



Slapton Coastal Zone Management Main Study

Volume 3: Phase 2 Report

Prepared by Scott Wilson
with Slapton Line Partnership



August 2006

DOCUMENT APPROVAL FORM

Document Title: Slapton Coastal Zone Management Main Study

Volume 3: Phase 2 Report

Author: Scott Wilson

Amendments Record and Author Approvals:

Version	Date	Description	Prepared	Reviewed	Approved
1	June 2005	Draft	Scott Wilson	D C Dales	D C Dales
1.1	September 2005	Minor amendments following technical group meeting	Scott Wilson	D C Dales	D C Dales
2	September 2005	Minor amendments following Advisory Forum meeting	Scott Wilson	D C Dales	D C Dales
3	July 2006	Minor amendments	Scott Wilson	D C Dales	D C Dales
4	August 2006	Minor amendments	Scott Wilson	D C Dales	D C Dales

Project D101963

This document has been prepared in accordance with the scope of Scott Wilson's appointment with its client and is subject to the terms of that appointment. It is addressed to and for the sole use and reliance of Scott Wilson's client. Scott Wilson accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of the Company Secretary of Scott Wilson Ltd. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document are not to be construed as providing legal, business or tax advice or opinion. © Scott Wilson Group plc 2006

Scott Wilson Ltd.

Scott House

Basing View

Basingstoke

RG21 4JG

David.dales@scottwilson.com

Tel: 01256 310200

Preface

The Slapton Coastal Zone Management Study has been commissioned by the Slapton Line Partnership.

The Slapton Line Partnership is made up of the following organisations:

English Nature
Devon County Council
South Hams District Council
Whitley Wildlife Conservation Trust
Slapton Ley Field Centre
Environment Agency
Defra

The Partnership has been formed to decide how best to deal with potential future erosion of Slapton Line and its effect on the road, the environment, and the community.

The objective of this Study is to compile a single reference document that will form the basis for all future decision-making that affects the shingle ridge.

Scott Wilson has undertaken the Study in collaboration with the University of Plymouth, Roger Tym and Partners and Dr Mark Lee.

The University of Plymouth provided material for the chapters on coastal processes and modelling, Roger Tym and Partners focused on the socio-economic aspects of the study and Dr Mark Lee provided specialist geomorphology information.

This report is entitled 'Volume 3: Phase 2 Report' and presents the results of work undertaken during Phase 2 of the Study. This volume should be read in conjunction with the report on Phase 1 of the Study, published as Volumes 1 and 2, and the overall Executive Summary Published as Volume 4

Contents

1	Executive Summary.....	1-1
2	Phase 1 Study.....	2-1
3	Consultation	3-1
4	Funding	4-1
5	Beach Monitoring.....	5-1
6	Option Refinement.....	6-1
7	Option Evaluation	7-1
8	Forward Planning Workshop.....	8-1
9	Management Policy	9-1

ANNEX A: CONSULTATION ADDENDUM

1 Executive Summary

- 1.1 This report presents the findings of Phase 2 of the Slapton Coastal Zone Management Main Study. This report has been prepared by Scott Wilson for the Slapton Line Partnership. The terms of reference for the study were set out in detail in the brief for the study.
- 1.2 This volume forms part of the Slapton Coastal Zone Management Main Study. The results of Phase 1 of the Study were issued as Volumes 1 and 2, and included information on coastal processes, risk, environmental baseline and impacts, and costs, and put forward a provisional preferred management approach. This report refines a number of possible management approaches before recommending a preferred policy. This report also presents the results of the consultation process and the business impact questionnaire.

Aim

- 1.3 The aim of the Main Study is to provide a comprehensive evaluation of the issues relating to coastal processes at Slapton Sands for the purposes of determining an appropriate shoreline management response to the recent erosion and from this, to establish a robust long-term coastal zone management strategy for the area. The objective of the Study is therefore to compile a single reference document that will form the basis for all future decision-making that affects the shingle ridge.

Background

- 1.4 The A379 offers an important transport link between local communities, as well as providing a secondary emergency route into Dartmouth. The principal emergency route is via the A381 and A3122. Narrow lanes offer the only other alternative route, suitable for small vehicles only.
- 1.5 In previous years storms have caused significant damage to the shingle ridge, forcing road closure. In the winter of 2000/2001 a series of storms caused the loss of up to 5m of shingle beachhead over a length of 1000m. The erosion undermined a 200m section of the A379 that runs along the shingle ridge. This resulted in closure of the road.
- 1.6 Following the damage to the Coast Road, the worst affected section was realigned. The realignment extended over a length of about 300 metres and moved the road approximately 20 metres landwards. In addition some 12,000 tonnes of shingle were transported from the beach in the Strete Gate area and deposited in front of the affected area at Slapton, with shingle ‘bastions’ formed at each end of the protected length. Since 2001 there has been an accretion of shingle on the beach at the affected locations.

Phase 1 Study

- 1.7 The Phase 1 study found that the risk of damage to the road, and risk of a complete breach of the barrier, would increase over time due to the effects of sea level rise.
- 1.8 The Phase 1 study concluded that the preferred option is Managed Realignment of the road on the shingle barrier. It was concluded that this option plus Beach Recycling, Beach Renourishment and Inland Road Upgrade should be taken forward to Phase 2, subject to a reasonable expectation that funding would be available. The remaining options either had no prospect of securing funding or were not acceptable from a technical or environmental perspective.
- 1.9 The Phase 1 report concluded that the Managed Realignment option would allow the road to be maintained for at least another 30 years. Implicit in this conclusion is the assumption that eventually the effects of sea level rise will make maintenance of the road link economically and environmentally unviable and the road will then be abandoned.
- 1.10 At the end of the Phase 1 study, a consultation and exhibition event was mounted. Several hundred people attended the exhibition and of the 75 or so questionnaire responses received, 90% were in favour of intervention to maintain the road and 80% of these were in favour of a 'soft' approach to intervention – realignment of the road, beach nourishment or shingle recycling. There was a strong consensus of support from members of the public for the proposed policy of managed realignment of the A379 on the shingle barrier. There was also support from members of the Slapton Line Partnership in the formal consultation letters received.
- 1.11 A questionnaire was issued to over 450 businesses in the region to allow evaluation of the impact of road closure on the business community. There was a strong consensus that closure of the road had a negative impact on business and that works to keep the road in being were beneficial.

Phase 2 Study

- 1.12 A meeting was held with Defra to discuss possible funding of road realignment or protection works. From these discussions it was clear that Defra considered that the road was the responsibility of the highways authority (Devon County Council) and therefore that funding would not be available from Defra. Defra were also doubtful that funding would be available for any further studies of the coastal processes.
- 1.13 Scott Wilson also approached officers from South Hams District Council, Devon County Council, and the Government Office of the South West to help identify potential European funding sources and evaluate the likelihood of success of funds being obtained for the road.
- 1.14 It was concluded that it was unlikely that significant funding will be made available from Defra or other external sources to protect the road. When, at some point in the future, the road is not sustainable then funds may be available to help the community to adapt.

- 1.15 The requirement for funding for works to protect, maintain or realign the road will fall principally on the County Council as highways authority. No commitment has been made on the level of funding which will be available, and this remains a significant unknown.
- 1.16 3 options have been considered further in this report:
- Beach nourishment – importation of shingle to widen and raise the beach to provide additional protection to the road. The costs of this option are prohibitive.
 - Shingle recycling – excavation of shingle from areas of the beach where it is in abundance (e.g. currently to the north of Strete Gate) and transfer to sections where the beach is narrow and the road at risk of erosion, to widen and raise the beach thus providing additional protection. This option is not technically sound without movement of unacceptably high volumes of material.
 - Road realignment – realignment of the A379 landwards on the shingle barrier to move it away from the beach crest and therefore reduce the risk of damage during storms. This option is environmentally and technically sound.
- 1.17 It has been concluded that neither Beach Nourishment nor Shingle Recycling provides a viable option. Therefore both options have been discarded as a means of protecting the road. Limited shingle recycling has some role to play in local and short-term protective measures but cannot be a solution on its own.

Recommendations

- 1.18 It is recommended to the Slapton line Partnership that the A379 should be maintained by a combination of the following measures:
- Proactive realignment of the road to the north of the junction of the A379 and the road to Slapton village. The realignment should be undertaken as soon as funding and permissions are in place, which could start to be sought during late 2005.
 - Reactive realignment of the road at other locations. The realignment should be undertaken when damage to the road is believed to be imminent or has already occurred. The aim should be to reinstate the road as soon as is practicable. Realignment will involve landward movement of the road on the shingle ridge. In realigning the road, the viability of cost-saving measures such as provision of a carriageway to a lesser standard should be considered. Preliminary work on permissions and funding should be undertaken in advance, to expedite the re-opening of the road.
 - Localised movement of shingle to provide temporary protection to short lengths of the road or to allow reinstatement of short lengths of the road following damage. The volume of shingle

moved should be limited to the same order of magnitude as undertaken previously for the creation of the shingle bastions.

- 1.19 The cost of this approach is estimated as £300,000 for the proactive works and an average of £50,000 per year for the reactive works. It is recommended that this approach should be followed until such time as retention of the road becomes unsustainable.
- 1.20 A management policy based on this approach has been prepared and recommended to the Slapton Line Partnership. In addition to the recommendations for works, the policy makes a number of recommendations including:
- Monitoring of the beach, storms and road damage events;
 - Continuance of the Slapton Line management and consultation bodies (Technical Group, Advisory Forum, Partnership);
 - Regular reviews of the management policy, to refine it and adapt it to changing circumstances and check that the policy is still sustainable;
 - An initial workshop to kick-start work on developing an Adaptation Plan for the transition to the situation in the future when the road link has become unsustainable.
 - Publication of the policy so that local residents, businesses and service providers can begin to think about developing their own approach to adaptation to eventual road abandonment.
- 1.21 The full text of the recommendations is given in Section 9 of this report.
- 1.22 In the report on the Phase 1 study, it was noted that it would be appropriate to discard options if funding was not available to implement them. It is clear that funding remains a major issue. There is no guarantee that funds will be made available, but equally no decision has been made that funds will not be available. Therefore a pragmatic approach has been taken which identifies the best value option consistent with environmental and technical constraints, and this has been recommended for consideration by the Partnership.

2 Phase 1 Study

- 2.1 This Section summarises the findings of the Phase 1 Study.
- 2.2 A detailed study was made of the coastal processes affecting the shingle barrier. The study of coastal processes is in far greater detail than has previously been undertaken. This study included:
- An assessment of the wave climate
 - Analysis of water levels using data from Devonport
 - Analysis of wind data
 - Modelling of sediment transport along the beach and in the cross-shore direction
 - Modelling of breach probability
 - Assessment of historical changes in beach position and rates of erosion
- 2.3 The key beach processes affecting Slapton Sands were found to be:
- Short-term storm impacts
 - Medium term longshore transport gradients
 - Long-term sea level rise causing the shingle barrier to rollback landwards
- 2.4 The overall assessment of the January 2001 event was that it was caused by a combination of beach line recession (due to differential longshore transport rates in the preceding autumn) and the occurrence of a severe storm, which further cut back the beach profile.
- 2.5 Because the storm coincided with a period when the beach was at a historically narrow state, its observed effect on infrastructure (road, car park) was greater than it may otherwise have been.
- 2.6 Figure 11.51 (Volume 2) shows areas at risk at from a single storm event. The extent of erosion expected to occur at any particular point along the beach is a function of two other main variables: beach steepness (the steeper the beach, the more likely is erosion of the crest); and the presence of defences (these inhibit erosion of the crest). The steepest beaches occur in the central area near the car park and previous road realignment.
- 2.7 The figure shows that the main areas at risk are (south to north):
- The length of road immediately north of the rock revetment, including the length where the rock revetment is badly degraded
 - The central car park

- The two road sections north of the car park where the new road alignment joins the original road alignment
- 2.8 Long-term barrier retreat rates were estimated at 0.3m/year at the present day, increasing to at least 0.4m/year due to sea level rise.
- 2.9 The maps shown as Figures 11.52(a-g)(Volume 2), show areas at risk within different time epochs along the shingle bank. In accordance with guidance for Shoreline Management Plans, three epochs have been used: 0-20 years, 20-50 years and 50-100 years. The retreat rates used in preparing these maps are those of a 'Low Emission Scenario' and are applicable to the next 100 years.
- 2.10 Various authors have suggested that the shingle bank is likely to break down irreversibly and breach, forming tidal inlets, within the next 30 to 50 years. This was considered to be highly unlikely. Neither of the storm events that have occurred in the last 10 years has had a major impact on the shingle barrier height or width, nor has come close to causing a breach of the barrier. The current probability for a breach was considered to be much less than 1 in 100 years.
- 2.11 It was found that sea level rise and increased storminess will increase the rate of erosion and the risk of a major recession event, but the risk of a breach of the shingle bank will remain low over the next 20 or 50 years.
- 2.12 It was found that possibly after 50 years, and probably beyond 100 years, a No Intervention scenario will result in breakdown of the shingle barrier, with breaching and forming of intermittent tidal inlets.
- 2.13 It was found that retreat of the shingle barrier will eventually result in lowered beaches in front of Torcross, and leave the northern part of Torcross exposed to wave attack. Protection of Torcross will require an extension of the sea wall to link up with the retreated barrier location.
- 2.14 The following broad scale options were considered in Phase 1:
- Do nothing (also described as 'No Active Intervention')
 - Do minimum (keep the coast road for a limited period)
 - Hold the line (keep the coast road)
 - Advance the line
 - Managed realignment of the coast road
- 2.15 At the Strategic level, advance the line was discarded, as it offered no advantages and would be excessively costly. All other options were considered further. The hold the line option would

involve a commitment to maintain the road on the shingle barrier, either by realignment to accommodate erosion or by provision of defences.

- 2.16 A number of options for keeping the coast road were considered:
- Beach nourishment
 - Shingle recycling
 - Revetment
 - Sheet piled retaining wall
- 2.17 Three options for realignment were considered. One option would be to keep the road on the Slapton Line but relocate it further back, thereby increasing the distance between the beach and the road. This could be done in stages to spread out the cost and to deal with the most vulnerable sections first. In the long term it was found that the beach is likely to eventually erode entirely, leading to a breach of the barrier beach and hence the road. This option, which could be either a reactive or a proactive realignment, was evaluated and found to be feasible and to have the minimum cost of any option.
- 2.18 One alternative option would be to relocate the route inland of the Ley, using the existing road network wherever possible and upgrading over time as and when finances allowed. The most radical solution would be to build an entirely new road to the west of the Ley although even if the latter option were technically and environmentally viable it would be prohibitively expensive.
- 2.19 A third option would be to abandon the use of the coast road, and make limited upgrades to the existing inland road network. However limited upgrades would not fundamentally change the capacity of the existing inland road network and therefore would not provide the same quality of service as other options.
- 2.20 A preliminary assessment was made of eligibility for funding from Defra as a coast protection project. The assessment of the economics of each option was undertaken in accordance with the methodology of Defra for coastal defence projects. The assessment was a preliminary exercise, using only outline traffic data and excluding environmental and socio-economic costs and benefits.
- 2.21 Based on these figures, the proactive or reactive Managed Realignment on the barrier option was found to be the preferred option, and such a scheme would meet the benefit-cost and priority scoring requirements of Defra within the next 5 years. All other options were found to fail to meet the criteria.

- 2.22 It was estimated that a technically viable scheme to hold the road for 50 years, and protect Torcross for 100 years, would cost in the order of £4.5m over the 50-year period at present day prices.
- 2.23 An outline environmental assessment was made of the impact of all eight options identified. The evaluation method used for environmental impact is an abbreviated version of the TAG methodology using four environmental criteria (ecology, geomorphology, landscape, heritage and archaeology) and two socio-economic criteria (social & community issues and business impacts).
- 2.24 The key impacts of the No Active Intervention option were identified as being in the socio-economic and traffic areas. The main socio-economic impacts were identified as:
- Intermittent breaching of A379 will cause diversions and disruption to access/accessibility of services. Examples of these disruptions include bus services, travel to work times, emergency service access.
 - Longer term loss of road and necessary use of other roads may increase drive times to services/facilities e.g. schools, workplace, doctors etc
 - Use of minor roads may cause difficulties for larger vehicles – buses, vans, and lorries.
 - Lack of planned approach to change and consequential disruption to traffic movements will lead to confusion and difficulties for residents and service providers e.g. bus companies.
 - Unplanned nature of road diversions will be difficult for businesses to manage. May affect trade especially for businesses reliant on passing trade e.g. B&B's and village stores.
 - Ultimate loss of main road link will increase the 'isolation' of the villages – may lead to reduction in trade. Loss of trade may be as a result of reduced passing trade – may be experienced by B&B's, local stores, Ley (visitor attraction). Also may be as a result of increasing access difficulties – problems with supply chains to/from local businesses.
 - Dependant on the importance of the Ley in its freshwater state to tourists, there may be a reduction in visitor numbers.
- 2.25 It was identified that there is also the potential for positive impacts to be associated with the severance of the road. It is possible that some specialist businesses, e.g. recreational pursuits & natural history related, may actually benefit from the closure if it is perceived by some visitors that the area has been enhanced by the closure. The creation of new wildlife environments will attract specialist interest, and may be of interest to a more general market if actively marketed and interpreted. Any positive benefits are likely to be realised in the longer term and may require some initial capital investment in a "replacement" tourist infrastructure (e.g. new visitor centres). Furthermore, if the changes to the road structure inland include suitable parking and walking trail

development then it may be possible to add to leisure and tourism use of the countryside in the area. If this work takes in existing local businesses then some economic benefits can be gained.

- 2.26 The No Intervention option was found to generate significant adverse impacts in the socio-economic and transport contexts. The assessment of ecological, geo-morphological, landscape and archaeological impacts for the no intervention option was more balanced.
- 2.27 An integrated approach to assessing the options was developed which combined the technical, environmental and socio-economic aspects. A scoring system was developed which gave potential scores across a range of issues, and then determined an actual score for each option. The higher the score, the more acceptable the solution.
- 2.28 The results of the scoring are presented below.

	Do Nothing	Beach Nourishment	Beach Recycling	Rock Revetment	Sheet Piling	Managed Road Realignment on barrier	Inland Road Upgrade	New Inland Road
Technical	20	25	23	25	21	30	32	17
Environment	10.4	7.7	10.7	4.2	2.8	11.2	7.7	2.7
Socio-Economics	2.6	15	15	15	15	15	5.2	17.5
Total	33.0	47.7	48.7	44.2	38.8	56.2	44.9	37.2

Conclusions of Phase 1

- 2.29 It was concluded that the preferred option is Managed Realignment of the road on the shingle barrier. It was concluded that this option plus Shingle Recycling, Beach Nourishment and Inland Road Upgrade should be taken forward to Phase 2, subject to a reasonable expectation that funding will be available. The remaining options were found to either have no prospect of securing funding or were not acceptable from a technical or environmental perspective. It was found to be appropriate to discard any of the selected options prior to Phase 2 if funding was unlikely to be available.
- 2.30 The reasons for recommending taking forward more than one option were:
- There was no clear distinction between the advantages of some of the options, so it was not reasonable to discard these at that stage

- 2.31 The final preferred option needs to allow for the, as yet unknown, impacts of climate change and occurrence of severe storms. Therefore the final option may have more than one ‘strand’ to it, combining elements of several options.

3 Consultation

Results of Phase 1 Consultation

- 3.1 At the end of the Phase 1, a consultation and exhibition event was mounted, attended by 350 people. The results of this are presented in Annex A.
- 3.2 Of the 75 questionnaire responses received, 90% were in favour of intervention to maintain the road and 80% of these were in favour of a 'soft' approach to intervention – realignment of the road, beach nourishment or shingle recycling. There was a strong consensus of support from members of the public for the proposed policy of managed realignment of the A379 on the shingle barrier. There was also support from members of the Slapton Line Partnership. No dissenting opinions were received.

Results from Business Impact Questionnaire

- 3.3 During Phase 1 a questionnaire was issued to over 450 businesses in the region to allow evaluation of the impact of road closure on the business community. These results of this exercise were received after the closure of the Phase 1 report. Responses were received from over 100 businesses. Results are presented in Appendix A.
- 3.4 There was a strong consensus that closure of the road had a negative impact on business and that works to keep the road operational were beneficial.

4 Funding

Defra

- 4.1 A meeting was held with Defra to discuss possible funding of road realignment or protection works. From these discussions it was clear that Defra considered that because, with the exception of Torcross, there was no risk to people or property, the issue of safeguarding the road was one for the highway authority, Devon County Council. Therefore funding would not be available from Defra. Defra were also doubtful that funding would be available for any further coastal studies, other than the review of the Shoreline Management Plan.

Other Sources

- 4.2 Scott Wilson approached officers from South Hams District Council, Devon County Council, and the Government Office of the South West to help identify potential European funding sources and evaluate the likelihood of success of funds being obtained for the road.
- 4.3 A number of possible funding sources were considered:
- *New Opportunities Fund* – a fund for community transformation, from small grants at local level through to capital projects, intended to regenerate and revitalise communities.
 - *Heritage Lottery Fund* – care for heritage and help people experience it.
 - *Regional Development Agencies (RDAs)* – to coordinate regional economic development and regeneration, enabling regions to improve competitiveness and reduce imbalance within and between regions.
 - *Objective 2 programme for South West* – aids projects involving neighbourhood renewal, business support, rural regeneration, tourism and support to fishing communities in the Programme Area. The whole district of South Hams is eligible for the programme. Made up of two funds:
 - *European Regional Development Fund (ERDF)*: supports investment in infrastructure, new technologies, tourism, and community economic development. Priority 1 is Neighbourhood Renewal, Priority 2 is SME development, technology and innovation, Priority 3 is better future for traditional economies.
 - *European Social Fund (ESF)*: supports human resource development, training and employment.

Conclusion

- 4.4 It is unlikely that significant funding will be made available from Defra or other external sources to protect the road. Funding may be available to help the community to adapt to the loss of the road once this happens.
- 4.5 The requirement for funding for works to protect, maintain or realign the road will fall principally on the County Council as highways authority. No commitment has been made on the level of funding which will be available, and this remains a significant unknown. However, the principle of keeping the road in place would be consistent with the objectives of the Provisional Devon Local Transport Plan 2006-2011, published by Devon County Council, particularly in regard to Objective 3: Making Roads Safer and Objective 5: Improving Recreation, Leisure and Tourism.

5 Beach Monitoring

Monitoring Programme

- 5.1 During the course of the study, beach level monitoring was undertaken in the form of surveys of beach profiles at a number of locations. This work continued the monitoring which has been, and continues to be, ongoing through the Environment Agency and Field Studies Centre.

Monitoring Results

- 5.2 The monitoring results confirmed the potential for large changes in beach width. During the course of the study there were no serious beach erosion events and therefore the monitoring results do not affect any of the process results obtained in the phase 1 study, but they do add to the total knowledge of the system.
- 5.3 In October 2004 there was a significant storm event, which coincided with high water levels. This event caused shingle to be thrown onto the road and the road to be closed temporarily. No damage occurred to the road. The beach monitoring data showed that there was little cut-back of the shingle crest. This was because wave directions were predominantly from the west, rather than the east, and therefore wave heights were much diminished at Slapton. This conclusion supports the work in Phase 1 on the coincidence of events required to cause significant erosion – sustained high waves from the east combined with high water levels.
- 5.4 Monitoring data and locations of monitoring profiles will be passed back to SHDC on completion of the study.

Future Monitoring

- 5.5 The South Coast regional monitoring programme is due to start in 2005. This will provide monitoring information in the form of beach levels, photography etc. In view of the volatility of the beach at Slapton it is recommended that this work is supplemented by additional monitoring. The additional monitoring should be undertaken after significant storms and aim to pick up beach levels over the entire beach rather than on profiles. This improves the ability to calculate and interpret beach changes.

6 Option Refinement

Overview

- 6.1 The purpose of Phase 2 of the Study is to undertake option refinement and selection, taking into account the base knowledge gained during Phase 1, and the various comments received.
- 6.2 The results of the consultation are clearly in support of softer approaches where intervention is feasible. Therefore it is proposed not to consider further the options of sheet piling or rock revetment. Similarly the new inland road option received little support and this has also been discarded. The inland road upgrade option also received little support. This is principally the fallback option for when the coast road becomes unsustainable, not an option in its own right, and therefore need not be taken into account in final option selection.
- 6.3 Therefore 3 options have been considered further in this report:
- Beach nourishment – importation of shingle to widen and raise the beach to provide additional protection to the road
 - Shingle recycling – excavation of shingle from the beach at Strete Gate, and placement on the beach at Slapton to widen and raise the beach to provide additional protection to the road
 - Road realignment – realignment of the A379 landwards on the shingle barrier to move it away from the beach crest and therefore reduce the risk of damage in storms.
- 6.4 In the report on Phase 1, it was noted that it would be appropriate to discard options if funding was not available to implement them. From Section 4 it is clear that funding remains a major issue. There is no guarantee that funding will be made available, but equally no decision has been made that funding will not be available. Therefore a pragmatic approach has been taken which identifies the best value-for-money option consistent with environmental and technical constraints, and this has been recommended for consideration by the Partnership.
- 6.5 Based on the additional work done, a revised option scoring table is provided in Section 7. This presents a comparison of the three options.

Beach Nourishment

- 6.6 In order to be effective at maintaining the current level of protection of the road, the annual rate of addition of material would need to equal the volume effectively lost each year due to sea level rise. This equates roughly to 7,500 m³ per annum or 75,000 m³ every 10 years.

- 6.7 We have obtained information on a possible source of material, methods of placement and costs from an experienced contractor in this type of project. Our assessment is also based on our own experience of designing similar schemes. We estimate that the cost of each 75,000 m³ nourishment project would be £1.14 million, comprised of £0.99 million for supply and placement of the material and £0.15 million for mobilisation/demobilisation of the dredger. These are obviously very large sums, and over 30 years would result in a capital cost of over £3m.
- 6.8 It is likely that material would be dredged from an existing licensed source area off the western end of the Isle of Wight. The grading of the material would be generally suitable, to match the existing beach. It is likely that the material appearance would be different, possibly more angular, and the material is inherently not native to the Slapton area. To date English Nature has not advised its comments on proposals for large-scale nourishment. A detailed EIA would be needed to support such as proposal, looking in more detail at grading, chemical properties etc. A detailed sediment modelling exercise to design the nourishment would also be needed.

Shingle Recycling

- 6.9 The work undertaken in Phase 1 found that there were large fluctuations of material volume along Slapton Sands, and that gross sediment transport within a year could be up to 300,000 m³. Although these are uncalibrated figures, and subject to a margin of error, the premise of large fluctuations is supported by the results of the monitoring work, which show changes in beach width at the level of the crest of 10-20m between surveys only 1 or 2 months apart.
- 6.10 Where shingle recycling is used elsewhere, it tends to involve limited volumes of around 10-30,000 m³ and is used to take advantage of a repeatedly occurring excess of material at a particular location. At Slapton the volumes required to protect the road would be much larger, and there is insufficient monitoring data to show accumulation of material will repeatedly occur at any one location. The owner of the beach at Strete Gate has indicated that he would have considerable reservations about large-scale extraction of shingle from this frontage. The reason for this concern is that extraction might cause a permanent loss of beach material and even upset the equilibrium of the bay, or adjacent bays. These are legitimate concerns given that the history of Slapton shows quite large fluctuations, and the experience at Hallsands following large-scale shingle extraction. If this approach were to be taken forward, the owner would need to be given additional reassurance by being indemnified by the Partnership (or Council) and by further specific studies looking at shingle extraction impacts.
- 6.11 Given the considerable lengths of road at risk, where damage might occur, it is considered that it is not practicable to use recycling as a primary means of protecting the road, without large-scale movement (volumes larger than 30,000 m³ per annum). The environmental impacts of large-scale movement would be significant in terms of disruption to geomorphology and in terms of

traffic, noise, and loss of amenity of the beach. This option has a particular risk in that, despite the expenditure, the material may not be in the location where it is needed at the time it is needed.

- 6.12 The cost of recycling for the shingle bastions was about £2/m³. This cost is consistent with similar projects elsewhere. Therefore the cost in a single year of moving just than 30,000 m³ would reach about £60,000, without any guarantee of success. Much larger volumes would be needed to guarantee protection of the road.
- 6.13 Although recycling on large scale is not viable, recycling on a small scale to protect a specific location for a limited time is feasible. Material can be placed over a short length say of less than 50m, and this material can make a difference to the risk of damage. It can also provide a temporary solution while longer-term road realignment is planned and implemented. Therefore it is considered that small-scale recycling can provide a useful support to a more fundamental approach. Although review of the data has not been able to confirm that the shingle bastions work to encourage additional build up of material, they undoubtedly provide some benefit in widening and raising the beach at their own location.

Road Realignment

- 6.14 In the Phase 1 study Road Realignment was considered, and was provisionally identified as the preferred option. Realignment was considered to consist of two possible approaches – proactive realignment where the road is realigned before any damage occurs (in order to prevent such damage) and reactive realignment where the road would be realigned after a storm event which either caused actual damage or threatened imminent damage to the road.
- 6.15 In this Phase 2 of the Study the options for proactive and reactive approaches have been considered in more detail.
- 6.16 It is apparent that road realignment has no obvious source of funding other than the County highways budget, and this is uncertain. Therefore the proactive approach is more difficult to fund. Furthermore the reactive approach is more cost-effective in that expenditure is only made when a problem has occurred or is imminent, and is only made in areas where there is a problem or one is imminent.
- 6.17 The downside of the reactive approach are that there will on occasions be a delay while the new road alignment is proposed and implemented, which would be a much lesser risk if a proactive approach was taken.
- 6.18 After weighing up these alternatives it was decided that the optimum approach would be one that consisted of a proactive approach in areas where there was already a clear and imminent risk to the road, and where proactive measures could be undertaken with relatively minor works. Reactive works would be favoured in all other locations.

- 6.19 A series of 5 figures (6-4a to 6-4e) entitled 'Road Realignment Option' and based on aerial photography have been prepared showing the proposed approach. There are 2 areas of proactive realignment works. These are at the 'shoulders' of the previous road realignment works. Proactive works in these areas would be over a relatively short length of road, with corresponding low expenditure, and would immediately secure the integrity of the A379 road from the turn off to Slapton village as far as Strete Gate. Elsewhere the works are reactive only.
- 6.20 In all a total length of road of about 500m would be realigned. Using the costs of the 2001 realignment, the cost of this work has been estimated at £300,000. In addition there will need to be environmental and planning consents and consents from landowners. Once completed these works will provide a reasonable level of protection of the A379 over the great majority of its length along Slapton Sands.
- 6.21 It is recommended that these works are undertaken within the next 2 years, or sooner if beach levels are observed to drop or sooner if damage to the road occurs in the interim. It is acknowledged that this an aspiration, and is subject to the necessary funding being made available.
- 6.22 In costing the works we have assumed that the road will be reconstructed to the same standard as the existing road realignment stretch. A narrower road would be feasible and would be valuable if funds were not available for a full-width realignment.

Road Realignment – South of Slapton Junction

- 6.23 The road in section B is close to the beach crest although not showing signs of damage yet. This area will be monitored, and intervention will be on a reactive basis to any future erosion of the crest placing the road at imminent risk of damage. The measures taken will depend on the level of damage caused by the erosion.
- 6.24 Section C has the road set far back from the beach crest, so there is no need for intervention now. The position of the road in comparison to the beach crest will be monitored and reactive measures, such as realignment of the road, will be carried out when erosion of the crest means the road nears danger or becomes damaged.
- 6.25 Where only a small section of the road is damaged, or the damage can be repaired without excessive cost, this is classified as 'Minor Damage to the Road'. Repairs to this damage will be on a reactive basis, and on a local scale.
- 6.26 If the damaged section is large enough that the cost of repair is similar to that of realigning the road further inland (Moderate Damage to the Road), then the preferred option would be to realign the road further inland. Where large sections of the road are rebuilt, there will be the question of whether it is viable to build a road of equal quality, or whether the new road should be constructed to a lesser standard.

- 6.27 As Slapton Ley limits the distance inland that the road can be relocated, there will come a point where relocation of the road further inland is not possible. There is also the possibility of a complete breach of the shingle barrier occurring in this location. In these cases, or where a large section of the road has been damaged (Major Damage to the Road), an evaluation is required of whether it is feasible to reinstate the road. If this is feasible, then a decision is required on whether the road should be reinstated as a dual or single lane road. Monitoring will be continued. If the economics of replacing the section do not achieve the guidance criteria set by Defra then the works should not proceed.
- 6.28 The Slapton monument is within a section where the management proposal is to continue monitoring, as the road is currently set back from the crest. If erosion occurs and the monument nears the crest, then it can be relocated further inland, as happened before.
- 6.29 The car park will not be protected or replaced within this scheme, as to do so would create a hard point on the coast which would interfere with the geomorphology, and potentially cause accelerated erosion on adjacent lengths of coast. Current sea defences at the car park will be monitored, but consequently removed if erosion means they become a danger to the public or unsightly. Car park capacity, and opportunities for additional facilities elsewhere if necessary, will need to be assessed.

Road Realignment – North of Slapton Junction

- 6.30 Precautionary measures will be taken in Sections D and F due to their current proximity to the beach crest; these sit just to the north of the existing junction. This proactive approach will set back the road to beyond the 1 in 25 year storm event line. These measures will be carried out as soon as funding is available.
- 6.31 The shingle bastions are found in a couple of locations along this frontage, and will be monitored, and their performance evaluated before any decision will be made on their future.
- 6.32 In Sections E and G, the road is far enough back from the beach crest that the likelihood of damage is low. The position of the road in comparison to the beach crest will be monitored. There is no need for intervention now, so reactive measures, such as realignment of the road, will only be carried out if or when erosion of the crest means the road nears danger or becomes damaged.
- 6.33 Monitoring may show that the road becomes close to the beach crest in the future erosion events. Any erosion of the crest placing the road at imminent risk of damage will be dealt with on a reactive basis. The measures taken will depend on the level of damage caused by the erosion.
- 6.34 Where only a small section of the road is damaged, or the damage can be repaired without excessive cost, this is classified as 'Minor Damage to the Road'. Repairs to this damage will be on a reactive basis, and on a local scale.

- 6.35 If the damaged section is large enough that the cost of repair is similar to that of realigning the road further inland (Moderate Damage to the Road), then the preferred option would be to realign the road further inland. In the northern section, this will almost always be the case as suitable land is available landward of the current road. Where large sections of the road are rebuilt, there will be the question of whether it is viable to build a road of equal quality, or whether the new road should be constructed to a lesser standard.
- 6.36 Where there has been a large section of the road damaged (Major Damage to the Road), an evaluation is required of whether it is feasible to reinstate the road. If this is feasible, then a decision is required on whether the road should be reinstated as a dual or single lane road. Monitoring will be continued. If the economics of replacing the section do not achieve the guidance criteria set by Defra, or other appropriate investment criteria such as those of Department for Transport then the works should not proceed.

Road Realignment – Principles

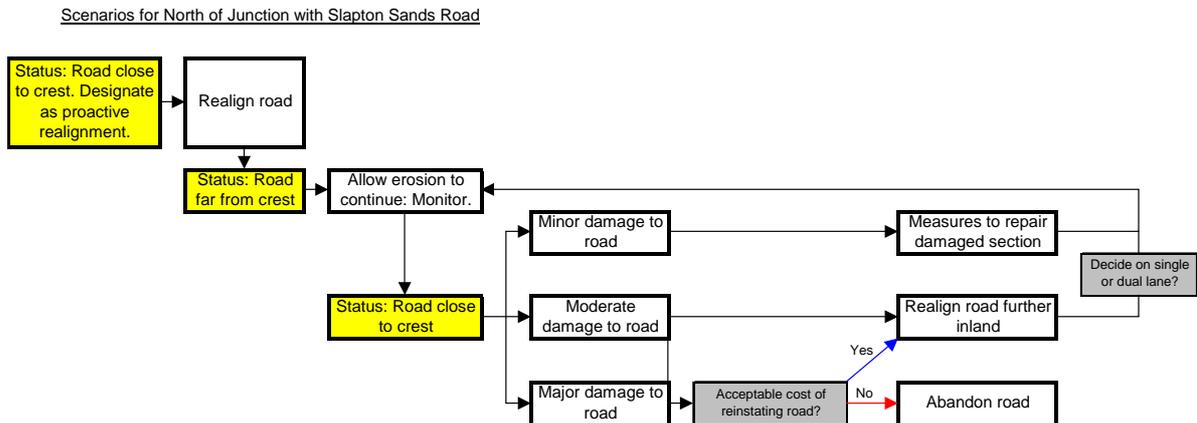


Figure 6-1

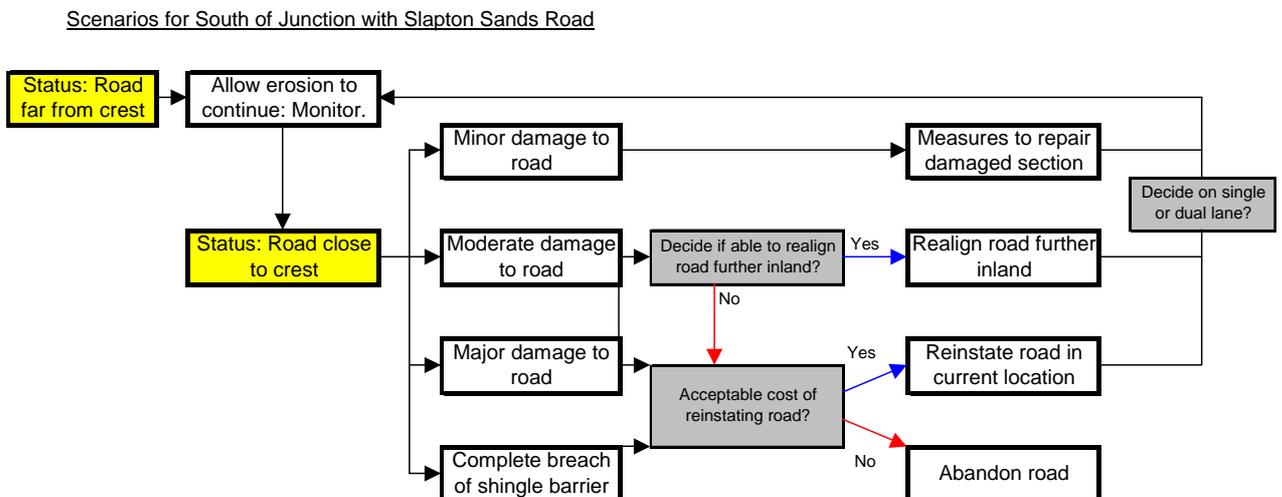


Figure 6-2

- 6.37 The cost of the proactive works is estimated at £300,000. The cost of the reactive works cannot be estimated reliably, especially over periods of time, but for budgetary purposes a mean expenditure of £50,000 per annum should be allowed for to keep the road in being.
- 6.38 The benefits of the shingle bastions are not clear. Although they provide a reservoir of shingle to withstand high water level events it is not at all clear that they will provide significant or cost-effective in withstanding severe storm events. However, they are below-cost innovation and it is worthwhile to keep them in being in order to judge them on their performance in the next severe storm that occurs. This requires careful pre- and post-storm monitoring.
- 6.39 If the council or partnership has sufficient funds than it may consider other low-volume recycling or shingle bastion type approaches. However the benefits of these are unclear and will only be properly evaluated if there is sufficient monitoring information.
- 6.40 When a severe storm has occurred then the data can be fed back into the sort of models used in the Phase 1 report to calibrate these models and make future projections more accurate.
- 6.41 Figure 6-3 shows a schematic representation of the risk of road damage and shingle barrier breaching under both the No Active Intervention and the Road Realignment options. Risks increase rapidly over time due to the effects of sea level rise. Road realignment reduces the risk of road damage, allowing the road to be maintained for longer.
- 6.42 Figures 6-4a to 6-4e are at the end of Section 6.

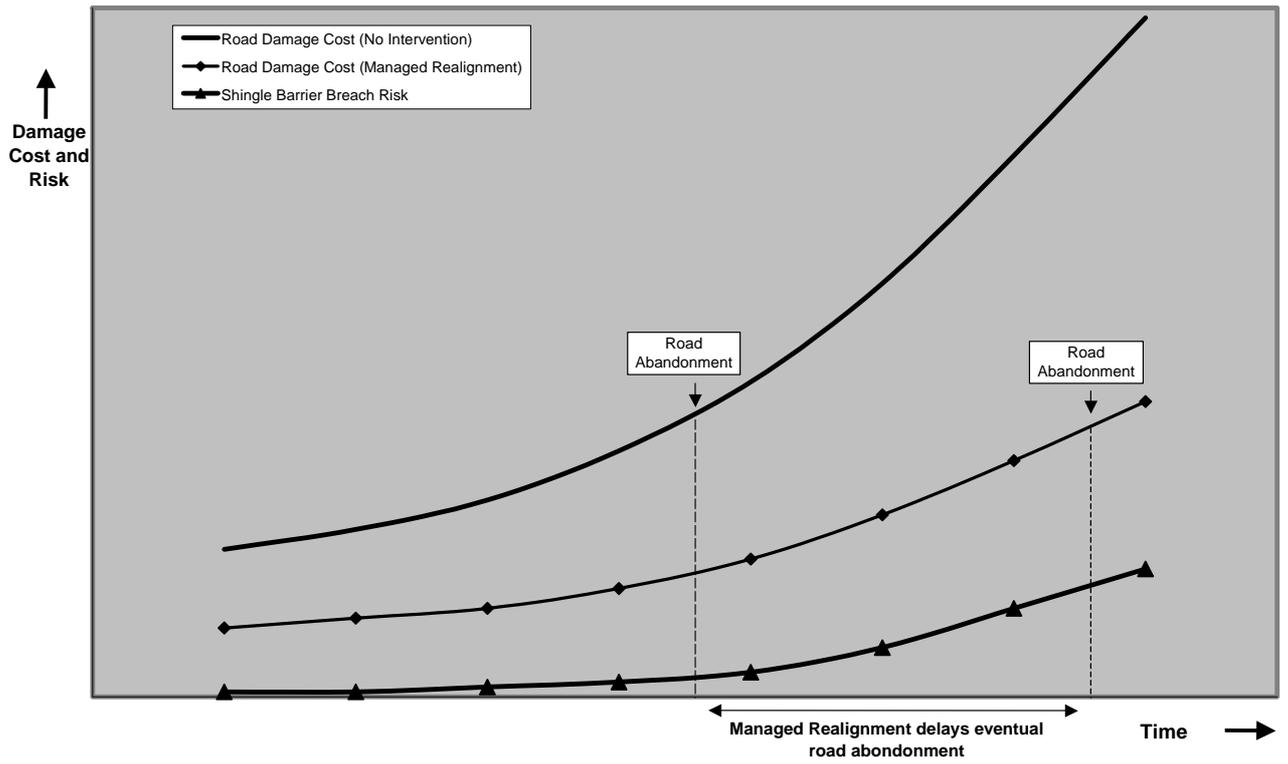
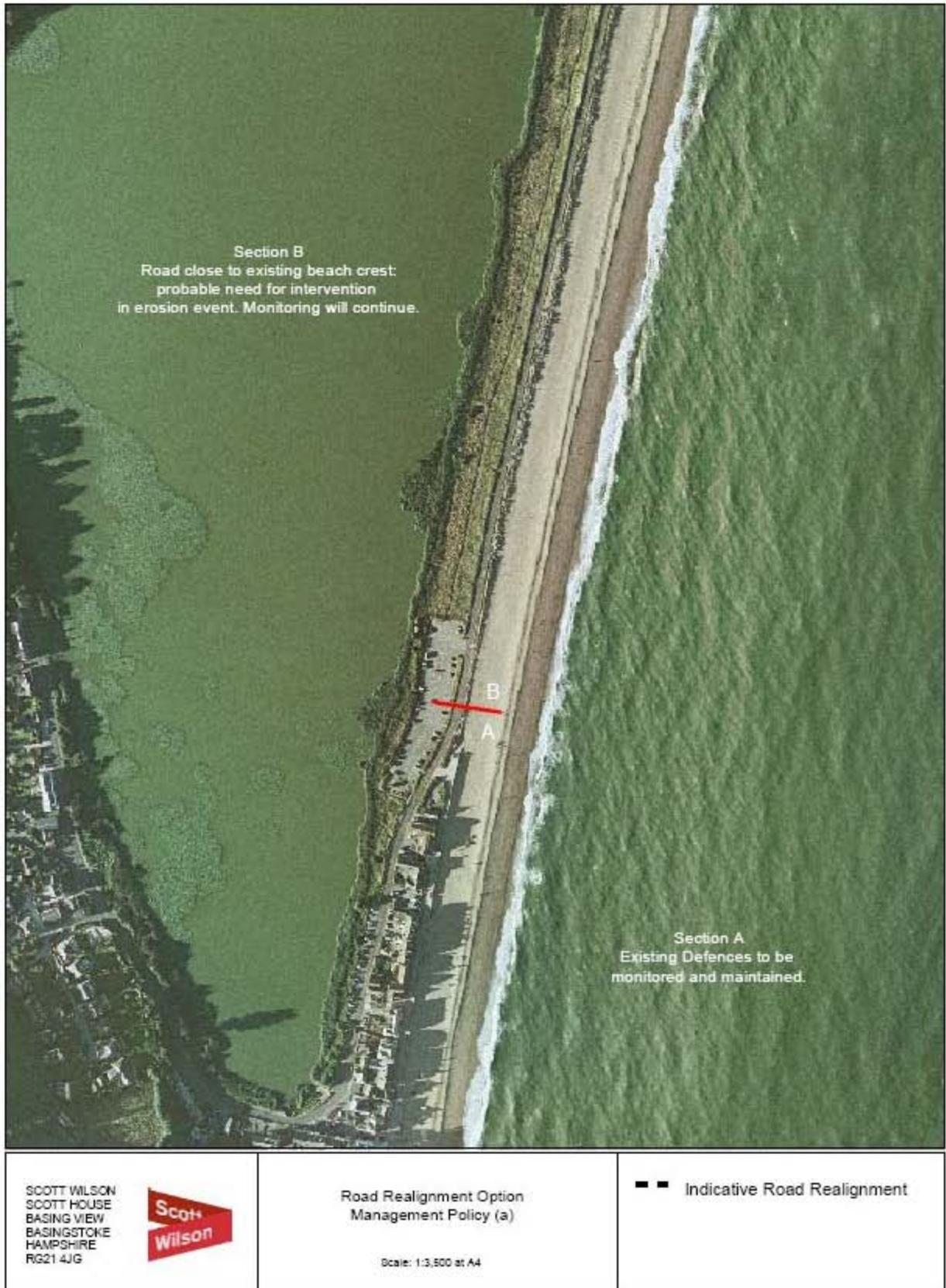


Figure 6-3



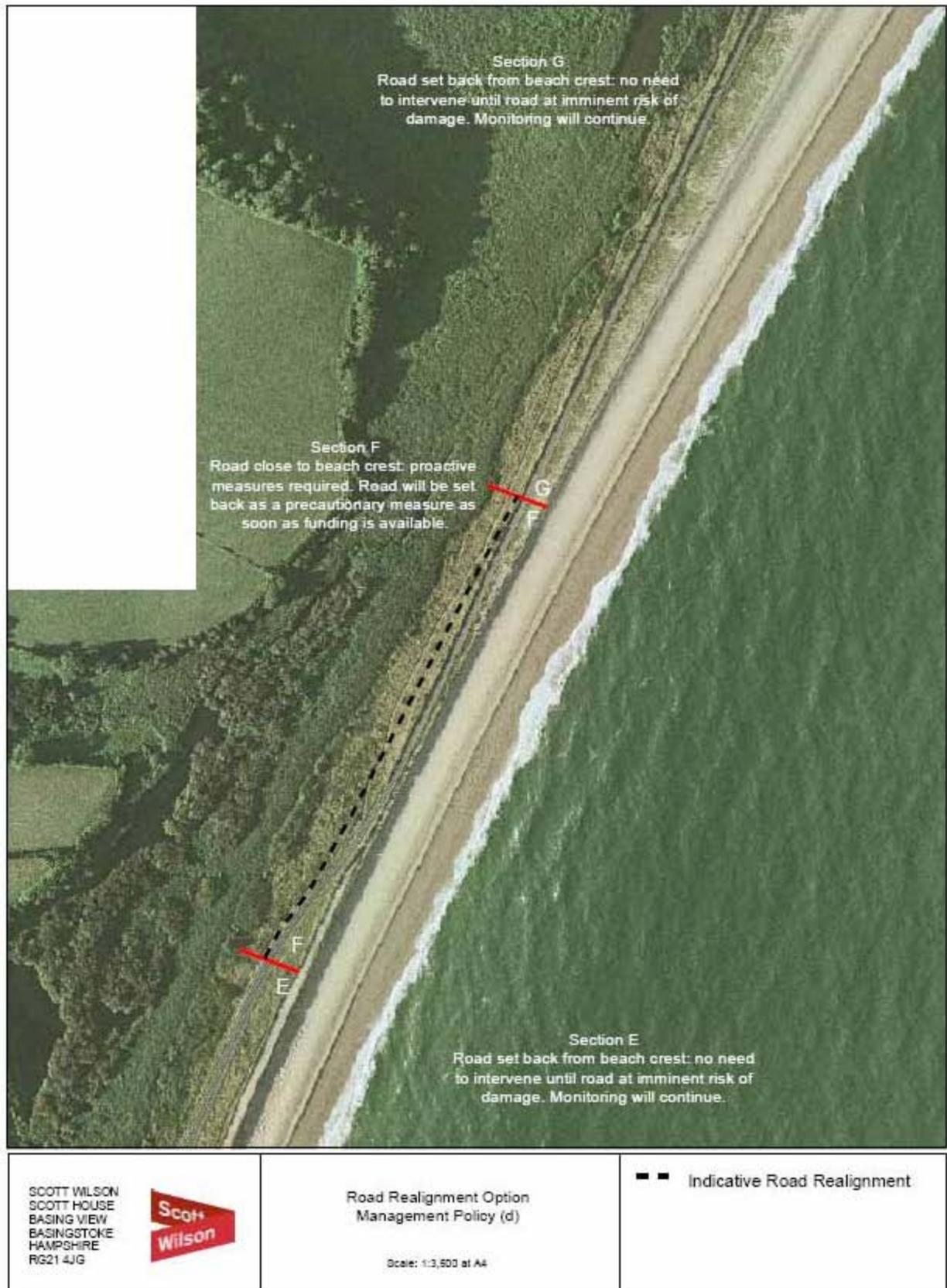
Figures 6-4a



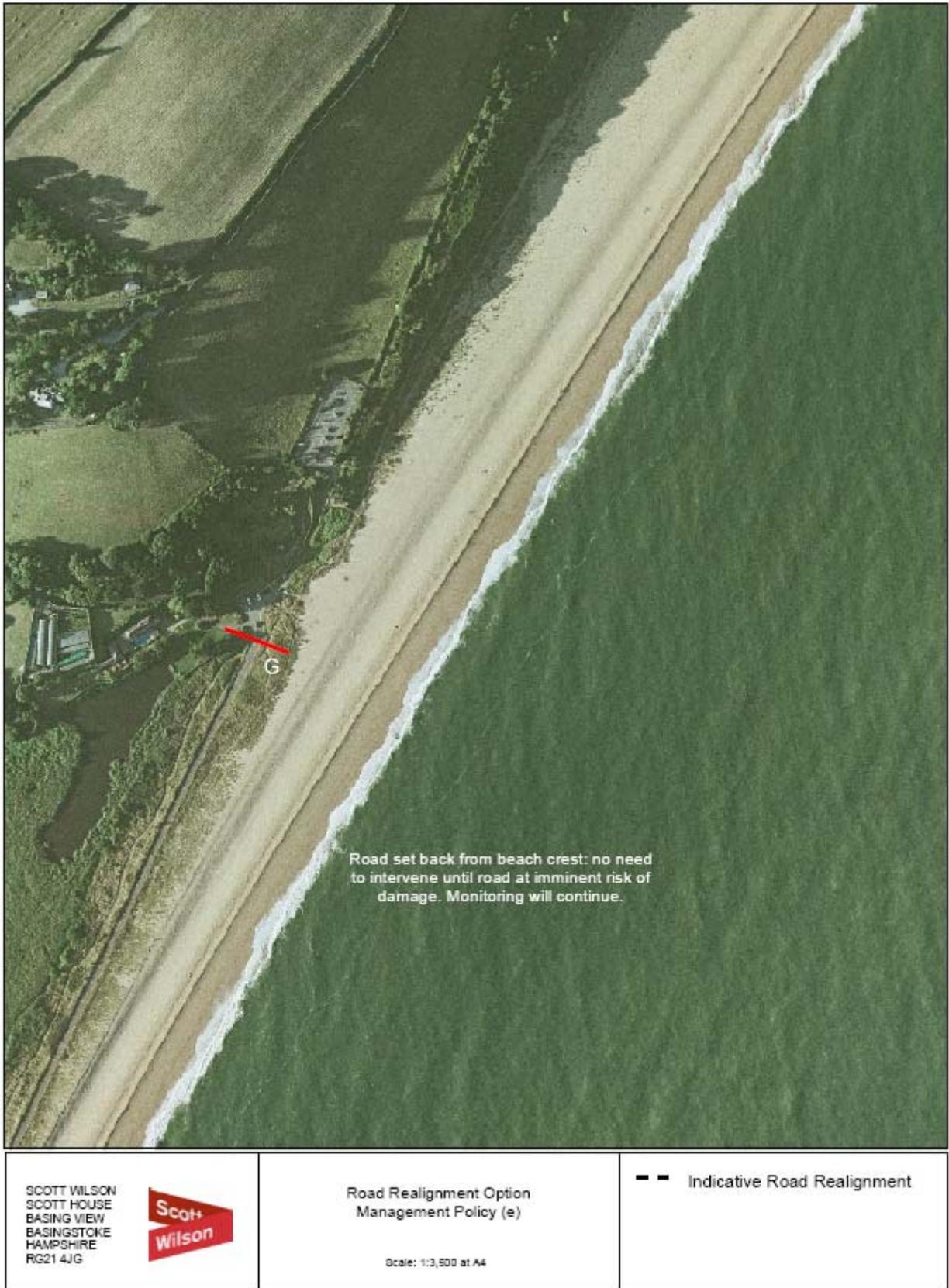
Figures 6-4b



Figures 6-4c



Figures 6-4d



Figures 6-4e

7 Option Evaluation

Overview

- 7.1 An integrated approach to assessing the options has been developed which combines the technical, environmental and socio-economic aspects. A scoring system was developed which gives potential scores across a range of issues, and then determines an actual score for each option. The higher the score, the more acceptable the solution. The weighting system has been slightly modified from that used in Phase 1, to more properly reflect environmental issues.
- 7.2 For each of the viable options a new assessment table has been completed. These are at the end of the section.
- 7.3 The results of the overall scoring are presented below.

	Beach Nourishment	Beach Recycling	Managed Road Realignment on barrier
Technical	24	18	28
Environment	15.4	21.4	22.4
Socio-Economics	15	15	15
Total	54.4	54.4	65.4

- 7.4 The table shows that Road Realignment is the highest-scoring option and therefore this option has been selected as the preferred option, and incorporated into the recommended management policy. The reason why Road Realignment is the highest-scoring option is that it:
- Costs less
 - Has less adverse environmental impact

Evaluation Tables - Key

Option Title		Description of Option	Environmental Impact on a scale from –3 to +3 (negative being adverse and positive being a positive impact)	Transferred Multiplier A decimal from 0 to 1, 0 being most adverse or lowest and 1 being most positive or highest. For environmental sub-objectives the decimal was calculated from the +3 to –3 score. For other objectives it was assessed directly.	Score The result of multiplying the decimal in the column to the left by a weighting
Objective	Sub-Objective	Qualitative Impacts	Quantitative Assessment		
Technical	Solution longevity			Decimal Score	Weighting 10
	Cost			Decimal Score	Weighting 10
	Benefit-Cost			Decimal Score	Weighting 10
	Technical Robustness			Decimal Score	Weighting 10
		Technical Sub-total contribution			Total of scores for the objective
Environment	Ecology		Impact	Decimal Score	Weighting 16
	Geomorphology		Impact	Decimal Score	Weighting 16
	Landscape		Impact	Decimal Score	Weighting 16
	Archaeology		Impact	Decimal Score	Weighting 12
		Environment Sub-total contribution			Total of scores for the objective
Socio-Economic	Community		Impact	Decimal Score	Weighting 15
	Business		Impact	Decimal Score	Weighting 15
		Socio-economic Sub-total contribution			Total of scores for the objective
TOTAL					Total of all 3 objectives

Beach Nourishment		Description	Impact Level (-3 to +3)	Transferred Multiplier (0 to 1)	Score
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT		
TECHNICAL	Solution longevity	Likely to be able to achieve required standard for 50-100 years.		0.9	9
	Cost	High		0.2	2
	Benefit-Cost	Low-Medium		0.4	4
	Technical Robustness	Good. Proven technique.		0.9	9
		Technical Sub-total contribution			24
ENVIRONMENT	Ecology	The <i>appropriate</i> placement of imported material on to the beach would, over time, protect the existing shingle vegetation and maintain valuable invertebrate habitats further north. There would be no effect on other features of the SSSI/NNR.	0	0.50	8
	Geomorphology	Impact on dynamic behaviour of barrier beach and promotes beach degradation. Beach crest protection will prevent barrier beach migration. As sea level rises, this will lead to a reduction in the <i>relative</i> crest height, an increase in the overwashing ratio (OWR) and increased likelihood of overwashing of the road, crest/beach face erosion and breaching. Introduction of alien material onto the beach i.e. impact on beach composition. Possible impact on barrier permeability i.e. impact on water levels in the Lower Ley	-3	0	0

Beach Nourishment		Description	Impact Level (-3 to +3)	Transferred Multiplier (0 to 1)	Score
	Landscape	The site lies within an AONB, the option will lead to a potential landscape change via the importation of aggregate to supplement the existing material of the beach. Landscape change will take the form of a modification in width and profile of the shingle barrier and a possible change in colour and texture of the beach dependant on the source of the aggregates. Visual impact will be most significant during the construction period.	-1	0.33	5.4
	Archaeology	The option is unlikely to have an impact on the cultural heritage resource within the immediate vicinity of the area, however, dredging may impact upon unknown archaeological remains within the marine environment.	-2	0.16	2.0
		Environment Sub-total contribution			15.4
SOCIO-ECONOMIC	Community	Continuation of existing services and access.	0	0.5	7.5
	Business	Businesses will continue trading as normal. Possible drop in visitor numbers due to construction traffic	0	0.5	7.5
		Socio-economic Sub-total contribution			15
TOTAL					54.4

Shingle Recycling		Description	Impact Level (-3 to +3)	Transferred Multiplier (0 to 1)	Score
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT		
TECHNICAL	Solution longevity	Doubt on whether able to achieve required standard for 50-100 years.		0.5	5
	Cost	High		0.3	3
	Benefit-Cost	Medium		0.5	5
	Technical Robustness	Fair. Proven technique but volumes/frequency not certain		0.5	5
		Technical Sub-total contribution			18
ENVIRONMENT	Ecology	The <i>appropriate</i> placement of imported material on to the beach would, over time, protect the existing shingle vegetation and maintain valuable invertebrate habitats further north. There would be no effect on other features of the SSSI/NNR.	0	0.5	8.0
	Geomorphology	Impact on GCR interest: disruption of longshore beach grading (re-established over time). Increased cliff recession between Stretre Gate and Pilchard Cove (possibly temporary impact). Note that beach widening will probably promote increased longshore sediment transport and beach face erosion, because of increased exposure to wave energy.	-1.5	0.25	4
	Landscape	The site lies within an AONB, the option will lead to landscape changes in the width and profile of the beach. The visual impact will be most significant during the construction periods, which will possibly occur for several months each year.	-1	0.33	5.4

Shingle Recycling		Description	Impact Level (-3 to +3)	Transferred Multiplier (0 to 1)	Score
	Archaeology	Extraction of beach material may indirectly impact on the World War II defensive sites located within the immediate vicinity of Strete Gate, as earthworks/structures will be at greater risk from coastal erosion.	-1	0.33	4.0
		Environment Sub-total contribution			21.4
SOCIO-ECONOMIC	Community	Road would be maintained allowing for continuation of existing services and access.	0	0.5	7.5
	Business	Businesses will continue trading as normal. Possible drop in visitor numbers due to construction traffic	0	0.5	7.5
		Socio-economic Sub-total contribution			15
TOTAL					54.4

Realign the existing Coast Road		Description	Impact Level (-3 to +3)	Transferred Multiplier (0 to 1)	Score
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT		
TECHNICAL	Solution longevity	Likely to be able to achieve required standard for 50 years only.		0.5	5
	Cost	Low (reactive/proactive)		0.9	9
	Benefit-Cost	High		0.9	9
	Technical Robustness	Medium. Proven technique, uncertainty on erosion rates.		0.5	5
		Technical Sub-total contribution			28
ENVIRONMENT	Ecology	The landward realignment of vulnerable stretches of road would give rise to a positive impact on the shingle bank, by allowing more natural movement of the shingle. However, the realigned road would result in the loss of areas of vegetated shingle and scrub which provides habitat for dormouse and breeding birds.	0	0.5	8
	Geomorphology	No direct impact on the GCR interest. Impact on dynamic behaviour if overwash material is removed from road surface and returned to beach face, preventing barrier beach migration. As sea level rises, this will lead to a reduction in the <i>relative</i> crest height, an increase in the overwashing ratio (OWR) and increased likelihood of overwashing of the road, crest/beach face erosion and breaching.	0	0.5	8

Realign the existing Coast Road		Description	Impact Level (-3 to +3)	Transferred Multiplier (0 to 1)	Score
	Landscape	Landscape change will take the form of a modification in width and profile of the shingle barrier. Visual impact will be most significant during the construction period.	-1	0.33	5.4
	Archaeology	Ground/Construction works are likely to impact on known/unknown archaeology and built heritage dependent on the exact realignment of the route.	-2.5	0.08	1.0
		Environment Sub-total contribution			22.4
SOCIO-ECONOMIC	Community	Dependant on exact location this option is likely to have minimal impact apart from the construction phase.	0	0.5	7.5
	Business	Dependant on exact location this option is likely to have minimal impact apart from the construction phase.	0	0.5	7.5
		Socio-economic Sub-total contribution			15
TOTAL					65.4

8 Forward Planning Workshop

Purpose

- 8.1 At some point in the future, the effects of climate change and sea level rise will make managed realignment of the road unsustainable. The A379 will then be permanently closed. This is unlikely to happen for 30-50 years if the recommended management policy is implemented.
- 8.2 The impacts of road closure will be many and varied. Some can readily be accommodated by administrative changes (e.g. bus routes), but others may require much longer planning horizons. The Contingency Plan already exists to deal with short-term priority issues. A more detailed plan is required for the longer-term. Because the timescale for road closure is not certain, advance planning is required to enable the community to adapt to the new situation.
- 8.3 The issues are highly important to local people, and meaningful discussion will need to take account of local knowledge. It is suggested that the best approach for this is on a participative basis involving community groups.
- 8.4 It is therefore proposed that a 1-day workshop is held once the current Study is complete and the recommended Management Policy accepted. This would address the question of how Slapton and other local villages and towns could adjust to a future without the A379 coast road. Attendance at the workshop would include Officers of South Hams District Council, Devon County Council, other members of the technical group, other members of the Advisory Forum, representatives of health authorities etc. Attendees would need to receive information on the recommended Management Policy in order that they could undertake preparatory work prior to the workshop.
- 8.5 The output from the workshop would be an issues paper with an advance-planning timetable. This would form the basis for a working group to take forward. The ultimate aim would be to prepare, maintain and implement an Adaptation Plan, which minimises negative impacts, and maximises positive impacts. Some elements of the Plan would be implemented well in advance of closure of the road, and others only once closure has taken place.
- 8.6 In addition to the formal Adaptation Plan, local residents, businesses and service providers should be informed of the objectives and policies in place and encouraged to undertake their own adaptive measures in anticipation of the eventual closure of the road in the long term.

Workshop Format and Attendees

8.7 The workshop would identify:

- The range of infrastructure elements and services that would be affected. This would include:
 - School catchments
 - Bus routes
 - Doctors and hospital catchments
 - Refuse collections
 - Emergency services
 - Adjacent road network
 - Utilities
 - Tourism related business
- The timetable for implementing change
- The implications for infrastructure programmes (e.g. road widening schemes, new hospitals, new schools)
- Gaps in service provision that could result or current gaps that could be filled
- Opportunities for enhancement, such as visitor centres, or tourism development
- Structure of group to take on forward planning

9 Recommended Management Policy

Introduction

- 9.1 This report makes recommendations to the Slapton Line Partnership for a Management Policy for the Slapton Line. The recommendations are set out below in the form of a number of Objectives, and more detailed Policies.

Recommended Management Policy for the Slapton Line

Recommended Objectives

- 9.2 To protect local communities against flooding and coastal erosion.
- 9.3 To maintain the character and value of the landscape, ecology, geomorphology, geology, archaeology and historical setting of the area.
- 9.4 To support local social and economic activities through the provision of community services and public infrastructure.
- 9.5 To maintain the coastline in a way that is environmentally sustainable, allowing the beach and shingle ridge to evolve with natural processes and minimal intervention.
- 9.6 To maintain a road transport link along the Slapton Line to the benefit of the local and regional community until such time as this becomes unsustainable.
- 9.7 To develop a programme for adaptation which will provide the infrastructure necessary to maintain the economic well being of the community when the road link is eventually lost.
- 9.8 To continue to provide an educational resource, and to provide a sound basis for decision-making, by continued and improved collection of data on coastal processes and the natural environment.
- 9.9 To involve the local community in decision-making and to maintain systems for communication between the community and the various agencies and organisations.
- 9.10 To keep in place an organisational framework for management and executive decision-making.
- 9.11 To publicise the Management Policy and to ensure that it's key principles are incorporated into other statutory and non-statutory plans.

Recommended Policies

- 9.12 The A379 should be maintained by a combination of the following measures:
- Proactive realignment of the road to the north of the junction of the A379 and the road to Slapton village. This realignment should be undertaken at two separate locations encompassing a total length of about 500m. The realignment should be undertaken as soon as funding and permissions are in place, which could start to be sought during early 2006.
 - Reactive realignment of the road at any other location. The realignment should be undertaken when damage to the road is believed to be imminent or has already occurred. The aim should be to reinstate the road as soon as is practicable. Realignment will involve landward movement of the road on the shingle ridge. In realigning the road, the viability of cost-saving measures such as provision of a carriageway to a lesser standard should be considered. Preliminary work on permissions and funding should be undertaken in advance, to expedite the re-opening of the road.
 - Localised movement of shingle to provide temporary protection to short lengths of the road or to allow reinstatement of short lengths of the road following damage. The volume of shingle moved should be limited to the same order of magnitude as undertaken previously for the creation of the shingle bastions.
- 9.13 A programme of regular surveys should be implemented to monitor the beach. Surveys should be undertaken following every major storm event, at least twice yearly, and in such a way that beach movements can reliably be calculated.
- 9.14 Data on the incidence of road closure, extent and cost of road damage and costs of road realignment should be maintained and kept up to date. The ecology of the shingle barrier and Ley should be monitored and kept up to date.
- 9.15 The Slapton Line Partnership, Slapton Line Technical Group and Slapton Line Advisory Forum should remain in being to provide systems for ongoing management and consultation.
- 9.16 A forward planning workshop should be held to initiate planning of measures, both short-and long-term, to help the community prepare for loss of the road at some point in the future. Following the holding of the workshop, a body should be set up to continue this work through the activities of councils, agencies and local community. An Adaptation Plan should be developed and implemented.
- 9.17 Local residents, businesses and service providers should be informed of the objectives and policies in place and encouraged to undertake their own adaptive measures in anticipation of the eventual closure of the road in the long term.

- 9.18 The key principles of the Management Policy should be incorporated into other local plans such as the Local Development Framework, the Devon Local Transport Plan and the Shoreline Management Plan.
- 9.19 The Slapton Line Partnership should from time to time, but not less frequently than every 5 years, undertake a review of the management policy, taking into account the results of monitoring and data on storm occurrences, trends in damage, damage costs etc to refine and amend the policy.
- 9.20 In the event of a road-damage event occurring the Contingency Plan should be put into operation until such time as the road is re-opened. The members of the Slapton Line Partnership should aim to re-open the road in such circumstances as quickly as possible.
- 9.21 When it becomes apparent that maintaining the road link is no longer sustainable (either in part or in whole), then the road should be closed and the measures developed in the Adaptation Plan for road abandonment should be put into being. The judgement on sustainability should be made using an accepted investment evaluation method, and should take into account projected long-term economic and environmental costs and benefits.
- 9.22 The existing defences at the Car Park should not be maintained or improved and should be removed if they present a hazard to the public. New defences should not be built and the edge of the car park should be allowed to erode. Some minor works may be undertaken to improve the visual aspect of this area.
- 9.23 In the event that the Monument is in danger of damage than it should be relocated landwards to a safer location.
- 9.24 The existing defences to the road at Torcross should remain, but not be enhanced.