Just downstream of the road bridge at Pen-y-Bont is the SAM designated remains of an old medieval fort. Upstream of the bridge, the estuary takes on a far more riverine character through to the confluence with the Cwm Clydach. At this confluence are several caravan parks and the farm and listed building of Felin Llwyn-gwair, together with a very local area of SSSI. The whole of the southern side of the Nyfer Estuary, extending up into the village of Newport is a designated Historic Landscape Area.

On the northern side of the estuary is the open Newport Sands with a car park area, golf course and facilities. To the north of Newport sands the coast returns to hard rock cliff and this cliff line is designated SSSI.

Newport Sands

2 Coastal Processes

The zone is relatively sheltered from the dominant southwesterly offshore wave climate, although it is still subject to longer swell from this offshore direction, diffracting around the general promontory of Pembrokeshire. Critical wave directions for Fishguard Harbour and Fishguard Bay are from the northwest to northeast. The main north breakwater provides a high degree of protection from these directions and this protection extends also to Lower Town Harbour. From wave modelling for the harbour it was found that there are critical and relatively frequent occurrences when waves may enter the harbour along a narrow directional window between the end of the North Breakwater and the alignment of the East Breakwater. It was also noted, and supported by observation that waves from a north-westerly direction reflect significantly from the eastern cliffs of Fishguard Bay and enter the harbour from the east. This can set up relatively large wave heights within the harbour area and, with subsequent reflection from the hard quay walls, can result in significant wave action against the southern end of the harbour. These specific features of the wave climate also tend to affect the beach area of the Parrog, tending to move sediment from south to north along the shoreline. Wave heights within the outer harbour can be in excess of 2m and might typically be in excess of 1.5m at the southern end of the harbour. Sea Level Rise is not likely to significantly increase wave heights as the wave climate is determined principally by the protection afforded by the various structures. It will, however, result in increased wave energy impacting on the Parrog as, at present in this area, waves are depth limited by the sloping foreshore.

Within the harbour, the sea bed has been found to be relatively stable and the only major dredging has been in the local vicinity of the main port.

Lower Town is well protected from wave action. This subsequently creates a low enough energy environment for mud to form the bed of the harbour. The main channel can, however, move, and the orientation through the road bridge and past the sailing club frontage does tend to throw the channel beneath the main quay wall, where there has been undermining in the past.

At Pwllgwaelod, the sandy beach facing to the southwest is very sheltered. There is at present only local pressure for erosion. On the other side of Dinas Head, the bay of Cwm-yr-Eglwys is more exposed to the north and despite the degree of protection provided by Pig y Baw, and the works to infill Careg y Defaid, there can be significant wave action against the various defences. There is evidence of scour along the toe of the road wall to the south and there are large concrete toes to the church wall and the adjacent defences. The beach in this bay can build but can also be significantly drawn down, depending on specific wave period and direction. Increasing water depth with Sea Level Rise may trigger a more general lowering of the foreshore due to squeeze against the hard backshore.

The Newport Parrog

At Newport Parrog there can be significant wave action against both seawalls along south cliff line and directly onto the walls of the small headland. A recent appraisal report for the area gave design estimates of wave heights in the order of 1.75m as a joint probability with a 1:200 year

water level. Earlier studies in the area, prior to reconstruction of the headland wall suggested that waves would be depth limited, giving significantly greater wave heights against the frontage. Certainly, one key issue is the wave build up along the low cliff frontage, potentially developing a Mach Stem affect and the ability of waves to progress along the channel to impact on the small headland. The position of the channel is very much determined by the influence of the Bennet pushing down from the north. The road bridge anchors flow direction further upstream. This possibly holds the channel position to the north of the inner estuary, whilst the growth of the Bennet forces the flood channel over to the south side at the entrance. The small headland then acts as a spit, driving the flow to the north against the back of the Bennet on the flood. The estuary shape, therefore, seems quite constrained, despite its relative open appearance. The growth of saltmarsh behind the small headland is evidence of the influence of the spit.

There has been no detailed historical analysis of the past and future behaviour of the estuary and the above assessment only provides a coarse overview of processes. With Sea Level Rise, there would be an equivalent increase in wave action as waves are considered to be depth limited. Joint probability analysis of wave height and water level is not seen as being appropriate because any Extreme Water Level event is likely to be associated with high energy wave conditions. Within the estuary it has been assessed that the estuary would have the capacity to infill further with Sea Level Rise. Even so, there may be an increase in tidal prism as the system adjusts. Under existing configuration this could lead to increased ebb pressure on the back of the Bennet and further adjustment of the channel in front of the Parrog. The main beach of Newport Sands will, with Sea Level Rise, tend to roll back. This would provide further sediment to the Bennet but also tend to decrease the width of the spit as pressure increases on the inside face.

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.

Whilst within local bays, Sea Level Rise (SLR) will be a significant factor in future development of the shoreline, over much of the zone the very slow erosion of the main hard cliffs would be little affected. 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 at Pwllgwaelod and Newport Sands 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.

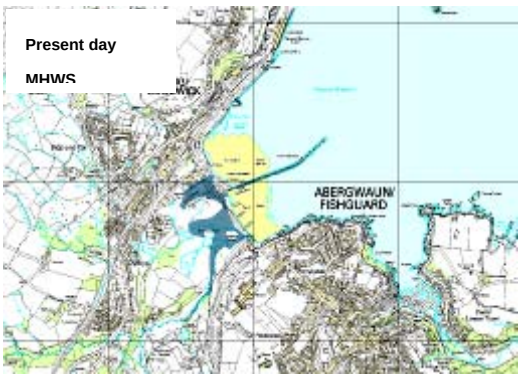
Location	NAI Base Rate (m/yr)	Notes	100yr. Erosion range (m)
Goodwick Parrog	0.2	Roll back of ridge	30
General cliff line	0.05	Some areas of coastal slope instability	10 to 20
Pwllgwaelod	0.05	Roll back of ridge	30
Cwm Eglwys	0.1 to 0.3	Erosion following failure of defences	10 to 45
Newport Parrog	0.1 to 0.2	Erosion following failure of defences	10 to 30
Newport Sands	0.05 to 0.2	Roll back of dunes with local erosion where defended	40

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.

FLOODING

While there would be significant impact on coastal behaviour as a result erosion due to Sea Level Rise, one of the major impacts would be on flood risk.

Within Fishguard Harbour, Sea Level Rise will have a significant impact on the operations of the port. Under present conditions the port operation area is only affected by wave overtopping. Even under an extreme event the level of the quay is assessed as being above Still Water Level. The same applies to the area of the car park and tourism centre. With Sea Level Rise the risk increases. The main area of flood risk is to Goodwick Moor and to the lower parts of Goodwick. The following plots show the estimated impact of Sea Level Rise in terms of areas affected at MHWS. The plots are only indicative but do highlight the main issues.



At present there is only limited flood risk, on normal tides, to the area of Goodwick Moor. There is greater area of risk identified for more extreme events, potentially covering substantial areas of the industrial estate. This is recorded by the Environment Agency's Flood Risk Mapping for the area. Even with modest Sea Level Rise, the risk of normal tidal flooding extends quite considerably. The road level at the Parrog is assessed as being of the order of 3.5m to 4m OD compared to a MHWS level of 2.36m OD and a 1:200 year level of 3.56m OD. The area of the car park and the port is in excess of 5m OD. With anticipated Sea Level Rise, there is the possibility of direct overtopping of the Parrog on normal tides with the extent of inundation taking in all the Goodwick Moor area and a substantial part of the development area behind the harbour within the next 100 years.

Impact of different Sea Level Rise Scenarios

The flood risk area under normal tidal flooding is very sensitive to the rate of Sea Level Rise. Under a 2m SLR scenario over the next 100 years, while the extent of flooding is not significantly greater, being limited by the rising topography, the frequency of flood risk increases. The full flood risk area could be affected within 50 to

75 years. Under this scenario the main road to the port would be subject to regular flooding over the same time period. Furthermore areas of the port and the car park could now be affected over the 100 year period, with increased flood risk on extreme events becoming a more regular occurrence far sooner.

At Lower Town there is, under existing conditions, a significant risk of flooding to the open area just downstream of the bridge. This also has the potential to extend further into the village where Quay Street joins with the main road. Current flood risk is at about the 1:10 year level. Further along Quay Street the levels are in the order of 4m to 4.5m OD. With Sea Level Rise over the 100 years, areas of the quay would be regularly flooded and the main road would be subject to flooding on spring tides.

Lower Town Fishguard

The Catchment Flood Management Plan for the area identifies the difficulty of managing the short steep catchments of rivers such as the Gwaun, and the increased tidal locking on normal tides would introduce further flood risk to the area upstream of the bridge, with the possibility of flooding in the centre of the village and to the main road.

Impact of different Sea Level Rise Scenarios

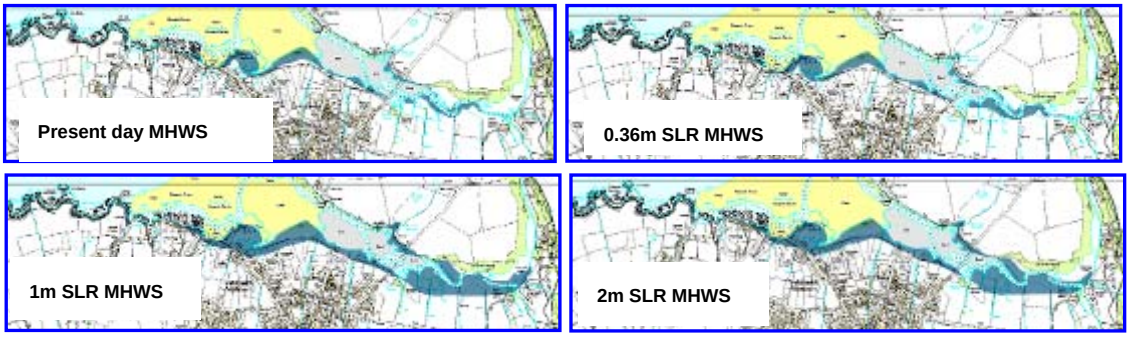
As at Goodwick, when flooding would become an unacceptable hazard would depend critically on the rate of Sea Level Rise. Under a 2m SLR Scenario areas of Quay Street would be inundated on MHWS, potentially within 50 to 75 years. The threat of major disruption to the main road would be sooner.

Rising sea level would cause potential flooding of the road at Pwllgwaelod and locally at Cwm-yr-Eglwys. However, there is no risk of the valley behind Dinas Head becoming flooded.

At Newport Parrog there is significant flood risk at present. A large element of this is due to wave overtopping, both due to the waves building along the walls along the southern cliff line and due to direct overtopping of the headland and waves running up the slipways in this area.


Newport Parrog

The typical ground levels within the car park to the headland are around 3m OD with defences of the order of 4m to 4.5m OD. The defence level to the rear of the headland is substantially less. Clearly with Sea Level Rise there is the potential for flooding on normal spring tides within the next 50 years. This risk would increase due to increased wave action.



Indicative flood areas for MHWS with Sea level Rise – Newport Parrog

There is also some risk of flooding further within the Nyfer Estuary over the next 100 years. This might be mitigated partially by warping up of the saltmarsh areas.

EXISTING DEFENCES


Goodwick Parrog

Within Fishguard Bay, with the exception of the long length of natural cliff, virtually all developed areas are defended. The defences within the harbour are, overall, in good condition, with much of the area, including the massive North Breakwater under the responsibility of the Port Authority. The East Breakwater has suffered some damage.

Along the Goodwick Parrog only light defences are in place at the crest of the shingle beach. To the southern end the Goodwick stream cuts through the Parrog and there are low embankments along the edge of Goodwick Moor.

The defence at Lower Town is provided principally by the Quay Street wall, which has in the past, suffered undermining and collapse. The river is quite tightly constrained by defences on both sides downstream of the bridge, before opening into the main harbour area. There is also a rock revetment to the Fishguard side of the harbour that acts to stabilise the coastal slope. The small breakwater acts as an important defence against wave action within the harbour.


Cwm-yr-Eglwys Road Wall

There is a low pitched rock revetment at Pwllgwaelod that supports the road and car park area. This wall has suffered some damage but is generally in moderate condition.

To the west of Dinas Head, there are the several infilled sections of masonry and concrete to Pig y Baw and Careg y Defaid. However the main defence in this area is that supporting the graveyard and that beneath the road running from the village to the south. The church wall has a substantial concrete apron but the slate wall above, though backed by a concrete deck, is in relatively poor condition.

Much of the defence along the southern low cliff of Newport Parrog comprises private defences. Behind the rock scar to the west of the frontage the walls tend to be set back at a higher level, retaining the earth bank in front of property and the access road. To the east of the rock outcrop the walls are comprised of the typical vertical slate and form a continuous defence through to the small headland. Areas of the headland wall were improved by the sailing club and the National Park during the 1990s and at the sailing club there is a small rock armour toe. The traditional slate walling is considered to be an important quality of the landscape. Behind the headland the defence is a discontinuous very low earth bank. The only other significant defence within


Newport Sands

the Nyfer is to the abutments to the road bridge.

There is a short section of rock revetment at the northern end of Newport Sands.

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 impacts 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.

The hard rock cliffs would continue to erode back as at present. In the area of Fishguard Harbour, it is the harbour that is obviously the main influence. If the harbour were not there, the sea front would be set back but with the potential for dunes to develop and for the Goodwick Moor to revert to saltmarsh. As the coast rolled back the Moor might possibly warp up in response to Sea Level Rise.

The harbour has a significant influence on Lower Town. In the absence of defences there would be increased wave action within the small bay and, as in the case of the main bay, the shoreline would gradually move up the valley with Sea Level Rise. A similar situation would arise at Pwllgwaelod and at Cwm-yr-Eglwys.

At Newport Parrog, the small headland would quite probably be eroded away. With this, there would be significant erosion of the saltmarsh behind, and the possibility that the flood channel would form along the southern side of the estuary. This would influence the ebb channel to the north. The Bennet may curve more into the estuary and there may be increased sand infill. The main difference along Newport Sands would be at the northern end where the backshore would retreat in land to keep in line with the general retreat of the Bennet.

KEY INTERACTION WITH DEFENCES

The above discussion highlights the way in which defences generally over the zone are holding the shoreline forward. Only at Newport are defences substantially impacting on larger scale processes. The unconstrained scenario for the mouth of the Nyfer is quite speculative but does highlight that the small headland could be quite influential in the way in which the estuary is responding.

Locally, the walls at Cwm-yr-Eglwys are seen as having a significant impact on beach levels. From specific wave directions the reflection off the walls can create a significant increase in wave energy.

Also quite locally, the wall along the low cliff of Newport Parrog encourages waves to build along its length, increasing overtopping but also possibly increasing wave height and run up at the first slipway at the root of the headland.

3 Management Scenarios

3.1 No Active Intervention – Baseline Scenario 1.

The overall structure of the coast would be as at present; the hard cliffs would erode slowly with no substantial increase in the rate of erosion resulting from Sea Level Rise. It is within each of the protected bays that significant change would occur.

At Fishguard Harbour, even with a policy of No Active Intervention, it is assumed that the Port Authority would operate and would maintain the North Breakwater and East Breakwaters, whilst taking actions to maintain operation of the Main Quay. There would, however, be a need for change in operation in response to Sea Level Rise. Along other sections of the harbour, no further work would be undertaken to improve or maintain defences. These defences are in good condition at present and it would probably not be until the third Epoch that a noticeable impact was felt. Together with Sea Level Rise and the deterioration of the defences, there would initially be greater overtopping. As this became worse there would be a loss of the car park and the use of buildings on the embankment would be put at risk. There would be increased flood risk to the port entrance.

At the Goodwick Parrog, the defences would deteriorate at a faster rate and the narrow width of open space in front of the road would probably be lost over the first two epochs. During Epoch three, there would be regular flooding of the Parrog, with potential loss of property and increased flooding due to overtopping of the Parrog into Goodwick Moor. The defences to the Goodwick Stream would have, in any event, begun to fail and would be overtopped on a regular basis. By the end of the second Epoch, it is probable that Goodwick Moor would be open to regular inundation on every tide. There would be regular flooding to the industrial area of Goodwick and to the lower parts of the village. However, only some six properties are currently at risk, increasing to 10 over the period of the SMP. The access to the port would be increasingly difficult and there might be the need to revert to the old road through Goodwick as the main access route. This would have significant implications for further regeneration of the whole area. The tidal flooding of Goodwick Moor would allow development of saltmarsh and potential areas of mud flat.

Impact of different Sea Level Rise Scenarios

Under the NAI scenario the main impact of more rapid Sea Level Rise would be in terms of timescales. With a 2m SLR over the 100 year period, deterioration of defences within the harbour would occur during Epoch two. The road level across the Parrog would be within 0.5m of Spring Tide level and by the end of Epoch three would be subject to 0.5m of flooding every Spring Tide. The area of Goodwick Moor would be subject to tidal inundation potentially by the beginning of Epoch two.

Lower Town car park area

At Lower Town, there would be more regular flooding to the car park area close to the bridge, with a substantially greater risk of flooding to the centre of the town over the next 20 to 50 years, potentially resulting in closure of the main road on most spring tides by Epoch three. The road would probably be disrupted several times a year within 20 to 50 years. The use of the quay would become more difficult with regular spring tide flooding over the 100 years. There would be regular

inundation of property in the area by the bridge at the southern area of Quay Street.

Property behind Quay Street may not suffer significant damage, although there would be increased difficulty in terms of access and the risk due to wave action. However, the increased risk of flooding to the quay is likely to result in increased deterioration and the possibility of failure of much of the quay wall during the first two epochs. Under this baseline scenario, although there are only some 15 properties at direct risk from flooding, these would be considerably more affected due to loss of access and erosion along the quay. The overall impact, as well as resulting in loss of access along the main road, would be the significant loss of character to the village and significant impact on its conservation status.

Impact of different Sea Level Rise Scenarios

As in the case of Goodwick more rapid Sea Level Rise would result in increased risk sooner. With a 2m SLR over the 100 year period, the main road within the centre of Lower Town would be subject to normal tidal flooding during Epoch two. The quay could be subject to tidal flooding also within that period of time.

The access road between Fishguard and Lower Town is at potential risk due to land instability. This slope is protected by a rock revetment at the toe of the slope. With Sea Level Rise and with gradual deterioration of the defence, there is the potential for the road to be lost during the third Epoch.

The pitched stone revetment at Pwllgwaelod is showing signs of deterioration, although at present it is only on more extreme events that this short frontage is exposed to significant wave action. This deterioration would continue under this scenario and, as sea level rises, there would be increased overtopping affecting the integrity of the structure. The structure would probably fail without maintenance towards the end of the first Epoch. There would be loss of the car park and eventual loss of the road. The access to the farm would also be lost. Although quite local, this would impact on tourism and recreation and would impact on the agricultural use of the area.

To the other side of Dinas Head at Cwm-yr-Eglwys, there would be continued deterioration of the church wall with probable failure during Epoch two. This would result in rapid loss of the graveyard and the remains of the church and have a severe impact on use of the beach and character of the village. There would be more gradual loss of other defences with loss of seafront property. The road wall to the south of the village would be subject to increased overtopping with Sea Level Rise. This is likely to re-activate the coastal slippage and result in the loss of the road towards the end of Epoch two. This could limit access to the village, although there is an alternative route.

The recent study of Newport Parrog identified that some six properties are currently at risk from flooding on a regular basis. This is confirmed by the analysis undertaken as part of the SMP. A further eight properties are at risk from direct flooding on more extreme events; this total number would increase to some 23 with Sea Level Rise. More properties are affected by wave overtopping and the greatest impact, under this baseline scenario, would be as a result of increased wave action and failure of the sea walls. In effect, failure of the defences could result in loss due to erosion of much of the small headland and loss of property between the headland and the rock outcrop to the west. This would also result in loss of the sailing club and the important heritage features associated with the headland. The main village would lose its existing and important seafront area, although in other respects the village would remain.

With the erosion and gradual loss of the headland there would be loss of saltmarsh behind. As discussed earlier, there could be a significant change in the way in which the estuary behaves. It is suggested, although unsupported by any detailed analysis, that the Bennet would tend to curve in towards the estuary as the flood channel tends to remain closer to the southern side of the estuary. There would be an increased tendency for the estuary to accrete.

The failure of the revetment to the north of Newport Sands would result in loss of the car park and the associated building, due to erosion.

3.2 With Present Management – Baseline Scenario 2.

The following table sets out current policy and management approach for the Zone.

SMP 1			Subsequent Management Approach
No.	Management Unit	Policy	
Pembrokeshire SMP1			
21FH/D	Strumble Head to Fishguard Harbour	DN/DN	
21FH/C	Fishguard Harbour	HTL/HTL	
21FH/AB	Goodwick	HTL/HTL	
21LTFC	Penyraber	DN/deferred	
21LTF/A&B	Lower Town Fishguard	HTL/HTL	
21DIWB	Old Fort (quay) to Pwllgwaelod	DN/DN	
21DIW/A	Pwllgwaelod	DN/R	
21CYE	Pwllgwaelod to Dinas Head	DN/DN	
22CYE/B	Dinas Head to Cwm-yr-Eglwys	DN/DN	
22CYE/A	Cwm-yr-Eglwys	HTL/HTL	
22NBS	Cwm-yr-Eglwys to Newport Parrog	DN/DN	
22NPP	Newport Parrog	HTL/HTL	Recent appraisal for HTL
22NYF	Nyfer Estuary	SHTL/SHTL	
22NPS	Newport Sands	SHL/R	

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

In addition, the following information and policy is abstracted from the Pembrokeshire and Ceredigion Rivers CFMP Draft Plan.

Policy Unit 4 Western Coastal Rivers	The Western Coastal Rivers Policy Unit comprises many short steep watercourses, which respond quickly to rainfall and drain the coast of Pembrokeshire from Tenby in a westerly direction to Fishguard.
Problem / risk:	**Problem:** The main source of flooding is fluvial flooding and tidally influenced fluvial flooding. River channels quickly fill and flow out of bank across the floodplain. Onset is rapid and duration is likely to be short. Tidally influenced fluvial flooding is a problem in the lower river reaches especially when high tides and strong winds combine with high river levels. Localised surface water flooding is also a problem. **Current Flood Risk:** - The majority of people affected by flooding live in Fishguard, Solva and Tenby. Solva and Tenby have particularly vulnerable communities. - Narrow and confined river valley causes deep fast-flowing floodwater in

	Fishguard and Solva. - A total of 1.2km of raised defences across the policy unit protects approximately 60 properties from a 10% AEP event, mainly in Fishguard and Solva. **Future Flood Risk:** - Broadscale modelling shows that climate change is likely to increase the number of properties at risk of flooding from approximately 200 to 310 properties; this is an increase of 55% from the current number of properties at risk from the 1% AEP flood event. - Landuse change and urbanisation is not expected to have a significant impact in this policy unit. - Approximately 1% of the total population of the policy unit are at risk from a 1% AEP flood event. This is a 42% increase from the current number of people at risk from the 1% AEP flood event. - Greater floodwater depth and velocity will increase the level of hazard for people living in areas prone to flooding. - Flood damages are expected to increase by approximately 83% for the 1% AEP flood event. - It is likely that flood depths will increase in the future, with typical depths of flooding during a 1% AEP event increasing by nearly 1m as a result of Sea Level Rise in Fishguard and Tenby. - The speed of onset of flooding will increase slightly in the more upland catchments of the Western Coastal Rivers.
Policy selected	Policy 4 – Take further action to sustain the current level of flood risk into the future.
Justification and alternative policies considered	Policy 4 – There are a number of smaller settlements at risk of flooding dispersed throughout the Policy Unit. When combined, however, these dispersed settlements amount to relatively large numbers of properties at risk from flooding. Due to the level of risk anticipated in the future, a policy option 4 would deliver the objectives maintaining the current level of flood risk in the future in line with climate change. Under a policy 4, flood warning and flood resilience measures will continue to improve now and in the future. A policy 4 would allow flood risk management actions to be focused in areas of greatest risk, such as Fishguard. Sustaining the current level of flood risk in the future under a policy 4 would result in annual average damages remaining at approximately £0.18m. We have selected this policy based on the risk posed by inland flooding sources and tidal flooding sources. If the risks posed by tidal flooding were removed from the policy appraisal process, preliminary estimates suggest that this policy would change from a Policy 4 to a Policy 3. **Alternative policy options considered:** Policy 3 – A policy option 3 would result in an increase in flood frequency and depth in the future. The residents and businesses of Fishguard, Solva and Tenby would be affected by an increase in disruption to infrastructure, social stress and economic loss. Policy 5 –Measures have already been put in place to reduce the risk of flooding at Solva and are proposed for Merrion and Stepaside. Due to economic, social and environmental reasons it is unlikely that further flood alleviation options could be implemented to reduce the level of flood risk. Policy 6 –There is already a purpose-built flood alleviation/storage scheme at Pont y Cerbyd, which has been specifically built to reduce the extent of flooding in the town of Solva. For the other watercourses, due to the small size of their

	catchment area and short length, there is a limit to the physical area available for flood storage.
Catchment-wide opportunities & constraints	**Opportunities:** To reduce flood risk to Fishguard and Solva through improved flood warning and emergency response. Unlike raised defences, flood warning and emergency response actions allow the connection between the river and floodplain to be maintained. **Constraints:** Steep, short coastal catchments with potential for rapid response to flooding such as the Nevern, Solva, Gwaun and Brandy Brook in the Western Coastal Rivers Policy Unit, are difficult to manage. We must recognise that there are few options available which will change the frequency or extent of flooding and there is limited opportunity to improve flood warning in steep, short coastal catchments which have a rapid response to rainfall. Our approach to managing flood risk must focus on reducing the impact. Dispersed, smaller settlements with limited scope or justification for individual defences such as Solva. When combined however, these dispersed settlements amount to relatively large numbers of properties at risk from flooding. This makes it difficult to apply cost-effective flood risk management actions.

The general approach to management is, therefore, to sustain existing defences to the developed sections of the coast but to allow continued erosion to occur elsewhere.

Considering these developed areas, at Fishguard Harbour there would be continued operation of the port and defence to its operational area. Defences in this area would need to be raised in line with Sea Level Rise. Access along the East Breakwater would be maintained and, to achieve this, the crest of the breakwater would need to be raised in some 50 years time. The area of the car park would be at greater risk of wave overtopping and, towards the end of Epoch two; there would be a need to raise the crest of the defences. The main effort in improving defences would be along the Parrog. Here, the defences would be required to stop tidal flooding of the road towards the end of the third Epoch. The defence to the front of the Parrog would need to be improved and there would be a general loss of the beach area. In addition, flood defences to Goodwick Moor would need to be raised substantially over Epoch two to address the risk of flooding to the back of Goodwick and to safeguard the road access to the port. Raising these defences would need to take account of the increased tidal locking of the river. The further canalisation of the water course could lead to increased scour and risk of sudden failure with increased risk of spate flows.

Impact of different Sea Level Rise Scenarios

With higher Sea Level Rise of 2m over the next 100 years, works to the car park area would need to exclude still water level flooding over Spring Tides during Epoch three. The defence to the Parrog would similarly need to be raised to exclude normal tidal flooding of the road.

At Lower Town, defences would be increased in the area of the car park by the bridge and possibly upstream of the bridge as the river was further constrained. It would be technically feasible, and necessary, to increase defence along Quay Street to provide protection to the centre of the town and to allow access to properties along the quay. This may require strengthening of the walls, as with increased flow down the river, there is likely to be increased flow directed against the walls. Defence to the car park would

need to increase in the order of 1m, and there would need to be flap valves to ensure that tidal flooding did not enter the drainage system. As a result there would be increased potential for surface water flooding to the centre of the town. Along the quay there would be less increase in level of the quay.

Impact of different Sea Level Rise Scenarios

Under the 2m SLR Scenario defences around to car park would need to be raised in the order of 1m to prevent normal tidal flooding to the town and the road, with a further increase to somewhere in the order of 2m by the end of Epoch three. Clearly, the risk of surface water flooding would also increase as the centre of the town became tidally locked for several hours over a Spring Tide. The crest of the quay might need to be raised by 0.5m during Epoch three.

The impact of increased defence would be significant in the area around the bridge but less so along the quay. However, works may impact on the listed designation of the quay. More significantly, continued defence of the area into the future would place the whole centre of the village at risk from extreme flooding risk, potentially from tidal, fluvial and surface water flooding. There could be a risk to the bridge and to the road, making the area overall increasingly vulnerable.

Under this baseline scenario the intent is to allow retreat of the defence at Pwllgwaelod. A new access would have to be created to the farm and to sustain use of the beach new areas created for car parking.

At Cwm-yr-Eglwys, the walls would need to be strengthened and raised. Such works would be expensive with little direct economic justification. Wave energy within the bay is likely to increase, with increased erosion of the beach. Further work would be needed to protect the coastal slope to the road, and this would need to be justified in term of access to the village. The erosion to the beach may result in decreased tourism and maintaining this southerly access may not be justified.

In addition to improving defence to the Newport Parrog headland, there would need for substantial increase in level to the walls along the low coastline to the south. Where there is the relatively high rock outcrop to the west, maintaining local defences may be sustainable, although the present access along the foreshore would be more difficult to sustain. Along the low section of frontage to the east of the rock outcrop, increasing water levels and an associated increase in wave action would substantially increase overtopping and the risk of flooding.

The Newport Parrog

To maintain the existing level of flood protection would require a far more substantial wall, effectively increasing its height by some 1m over the next 100 years. Even then some properties would be at risk for tidal flooding on spring tides. The continued policy towards a linear defence would increase the wave action along the wall, potentially increasing wave run-up and flooding at the slipway at the root of the headland. Along the headland, defences would need to be strengthened and raised. The recent appraisal for the area demonstrated the benefit of raising the crest of the wall to 5m OD with an earth embankment to the rear of the headland and the need for pumping to address continued overtopping. The appraisal allowed for 0.5m Sea Level Rise.

Over 100 years this would the need to be raised at least a further 0.5m, raising the defence some 2m above the general level of the car park.

Impact of different Sea Level Rise Scenarios

Under the 2m SLR scenario defences to the headland would need to be raised to a typical level of 5.5m over the next fifty years, increasing by around a further metre over the hundred years. There would be a substantial increase in the need for pumping and the area would be increasingly vulnerable to defence failure.

The impact on the area would be to isolate the headland and properties from their current important association with the shoreline. There would be increased erosion of the foreshore and a need to improve toe defence to the sea walls. Although maintaining the various listed buildings in the area, the protection of the Parrog would significantly damage the conservation status and heritage value of the area.

Within the Nyfer Estuary, current policy is to selectively Hold The Line. It is unlikely that this would significantly impact on the nature conservation values but equally it is unlikely that defences would attract grant in aid.

Maintaining the defence at the northern area of Newport Sands is likely to be feasible over the next fifty years. Beyond that time holding the existing defence line would result in the frontage being held well in front of the retreating natural dune line to the south. There is no anticipated flood risk to the golf course behind and it would be difficult to justify significant increase in defence to the car park area.

4 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

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Table 1. Economic Assessment

The following table provides a brief summary of erosion damages determined by the SMP2 MDSF analysis for the whole PDZ. 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.

ASSESSMENT OF EROSION DAMAGES

Epoch	0 -20 year			20 – 50 years			50 – 100 years			50 – 100 years (2m SLR)		
No Active Intervention	**No. of properties:**		**Value x £k**	**No. of properties:**		**Value x £k**	**No. of properties:**		**Value x £k**	**No. of properties**		**PV Damages (£x1000)**
Location	*Res.*	*Com.*		*Res.*	*Com.*		*Res.*	*Com.*		*Res.*	*Com.*	
Fishguard	0	0	0	0	0	0	1	0	197	1	0	42
Lower Town Quay	0	0	0	0	1	8	1	1	133	4	2	22
Castle Point cliffs	0	0	0	0	0	0	1	0	197	1	0	10
Cwm yr Eglwys	0	0	0	1	0	197	4	0	661	5	0	160
Newport Parrog	0	0	0	0	0	0	8	1	1305	9	1	154
											Total for PDZ1	**388**

With Present Management	No. of properties		Value x £k	No. of properties		Value x £k	No. of properties		Value x £k	No. of properties		PV Damages (£x1000)
Location	*Res.*	*Com.*		*Res.*	*Com.*		*Res.*	*Com.*		*Res.*	*Com.*	
Fishguard	0	0	0	0	0	0	0	0	0	0	0	0
Lower Town Quay	0	0	0	0	0	0	0	0	0	0	0	0
Castle Point cliffs	0	0	0	0	0	0	1	0	197	1	0	10
Cwm yr Eglwys	0	0	0	0	0	0	0	0	0	0	0	0
Newport Parrog	0	0	0	0	0	0	0	0	0	0	0	0
											Total for PDZ1	**10**

Notes: PVD determined for 1m SLR in 100 yrs.

Other information:

The following flood damages have been determined through use of MDSF. These figures are aimed to indicate the level and impact of flood risk rather than being a detailed economic appraisal. In many areas substantial numbers of properties would be liable to flooding on the more frequent events both under NAI and WPM, a nominal write off value has been allowed in the table for properties at frequent risk; this generally excludes values at risk at present on a 1:1 year event, in 50 years time for the 1:10 year event and in 100 year time the 1:50 year event.

ASSESSMENT OF POTENTIAL FLOOD RISK

	Flood risk tidal 2010			Flood risk tidal 2060			Flood risk tidal 2110			tidal risk 2m SLR		
No Active Intervention	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**PVD**
Location	<1:10 yr.	>1:10 yr	**x £k**	<1:10 yr.	>1:10 yr	**x £k**	<1:10 yr.	>1:10 yr	**x £k**	<1:10 yr.	>1:10 yr	**(£x1000)**
Goodwick	2	4	16	6	1	89	7	3	948	10	0	4020
Lower Town	1	6	3	3	5	28	8	7	200	18	4	924
Cwmyr Eglwys											1	
Parrog	6	8	85	13	3	801	19	4	1092	28	4	11931
Nyfer								1	0.01	1	0	0.04
											Total for PDZ4	16,876

With Present Management	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**AAD**	**No. of properties**		**PVD**
Location	<1:10 yr.	>1:10 yr	**x £k**	<1:10 yr.	>1:10 yr	**x £k**	<1:10 yr.	>1:10 yr	**x £k**	<1:10 yr.	>1:10 yr	**(£x1000)**
Goodwick	0	6	8	0	7	9	0	10	12	0	10	261
Lowertown	1	6	2	1	7	7	1	14	38	1	21	214
Cwmyr Eglwys	0	0	0	0	0	0	0	0	0	0	1	0
Parrog	6	8	85	7	12	105	12	11	134	12	20	2,870
Nyfer	0	0	0	0	0	0	0	1	0.01	0	1	0.04
											Total for PDZ4	3,345

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.

STAKEHOLDER OBJECTIVE	NAI			WPM		
	Fails	Neutral	Acceptable	Fails	Neutral	Acceptable
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 or unplanned change of use.						
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.						
To maintain Fishguard and Goodwick as a viable commercial centre and support opportunities for regeneration.						
To maintain the use and development of Fishguard Harbour.						
Maintain character and integrity of coastal communities.						
To support the commercial fishing industries particularly at Fishguard, Lower Town.						
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 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.						
Avoid damage to and enhance the natural landscape.						
Maintain the human landscape and character of communities.						
Maintain international national transport route at Fishguard.						
Maintain transport route between Fishguard and Cardigan and gateway to West Wales.						

5 Discussion and Detailed Policy Development

The discussion and assessment of the two baseline scenarios shows that whilst an overall policy of No Active Intervention would result in significant loss and disruption to the economic well being of the area, there are also fundamental difficulties in purely extending the present management approach through all epochs considered by the SMP process.

In particular:

- At Fishguard Harbour and Goodwick, there would be an increasing reliance on defence to maintain access to the port and to sustain economic regeneration. The access to the port would be particularly vulnerable to the failure of defences and to the potential for a major breach along the Parrog. Maintaining defence to Goodwick Moor would become increasingly difficult and the whole structure of economic growth into the future would be increasingly dependant on management of defences.
- Within Lower Town, defences would need to be increased over Epoch two to maintain the centre of the village and to sustain the transport route between Fishguard and Cardigan. Continuing to increase defence levels would make this area increasingly vulnerable to failure of defences. This problem would be exacerbated by the constraint imposed on the river flow and the risk of tidal locking and the difficulty in managing surface water flooding. The visual impact on the village of increasing defence along the quay could be manageable but there would be concern that the landscape of the village and its conservation status would be damaged in the effort to maintain the defence of the centre of the village.
- The defences at Cwm-yr-Eglwys will come under increasing pressure and associated with this there is likely to be increased erosion of the beach with loss of amenity and tourism value. Maintaining these defence are unlikely to attract sufficient coast protection grant.
- At Newport, while the recent appraisal confirms significant economic justification for improving defences, the course then set of increasing the height of defences in line with Sea Level Rise is not seen as being sustainable and, even if manageable in the short to medium term, would not address the probable impact in the future. The approach of raising defences would in effect destroy the very values that are identified as being essential to the well being of the area.

With respect to both Goodwick and Fishguard Harbour and Lower Town, this raises issues at a regional or national scale: given the significance of the port, the Wales Spatial Plan intent for regeneration of the area and in terms of the strategic coastal road link. The pressure for change is not immediate but potentially impacts on long term planning for the area.

In terms of policy, therefore, the current practice of maintaining defences in the short term (Epoch one), the policy for these essential areas would be for Hold The Line. For Fishguard Harbour, a key issue, as sea level rises, would be the defence of the road link across the Parrog, and associated with that, defence of Goodwick Moor and the hinterland of Goodwick. Towards the end of Epoch two (fifty years time and potentially sooner if Sea Level Rise were to accelerate) defence of this vital road link would require a step change in approach, from merely defending against extreme event overtopping to significant reinforcement of the causeway and eventually raising defences to stop normal tidal flooding. This would severely constrain flows within the stream such that the bridge may also be under pressure. With this step change in approach to maintain access to the port, the opportunity arises to open this frontage such that the road is taken as a new bridge over the valley in this area. Consistent with such an approach

would be the intent to allow increased tidal flooding of the Goodwick Moor area. It is possible that in maintaining defence to the road below the area of the car park, that it would be sustainable to construct a new flood defence to the property and petrol station at the back of the harbour. The extent of flood risk, even under a 2m SLR Scenario, is contained by the rising land levels to the lower part of Goodwick. Ideally, this natural level of flood risk would be the new defence line. It is recognised that there is the industrial estate, part of which would be subject to increased flood risk, and the potential for an embankment along this area would need to be examined in detail. Use of Goodwick Moor and the proposed development of a recreation centre would need to be examined in light of the proposed change. The road would in effect run as a bridge between the rising cliffs on the Fishguard side of the valley to link with the raised area behind the harbour. There is the opportunity to re-create the natural estuary of the Goodwick stream with the potential enhancement of nature conservation interest.

Within the harbour, the maintenance of the port operation is essential to the region. The policy for the port area, extending to include protection at the northern end, would be Hold The Line. The primary responsibility would be seen as lying with the Port Authority. Given the sheltered nature of the head of the harbour, it is seen as sustainable to maintain defence to the car park area, although defences would need to be raised towards the end of Epoch two. There is width to allow this and maintaining this area would be seen as essential to maintaining access to the port. It has been identified in previous reports that the large harbour area is significantly under-used and various schemes have been suggested for infilling part of the area. This is seen as a sustainable approach to management within the area, creating opportunity for maintaining coastal defence, whilst offering opportunity for future economic regeneration. It goes beyond the remit of the SMP to set a policy for Advance The Line within the harbour, as various broader economic and environmental factors would need to be considered. However, from a flood and coast protection perspective, this is put forward as an alternative opportunity to that of merely holding the existing line. This would also create the opportunity for joint funding of coastal defence.

The SMP intent would be, therefore, for No Active Intervention to the cliff line from Pen Anglas through to the area of the sewage works just north of the harbour, Hold the Line from the sewage works through to the East breakwater but the possible future opportunity for advance the line within areas of the harbour and for future Managed Realignment along the Parrog and in terms of management of Goodwick Moor.

SMP 1 suggested the possible need for some management of the cliffs around the Penyraber Headland. This is not considered appropriate although any risk of coastal slippage should be monitored. The intent of the plan would be to maintain the nature cliff behaviour without intervention.

The long term issues at Lower Town are difficult. It seems appropriate to Hold The Line to the southern side of the harbour beneath the coastal slope, as this maintains the use of the road. Increasing defence to the sailing club is seen as potentially further constraining the opportunity for allowing more unconstrained development of the course of the river. This would not preclude management of the erosion and flood risk on this side of the river but should be seen as part of a changing pattern of defence to the whole area of the river mouth, the central area of the village and the area of the bridge. This management would need to be looked at in more detail and in consultation with the Highway Authority. The general approach and intent would be to redesign the area in the future, certainly with the potential for realigning the defence along the car park and potentially adapting defences in the area of property behind. Over the short term the

policy would be to hold the existing line, but with the intent, possibly during the second Epoch to realign and take a different approach to defence of the whole area. This should also consider the way in which flow pressure develops along Quay Street, with the intention of continuing to hold and improve defences along the quay. This whole approach is likely to require a joint funding arrangement involving the Highway Authority, benefits associated with maintaining the character and historic value of the village, as well as contribution from flood and coast protection grant. Without such an arrangement, the default policy for flood and coast protection would potentially be Managed Realignment, with the potential long term policy of withdrawing maintenance of defences.

The intent of the Plan over the coast between Lower Town through to Cwm-yr-Eglwys would be for No Active Intervention. Some maintenance might be undertaken, in the short term, of the existing defence at Pwllgwaelod, but only to sustain the defence in a safe condition as it fails. There would, therefore, be a limited period of Hold The Line at this location and a need to examine how restoration of the natural function of the bay could best be managed whilst still maintaining access to the farm and maintaining the important recreational function of the bay.

At Cwm-yr-Eglwys there are two basic drivers for management; that of maintaining defence of the church and graveyard and that of maintaining the beach and access to the shore. In the short term, potentially through to Epoch two, it is seen as sustainable to do so, without significant detriment to the foreshore. However, funding for work to sustain the church wall is dependant on the heritage value and the associated value of removing remains from the graveyard. As such, the policy along this frontage would be for Hold The Line. In the third Epoch, to maintain both functions in the area would require works to restore the beach, to reduce wave action and to reduce the reflection from the road wall. There is no scope for Managed Realignment without damage to the graveyard and even if the road wall were removed there would still be significant reflection off the steep coastal slope. In effect, sustainable management of the defences is likely to involve works over the foreshore, constructing breakwaters or groynes. Whether this is feasible economically would have to be explored in terms of the value of the heritage. The policy in the long term is for Hold The Line but with the very strong caveat that this will be subject to funding. The default policy is for Managed Realignment and future No Active Intervention. This would not preclude local management to property funded privately.

At Newport Parrog, the policy of the western section of the frontage is for Managed Realignment behind the rock outcrop. This would specifically support local private management of defences to property but with no expectation of public funding.

To the east of the rock outcrop and along the headland, the recent study demonstrates a significant economic benefit to sustain and improve defences. However, the approach suggested is not seen as being sustainable over Epoch three. In the past, works have been funded privately or through grant, for sustaining important heritage aspects of the area through the National Park. This work was undertaken with the specific constraint that works should be carried out in a traditional manner. Raising defences to the necessary extent proposed in the study, with the expectation that this would be continued into the future, would fail to meet the landscape criteria and would in fact significantly damage the very values that are trying to be sustained. From this perspective, the only alternative form of defence would be to encourage development of a substantial beach in front of the existing line of defence. This might typically involve construction of structures within the foreshore area. Clearly, some form of structure

associated with the rock outcrop, increasing the influence this has on flows and wave action along the wall, would significantly reduce the need to raise defences to the southern section. Developing a structure from the sailing club frontage has the potential of moving the channel further offshore and influencing wave action along the headland walls. This would all impact on the area, but could potentially be undertaken in a manner that did not significantly impact on the overall quality of the built landscape. Such an approach would need to be considered in terms of the potential broader behaviour of the estuary and in close consultation with the National Park and the community. The approach would not necessarily ensure that all sections of defence were maintained, and there remains the distinct possibility that, in the long term, defence to the area as a whole could not be maintained. As such, the policy for the area is for Managed Realignment subject to further detailed study, but with a default policy of No Active Intervention in the longer term. The intent would be to restore a natural beach to the frontage, which could be maintained sustainably over the next 100 years. Without this, the policy from Epoch three would be No Active Intervention, with earlier policies of Hold The Line through local improvement to defences, addressing wave run-up on the slipways and improving flood defence locally to the back of the headland.

There is only minor flood risk and erosion risk within the Nyfer Estuary. The intent of the plan would be to allow natural development of the estuary. This would not preclude local private defence that could be shown not to impact on the behaviour of the estuary.

With respect to the defence along Newport Sands, the intent would be to manage the realignment of defences in terms of a stepped retreat. Management of this would depend on the importance associated with maintaining the car park and access and would, in the long term, probably revert to a policy of No Active Intervention. In the short term the defence is not seen as having a significant impact on the natural behaviour of the whole frontage and over Epoch one this defence could be maintained.

6 Management Summary.

The intent of the Plan over much of the Zone is to allow natural behaviour of the coast. Only in front of the various areas of development would management be continued. Even in these areas there is the need for substantial change in the approach, generally over the second and third Epochs. The area is divided into three principal management areas reflecting the potential interaction between individual policies. The policies are summarised below.

M.A.5 FISHGUARD AND GOODWICK: From Pen Anglas to Castle Point.

Policy Unit		**Policy Plan**			
		2025	**2055**	**2105**	**Comment**
4.1	Pen Anglas to Pen Cw	NAI	NAI	NAI	.
4.2	Fishguard Harbour	HTL	HTL	HTL/ AL	Maintain operation of the port and improve defences. Potential for advance the line to improve sustainability of the head of the harbour through possible joint funding.
4.3	The Parrog and Goodwick Moor	HTL	MR	MR	Potential for opening up the estuary with the road taken across as a bridge.
4.4	Penyraber	NAI	NAI	NAI	
4.5	Hill Terrace	HTL	HTL	HTL	Support to coastal slope.
4.6	Lower Town centre	HTL	HTL	MR	Redesign of river entrance and development plan for the core of the village in association with

					highway authority. Subject to joint funding.
4.7	Lower Town Quay	HTL	HTL	HTL	Subject to joint funding.
4.8	Castle Point Cliffs	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

M.A.6 DINAS HEAD AND ADJACENT CLIFFS: From Castle Point to Carreg Germain

Policy Unit		**Policy Plan**			
		2025	**2055**	**2105**	**Comment**
4.9	Castle Point to Pwllgwaelod	NAI	NAI	NAI	.
4.10	Pwllgwaelod Bay	HTL	NA	NAI	Local maintenance prior to removal of defence
4.11	Dinas Head	NAI	NAI	NAI	
4.12	Cwm-yr-Eglwys	HTL	HTL	HTL	Subject to funding, with the intent to manage and improve the beach and foreshore.
4.13	Cwm-yr-Eglwys to Carreg Germain	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

M.A.7 NYFER ESTUARY AND NEWPORT SANDS: From Carreg Germain to Pen-y-Bal

Policy Unit		**Policy Plan**			
		2025	**2055**	**2105**	**Comment**
4.14	Newport Parrog West	MR	MR	MR	Support local private defence.
4.15	Newport Parrog	HTL	HTL	MR	Subject to further detailed study. The default policy in the third Epoch would be NAI
4.16	Nyfer Estuary	NAI	NAI	NAI	This would not preclude local management.
4.17	The Bennet	NAI	NAI	NAI	
4.18	Newport Sands	HTL	MR	NAI	Retreat defence line in balance with roll back of the Bennet.
4.19	Newport Bay Cliffs	NAI	NAI	NAI	Maintaing natural function of Cliffs and SSSI
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

PDZ4
Management Area Statements

Fishguard and Goodwick
Pen Anglas to Castle Point

Dinas Head and Adjacent cliffs
Castle Point to Carreg Germain

Nyfer Estuary and Newport Sands
Carreg Germain to Pen y Bal

Location reference:	**Fishguard and Goodwick**
Management Area reference:	**M.A. 5**
Policy Development Zone:	PDZ4

* 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 5
Management Area
Policy Unit
Policy Development Zone
Scheduled Monument
N
Holyhead
Bangor
Caernarfon
Dolgellau
Aberystwyth
Fishguard
Carmarthen
Swansea
Pen Anglas
96
97
Crincoed Point
PU4.1
FISHGU
BAE AB
Carn Coed
MA5
VEHICLE FERRY
FROM FISHGUARD TO
Rosslare 3 ½ hours
CATAMARAN
FROM FISHGUARD TO
Rosslare (V) 1 ½ hours
Burial Chamber
Harbour Village Hotel
PU4.2
Fishguard Harbour
Quay
Ocean Lab
Breakwater
GOODWICK / WDIG
Castle Point
Old Fort
Coch y Ceiliog
PU4.3
PU4.4
PU4.8
Carn Fran
Tynewydd
Penyraber
Dyffryn
The Drin
PU4.7
PU4.5
PU4.6
A 487
Lower Town
Sch
59
4
Weir
B 4313
Cemy's
0
0.325
0.65 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
Ramsar
SAC
SPA
SSSI
NNR
Existing Indicative EA Flood Zone 3
EA Flood Risk Zone 2 where under the SMP policy there would be increased probability of flooding
ROYAL HASKONING

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

INTENT OF THE PLAN:

The area is identified within the Wales Spatial Plan as an important hub for regeneration and as a key international transport route. Maintaining the operation of Fishguard Harbour and the potential for development in this area is essential to this.

Goodwick, Fishguard and Lower Town are all important communities in their own right but also as an important regional tourism resource with key transport routes. Notwithstanding these aspects the whole area contributes to the nature conservation and landscape values. There are significant risks, however, to existing assets from flooding and erosion, especially in the face of sea level rise. The intent of the plan is to support and sustain the important community and economic values to the area through adaptive management and as a consequence a need for adaptation of land use, transport routes and associated with this the potential loss of property particularly at Lower Town.

More specifically, the aim of the plan is to sustain the use of the harbour area and continue defend Goodwick with maintenance and improvement of defences. Within the Harbour there may be opportunity to advance the line of defence to both provide regeneration opportunities and a resilience coastal defence. However, along the Parrog, increasing water levels will increase pressure on this frontage. The approach within the plan would not continue to defend this frontage, opening the area of Goodwick Moor to increased flooding. This provides opportunity for habitat creation. How this impacts the road needs to be considered with the possibility of constructing a bridge. Opening the Moor will have implications for planned land use behind but the intent would be to maintain defence to the village.

At Lower Town there are similar issues with long term flood risk to the main road bridge and to the core of the village. To avoid increasing flood risk and maintain the character of the village there is likely to be a need to set back defences as part of reviewing future development within this area. There may be the loss of some properties due to increased flooding and the need for a more adaptive approach to flood risk management including better flood warning. Along the Quay, the intent of the plan is to continue to support defence of this area to sustain use of the harbour. This is, however, likely to require a collaborative funding approach rather than reliance of flood management grant in aid. The whole plan for adaption at both Goodwick and Lower Town needs to be taken forward in discussion with the strong communities in this area.

KEY ISSUES/RISK AND UNCERTAINTY:

There are uncertainties in terms of timing of the proposed changes. There is also a need for a detailed planned response to change. It will be important to relate this to national monitoring of sea level rise and more general climate change.

- An integrated approach is required to funding of defence and development within Fishguard Harbour.
- Discussion is required of funding and impact of realignment at the Parrog.
- Joint funding and future adaptation needs to be developed with the community and the fishing community at Lower Town. Without such agreement the default policy would be for gradual reduction of flood risk management and approaches less sympathetic to the use and character of the area.

ACTIONS:

ACTION	PARTNERS
Adaption planning ▪ Fishguard Harbour. ▪ Lower Town ▪ Goodwick Moor	**PCC** **Communities** **Highways**
Develop opportunities for habitat creation	**PCC** **CCW**

DELIVERY OF THE PLAN

SUMMARY OF SPECIFIC POLICIES

Policy Unit		**Policy Plan**			
		2025	**2055**	**2105**	**Comment**
4.1	Pen Anglas to Pen Cw	NAI	NAI	NAI	.
4.2	Fishguard Harbour	HTL	HTL	HTL/ AL	Maintain operation of the port and improve defences. Potential for advance the line to improve sustainability of the head of the harbour through possible joint funding.
4.3	The Parrog and Goodwick Moor	HTL	MR	MR	Potential for opening up the estuary with the road taken across as a bridge.
4.4	Penyraber	NAI	NAI	NAI	
4.5	Hill Terrace	HTL	HTL	HTL	Support to coastal slope.
4.6	Lower Town centre	HTL	HTL	MR	Redesign of river entrance and development plan for the core of the village in association with highway authority. Subject to joint funding.
4.7	Lower Town Quay	HTL	HTL	HTL	Subject to joint funding.
4.8	Castle Point Cliffs	NAI	NAI	NAI	
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. Develop adaptation planning. Develop funding plan.
Medium term	Maintain defences while moving towards adaptive management. Open up Goodwick Moor to flooding, examining need for local retired defence and addressing highway needs
Long term	Maintain defence within the harbour. Implement community based adaptation plans.

IMPLICATIONS OF THE PLAN

CHANGES FROM PRESENT MANAGEMENT

There are significant changes in approach to shoreline management with sea level rise at the Parrog and at Lower Town Fishguard.

ECONOMIC SUMMARY

Economics (£k PV)	by 2025	by 2055	by 2105	Total £k PV
Potential NAI Damages	230.9	759.0	4,019.6	5,009.5
Preferred Plan Damages	121.1	144.7	713.9	979.7
Benefits	109.8	614.3	3,305.7	4,029.8
Costs of Implementing plan	440.3	788.8	229.7	1,458.8

FLOOD AND EROSION RISK MANAGMENT

POTENTIAL LOSS

There would be change in use of Goodwick Moor. There may be loss of property at Lower Town as flood risks increase in epoch 3.

BENEFITS OF THE PLAN

Four properties would be protected from erosion and the plan would provide the opportunity to provide improved flood defence to some 20 properties, with some 10 properties current subject to flooding on events of less than 1: 10 year risk being defended to a higher standard.

SUMMARY OF STRATEGIC ENVIRONMENTAL ASSESSMENT (INCLUDING HRA)

PDZ 4				
SEA Objective	**Impact of Preferred Policy for each Epoch**			
	1	**2**	**3**	**Mitigation**
Policy Units 4.1 to 4.19				
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.				Appropriate design
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.				Relocation
To minimise coastal flood and erosion risk to key community, recreational and amenity facilities.				Relocation
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

Implications for the integrity of the Site: It is considered that given the distance to the SAC and that no habitat loss will occur there as a result of the policies for this PDZ there will be **no adverse effect on the integrity** of the Cleddau Rivers SAC, which is the only International site adjacent to this PDZ.

SUMMARY CONCLUSION FROM THE WATER FRAMEWORK ASSESSMENT

This area was scoped out of the assessment.

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)
Cardigan Bay South (Coastal – C2) (PDZs 3,4 and 5) (MAN part 4, 5, 6, 7, 8, 9 and 10)	N/A	✓	✓	✓	No **- not necessary as delivery of the WFD Environmental Objectives will not be prevented by the SMP policies and in some cases will ensure they are of benefit.**	**There were no relevant measures to the SMP2 for this water body.**	N/A
Gwaun (Transitional – T2) **(PDZ part 4)** **(MAN part 5)**	N/A	✓	✓	✓	No **- not necessary as delivery of the WFD Environmental Objectives will not be prevented by the SMP policies and in some cases will ensure they are of benefit.**	**There were no relevant measures to the SMP2 for this water body.**	**N/A**

Location reference:	**Dinas Head and Adjacent Cliffs**
Management Area reference:	**M.A. 6**
Policy Development Zone:	PDZ4

* 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 6 & 7
Management Area
Policy Unit
Policy Development Zone
Scheduled Monument
N
Holyhead
Bangor
Caernarfon
Dolgellau
Aberystwyth
Aberdyfi
Fishguard
Carmarthen
Swansea
MA5
MA6
MA7
PU4.1
PU4.2
PU4.4
PU4.7
PU4.8
PU4.9
PU4.10
PU4.11
PU4.12
PU4.13
PU4.14
PU4.15
PU4.16
PU4.17
PU4.18
PU4.19
DINAS HEAD
FISHGUARD BAY / BAE ABERGWAUN
NEWPORT BAY / BAE TREFDRAETH
FISHGUARD / ABERGWAUN
Newport
Trefdraeth
Dinas Cross
Llanychaer
VEHICLE FERRY FROM FISHGUARD TO Rosslare 3½ hours
CATAMARAN FROM FISHGUARD TO Rosslare (V) 1¼ hours
Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2010. All rights reserved. Ordnance Survey licence number 100026380
0
1
2 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
Ramsar
SAC
SPA
SSSI
NNR
Exisitng Indicative EA Flood Zone 3
EA Flood Risk Zone 2 where under the SMP policy there would be increased probability of flooding
ROYAL HASKONING
I:\9T9001\Technical_Data\GIS\Projects\SMP_Report_Figures\Management Areas

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

INTENT OF THE PLAN:

The underpinning intent of the plan is to allow the natural development of the shoreline. There is local existing defences at Pwllgwaelod and at Cwm Yr Eglwys.

At Pwllgwaelod, the aim of the plan is to restore the natural function of the bay as defences fall into disrepair during epoch 2. This will impact on access and will reduce the area of car parking. While these issues will need to be addressed, taking this approach to defence, would not result in flooding to the valley behind.

The defences at Cwm yr Eglwys include that to the graveyard, the road, in addition to local private defences. Continuing to maintain the walls will increase the potential for beach loss with the subsequent need for heavier and raised defences. The intent set out in the plan is to continue to mange the defence in this area but to move towards and approach aimed at retaining and rebuilding the beach. This would develop on the action taken at present in reinforcing the natural rock outcrops but would require nearshore structures such as small breakwaters. This would support the high amenity value of the frontage.

KEY ISSUES/RISK AND UNCERTAINTY:

There are uncertainties in terms of timing of the proposed changes. There is also a need for a detailed planned response to change. It will be important to relate this to national monitoring of sea level rise and more general climate change.

At Cwm Yr Eglwys part of the frontage is defended privately and the southern wall protects the highway. There would need to be collaborative funding to achieve a more sustainable long term approach to defence within the bay as a whole. Without this, it is unlikely that defences would be sustainable within epoch 3 and the policy may then change to MR.

ACTIONS:

ACTION	PARTNERS	
Shoreline monitoring	**PCC**	
Adaption planning to provide access beyond Pwllgwaelod	**PNP** **Communities**	
Develop joint funding principles for Cwm Yr Eglwys	**PCC** **PNP** **Individuals**	**Highways**
Assess in detail potential impact on historic environment		

DELIVERY OF THE PLAN

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
4.9	Castle Point to Pwllgwaelod	NAI	NAI	NAI	.
4.10	Pwllgwaelod Bay	HTL	NA	NAI	Local maintenance prior to removal of defence
4.11	Dinas Head	NAI	NAI	NAI	
4.12	Cwm-yr-Eglwys	HTL	HTL	HTL	Subject to funding, with the intent to manage and improve the beach and foreshore.
4.13	Cwm-yr-Eglwys to Carreg Germain	NAI	NAI	NAI	
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.
Medium term	Withdraw maintenance from Pwllgwaelod defence. Continue to maintain defence at Cwm Yr Eglwys and undertake beach management/ control scheme.
Long term	Continue to mange defence to Cwm yr Eglwys.

IMPLICATIONS OF THE PLAN

CHANGES FROM PRESENT MANAGEMENT

No significant change from that set out in SMP1.

ECONOMIC SUMMARY

Economics (£k PV)	by 2025	by 2055	by 2105	Total £k PV
NAI Damages	0.0	48.0	122.0	170.0
Preferred Plan Damages	0.0	0.0	10.0	10.0
Benefits	0.0	48.0	112.0	160.0
Costs	3.4	73.9	39.5	116.8

FLOOD AND EROSION RISK MANAGMENT

POTENTIAL LOSS

There is the potential loss of one property along the Castle Point cliffs towards the end of epoch 3.

BENEFITS OF THE PLAN

The plan provides a longer term sustainable approach to defence to some 5 properties at Cwm Yr Eglwys as well as maintaining defence to the church, graveyard and highway.

SUMMARY OF STRATEGIC ENVIRONMENTAL ASSESSMENT (INCLUDING HRA)

PDZ 4				
SEA Objective	**Impact of Preferred Policy for each Epoch**			
	1	**2**	**3**	**Mitigation**
Policy Units 4.1 to 4.19				
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.				Appropriate design
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.				Relocation
To minimise coastal flood and erosion risk to key community, recreational and amenity facilities.				Relocation
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

Implications for the integrity of the Site: It is considered that given the distance to the SAC and that no habitat loss will occur there as a result of the policies for this PDZ there will be **no adverse effect on the integrity** of the Cleddau Rivers SAC, which is the only International site adjacent to this PDZ.

SUMMARY CONCLUSION FROM THE WATER FRAMEWORK ASSESSMENT

This area was scoped out of the assessment.

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)
Cardigan Bay South (Coastal – C2) (PDZs 3,4 and 5) (MAN part 4, 5, 6, 7, 8, 9 and 10)	N/A	✓	✓	✓	No **- not necessary as delivery of the WFD Environmental Objectives will not be prevented by the SMP policies and in some cases will ensure they are of benefit.**	**There were no relevant measures to the SMP2 for this water body.**	N/A

Location reference:	**Nyfer Estuary and Newport Sands**
Management Area reference:	**M.A. 7**
Policy Development Zone:	PDZ4

* 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 6 & 7
Management Area
Policy Unit
Policy Development Zone
Scheduled Monument
N
Holyhead
Bangor
Caernarfon
Dolgellau
Aberystwyth
Llanguric
Fishguard
Carmarthen
Swansea
MA5
MA6
MA7
PU4.1
PU4.2
PU4.4
PU4.7
PU4.8
PU4.9
PU4.10
PU4.11
PU4.12
PU4.13
PU4.14
PU4.15
PU4.16
PU4.17
PU4.18
PU4.19
DINAS HEAD
FISHGUARD BAY / BAE ABERGWAUN
NEWPORT BAY / BAE TREFDRAETH
FISHGUARD / ABERGWAUN
Newport / Trefdraeth
Llanychaer
VEHICLE FERRY FROM FISHGUARD TO Rosslare 3½ hours
CATAMARAN FROM FISHGUARD TO Rosslare (V) 1¼ hours
Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2010. All rights reserved. Ordnance Survey licence number 100026380
0
1
2 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
Ramsar
SAC
SPA
SSSI
NNR
Exisitng Indicative EA Flood Zone 3
EA Flood Risk Zone 2 where under the SMP policy there would be increased probability of flooding
ROYAL HASKONING
I:\9T9001\Technical_Data\GIS\Projects\SMP_Report_Figures\Management Areas

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

INTENT OF THE PLAN:

Over much of the coast and within the estuary the key drive for management is to support the natural function of the shoreline, maintaining both nature conservation and landscape values. The main area where there has been intervention is at Newport Parrog. This area is important as a small community, tourist location, for boat use and as part of the built landscape; particularly the slate walls defending the area.

There are a significant number of properties already at flood risk and, as a result, a strong economic justification for defence. However, this also highlights the high residual risk that exists; a risk that would increase significantly with sea level rise. The aim of the plan is support the effort to sustain the community. However, the SMP identifies that to do this by merely continuing to raise defences would be inappropriate, resulting in damage to the landscape and amenity values of the area. It is proposed that, subject to more detailed study, the approach to management should move towards reducing the waves actually approaching the defences. This may well have the additional benefit of restoring beach levels, further supporting the amenity use. The defences to the west of the main part of the village are private and the plan would be to support private action to maintain these.

The plan for the Newport Sands area would be for managed realignment of the existing defences to the car park restoring the natural function of this area.

KEY ISSUES/RISK AND UNCERTAINTY:

There are uncertainties in terms of timing of the proposed changes. There is also a need for a detailed planned response to change. It will be important to relate this to national monitoring of sea level rise and more general climate change.

While the SMP would support private investment in defence this would need to be carried out in a manner sympathetic to the character of the area and subject to normal approvals. Future defence of the area would be subject to detailed study. If alternatives to purely raising defences were not acceptable or viable, then, while defences might be maintained over epoch 2, in the longer term the default policy over epoch 3 would be to move towards NAI.

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ACTIONS:

ACTION	PARTNERS	
Shoreline monitoring	**PCC**	
Improve food reliance to property and review flood warning.	**PCC** **PNP**	**Community**
Develop strategy for long term management of the area	**PCC** **PNP** **CCW**	**Community**
Assess in detail potential impact on historic environment		
Develop opportunities for habitat creation	**PNP** **CCW**	

DELIVERY OF THE PLAN

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025	2055	2105	Comment
4.14	Newport Parrog West	MR	MR	MR	Support local private defence.
4.15	Newport Parrog	HTL	HTL	MR	Subject to further detailed study. The default policy in the third Epoch would be NAI
4.16	Nyfer Estuary	NAI	NAI	NAI	This would not preclude local management.
4.17	The Bennet	NAI	NAI	NAI	
4.18	Newport Sands	HTL	MR	NAI	Retreat defence line in balance with roll back of the Bennet.
4.19	Newport Bay Cliffs	NAI	NAI	NAI	Maintaing natural function of Cliffs and SSSI
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. Develop flood resilience measures and flood warning
Medium term	Maintain defences while examining long term strategy
Long term	Implement strategy for defence.

IMPLICATIONS OF THE PLAN

CHANGES FROM PRESENT MANAGEMENT

There is a change in epoch 3 from Hold the Line to Managed Realignment at Newport Parrog.

ECONOMIC SUMMARY

Economics (£k PV)	by 2025	by 2055	by 2105	Total £k PV
NAI Damages	1,067.5	4,941.5	6,079.8	12,088.8
Preferred Plan Damages	1,067.5	2,147.8	2,504.0	5,719.3
Benefits	0.0	2,793.6	3,575.8	6,369.4
Costs	252.6	0.0	256.5	509.1

FLOOD AND EROSION RISK MANAGMENT

POTENTIAL LOSS

The intent of the plan would be to maintain the village at Newport Parrog, but with the possibility that some properties might be lost either due to increased flooding or through the need to realign defence in the long term. There is likely to be loss of facilities and car park at Newport Sands in the longer term.

BENEFITS OF THE PLAN

The plan would continue to provide protection to 9 properties at risk from erosion and would aim to reduce flood risk to some 23 properties, potentially reducing flood risk to some 7 properties at present at risk on a 1:10 year event.

SUMMARY OF STRATEGIC ENVIRONMENTAL ASSESSMENT (INCLUDING HRA)

PDZ 4				
SEA Objective	**Impact of Preferred Policy for each Epoch**			
	1	**2**	**3**	**Mitigation**
Policy Units 4.1 to 4.19				
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.				Monitoring and appropriate design (removal)
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.				Appropriate design
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.				Relocation
To minimise coastal flood and erosion risk to key community, recreational and amenity facilities.				Relocation
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

Implications for the integrity of the Site: It is considered that given the distance to the SAC and that no habitat loss will occur there as a result of the policies for this PDZ there will be **no adverse effect on the integrity** of the Cleddau Rivers SAC, which is the only International site adjacent to this PDZ.

SUMMARY CONCLUSION FROM THE WATER FRAMEWORK ASSESSMENT

This area was scoped out of the assessment.

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)
Cardigan Bay South (Coastal – C2) (PDZs 3,4 and 5) (MAN part 4, 5, 6, 7, 8, 9 and 10)	N/A	✓	✓	✓	No **- not necessary as delivery of the WFD Environmental Objectives will not be prevented by the SMP policies and in some cases will ensure they are of benefit.**	**There were no relevant measures to the SMP2 for this water body.**	N/A
Nyfer (Transitional – T3) (PDZ 4) (MAN part 6 and 7)	N/A	✓	✓	✓	No **- not necessary as delivery of the WFD Environmental Objectives will not be prevented by the SMP policies and in some cases will ensure they are of benefit.**	**There were no relevant measures to the SMP2 for this water body.**	N/A