

DUNGENESS TO PETT LEVELS COASTAL HABITAT MANAGEMENT PLAN (CHaMP) – EXECUTIVE SUMMARY

1 INTRODUCTION



The coastal environment is an extremely important natural resource and supports a wide variety of habitats and species. Many sites around the UK coastline, including Dungeness, support significant assemblages of habitats and species which are recognised for their ecological and nature conservation importance through designation under the European Union Habitats and Birds Directives and the Ramsar International Convention on Wetlands.

Both Directives include requirements for the designation of conservation areas. In the case of the Habitats Directive these are Special Areas of Conservation (SACs) which support certain natural habitats or species, and in the Birds Directive, Special Protection Areas (SPAs) which support wild birds of European Union interest. These sites will form a network of conservation areas across the EU to be known as “Natura 2000”.

Coastal Habitat Management Plans (CHaMPs) are being produced to provide a way of fulfilling the UK Governments obligations under the Habitats and Birds Directives and the Ramsar Convention, to avoid damage and deterioration to Natura 2000 and Ramsar sites; particularly when developing Shoreline Management Plans (SMPs) and flood and coastal defence strategies, and planning maintenance and capital works.

The primary functions of the CHaMP is to:

- To offer a long-term (30-100 year) strategic view on the balance of losses and gains to habitats and species of European interest likely to result from sea-level rise and the flood and coastal defence response to it.
- To develop a response to these losses and gains by setting the strategic direction for the conservation measures that are necessary to offset predicted losses. They also identify suitable locations for new habitats that will need to be created and the flood and coastal defence works required to maintain protected habitats.
- Make recommendations to SMPs to ensure flood and coastal defence options address the requirements of the Habitats and Birds Directives.

The Dungeness CHaMP sets out the significance of the European designations and outlines the conservation objectives for the management of the designated interest features occurring in the area. A best guess methodology has been developed which identifies the likely shoreline changes that will occur over the next 30 to 100 years. The geomorphological prediction takes into account predicted climate change and sea level rise over the study time period. An analysis has then been undertaken of the balance of European interests likely to be lost or gained (loss/gain accounting) in order to determine the effect of existing coastal defence policy on the

integrity of the designated European interest features. Throughout this process, for designated features landward of a sea defence, there is a presumption in favour of maintaining the habitat *in situ*. However, where it is apparent that an adverse effect on the ecological integrity of a designated feature could occur, then alternative flood and coastal defence options and the development of suitable replacement habitats have been considered.

The Dungeness and Pett Levels CHaMP includes the following European sites and their constituent SSSIs:

- Dungeness cSAC (Dungeness SSSI, Rye Harbour SSSI)
- Dungeness and Pett Levels SPA (Dungeness SSSI, Rye Harbour SSSI, Camber Sands and Rye Saltings SSSI and Pett Levels SSSI)
- Dungeness and Pett Levels proposed Ramsar site (Dungeness SSSI, Rye Harbour SSSI, Camber Sands and Rye Saltings SSSI, Pett Levels SSSI and Walland Marsh SSSI).

The CHaMP area extends from Cliff End (Pett) in the west to Littlestone-on-Sea in the east (see Figure 1). This covers all of the European designated sites within an integrative “site complex” and defines the area within which the detailed assessments have been undertaken.

2 ECOLOGICAL INTEREST AND DESIGNATED AREAS

The CHaMP area includes two shingle beaches, at Dungeness and Rye Harbour, which have a common origin, and the grazing marshes and arable land lying behind them. Also included is Pett Level grazing marshes, bounded by the Royal Military Canal to the west, the Pannel Valley wetlands and saltmarshes at the mouth of the River Rother.

The distinct beach system at Dungeness with its variations in pebble size, age and exposure to maritime influence has allowed highly unusual vegetation types to develop. Many plant and animal species of restricted distribution occur here. The shingle system at Rye Harbour has similarities to that at Dungeness, though it is far less extensive. Many uncommon species are found associated with the shingle ridge habitats. Invertebrates include scarce and rare species, with moths, true flies, bees, wasps, beetles and spiders especially well represented. Several invertebrate species that breed nowhere else in Britain occur here, including the beetle *Omophron limbatum*, the Sussex emerald moth (*Thalera fimbrialis*) and a subspecies of the grass egg moth (*Lasiocampa trifolii*) which occurs nowhere else in the world.

Natural wetlands within the Dungeness beach system include a succession from species-rich sedge fen, through swamp to sallow carr at the Open Pits, although much of the fen has been lost in recent years. Artificial lakes and islands created through gravel extraction are important for great crested newts, breeding and wintering birds such as terns, but, except at the marshland edge where nutrient levels are higher, have developed limited vegetational interest. Medicinal leeches (*Hirundo medicinalis*) have been recorded at Dungeness, Walland Marsh and Rye Harbour, with the largest known British population occurring on the former site. Grazing marshes are found at Walland Marsh and at Pett Levels. The pastures are grazed mainly by sheep, and the dykes that separate them are of botanical and entomological importance. In places dense beds of common reed (*Phragmites australis*), or, in brackish conditions sea club-rush (*Bulboschoenus maritimus*) occur.

These habitat types either form the ecological interest features of the three international designated sites or support the species populations for which the sites have been designated.

2.1 Dungeness to Pett Level Special Protection Area (SPA)

The Dungeness to Pett Level SPA has been designated under the EU Birds Directive as it is used regularly by 1% or more of the Great Britain population of four Annex I species (Bewick's swan, common tern, little tern and Mediterranean gull) and as it is used regularly by wintering shoveler. In addition, the site supports nationally important of gadwall (*Anas strepera*), pochard

(*Aythya ferina*), sanderling (*Calidris alba*), little grebe (*Tachybaptus ruficollis*), cormorant (*Phalacrocorax carbo*), coot (*Fulica atra*), smew (*Mergellus albellus*), little stint (*Calidris minuta*) and ruff (*Philomachus pugnax*). Consideration is currently being given to including the aquatic warbler as a designated feature of the SPA. The wetland habitats of the Pannel Valley provide a stopover for this species on its autumn migration to Africa. Up to 20 individuals have been recorded, making this the most important site for the species in the UK.

2.2 Dungeness candidate Special Area of Conservation (cSAC)

Dungeness candidate SAC, as designated under the EU Habitats Directive, qualifies as a SAC for the following interests:

- Annex I habitat – perennial vegetation of stony banks ;
- Annex I habitat – annual vegetation of drift lines; and
- Annex II species – great crested newt (*Triturus cristatus*).

2.3 Proposed Dungeness and Pett Levels Ramsar Site

The Dungeness foreland, Rye Harbour and Pett Levels are at present a proposed Ramsar site. The site includes parts of Romney Warren, Dungeness, Walland Marsh, Camber Sands and Rye Saltings, Rye Harbour and Pett Level SSSI's encompassing all of the existing Dungeness and Pett Levels SPA and much of the Dungeness cSAC. The proposed Ramsar site is a wetland that comprises a mosaic of habitats, including shingle beaches, artificial lakes, grazing marshes, intertidal sands and mudflats. It provides breeding and winter habitats for important assemblages of wetland bird species, particularly wildfowl, waders and terns.

3 GEOMORPHOLOGY

The Dungeness area has a highly dynamic geomorphological history, evidence for which has been uniquely preserved in its extensive set of shingle ridges. The shingle for these ridges originated mainly from glacial deposits on the seabed, supplemented with material derived from the erosion of flints from the chalk cliffs to the west. Longshore drift transported the shingle to the east, creating the shingle barrier-beaches that protects the, now reclaimed, marshes of Pett, Walland and Romney. The shingle barrier developed between 6000-5000 yr BP (Before Present), driven primarily by storm activity. The gravel barrier was stable until 2000 yr BP when the orientation of the shingle ridges changed and a cusplate foreland (the "ness") began to develop.

Stratigraphic evidence suggests that marine influence increased as the barrier proceeded to break down 3,000-2,000 yr BP. The breakdown of the shingle barrier and consequent increase in the marine influence to landward was possibly due to a reduction in sediment supply to the barrier, or possibly due to the growing size of the foreland. Evidence suggests that the area was inundated during storm surges in the 13th century. Today the barrier in Rye Bay area is migrating inland, thus exposing previous back-barrier sediments to the foreshore. Further details on the geomorphological history can be found in Appendix 4.1 of the main report.

The area in the vicinity of the cusplate foreland of Dungeness has accreted relatively recently, for example, the land on which Dungeness nuclear power station has been built was formed between 400 and 200 yr before present. Estimates for sediment transport in the early part of the 20th century suggest that there was more erosion on the south coast compared to deposition on the east coast, perhaps due to the construction of coastal works, particularly the Rye harbour mouth development. Estimates of rates of erosion during the construction phase of the nuclear power station in the 1960's indicated landward erosion of 1.1 to 1.5 m of shingle annually.

The recent geomorphology of Dungeness has been dominated by a number of human interventions that have altered and continue to alter the morphology of the coast. The main events responsible for these changes are:

- Construction of shore defences along the coast to the west of Dungeness; these, together with the depletion of seabed shingle deposits, has resulted in a reduction in sediment inputs to the area and caused a change from dominantly drift aligned to a break-down phase in which a swash alignment is now developing;
- Gradual reclamation of the salt marshes of the Rother/Brede through the 19th and early 20th centuries, leading to reduction in tidal prism in the estuary of these rivers and allowing shingle to block the harbour mouth and navigational access;
- Construction of the Rye Harbour terminal groyne and its predecessors, beginning in the 1920s, as a response to the blocking of the harbour mouth by shingle;
- Development of infrastructure, including the village of Winchelsea Beach, sections of Camber and the nuclear power station, in areas at risk from flooding or erosion by the sea; and
- Flood defence construction to protect built assets, including the recycling of shingle on the western shore and at the Ness and a number of secondary flood embankments landward of the shingle and sand dunes at Pett, Camber and Jury's Gap.

3.1 Approach to geomorphological predictions

In order to quantify the geomorphological changes brought about by the interventions listed above, a comparison between maps and a series of aerial photographs has enabled a detailed analysis of changes in the area above HWMST to be made. The model predictions summarised in the Hastings to Folkestone Strategy (HR 1999) and the Halcrow monitoring reports were used to provide quantitative verification of the map evidence.

Comparison of the maps listed above shows that three major areas of coastal change could be defined. For convenience, these three areas will be referred to in the text as follows:

- **The western shore:** Winchelsea to Rye Harbour terminal groyne, characterised by net accretion (existing SMP policy is hold the line);
- **The southern shore:** Camber to the Ness, characterised by net erosion (existing policy is hold the line); and
- **The eastern shore:** Ness to Littlestone, characterised by net accretion (existing policy is do nothing)

It has been concluded, from the analysis undertaken that the retreat of the southern shore of Dungeness is a response to the reduction of sediment input due to the Rye Harbour terminal groyne and coastal defence works further to the west. The almost complete removal of such inputs has meant that the southern shore from Camber to the Ness is now in the breakdown phase of a change from a drift aligned to a swash aligned morphology. This process involves a re-orientation of the shore so as to reduce the wave approach angle, principally from southwest waves. The long term (approximately 1000 years) result of this re-orientation would be an asymmetric bay with its bay-head located along the line of the present Midrips and the western arm extending along the Rye town frontage. It is this ultimate geomorphological end point that must be considered in any assessment of the management options for the Dungeness system.

4 MANAGEMENT OPTIONS AND PREDICTED CHANGES TO DESIGNATED HABITATS AND SPECIES

The main issues raised by the geomorphological analysis of sediment budget and consequent impact on the shoreline are as follows:

- A fundamental and significant decline in sediment input into the Pett-Dungeness frontage;
- The critical nature of the Rye terminal groyne for the sediment transport processes and the resultant geomorphology of the shore;
- The net loss of shingle habitat from the southern shore resulting from the construction and maintenance of the terminal groyne;

- The reclamation of the tidal marshes within the Rye Harbour estuary resulting in a reduction in tidal discharge, increased harbour-mouth sedimentation and, eventually, the construction of the terminal groyne;
- With the terminal groyne in place, the drift alignment along the southern shore can only be maintained by the recycling operations. Once these are removed the coast east of the terminal groyne will have no sediment input and will consequently gradually become swash aligned – that is it will re-orientate until transport rates due to wave action are zero; and
- The juxtaposition of the eroding southern coast and the accreting eastern coast implies that a point of zero coastal change lies between the two areas. Comparison of the 1800 and 1997 maps shows that this zero point has drifted east at a rate of approximately 12m per year. It is around this point that re-orientation of the southern shoreline would occur as it moves towards swash-alignment.

The management issues outlined above suggest a number of interventions or measures that, if implemented, could alter the geomorphological development of the Dungeness coastal system and which, would therefore have implications for flood defence and habitat conservation. For the CHaMP a number of options comprising combinations of identified measures have been tested with respect to this. These are discussed below together with their implications for the designated features of the CHaMP area.

4.1 Option 1 - Do-Nothing

Under the *Do Nothing* option, all existing flood defence management practices, such as recycling, would be stopped. Existing flood defence infrastructure would remain in place but would not be maintained or replaced. Four critical developments follow the introduction of such an option (summarised in Figure 2):

- The probable breaching of the Pett Level shingle ridge and flood embankment resulting in flooding of the grazing marshes forming part of the SPA/Ramsar site and adjoining marshes and Winchelsea Beach village;
- The failure of the Rye Harbour terminal groyne resulting in the release of shingle into the sediment transport pathway, blockage of the Rye Harbour navigation channel and interruption of sand transport processes along the Camber frontage; and
- The probable breaching of the shingle ridge between Camber and Jury's Gap and its secondary flood embankment resulting in flooding of extensive areas of Walland Marsh and low lying areas of Camber village; and
- The failure of the shingle bank at the Power Station resulting in a significant threat to the integrity of the Power Station and associated risk of a major radiological disaster as well as loss of valuable infrastructure.

This option would result in an eventual return to fully dynamic coastal conditions within the area covered by the CHaMP, which would benefit those features which rely on dynamic processes for their formation and maintenance. The annual vegetation of drift line feature would benefit significantly (gain of approximately 4km of unmanaged shoreline) as existing management measures (recycling and re-profiling) used to ensure the maintenance of the flood defence standard would cease. There would be an overall loss of perennial shingle vegetation (-136ha over 100 years), with the erosion of habitat from within the designated cSAC being partly counterbalanced by accretion along the eastern shore (overall change of -85ha). The main habitat loss under this option would be grazing marsh habitat at Pett Levels and Walland Marsh. Of this 100% of existing SPA and pRamsar designated marsh at Pett Levels would be affected and approximately 300ha at Walland/East Guldeford Level. The greatest impact would be on designated pRamsar site interests, which include all wetland habitat and in particular the freshwater dyke systems of Pett Levels, which support a number of rare plants and invertebrates. With respect to the designated features the following impacts are predicted:

Annual vegetation of drift lines – significant increase in linear extent (4km) of unmanaged active shoreline would benefit the development of this community the extent being dependent on the scale of changes in management practice. No impact on the integrity of the feature.

Perennial Vegetation of Stony Banks – loss of 85ha after 100 years would be expected, (loss to erosion of 136ha counteracted by a gain due to accretion of 51ha). Adverse impact on the integrity of the feature due to overall loss of habitat and potential change in community structure.

Great Crested Newt – there would be no loss of freshwater habitat at Dungeness which supports this species. The loss of perennial shingle vegetation would be unlikely to affect this species due to its preference for other types of habitat for hibernation. The consequence of the potential loss of freshwater habitat at Rye Harbour and Pett Levels on this species is unknown, but potentially any populations using these waterbodies would be adversely affected.

Designated SPA species – no impact on existing populations of wintering Bewick's swan, breeding Mediterranean gull or common tern. A small reduction in wintering shoveler population might be expected due to the loss of Pett Pools, but this change would probably be within the normal variation in numbers displayed by this species and suitable habitat is available at Dungeness. Breeding little tern may be adversely affected due to the loss of habitat used as a breeding area at Rye Harbour. However, disturbance and predation pressure may be the limiting factors rather than available habitat area. Accretion of shingle habitat along the eastern shore could provide additional habitat area for this species. Freshwater habitat in the Pannel Valley used by aquatic warbler on passage would be lost with a consequent adverse impact on this species. With respect to the SPA as a whole it is therefore considered that there would be an adverse affect on the integrity of aquatic warbler with all other species populations being maintained.

Ramsar interests – loss of vegetated dyke system with associated rare plants and invertebrates at Pett Levels and Walland Marsh.

Required Mitigatory Measures

1. To counteract the loss of perennial shingle vegetation, an area of similar size and value would need to be created. This would have to be undertaken within and as part of the existing sediment system and in an area where the additional habitat would be stable in the longer term (>100 years). Material for the creation of the area could not be derived from the existing resource and could not be utilised in such a manner that it would also have a coastal defence benefit as this would constitute an operational activity (i.e. habitat creation should not in itself have a coast defence function). As such the only location for the creation of shingle habitat would be on the eastern side of Dungeness where shingle sediment naturally accretes at the present time and would be likely to continue to do so. It is suggested that the shingle would have to be derived from offshore (marine) sources and be placed at the southern end of the eastern coastal section for natural transport and accretion along the frontage. This would enhance the natural accretion of sediment that would occur as a result of the erosion of sediment from the southern shore of Dungeness and from the Rye Harbour frontage.

It is considered unlikely that perennial shingle vegetation similar to that which would be lost from along the southern part of Dungeness and from Rye Harbour would develop given the differing physical conditions, sediment characteristics and timescale of the operation. However, if sediment feed were undertaken over a prolonged time period, potentially natural accretionary processes could be mimicked enabling a more natural structure to develop. Vegetation could be allowed to develop without intervention or management measures introduced to try and develop a community structure as similar to that lost from other parts of the site.

2. In order to offset the loss of the pRamsar designated interests of the Pett Levels and Walland Marsh grazing marsh an area of equal (or enhanced) value would need to be created. The most appropriate mechanism to undertake this would be through the improved

management/creation of an existing area of agricultural land preferably established grassland. Given the potential inundation under this option of large areas of existing agricultural land that could be suitable for grazing marsh creation, suitable areas are limited. Water levels would require raising and agricultural practices changed to improve water quality to a level that will enable vegetation to develop. In addition, open water pools could be created to replace those lost at Pett Pools. These might provide suitable habitat for wintering shoveler and compensate for the potential reduction in the wintering population due to the loss of Pett Pools.

3. For breeding little tern management measures could be implemented to ensure that suitable sites within the CHaMP area were maintained disturbance and predator free in order to encourage breeding colonies to develop.

4.2 Option 2 - Hold the Line: maintain existing management practices

Under this option all existing management practices, flood defence structures and the Rye Harbour terminal groyne would be retained indefinitely. Re-profiling of the shingle ridge as presently carried out would also be retained. This option effectively constitutes the preferred policy option put forward in the Folkestone to Hastings SMP.

Identified issues associated with this option include (summarised in Figure 3):

1. The recycling process results in the prevention of natural habitat colonisation of 2ha of potential perennial shingle habitat at the Ness extraction site and a further 1ha at the Rye Harbour terminal groyne extraction site
2. Re-profiling the shingle shore-face results in potential damage to annual vegetation of drift lines between Cliff End and the terminal groyne and between Jury's Gap and the Power Station. The area affected within the designated boundary of the cSAC is in the order of 4km, as the Cliff End re-profiling operation takes place outside of the cSAC. This would not alter with continued maintenance of this operation over the 30-100 year timescale covered by the CHaMP.
3. The loss of perennial shingle habitat on the southern shore due to the ongoing maintenance of the Rye Harbour terminal groyne and the recycling process is estimated to be ~0.5ha. The annual gain in perennial shingle vegetation presently occurring on the west and east shores is predicted to continue under this option, with a total gain of 0.02ha (west shore) and 0.2ha (east shore).

With respect to the designated features the following impacts are predicted:

Annual vegetation of drift lines – The existing operation of re-profiling and extraction of shingle for recycling may be damaging the annual vegetation of drift line interest feature, or not allowing it to attain its full ecological structure, along part of the southern coastal frontage within the cSAC (approximately 4km of coast). Continuation of existing practice would not alter this situation and unless it is determined that the existing practice is having an adverse effect on the integrity of this feature then there would be no future adverse impact.

Perennial Vegetation of Stony Banks – an overall loss of 34ha (over 100 years) due to erosion of shingle habitat from the southern shore not being balanced by accretion on the eastern shore. This represents approximately 1.5% of the total shingle present at Dungeness and Rye. It is likely that this loss would represent an adverse effect upon the ecological integrity of this designated feature.

Great Crested Newt – no loss of suitable breeding and hibernating areas and therefore no impact on integrity of feature.

Designated SPA species – no impact on existing populations of SPA qualifying species or the habitats that support them.

Ramsar interests – no loss of pRamsar designated interests.

Required Mitigatory Measures

The loss of perennial vegetation from the southern shore of the Ness would require offsetting. The creation of additional shingle habitat would have to be achieved through the importation of shingle from outside of the existing system. This measure is discussed in more detail in Option 1 and Option 2a.

4.3 Option 2a - Alternative management practices

This option involves maintenance of the re-cycling programme but with three modifications (summarised in Figure 4):

- Reduce the annual volume of re-cycled sediment;
- Seek an alternative source outside the Dungeness designated area (a marine source); and
- Remove the re-profiling operations on the shingle shore-face.

The reduction in the volume of shingle re-cycled between the Ness and the Jury's Gap and Power station placement sites may be possible without loss of flood defence integrity. Since this shoreline is currently in the process of clockwise re-orientation towards a swash alignment it may be proposed that an anti-clockwise re-orientation will increase the drift rates. Re-cycling involves the progradation of the beach leading to a slight anti-clockwise re-orientation. As a result the more material that is re-cycled the greater the drift rate. This positive feedback process may be the reason for the excellent correlation between beach feeding volumes and subsequent return to of the sediment to the extraction site. A reduction of the volumes to a minimum value, probably close to the present annual erosion rate of 33,000m³ may therefore not involve any increase in this erosion rate. The gain in habitat involved would be minor, involving only a reduction in area of the extraction site (a possible 1ha gain in perennial shingle habitat) but would reduce costs. Maintenance of the terminal groyne would still involve loss of habitat as detailed above for the maintain the line option.

Re-sourcing the re-cycled shingle from a marine site would provide major perennial shingle habitat gains on the eastern shore. The area of gain depends on the volume of sediment extracted, which is limited only by availability and cost. However, as a guide, if the present levels of recharge were continued using marine-sourced sediment, gains of 2ha per year of perennial shingle habitat would accrue on the eastern shore or between 60 and 200ha over the 30 to 100 year period of the CHaMP. These gains would be confined to the eastern shore since, unless the terminal groyne is extended seawards indefinitely, any recharge from external sources on the western shore would be transported around the end of the terminal groyne and subsequently along the southern shore. This process could result in blockage of the navigational access to Rye Harbour.

Annual vegetation of drift lines – improvement to management of 4km of shoreline with a return to more 'natural' active beach processes.

Perennial Vegetation of Stony Banks – the sourcing of shingle from an offshore site for the re-cycling operation could lead to the creation of up to an additional 200ha of perennial shingle habitat over a 100 year period. This would have obvious benefits with respect to this interest feature.

Great Crested Newt – no loss of suitable breeding and hibernating areas and therefore no impact on integrity of feature.

Designated SPA species – no impact on existing populations of SPA qualifying species or the habitats that support them.

Ramsar interests – no loss of Ramsar designated interest.

Required Mitigatory Measures

None required as mitigation for the erosion of shingle from the southern shore is already built into the option.

4.4 Option 3 - Managed retreat: removal of the terminal groyne

The construction of the Rye Harbour terminal groyne in the early 1920s has been identified as one of the most significant events in the modern geomorphological history of Dungeness. The severance of the sediment transport pathway from west to east resulted in accelerated erosion of the south shore and the necessity for the recycling programme around the Ness. The retreat of the Camber to Ness shoreline has led to the formation of a re-entrant bay with a sharp disjunction along the terminal groyne. This provides a major tension in the coastal system and one that can only be managed by continual maintenance of the terminal groyne.

The rapid reduction in gross shingle inputs to the Dungeness system over recent years means that the terminal groyne is no longer retaining new sediment inputs but merely preventing shingle already in the system from moving eastwards.

Removal of the terminal groyne may allow this shingle to move across to the south shore and reduce the erosion of shingle from the south shore preventing loss of ~2ha of perennial shingle vegetation per year. The erosion of the shore to the west of the terminal groyne would result in a loss of ~2ha per year, but would, ultimately, allow development of a conformable bay that would subsequently retreat to its swash-aligned morphology. Removal of the terminal groyne could result in:

- Blockage of the Rye Harbour navigation channel with shingle; and
- Failure of the Pett Level shingle ridge and flood embankment and flooding of Pett Levels (SPA/Ramsar site) and Winchelsea Beach village.

In order to prevent these negative impacts and to allow a more stable coastline to form, the option under consideration here would need to involve the following (as summarised in Figure 5):

- Removal of the terminal groyne;
- Set up a shingle bypass system across the Rye Harbour outfall using a permanently deployed dredger that would move shingle across the channel to Broomhill beach (Camber Sands would therefore be unaffected);
- Provide a secondary defence within Pett Levels to allow an asymmetric bay to develop between Winchelsea Beach and Cliff End; and
- Provide a secondary defence within the Walland Marsh Ramsar site, following the existing Wainway and Kentpen Walls but extending these to provide a defence along the northern boundary of Camber Village.

Under this Option, shingle would erode from the area immediately west of the terminal groyne and nourish the south shore, removing the necessity for recycling. It is estimated that this erosion would continue for 130 years before the 1800 coastline was re-established. By this time, it is understood that there is a significant possibility that Dungeness Power Station would have been decommissioned and the threat of a major radiological incident due to loss of the station would be avoided. Thus it would be possible to allow the entire beach system at Dungeness to retreat.

Camber village represents a major problem under any option to allow a natural shoreline to form once erosion of the western shingle deposits ceases (i.e. after 130 years). The southern shore would begin to retreat at approximately 2m per year. All the domestic houses, holiday infrastructure and coastal road are located within 700m of the present HWMST, indicating that they will be at risk from erosion and flooding within 200 years of the cessation of shingle inputs or

within 300 years of removal of the terminal groyne. However, given the duration of this period it should be possible to undertake long term planning to enable the assets at Camber to be relocated inland.

The shingle ridge at Pett Level would probably breach within <50 years of the removal of recycling. The construction of a secondary defence would prevent flooding of much of the designated area of the SPA although potentially the loss of an area of up to 175ha (depending on the location of the secondary defence) could occur. The breach would allow tidal flooding over this area and a salt marsh and associated tidal lagoon would form as has recently occurred at Porlock Bay in Somerset following breach of the shingle barrier fronting low-lying agricultural land.

Significant features of this option would result in:

- The loss, of perennial shingle habitat from west of the terminal groyne but a proportion of this shingle would, however, move eastward and ultimately be deposited on the eastern shore with a commensurate gain;
- The loss of the existing little tern breeding site at Rye Harbour. However, potentially, birds could relocate to landward as the shore migrated or possibly new habitat on the eastern shore would provide a suitable breeding area in the longer term;
- The movement of shingle from the erosion site west of the terminal groyne along the south shore would reduce erosion rates there. While this cannot be regarded as a habitat gain when compared to the existing management regime, it does provide a more sustainable approach to the management of this section of the system;
- Breaching the Camber to Jury's Gap dune ridge would result in flooding of the Walland Marsh section of the proposed Ramsar site. The extent of this flooding could be contained by a secondary defence. None of this area lies within the cSAC or SPA;
- The probable change in habitat of part of the Pett level SPA/pRamsar site located within the secondary defence would represent a loss of Ramsar designated grazing marsh and a gain in inter-tidal habitat. The Ramsar interest that would be lost comprises freshwater dyke plant and invertebrate communities; and
- Open water sites on Pett Level and at Rye Harbour would be lost totalling 5ha. This would result in the loss of available wintering habitat for the shoveler population that use Pett Levels and possibly a reduction in available breeding habitat for common tern at Rye Harbour.

Under this option, although some initial maintenance work would be needed (probably within the first 50 years) the ultimate coastal system would be self-maintaining with no requirement for re-nourishment from internal or external sources, so that the option offers strong sustainability).

Part of the Pett Levels and Walland Marsh Ramsar site would be lost through retreat to a new defence line at both locations. As not all of the existing area within the Ramsar site would be lost it might be possible to retain some of the existing interest (dyke vegetation and associated invertebrate communities). The actual impact on the designated interest would therefore vary depending on how much of the freshwater dyke interest could be retained, as it is not entirely reliant on extent of area for its maintenance. However, given that half of the existing site would be lost it is likely that the option would have an adverse impact on the integrity of the designated Ramsar interests.

Annual vegetation of drift lines – significant increase (4km) in linear extent of unmanaged active shoreline would benefit the development of this community.

Perennial Vegetation of Stony Banks – there would be an increase of approximately 80ha of shingle habitat due to accretion along the eastern shore with material being derived from the retreat of the western shore and some continued erosion along the southern shore.

Great Crested Newt – there would be no loss of freshwater habitat at Dungeness which supports this species. The loss of established perennial shingle vegetation along the western and southern

shores would be unlikely to affect this species due to its preference for other types of habitat for hibernation. The consequence of the potential loss of freshwater habitat at Rye Harbour and Pett Levels on this species is unknown, but potentially any populations using these waterbodies would be adversely affected.

Designated SPA species – no impact on existing populations of wintering Bewick's swan, breeding Mediterranean gull or common tern. A small reduction in wintering shoveler population might be expected due to the loss of Pett Pools, but this change would probably be within the normal variation in numbers displayed by this species and suitable habitat for the relocation of birds is available at Dungeness. Breeding little tern may be adversely affected due to the loss of habitat used as a breeding area at Rye Harbour. However, disturbance and predation pressure may be the limiting factors rather than available habitat area. Accretion of shingle habitat along the eastern shore could provide additional habitat area for this species. Freshwater habitat in the Pannel Valley used by aquatic warbler on passage would be retained. With respect to the SPA as a whole it is therefore considered that there would be no adverse affect on the integrity of the designated species.

Ramsar interests – partial loss of vegetated dyke system with associated rare plants and invertebrates at Pett Levels and Walland Marsh.

Required Mitigatory Measures

1. In order to offset the loss of the pRamsar designated interests of the Pett Levels and Walland Marsh grazing marsh an area of equal (or enhanced) value would need to be created. The most appropriate mechanism to undertake this would be through the improved management/creation of an existing area of agricultural land preferably established grassland. Water levels would require raising and agricultural practices changed to improve water quality to a level that will enable vegetation to develop. In addition, open water pools could be created to replace those lost at Pett Pools. These might provide suitable habitat for wintering shoveler and compensate for the potential reduction in the wintering population due to the loss of Pett Pools.

2. For breeding little tern management measures could be implemented to ensure that suitable sites within the CHaMP area were maintained disturbance and predator free in order to encourage breeding colonies to develop.

4.5 Option 4 - Managed retreat: retreat to 1800 coastline

Under this Option the proposal to remove the terminal groyne (see Option 3) is modified to allow more control over the retreat process. The main elements of the option (as summarised in Figure 6) are:

- Continue beach nourishment along both west and south shores using the shingle deposits west of the terminal groyne. The shingle would be moved by barge across the Rye Harbour mouth (to feed the southern shore) and by lorry, as at present, to the Cliff End site. Reduction in impact of lorries on the shingle habitat at the Ness would result;
- Shingle extraction would be confined to the winter period thus reducing impacts on Little Tern nesting sites;
- Use of this shingle source provides approximately 130 years of beach nourishment and at the same time allows controlled retreat of this western shore to the 1800 shoreline, enabling the re-establishment of a conformable coastal system as outlined in section 5.7 above;
- Once the shingle source has been exhausted, after 130 years, natural erosion of the shingle ridge between Cliff End and Rye harbour and between Jury's Gap and the Ness would be initiated;
- Depending on the timescale for decommissioning it is likely that after 100 years, the Power Station would no longer require defending; and
- A secondary defence would be constructed within the Pett Level SPA and the Walland Marsh Ramsar site, as outlined for the previous option. This would involve loss of approximately

175ha of grazing marsh within the Pett Level SPA but would result in a gain of 175ha of marine and inter-tidal habitat.

Under this option, the erosion of shingle from along the western shore would result in the transport of sediment to the east. This shingle would block the Rye Harbour navigation channel. This could be prevented by increasing the tidal discharge from the Rother estuary through the restoration of areas of reclaimed former intertidal areas. This would, in effect, return the system to its 18th century configuration when, according to maps and charts of the time, the navigation channel was kept open to the sea as a result of the large tidal incursion into the extensive intertidal area that then bordered the Rother. Preliminary calculations suggest that an increase in tidal velocity, sufficient to initiate shingle transport, would require approximately 25ha of inter-tidal area to be added to the Rother. The reclaimed salt marsh south of the Martello Tower would provide such an area and could be restored using the existing bridge and sluice across the shore road. Northpoint lake, on the northern side of the Rother, would also provide the necessary inter-tidal area and would require only to be reconnected to the estuary channel. Either of these restoration schemes would remove the necessity for a terminal groyne and would allow a tidal delta to develop similar to that present in the 18th century.

Once the 1800 shoreline was re-established under this option, the shore would begin to retreat towards a swash-alignment. The asymmetric bay formed by this process would extend from Winchelsea Beach to the Ness with the bay-head being located at Midrips. Camber village would be at risk from flooding and erosion within the next 100 to 300 years. This time scale should be sufficient to allow for the relocation of assets. Camber village remains however one of the more difficult issues in any option intended to develop a sustainable, natural coastal system at Dungeness.

Significant features of this option would result in:

- The loss, of perennial shingle habitat from west of the terminal groyne. A proportion of this shingle would, however, move eastward and be deposited on the eastern shore with a commensurate gain in shingle habitat;
- The loss of habitat at Rye Harbour currently utilised by breeding little tern. Potentially, birds could relocate to landward as the shore migrated or possibly new habitat on the eastern shore would provide a suitable breeding area in the longer term. The success of a tern colony under this scenario would also depend on other factors such as human disturbance and predation levels being maintained at a low level;
- The movement of shingle from west of the existing terminal groyne along the south shore would reduce erosion rates along this section. While this cannot be regarded as a habitat gain when compared to the existing management regime, it does provide a more sustainable approach to the management of this section of the system;
- The eventual breaching the Camber to Jury's Gap dune ridge would result in flooding of the Walland Marsh section of the proposed Ramsar site. The extent of this flooding could be contained by a proposed secondary defence. None of this area lies within the cSAC or SPA;
- The change in habitat of part of the Pett level SPA/pRamsar site located seaward of the proposed secondary defence would represent a loss of Ramsar designated grazing marsh (freshwater dyke plant and invertebrate communities) but a gain in intertidal and marine habitat;
- Open water sites on Pett Level and at Rye Harbour would be lost totalling 6ha. This would result in the loss of available wintering habitat for the shoveler population that use Pett Levels and possibly a reduction in available breeding habitat for common tern at Rye Harbour; and
- Creation of an area of intertidal habitat within the floodplain of the Rother (approximately 25ha). If Northpoint Lake were utilised as the retreat site this would result in the loss of open water (freshwater) habitat from within the existing designated SPA/pRamsar site. The lake is used as a feeding area by terns and by wintering waterfowl.

Under this option, although some initial maintenance work would be needed (probably within the first 50 years) the ultimate coastal system would be self-maintaining with no requirement for re-nourishment from internal or external sources, so that the option offers strong sustainability).

This represents a potential solution to dealing with the effect that the Rye Harbour terminal groyne has on the nearshore coastal processes and therefore the potential impacts are similar to those outlined for the previous option.

The creation of approximately 25ha of intertidal habitat along the River Rother would contribute towards the overall ecological interest of the CHaMP area. However, if Northpoint Lake was used as the retreat site there could be some impact on the interests of the SPA as this waterbody forms part of the designated area. Its main use would appear to be as a feeding area for terns, although it is also used by waterfowl during the winter period. Its change from freshwater to intertidal would probably not lead to a loss of available feeding resource for terns, but could impact on wintering waterfowl (shoveler).

Annual vegetation of drift lines – significant increase in linear extent of unmanaged active shoreline would benefit the development of this community.

Perennial Vegetation of Stony Banks – overall loss of 56ha of this habitat feature from within the cSAC. This would constitute an adverse impact on the integrity of the feature due to overall loss of habitat and potential change in community structure.

Great Crested Newt – there would be no loss of freshwater habitat at Dungeness which supports this species. The loss of established perennial shingle vegetation along the western and southern shores would be unlikely to affect this species due to its preference for other types of habitat for hibernation. The consequence of the potential loss of freshwater habitat at Rye Harbour and Pett Levels on this species is unknown, but potentially any populations using these waterbodies would be adversely affected.

Designated SPA species – no impact on existing populations of wintering Bewick's swan, breeding Mediterranean gull or common tern. A small reduction in wintering shoveler population might be expected due to the loss of Pett Pools, but this change would probably be within the normal variation in numbers displayed by this species and suitable habitat for the relocation of birds is available at Dungeness. Breeding little tern may be adversely affected due to the loss of habitat used as a breeding area at Rye Harbour. However, disturbance and predation pressure may be the limiting factors rather than available habitat area. Accretion of shingle habitat along the eastern shore could provide additional habitat area for this species.

Ramsar interests – partial loss of vegetated dyke system with associated rare plants and invertebrates at Pett Levels and Walland Marsh.

Required Mitigatory Measures

1. To counteract the loss of perennial shingle vegetation, an area of similar size and value would need to be created. This would have to be undertaken within and as part of the existing sediment system and in an area where the additional habitat would be stable in the longer term (>100 years). The only location for the creation of shingle habitat would be on the eastern side of Dungeness where shingle sediment naturally accretes at the present time and would be likely to continue to do so. For further comments on this potential measure see Section 6.1.

2. Improved management/creation of an area of grazing marsh to support dyke vegetation lost from Pett Levels and Walland Marsh. Many suitable areas exist on other parts of Walland Marsh and to the north of Winchelsea. Water levels would require raising and agricultural practices changed to improve water quality to a level that will enable vegetation to develop. In addition, open water pools could be created to replace those lost at Pett Pools. These might

provide suitable habitat for wintering shoveler and compensate for the potential reduction in the wintering population due to the loss of Pett Pools.

3. For breeding little tern management measures could be implemented to ensure that suitable sites within the CHaMP area were maintained disturbance and predator free in order to encourage breeding colonies to develop.

5 CONCLUSIONS

The broad-scale assessment of the various options shows that there are potential adverse and beneficial impacts associated with each option.

All of the four investigated management options lead to some degree of loss of designated cSAC, SSSI and SPA area. The largest expected loss would be to the SPA/pRamsar resulting from the Managed Retreat version 2 Option; this loss would represent about 8% of the designated SPA area.

Small gains (<5% of total area) can be identified for perennial vegetation for the Hold the Line and Managed Retreat version 1 Options, whereas small losses (<5%) are predicted with the other two management Options. The majority of the loss of shingle habitat would occur to the west of the Rye Harbour Terminal Groyne either due to use of material for renourishment or through natural erosive processes following failure of the groyne (predicted loss of between 14 to 34% of this area of the SPA/cSAC under all management Options except for Hold the Line.

Continuing with existing policy (Hold the Line), and operational practice in its implementation, has a limited impact on the integrity of the designated sites, the main impact being a loss of perennial shingle habitat. Potentially, this loss could be compensated for through the introduction of shingle from a source outwith the Dungeness sediment transport system. If such a measure were undertaken there would potentially be no loss of habitat and consequently no loss of ecological function or integrity. Under this simplified approach to management, this option is therefore acceptable. Similarly, changes to the existing management regime, including the use of non-Dungeness sourced shingle for recycling would maintain and enhance the existing habitats and ecological interest of the CHaMP area.

However, this overall policy approach should be viewed within the context of sustainability and within the wider framework of other physical (and therefore potential ecological) forcing mechanisms (e.g. climate change). Clearly, continued management through recycling of shingle and/or introduction of shingle from a new source would not represent the 'true' functioning of dynamic processes along this section of coastline, as existing impediments (e.g. the Rye Harbour Wall) would still be in place. However, it could be viewed that the Dungeness cSAC and SPA were designated on the basis of the existing policy and operations and therefore intervention, regardless of its sustainability, is part of the overall ecological management regime for the site.

Conversely, the stance could be taken that ecological function would be better served through allowing nature to take its course and for dynamic processes to operate fully. From a management perspective this represents a much more long-term and sustainable approach that would enable ecological response to forcing mechanisms such as climate change. Such an approach would, however, require short-term and relatively drastic management measures, which in themselves would need to be viewed against the outcomes (with respect to nature conservation interests). Clearly the Do Nothing and Retreat options, as discussed above, would result in large-scale coastal change in the Pett and Camber area. Whilst, from a coastal defence and ecological sustainability perspective these options are beneficial, they obviously have major implications for the socio-economic interests of the local area. Such aspects would need to be seriously considered through the Shoreline Management Planning process.

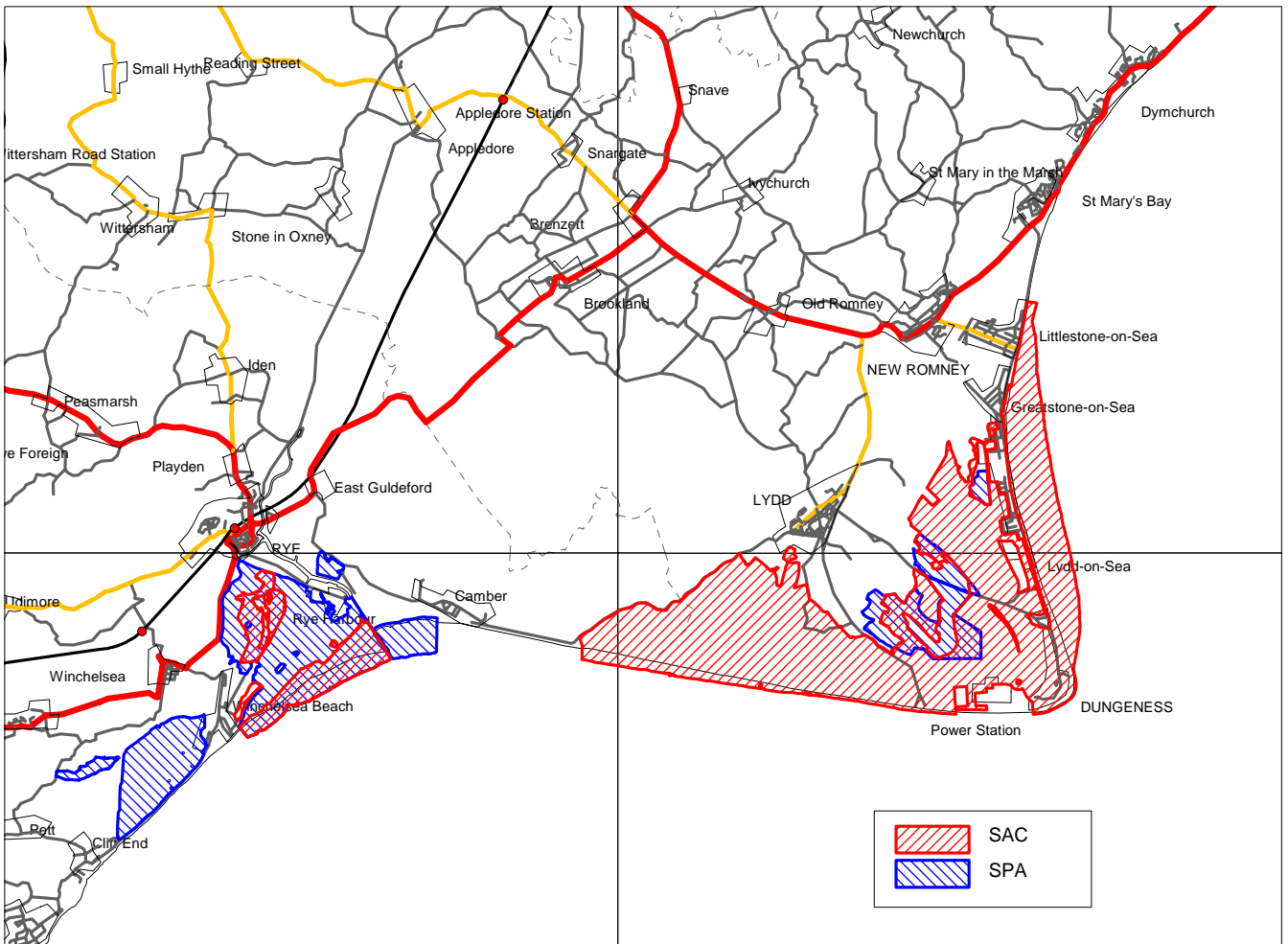


FIGURE 1 – Map showing location of the Dungeness-Pett CHaMP area and extent of the designated cSAC and SPA

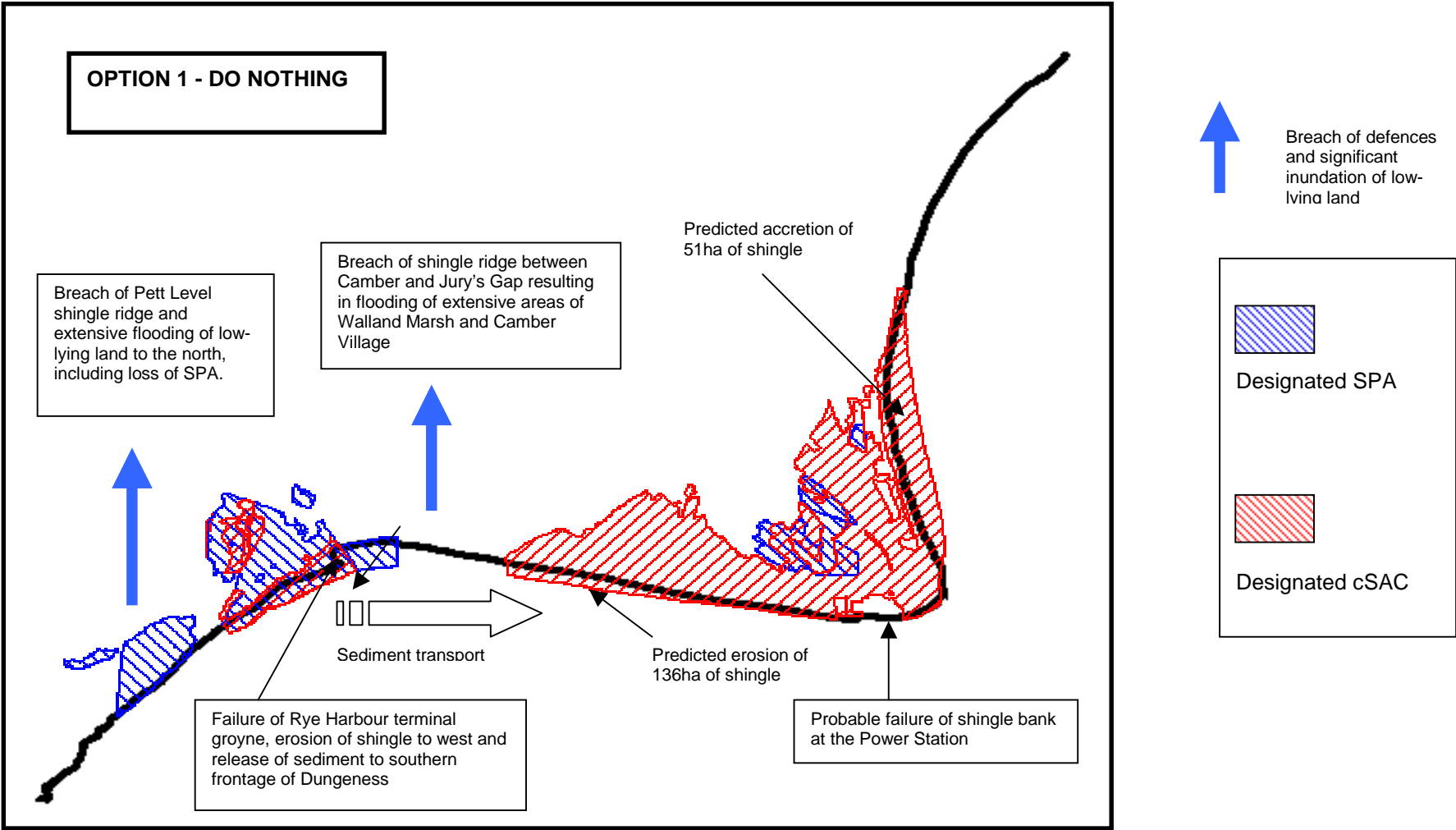


FIGURE 2. Summary of the predicted consequences of the Do Nothing option

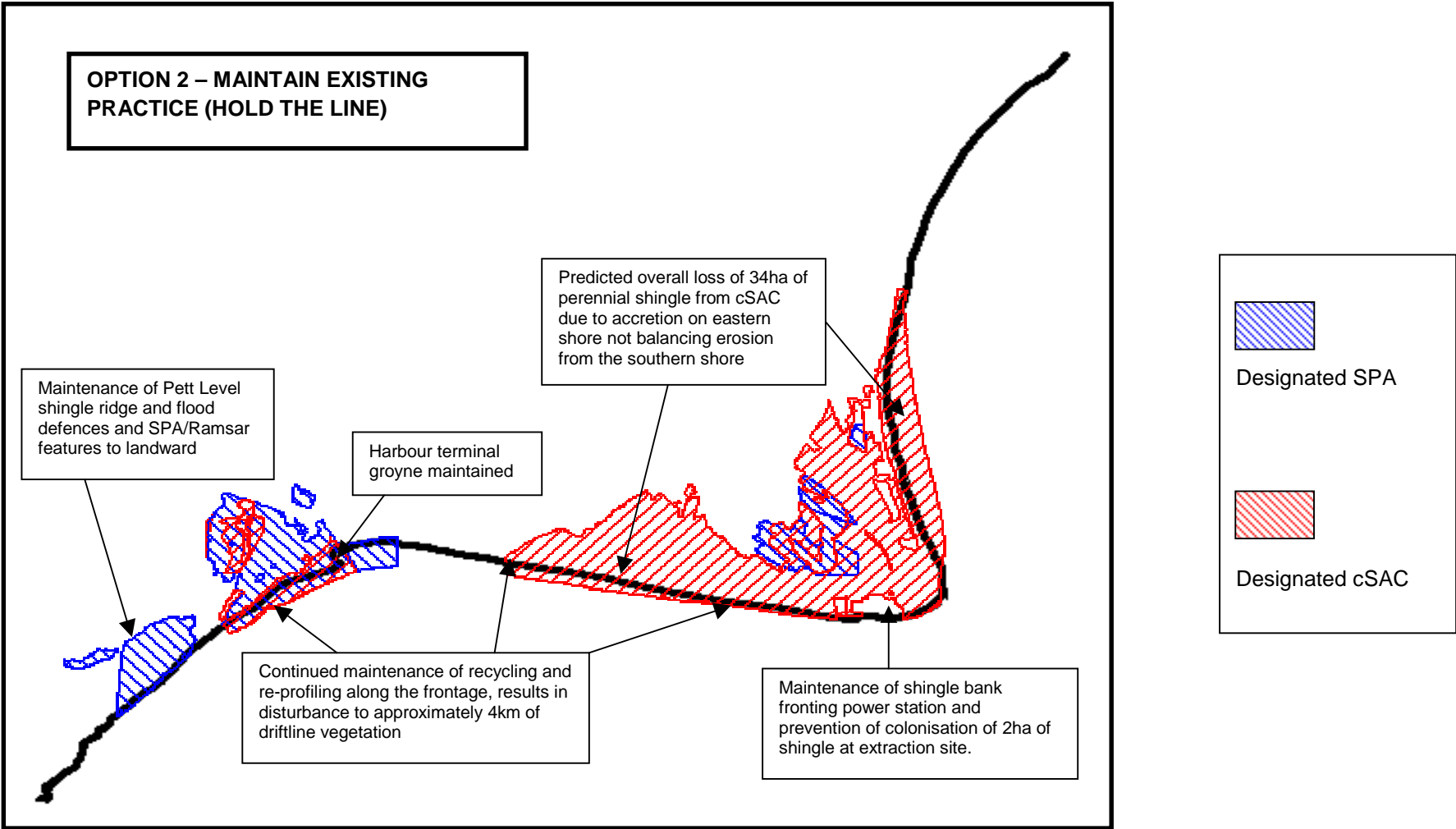


FIGURE 3. Summary of the predicted consequences of the Maintain Existing Practice option

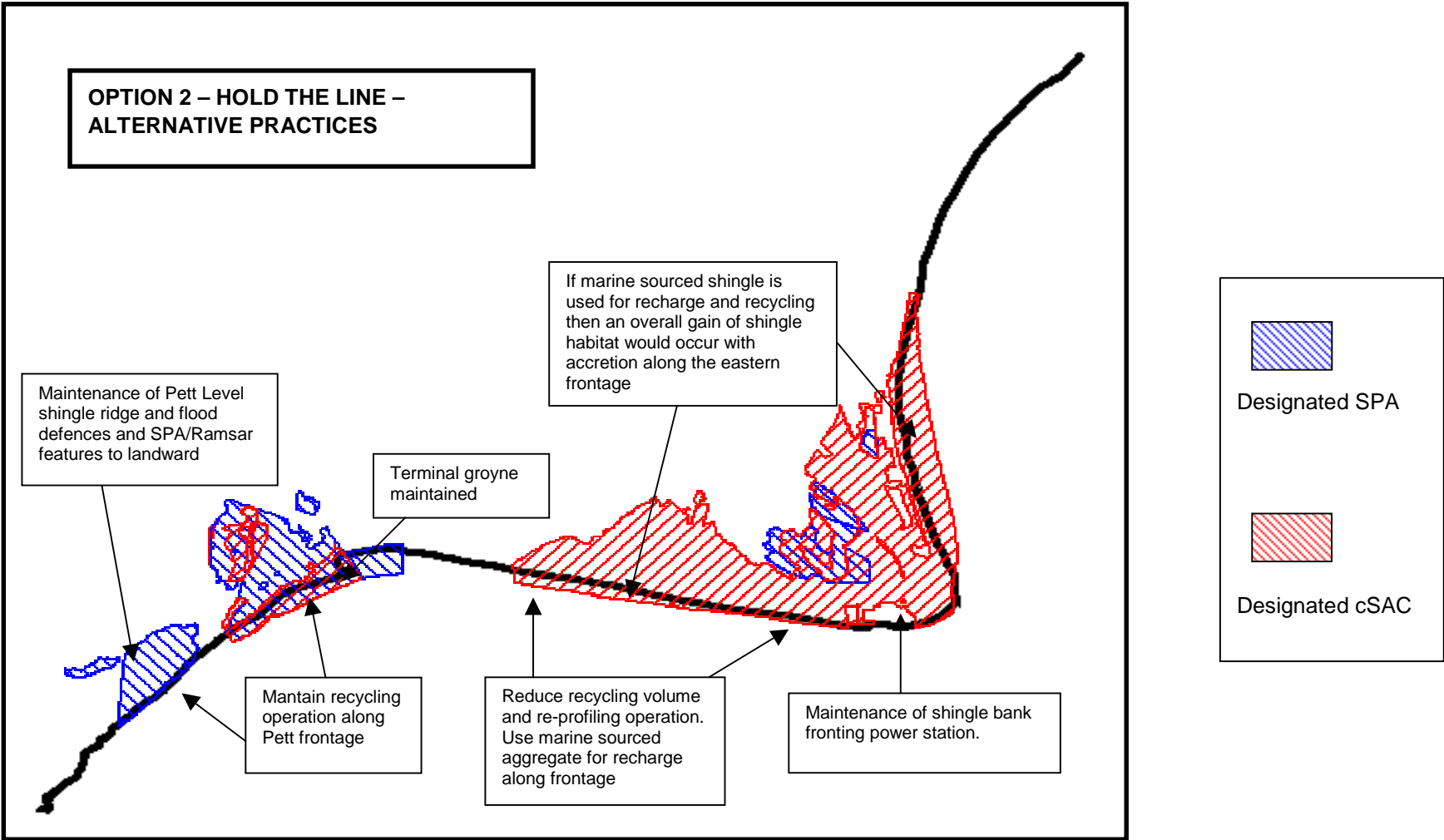


FIGURE 4. Summary of the predicted consequences of the Hold the Line alternative practices option

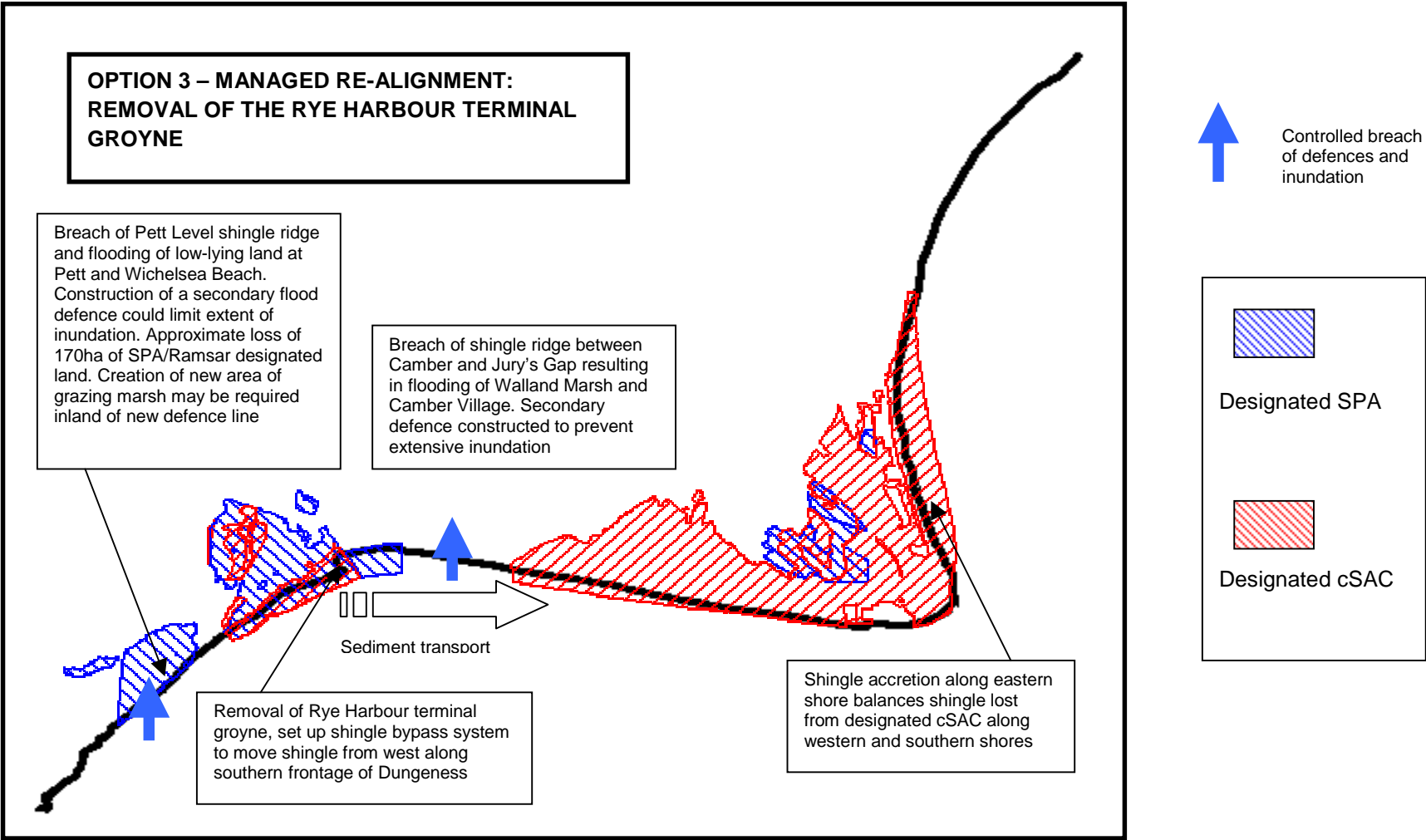


FIGURE 5. Summary of the predicted consequences of the managed realignment (removal of terminal groyne) option

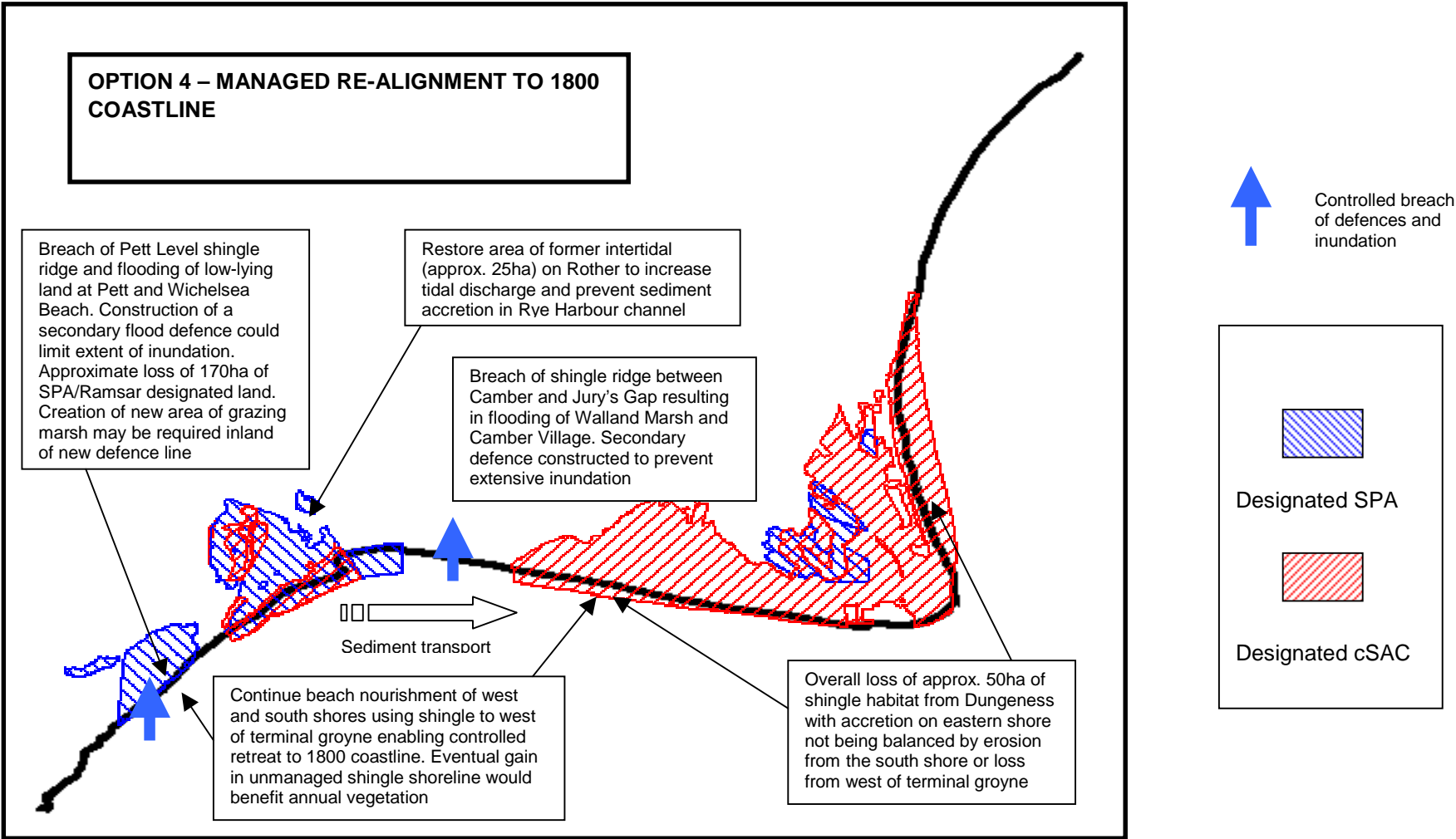


FIGURE 6. Summary of the predicted consequences of the managed realignment to the 1800 coastline option