



Slapton Coastal Zone Management Main Study

Volume 3: Phase 2 Report

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with Slapton Line Partnership



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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

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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 Nourish- ment	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 a 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

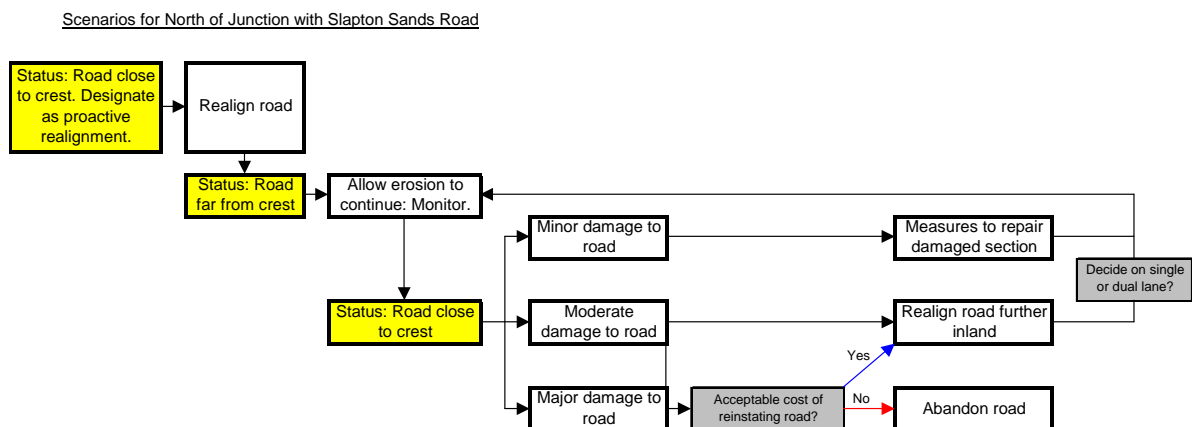


Figure 6-1

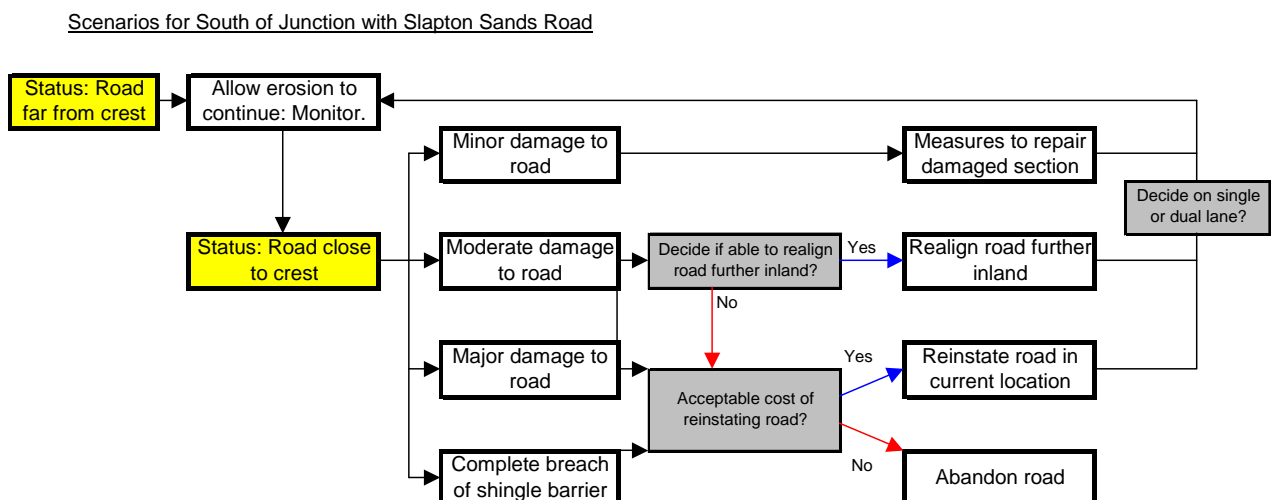


Figure 6-2

- 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.

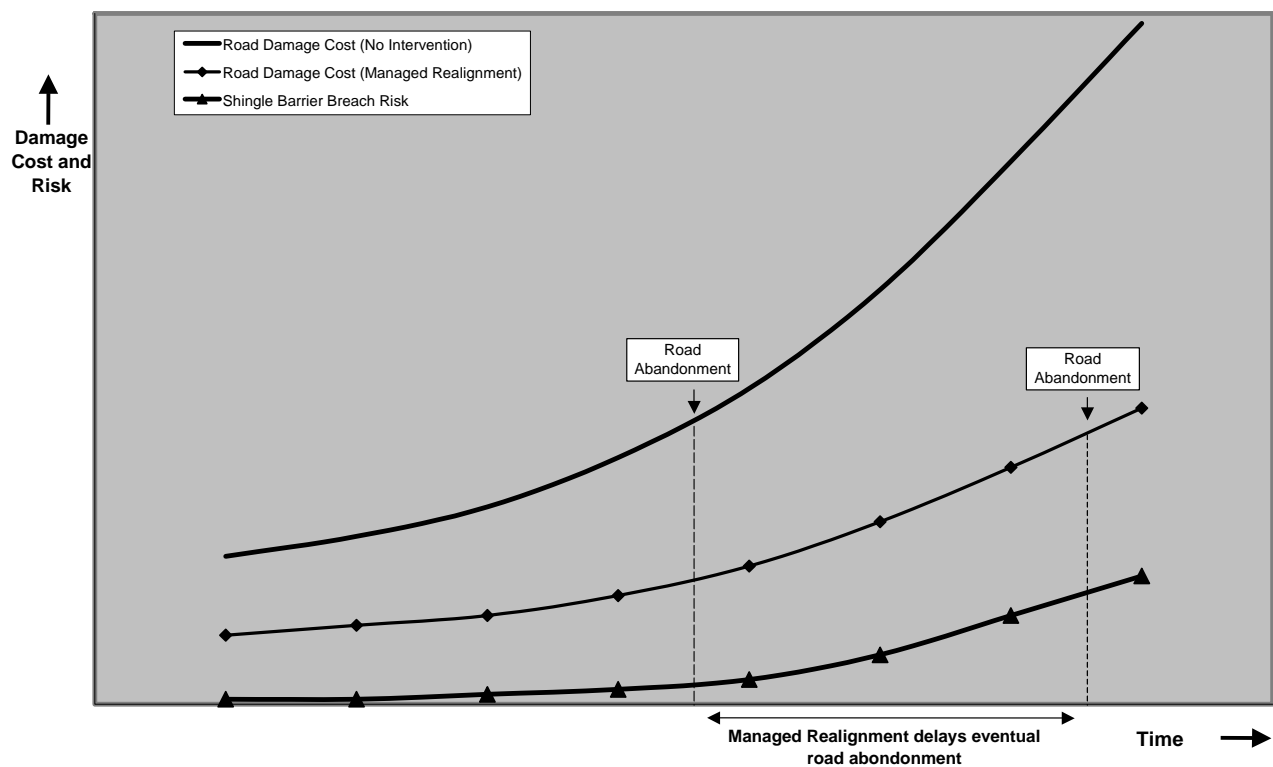
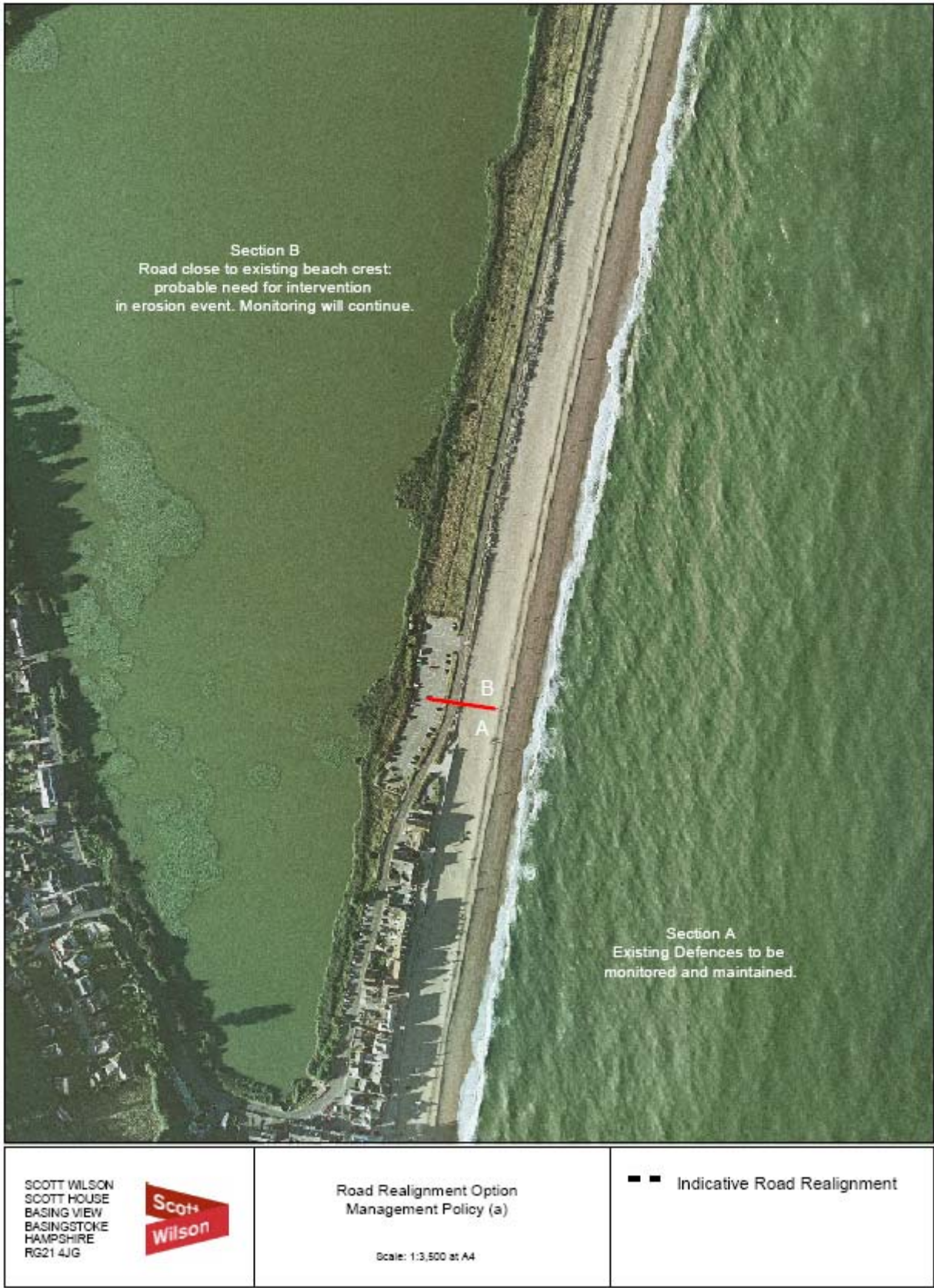


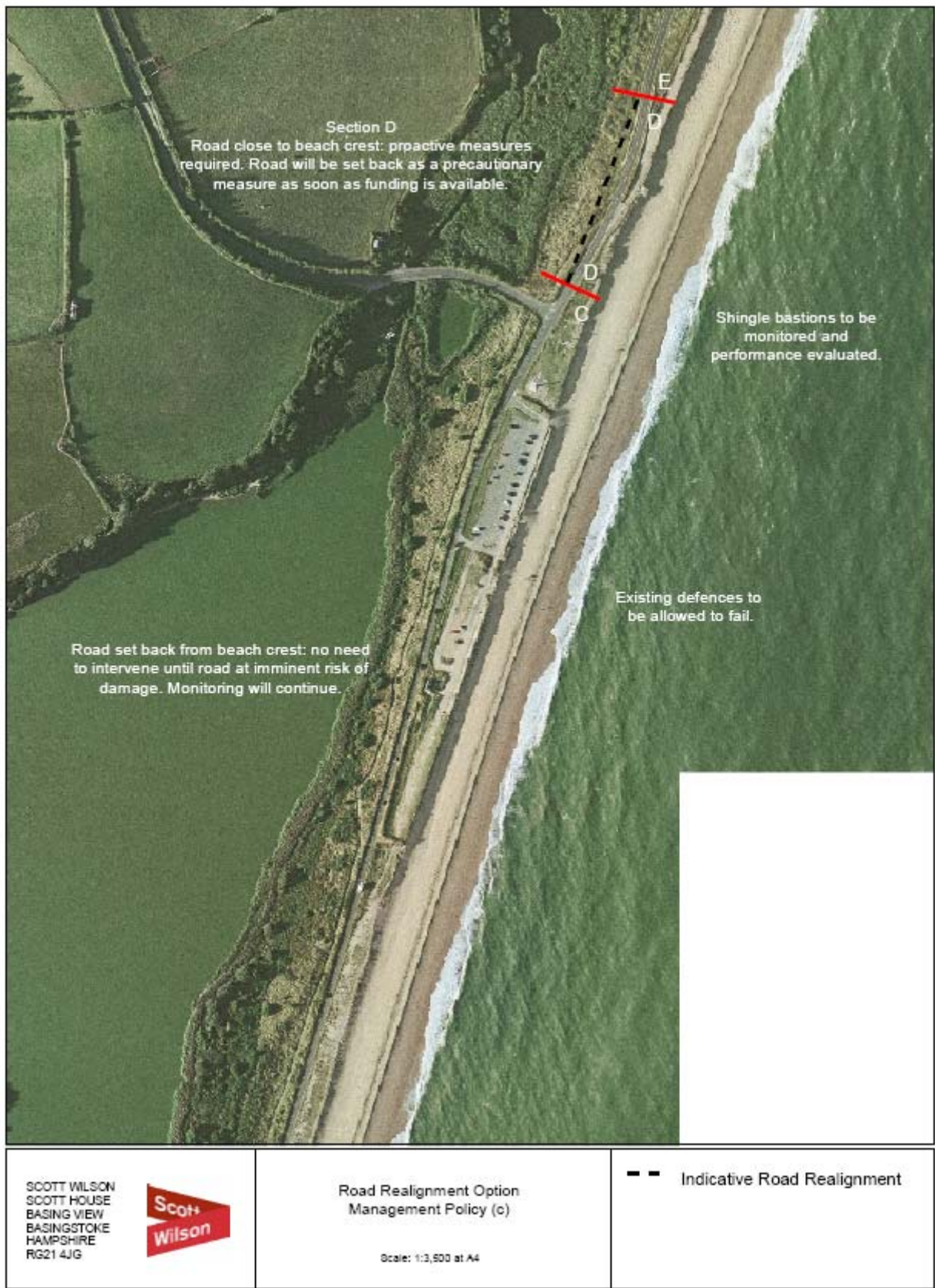
Figure 6-3



Figures 6-4a



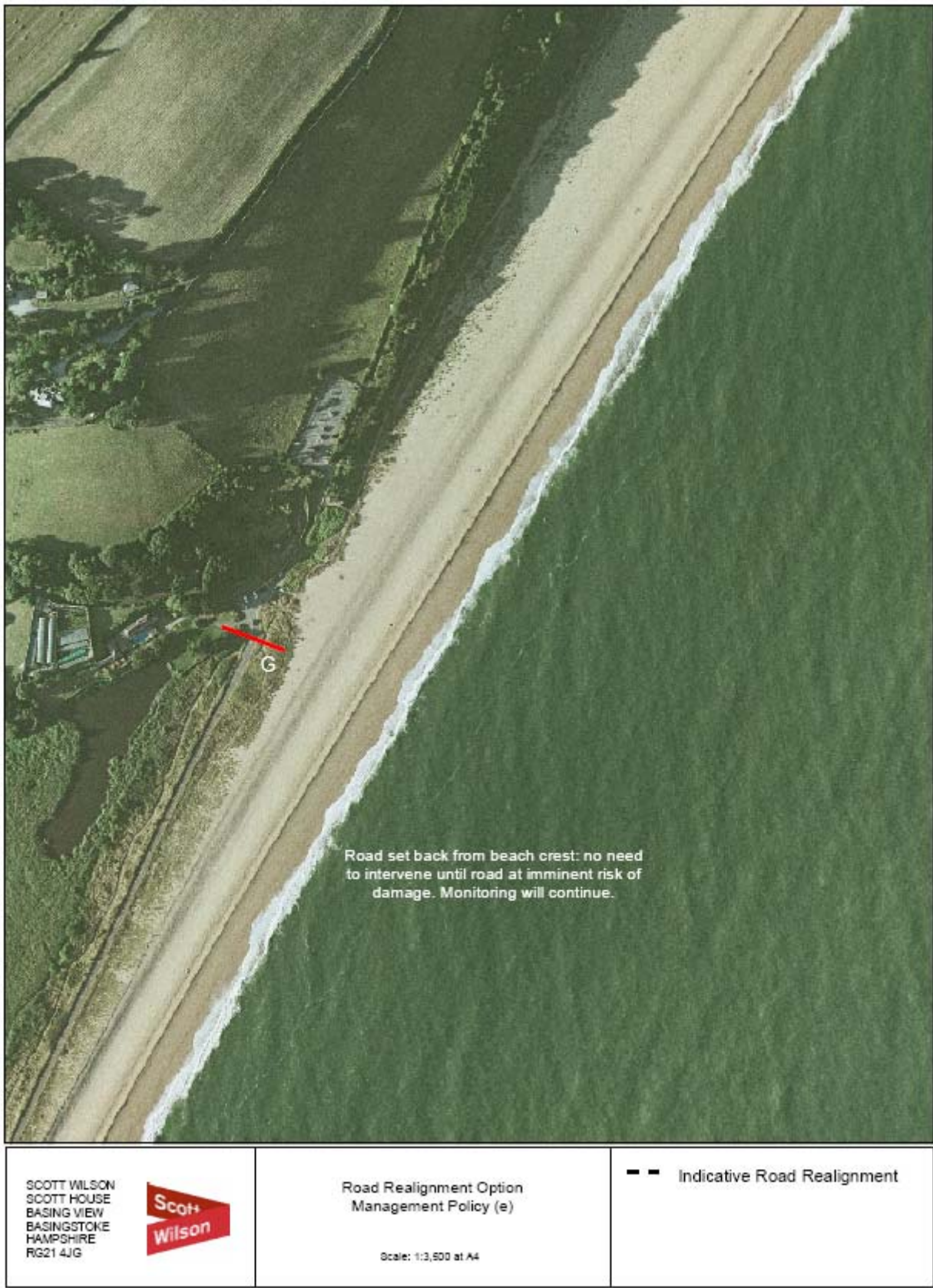
Figures 6-4b



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
		Increase beach width/height to prevent road closure/damage			
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
ENVIRONM ENT	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
		Increase beach width/height to prevent road closure/damage			
	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
		Extract beach material from the northern end, transport south and widen beach in front of the existing road at the southern end of the beach			
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 Strete 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
		Extract beach material from the northern end, transport south and widen beach in front of the existing road at the southern end of the beach			
	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 Realign the existing road along the shingle beach; retreat road to evade erosion	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
		Realign the existing road along the shingle beach; retreat road to evade erosion			
	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 its 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.

Slapton Coastal Zone Management Main Study

Volume 3 Annex A - Consultation Addendum

Prepared by Scott Wilson For
Slapton Line Partnership



DOCUMENT APPROVAL FORM

Document Title: Slapton Coastal Zone Management Main Study

Volume 3 Annex A - Consultation Addendum

Author: Scott Wilson, with University of Plymouth, Atlantic Consultants and Dr Mark Lee.

Amendments Record and Author Approvals:

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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 Annex was originally published in March 2005 as a report entitled Consultation Addendum. This Annex is part of Volume 3 of the study report, and should be read in conjunction with Volumes 1, 2 and 4. Volumes 1 and 2 present the findings of Phase1 of the study and Volume 4 presents the Executive Summary.

1. Introduction

The Phase 1 Report for the Slapton Coastal Study was published in November 2004.

Copies of the Report were issued to attending organisations and individuals of the Slapton Advisory Forum at the Forum meeting held in Slapton on 18 November.

A public exhibition event was held at the Torcross Tavern in Torcross on Friday and Saturday 19th and 20th November. The exhibition material focused on the scope of the study, work undertaken during the study, the options, issues and recommendations. Copies of the executive summary were given to all attendees. Attendees were requested to complete a questionnaire in order to provide their comments on the Report in a structured format.

The exhibition in the Torcross Tavern was well attended with a total number of attendees exceeding 350. The exhibition was attended by staff from Scott Wilson and University of Plymouth, who were available to answer questions.

The exhibition was advertised and promoted through posters, and promotion by representatives of the local communities and businesses. The press and media also promoted the events.

In addition the exhibition material was displayed at the Torcross Tavern for a full week after, and full copies of the consultants report was available at various local public places including Dartmouth and Kingsbridge libraries.

In response to requests made at the exhibition, approximately 20 electronic copies of the full report were issued on CD.

2. Analysis of Consultation Questionnaires

Comments were recorded at the event on questionnaires or returned after the event (requested by 14th January 2005). A total of 75 questionnaires were returned. Comments were sought both on the scope of the study, comments on the recommendations of the study and views of the study options.

Comments ranged from those of a strategic nature through to very detailed comments with specific proposals and suggestions.

Tables 1 to 4 give a breakdown of responses for the three main areas of comments received:

- Study scope
- Study conclusions and recommendations

- Study Options

Comment on scope of study	Number of responses	Comments
No comments	13	
Scope good	38	
Scope broadly satisfactory	10	
Scope poor	14	Most criticisms of the scope concerned lack of work on historical events

Table 1: Comments on Study Scope

Comment on conclusions and recommendations of study	Number of responses
No comments	25
Broadly agree with conclusions/recommendations or find them reasonable	33
Broadly disagree with conclusions/recommendations or find them unreasonable/inadequate	17

Table 2: Comments on Study Conclusions

Option	Average Score (1= bad, 5 = good)
1 No active Intervention	2
2 Beach nourishment	3
3 Beach recycling	3
4 Rock revetment	3
5 Sheet piling	3
6 Realign road on shingle bank	4
7 Upgrade inland road	2
8 New road landward of Ley	2

Table 3: Average Scores for Options

From this it is clear that from the sample of returned questionnaires as a whole, both the No active intervention and the inland road upgrade/new inland road options were viewed as moderately bad. Road realignment on the shingle bank was viewed as moderately good, and all other options as neutral.

Option	Option Preference (option receiving highest score from an individual consultee)
1 No active Intervention	7
2 Beach nourishment	4
3 Beach recycling	4
4 Rock revetment	4
5 Sheet piling	9
6 Realign road on shingle bank	40

7 Upgrade inland road	1
8 New road landward of Ley	5
None	1

Table 4: Option Preferences

From this table it is clear that of the options presented, the option which was preferred by most consultees was Option 6, Realign the road on the shingle bank. This accounted for approximately 50% of all replies. The next most preferred option, Sheet Piling, accounted for about 12% of replies. None of the other options accounted for more than 9% of replies.

90% of replies preferred some form of intervention to no active intervention. Those preferring a 'soft' type of intervention (beach nourishment, recycling, realignment of road, upgrade of road or new road) accounted for about 72% of replies. Those preferring a 'hard' type of intervention (rock revetment or sheet piling) accounted for about 17% of replies.

It is notable that of all responses received only 7, or less than 10% of the total, were from consultees giving their age as less than 50. From this it is clear that the issue has not engaged the interest of young people, or even the middle aged. Given that the project is concerned with the long-term future, this is a particular issue which would usefully be addressed in a follow-up study or through local groups.

A business questionnaire was also issued to 492 local businesses in the postal areas of Kingsbridge, Dartmouth, Slapton, and Chilmington. The results of this can be seen in section 5 of this report.

3. Comments Received on Consultation Questionnaires

Table 5 provides a sample of the comments received with the questionnaires. These are not necessarily representative of all responses, but give an idea of the types of issues that were raised.

Sample Comments
1) A breach would be an advantage, because it would reduce the volume of traffic through old and narrow roaded villages such as Charletons and Frogmore, but especially reduce heavy and large lorries which cause structural damage to properties. 2) When the line is breached, its is likely that a salt marsh would be formed. This would enhance the wildlife attraction of the area. 3) The report states that storms will become more frequent and severe because of global warming, with increased sea levels. Breach of the line is inevitable. The businesses of Torcross should adapt and prepare for these changes while time is available, rather than wondering what to do when it happens. Previous generations have adapted to change.
Reassuring and well presented study, although doubts about financial commitment are obviously a matter of concern. I would be strongly against a recommendation which would involve re-routing traffic through Slapton village which already suffers from congestion due to inappropriate vehicle size and length.
Having identified the weakest areas of the shingle bank. How about submerging offshore shingle rocks to the south of this area to reduce shingle movement and to reduce wave power against the shingle bank. As there is a strong S to N flow of tide, I suggest we use this for the generation of electricity. There would be no talk of closing the road then and we would be adding to green power. The option of no intervention and the road closure, which may be this winter or may be in 50 years time, is not an option. The road must be saved for 1) the people n the district 2) communication 3) maintaining the freshwater wildlife in and on the Ley.
Should the road (A379) be allowed to go, the villages Torcross/ Streete and others will become isolated. Travelling to Dartmouth, a nightmare through the Lanes. Any upgrading of the lanes would be too expensive. The sea must not be allowed to encroach into the freshwater Ley- thus changing Flora and Fauna and making a swampy smelly inlet. Villages are already losing Po's stores, small businesses i.e. B&B. Beautiful Slapton Sands for all its past WWII history deserves to be saved for future generations. Funding is obviously a big problem.
This progressive urbanisation of a beautiful area is not what visitors (or this local) want to see. Priority Keep the road open. After 50 years of using the road and showing its delights to visitors, I can confirm that is a major attraction and in a tourist related area such as this, on the basis that people are more important tan animals, preservation of the road is more important than any infringement of the nature reserve that might possibly occur.
As a long term user of the road, my interest is largely in maintaining the roadway as a viable link for as long as possible. This would indicate option 6, of gradual realignment is the best option, until it is overwhelmed by Global Warming.

Table 5: Sample Comments

Some general comments included in the response forms are summarised below:

No Active Intervention

- The majority of consultees felt that this option was unacceptable.

- Some comments included suggestions that a breach of the road would be advantageous, and remove the commuter traffic and heavy vehicles from the local roads.
- A breach of the road would allow the creation of new habitats, and increase local wildlife diversity

Sheet Piling and Rock Revetments

- Some consultees felt this option the most appropriate line of defence for the road. However the majority would not want to see hard defences such as sheet piling or rock revetments along the Slapton Line.

New Inland route

- This option was felt by some consultees to provide the most suitable option, which would not require realignment, and would ease traffic problems on smaller local roads.

Alternative Ideas Suggested

- Creating the A379 road on stilts, to allow migration of the barrier, whilst avoiding the need for realignment.
- Sinking old ship hulls in the bay, and 'restoring the closed cell structure' of the bay

It was almost unanimously agreed that the A379 transport link was vital. If the Slapton road should go, another alternative route would be needed inland.

The local business representatives felt that not a large enough sample of business questionnaires had been sent out. The survey had been too selective. If this was to be conducted in future a much wider and more detailed study of the effects on businesses should be addressed.

However the majority of consultees felt that the study was comprehensive and extensive, although some of the language could have been simplified. Most agreed with the conclusions but felt it would have been better to be consulted at an earlier stage in the study.

4. Responses from Organisations

Formal responses were received from the following organisations:

- Stokenham Parish Council

- The Whitley Wildlife Conservation Trust
- English Nature
- Devon County Council
- South Hams AONB Unit
- South Hams District Council
- Devon Fire and Rescue Service
- Slapton Parish Council

Table 6 summarises the main points raised by each of these organisations.

Copies of all of the responses are included in Appendix A.

Organisation	Summary of Comments
Stokenham Parish Council	Broadly concur with conclusions but have concerns about a number of aspects of the report - clarity and readability of the report, smallness of sample for business survey, historic removal of shingle.
Whitley Wildlife Trust	Work on geomorphology very thorough. Option assessment reasonable and robust. Suggest that realignment must be reactive not proactive in order to be efficient.
English Nature	Road reinstatement could be to standard matching adjacent lengths of road, not the existing Slapton Sands length. Various detailed comments. Weighting for nature conservation etc. aspects is low.
Devon County Council	Comprehensive consideration of coastal processes and geomorphology. Supports recommendations on options to be taken forward. Suggests consideration of hybrid options. Would prefer to see a Climate Impact Assessment to bring together all climate related findings in one place. Need to look at reorganisation of community services. Detailed critique of the report in context of Climate Change is appended to DCC's comments. The critique suggests that the risks of a breach are understated due to underestimation of long-term sea level rise rates and increases in storminess and surge.
South Hams AONB Unit	Approach welcomed, scope thorough. Suggestion that Iteration 2 should look at combinations of beach recycling and local realignment. Also whether adverse social impacts of road closure will be avoided if there is a sufficient period of lead in and adjustment. Need to consider future of Monument car park.
South Hams District Council	Support outcome of report. Options to be considered further should be managed realignment, potentially supported by beach replenishment and recycling, improvements to the inland road and minimal intervention.
Devon Fire and Rescue Service	Well presented study. Further consideration for emergency vehicles.
Slapton Parish Council	Raised issues to do with programme and funding.

Table 5: Responses from Organisations

5. Business Survey Responses

Business questionnaires were sent out to a selection of 462 businesses in the postal areas of Kingsbridge, Dartmouth, Slapton and Chilmington. 23.6% (or 109 businesses) responded. The types of businesses are outlined below in Table 6.

	Number	Proportion of Total
Accommodation Providers	17	15.5%
Eating Establishments	6	5.5%

Attractions	1	0.9%
Pubs	5	4.5%
Other	41	37.6%

Table 6: Business Response Categories

The 'other' category businesses ranged from taxi companies to garden centres. Over 50% of the responses were from tourist dependent businesses.

Although the majority of responses came from the area of Kingsbridge, over 17% of responses were from the Slapton/Torcross area.

Comments on the Impact of the Road

- Overall 57% of businesses felt they were affected by the closure of the A379, whilst 35% of businesses felt they were unaffected. An indication of reduced costs from the closure of the A379 averaged at £6,000 loss of turnover per business during this time.
- 50% of businesses felt that improving the road inland was not an acceptable alternative, and their businesses would be adversely affected. 35% of businesses indicated the improvements to the inland road would be acceptable providing they widened the road to allow two-way traffic access.
- The business responses specifically from the area of Slapton and Torcross, felt the alternative access was poor, resulting in increased difficulty for staff to get to work, and potential future problems for recruitment and supply. All local businesses recommended that if the alternative route was to succeed, the road must allow two-way traffic, and not a system of one-way with passing lay-bys.
- Business respondents were concerned with potential negative impacts on their businesses, if the shingle ridge A379 closes, and no suitable alternative route is provided.

The full analysis of Business Questionnaire results is given in Appendix B.

Appendix A

Organisation Responses

Devon Team

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Email devon@english-nature.org.uk

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Your ref:

Our ref:

English Nature comments on
Iteration 1 sent 14-01-05

Date:

14 January 2004

Dear David

RE: SLAPTON COASTAL ZONE MANAGEMENT MAIN STUDY ITERATION 1: DETERMINING THE SHORELINE MANAGEMENT APPROACH

This letter is English Nature's response to the Iteration 1 report of October 2004. Thank you for supplying English Nature with both a hard and electronic copy of the report.

EN welcomes this report and its links with the SMP process. The report clearly sets out the findings of the investigations into the coastal processes. Also its preliminary examination of the potential options is comprehensive. Here are a few specific comments that I hope are helpful.

Chapter 4 the ecological baseline summarises the main habitats and features of the SSSI and surrounding areas. There are perhaps one or two minor inaccuracies but these are insignificant. For example 4.1.4, the SSSI was notified 1952, 1984 and 2004, not 1952, 1982 and 2004 as stated.

Chapter 5 the geomorphology baseline gives the potential for future evolution of shingle bar on a geomorphology based projection, with a retreat efficiency rate of 0.2 (Orford model). I understand, and it is made clear in the text, that the lines on the maps in volume 2 are based on our current understanding of future scenarios and are predictions based on probability. How certain can one be of the projections from the Orford Model and can any numbers of the statistical probability be put on these lines?

It is interesting that the prediction for a breach of the shingle bar is much less than 1 in 100 years. This means the freshwater aspects of the SSSI are almost certainly secure for sometime to come. There has been much concern about breaching, the future of the freshwater interests of the SSSI and what could be done to protect these. I hope this helps to address many of the fears held.

English Nature notes that the protection of Torcross is a different problem from the protection to the road (1.36). Torcross would be threatened by the shingle bar moving back landwards of the end of the village and this part would need an extension sea wall to protect it.

English Nature comments on Iteration 1 sent 14-01-05

From your report it would seem likely that it will be possible to maintain the road along the shingle bar for a considerable time yet, possibly up to 50 years and even beyond. We also note that it is inevitable that the road will go eventually, as the cost of maintaining it becomes uneconomic. The eventual loss of the road is likely to come about as a result of a storm event, thus the exact timing of the end of the road is likely to remain unpredictable to the last. It is obvious then that any adjustments needed to the local social and economic services should be in place well in advance of this eventuality. Further reports should consider what would be required for these adjustments, and what would be the trigger for resources to be transferred from maintaining the road on the shingle bar to the other options. There does appear to be plenty of time left in which to ensure adjustments are put in place, this should not however lead to complacency.

It is noted that the preferred option at this stage would appear to be managed realignment of the road on the shingle bar. It is also noted that the final preferred option is likely to have more than one strategy within it.

The A379 is of course currently an A road which I understand can only be repaired to A road standard. On considering the nature of most of the A379 from Dartmouth to Kingsbridge, which is certainly not of A road standard, it might well be possible to downgrade the status of the road so that future setback options would involve less expensive engineering. This would have no effect in terms of the transport function of the road.

I do not understand in 12.17 by what mechanism the road could slow down changes to the shingle bar from wave action.

Here are some comments on Chapter 13, the Environmental & Socio-economic appraisal. First in the contents section it is only referred to as Environmental Appraisal. One small point which I am sure has been noticed already the word barrier has been replaced with barberries - computers.

13.11 Cetti's warbler is a separate SSSI feature, in addition to the breeding bird assemblage.

13.16 Similarly to the wording in 13.15, this option may require mitigation measures to protect shingle vegetation.

13.21-13.23 Option 8 It would seem inappropriate to consider building a new road along the landward shore of the Ley. This would almost certainly damage the important features of the SSSI. Any new road would be better situated further inland on the plateau farmland area. There would still be some damaging effects of this in both landscape and ecological terms but far less than if the road is immediately next to the ley.

13.31 The beach recycling option could only be continued to a point where no substantial lowering of beach volume in the northern section were observed. Any threat to the northern section would have to trigger a cessation of this option. In this situation I would consider the potential impact of such an option would be no worse than 0 to -1

13.32 & 13.33 Both these options, rock revetment and sheet piling, would destroy the natural response of the shingle bar to the coastal processes. This would severely damage the geomorphological interest.

It is interesting that you have reached the same conclusion as other experts who have advised English Nature concerning sheet piling and rock revetment. That is that stabilisation of the bar by these means would increase the likelihood of the barrier breaching (figure 13.2). This has been a difficult point to explain to many local people, who have seen these hard defence options as protecting both the road and the freshwater features of the SSSI.

13.34 This would suggest that shingle on the road should be moved to the backslope of the shingle bar.

13.37 This would not appear to be relevant to Option 7, the heading above it.

13.57 This section does not recognise that the shingle bar is likely to remain intact for a long time into the future, with no loss of landscape value. It may even remain intact for considerably more than a century. Also when the road is lost there will be no more traffic on the line, which many would consider to be an improvement of the visual landscape. Hence there are potential positive impacts of option 1 on landscape as well as the negative ones considered.

In Chapter 15, Option Appraisal, there is a relatively low weighting given to the ecology, nature conservation, geomorphology and coastal processes. These four aspects have created the local environment which everyone, including tourists, value. English Nature would therefore maintain that a total weighting of 16 percent for these aspects is rather on the low side.

English Nature appreciates the effort made in the investigations and production of this report and welcomes its expert and independent view.

Yours sincerely



Dr Simon Dunsford
Conservation Officer
(Direct line 01392-889772)



DEVON COUNTY COUNCIL

Edward Chorlton
County Environment Director &
Deputy Chief Executive

County Hall
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FAO: David Dales
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Your ref:
My ref: JDA

Date: 1 February, 2005
Please ask for: David Andrew

Phone: (01392) 382175
Fax: (01392) 382135

e-mail: dandrew@devon.gov.uk

Our ref: DCH/CH7/A/COM CH(921)

Dear David

**Devon County Council Response to:
Consultation by Consultants, Scott Wilson, on behalf of the Slapton Line Partnership
Slapton Coastal Zone Management Main Study – Iteration 1: Determining the
Shoreline Management Approach**

Further to my e-mail of 20th January 2005, forwarding a draft of the County Council's Response to the Consultation, please now find enclosed the County Council's formal Response, as approved by the Executive Chairman for Environment.

There has been one amendment made to the earlier draft, this the inclusion in the final paragraph of "... change **and sea level rise**, in the event of ...".

I look forward to receiving your comments on Ian Bateman's paper forwarded to you earlier, and also to our meeting of the Slapton Line Technical Group on Friday 25 February 2005, to consider the Consultation Responses.

Yours sincerely

David Andrew
Assistant Environment Director

Ccs Bill Lawrence, South Hams District Council
Simon Dunsford, English Nature



DEVON COUNTY COUNCIL

**Consultation by consultants, Scott Wilson, on behalf of the Slapton Line Partnership
Slapton Coastal Zone Management Main Study – Iteration 1: Determining the Shoreline Management Approach
Devon County Council Response**

The County Council welcomes the opportunity to comment on the Slapton Coastal Zone Management Study Iteration 1.

The following comments reflect the County Council's interests as Highway Authority, Strategic Planning Authority and provider of community services including lifelong learning, libraries and social services. The Council is an active member of the Slapton Line Partnership and the South Devon AONB Partnership. The Council has been responsible for funding and implementing a number of schemes following the major storm damage to the A379 in January 2001, including the construction of the new inland section of carriageway and the relocation of the Memorial.

The County Council welcomes the Study report and the comprehensiveness of its consideration of the coastal processes and geomorphology.

We seek your assurances that the implications of global warming and climate change and the consequences for sea level rise, storm conditions and storm surges, and in turn the predicted timescale for events affecting Slapton Sands have been fully accounted for in the assessment of the implications for Slapton Line. It would be useful for a Climate Impact Assessment to be included in the report to bring together all the climate related findings into one place.

There are concerns that the environmental and economic analysis has been less thorough, and in particular that the results of the business survey have not been available to inform the report. We have already agreed with you that the archaeological and cultural heritage baseline assessment will need to be considerably enhanced to provide an adequate basis on which to take forward Iteration 2.

The Council believes that, as important as the above considerations are, they do not materially affect the validity of the option development and evaluation and the conclusions as to which options should be further assessed in Iteration 2.

The County Council accepts the report's principal conclusions that options involving hard defence of the shingle ridge or the construction of a new inland road are not acceptable and should not be taken forward for Iteration 2 assessment. The report's recommendations that the option of managed realignment be carried forward for further in depth consideration along with the options involving beach recycling, beach nourishment and inland road upgrade is supported.

There is considered to be a strong probability that in reality, measures available to maintain the A379 will be a hybrid of several of these options, much as at present, drawing on selective realignment of some carriageway sections, beach recycling and nourishment eg replacement of shingle bastions, and some minor improvements to the inland local road network in support of the Contingency plan. This should form part of the Iteration 2 assessment.

Subject to your assurances about the assessment of the impacts of climate change and sea level rise, in the event of storm damaging events being seen to occur sooner and with greater frequency, it is considered that the 'Do nothing' option may need to be called on at an earlier date than the report anticipates and should be given higher status, than that currently proposed. This option requires examination as to how the forecast adverse socio-economic and transport impacts could be mitigated, for example, how the provision of local community services would need to be reorganised if the road was eventually permanently to be severed.

End

Working together to conserve and enhance the



David Dales
Scott Wilson
Scott house
Basing View
Basingstoke
Hamshire
RG21 4JG

20th January 2005

Dear Mr Dales

Slapton Coastal Zone Management Main Study (Iteration One).

I write in response to the publication of the Slapton Main Study, on behalf of the Partnership Committee for the South Devon Area of Outstanding Natural Beauty.

Please note that a number of AONB Partnership member organisations will have made their own individual responses to you separately as well, and these will no doubt have expressed a broad variety of views. This response aims to concentrate on issues from the point of view of the AONB Management Plan.

The report is welcomed: the scope of the Study is broad-reaching and the approach is thorough.

The Study's recommended shortlist of options to be taken forward to the next stage of detailed investigation is supported (managed re-alignment of the road; beach recycling; beach replenishment; inland road upgrade). The recommendation of discarding at this stage the engineered "hard coast defence" options (rock revetment and sheet piling) and new inland road construction is also supported. This general approach appears to accord with the aims and policies of the AONB Management Plan (see attached relevant extracts).

The overall effect of the Study is one of re-assurance in the short and medium term: the assertion that the storm damage of 2001 was the result of "episodic erosion rather than continuous erosion" (a 1 in 25 year event) and the indication that the road should be maintainable on the shingle ridge for 50 years or so (albeit at an increasing scale of costs over time) allows a breathing space and allays fears that the destruction of the road is imminent without a major engineered coast defence intervention in the very near future.

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Funded by:



This scenario allows the pursuit of coastal management measures which are relatively benign environmentally while permitting the continuity of the road link for the time being. The Study indicates that the costs of pursuing this approach would be relatively low in the short-medium term and, provided that this can be afforded, the prognosis for the next 20-30 years is better than might have been expected.

However, this scenario could also provide the temptation to defer addressing the harder long term issues. In particular, the Study clearly indicates that pursuing any of the short-listed approaches would still lead to the eventual loss of the road when there is no longer any space (or funding) left to keep rolling it back away from the sea, possibly after 50 years. It buys time, but all the listed negative impacts of the "do nothing" scenario (the lowest scoring of the options considered in the Study) could then come into play at that later stage. A future generation may have to repeat the whole process we are now going through unless long term clarity of policy and purpose is also addressed now.

In the next stage of the Study, attention therefore needs to be paid to the following:

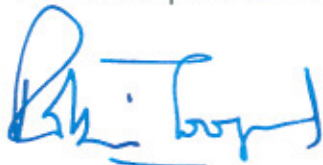
It is recommended that a combination of short/medium term solutions be investigated. For example, a mixture of beach recycling (moving beach material to vulnerable areas) and local re-alignment of the road where it is threatened with erosion, are two approaches that could be complimentary and work well together.

It is accepted that the A379 is of great importance to the current economic and social well-being of the area. The economic, social and transport analyses of the Study are based on an assessment of the impacts of the road closing immediately, and indicate serious adverse consequences. This is only to be expected when travel to work journeys, travel to school journeys, shopping patterns, delivery rounds, etc etc are all based on having a connecting A-road. However, it would be helpful if the next stage of the Study could analyse whether the serious adverse consequences of road loss might be significantly reduced if a lead-in period allowed a process of adjustment and adaptation to take place. Could a "cul de sac" layout be a realistic and tenable long term option, provided that local residents, businesses and organisations had (say) 25-30 years to adjust? What other social and economic mitigation measures might be needed? There may be an option of adopting one approach in the short and medium term (perhaps managed re-alignment of the road, and beach recycling) in order to "guarantee" the road connection for a given duration, in preparation for progression to a second, longer term option (perhaps inland road upgrade and other social/economic mitigation measures). It is acknowledged that this is a very complex and difficult issue to unravel, but it does seem to be an avenue that will need to be explored.

The present Study helpfully notes that, as well as problems, the severance of the road could also bring benefits and opportunities for tourism and recreation in the area. (Paragraphs 13.96, 17.40, etc). However, this analysis fails to acknowledge the issue of congestion, hazard and noise intrusion arising from the current heavy use of the A379 and consideration might be given as to whether the removal in the long term of through-traffic could bring significant improvements to the peace and quiet of residents in the villages alongside the A379 between Kingsbridge and Dartmouth.

The future of the Monument Carpark in the centre of Slapton Sands is a difficult but pressing issue that will need to be addressed by the Slapton Line Partnership. Figure 11.51 indicates a potentially significant further loss of carparking space from future storm events. It would be helpful if the next stage of the Study could recommend a future management option for the site and in particular for the existing damaged concrete block coast defences.

I would be pleased to discuss any of these issues further with you. Yours sincerely



Robin Toogood
AONB Manager

Attached below: relevant extracts from the South Devon AONB Management Plan.

South Devon AONB Management Plan.

Relevant extracts from the AONB *Management Plan 2004-2009* relating to coastline and estuaries are as follows:

The Management Plan overview of coasts and estuaries:

Wild and rugged coastline, secretive estuaries and the quality of tranquillity are what define the South Devon AONB. Rivers and in-shore waters permeate the landscape character of the AONB and bring a rich heritage of maritime and trading tradition. The coast is a valuable resource for peaceful recreation and enjoyment treasured by residents and visitors alike. It supports the economic sectors of tourism, recreation, boating and fishing.

The Management Plan aim for coast and estuaries is:

To maintain the highest quality of undeveloped coastal landscape as a defining feature of the AONB and an asset to the nation's natural heritage.

The Management Plan policies for coast and estuaries include:

To respond positively to the challenges of coastal change and sea level rise by planning for the future; and to consider natural processes and "soft defences" in long term coastline management wherever appropriate, accompanied by the realignment of coastal infrastructure to more sustainable locations where there is space to accommodate it.

To protect and maintain the tranquil and unspoiled character of the coastline and estuaries and to secure improvements to coastal sites damaged by past poor quality development or intensive recreational pressure.



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10th January 2005

Mr. David Dales
Scott Wilson
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Hampshire RG21 4JG

Dear Mr. Dales,

Re: Slapton Coastal Zone Management Main Study

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I am writing to give the Whitley Wildlife Conservation Trust's view on the results of the first iteration of the above study as presented in the report dated October 2004. The Trust was one of the funders of the study, through the Slapton Line Partnership, and has participated in the oversight of the work through both the Steering Group and the Advisory Forum. We have therefore been aware of and commented verbally on the interim reports on the progress of the work. Nevertheless, the results of the study were very interesting and, as the Trust is the single largest landholder likely to be affected by any proposals arising from it, of particular relevance to us.

Perhaps the first comment to make is our observation that the work on the geomorphology of the shingle ridge is very thorough and provides genuine insight into the probability of a breach of the ridge within a reasonable timescale. The results confirm our belief that such an event is relatively unlikely to occur within 50 years and that the events of January 2001 were a result of an extraordinary set of circumstances. Broadly similar, but not exactly the same, circumstances occurred in October 2004 without any noticeable effect on the shingle ridge, thus confirming the conclusion.

We are aware that the detailed methodology (e.g. the weightings used) of the assessment of the various options has been questioned by some but we believe it to be reasonable and robust. Consequently we believe that the Managed Realignment option is the most appropriate subject only to further refinement under Iteration 2.

Of course, Managed realignment runs the risk of meaning different things to different people, hence my question to you at the recent Advisory Forum meeting on how proactive such realignment should be. It is our view that positive realignment would involve too much 'second guessing' of where potential damage to the ridge might occur to be feasible. In any

EXECUTIVE DIRECTOR SIMON J. TONGE, B.Sc.

The Whitley Wildlife Conservation Trust - a registered educational and scientific charity

owner of Paignton Zoological & Botanical Gardens • Slapton Ley National Nature Reserve • Primley Park Nature Reserve

Trustees: D. J. Stradling, B.Sc., Ph.D., F.R.E.S. (Chairman), D. Bailey, B.A. (Hons) ACCA, P. R. F. Chanin, M.A., Ph.D., A. C. J. Cooper, B.Sc. (Hons), R. W. J. Ford, FINSTD,
Mrs. S. J. Greinig, B.A. (Hons), H. C. Knight, B.Sc., K. L. Mitchell, LL.B., M. C. F. Proctor, M.A., Ph.D., W. H. Whitley,

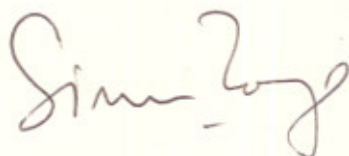
Charity No. 306622

Environment Friendly Paper

case, funding for such a move would not be available from any source that we are aware of. This Trust believes that Managed Realignment means responding to damage to the road *as and when it occurs* exactly as happened three years ago. The only difference is that as all parties now understand the legal issues involved and how our various obligations and liabilities interact we should be able to respond a great deal quicker. Perhaps at this juncture I should point out that this Trust could never fund any work to reconstruct a road. That must remain the responsibility of others.

Although we all accept that a catastrophic and irreparable breach to the ridge is most unlikely, I nevertheless feel it necessary to point out that this Trust would have great difficulty supporting a proposal to reconstruct the road using bridging or sea defences if such an event did, in fact, occur. Our view all along has been that in the long term (100 years+) the likelihood is that the ridge will erode and the road will be lost. It is imperative that the communities around Slapton come to terms with this and prepare themselves for it. They have been given more than adequate warning to enable them to do it.

Yours sincerely,

A handwritten signature in dark ink, appearing to read 'Simon Tonge', written in a cursive style.

Simon Tonge
Executive Director

STOKENHAM PARISH COUNCIL

Clerk: Mrs Gill Claydon
Telephone: Kingsbridge (01548 581185)
Email: clerk@stokenham-pc.gov.uk
Website: www.stokenham-pc.gov.uk

Highfield,
Kiln Lane,
Nr. Kingsbridge,
Devon TQ7 2SF.

D. Dales, Esq.,
Scott Wilson,
Scott House,
Basing View,
Basingstoke,
Hamps. RG21 4JG.

10th January 2005.

Dear Mr Dales,

Slapton Line A379 - Report

Councillors have requested that I express their satisfaction and concur with the comment contained within your report wherein you offer the view that in the event the A379 along Slapton Sands becomes undermined it should be made good.

At our last full council meeting on the 16th December 2004 however it was resolved that I should draw your attention to the following concerns.

It was noted that the Executive Summary provided with the full report did not appear to have been written in the terminology and with the active desire for participation of the audience it was intended to serve. It was also felt that those members of the public who have relied on the Executive Summary and not had the benefit of reading the full report may have not been provided with a clear picture of your analysis therefore diluting its impact. Further the exhibition laid on to consult with the community appeared as though it was hurriedly put together and lacked presentation techniques that would have provided true consultation and involvement of parishioners. From general comments received from parishioners and councillors alike the presenters were also perceived as dismissive of local enquiry and input.

This council has been advised that a business survey took place but from anecdotal and personal experience would question its inclusiveness and therefore request further details of those canvassed and the number of responses received? It is felt that a presentation has taken place but not true community consultation of the views of the local and wider population wherein local knowledge can add to and compliment sound fact.



It is also noted that the study appears to have overlooked the historic removal of the shingle. Whilst it is acknowledged the area in question is a closed system and there are arguments for and against the effects of the removal of the shingle, it is believed that consideration should be given within the report to the removal and movement of the shingle up and down the bay. Until this has at least been explored and considered local people will undoubtedly question the intention and reasons for this study.

It is acknowledged that sound evidence is needed for a case to be made for funding if future breaches occur but from the evidence gathered to date little or no further benefit has been achieved. It is felt therefore that further partnership funding would be better spent dealing with reinstatement and future protection of 'the line' rather than the collation of information already available.

On a final point it was requested that this council be provided with the details of the contingency plan now in place should another breach occur.

Yours sincerely,



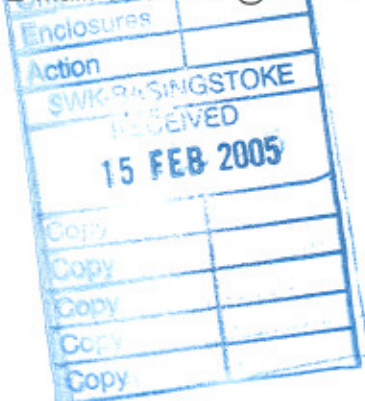
G.A. Claydon (Mrs)
Clerk for and on behalf of
Stokenham Parish Council.

c.c. South Hams District Council
Devon County Council
Owen Masters
Anthony Vale
Slapton Line Defence Group

Mr D Dales
Scott Wilson
Scott House
Basing View
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Follaton House, Plymouth Road, Totnes, Devon TQ9 5NE
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Fax: (01803) 866151 DX 300050 TOTNES 2

Please reply to: Ruth Bagley, Chief Executive
Direct telephone: 01803 861363 Direct fax: 01803 866669
E-Mail: chief.exec@southhams.gov.uk



Your Ref:
Our Ref: CE/REB/NR

14 February 2005

Dear David

SLAPTON PROPOSALS – SOUTH HAMS DISTRICT COUNCIL RESPONSE

I am sure Bill Lawrence has reported the Council's response to your Iteration 1 report informally but for completeness I can confirm that the Council supports the outcome of your report as follows:

That the options to be further considered should be:

- Managed realignment potentially supported by beach replenishment and recycling
- Improvements to the inland road network
- Minimal intervention – for the purposes of comparison

Members accepted the view that hard defence on the shingle ridge or the construction of a new inland road would not be acceptable from either a technical, environmental or economic perspective. They stressed that they saw the preservation of the road where feasible as vital to the community.

They also expressed some concern about the delay in achieving the original project timetable and hoped that, because some of the work for the later iterations had been progressed, we had not lost too much time.

For your further information I attach copies of recent letters from the area. Whilst strictly not a response to consultation it may add to any response you have received.

Best wishes.

Yours sincerely



Ruth E Bagley
Chief Executive

Please record your comments

Details about you	Are you a local resident or visitor?	N/a - Devon Fire and Rescue Service
	Are you a member of an action group?	No
	If you are a resident where do you live?	N/a
	What is your occupation?	Fire Officer
	Are you employed locally or do you run a local business?	Employed by Devon Fire Authority
	What is your age?	50
Scope of Study What are your comments on the scope of the study?	A well presented study which clearly identifies the options available.	
Comments on Study What are your comments on the conclusions and recommendations of the Iteration 1 report?	Whilst the study correctly looks at the amount of vehicle use and there is some mention relating to lorries having to use narrow lanes, there is only limited reference to Emergency vehicle use, whilst this is just one of many points to consider within the study as a whole, more detailed consultation will be required in order to determine what impact the final solution will have on attendance times for Emergency vehicles responding to incidents in the general area.	
View of Options What are your views on the study options? Score 1 to 5 for each option (1= bad and 5 = good) Options are: 1) No Active Intervention 2) Beach Nourishment 3) Beach Recycling 4) Rock Revetment 5) Sheet Piling 6) Realign the existing road on the shingle bank. 7) Upgrade inland roads 8) New Road landward of Slapton Ley.	As a service we have, from the very beginning of the project clearly stated that we would support any solution that did not have an adverse effect on our existing ability to gain access to all areas directly or indirectly served via the existing route. Should the existing road be lost as a result of option 1, then current attendance times would suffer. Options 2 – 6 would have little effect on our day to day operations. Options 7 and 8 would need more detailed consideration as they would change our existing routes and attendance times.	

Further Comments	Are there any further points you would like us to consider?
	More detailed consultation will need to take place as and when the options begin to develop a clear course of action, our initial criteria remains unchanged, no significant change or reduction to our existing access and attendance times.
If you are agreeable, please leave your name and address here (as we may wish to respond)	
crockey@devfire.gov.uk	

THANK YOU!

Please record your comments on the sheets available at the event, or on the website www.slaptonlinepartnership.co.uk. Alternatively send them in writing by 14th January 2005 to the consultants at:

Scott Wilson
C/o David Dales
Scott House, Basing View, Basingstoke
Hampshire, RG21 4JG



SLAPTON PARISH COUNCIL

Clerk, Larkin House, 47, Embankment Road, Kinsbridge, Devon, TQ7 1LA.

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Ruth Bagley,
Chief Executive,
SHDC,
Follaton House,
Totnes,
TQ9 5NE



8th December 2004

Dear Ruth,

Re: Slapton Coastal Zone Management Study

The Parish Council has received both the Main Study and the Executive Summary – Iteration 1 Determining the Shoreline Management Approach and examined the various recommendations.

Understandably the Council is concerned at this stage that the findings and recommendations do not become dormant as the future of the community at Slapton Village is seriously at stake. Clearly a time scale mentioned in the report of both 50 years and 50 – 100 years is not an imminent threat to the future of Slapton. Equally any threat that could result in the loss of the A379 link would have very serious transportation problems with the inadequacy of the Inland Road network. Notwithstanding the technical analysis of the study, the moment of a serious breach in the sand bank will remain unknown until the time it happens. It is accepted that the 'Do nothing' option cannot be adopted. So the obvious questions which the Parish Council would like addressed by the Slapton Line Partnership are:

- (i) What happens next prior to Iteration 2?
- (ii) What is the time scales involved? and
- (iii) What are the medium term problems/solutions to funding issues?

Could you please let the SPC know when you are likely to be in a position to start addressing these matters?

Yours sincerely



Clerk

Appendix B

Business Questionnaire

Scott Wilson
SLAPTON COASTAL ZONE MANAGEMENT STUDY



ROGER TYM & PARTNERS
Planners and Development Economists

Business Survey Report
February 2005

ROGER TYM & PARTNERS

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Exeter
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Introduction

- 1.1 The Village of Slapton lies midway between Kingsbridge and Dartmouth and is half a mile inland from Slapton Sands where the A379 route runs parallel to the coast and connects the villages of Torcross and Strete. This road runs on a shingle ridge which separates the sea at Slapton Sands and a fresh water lagoon, Slapton Ley.
- 1.2 Slapton has a general store, two public houses, village community venues (Hall Church and Chapel) the Slapton Ley Field Study Centre and two local campsites.
- 1.3 All business in Slapton and the surrounding settlements and catchment areas were contacted with a postal questionnaire. Questionnaires were sent with a covering letter explaining the purpose of the survey together with a reply paid envelope. In total 462 questionnaires were sent to businesses in the postal areas of Kingsbridge, Dartmouth Slapton and Chilmington.

Questionnaire Response

- 1.4 In the event, 109 questionnaires were returned equating to a 23.6% response rate. Postal surveys often achieve a response rate of no more than 10 - 15% and this response rate was therefore seen as acceptable.
- 1.5 A total of 18 responses were received from the Slapton/Torcross area, providing a similar response rate. The types of respondents from this area were holiday accommodation providers, pubs and eating establishments.
- 1.6 This short report analyses the response first in terms of response to road issues, with comment included from the wider area and the Slapton/Torcross area; then with analysis of the business context of respondents. This provides some insights into the types of businesses replying and indicates the ways in which road issues may affect their business.

Comments on Impact of Road Issues and Options

Businesses affected by the previous closure of the A379

- 1.7 Of the overall total of responses 62 (out of 109) said that they were affected by the closure of the A379 with 39 saying they were not affected. 8 failed to answer this question.

11 out of the 18 responses from Slapton/Torcross said that they had been affected by the temporary closure; 6 had not.
- 1.8 27 felt that they had suffered a loss of business, 25 said that this had been seen in the reduced turnover. 18 felt that the closure had made it difficult for staff to travel to and from work and 47 felt that access by customers and suppliers had been severely affected.

Of the Slapton/Torcross responses, 8 said that they had lost business; 10 had experienced difficulties in accessing supplier or customers; 4 had found difficulties for staff travelling to work; and 10 (the majority) had experienced loss of turnover.
- 1.9 Some indication was given by 29 respondents of the amount turnover was reduced by. 13 said that turnover was down by £2,500, 8 said that turnover was reduced by £2,500 to £7,500, 4 said that turnover was reduced by £7,500 to £15,000 and a further 4 seeing more than £15,000 reduction in turnover. This indicates an overall norm of approximately £6,000 loss of turnover per business as a result of closure - but the information from Slapton/Torcross area respondents indicated that losses may have exceeded £10,000 per business on average.

The importance of the A379 shingle ridge to business

- 1.10 The respondents who answered this question , 84 said that their business would be affected by the closure with 25 saying they would suffer no effect.

Nearly 90% of responding businesses in the Slapton/Torcross area said that retention of the A379 is important to their business.

The improvement of the existing inland route

- 1.11 92 respondents answered this question with 55 saying that improving the inland road was not an acceptable alternative and 37 saying that this would be an acceptable alternative providing that the road was widened to allow two lane traffic in all areas and no just a series of passing places.

Nearly 80% of Slapton/Torcross businesses said that the improvement of the inland route is not a suitable replacement for the A379 shingle ridge route.

The abandonment of the shingle road together with no significant improvements to the inland road

- 1.12 Of the 109 respondents 90 gave their comments. Respondents indicated that they foresaw various impacts of abandonment of the road. These have been grouped into 7 broad categories of impact:

Impact would be found in:	Number of Respondents	Proportion of Responses
Local Economy including tourism dependent on the existing road	18	16.5%
Loss of direct route to Slapton, Stokenham Strete Dartmouth and/or Torcross	24	22.0%
Loss of outstanding natural beauty	5	4.6%
Extra travel times for Residents, Customers, Employees and Pupils	18	16.5%
In favour of second road if the route is two lanes in all places	10	9.2%
Loss of Business which will lead to closure	15	13.8%
No impact	2	1.8%

- 1.13 Comments specifically received from businesses in the Slapton Torcross area indicated a range of problems from abandonment of the route. The main comment was the poor access of the alternative route. Businesses could see an increase in staff having difficulties getting to work and also possible recruitment problems in the future. The length of journeys would be increased for their suppliers as well with possible suppliers decreasing their deliveries to the area.
- 1.14 Businesses in this area see that they are the ones that are likely to be most affected by any diversion of the existing route and therefore with the most to lose financially. Two businesses from Beeson both said that the closure would increase the length of trips by themselves taken to Dartmouth, thus not having that time availability to spend on business matters at home.
- 1.15 There was one business response from Beesands that was very disturbed at the prospect of the road closure as they had just expanded the business and are relying on the road staying.
- 1.16 The current inland route has a series of passing places which result in slow moving traffic. All businesses that commented on this issue said that if this route was to be adopted the road must be at least two lanes if not more in all places.

Characteristics of Businesses Surveyed

Type of Business Responding

- 1.17 Not all respondents gave a clear description of their type of business. Those which were identified were as below

Business Type	Number of Respondents	Proportion of Total
Accommodation Providers	17	15.5%
Eating Establishments	6	5.5%
Attractions	1	0.9%
Pubs	5	4.5%
Other	41	37.6%

- 1.18 The 41 "other" businesses identified ranged from Taxi companies to Garden Centres.
- 1.19 The majority of the overall response came from Kingsbridge (69) where businesses did not feel that the closure of the road would affect their business. However they did feel that the closure of the road would affect tourism and trade within the immediate area of Slapton, Torcross and Beesands.

Opening Times

- 1.20 Respondents were asked to indicate their opening times throughout there trading year. Out of the 109 received the vast majority are open all year round. 3 schools are closed in August, 1 outdoor activity centre is closed January, February and December, 1 accommodation business closes January and February with a further one closing in January only.

Length of time operating in this location

- 1.21 Respondents were asked to indicate how long they had been in business in the area. The majority had been open for more than 5 years, and only 6.4% for 2 years or less.

Length of Time in Operation	Number of Respondents	Proportion of Total
Less than 1 Year	3	3.2%
1 - 2 Years	3	3.2%
2 - 3 Years	2	2.1%
3 - 4 Years	7	7.6%
4 - 5 Years	10	10.9%
Over 5 Years	83	76.1%

Strengths and Weaknesses of the Area

Strengths

- 1.22 90 businesses expressed views about the strengths and weaknesses of the area. 61% said that the major strength was that the area is an Area of Outstanding Natural Beauty. 28.3% felt that the location was good from a business perspective, that being their own proximity to a town - though some commented particularly on very local advantages.

Weaknesses

- 1.23 57% of the respondents commented on weaknesses. Many of these comments related to local issues - for example car parking in Kingsbridge and Dartmouth was mentioned by 10.9% and others commented on their poor location at the top of a hill.
- 1.24 These answers are much less significant than the overriding issues of poor transport and poor communications. Respondents that commented on a more strategic weakness to the area - 41% commented on poor transport both through roads being too small for the volume of traffic and poor public transport links. However when asked the question "Are you likely to move away?" 73.3% said they would not move away.

Staff employed within the businesses

- 1.25 A total of 697 full time workers and 333 part time workers are employed by the 109 businesses responding (an average of nearly 7 full-time and over 3 part-time employees per business). The total number of employees shown to live outside the area was 371, or over 3.5 employees per business responding

Growth over the last 3 years

- 1.26 100 of the 109 respondents gave some information. 43 said that business had increased and 16 that it had decreased; 7 said that business had stayed the same.

Principal Customers

- 1.27 Businesses have a mixture of customers/clients from a wide base within the South Hams. 46 Businesses said that their trade was tourist based but many also had a mixture of clients from local residents, residents within the South Hams and businesses within the South Hams.

Business Supplies

- 1.28 The majority of businesses have their supplies sourced and/or delivered outside of the South Hams, but some of these businesses have suppliers from within the South Hams area. Some of the cafes, restaurants, pubs and Hotels said that they prefer to source their supplies locally with 38% coming from the towns of Kingsbridge and Dartmouth. Only 14.2% of the businesses have locally sourced supplies only.

Expansion Plans

- 1.29 96 respondents answered this question. 42 said that they were considering expansion, and 54 said that they had no expansion plans. The nature of expansion tended to be plans for new extensions to increase covers in some cafes, restaurants and pubs. Those that did not foresee expansion gave reasons of retirement and their premises were too small. On the whole not many reasons were given.

Destinations of business travel

- 1.30 Of the 109 respondents, a variety of business travel destinations were identified. Several businesses cited a variety of destinations visited most commonly. 61 businesses indicated business travel destinations within the Dartmouth/Kingsbridge area, 50 within the South Hams and 50 were identified outside the South Hams.

Tourism Industry Answers

- 1.31 This question related specifically to businesses in the tourism industry, serving visitors to the area. Businesses who responded to this question apparently served a total of 491,975 customers visiting the area. The averages spend per head varied from £5 per head to £50 per head.

- 1.32 Very few businesses identified where their visitors come from although 22 did state that their visitors were from outside the South Hams.

New facilities, Projects or Measures to minimise adverse affect on the local community and local business

- 1.33 The questionnaire included an opportunity for suggestions of measures that could be considered to minimise adverse impacts of route changes. There were few positive suggestions however a further emphasis at this point was that any inland route should be an "A" class road, as the shingle ridge road is now.

Conclusions

- A good response rate was achieved (24% of all those questioned)
- Roughly 50% of respondents were tourist based businesses
- 17% of responses were from businesses in the Slapton/Torcross area
- In total, respondents employed over 1000 people in the area
- Generally businesses had a positive view of the future, with many reporting increased business, and many are considering expansion
- The majority of respondents had been adversely affected by previous closure of the A379 - of those indicating the level of lost turnover, the norm was approximately £6,200 lost, possibly over £10,000 per business in the Slapton/Torcross area
- The vast majority of respondents expect a negative effect on their business if the shingle ridge road closes, and a majority say that improving the inland road is not an acceptable alternative. This view is particularly strong in the Slapton/Torcross area
- Over 30% of respondents in the whole survey area said that the inland route would be acceptable if it is widened to two lanes throughout; but nearly 80% of respondents in Slapton/Torcross said that this route would not be acceptable even if improved.
- Few suggestions were made about ways to minimize adverse effects of the route is changed.