

4.3 PDZ 3 Souter Point to Chourdon Point

4.3.1 Policy Development Analysis

DESCRIPTION

Physical

The zone covers a stretch of coast, some 18km in length, running almost north south and comprising, at the large scale, two principle bays:

- Whitburn Bay, formed in the softer Whitburn valley deposits between the two natural control features of the hard Souter Headland and the delta deposits and rock outcrops of the river Wear.
- Ryhope Bay, cut into the softer rock and glacial till cliffs, held again by the Wear delta and the Chourdon Point headland to the south.

The Wear delta deposits of sand and mud banks, overlying rock outcrops, have been reinforced through the construction of the piers and defences of the Port of Sunderland. To the southern end, the works to Seaham Harbour have effectively transferred the control point of this southern bay slightly further north.

Within this broad structure there are secondary control features, with Parsons Rocks subdividing Whitburn Bay and the headlands of Salterfen, Pincushion Rocks and Featherbed Rocks creating further scalloping of Ryhope Bay. In more detail the frontage may be described in five sections:

Souter Point to Parsons Rocks. This section comprises, in the north, low Magnesium limestone cliffs underlying relatively thick deposits of till. There is a wide platform of rock foreshore with bars and banks of relatively large but potentially mobile stones and boulders, most obviously represented by the feature overlying Whitburn Steel. The cliff to the back of the foreshore reduces in level, forming a low sand and shingle dune at the Bents, immediately behind Whitburn Steel. South of here the foreshore is predominantly sand overlying clays and rock, with a narrow strip of upper sand beach backed by seawalls, a promenade and a sloping bank to the main coastal road. In areas, the width between the coastal defence and the road is only of the order of 5m to 10m, but this increases to over 40m just north of Dykelands Road. The upper beach disappears just north of Dykelands Road. A more massive sea wall has been constructed which effectively it cuts across the natural line of the bay to join with the defence line below Roker Cliff Park. There is a progressive lowering of the beach levels against this wall from north to south. The foreshore in front of the cliff park comprises the exposed rock outcrop of Parson's Rock.

From the Bents through to Parson's Rocks there is near continuous development to the landward side of the road. The only development seaward of the coastal road, apart from various promenade structures, are the Whitburn Bents Fishermen's Cottages and the associated residential properties at Pebble Beach and, further north, the newer housing and school development of Whitburn itself; set back some 50m to 70m behind the crest of the cliffs.

Parson's Rocks to Roker Pier. The Roker Cliff Park extends nearly 100m out beyond the general line of the coast, with the cliff crest rising to some 15m above the outcrop of rocks to the foreshore. The cliffs remain at this level through to the Wear Estuary; although the character of the cliffs change from a near vertical profile over the northern half of the section to a more gentle coastal slope behind Marine Walk and Roker Pier. The full length of the coast is protected by seawalls, with a promenade running from the north to the south of the Roker Cliff Park and starting again along Marine Walk. Despite the generally sandy foreshore, it is only at the southern end of the section, in the crook of Roker Pier, that an upper beach, well above normal high waters is present.

Sunderland Port. The main harbour entrance is between the sweeping arms of the Roker and New South Pier, which extend out some 800m beyond the principle line of the coast. Within the shelter of these piers, the entrance to the river is defined between the North Pier and the Old South Breakwater. The north dock area is now developed with residential properties and development associated with the North Dock Marina. The seaward face of this development (still within the enclosure of the main piers) has an area of sand beach, backed by a sea wall and rock revetment.

The southern side of the river mouth is occupied by the area of core port activity, with this extending some 1.5 km along either side of the Hudson Dock. At the northern end, within the shelter of the main pier is a relatively new development of warehousing important to the modernisation of the port. This

is protected on its seaward face by revetment and sea walls. There is again an area of sand shingle foreshore trapped in the crook between these defences and the New South Pier.

South of the New South Pier various defences protect an area of old dock lands, now generally open land. This forms an important link through to the area by the river. The old dock lands area, built apparently over intermittent rock outcrops and deposits of the earlier Wear delta, forms a barrier between the sea and the Hudson Dock. The southern limit of this land is held by the North East Pier and the South West Breakwater, with the South Outlet to the docks (now closed) forming a small area of water open to the sea between the piers.

The defence line further south returns in a stepwise manner to the more clearly defined coastline, with further defences at the end of the Hudson Dock (the Cofferdam Barrier), through to the Hendon Foreshore barrier; behind which is a major sewage treatment works. Following from this is the Hendon Tip wall and Hendon Banks Barrier wall, each providing protection to industrial areas linked to the port activities. The land immediately to the rear of the defences is generally level at some 6m Ordnance Datum Newlyn (ODN), with a steeper coastal slope behind.

Over both the length between the New South Pier and the North East Pier and in front of the Hendon Tip and Banks Barrier walls there is a narrow width of drying sand foreshore.

Hendon to Featherbed Rocks. The initial length south of Sunderland comprises a major defence of rock revetment backed by a concrete sea wall and promenade, rising to the rear with a coastal slope. To the crest of this slope is the main railway spur to the docks, with property and commercial areas behind. South of this are natural cliff exposures of magnesian limestone overlain with glacial till. The level of the boundary between the relatively harder limestones and the till varies quite considerably; resulting in different depths and exposure conditions to the till.

The frontage is punctuated by two principle headlands, at Salterfen and Pincushion, but also by more local hard points, as different strengths in the limestone are exposed. At present the cliff line between Hendon and Salterfen is clearly eroding with little vegetation. To the south, between Salterfen and Pincushion, there is a greater punctuation of the coast with narrow sections of harder material locally resisting erosion. The variation and scale of these local hard points is evidenced by the small stacks; particularly around Pincushion.

Towards Seaham, south of Pincushion, the cliff becomes more uniform, but is also more vegetated than further north; indicating less erosion.

The final length of this section comprises a steep, relatively hard cliff running through to the Featherbed Rocks. This is protected at the toe by a concrete wall and promenade and at the southern end by a rock revetment.

Over much of the frontage is open agricultural land, backed by the railway line and the coastal road. Key settlements are at Hendon, Grangetown and Ryhope; all to the rear of the railway line. At Seaham, the town centre is close behind the road at the crest of the cliff.

Cutting through the cliff line are a series of generally heavily vegetated denes or valleys.

Along the foreshore there is generally a quite wide sand veneer beach foreshore with mean high water reaching up to the toe of the cliff or manmade defences. Only in local areas are there normally dry areas of beach, where a backshore beach is created by material trapped either between local hard points or behind slightly raised areas of rock outcrop or scree on the foreshore. The main foreshore features are currently associated with the principle headlands identified above, but areas of rock or scree further offshore are possibly indicative of former hard points. New areas of outcrop are now being exposed as the general line of the coast retreats.

There are several outfalls along the frontage; two between Salterfen and Pincushion, which have substantial head-works at the toe of the cliff and a further outfall closer to Seaham.

Seaham Harbour to Chourdon Point. Much of the northern part of this section has man made defences, in terms of the rock revetment around Featherbed Rocks and extending below part of the North Terrace cliffs. This small bay curves in to the lee of the main North Pier to the Harbour. The beach in this bay is a combination of sand and shingle running steeply down to deeper water. There are areas of development, car parking and amenity areas close to the cliff top.

The North Pier and South Pier enclose the Harbour of Seaham, extending seaward some 500m from the natural cliff line. Within this enclosure are various commercial areas associated with the port and along the crest of the coastal slope behind is the new coastal link road, connecting the north and south of the town.

There is a substantial rock revetment extending to south of the harbour, running some 700m to a point below the Edith Street roundabout. Behind this defence are the typical steep limestone cliffs, but also areas of mining waste infill. Above them is the main port entrance and storage area.

South of the revetment the coast is currently undefended through to Chourdon Point, with the steep cliffs of Dawdon Bank and the deeper bay of Blast Beach; still substantially infilled with mining waste. Over much of the frontage there is veneer of sand to the beaches, but with extensive areas of rock outcrop both in the intertidal area and the nearshore area. Even where this is largely obscured at Blast Beach, there are small areas of rock outcrop emerging from beneath the eroding waste material.

Environment

Major sections of the frontage fall within nature conservation designated areas: Ramsar, SPA, SCA and SSSI designations covering the cliffs and foreshore area through from Souter Point to Whitburn Steel and the section between Hendon and Pincushion. Both Parson's Rock and Featherbed Rocks (including sections of Seaham Harbour) are Ramsar, SPA and SSSI and Blast Beach; within the ownership of the National Trust, is an SAC and SSSI. To a degree linking these areas, certainly as far as Pincushion, and linking to the coast along the Wear Valley, the area has been defined as a Wildlife Corridor. The areas between Salterfen Rocks and Hall Farm Dene and from Noses Point running south are designated as Heritage Coast; excluding the town of Seaham. There is also a small area of SSSI within the enclosure of Sunderland Harbour, where the southern extent of sand and shingle is important as a tern colony; the presence of this is in part due to the remoteness of the feature, protected from human pressures by the port development of warehouses.

Other environmental features are summarised below.

The northern end of the zone has strong links with the area of the Souter Headland; continuing the focus on informal recreational activity provided by the natural coast. This is enabled by the width between the slowly eroding cliffs and any hard assets to the rear.

Moving south towards Sunderland the area becomes more urban, with both new buildings constructed local to the coast, as well as important cultural features such as the Fishermen's Cottages at the Bents.

The City of Sunderland Unitary Development Plan identifies the seafront as "an important environmental and recreational amenity serving the City and beyond" and as such defines a Seafront Zone where there is a focus on indoor and outdoor facilities promoting leisure and tourism to the region. Within this Seafront Zone is a Coastal Zone, defined as being seaward of the A183. The intent of this designation is to maintain existing open spaces, retained for passive recreational use. A significant aspect of this value is attributed to beach use and the association of this with the promenade. This generally urban section of the coast includes the commercial and industrial areas of the Port.

The Port area is a complex matrix of use, significance and assets. The Roker Pier is a listed structure of historical significance and the New South Pier is a Scheduled Ancient Monument. The area of the North Pier is considered to be of Potential Archaeological Interest. Clearly the new residential and amenity facilities around North Dock have significant social importance and the port area and operation remains a major contributor to the national, regional and local economies; as well as increasingly providing scope for development of water related activity. An important driver in this area is to maintaining the safe operation and navigation to the Port.

Proposals for regeneration development of the area east of the Hudson Dock are being prepared and look to utilise this relatively remote area in rationalising and improving the quality of waste and recycling management for the City as a whole. The presence of the sewage treatment facility is regionally important to public health within the City.

At the southern end of the port, the Hendon Seafront frontage is seen as a significant opportunity to provide valuable and unique open space to the area of South Sunderland. In addition the area is defined as having significant Archaeological Potential. Notwithstanding the national and international

commitments and significance of natural conservation objectives within this section, there is a clear interdependency of social, amenity and culture values, underpinned by the importance of the City and Port to the regional and national economies.

The immediate issues for the coast south of Sunderland is in maintaining its naturalness (as reflected in its designation as an Area of Special Landscape) and, associated with this, maintaining and improving the public access to the coast; both in terms of extending the rights of way of the cliff top path and maintaining access to the beaches, generally through the denes. Potentially in conflict with this is the pressure being placed on agricultural use of the coast, to make maximum use of the reducing land area due the continuing process of erosion.

At Ryhope the former Halliwell Banks Quarry, infilled with waste, is being exposed by this cliff erosion. The composition of the fill and options for addressing this are currently under review. Concerns have been expressed by consultees as to the potential contamination of the beaches.

Further inland is the village of Ryhope, with properties some 300m from the cliff line. Just to the east of Ryhope and running over much of this length of coast is the main coastal railway line between Middlesbrough, through Hartlepool to Sunderland. This railway is of national significance being part of the National Railway Service. Furthermore, consideration is being given to creating a halt at Ryhope as part of the regional public transport plan.

Between Seaham and Ryhope a minor but well used coastal road runs to the seaward side of the railway over much of the length. Potentially more significant is the new Sunderland Southern Radial road cutting to the east of the railway line just to the south of Salterfen Headland and running north, re-crossing the railway line between Grangetown and Hendon. The proposed route of this road, currently under preparation with diversions of the gas and sewerage pipelines; which also run along the coast in this area, is some 60m from the cliff line at Salterfen Dene and some 200m inland of Salterfen Head.

Recent development has extended the town of Seaham northward to the Seaham Hall Dene. This development, together with much of the coastal development to the northern section of the town, is immediately to the landward side of the coastal road running along the crest of the cliffs. The frontage includes the main seafront promenade at the base of the cliffs and this together with the beach is the main coastal recreational area of Seaham. The area close to the harbour has been improved as part of the Seaham regeneration plan, with an integrated approach which has included the new coastal link road and the development of the commercial area to the south of Seaham; all centred around the port area, which still provides a core focus for economic prosperity to the town. Amidst these developments are listed buildings. In a similar way to Sunderland but at a smaller scale the human environmental values of Seaham are closely interdependent.

The area to the south of Seaham through to Chourdon Point returns to a more natural (or at least semi natural) frontage. In addition to the national and international designations for conservation noted at the start of this assessment Seaham is the start for the Durham Coastal Path.

KEY PRINCIPLES

- To contribute to sustainable development and support and integrated approach to land use planning.
- To avoid damage to and enhance the natural heritage.
- To support the cultural heritage.
- To minimise reliance on defence

KEY OBJECTIVES (a full list of objectives for this zone is presented in Appendix E)

- To support regeneration of the urban hinterland areas.
- To avoid disruption to the commercial operation of the Port of Sunderland and associated water activity.
- To avoid disruption to the commercial operation of the Port of Seaham.
- To maintain key transport links.
- To minimise contamination.

PHYSICAL CHARACTERISTICS

Water levels

MLWS	MHWS	HAT	1:10yr	1:25yr	1:50yr	1:100yr	1:200yr
-1.92	2.48	3.18	3.29	3.42	3.48	3.59	3.66

Levels are to Ordnance Datum Newlyn. Chart Datum is approximately 2.7m below Ordnance Datum.

Source (tidal levels): Admiralty Tide Tables (2005) for main and secondary ports, with other values interpolated between.

Source (extreme water levels): Babbie, 1998. Shoreline Management Plan, River Tyne to Seaham Harbour. Sub cell 1b. NB. Values for 200 yr ARI are interpolated between 100 yr and 250 yr values.

Wave climate

Return Period (1:X years)	Wave Height Hs (m)
0.10	3.94
1	5.55
10	7.14
20	7.61
50	8.24
100	8.71
1000	10.26

Source: Babbie, 1998. Shoreline Management Plan, River Tyne to Seaham Harbour. Sub cell 1b. OUTRAY used to determine inshore wave data at 10 m contour.

Baseline Erosion Rates

Whitburn	0.1m/yr
Whitburn Bay	0.4m/yr , more rapid erosion of low water identified
Parson's Rocks	0.4m/yr , more rapid erosion of low water identified
Marine Walk	0.2m/yr , more rapid erosion of low water identified
Sunderland Harbour	Re-adjustment re-establishing the Wear Estuary
Hendon	0.4m/yr , more rapid erosion of low water identified
Salterfen	1m/yr, more rapid erosion of low water identified
Pincushion	0.4m/yr
Seaham North	0.3m/yr
Seaham South	0.5m/yr
Blast Beach	Continuing rapid erosion of waste then 0.3m/yr
Chourdon Point	0.3m/yr

All the above rates are based on existing evidence and are likely to increase with sea level rise. A factor of 2.5 has been used to allow for this over 100 years. Where defences exist it is generally assumed that if they fail erosion rates would initially be greater, subject to other control features in the area.

Evolutionary Trend

Existing Processes:

At the high level this zone should be considered as a unit. Below this, at increasing levels of local detail, the processes and interactions change; such that, while at this high level, it is demonstrated that there is an overall net drift of sediment to the south, at the local level there can be areas where there is little sediment transport against the shoreline. Over time (over the 100 years of the SMP and beyond), there may be radical changes in processes and interactions at a local level. These will depend on management decisions and on the continuing natural evolution of the coast (such as the erosion of existing natural hard points). This change will be within the context at the higher level of a continuation of the general processes affecting the frontage.

At the higher level, as described earlier, the zone has developed as two bays, divided by the dynamic influence of the Wear Estuary, with its sand and mud banks overlying the rock outcrops in this area. This natural division is now reinforced by the defences and harbour works of the Port of Sunderland. Several studies have considered the sediment drift patterns for the area, with apparently significantly different results in terms of potential volume of movement. These differences may be resolved by considering the different zones of movement; working from the offshore to inshore. In the offshore area there is a strong net southerly drift, working typically over a zone between 500m and 1250m from the foreshore. The principle determining factors as to width and position of this movement pathway are the slope of the nearshore area and the orientation of the offshore contours. To the north of Sunderland this zone of movement is shown as being within an area extending some 500m of the shoreline, indicating a continuous profile of movement over foreshore and nearshore shore zones. Further south, in the area of the Pincushion rocks, and even down to Seaham Harbour, the main offshore zone of movement is seen as being quite distinct from foreshore movement, being of the order of 1000m from the shoreline. Even so, in both situations there is likely to be a transfer of material, onshore/offshore, between the zones. In crude terms, therefore, over the whole section of the coast, and indeed, continuing further north and south, there is seen to be a significant potential for sediment movement, sometime driven north by more southerly wave conditions but more typically driven south by the dominant northerly wave climate. The degree to which this sediment pathway is realised depends on the nature and depths of sediment in the offshore area. While this remains uncertain, surface samples of material in this offshore area suggest that there is mobile sediment capable of being moved.

The linear extent and orientation of the outer length of Roker Pier, together with the limited degree of accumulated sediment to the north of Sunderland Harbour, indicates that the Harbour structures do not significantly interrupt the flow of sediment in this offshore zone. Similarly, Parson's Rocks, to the north of Sunderland harbour is set back further than the Harbour and will not impact on the general sediment drift. In the south, at Seaham, it has been established that the harbour arms, again, do not significantly cut across the offshore sediment pathways.

The assessment of the volumes of beach and foreshore sediments derived from cliff erosion over the zone is variable along the coast, with an estimated total volume of some 3,500m³/yr north of Sunderland and some 50,000m³/yr from the cliffs between Sunderland and Seaham; only a fraction of this being coarse material. Although this material may be important in feeding beaches locally, the supply to the offshore zone of sediment drift is believed to be relatively small; in relation to the amount of material moving in this offshore area. The transfer of material between the offshore and the inshore may however be more significant in relation to the volume of sediment at the shore. This is seen in the volumes of dredged material from the Harbours, which must be sourced from the offshore stream (50,000m³/yr to 100,000m³/yr at Sunderland and 80,000m³/yr at Seaham, although, in this latter case, this has been reducing since cessation of the tipping of colliery waste). In other areas the variation in beaches levels, most obviously in the length between Sunderland's New South Pier and the North East Pier where material can only come from the offshore stream, suggests a significant potential transfer between the offshore and shoreline regimes.

In relation to the general processes, therefore, it is highlighted that while management at the shoreline would currently appear to have only minor influence on the overall processes of the zone, the interaction between offshore processes and the shore is important to the management of the shoreline. Substantial reduction in the availability of offshore sediments would significantly alter the ability of the shore to respond to variation in short term wave climate or to longer term climate change. A better understanding of potential change in the offshore regime is therefore required.

Within this general regime there is greater variability in behaviour and interaction along the shoreline. North of Sunderland the general shoreline is quite stable, the erosion rates of the Whitburn cliffs are low, the rock outcrops, such as Whitburn Steel and Parson's Rocks, provide a general control of the

beaches and Roker Pier acts to retain foreshore sediments at the southern end. There is a general concern that beaches are steepening, in that the crest of the shore is being held by hard defences while there is some evidence that the low water mark is moving landward. This low water retreat is at present only interpreted from map data and detailed monitoring has only recently been instigated. There is an indication that the low water retreat is more significant in the south of this section but this could be as a result of the large degree of wave reflection from Roker pier. The structure was constructed in the late 19th century and may have significantly affected the area over the period covered by the map based analysis.

At a more local level, the construction of the wall, seaward of the natural shoreline, just to the north of Parson's Rocks, has resulted in a local area of high wave energy where any accumulation of the beach is easily eroded during storm conditions. The influence of Roker Pier in reducing exposure to more southerly waves has meant that beach sediment tends to accumulate in the southern corner between Marine Walk and the Pier, at the expense of beach levels just to the south of Parson's Rocks. This is possibly exacerbated by waves running along the hard defence to the toe of Roker Cliff Park and by wave reflection off the face of the Pier.

The frontage between the Bents and Roker Pier is subject to a substantial degree of overtopping affecting the promenade, the road and properties behind the road. If beach steepening does continue, which has to be assumed from current information, and given increasing sea levels, the low lying areas of rock outcrop will become less effective in controlling sediment movement. Beach levels generally at the shoreline over the whole length will drop and there will be increased levels of overtopping and pressure on defences; particularly in the two local areas described above (just north of Parson's Rock and between Parson's Rock and Roker Pier).

Roker Pier and the New South Pier act to create a sheltered enclosure for port operations but also create a sheltered bay within which beaches supplied from the offshore zone have been able to develop. The backshore of this bay is cut by the River Wear, and the North and South Piers confine and control the channel of the river; while also limiting direct spill of beach material in to the channel. Sea level rise would tend to reduce the width of the beaches resulting in increased wave interaction within the outer harbour.

The New South Pier together with the promontory created by the North East Pier forms a small bay, with the South Rocks, midway between, tending to pull forward the natural coastline within the centre. The similarity in shape and orientation between this bay and the shape of the coast further south, associated with the natural headland of Pincushion Rocks, suggests that this bay is relatively stable in terms of longshore drift. This indication is further supported by the presence of natural beach material along the frontage and, associated with limited longshore drift of material, the fact that the South Inlet has not rapidly infilled. The frontage has been built out on the natural accumulation of materials associated with the old Wear Delta but the advanced position of the area and the hard defences have resulted in an area of high wave energy which tends to result in considerable fluctuation in foreshore levels. This is most noticeable in the crook between the Stone Hill Wall and the New South Pier. This variation in level indicates a transferring material between the shoreline and the offshore zones. Variation in wave direction means that, while in terms of net drift the frontage remains relatively stable, under certain conditions sediment will be moved south and will be lost to the bay. Sea level rise will increase the wave energy, reducing the capacity for the frontage to retain sediment and increasing pressure on the existing defences.

The drift supply to the Hendon Foreshore Barrier frontage is limited and, although due to the steep south westerly facing orientation of the defence line, it will only tend to be wave conditions from a more easterly direction which scour material from the frontage, transport from the frontage will be high. This is reflected in the heavy nature of construction of defences along this lengths, the depth to toe of structures and the degree of overtopping experienced. Sea level rise will increase the wave exposure, although not necessarily the potential for scour.

South of this return length of the harbour structures, the length of the Hendon Tip, Banks and Sea Walls and beyond to Salterfen Rocks is likely to be subject to significant variation in drift, resulting in differential erosion and accretion. To a degree the main harbour area should provide some protection from the more northerly wave directions. This shelter diminishes south along the shore. The tendency, therefore, would be for material to be moved north along the Hendon Tip wall and south along the Hendon Banks wall. Significant differential erosion would then be expected in the area of drift divide at the Hendon Banks.

This situation will change for wave conditions between north east and east, where waves will tend to

scour any transient mobile material down the southern face of the harbour return frontage and along the southern frontage, tending to deposit material in the area of the Hendon Sea Wall; drift becoming less acute on this section of the frontage. In reality, this can be seen to a degree in the fluctuating foreshore at Hendon Tip, the consistently low levels in front of the Hendon Barrier wall and, in part due to the fact that the Hendon Sea Wall is set back slightly from the walls to the north, in the relatively higher foreshore in front of this southern wall. It was noted in the report prior to the construction of the Hendon Sea Wall (Lewis and Duvivier 1968) that material from the Hendon Tip area was obvious on the foreshore at Hendon Sea Wall. Although the walls to the north, therefore, limit direct input from backshore erosion to the south Hendon area, their presence and character may give rise to a mechanism for offshore sediments feeding through to this southern area. This supports the observations that, while beach levels in front of the Hendon Sea wall have fallen since its construction, there can be and has been some improvement since the intense reflected energy has been reduced by the more recent introduction of a rock toe. There is, therefore evidence of continued sediment supply allowing the foreshore to recover. While this mechanism is not confirmed by modelling, it does further highlight a potential linkage which would need to be considered in management of the defences further north.

South of Hendon the coast is naturally eroding cliffs. The processes depend on three factors, the erodability of the cliffs, the width and stability of the foreshore and the sediment supply. In terms of geological timescales the whole this section of coastline, between the Wear Estuary and the harder coastal features at Seaham; and to the immediate south of Seaham, is eroding slowly, at a uniform rate. Within this process locally harder sections of cliff are being exposed, resulting, for a period of time, in the formation of headlands. This process may be seen at a relatively large scale in the headlands at Salterfen and at Pincushion, but also on a smaller scale just south of Salterfen Lane and, at an even more specific scale, in the stack to the south of Pincushion. If the area of resistance (the harder sections of coastline) is sufficiently large and is effective over a sufficiently long period of time, the coast to either side is able to adjust to the wave energy, forming scalloped, or crenulate bays². To the north of any headland there is significantly less sediment transport and material from the eroding cliff acts to protect the cliff from erosion, while to the south of any headland, potentially starved initially of drift from further north, erosion cuts deeper beyond the headland until, within the shelter of the headland, the wave climate is modified to the extent that again material falling from the cliffs tends to protect the cliff from further erosion. The coast is, therefore, continually in a process of adjustment to the net wave energy direction approaching the shore.

The current headlands, geologically speaking are transient features. The depth to which bays need to develop to become inherently stable is dictated by the spacing and the relative position (relative to the direction of net wave energy) of the headlands. The erosion of the headlands (or in the more local situation, outflanking of the local hard point) can cause a significant readjustment in the shape of the coast. In some cases these earlier hard points may continue to affect the coast due to a residual raised area of rock outcrop to the beach. Such a feature may be seen just north of the Halliwell Banks. Sea level rise would make such submerged features less prominent in the control of the coast.

The various studies for the area have shown that there is a tendency for erosion rates to reduce along the section of coast from north to south. Most particularly, over recent times erosion to the north of Salterfen has apparently increased, giving possible rates of erosion of the order of 1m/yr. This, consistent with the above discussion, is associated with an increased rate of erosion at Salterfen Heading. South of Pincushion erosion rates are significantly lower, to the extent that there is significant vegetation to the cliff face. It is reasonable to assume, because of the erosion of Salterfen; and its relatively local nature, and the observed broader extent of the Pincushion Headland; and hence slower rate of general erosion, that this variation in erosion will continue. There is some indication of a harder point in the shore being exposed midway between Salterfen and the end of the Hendon Sea Wall, but the degree to which this will resist erosion or link through to Salterfen, forming a broader headland is very uncertain.

The cliffs north of Seaham currently provide only a limited, but possibly quite important, sediment drift supply to the protected Seaham frontage. At Seaham the longshore drift is quite small due to the orientation of the beach in relation to wave direction. The level of the beach to the north promenade does vary significantly, but does also tends to recover. Longer term trends will be established from

² A crenulate bay, or half-heart shaped bay, is formed in the lee of a headland. The headland acts to protect the coast, creating an area of shelter. Waves progressing passed the headland diffract, creating this spiral shape in the shoreline.

monitoring. There may be a slight overall loss of material now, which would be exacerbated with sea level rise. Similar to the area just north of the Roker Pier in Sunderland, The Seaham Harbour North Pier acts to retain a beach in the crook with the cliffs to the north but also, due to reflections off the arm of the pier, may increase exposure to the revetment around the Featherbed Headland.

Seaham Harbour acts to protect the cliffs to the back of the Port, but unlike the return line of defences at Sunderland Harbour, the steeper orientation of the Seaham South Pier regularly gives rise to waves building along the exposed face, impacting on the Dawdon Cliff frontage, providing significantly less shelter to this section of the coast to the south.

There is a relatively weak sediment drift system along the Dawdon Cliff frontage and this will be further contained if erosion allows Nose's Point to re-emerge as a prominent headland. The colliery waste within Blast beach is being eroded and, while a significant proportion of this material is in the nature of fines, some beach material is lost to the south. Increasingly, as the Chourdon Headland dominates the bay, so this sediment drift will reduce. Rising sea levels will tend to roll back the beach within the bay, potentially eroding the back cliffs at the same slow rate as Chourdon Point.

Unconstrained:

In the absence of the main man made control features the coast to the north of Sunderland would erode and roll back, initially at a relatively rapid rate, but slowing as erosion of the softer areas allowed the hard features of the Souter Headland and Parson's rock to take greater control. The current pressure to do so, however, is relatively small. This pressure would increase with sea level rise.

Over the mouth of the Wear, the unconstrained behaviour of the coast is less clear. It is likely that the mouth of the river would widen and shallow. The degree to which material would be carried into the river cannot really be determined, however, it is probable that the old ebb tidal delta would be re-established, potentially forming a low level deposition of material to the north, maintaining an offshore bar and protecting the cliffs to the south. In this event, it is unlikely that there would be a significant increase in sediment to the coast to the south along the shore, interactions being primarily linked to the sediment stream in the offshore zone. The Estuary would still act as a control point to the coast.

South of Sunderland there would be significantly greater change in the long term. The Hendon area would continue to erode. On the assumption that the influence of Salterfen rocks would diminish and in the relatively unlikely event that no new headlands emerge, there would be rapid erosion of the frontage linking through to the more major control point of Pincushion. In this configuration, the stable coastline would run close to the A1018 within Grangetown cutting through Hendon and linking to the area of the Wear Estuary. It would take two to three hundred years to develop a stable bay but does demonstrate the significance of the hard points on the coast. With the loss of the existing hard points there would be a change in locations where pressure would develop along the shore. Substantial loss of Pincushion, in the future, would allow an even deep bay to form between Seaham and Sunderland, significantly cutting through only a limited extent of Ryhope, but cutting even more substantially through Grangetown and Hendon. Such estimates of the future shape of the coast are hypothetical but are not unrealistic assuming no management and assuming the typical erosion rates currently occurring at Salterfen. Unless new headlands emerge, the development of a stable bay shape might take 500 years.

At Seaham the unconstrained coastal change would be less dramatic, with slower erosion more uniformly over the frontage of some 60m over the next 100 years.

MANAGEMENT

Present Management

SMP1

The zone is divided into management units B4, B5, B6, B7, B8, B9 B10 and part of C1:

B4

B5, B6, B7, B8

B9

B10

C1

Policy

Do Nothing

Hold the line

Do Nothing

Hold the line

Do Nothing

Whitburn

The strategy recommends no active intervention.

No active intervention

Whitburn Bay to Ryhope Coast Protection Strategy

The strategy recommends maintaining existing linear defences over the frontages north and south of Sunderland and in the area of the Harbour.

Do Nothing in MU B9

Hold the Line

Do Nothing

Seaham Coastal Strategy

The strategy recommends no action over the length north of Seaham Hall.

Hold the line for the defended sections and just south of Seaham

Investigation of potential contamination issues north of Noses Point.

No active intervention to Blast Beach

No active intervention

Hold the line

Hold the line

No active intervention

Baseline scenarios for the zone.

No Active Intervention (Scenario 1):

The area to the north of Whitburn Bay will continue to erode, reducing the width of open ground between the properties and the top of the cliffs but not affecting assets over the 100 years of the SMP. This will continue to provide a small but important drift of material to the frontages to the south.

At the Bents, long term erosion will have more impact on the urban area resulting in the loss of the Fishermen's Cottages, loss of the road, impinging on the residential area of the Bents and affecting the sea front down to the Seaburn Park roundabout. Although Roker Pier will fall into disrepair, it would still act to control the frontage over the next 75 years. Beyond this time its influence would diminish, allowing loss of the sand beach and greater erosion of the cliffs behind; affecting all areas back to Roker Terrace and the property behind. Over much of the frontage, all defences would act similarly; falling into disrepair and eventually allowing sudden spates of erosion. This process would be exacerbated by sea level rise, submerging the rock outcrops and reducing their ability to control sand levels over the frontage. Progressively over the SMP period of 100 years, the quality of the beach would reduce (although in the long term this might be restored as the backshore reverts to a more natural state). As beach levels fall initially there would be increased overtopping, potentially making the road and properties unusable well before they are actually lost to erosion. In the long term, the intent of the UDP coastal zone area might be restored as a natural recreation area, the intent of the seafront zone, as an area of more formal amenity with appropriate facilities serving the City and attracting tourism, would be lost.

The progressive loss of the Roker Pier and the loss of the New South Pier, together with the increased exposure and subsequent loss of defences within the harbour will close the use of Sunderland as a nationally important Port. This would have major implications for the whole associated urban area and the region in general.

Failure of the New South Pier and the defences immediately to the south would render the

seaward area of the docks unusable for development and would disrupt the use of the associated port areas (although these would no longer be viable if the main harbour structures had failed in the meanwhile). All these defences, together with the defences along the southern return of the harbour would fail over the 100 years of the SMP. As defences fail and as the alignment of the shore is fragmented, there would be periods of increased sediment to the south and periods of diminished sediment. There could be, in the longer term, a decrease in sediment supply to the coast to the south as material is redistributed and stored within the re-establishing Wear Estuary Delta. There would be serious concerns in terms of pollution due to the loss of the sewage treatment works and the Tank Depot and, even if this were addressed, there would be a need to relocate the sewage works elsewhere, potentially occupying valuable lower lying land, possibly within the river valley. This would have a serious consequence for the City. The loss of potential development within the old docks area would, similarly, constrain opportunity for integrated land use management, with broader consequences to the hinterland and region as a whole.

South of Sunderland, there would be eventual failure of the Hendon sea wall, both directly and due to outflanking at its southern end. Even assuming the erosion of Salterfen reduces, loss of the Hendon Sea Wall would, over the longer term, result in loss of the dock spur railway behind. (Arguably this would not matter since, under this scenario for the coast, the loss of the port would no longer require the transport link.) However, on the assumption that the current erosion of Salterfen is indicative of a longer term trend, the associated loss of the Hendon Sea Wall would result in increased erosion of the whole frontage, such that within 50 to 75 years the new southern radial would be under threat. This road, together with the main coastal-link railway line and properties at the fringe of Grangetown, would be lost over the next 100 years.

The erosion would continue to the frontage to the south, between Salterfen and Pincushion and between Pincushion and Seaham. This, despite the increase in sediments moving through the frontage from the north. The erosion of frontages to the north would provide an improved supply of sediment to Seaham.

The present rates of erosion are threatening to expose the waste tip at the Halliwell Banks. In the future, under this scenario, this exposure would increase.

At Seaham there may be a slight improvement in both the level of the beach and, as a consequence, the resilience of the defences. However, it is probable that defences would still deteriorate to the extent that they no longer formed a coherent defence to the cliffs within the next 50 years. This would result in the loss of the road, access to and eventual loss of some properties at the northern end of Seaham. There would also be continued erosion to the bay south of Featherbed Rocks and the loss of the sea front core to the town. The deterioration of the Seaham Harbour structures would result in closure of port activities and other activities associated with the harbour area and further erosion of the area behind. This would have an impact on the coast both to north and south. These adjacent frontages would come under increasing pressure to erode, despite the increase in sediments supply from the north.

To the south of Seaham the coast would continue to erode slowly.

Due to the significant impacts of potential contamination and pollution and due to the very unnatural influence of deteriorating defences; affecting both local areas but also impacting on the overall geomorphological development of the coast, there would be significant issues relating to the water framework directives under this scenario. In terms of pollution this might be seen due to the loss of the sewage works, material generally lost from the harbour areas and the potential contamination from the Halliwell Banks waste tip. In terms of geomorphology, the loss of either harbour could result in loss of SSSIs but would also impact on the internationally designated sites to north and south. These affects would be of a scale that might be significant to the Tyne and Wear Water Body. Unless dispensation

<p>were granted, if this scenario were allowed to develop, then substantial action would be required to return the coast to its natural function and good ecological status by 2015. There would be significant cost implications in areas such as Whitburn Bay, Sunderland Harbour and Seaham, despite no further coast protection expenditure.</p>		
<i>MDSF Evaluation</i>		<i>PValue Damages</i>
<i>Erosion</i>	152 residential and commercial properties lost	£3,338
<i>Flooding</i>	119 residential and commercial properties at risk primarily around Wear entrance	£67,539
<i>Other Information</i>	<p>The strategy for Sunderland identifies potentially an £80 M damage which, in addition to the above, covers overtopping damages at the Bents.</p> <p>The Seaham strategy identifies a further £2.6M damages associated with loss of the coastal road and access to properties.</p> <p>No account is taken of future economic loss of railway or road south of Sunderland.</p>	
<i>Assessment of key objectives</i>	<ul style="list-style-type: none"> • The scenario would eventually (>100 years) produce a naturally developing coast and it provides increased exposure of the geology. In the interim there disruption to existing habitats. • It fails to support sustainable development of the coast and hinterland. • It fails to support the activities associated with the Ports of Sunderland and Seaham • It fails to maintain key transport links and re-establishing these would have significant impact to the hinterland. • It fails to support cultural heritage. • It would result in contamination. • It would reduce reliance on defence but at significant economic cost. 	
<p><i>With Present Management (Scenario 2):</i></p> <p>The present management at the northern end of zone, the Whitburn Cliffs, is for no active intervention. Erosion will continue, supplying limited supply of sediment, with no damage to assets.</p> <p>With present management, the no active intervention policy also applies to the northern end of the Bents. Here there would be a loss of physical assets and important heritage features. Over the southern area of the Bents, and over rest of the frontage down to the Roker Pier, the assets; the road, property and the promenade would be protected. The potential rate of erosion and possible pressure on the defence line is such that, even with sea level rise, management of these defences would not be excessive and they are therefore considered sustainable with respect to the assets they protect. Holding these defences would have no significant impact beyond this area in terms of coastal processes. Neither would there be any substantial impact on the designated areas of nature conservation.</p> <p>However, there would be implications with respect to the beach and beach use. It has been identified that there may be a steepening of the general foreshore in the area. This coupled to anticipated sea level rise will tend to increase energy at the defence line; tending to lower beaches. Based on a linear maintenance of defences, here would be a further loss of beaches and hence a commitment to increased levels in defence to address the worsening overtopping. The potential of such a commitment would be a separation of the sea front from the coastal zone; in terms of reduced beach usage and in terms of reinforcing the visual barrier between the sea front area and the shore.</p> <p>Roker Pier would be maintained and this would act to help sustain defences immediately to the north, although potentially still maintaining the pressure, due to wave reflection, on the defences to the south of Parson's Rock.</p>		

The Roker and the New South Piers would continue to provide shelter to the outer harbour area, maintaining the ability to manage defences within the harbour. This would in turn allow management of the entrance to the Port and the river Wear.

Continued defence to the existing line of the frontage between the New South Pier and the North East Pier would allow development of the full area behind. Continued defence of this area will, however, become increasingly difficult. Assuming that the South Outlet (just in the lee of the North East Pier) is not infilled for development, this area does offer opportunity for local environmental enhancement. This would be reliant on maintaining the North East Pier which is currently in a very poor condition.

Under this scenario of with present management, the southern flank of the planned development area would be maintained, protecting significant assets and further supporting the port operations. In particular the Hendon Foreshore Barrier maintains the access to the outer dock area and the corner of the Hudson Dock. Continuing the defence of this whole frontage allows continued use of the sewage treatment works and stops potential contamination of the coastal regime. It also maintains the possible drift mechanism feeding the coast to the south.

The Hendon Seawall will in the long term become more difficult to maintain, but again is unlikely to become technically unsustainable. The wall does protect an important area of open space, valuable to the South Sunderland area and the Port railway spur behind. More significantly, the southern end of the wall provides a substantial anchor on the coast, which will limit the erosion of the land to the south. With current erosion rates, particularly at the Salterfen Headland, the route of the new Southern Radial road will only come under threat in 75 to 100 years. This time scale does rely on the presence of the bastion at the end of the Hendon Sea Wall, limiting the development of a larger bay described in the earlier section on evolution of the coast.

The current Do Nothing policy for the Salterfen frontage, however, will mean that the new road, once constructed will have a life of only 75 to 100 years. The same applies to the main railway line and the Ryhope road. There is little scope for subsequent realignment of these transport routes. More immediately at risk are the two outfalls and the area of potential contamination at Halliwell Banks.

Further south, the erosion of the frontage would reduce areas of agricultural land and would have a local impact on the access to the foreshore via the Denes. At the southern end of this section between Pincushion and Seaham, the coast will cut back behind the Seaham Promenade and maintenance of this defence at the southern end will require works to stop outflanking. Over the next 100 years, maintaining the defence to North Seaham will be technically sustainable, but as in the north of the zone (at South Bents and Seaburn), there may be a general decrease in beach levels, despite continued feed of sediment from the north.

Defending the assets at the crest of the cliff will result in a squeeze between the beach, wishing to retreat, and the hard cliff line. Given the relatively narrow width of promenade, the position of the defence, whether it be set back at the toe of the cliff or in the current position, becomes relatively insignificant to the long term process of pressure on the frontage.

Between Featherbed and the Harbour the general current policy is for holding the line. This has assumed that there is scope for allowing some retreat of the cliffs behind. This would be compromised by development directly above the coastal slope, although this would be at only a local scale.

Maintaining the harbour structures at Seaham both protects the port, water sport activities and the new coastal road, as well as providing some benefit in maintaining defences to

either side (i.e between Featherbed Rocks and the Harbour and between the Harbour and Noses Point. The continuation of the defence to the south of Seaham extends the defence of the new road and the commercial area behind. While essential to maintain the stability of the cliff, these works are not under a significant degree of pressure because of the other natural and man-made features of the coastline. The issue of defence further towards Noses Point is seen, primarily; in the recent strategy, as being related to potential contamination. While the defence of the area is fundamentally sustainable, its justification depends on further investigation as to the impact of erosion of contaminated land on the coastal zone.

At Blast Beach the policy is for no intervention. The only asset identified within this section is a wartime pill box on the beach and this would not justify any intervention.

<u>MDSF Evaluation</u>	<i>PValue Damages</i>
<i>Erosion</i>	6 properties at risk, residual damage at South Bents £106,000
<i>Flooding</i>	No flood damages assessed
<i>Other Information</i>	No account is taken of the economic losses associated with the railway and road to the south of Sunderland.
<u>Assessment of Key objectives</u>	<ul style="list-style-type: none"> • The only area of potential enhancement to nature conservation would be at the South Outlet. However, overall there are no substantial conflicts between the key nature conservation objectives and the outcome of this scenario. • The scenario only partially meets the objectives on sustainable development because of the difficulties in maintaining the expectation of beach use at Whitburn. • The operation of the Ports of Sunderland and Seaham would be maintained. • Key transport links south of Sunderland would be lost in the longer term. This would have significant consequence to the regeneration plans of the harbour. • Key cultural heritage would be maintained but there would be specific loss at the Bents and along the Whitburn frontage. • There would be threats of contamination from the Halliwell Banks quarry and south of Seaham. • There would be a general increased dependence on defences but overall this would be considered sustainable in relation to other objectives. Only in the areas on the seaward face of the Sunderland Docks, due to further development of the area increasing expectation of defence, and at the southern point of the Hendon Sea Wall would there be significant increased coast protection be required.

DISCUSSION AND DETAILED POLICY DEVELOPMENT

An overall future scenario of no active intervention is evidently not acceptable. It does not achieve the balanced approach of reducing reliance on defence with sustainable forward looking development of important urban areas. There seems little argument, therefore, against the need to manage the coastline in this area. While current policy for defence, which is in effect to hold the line in all areas of current defence, would appear justified and achieves a valuable reduction in risk, there are essential local issues arising from this general policy which need to be re-examined.

The length of coast has needed to be examined as a single zone:

- Primarily because there is the linking offshore sediment stream (although this seems unlikely to be significantly affected by any shoreline management).
- Secondly because, in virtually each individual section, there are associated management issues with the coast to either side (for example the influence of the Roker Pier both on the Harbour and in relation to the coastal defence to the north; in effect a chain of linkages).
- Finally because of the significant association between areas of the hinterland. An example of this is the transport link to the docks, protected by the Hendon wall. This link is only of value if the docks remain a viable operation. However, this specific length of railway also relies on maintaining the transport link behind the coast to the south.

It is these last two points, the chain of linkages and the linkage created by associated land use that tends to dominate the approach to coastal management over this zone, rather than the large scale processes.

With respect to both Sunderland and Seaham, maintaining key aspects of the coast are seen as essential to the broader welfare and sustainable development of the City or the Town. In both cases, the harbour areas are important in this regard; the port operations provide essential employment and opportunity for economic growth and the port structures act to defend or enable important new development and water activity. The justification for maintaining the basic port structures goes beyond mere flood and erosion risk management.

In terms of how this influences management of the coast, at Sunderland, the Roker and New South Piers consolidate what is considered to be a natural control point of the coast. While the structures do have a local impact on adjacent frontages; primarily beneficial, their presence is not believed to fundamentally alter coastal processes at a broader scale. At Seaham the piers have only a local impact on processes and again, overall these are beneficial. On this basis, given the overriding economic importance of these two sets of structures, the fact that sustaining these structures is justifiable against this broader economic value and the fact that they have little significant detrimental impact on to either conservation or adjacent defence issues, the preferred policy for these structures would be to hold the line. This then provides fixed reference points from which to examine shoreline management policy in detail elsewhere.

Sunderland North

North of Roker Pier the coast may be considered as five potential policy units:

- Whitburn Cliffs (currently Do Nothing)
- The Bents (currently Do Nothing)

- South Bents/Seaburn (currently Hold the Line)
- Parson's Rock (currently Hold the Line)
- Marine Walk (currently Hold the Line)

For the Whitburn Cliffs there is neither justification nor benefit in adopting any other policy than no active intervention. This is the preferred policy. The implications of this in terms of planning are the setting up a buffer zone between the cliffs and any development behind. This has been achieved to date but needs to be recognised in future planning.

At present defence of South Bents/Seaburn through to Marine walk is justified in terms of the assets protected from erosion and flooding due to overtopping. More significant in terms of policy is that this area is identified in the UDP as a vital asset to the City of Sunderland. Over the short to medium term the shoreline management policy and that of the UDP are consistent. The UDP identifies a sea front zone in which appropriate development would be allowed, and a coastal zone, for passive recreational use. The identification of the coastal zone, distinct from the sea front zone, creates the opportunity for improving defence through the use of set back flood defence. Any environmental improvements in the future should look to incorporating additional defence to reduce flood damage. Over the longer term, however, even within the UDP policy for a sea front zone and a coastal zone, there is inherent conflict. Possibly over the next 50 years beach levels may continue to drop, both due, possibly, to the nearshore steepening and due to sea level rise. This will increase pressure on the defences and would also reduce amenity value of the frontage. The pressure on the defences would tend to affect all sections of the frontage, including the currently undefended section behind Whitburn Steel.

While linear defence of this section would be feasible, this would tend to contribute to the loss of beach. Alternative options should include consideration of advanced control structures, with the aim to re-establish the effective control and shelter provided by the natural rock outcrops. This would allow a more natural defence to be retained. A similar approach should also be considered at other strategic locations along the frontage, potentially most critically in the area of the Seaburn Park roundabout, where already there is increasing pressure on the defences. Quite correctly the strategy for the area demonstrates that simple cross-shore structures would have to be excessively long to substantially trap sediment. However, the SMP analysis of data indicates that there would be a good opportunity to retain material moving in an inshore/offshore direction. Any works would have to be integrated with the SAC and SPA interests in the outcrops of rock. Potentially, in the case of the SPA, additional extension of the rock outcrops could provide compensation for the gradual submergence of the existing rock feature with sea level rise.

The approach to retain beach material would similarly have potential at the southern end of Parson's Rock, to act both to reinforce the more exposed length of defence and to allow some re-adjustment of the beach between Marine Walk and Parson's Rock. Having reinforced either side of Parson's Rock, in effect anchoring the coast at these points, justification for defence of the actual headland would be solely based on the value of the promenade. While loss of this from an amenity perspective may be to the area's detriment, a long term policy could be to abandon this defence, potentially enhancing opportunity for increasing the area of SPA and Ramsar site.

There is the possibility that wave reflection from the Roker Pier may increase wave action on the area of Parson's Rock. Any long term maintenance of this Harbour structure should carefully consider any advantage of placing rock to the outer face to reduce this.

On this basis the following preferred options are recommended:

- Whitburn Cliffs (No active intervention)
- The Bents (Retreat but with nearshore control to improve beach levels)
- South Bents/Seaburn (Hold the Line, with a medium to long term policy for controlling and maintaining beach levels)
- Parson's Rock (short to medium term Hold the Line, consideration of retreat controlled by structures in the longer term)
- Marine Walk (Hold the Line, with a medium to long term policy for modifying and maintaining beach levels).

Sunderland Inner Harbour

The objectives for this area are clearly to maintain the two main harbour structures on the basis of maintaining port and harbour activities. This overall policy would provide the basic shelter necessary to sustain the defence to the north and south Harbour areas. To North Harbour the existing defences provide essential protection to the new development behind. The orientation and length of the North Pier, and the associated revetment, provide adequate potential to retain the North Beach, even though this feature will tend to be squeezed by increasing sea level. To the south the defence maintains important protection to the Port infrastructure. Consideration should be given to allow the small area of beach in the southern corner of the South harbour to move back, so as to retain the SSSI interest. The preferred policy for these areas is:

Main Harbour Piers (Hold the Line)

North Harbour (Hold the Line)

South Harbour (Hold the Line, with a potential to locally retreat in the long term.)

Sunderland Harbour East Bay (Stonehill Wall to North East Pier)

This area of the Port is considered important regeneration land and this is currently being examined in the Port Development Plan. The coast protection strategy for the area has identified that the likely expenditure to restore each individual length of defence to a suitable condition would be economically justified given the potential subsequent the loss of key infrastructure to erosion. There are, however, difficulties in attracting coast protection grant, although recent emergency works have been undertaken. The two key structures of concern are the Stone Hill Wall and the North East Pier, with respective re-construction costs of £1.2M and £2.5M. While the SMP review concurs with the strategy as to the value of the area behind; the likely loss in terms of usability of that land if defences are not maintained, and the technical feasibility of maintaining the defences probably over the next 100 years, there are concerns that as the land is developed any future scope for improving the resilience or sustainability of the defence line through retreat will be lost.

The frontage is built on old sediment deposits, underlain, at least in part by rock. In effect the frontage forms a shallow bay between the New South Pier and the North East Pier. There is, therefore, good justification for treating the frontage as a complete unit in terms of its defence, rather than in focussing on maintaining individual defence lengths. Reinforcing part of the North East Pier and possibly in the area of South rocks (the outcrop midway between the New South Pier and the North East Pier) would effectively create down coast headlands. This would provide control on the frontage allowing retreat of the line of the Stone Hill Wall, with the intent of creating, most probably, a reveted face some 20 to 40m to the rear of the existing line. The main infrastructure would remain, although there would be

loss of some development land. In adopting this approach there would still be scope to maintain the old South Outlet, potentially enhancing its quality in terms of its nature conservation value. These proposed works should be considered as an integrated part of the Port Regeneration plan for this area.

Subject to further discussion with engineers and planners and more detailed studies, the preferred policy for the frontage would be one of retreat in the short term but hold the retreated line in the future for the period of the SMP.

Sunderland Harbour South Face (South West Breakwater to Hendon Banks Barrier)

The important assets at risk, both in terms of port operation and direct economic value to the nation, are such that sustaining these defences is justified. There is no real scope for retreat, and even if there were, this would not substantially reduce the pressure on the frontage; scour would still occur due to the obliquity of wave attack. The frontage through to the southern end of the Hendon Banks Barrier does not significantly impact on sediment supply to the south and, if anything, may assist with transferring sediment from the offshore zone. The preferred policy for the frontage, as set out in the coast protection strategy, would be to Hold the Line.

Hendon to Seaham

The current policy at the northern end of this section is to hold the line of the Hendon Sea Wall, whilst the policy for the coast down to Seaham is Do Nothing. However, as discussed earlier in the assessment of scenarios 1 and 2, these sections cannot be considered independently. Locally at Hendon, the strategy has demonstrated that there is justification for maintaining the line of the defence. Primarily, the economic justification arises from the benefits of maintaining the railway line and commercial properties to the rear, which, it is assessed, would be lost sometime within the next 50 to 100 years. In addition to this loss there would be a loss of the promenade and open area which have been identified as being of equal significance in terms of benefits to the area of South Sunderland; although more difficult to evaluate in monetary economics.

However, the decision to hold this line and the reasons for this decision have strong association with the management decision further south. The new South Radial road runs to the rear of Salterfen, together with the realigned sewer and gas lines and the line of the railway. Further south still is the quarry tip at Halliwell Banks and again the railway line to the back of the open land at Ryhope.

Based on current erosion rates, and assuming that both Salterfen and Pincushion still maintain some control over the coastal shape, it has to be assumed that the new road and railway line, north of Salterfen, would be lost sometime between 75 and 100 years in the future. South of Salterfen the railway would be lost, possibly within the next 50 years. In many ways the position and resilience of Salterfen is key to this assessment. However, equally important, to the north of Salterfen, is the control imposed on the coastline by the southern end of the Hendon Sea Wall.

Several local scenarios can be envisaged:

Scenario (a)
Description: Extend the no active intervention policy further north to include the Hendon Sea wall.

Rationale: The future loss of the railway between Salterfen and Pincushion negates much of the justification for continuing to hold the Hendon Sea Walls.

Implications: There would be a need to substantially increase the defence at the end of the Hendon Banks Walls both to address the risk of outflanking and to resist increased erosion in front of this wall. The loss of the southern end of the Hendon Sea wall would substantially increase the extent of erosion potential between Salterfen and the southern end of the Hendon Banks Barrier, such that a long term stable profile for the shore would cut back some 300m from the coast; including significant areas of Grangetown. Since, even without maintenance the southern end of the Hendon Sea wall would still maintain some control over the next 50 years, there would be little change from the current situation in terms of anticipated loss of the route for the South Radial road.

Further south there would be, over the next 100 years, near total loss of the open space between the cliffs and the development landward of the railway line.

Impacts: There would be potential improvement to the marine aspects of the SAC, SPA and SSSI in that the whole section of coast would continue to move back, maintaining a continuity of nature conservation interest along the foreshore. The grassland and agricultural land to the crest of the cliffs would be substantially lost over much of the length between Hendon and Pincushion, squeezed between the eroding cliff and the development behind. In terms of maintaining access along the heritage coast there would be significant loss. There would be a loss in terms of transport access to the Port and this would significantly affect the viability of the Port and the proposed regeneration of the area. There would be a more general loss in terms of sustainable public transport and transport opportunity. The current design life of the South Radial road is understood to be over a 50 year period. Within this time frame the road would not be lost. There would, however, be no opportunity to extend use of this route and this may have significant impact on transportation more generally as the overall network adjusts to the existence of this southern route. The longer term impact of a Do Nothing policy would be to accept substantial loss to the developed area of Grangetown in the future.

Scenario (b)

Description: Maintain the Hendon Sea wall with Do nothing to the South

Rationale: This is the current policy.

Implications: There would be an increasing effort to maintain the southern end of the Hendon Sea wall as Salterfen erodes back and there is increased pressure on the end of the sea wall. Maintaining the wall, however, limits the long term development of the larger bay shape between Salterfen and the Hendon Banks Barrier and acts to transfer pressure from this northerly wall. There would still be a loss in 50 years of the railway line further south and the loss of the route for the South Radial road from year 75 onward.

Further south there would still be near total loss of the open space between the cliffs and the development landward of the railway line.

Impacts: There would be potential improvement to the marine aspects of the SAC, SPA and SSSI in that the currently designated section of coast would continue to move back maintaining a continuity of nature conservation interest along the foreshore. The grassland and agricultural land to the crest of the cliffs would be substantially lost over much of the length between Hendon and Pincushion, squeezed between the eroding cliff and the development behind. In terms of maintaining access along the heritage coast there would be significant loss. There would still be a loss in terms of transport access to the Port and a more general loss in terms of sustainable public transport and transport opportunity.

Scenario (c)
Description: Maintain the Hendon Sea wall and extend linear protection further south
Rationale: The aim of this approach would be to protect the important transport links as they become threatened.
Implications: Typically works would be undertaken, most probably in a staged manner, addressing areas of concern over a period from year 50 onward, with the intention of providing direct protection to sections of erosion threatening specific lengths of assets. Initial lengths of defence would be over the length between Salterfen and Pincushion to protect the railway line and the southern extent of the South Radial route. A second section of defence would be constructed between the Hendon Sea wall and Salterfen. As erosion continued between sections of defence, there may be a need to extend the line of defence to maintain continuity. While it would not be expected that the whole length of coast is protected, much of it would be.
Impacts: There would be significant damage to the integrity of the marine aspects of the SAC, SPA and SSSI in that a rock toe would be extended over much of the foreshore. The grassland and agricultural land to the crest of the cliffs would be partially retained. In terms of maintaining access along the heritage coast, this would be maintained. The transport links would be maintained.

Scenario (d)
Description: Maintain the Hendon Sea wall and act to enforce or reinforce control at strategic points along the coast.
Rationale: The aim of this approach would be protect the important transport links by limiting the extent of erosion through the creation of smaller bays.
Implications: An earlier decision would need to be made as to when to take action compared to scenario C. Typically control points would be created between Salterfen and the Hendon Sea wall, at Salterfen and potentially at two further points between Salterfen and the Halliwell Banks. Works may be required over a period between year 10 and year 20, based on current rates of erosion, if benefit is to be derived from the width of land between the cliff and the assets at risk. Natural cliff evolution would occur between the hard points.
Impacts: There would be some damage to the integrity of the marine aspects of the SAC, SPA and SSSI in that the hard points would occupy areas of the foreshore. The grassland and agricultural land to the crest of the cliffs would be partially retained. In terms of maintaining access along the heritage coast this would be maintained. The transport links would be maintained.

There is still considerable uncertainty associated with specific erosion rates for the area and also in how sea level rise might impact on these rates. Therefore, regardless of the scenario it would be recommended that detailed monitoring of cliff recession is continued and, to a large degree, the selection of a preferred policy would need to be assessed in relation to this. Even so, it is important to develop in principle a preferred approach so that local response to immediate issues that arise may be judged within an appropriate long term framework. As such the scenarios may be assessed in terms of what they deliver.

Scenario (b), the current policy, fails to address the broader issue that the benefit of holding the line along the Hendon Sea wall is negated to a large degree by the subsequent loss of transport links to the Port due to erosion further south. This scenario would need to be re-assessed as a better understanding of erosion rates is developed but in reality over the longer term the policy would revert to Scenario (a); as the justification for the Hendon wall is lost.

Scenario (c) would result in significant damage to the nature conservation interests on the coast. It is unlikely, that this approach would be acceptable unless there was really found to be no alternative.

Scenario (a) would result in major damage to the infrastructure and in the still longer term (beyond 100 years) may result in decisions on a more local basis to protect the extensive areas of development as these came under threat. There would be little scope for a more adaptable transition from a natural coastline to a controlled coastline. It is probable that there would be overriding public interest eventually to defend the coast.

Scenario (d) attempts to minimise damage to the natural coast line by taking advantage of the existing width currently available between the cliff and assets at risk.

On this basis Scenario (d) is seen as a preferred approach with the policy, therefore, to hold the Hendon Sea wall and to allow strongly controlled retreat of the coast to the south. More detailed studies would need to be undertaken to determine the detail of this southern policy.

Even under this policy there remains the potential threat of contamination from the Halliwell Banks Quarry. This is currently under investigation. If unacceptable levels of contamination were determined then under the above general policy, the recommendation of the SMP would be for potential contamination to be removed. Only if this were found to be excessively expensive and resulting in broader damage to the environment should consideration be given to protection to the area. This should then be considered in terms of whether protection at this position could be incorporated with the longer term policy of developing key control points on the coast.

Fundamental to the above preferred policy would be the need to ensure that no additional development or infrastructure were placed in the open area above the existing cliff line.

South of Pincushion, the policy would be for no active intervention. The interface between the policy of managed realignment and no active intervention would be re-assessed as the preferred policy over the northern section was progressed.

On this basis the following preferred options are recommended:

- Hendon Sea wall (Hold the Line)
- Hendon to Pincushion (No active intervention initially with a longer term policy of retreat controlled by local hard defence).
- Pincushion to Seaham Hall (No active intervention).

Seaham

The harbour structures, the piers and the revetments to the south of the harbour, as discussed earlier, are seen as being important in sustaining the significant local and regional benefit of the Port. In addition these structures support the new coastal link road and support the commercial area to the south of the Town. The existing works have no general overall impact on the evolution of the coast, although they do act in a beneficial manner in maintaining beach levels to the north.

The strategy for Seaham identifies that the beach in front of the north promenade is at risk in the longer term. This will give rise to increased pressure on the defences and the strategy

has identified a possible need in the future to construct a rock toe to the defence. This will need to be reviewed against on-going monitoring results and, as in the area of North Sunderland, further consideration would need to be given to alternative responses to beach erosion such as local rock groynes. The strategy confirms the economic justification for maintaining defence to this frontage and this policy of holding the line would allow sustainable development of the north area of the town and protect the important coastal road.

The area between Featherbed and the North Pier has also been considered in the strategy and while the preferred option is determined as allowing some further monitored erosion to the cliff to reduce the need for increasing effort in defences, the overall policy for the frontage is to hold the line due to the important amenity and regeneration features at the crest of and set back slightly from the cliff crest. As in the area to the north monitoring of the frontage would be important. This would define the timing of when defence to the cliff needs to be extended. It is noted that some further development of the land to the crest of the cliff has been carried out. Further development close to the cliff should be discouraged. Ensuring support to the existing development line would then trigger the need for defence.

South of Seaham at Dawdon, the decision to protect the coast between the Edith Street Roundabout and Noses Point would depend entirely on the potential degree of contamination in these areas of fill behind. The extent and depth of potentially contaminated material may not sensibly allow a policy based on excavation. Equally the possible nature of contamination might be such that diffused release to the coastal zone would be unacceptable. These options would need to be considered in detail. Even so, the preferred policy would be for no active intervention. Eroded material from the cliff provides little foreshore sediment and the policy for this section has little strategic impact, beyond that related to contamination.

Beyond the main Seaham frontage, there is no justification for intervention at Blast Beach.

On this basis the following preferred options are recommended for the Seaham area.

- North Promenade (Hold the Line)
- Red Acre Cliffs (short term policy to retreat, with a longer term policy of Hold the line)
- Seaham Harbour structures (Hold the Line).
- Seaham South (Hold the Line)
- Dawdon Beach (No active intervention unless driven by the need to stop contamination)
- Blast Beach (No active intervention).

MANAGEMENT AREAS

While the discussion above has split the zone into several different sections in terms of developing these policies, it is recommended that policy units are grouped in the following way to achieve appropriate management of the zone. These management areas are:

- Whitburn Bay, from Souter Point through to Roker Pier. This allows a more strategic approach to managing individual policy units, with the intent of maintaining both protection to important assets and creating the opportunity of maintaining beach levels.
- Sunderland Harbour, between Roker Pier and New South Pier. The principle objective within this area is maintaining the use of the Port and associated developments within the mouth of the Wear.

- Ryhope Bay, covering the southern area of the Harbour, the Hendon frontage and the section of coast from Hendon to Pincushion. While the policies within this area differ, considering the whole of this frontage is important in recognising the impacts with respect to the essential transport links.
- Seaham, including the coast from Pincushion south to Chourdon. This allows consideration of the impact of Seaham Harbour on the adjacent frontages and establishes the important links in terms of the continued sediment supply from the eroding cliffs north of Seaham and the links between the management of the coast at Noses Point and Blast Beach to the south.

The management areas can to a degree be considered separately but there are still linkages between areas that have to be acknowledged.

- The Roker Pier is important with respect to the management of the section of coast to the north.
- The New South Pier influences the way in which the Port regeneration area is managed.
- The management of Pincushion has implications for the management of the area to the north and the evolution of the coast to the south, affecting then the management of the Seaham area.

Policy statements or summaries are presented by management areas in the following sheets.

4.3.2 MANAGEMENT AREA POLICY STATEMENTS (MA06-MA09)

Location reference:	Souter Point to Sunderland Harbour
Management Area reference:	MA06
Policy Development Zone:	3

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The management intent for this area aims to provide a transition between the important nature conservation interests to the north and the management of protection of important urban and recreational interest to the north of Sunderland. The main transition area is at the Bents and the plan recommends here a policy of retreat but introducing reinforcing of the nearshore natural controls to provide better opportunity for maintaining a relatively natural defence of the road, heritage features and property. The danger of defending the area of South Bents and Seaburn is one of coastal squeeze. This is already evident in the area of the Seaburn roundabout due to the alignment of the sea walls. There is economic justification for defence of this southern section but management needs to consider how, in the longer term, a beach may be retained. This would be important in delivering the coastal zone management objectives of the UDP. Use of foreshore structure could potentially offer this opportunity but then also provides the opportunity to allow a controlled retreat in the local area of Parson's Rock Headland, potentially supporting objectives for nature conservation. Long term management to achieve amenity objectives is likely to require funding other than that for coast protection. Strict coast protection needs can be sustained through maintenance of linear defences, but this would result in long term amenity damage.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day:	Planning policy for the creation of a buffer zone along the Whitburn Cliffs need to be confirmed. The present management approach of the hard defences would be maintained.
Medium term	Options for foreshore management need to be developed, integrated with development of the UDP coastal zone management. This would be developed for the length from the Bents through to Roker Pier, with consideration being given to managed retreat of the Parson's Rock promenade.
Long-term	Existing hard defences would be sustained, with the exception of Parson's Rock, in association with management and control of the foreshore and the beach. Defences would be constructed to the area of the Bents.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025.	2055	2105	Comment
6.1	Whitburn Cliffs	NAI	NAI	NAI	No change
6.2	The Bents	R	R	HR*	Provide additional nearshore protection
6.3	South Bent/Seaburn	HTL	HTL	HTL	Maintain defences and improve beach control.
6.4	Parson's Rock	HTL	HTL	R	Eventually removing defences
6.5	Marine Walk	HTL	HTL	HTL	Maintain defences and improve beach control
Key: HTL - Hold the line, A - Advance the line, R - Retreat or Realignment, NAI – No active intervention * HR – Hold the Line on a retreated alignment					

CHANGES FROM PRESENT MANAGEMENT

The SMP2 identifies the increasing pressure on the existing defences. Management of this in strict protection terms can be sustained but with loss of the beaches. While the policy for most of the frontage does not change from that defined by SMP1 and the strategy study, SMP2 recommends a different approach in the longer term. Through this change in approach the opportunity exists in extending a degree of protection further north to address problems at the Bents and the opportunity of removing defences in front of Parsons Rock.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

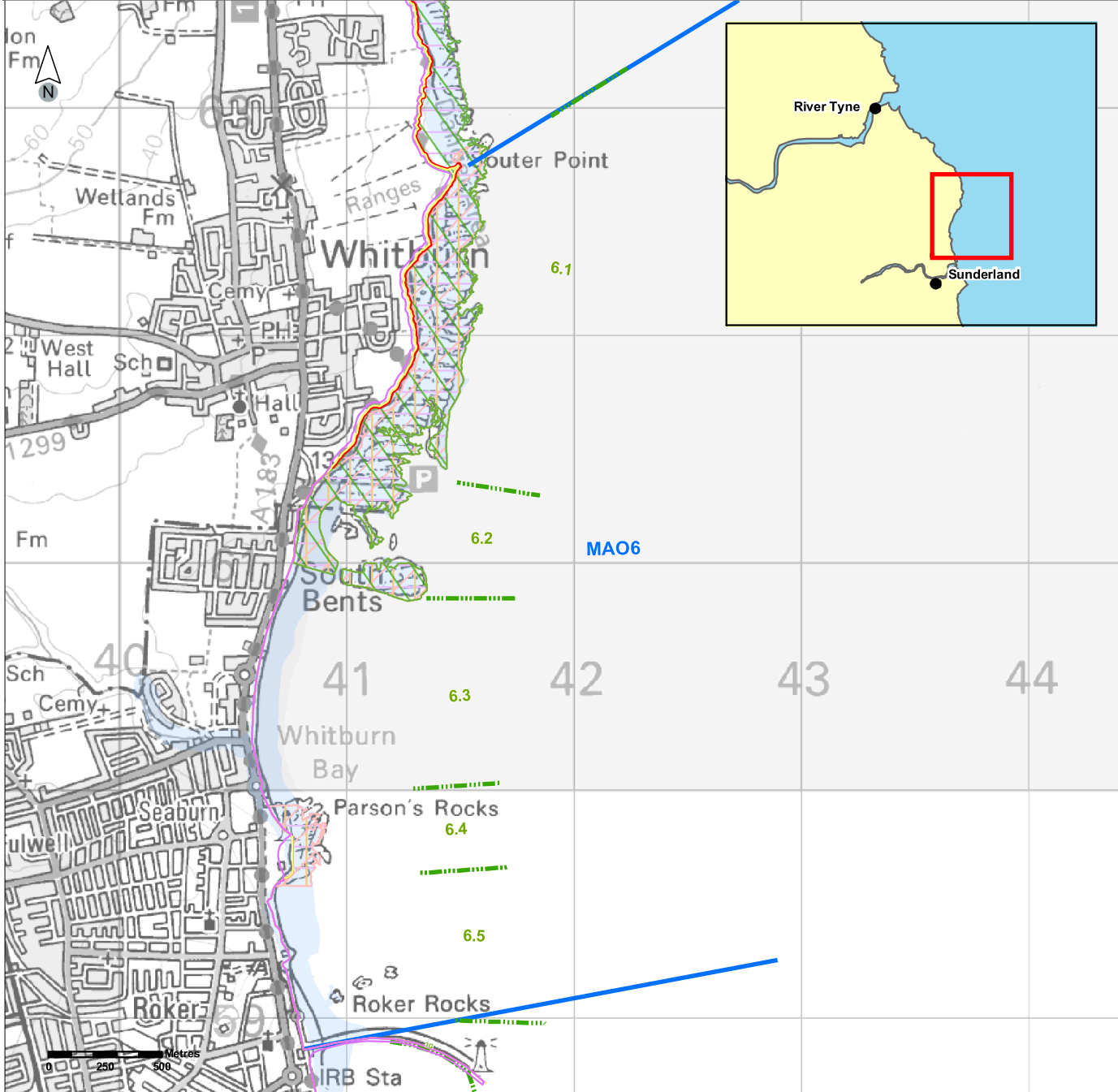
Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	153	543	249	946
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	153	543	249	946
	Costs of Implementing plan £k PV	3,500	618	142	4,312
Costs are based on strategy No account is taken of NAI overtopping damages identified in strategy Description of damage and benefits under preferred plan: <ul style="list-style-type: none"> • Loss of the Parson's Rock promenade in 2055. • Protects property and the coastal road. 					
Heritage	No loss of heritage structures. Fishermen's Cottages protected.				
Amenity	Sustains beach use. Loss of amenity use in the area of Parson's Rock Potentially intrusive structures to the foreshore.				

POTENTIAL WATER FRAMEWORK DIRECTIVE ISSUES (see Appendix F for details)

Impact on water quality	No
Impact of geomorphology and hydrodynamics	Yes

* 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.

**River Tyne to Flamborough Head Shoreline Management Plan
Management Area MA06
Policy Units 6.1-6.5**



POLICY (FOR FULL DETAILS SEE RELEVANT POLICY STATEMENT)

From Present Day:	Medium - Term:	Long - Term:
Planning policy for the creation of a buffer zone along the Whitburn Cliffs need to be confirmed. The present management approach of the hard defences would be maintained.	Options for foreshore management need to be developed, integrated with development of the UDP coastal zone management. This would be developed for the length from the Bents through to Roker Pier, with consideration being given to managed retreat of the Parson's Rock promenade.	Existing hard defences would be sustained, with the exception of Parson's Rock, in association with management and control of the foreshore and the beach. Defences would be constructed to the area of the Bents.

Key:		Predicted Shoreline Mapping*	
Preferred Plan	Management Areas	20 Years	SPA
20 Years	Policy Units	50 Years	RAMSAR
50 Years	NNR	100 Years	SAC
100 Years	SSSI	Scheduled Ancient Monuments	
	EA Flood Zone - Sept 05		



ENVIRONMENTAL ASSESSMENT – PREFERRED PLAN

MANAGEMENT AREA: MA06			
	Description of Designation	Effect of Preferred Plan	Measures to offset effects /impacts Compensation/Mitigation/Alternative Solution
International	Souter Point to South Bents and Parson's Rocks are both RAMSAR sites and part of the Northumbria Coast SPA (breeding little terns, purple sandpiper, turnstones). Also Durham Coast SAC.	6.1 Potential loss of SAC cliff vegetation and SPA foreshore features due to possible cliff protection works to protect proposed new comprehensive school. SMP identifies a policy of no active intervention.	Investigation of alternative construction locations should be completed.
National	Parsons Rocks and the coastline from Souter Point to South Bents are part of Durham Coast SSSI (vegetated coastal magnesian limestone cliffs)	6.1 Potential loss of geological SSSI features due to possible cliff protection works to protect proposed new comprehensive school. SMP identifies a policy of no active intervention.	Investigation of alternative construction locations should be completed.
Local	Whitburn Point LNR	No likely impacts	None proposed

ACTION PLAN FOR MANAGEMENT AREA 06

Action	By when	Responsibility	Cost £k
Review Strategy	2010	City of Sunderland	25
Monitoring plan <ul style="list-style-type: none"> • beach levels • defence condition 	2006	City of Sunderland	2 pa
Schemes: No schemes planned at present			

Location reference:	Sunderland Harbour
Management Area reference:	MA07
Policy Development Zone:	3

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The management of the area is driven by the objective to maintain nationally important operation of the Port of Sunderland. Maintaining the outer Piers, the Roker Pier and the New South Pier provides the basic structure for management of the area within the outer harbour. North Pier and the associated defences along North Harbour is essential in maintaining the control to the mouth of the Wear and in providing adequate protection to the developed area behind. There may be an opportunity to retreat the line of defence over the South Harbour frontage without affecting the warehouse area behind. This would allow further development of the habitat in this corner while maintaining and important spending beach area for dissipation of wave energy.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day:	Maintain main Piers and defences within the harbour
Medium term	Maintain main piers. Improve condition of North Pier
Long-term	Maintain main piers. Maintain defence of North Harbour Consider retreating the line of defence to South Harbour

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025.	2055	2105	Comment
7.1	Main Harbour Piers	HTL	HTL	HTL	Principle benefit to Port operation
7.2	North Harbour	HTL	HTL	HTL	Improve condition of North Pier
7.3	South Harbour	HTL	HTL	HTL	Examine opportunity for local retreat
Key: HTL - Hold the line, A - Advance the line, R - Retreat or Realignment, NAI – No active intervention					

CHANGES FROM PRESENT MANAGEMENT

No change from present management.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

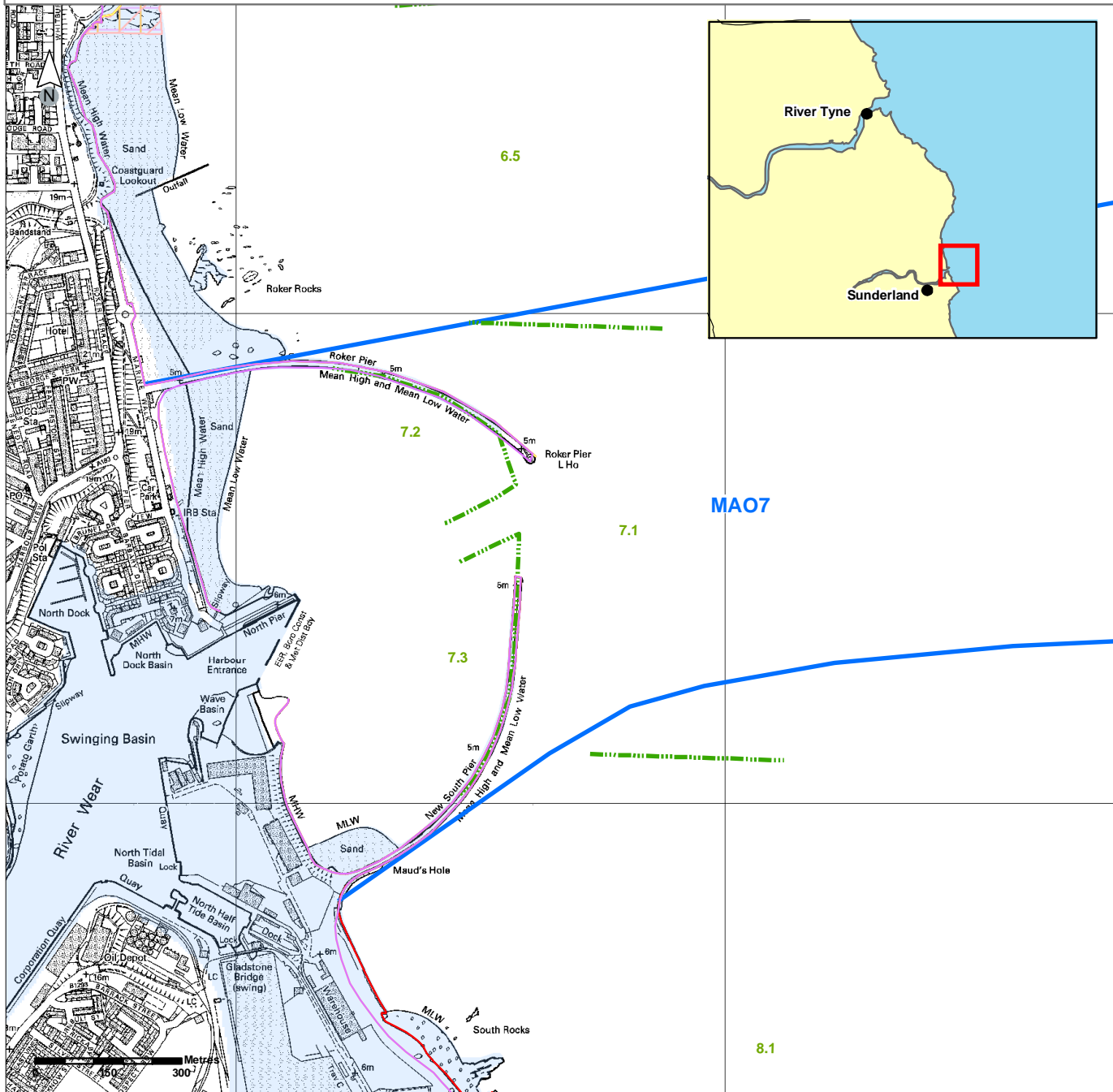
Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	19,452	13,613	8,240	41,305
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	19,452	13,613	8240	41,305
	Costs of Implementing plan £k PV	3,602	652	656	4,866
Costs are based on strategy Description of damage and benefits under preferred plan: <ul style="list-style-type: none"> • No losses • Maintains operation of Port and protects assets. 					
Heritage	No loss of heritage structures.				
Amenity	Maintained use of water sports.				

POTENTIAL WATER FRAMEWORK DIRECTIVE ISSUES (see Appendix F for details)

Impact on water quality	Yes
Impact of geomorphology and hydrodynamics	No

* 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.

River Tyne to Flamborough Head Shoreline Management Plan Management Area MA07 Policy Units 7.1-7.3



POLICY (FOR FULL DETAILS SEE RELEVANT POLICY STATEMENT)

From Present Day:	Medium - Term:	Long - Term:
Maintain main Piers and defences within the harbour	Maintain main piers. Improve condition of North Pier	Maintain main piers. Maintain defence of North Harbour Consider retreating the line of defence to South Harbour

Key:	Predicted Shoreline Mapping*	Management Areas	SPA
	Preferred Plan	Policy Units	RAMSAR
	20 Years	NNR	SAC
	50 Years	SSSI	Scheduled Ancient Monuments
	100 Years	EA Flood Zone - Sept 05	



ENVIRONMENTAL ASSESSMENT – PREFERRED PLAN

MANAGEMENT AREA: MA07			
	Description of Designation	Effect of Preferred Plan	Measures to offset effects /impacts Compensation/Mitigation/Alternative Solution
International	none	N/A	None proposed
National	none	N/A	None proposed
Local	none	N/A	None proposed

ACTION PLAN FOR MANAGEMENT AREA MA07

Action	By when	Responsibility	Cost £k
Review Strategy	2010	City of Sunderland	25
Monitoring plan <ul style="list-style-type: none"> • beach levels • defence condition 	2006	City of Sunderland	1 pa
Schemes: No schemes identified at present			

Location reference:	Sunderland Harbour to Pincushion Rocks
Management Area reference:	MA08
Policy Development Zone:	3

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: None of the individual policy units within this management area can be considered independently. If regeneration of the Port area is to be taken forward, there is a need to manage the coast to the south so as to maintain essential transport routes. If this southern section of the coast is managed there will be an impact on the nature conservation interests. If it is not managed, in the longer term there will be significant threat to the urban development of the South Sunderland. The Plan intent of the plan is to reconcile these different issues. In terms of regeneration of the port area, the plan recommends a broader approach to maintaining defences, looking to realign the East Bay frontage such that individual lengths of defence are more manageable in the future. This needs to be undertaken in association with developing plans for regeneration. There is no scope for doing other hold the line on the southern face of the harbour and in doing this there may be benefits in terms of providing a sediment supply to the shore to the south. The defence of the Hendon area is seen as an important control of future evolution of the coast to the south but this needs to be supported by additional control points further south. Over this southern frontage, between the Hendon sea wall and Pincushion, there is uncertainty with respect to erosion rates. This critically needs to be monitored over the next 10 to 20 years such that a long term management plan for this currently undefended area may be developed

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day:	Consider realignment of the defences of East Bay. Maintain defences to the south face of the harbour and at Hendon. Monitor erosion of the frontage between Hendon and Pincushion. Investigate the waste tip at Halliwell Bank.
Medium term	Realign defences to East Bay Hold the line to the harbour South Face and at Hendon Construct control structures to the section between Hendon and Pincushion.
Long-term	Maintain all defended areas.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025.	2055	2105	Comment
8.1	Harbour East Bay	HTL	R	HTL	Integrate with land use planning
8.2	Harbour South Face	HTL	HTL	HTL	
8.3	Hendon Seawall	HTL	HTL	HTL	linked benefits with area to south
8.4	Hendon to Pincushion	R	R	R	Hard point control
Key: HTL - Hold the line, A - Advance the line, R - Retreat or Realignment, NAI – No active intervention					

CHANGES FROM PRESENT MANAGEMENT

The most major change from present policy would be controlled management of the section between Hendon and Pincushion. This needs to be planned during the first 10 to 20 years of the SMP to avoid defence creep along the frontage. Works are necessary to sustain transport links to sections further north but are also essential in managing the future threat to major urban areas in the longer term.

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

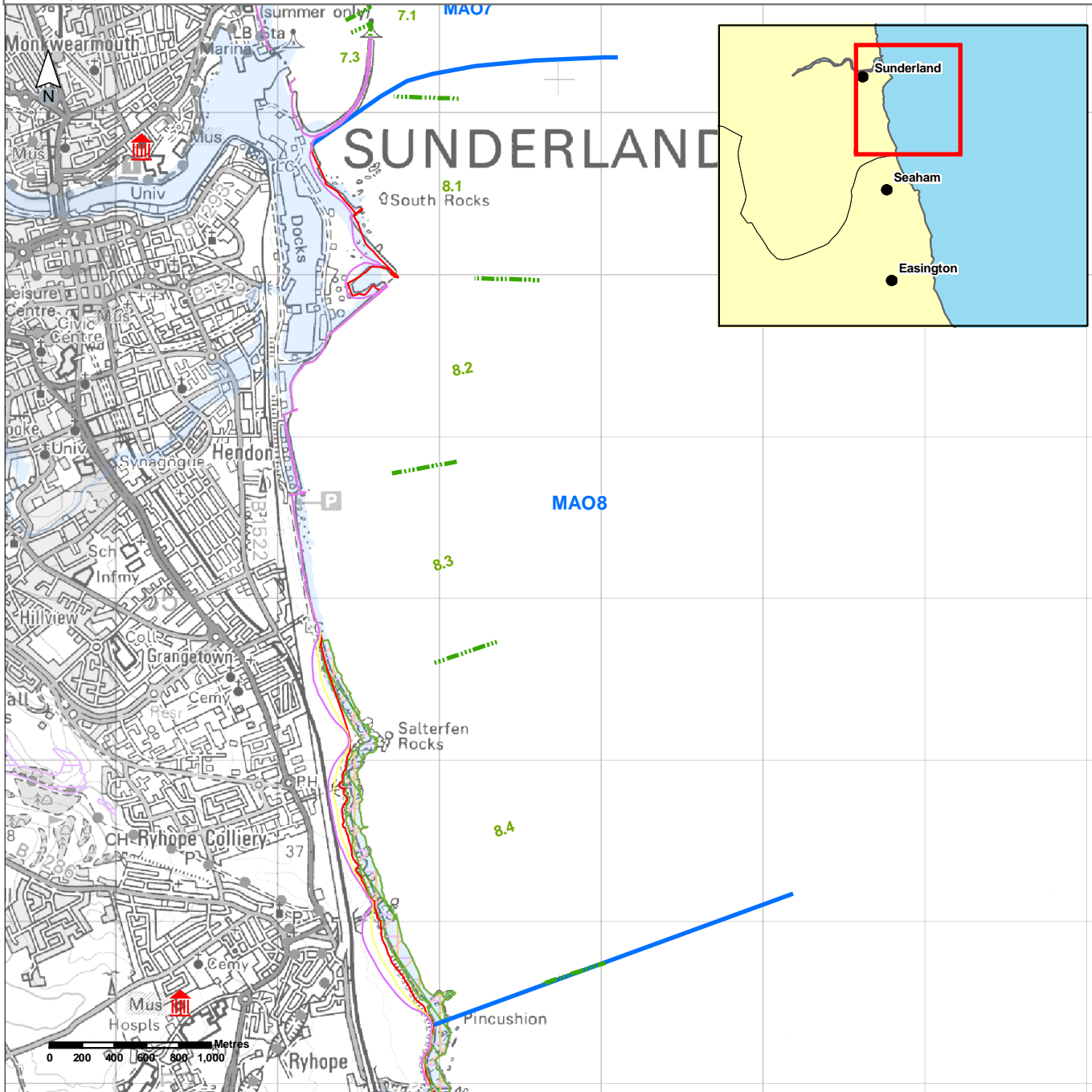
Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	13,317	10,043	5,082	28,441
	Preferred Plan Damages £k PV	0	0	0	0
	Benefits £k PV	13,317	10,043	5,082	28,441
	Costs of Implementing plan £k PV	6,218	668	593	7,014
Costs are based on strategy, with additional costs estimated for control of coast to south of Sunderland. NAI damages do not include economic loss of railway and road. Description of damage and benefits under preferred plan: <ul style="list-style-type: none"> • Loss of areas for regeneration but creating a more sustainable integrated defence. • Protects the main area of regeneration. • Protects the use of Hudson Dock. • Develops a long term sustainable plan maintaining transport links and defence of South Sunderland. 					
Heritage	No loss of heritage structures.				
Amenity	Maintains opportunity for developing amenity benefit at Hendon. Maintains access along the cliffs to the south.				

POTENTIAL WATER FRAMEWORK DIRECTIVE ISSUES (see Appendix F for details)

Impact on water quality	Yes
Impact of geomorphology and hydrodynamics	Yes

* 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.

**River Tyne to Flamborough Head Shoreline Management Plan
Management Area MA08
Policy Units 8.1-8.4**



POLICY (FOR FULL DETAILS SEE RELEVANT POLICY STATEMENT)

From Present Day:	Medium - Term:	Long - Term:
Consider realignment of the defences of East Bay. Maintain defences to the south face of the harbour and at Hendon. Monitor erosion of the frontage between Hendon and Pincushion. Investigate the waste tip at Halliwell Bank.	Realign defences to East Bay Hold the line to the harbour South Face and at Hendon Construct control structures to the section between Hendon and Pincushion.	Maintain all defended areas.

Key:

Predicted Shoreline Mapping*	Management Areas	SPA
Preferred Plan	Policy Units	RAMSAR
20 Years	NNR	SAC
50 Years	SSSI	Scheduled Ancient Monuments
100 Years	EA Flood Zone - Sept 05	



I:\90184\Technical_Data\Arcview\Figures\Policy_Development_Zones\Management_Areas\MA08.mxd

ENVIRONMENTAL ASSESSMENT – PREFERRED PLAN

MANAGEMENT AREA: MA08			
	Description of Designation	Effect of Preferred Plan	Measures to offset effects /impacts Compensation/Mitigation/Alternative Solution
International	Just north of Salterfen Rocks to Pincushion are part of the Durham Coast SAC and Northumbria Coast SPA/ RAMSAR	8.4 Potential loss of SAC cliff vegetation and SPA foreshore features due to possible cliff protection works to protect new southern radial road and railway	If defences are likely to cause a significant adverse impact to European protected features, and road and railway realignment is not possible, compensation is likely to be required. This should be identified as part of detailed proposals.
National	Just north of Salterfen Rocks to Pincushion are part of the Durham Coast SSSI	8.4 Potential contamination of SSSI foreshore features due to leaching of contaminants from former coastal quarry and landfill site. Also potential loss of SSSI foreshore features due to possible cliff protection works to protect new southern radial road and railway.	Managed retreat and monitoring of landfill to assess risk and investigate potential of the coast to absorb diffuse pollution. There is little scope for re-aligning the road and the railway.
Local	None	N/A	None proposed

ACTION PLAN FOR MANAGEMENT AREA MA08

Action	By when	Responsibility	Cost £k
Review defence requirements to Harbour regeneration area.	2006	City of Sunderland	25
Review monitoring and develop long term strategy	2016		50
Monitoring plan <ul style="list-style-type: none"> • beach levels • defence condition 	2006	City of Sunderland	2 pa
Schemes: Scheme under review		City of Sunderland	

Location reference:	Pincushion Rocks to Chourdon Point
Management Area reference:	MA09
Policy Development Zone:	3

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The management plan centres on sustaining the use of the Port of Seaham and supporting the regeneration of Seaham town centre. The plan recommends no active intervention in defence of the cliffs north of the existing urban area of Seaham, accepting a natural retreat of this frontage. Despite the anticipated loss to the beach area of the town's northern promenade, there is little benefit retreating the line of defence. Between the Featherbed Rocks and the Harbour, the frontage is relatively contained and even limited retreat of this undefended length would be beneficial in allowing adjustment for sea level rise. The extent of retreat would be determined by maintaining the support to the existing development line at the crest of the cliff and the need to intervene would be determined through monitoring. There needs to be further investigation as to the nature of contamination within the cliffs to the south of the Harbour. Existing defences maintain protection to the commercial area above the cliffs and, therefore, extension of the line of defence towards Noses Point would only be justified by the potential impact of contaminated material being allowed in to the coastal zone. The potential difficulty of excavating the contaminated material would possibly mitigate against its removal. To the south of Noses Point the natural erosion of the coast would continue with diffusion of mining waste into the coastal zone.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day:	Defences at Seaham would be maintained. Investigations into potential contamination due to erosion of the cliff south of Seaham
Medium term	Review management of defences north of Seaham in particular with respect to the transition from the eroding cliff line to the north and the potential reduction in beach levels. Protect the cliffs between Featherbed Rocks and the Harbour, Potentially extend defence towards Noses Point.
Long-term	Maintain defended areas.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			
		2025.	2055	2105	Comment
9.1	Pincushion to Seaham	NAI	NAI	NAI	
9.2	Seaham North Prom.	HTL	HTL	HTL	
9.3	Red Acre Cliffs	R	HR*	HR*	
9.4	Seaham Harbour	HTL	HTL	HTL	primarily for port activities
9.5	Seaham South	HTL	HTL	HTL	
9.6	Dawdon Beach	NAI	NAI	NAI	subject to potential contamination
9.7	Blast Beach	NAI	NAI	NAI	
Key: HTL - Hold the line, A - Advance the line, R - Retreat or Realignment, NAI – No active intervention * HR – Hold the Line on a retreated alignment					

CHANGES FROM PRESENT MANAGEMENT

With the possible exception of extending defences south of Seaham, there is no change from the SMP1 policy nor from that put forward in the strategy..

IMPLICATION WITH RESPECT OF BUILT ENVIRONMENT

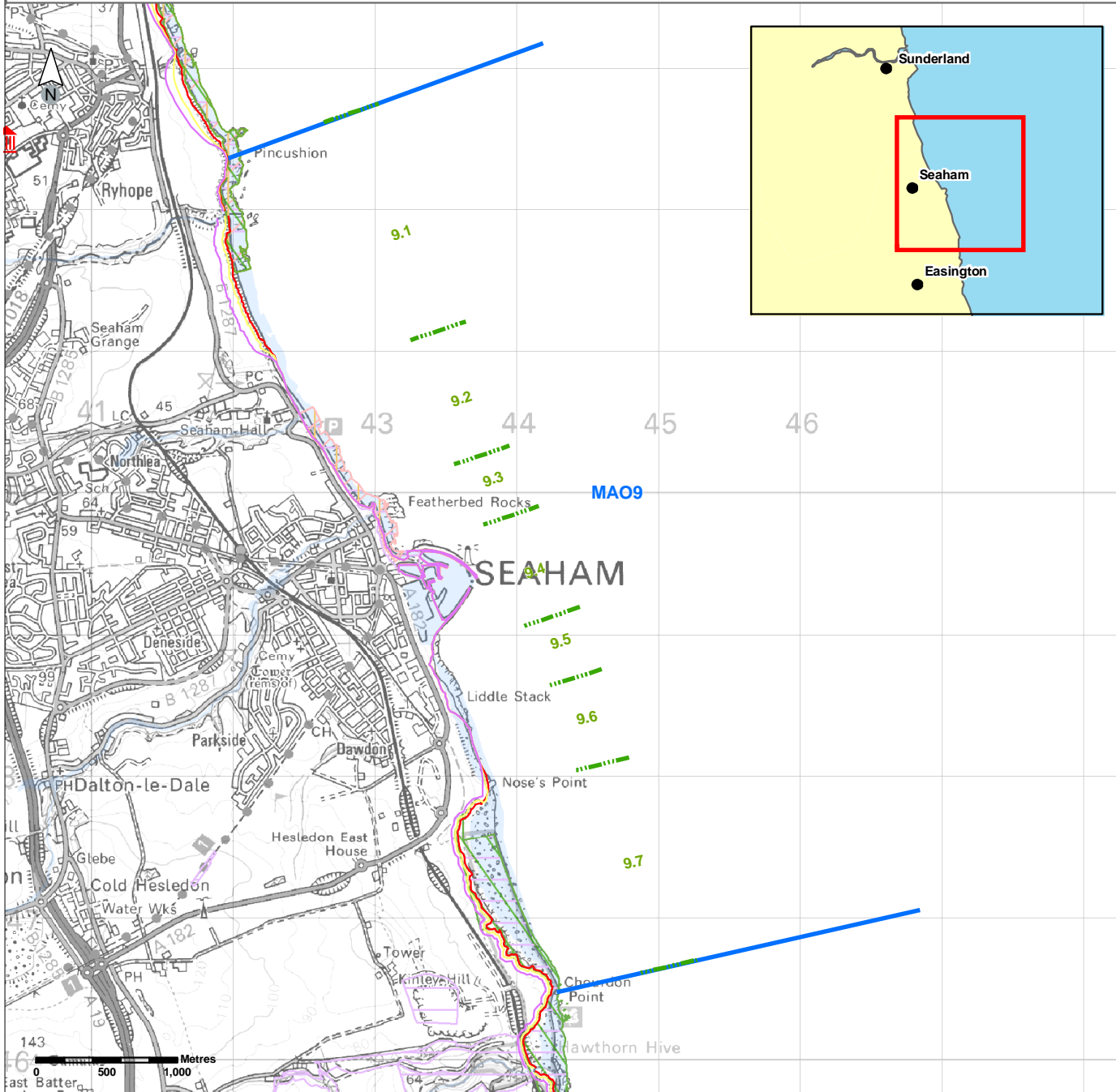
Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	0	2,612	190	2,802
	Preferred Plan Damages £k PV	0	3	3	0
	Benefits £k PV	0	2,609	187	2,796
	Costs of Implementing plan £k PV	10	1013	8	1,031
Costs are based on strategy NAI damages taken from strategy Description of damage and benefits under preferred plan: <ul style="list-style-type: none"> • Loss of agricultural land north of Seaham. • Protects the town and coastal road. • Maintains operation of the Harbour. • Maintains defence to the commercial area south of Seaham. 					
Heritage	No loss of heritage structures.				
Amenity	Potential loss of amenity beach to the north of Seaham..				

POTENTIAL WATER FRAMEWORK DIRECTIVE ISSUES (see Appendix F for details)

Impact on water quality	Yes
Impact of geomorphology and hydrodynamics	Yes

* 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.

**River Tyne to Flamborough Head Shoreline Management Plan
Management Area MA09
Policy Units 9.1-9.7**



POLICY (FOR FULL DETAILS SEE RELEVANT POLICY STATEMENT)

From Present Day:	Medium - Term:	Long - Term:
Defences at Seaham would be maintained. Investigations into potential contamination due to erosion of the cliff south of Seaham	Review management of defences north of Seaham in particular with respect to the transition from the eroding cliff line to the north and the potential reduction in beach levels. Protect the cliffs between Featherbed Rocks and the Harbour. Potentially extend defence towards Noses Point.	Maintain defended areas.

Key:

Predicted Shoreline Mapping*	Management Areas	SPA
Preferred Plan	Policy Units	RAMSAR
20 Years	NNR	SAC
50 Years	SSSI	Scheduled Ancient Monuments
100 Years	EA Flood Zone - Sept 05	



ENVIRONMENTAL ASSESSMENT – PREFERRED PLAN

MANAGEMENT AREA: MA09			
	Description of Designation	Effect of Preferred Plan	Measures to offset effects /impacts Compensation/Mitigation/Alternative Solution
International	Pincushion and Featherbed Rocks (including North Pier of Seaham Harbour) are part of the RAMSAR site and Northumbria Coast SPA. From Nose's Point to Chourdon Point is part of the RAMSAR site.	9.6 Potential contamination of foreshore features due to leaching of contaminants.	Managed retreat based solution with monitoring of contamination to assess risk and investigate the potential of the coast to absorb diffuse pollution is preferable to possible defence works
National	Pincushion, Featherbed Rocks and Nose's Point to Chourdon Point are all part of the Durham Coast SSSI (vegetated coastal magnesian limestone cliffs)	9.6 Potential contamination of SSSI foreshore features due to leaching of contaminants.	Managed retreat based solution with monitoring of contamination to assess risk and investigate the potential of the coast to absorb diffuse pollution is preferable to possible defence works
Local	none	N/A	None proposed

ACTION PLAN FOR MANAGEMENT AREA MA09

Action	By when	Responsibility	Cost £k
Investigate potential contamination	2007	Easington BC	50
Review strategy	2014		25
Monitoring plan <ul style="list-style-type: none"> • beach levels • defence condition 	2006	Easington BC	3 pa
Schemes: No schemes anticipated			