

Joint Defra/EA Flood and Coastal Erosion Risk
Management R&D Programme

Annex B.1:

Case study no.1:

Assessment of the Kelling Hard to Lowestoft Ness
shoreline management plan

R&D Project Record FD2013/PR2

Produced: November 2004

Statement of use

This report provides guidance on the use of MCA and ASTs to assist in the appraisal of flood and coastal erosion risk management projects, strategies and policies. It should be noted that it does not constitute official government policy or guidance, which is unlikely to be available until work to develop the methodology and identify appropriate sources of data has been undertaken through pilot studies.

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Research contractor contact details:

Lead contractor: Risk & Policy Analysts Ltd (RPA), Farthing Green House, 1 Beccles Road, Loddon, Norfolk, NR14 6LT (Tel: 01508 528465; Fax: 01508 520758; www.rpald.co.uk). The project director was Meg Postle, the project manager for RPA was John Ash with research support from Susana Dias and other members of RPA staff.

The research team also included: Colin Green (Flood Hazard Research Centre, Middlesex University); Alan Pearman (University of Leeds); Ron Janssen (The Institute of Environmental Studies, Free University, Amsterdam), Terry Oakes and Hugh Payne (Independent Consultants)

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Defra project manager: Matt Crossman, Defra, 3D Ergon House, Horseferry Rd, London, SW1P 2AL. Email: matthew.crossman@defra.gsi.gov.uk

Publishing organisation

Defra
Flood Management Division
Ergon House
Horseferry Road
London SW1P 2AL
Tel: 020 7238 3000
Fax: 020 7238 6187

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1. Introduction

The Shoreline Management Plan (SMP) for Kelling Hard to Lowestoft Ness is being revised and updated by Halcrow Group Limited. The case study draws on information from the revision as well as the original SMP produced in 1996, but the assessment described here has been developed through the application of the Multi-Criteria Analysis (MCA) approach.

Key data sources for the case study include:

- William Halcrow & Partners (1995): **Sheringham to Lowestoft Shoreline Management Plan Sediment Sub-Cell 3B**, Phase 1, May 1995 (including maps); and
- William Halcrow & Partners (1996): **Sheringham to Lowestoft Shoreline Management Plan Sediment Sub-Cell 3B**, Phase 2, May 1996.

1.1 Summary of the project area

The project area for the whole SMP runs along the North Norfolk coast from Kelling Hard to Lowestoft Ness. This has been sub-divided into 32 assessment units. Due to time and information constraints, three assessment units are considered in this case study. They have been selected to cover as wide a range of issues as possible. The three assessment units are:

- Cromer (urban frontage);
- Winterton (rural frontage with important environmental assets); and
- Trimingham to Mundesley¹ (mixed urban/rural frontage with cliffs designate as SSSI).

The assessment unit for Cromer runs from Bernard Road to Cromer Coastguard Lookout. The town of Cromer has a population of 7,000 and is predominantly residential, although the town is heavily reliant on income from tourism. There are important recreational facilities including a pier, golf course, holiday amenities and the promenade. The beach is an important attraction for visitors. Cromer Sea Front County Wildlife Site (CWS) covers an area between West Runton Cliffs SSSI and Overstrand Cliffs SSSI.

Within the assessment unit for Winterton, which runs from Winterton Beach Road to Long Beach Estate, Hemsby, there are areas of SPA, SSSI, NNR and CWS. The unit is covered by the Winterton to Horsey component of the Great Yarmouth North Denes SPA, which supports a breeding population of Little Tern and Ringed Plover. Landward of the SPA is the Winterton to Horsey SSSI, which is important for rare species present in the dune and scrub. The unit falls

¹ The names of the assessment units may differ slightly from those given in Halcrow Group Limited reports for the updating of the SMP. This is because maps of the scale required were only available for the 1996 SMP.

within the Norfolk Coast AONB. The main settlement within the unit is Winterton-on-Sea, a predominantly residential area with some holiday accommodation, public amenity buildings and open land. There is also good beach access and the unit attracts recreational walkers and birdwatchers. Much of the land backing the conservation and recreational areas is agricultural.

For Trimingham, the assessment unit runs from Beacon Hill to Seaview Road, Mundesley. The unit is characterised by cliffs that diminish in height towards Mundesley. A narrow sandy beach fronts the cliffs, widening slightly towards Mundesley. The unit has two large cliff top chalet/caravan parks, with residential properties behind and between the parks. All of the cliff top properties are at risk of erosion. Vale Road provides the only access to the beach for 6km south of Overstrand. Sidestrand and Trimingham Cliffs SSSI runs through the whole of the assessment unit, and require ongoing erosion to maintain the environmental interests. The whole stretch of coastline lies within the Area of Outstanding Natural Beauty (AONB).

1.2 Existing defences

The defences at Cromer include a Victorian promenade above a groyned beach. The beach also forms an important part of the defences. The condition of the defences is generally good.

There are no built defences at Winterton. The sand dunes provide natural defences and, while they are established and relatively stable, they are still mobile. The area is also generally accreting.

Timber defences above a concrete apron coupled with a timber groyne field form the defences from Trimingham to Mundesley. Much of the timber revetment is in a very poor condition.

1.3 Policy framework

The original SMP was produced in 1996 for the coastline between Sheringham and Lowestoft Ness. The framework developed within the SMP sets out a protocol for a sustainable approach to shoreline management on a wide area scale. The original SMP is currently being updated to take into account the revision to procedural guidelines for undertaking an SMP.

The preferred options within the original SMP for each of the case study assessment units were:

- Cromer (Bernard Road to Cromer Coastguard Lookout): **hold the existing line**;
- Winterton (Winterton Beach Road to Hemsby, Long Beach Estate): **'do-nothing'**; and

- Trimmingham (Beacon Hill to Mundesley, Seaview Road): **managed retreat of the existing line.**

1.4 List of stakeholders and interested parties

As part of the revision and update of the 1996 SMP, an Extended Steering Group (ESG) has been set up. Part of the involvement of the ESG has been to identify issues and objectives for the SMP coast through participation in meetings and workshops. Table 1.1 presents the list of stakeholders invited to participate on the ESG.

Table 1.1: List of stakeholders of the Kelling Hard to Lowestoft Ness SMP ESG

| Name | Company | ESG/CG |
|----------------------|---|---------------|
| Patricia Rowe | Sea Palling Parish Committee | ESG |
| Mr Terry W Morris | Corton Parish Council | ESG |
| Prof. Tim O'Riordan | University of East Anglia | ESG |
| Mr Stan Jeavons | Environment Agency | ESG |
| Cllr Steve Chilvers | Gunton and Corton Ward | ESG |
| Mr. Steve Baker | North Norfolk District Council | ESG |
| Mr Roger Bell | Waveney District Council | ESG |
| Mr Robin Buxton | Flood Defence Committee | ESG |
| Mr Peter Murphy | English Heritage | ESG |
| Mr Peter Docktor | Environment Agency | ESG |
| Mr. Paul Long | CLA | ESG |
| Paul Mitchlemore | Environment Agency | ESG |
| Mr. Paul Hammett | National Farmers Union | ESG |
| Mr Mike Dowling | Great Yarmouth Borough Council | ESG |
| Ms. Karen Thomas | Environment Agency | ESG |
| Ms Julia Masson | Broads Authority | ESG |
| Mr. John Hiskett | Norfolk Wildlife Trust | ESG |
| Mr John Sizer | National Trust | ESG |
| Ian Dodson | Environment Agency | ESG |
| Mr. Ian Loughran | Phillips Petroleum | ESG |
| Helen Deavin | Royal Society for the Protection of Birds | ESG |
| Ms. Heidi Mahon | Norfolk County Council | ESG |
| Ms Dorothy Casey | Suffolk Wildlife Trust | ESG |
| Cllr D Corbett | Bacton Division | ESG |
| Cllr B J Hannah | Sheringham Division | ESG |
| Mr Tim Venes | Norfolk Coast Project | ESG |
| Mr Adam Nicholls | Suffolk County Council | ESG |
| Cllr Tony Overill | Caister-on-Sea Parish Council | ESG |
| Mrs B Buxton | | ESG |
| Mrs S.Weymouth | | ESG |
| Mr. Patrick McNamara | Gt Yarmouth Port Authority | CG |
| Mr. Peter Frew | North Norfolk District Council | CG |
| Mr Peter Lambley | English Nature - Norfolk | CG |
| Mr. Julian Walker | Waveney District Council | CG |
| Mr. Gary Watson | North Norfolk District Council | CG |
| Mr Guy Cooper | Environment Agency | CG |
| Mr. Gary Alexander | North Norfolk District Council | CG |
| Mr David Wilson | Defra | CG |
| Mr. Bernard Harris | Gt Yarmouth Borough Council | CG |

Source: Provided by Kevin Burges at Halcrow.

2. Definition of objectives and management options

The aim of the SMP is *'to promote sustainable management policies, for a coastline for the 22nd century, which achieve objectives without committing to unsustainable defences'*. Further issues and objectives have been defined by the ESG. Four overarching objectives have also been developed to ensure that the policy along the coast will be set within existing legislation and other constraints in addition to those identified during consultation. These objectives are:

- **Framework objective:** shoreline management policies should comply with the current flood and coastal defence management framework where public funding would be required for their implementation;
- **Technical objective:** shoreline management policies should seek to have no adverse effect on any physical processes that benefits rely upon;
- **Environmental objective:** shoreline management policies should take due consideration of biodiversity and seek to achieve Biodiversity Action Plan targets; and
- **Socio-economic objective:** shoreline management policies should consider current regional development agency objectives and statutory planning policies.

The assessment of options for the case study against these objectives is based upon the usual options appraised in an SMP. These options are:

- 'do-nothing';
- managed realignment;
- hold the line; and
- advance the line.

For the three assessment units appraised in the case study, the advance the line option was not considered as it was either not technically feasible or would be prohibitively expensive.

3. Structuring the problem

This section intends to break down the problem into its component parts, identifying the set of impacts and associated criteria that will be used to make a decision. In other words carries out a screening exercise for the Cromer, Winterton and Trimingham assessment units of the Kelling Hard to Lowestoft Ness SMP.

3.1 Summary of the screening exercise

This screening exercise is used to determine (i) which categories are relevant and (ii) which categories will be appraised by assigning a monetary value to impacts and which will be appraised by assigning a score to the impacts. Relevant categories are those where there is a difference in the impacts of the three options being appraised ('do-nothing', managed realignment and hold the line).

The screening exercise for the SMP case study was based on the following sources of information:

- William Halcrow & Partners (1995): **Sheringham to Lowestoft Shoreline Management Plan Sediment Sub-Cell 3B**, Phase 1, May 1995 (including maps);
- William Halcrow & Partners (1996): **Sheringham to Lowestoft Shoreline Management Plan Sediment Sub-Cell 3B**, Phase 2, May 1996; and
- Halcrow Group Limited (2003): **Kelling Hard to Lowestoft Ness Shoreline Management Plan – Extended Steering Group Policy Development Workshop**, November 2003.

The high level screening exercise highlighted the fact that the majority of the more significant impacts of the options for the SMP are related to economic assets such as housing and commercial premises; agricultural land; and to recreation and tourism activities in the area, such as the beach and the landscape in general. Environmental issues are also important, particularly for Winterton and Trimingham.

It also becomes clear that the majority of impact categories will be assessed through scoring. Assets, historical environment and recreation, however, will be assigned monetary values for Cromer; assets and recreation will be valued in monetary terms for Trimingham; and no categories will be valued for Winterton. The number of categories considered as part of the appraisal for Winterton is reduced considerably by screening, since only impacts on assets, physical habitats and policy integration are relevant and/or significantly different between the options.

Table 3.1: Table summarising the results of the screening exercise

| Project Name | Kelling Hard to Lowestoft Ness SMP | | | | | |
|--|------------------------------------|--------------|--|--------------|-----------------------|--------------|
| Category | Cromer | | Winterton | | Trimingham | |
| | Monetary value | Score | Monetary value | Score | Monetary value | Score |
| <i>Economic impacts</i> | | | | | | |
| Assets | ✓ | | | ✓ | ✓ | |
| Land use | | ✓ | Not relevant | | | ✓ |
| Transport | | ✓ | Not relevant | | | ✓ |
| Business development | | ✓ | Not relevant | | | ✓ |
| <i>Environmental impacts</i> | | | | | | |
| Physical habitats | | ✓ | | ✓ | | ✓ |
| Water quality | Not relevant | | Not relevant | | Not relevant | |
| Water quantity | Not relevant | | Not relevant | | Not relevant | |
| Natural processes | Not relevant | | Not relevant | | | ✓ |
| Historical Environment | ✓ | | Not relevant | | Not relevant | |
| Landscape and visual amenity | | ✓ | No significant differences between the options | | | ✓ |
| <i>Social impacts</i> | | | | | | |
| Recreation | ✓ | | No significant differences between the options | | ✓ | |
| Health and safety | | ✓ | Not relevant | | | ✓ |
| Availability and accessibility of services | | ✓ | Not relevant | | | ✓ |
| Equity | | ✓ | Not relevant | | | ✓ |
| Sense of community | | ✓ | Not relevant | | | ✓ |
| <i>Cross-cutting impacts</i> | | | | | | |
| Policy Integration | | ✓ | | ✓ | | ✓ |

4. Cost of options

For all three frontages, the 'do-nothing' option has zero (£0) costs. The costs of the other options were provided, by personal communication, by the Consultants in charge of the SMP project. The case study does not correspond exactly to the original project as only three of the 32 assessment units have been included in the MCA appraisal, hence the costs provided by the Consultants had to be adjusted to take into account the differences. In essence, the adjustments relate to:

- the need to cost additional options that were not considered by the original project, for example management realignment, which was considered to be 75% of the cost of the hold the line option; and
- the need to take into account of the difference in the number of assessment units appraised. For example, the original costs for the Cromer assessment unit were divided by three, since the Cromer frontage used in the case study represented one of three frontages included in the original assessment unit.

The costs used in the case study appraisal are illustrated in Table 4.1. They represent present value costs over 100 years.

Table 4.1: Summary of costs of options used in the case study appraisal

| | Options costs (£k) | | |
|-------------------|--------------------|---------------------|---------------|
| | 'do-nothing' | Managed realignment | Hold the line |
| Cromer | 0 | 3,000 | 4,000 |
| Trimingham | 0 | 6,000 | 8,000 |
| Winterton | 0 | 1,500 | 6,000 |

5. Assessment of impacts

5.1. Qualitative and quantitative assessment

The qualitative and quantitative assessment of the different options for each of the management units was carried out using the Appraisal Summary Table for the Main Assessment (MA-AST) and it is presented in Appendices B1.2 to B1.4 to this Annex.

The assessment followed a stepped approach, starting with the qualitative assessment of all impact categories and moving to the quantitative assessment whenever information was available.

5.2 Monetary valuation of impacts

5.2.1 Assets

Damages to assets (primarily residential and non-residential properties) under the 'do-nothing' option have been estimated for Cromer and Trimmingham (note, these damages are often assumed to be the same for the managed realignment option). No assets were directly affected by erosion for Winterton.

Cromer

All damages to assets will occur because of erosion. Over the 100-year time horizon a total of 40 residential properties, 30 commercial/tourist properties, 1km of promenade, 1 lifeboat station, and one pier will be lost as a result of erosion. Only damages due to loss of residential properties, commercial/tourist properties and the lifeboat station are considered under the category of assets.

The total value of the residential properties is estimated using information on the average house price in 'NR27 9' from the Land Registry Internet site, of £128,000 (October-December 2003). The total value of properties affected by erosion is £5.1 million (£128 000 x 40).

The total value of commercial/tourist properties is estimated using data from the Valuation Agency Office Internet Site. This provides information on the rateable value of commercial premises in the 'NR27 9' postcode sector. The average rateable value is £20,000 per year. This allows an estimate of property value of £200,000 to be made (from 10x the rateable value). Thus, the total value of commercial/tourist properties affected by erosion is £6.0 million (£200,000 x 30).

The value of the lifeboat station is taken as £200,000 as no information on the rateable value or property value was available.

The timing of losses differs according to the location of the property. It is assumed that erosion of properties (both residential and commercial/tourist)

begins in year 20 and continues to year 99. For the purposes of the economic appraisal, it has been assumed that 1/80th of the total value of the assets is lost each year. This means that the damages incurred each year (before discounting) are the same. Thus, in year 99, all properties affected by erosion in the 100-year time horizon will have been lost.

Trimingham

Damages to assets for Trimingham are also caused by erosion. Over the 100-year time horizon, seven residential properties, two caravans, 7ha of agricultural land and one agricultural reservoir would be lost.

The average price of detached properties in the 'NR11 8' postcode sector is given as £220,000 on the Land Registry Internet site (for October-December 2003). Each of the seven properties is located at a different distance from the coast such that the time when each property will be eroded is not the same. The year when a property would be lost has been calculated as the time taken for erosion to reach the boundary of the property (measured from the maps given in William Halcrow & Partners, 1995). The properties are assumed to be lost in:

- one property eroded in year 36;
- one property eroded in year 42;
- one property eroded in year 48;
- one property eroded in year 71;
- one property eroded in year 83; and
- two properties eroded in year 89.

The value of the caravan parks is based on the rateable value multiplied by 10. The average rateable value is taken as £60,000 per year (from information on the Valuation Agency Office Internet site), giving a total value of £600,000 per caravan park. The timing when each park would be lost is taken as the time when half of the site would be lost. This occurs in year 30 for the caravan park near Vale Road and year 60 for the caravan park near the SSSI.

Agricultural land is assumed to be lost when more than half of the land is eroded. The value of the agricultural land is assumed to be Grade 3 and is taken as £7,203 per ha (from Nix, 2002). This is multiplied by 0.45 to remove the effect of subsidies, to give £3,241 per ha. The time when the individual fields would be considered 'lost' varies from year 48 to year 77, with the majority of land lost in year 65 (0.6 ha lost in year 48, 5.7ha lost in year 65 and 0.7ha lost in year 77).

5.2.2 Historical environment

Impacts on the historical environment have only been assigned a monetary value for Cromer. There are no known significant impacts on the historical environment for Trimingham and Winterton.

The area of Cromer that would be eroded under the 'do-nothing' option contains five Grade II listed buildings that would be eroded. It is also assumed that they would be eroded under managed realignment. No monetary values are available on the heritage aspect of these buildings, hence, it is assumed that their value is twice that of the commercial property value, i.e. £400,000. The time at which each Grade II listed building would be lost varies throughout the 100-year time horizon and one building is assumed to be lost every 20 years (i.e. years 20, 40, 60, 80 and 99).

5.2.3 Recreation

Monetary values have been placed on impacts on recreation for both Cromer and Trimingham. No significant difference between the options is expected for Winterton.

Cromer

Erosion of the promenade would result in the loss of access to the beach from the town. The loss of visitor attractions, such as the pier and commercial/tourist properties in the town itself would also result in a loss of tourists. It is estimated that 100,000 visits per year are made to Cromer beach/promenade each year and that these would be lost over time as erosion of the promenade and other attractions occurs. The average value of a trip to Cromer is estimated at £3.59 (from a value given in the Multi-Coloured Manual for the deterioration in the beach and promenade (Middlesex University Flood Hazard Research Centre (MUFHRC), 2003). The maximum losses in any one, year can therefore be estimated at £359,000.

Erosion of the promenade is expected to begin in year 20 and the total length of the promenade, access to the beach and other tourist facilities (including the pier) will be lost by year 49. Between year 20 and 48, the proportion of visits to Cromer affected increases by 3% per year (or 3,000 visits per year) from 3% (or 3,000) in year 20 to 97% (or 97,000) in year 48. From year 49 onwards, 100,000 visits are lost every year.

Trimingham

Access to the beach via Vale Road is the only access point for 6km south of Overstrand. Loss of access would, therefore, result in a significant decrease in the number of beach visits, as there are no alternative access points for a considerable distance. It is estimated that 30,000 visits per year are made to the beach at Trimingham (based on beach visitor data given in Environment Agency, 2003). These trips would be lost once access to the beach is lost. This is expected to occur in year 20, after which time no further recreation could occur along the beach. The value per trip is taken as £1.89 (from a value given in the Multi-Coloured Manual (MUFHRC, 2003) for cliff erosion, deterioration in beach and seawall, much reduced access to and along the beach and seawall). The maximum (undiscounted) loss that would occur in any one year can therefore be estimated at £56,700 per year.

5.3 Scoring of impacts

The approach to assigning scores to the categories varied according to the assessment unit being appraised and the type of (quantitative) information that was available upon which to base the scores. Furthermore, the SMP case study was used to test four different scoring systems. This case study report provides the scores that were assigned when a relative scoring system across the units was used. More information on the other scoring systems that were trialled, with their relative advantages and disadvantages can be found in the main report (Section 6). A summary of the scores assigned and the justification behind them for all three assessment units is provided in Table 5.1.

Table 5.1: Table summarising scores and monetary estimates

| Project Name | | | | | | | | | | |
|---|--------------|---------------------|---------------|--------------|---------------------|---------------|--------------|---------------------|---------------|---|
| Kelling Hard to Lowestoft Ness SMP: CROMER, WINTERTON and TRIMINGHAM assessment units | | | | | | | | | | |
| Category | Cromer | | | Winterton | | | Trimingham | | | Justification for scores |
| | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | |
| Economic impacts | | | | | | | | | | |
| Assets | £2.0m | £2.0m | £0.07m | Neg. | Neg. | Neg. | £0.5m | £0.2m | £0.02m | See Section 4.1.1 |
| Land use | 0 | 0 | 100 | - | - | - | 0 | 33 | 100 | Reflects the degree of land use change that would occur, where there would be a total land use changes under 'do-nothing' and managed realignment and no change in land use under hold the line for Cromer. Hold the line for Trimingham would also result in no change in land use, hence, both hold the line options are assigned a score of 100. Both 'do-nothing' options would result in a total change of land use and are scored 0. Managed realignment for Trimingham would result in a change in 2 (out of 3) land use types, hence, a score of 33 is assigned (to reflect the two-thirds of land uses that would change). |
| Transport | 0 | 0 | 100 | - | - | - | 40 | 40 | 100 | Cromer would result in the maximum length of roads lost (0.75km) under 'do-nothing' and managed realignment. Under hold the line, no roads would be lost. For Trimingham, 0.3km of road would be lost, such that 'do-nothing' and management realignment are assigned a score of 40 (from $0.3 \div 0.75$). Hold the line would protect all roads for both units, hence, is |

Table 5.1: Table summarising scores and monetary estimates

| Project Name | | | | | | | | | | |
|---|--------------|---------------------|---------------|--------------|---------------------|---------------|--------------|---------------------|---------------|--|
| Kelling Hard to Lowestoft Ness SMP: CROMER, WINTERTON and TRIMINGHAM assessment units | | | | | | | | | | |
| Category | Cromer | | | Winterton | | | Trimingham | | | Justification for scores |
| | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | |
| | | | | | | | | | | assigned a score of 100. |
| Business development | 0 | 0 | 100 | - | - | - | 12 | 23 | 30 | Cromer would lose the greatest area of commercial properties (25%) and, hence, income from tourism under 'do-nothing' and managed realignment, while hold the line would protect the whole area such that business development would not be affected. There are only 30,000 visits to Trimingham each year (compared with 100,000 to Cromer). Therefore, business development from the loss of 30,000 visits to Trimingham will be less than the impacts on business development from the loss of 100,000 visits to Cromer. To ensure relativity between the assessment units, Trimingham can only achieve a score of 30 (to reflect that it only attracts 30% of the visitors to Cromer). Under 'do-nothing' for Trimingham, 50% of tourist visits would be lost, which when assigned a multiplier of 1.2 would result in 60% of income/investment being lost such that a score of 12 is assigned to 'do-nothing'. Under managed realignment, caravan parks would be moved such that a smaller proportion of income from tourism would be lost (20%), giving a score of 23. |
| Environmental impacts | | | | | | | | | | |
| Physical habitats | 0 | 0 | 100 | 100 | 100 | 80 | 100 | 100 | 20 | Cromer would see the loss of one County Wildlife Site under 'do-nothing' and managed realignment. Hold the line would protect the existing environment for Cromer. Erosion of the frontage is required to maintain the quality of environmental sites for Winterton and Trimingham such that hold the line scores 80 for Winterton (where only minimal intervention would be undertaken) and 20 for Trimingham (where Hold the Line would result in a gradual loss of environmental value over time). The existing environmental habitats and conservation value would be maintained under 'do- |

Table 5.1: Table summarising scores and monetary estimates

| Project Name | | | | | | | | | | Kelling Hard to Lowestoft Ness SMP: CROMER, WINTERTON and TRIMINGHAM assessment units |
|-------------------------------------|--------------|---------------------|---------------|--------------|---------------------|---------------|--------------|---------------------|---------------|---|
| Category | Cromer | | | Winterton | | | Trimingham | | | Justification for scores |
| | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | |
| | | | | | | | | | | nothing' and managed realignment for Winterton and Trimingham, such that these options also score 100. |
| Water quality | - | - | - | - | - | - | - | - | - | Category not relevant for the assessment units |
| Water quantity | - | - | - | - | - | - | - | - | - | Category not relevant for the assessment units |
| Natural processes | - | - | - | - | - | - | 100 | 100 | 0 | Only Trimingham would see a difference in the options for natural processes. This is because erosion would be minimised under hold the line, but would continue under both 'do-nothing' and managed realignment. For Winterton, hold the line would involve only minimal intervention which would not affect erosion under any of the options. |
| Historical Environment | £0.4m | £0.4m | £0.01m | - | - | - | - | - | - | See Section 4.1.2 |
| Landscape and visual amenity | 0 | 0 | 100 | - | - | - | 100 | 50 | 60 | Cromer would see the loss of part of the town, listed buildings within it, and the beach and promenade, hence, a change to the townscape under 'do-nothing' and managed realignment. Hold the line would protect the townscape. For Trimingham, it is the 'do-nothing' option that would improve the naturalness of the landscape. It is not possible to directly compare the townscape of Cromer with the natural landscape of Trimingham, hence, the 'best' options for both assessment units have been scored 100. Under managed realignment for Trimingham, caravans would be relocated to agricultural land, affecting the AONB. Under hold the line, the caravans would remain in their current position. The scores assigned are based on the NERA Landscape Index (in Environment Agency, 2003) where managed realignment is assumed to result in an 'undistinguished' landscape (with an reduction factor of 50%) and hold the line in a 'slight intrusion' (with a reduction factor of 40%). |

Table 5.1: Table summarising scores and monetary estimates

| Project Name | | Kelling Hard to Lowestoft Ness SMP: CROMER, WINTERTON and TRIMINGHAM assessment units | | | | | | | | |
|-----------------------|--------------|---|---------------|--------------|---------------------|---------------|--------------|---------------------|---------------|--|
| Category | Cromer | | | Winterton | | | Trimingham | | | Justification for scores |
| | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | |
| Social impacts | | | | | | | | | | |
| Recreation | £3.0m | £3.0m | £0.1m | - | - | - | £0.8m | £0.8m | £0.03m | See Section 4.1.3 |
| Health and safety | 0 | 50 | 100 | - | - | - | 0 | 30 | 30 | <p>Under 'do-nothing' and managed realignment for Cromer the lifeboat station would be lost. 'Do-nothing' would also result in erosion of the promenade making access to the beach very dangerous. Warning signs and barriers would be put in place under managed realignment, such that safety would only be affected by loss of the lifeboat station (i.e. assumed to be half as safe as hold the line which protects both the lifeboat station and beach access).</p> <p>For Trimingham, the potential impacts are less severe since only 30% of the visitors go to Trimingham compared with Cromer. This means that the maximum score for Trimingham is 30. Under 'do-nothing', beach access would be lost and defences would deteriorate to a dangerous condition. It is not possible to compare these hazards with the result of the loss of the lifeboat station, hence, 'do-nothing' scores 0. Managed realignment and hold the line would avoid safety concerns by the use of warnings/barriers or by protecting/maintaining the access and defences, respectively.</p> |

Table 5.1: Table summarising scores and monetary estimates

| Project Name | | Kelling Hard to Lowestoft Ness SMP: CROMER, WINTERTON and TRIMINGHAM assessment units | | | | | | | | |
|---|--------------|---|---------------|--------------|---------------------|---------------|--------------|---------------------|---------------|---|
| Category | Cromer | | | Winterton | | | Trimingham | | | Justification for scores |
| | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | |
| Availability and accessibility of services | 0 | 0 | 100 | - | - | - | 15 | 24 | 30 | <p>For Cromer, the 'do-nothing' and managed realignment options would result in loss of many services and infrastructure currently provided by the town (including recreational services for local people). Hold the line would protect all of these services.</p> <p>As Trimingham attracts only 30% of visitors compared with Cromer, the maximum score it can attain is 30. Loss of tourist facilities may also affect local residents (particularly where shops are lost), such that 'do-nothing', which would reduce visitor numbers by 50% is assigned a score of 15. Managed realignment would allow some facilities to be moved but 20% of visitors would still be lost giving a score of 24.</p> |
| Equity | 0 | 0 | 100 | - | - | - | 15 | 24 | 30 | <p>For Cromer, loss of tourism under the 'do-nothing' and managed realignment options would affect local people through a loss of jobs. This is likely to increase deprivation. Hold the line would protect tourism and income from tourism and would avoid the knock-on impacts on deprivation of those groups relying on this area for employment.</p> <p>As for availability and accessibility of services, the loss of visits to Trimingham is limited to 30% of those at Cromer such that the maximum score is 30. The loss of income would result in loss of jobs and, hence, increase deprivation in those groups whose income is reliant on tourism.</p> |

Table 5.1: Table summarising scores and monetary estimates

| Project Name | | Kelling Hard to Lowestoft Ness SMP: CROMER, WINTERTON and TRIMINGHAM assessment units | | | | | | | | |
|--------------------|--------------|---|---------------|--------------|---------------------|---------------|--------------|---------------------|---------------|--|
| Category | Cromer | | | Winterton | | | Trimingham | | | Justification for scores |
| | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | |
| Sense of community | 0 | 0 | 100 | - | - | - | 20 | 35 | 50 | <p>Under 'do-nothing' and managed realignment for Cromer, houses, commercial properties and jobs would all be lost. These will all affect sense of community in the area, with many people having to be relocated out of the area. Hold the line would protect these people and, hence, avoid impacting upon sense of community.</p> <p>Trimingham would only result in a much smaller loss in terms on number of properties, but this is a larger percentage of the properties within the area. Thus, the maximum score assigned to Trimingham (50) is related to the proportion of total households that would be affected by the various options. Hold the line would result in no impacts on sense of community and scores 50. 'Do-nothing' would have significant impact on numbers of visitors, beach access and would also result in erosion of some properties. This options scores 20. Managed realignment would allow more visits to continue, although beach access may be affected and properties would be eroded. This option score 35.</p> |

Table 5.1: Table summarising scores and monetary estimates

| Project Name | | | | | | | | | | Kelling Hard to Lowestoft Ness SMP: CROMER, WINTERTON and TRIMINGHAM assessment units |
|--|--------------|---------------------|---------------|--------------|---------------------|---------------|--------------|---------------------|---------------|---|
| Category | Cromer | | | Winterton | | | Trimingham | | | Justification for scores |
| | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | 'do-nothing' | Managed realignment | Hold the line | |
| Cross-cutting impacts | | | | | | | | | | |
| Policy integration | 0 | 0 | 100 | 100 | 100 | 90 | 20 | 90 | 80 | For Cromer, 'do-nothing' and managed realignment will be contrary to local planning, local authority, economy, tourism, etc. policies. Hold the line will be concordant with almost all policies. For Winterton, it is 'do-nothing' and managed realignment that are most in line with the policies relevant to that assessment unit. Hold the line would involve only minimal intervention, such that it is assigned a score of 90. For Trimingham, hold the line is concordant with most policies, but would prevent erosion and result in a reduction in environmental quality such that it is against the requirements of environmental policy of a sustainable, natural unit. 'Do-nothing' is against almost all policies except the environment and scores 20. Managed realignment is in line with environmental policies but is somewhat discordant with tourism and economic policies for the area. |
| Notes and key: Neg. = negligible (relates to monetised estimates of impacts) - = not relevant (relates to those categories which are not present in the assessment unit or where there are no significant differences between the options) | | | | | | | | | | |

6. Weighting and comparison of options

6.1 Source of weights

In all cases, the Constrained Random Weight Generator (CRWG) was used to calculate minimum, maximum and average total weighted scores and total weighted incremental scores for the options under consideration. These, along with interpretation, are provided in the summary tables for each management unit.

6.2 Comparison of options

6.2.1 Cromer

Table 7.1 provides a summary table of monetary costs and benefits and scores for the Cromer Management Unit.

As can be seen from the table, 'Hold the Line' is the option with the highest benefit-cost ratio with a benefit-cost ratio of 1.28. The option also has an incremental benefit-cost ratio of 5.12, which far exceeds the necessary criterion of robustly greater than 1 (i.e. 1.5). As such, no additional benefit is required to meet the incremental benefit-cost criterion of 1.5.

In terms of intangible benefits, 'Hold the Line' scores 100 for all criteria and thus will score 100 regardless of the weights. The CRWG was used to calculate intangible benefits incremental to the Managed re-alignment option. These are all positive (ranging between 86.5 and 99.3). It can be concluded, therefore, that as there are no intangible incremental dis-benefits that could act to reduce the incremental monetary benefit-cost ratio of 5.12, 'hold the line' is the preferred option.

6.1: Summary table of costs and benefits – Cromer

| | Option 1: 'do-nothing' | Option 2: Managed re- alignment | Option 3: Hold the Line | | |
|---|---------------------------|---------------------------------------|--|--|--|
| PV costs from estimates | | | 2,500 | | |
| Optimism bias adjustment | | | 1,500 | | |
| Total PV Costs for appraisal PVc | | 3,000,000 | 4,000,000 | | |
| PV damage PVd | | | | | |
| PV damage avoided | | - | - | | |
| PV assets Pva | 5,287,595 | | | | |
| PV asset protection benefits | | - | 5,118,074 | | |
| Total PV benefits PVb | | 0 | 5,118,074 | | |
| Net Present Value NPV | | -3,000,000 | 1,118,074 | | |
| Average benefit/cost ratio | | 0 | 1.28 | | |
| Incremental benefit/cost ratio | | 0 | 5.12 | | |
| Required Incremental B/C ratio | | | 1.5 ² | | |
| Required Additional Benefits to Meet Criterion | | 0 | None | | |
| | | | Min | Ave | Max |
| Weighted Score (CRWG) | | | 100.0 | 100.0 | 100.0 |
| Scored Intangible Incremental Benefit of Moving to the Next Option (CRWG) | | | 86.5 | 96.8 | 99.3 |
| Comments | N/A | N/A | Justified without Extra benefit | Justified without Extra benefit | Justified without Extra benefit |
| Implied Additional Benefits per Point (k) to meet criterion | N/A | N/A | N/A | N/A | N/A |

6.2.2 Winterton

Table 6.2 provides a summary table of monetary costs and benefits and scores for the Winterton Management Unit.

As can be seen from the table, 'Hold the Line' has an incremental benefit-cost ratio of 0. As such, to meet the incremental benefit-cost criterion of 1.5 it would require £2,250,000 of additional (intangible) incremental benefit.

As the option below (Managed re-alignment) scores 100 on all criteria in the scoring system (and thus 100 overall) and Hold the Line does not, there are, obviously, no incremental intangible benefits from moving to the Hold the Line Option. As there are no intangible incremental benefits from moving to the option, there is no potential to acquire the addition £2,250,000 of intangible

² The required incremental benefit-cost ratio is assumed to be 1.5 since Option 2 (maintain) would only provide a 1 in 5 year standard of defence at the end of the 100 year time period, which is below the indicative standard of 1:10 to 1:100 for Land Use Band C. Option 3 (sustain) provides a standard of defence of 1:20, thus Options 4 and 5 require an incremental benefit-cost ratio greater than 3 to become the preferred option.

benefit to reach the 1.5 criterion. It can be concluded that Hold the Line cannot be justified over managed re-alignment.

6.2: Summary table of costs and benefits – Winterton

| | Option 1: 'do-nothing' | Option 2: Managed Realignment | Option 3: Hold the Line | | |
|--|---------------------------|-------------------------------------|-------------------------|---------------|---------------|
| PV costs from estimates | | | | | |
| Optimism bias adjustment | | | | | |
| Total PV Costs for appraisal PVc | | 6,000,000 | 1,500,000 | | |
| PV damage PVd | | | | | |
| PV damage avoided | | | | | |
| PV assets Pva | | | | | |
| PV asset protection benefits | | | | | |
| Total PV benefits PVb | | 0 | 0 | | |
| Net Present Value NPV | | | | | |
| Average benefit/cost ratio | | 0 | 0 | | |
| Incremental benefit/cost ratio | | 0 | 0.0 | | |
| Required Incremental B/C ratio | | | 1.5 ³ | | |
| Required Additional Benefits to Meet Criterion | | | 2,250,000 | | |
| | | | Min | Ave | Max |
| Weighted Score (CRWG) | | | 82.0 | 84.9 | 88.0 |
| Scored Intangible Incremental Benefit of Moving to the Next Option (CRWG) | | | -18.0 | -15.1 | -12.0 |
| Comments | N/A | N/A | Not Justified | Not Justified | Not Justified |
| Implied Additional Benefits per Point (k) to meet criterion | N/A | N/A | N/A | N/A | N/A |

6.2.3 Trimmingham

Table 6.3 provides a summary table of monetary costs and benefits and scores for the Trimmingham management unit.

As can be seen from the table, 'Hold the Line' has an incremental benefit-cost ratio of 3.2, which exceeds the criterion of robustly greater than 1 (i.e. 1.5) that would be required for the option to be preferred. As such, there is no additional benefit required to meet the incremental benefit-cost criterion of 1.5.

³ The required incremental benefit-cost ratio is assumed to be 1.5 since Option 2 (maintain) would only provide a 1 in 5 year standard of defence at the end of the 100 year time period, which is below the indicative standard of 1:10 to 1:100 for Land Use Band C. Option 3 (sustain) provides a standard of defence of 1:20, thus Options 4 and 5 require an incremental benefit-cost ratio greater than 3 to become the preferred option.

However, analysis with the CRWG suggests that, depending on the weights used, resulting total weighted scores indicate that there may be intangible dis-benefits from the 'Hold the Line' option.

In such circumstances the decision rules dictate that one should examine the margin between the monetary benefit-cost ratio and the criterion to make sure that the magnitude of intangible incremental dis-benefit is not large enough to reduce the overall benefits side of the equation to one that is below the criterion.

In this case, from the table it can be seen that an intangible dis-benefit with a value greater than around £512,000 would reduce the incremental-benefit cost ratio from 3.2 to one that is below the 1.5 criterion. The next question to consider is whether or not this is likely.

This, in turn, requires consideration of the actual likely magnitude of the incremental dis-benefit, and what this would imply the value of a point on the index (k) would have to be to change the conclusion from one of 'justified' to one of 'not justified' (and therein the total value of the assets being considered in the scoring index as a whole).

In this case, using a worst-case scenario of the lower bound estimate (-19.8), this would imply that the value of a point on the index (k in pounds) would have to be around £26,000 ($-512,000/-19.8$) to make a difference to the outcome of the decision. This would imply that the total value of the intangible assets being considered in the 100 point scoring system as whole would have to total around £2,600,000 to change the decision even if the lowest possible estimate were used. As this is equivalent to more than twice the asset protection benefits of £1,251,898 that have been valued in monetary terms, it could be concluded that this is an unreasonably high estimate of the value of intangible assets, and thus, even using a worst case estimate of intangible incremental dis-benefit, the 'Hold the Line' option is still likely to be justified.

The analysis could probably stop here with the conclusion that the 'Hold the Line' option is justified. However, if greater certainty were required, the analysis could continue by examining what the magnitude of incremental intangible benefits/dis-benefits is more likely to be (as opposed to the worst case scenario).

As noted previously, the upper bound estimate of intangible incremental benefits is 24.0, and here no additional benefit would be required for the option to be justified. The mid bound value from the CRWG lies around -3.3 and the lower bound estimate that has already been considered lies at around -19.8. Thus, the actual level of incremental intangible benefits lies somewhere between -19.8 and 24.0.

Examination of trends and relationships in the weights responsible for the lower range estimate reveals that these are the result of environmental impacts being weighted much more highly than economic impacts (and, on average the

weights for environmental impacts are twice as high as those for economic impacts).

Similarly, the upper range estimate is the result of the opposite, i.e. economic impacts are weighted much more highly than environmental impacts (and, on average the weights for economic impact are three times as high as those for environmental impacts).

Table 6.3: Summary table of costs and benefits – Trimmingham

| | Option 1: 'do-nothing' | Option 2: managed realignment | Option 3: hold the line | | |
|--|-----------------------------------|--|---|---|--|
| PV costs from estimates | | | | | |
| Optimism bias adjustment | | | | | |
| Total PV costs for appraisal PVc | | 1,000,000 | 1,300,000 | | |
| PV damage PVd | | | | | |
| PV damage avoided | | - | - | | |
| PV assets Pva | 5,287,595 | 1,003,436 | 41,465 | | |
| PV asset protection benefits | | 289,928 | 1,251,898 | | |
| Total PV benefits PVb | | 289,928 | 1,251,898 | | |
| Net present value NPV | | -5,710,072 | -6,748,102 | | |
| Average benefit/cost ratio | | 0.290 | 0.96 | | |
| Incremental benefit/cost ratio | | | 3.207 | | |
| Required incremental B/C ratio | | | 1.5 ⁴ | | |
| Required additional benefits to meet criterion | | | -£511,970 | | |
| | | | Min | Ave | Max |
| Weighted score (CRWG) | | | 39.9 | 55.1 | 71.9 |
| Scored intangible incremental benefit of moving to the next option (CRWG) | | | -19.8 | -3.3 | 24.0 |
| Comments | N/A | N/A | Justified as long as k per point no greater than | Justified as long as k per point no greater than | Justified without Extra benefit |
| Implied additional benefits per Point (k) to meet criterion | N/A | N/A | £25,836 | £156,448 | - |

Because of the large differences between the sets of weights in each case, it can probably be concluded that the actual incremental benefits lie at neither

⁴ The required incremental benefit-cost ratio is assumed to be 1.5 since Option 2 (maintain) would only provide a 1 in 5 year standard of defence at the end of the 100-year time period, which is below the indicative standard of 1:10 to 1:100 for Land Use Band C. Option 3 (sustain) provides a standard of defence of 1:20, thus Options 4 and 5 require an incremental benefit-cost ratio greater than 3 to become the preferred option.

extremity of the range and is closer to the mid range estimate (which is typified by no trend in the data). This, combined with the conclusions on the worst-case scenario may provide sufficient additional certainty that the option is justified.

If further certainty were required, the next step would be to determine which side of the mid bound estimate the actual value is likely to lie. To determine this one would begin by deciding which is more important: environmental impacts or economic impacts (and preferably by how much). If necessary, then, the appraisal could proceed towards eliciting stakeholder views on the issue. It is important to note however, that, stakeholders' views are likely to differ and, unless one takes the average, one is still left with a range of possibilities.

For the Trimmingham case study, some elicitation of weights was conducted. From these were derived the weight apportioned to economic impacts versus environmental impacts in the responses, and the average over all responses. These data are provided in Figure 6.1. As can be seen from the figure, there is a range of views concerning the relative importance of each and the average places economic impacts as being very slightly more important than environmental impacts (51% versus 49% respectively). This would suggest that the incremental benefits/dis-benefits of the Hold the line Option would lie towards the middle of the range, representing a few points on the scoring index either side of zero.

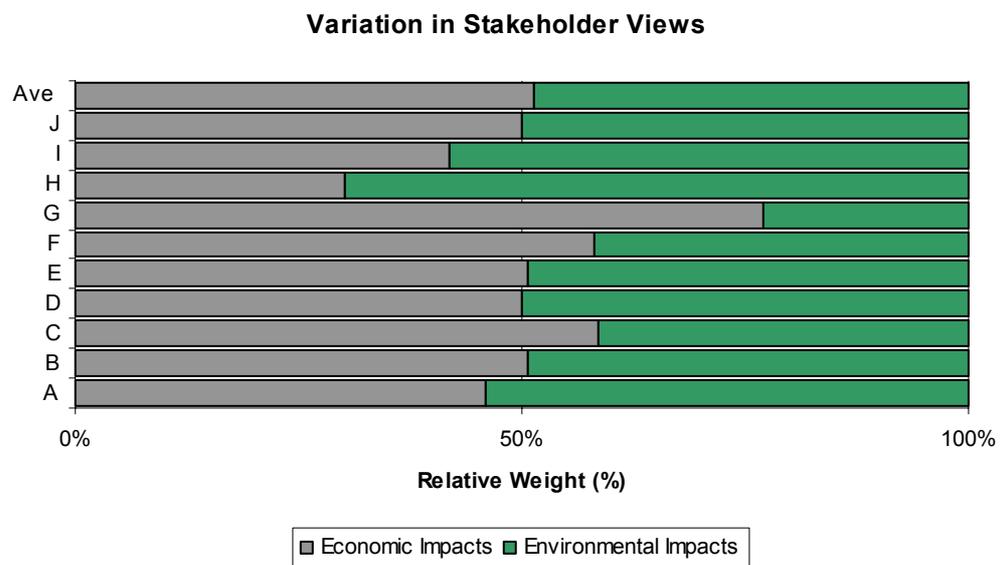


Figure 6.1: Variation in Stakeholder views

7. References

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Appendix B1.1

Appraisal summary table for high level screening – S-AST for the Kelling Hard to Lowestoft SMP – Cromer, Trimingham and Winterton Frontages

Table B1.1.1 Appraisal summary table for flood management and coastal defence – high level screening

| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | |
|-------------------------------------|----------------------|--|--|--------------------|
| Assumptions | | The high level screening will correspond to the 'do-nothing' option | | |
| Impact category | Impact likely? (Y/N) | Impact details | Qualitative or quantitative assessment | Monetary valuation |
| <i>Economic Impacts</i> | | | | |
| Assets | Y | <ul style="list-style-type: none"> • loss of residential and commercial properties from 20 years onwards. • loss of infrastructure associated with properties. • loss of tourist facilities along the sea front. • loss of Victorian seawall. • loss of life boat station after 20 years and pier after 50 years. | | ✓ |
| Land use | Y | <ul style="list-style-type: none"> • change from residential and commercial land use to abandoned areas with derelict/ damaged properties. | ✓ | |
| Transport | Y | <ul style="list-style-type: none"> • loss of some local roads, plus part of A149. | ✓ | |
| Business development | Y | <ul style="list-style-type: none"> • loss of tourist facilities is likely to have knock-on impacts on economy on town (which relies largely on tourism) such that business development is also likely to be reduced. | ✓ | |
| <i>Environmental impacts</i> | | | | |
| Physical habitats | Y | <ul style="list-style-type: none"> • natural environmental features are reliant on presently defended line remaining stable such that erosion of cliffs would result in loss of vegetated cliff face, which is a County Wildlife Site. | ✓ | |
| Water quality | N | | | |
| Water quantity | N | | | |

Table B1.1.1 Appraisal summary table for flood management and coastal defence – high level screening

| | | | | |
|--|-----------------------------|---|---|---------------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | |
| Assumptions | | The high level screening will correspond to the 'do-nothing' option | | |
| Impact category | Impact likely? (Y/N) | Impact details | Qualitative or quantitative assessment | Monetary valuation |
| Natural processes | N | | | |
| Historical environment | Y | <ul style="list-style-type: none"> after 20 years, there will be (gradual) loss of Grade II listed buildings, the church and other important monuments. | | ✓ |
| Landscape and visual amenity | Y | <ul style="list-style-type: none"> loss of historic buildings, loss of promenade will alter the visual amenity of the town. The beach is also likely to retreat changing the coastal landscape. | ✓ | |
| Social impacts | | | | |
| Recreation | Y | <ul style="list-style-type: none"> loss of promenade (between 20 and 50 years); loss of pier after 50 years; loss of access to beach as promenade is lost. | ✓ | |
| Health and safety | Y | <ul style="list-style-type: none"> gradual loss of promenade is likely to make beach access more dangerous. loss of lifeboat station may affect lifesaving actions to sea, while loss of pier may affect nearshore craft. | ✓ | |
| Availability and accessibility of services | Y | <ul style="list-style-type: none"> loss of many commercial properties and infrastructure is likely to affect services within the town. | ✓ | |
| Equity | Y | <ul style="list-style-type: none"> loss of tourism will reduce number of jobs available locally and is likely to increase deprivation. | ✓ | |
| Sense of community | Y | <ul style="list-style-type: none"> loss of tourism based jobs and properties are likely to result in people having to move out of the local area. The cost of housing nearby is very high such that the existing community is likely to be widely dispersed. | ✓ | |
| Cross-cutting impacts | | | | |
| Policy Integration | Y | <ul style="list-style-type: none"> potential for a move to a more naturally functioning coastline but at the expense of local planning. | ✓ | |

Table B1.1.2 Appraisal summary table for flood management and coastal defence – high level screening

| | | | | |
|-------------------------------------|-----------------------------|--|---|---------------------------|
| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | |
| Assumptions | | The high level screening will correspond to the 'do-nothing' option | | |
| Impact category | Impact likely? (Y/N) | Impact details | Qualitative or quantitative assessment | Monetary valuation |
| <i>Economic impacts</i> | | | | |
| Assets | Y | • potential loss of caravan parks and isolated properties in Vale Road, Mundesley. Agricultural land would also be lost. | | ✓ |
| Land use | Y | • change in land use from recreational/residential/agricultural to coastline. | ✓ | |
| Transport | Y | • small lengths of local roads lost, plus erosion of coastline may threaten B1159 after 100 years. | ✓ | |
| Business development | Y | • loss of caravan parks is likely to affect tourism in the area, although there are many other sites further back from the defences. | ✓ | |
| <i>Environmental impacts</i> | | | | |
| Physical habitats | Y | • Sidestrand and Trimingham Cliffs SSSI continues through this area and part of Mundesley Cliffs CWS. 'Do-nothing' would allow for continuance of erosion which is important for the maintenance of the environmental interests. | ✓ | |
| Water quality | N | | | |
| Water quantity | N | | | |
| Natural processes | N | • continued erosion will provide sediment that will be moved off-site due to the high on-offshore energy component. This will provide sediment supply to adjacent areas (although there is also the possibility of outflanking of defences). | | |
| Historical environment | Y | | ✓ | |
| Landscape and visual amenity | Y | • change in landscape as cliffs erode back replacing caravan parks, agricultural land and some residential properties. | ✓ | |

Table B1.1.2 Appraisal summary table for flood management and coastal defence – high level screening

| | | | | |
|--|-----------------------------|---|---|---------------------------|
| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | |
| Assumptions | | The high level screening will correspond to the 'do-nothing' option | | |
| Impact category | Impact likely? (Y/N) | Impact details | Qualitative or quantitative assessment | Monetary valuation |
| Social impacts | | | | |
| Recreation | Y | <ul style="list-style-type: none"> Vale Road is the main access point to the beach, and the only access for 6km south of Overstrand. Loss of this access point would result in a loss of beach-based recreation in this area. | | ✓ |
| Health and safety | Y | <ul style="list-style-type: none"> potential health and safety issues if access to the beach is lost and no warnings/barriers are put in place. The current defences are also in poor condition and may represent a safety hazard. | ✓ | |
| Availability and accessibility of services | Y | <ul style="list-style-type: none"> loss of tourist facilities may have knock-on impacts on local shops, businesses, etc. that may result in loss of services for local people (and for visitors to the area). | ✓ | |
| Equity | Y | <ul style="list-style-type: none"> loss of facilities, both for tourists and locals, is likely to result in local job losses and may increase deprivation in an area that relies on income from tourism. Loss of beach access would also affect recreation in the area (again for visitors and locals) and would reduce the quality of life. | ✓ | |
| Sense of community | Y | <ul style="list-style-type: none"> loss of businesses, employment and some properties is likely to reduce the sense of community. | ✓ | |
| Cross-cutting impacts | | | | |
| Policy Integration | Y | <ul style="list-style-type: none"> the coastline would move to a more natural state and would provide sediment for adjacent units. Tourism (and the economy) would be impacted. | ✓ | |

Table B1.1.3: Appraisal summary table for flood management and coastal defence – high level screening

| | | | | |
|--|-----------------------------|--|---|---------------------------|
| Project name | | Winterton (Management Unit WIN 2) from Winterton, Beach Road to Hemsby, Long Beach Estate | | |
| Assumptions | | The high level screening will correspond to the 'do-nothing' option | | |
| Impact category | Impact likely? (Y/N) | Impact details | Qualitative or quantitative assessment | Monetary valuation |
| Economic impacts | | | | |
| Assets | Y | • no assets on site but possible damage to cables following erosion of dunes. | | ✓ |
| Land use | N | | | |
| Transport | N | | | |
| Business development | N | | | |
| Environmental impacts | | | | |
| Physical habitats | Y | • maintenance of natural coastal conditions will help to maintain habitats and conservation interests of SPA, SSSI and NNR. Potential loss of County Wildlife Site. | ✓ | |
| Water quality | N | | | |
| Water quantity | N | | | |
| Natural processes | N | | | |
| Historical environment | N | | | |
| Landscape and visual amenity | Y | • may be localised changes in landscape due to areas of erosion/advance of dunes. | ✓ | |
| Social impacts | | | | |
| Recreation | Y | • may be some loss of access to beach if dunes are eroded, but there is likely to be a balance between retreat and advance such that alternative access points are likely to become available. | ✓ | |
| Health and safety | N | | | |
| Availability and accessibility of services | N | | | |

Table B1.1.3: Appraisal summary table for flood management and coastal defence – high level screening

| | | | | |
|-------------------------------------|-----------------------------|--|---|---------------------------|
| Project name | | Winterton (Management Unit WIN 2) from Winterton, Beach Road to Hemsby, Long Beach Estate | | |
| Assumptions | | The high level screening will correspond to the 'do-nothing' option | | |
| Impact category | Impact likely? (Y/N) | Impact details | Qualitative or quantitative assessment | Monetary valuation |
| Equity | N | | | |
| Sense of community | N | | | |
| <i>Cross-cutting impacts</i> | | | | |
| Policy Integration | Y | <ul style="list-style-type: none"> is in line with policy to make coastal processes more natural and sustainable. | ✓ | |

Appendix B1.2:

Appraisal summary table for main assessment – MA-AST for Kelling Hard to Lowestoft Ness SMP – Cromer Frontage

Table B1.2.1 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | 'Do-nothing' | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes are expected to fail towards the end of 20 years. After 20 years, there will be complete failure of the seawall. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| <i>Economic impacts</i> | | | | | |
| Assets | Y | <p>Loss of residential and commercial properties from 20 years onwards.</p> <p>Loss of infrastructure associated with properties.</p> <p>Loss of tourist facilities along the sea front.</p> <p>Loss of Victorian seawall.</p> <p>Loss of life boat station after 20 years and pier after 50 years.</p> | <p>80m will be eroded in 80 years (from year 20 to 100) at an erosion rate of 1m/yr.</p> <p>Loss of:</p> <ul style="list-style-type: none"> - 40 residential properties; - 30 commercial/tourist properties; - 1km of promenade; - 1 lifeboat station; and - 1 pier. <p>Average house price in 'NR32 9' is £128,000 (Oct-Dec 2003, from Land Registry Internet Site). Total value of lost properties: £5.1million.</p> <p>Average rating (from Valuation Agency Office) for 2000 of £20,000 per year; assumed total value is 10x rating = £200,000 per property. Total value of lost properties: £6.0 million.</p> <p>Lifeboat station assumed to have same value as commercial properties: £200,000.</p> <p>Loss of promenade valued in terms of recreation trips.</p> | | £11.3m |
| Land use | Y | Change from residential and commercial land use to abandoned areas with derelict/damaged properties. | | 0 | |

Table B1.2.1 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | 'Do-nothing' | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes are expected to fail towards the end of 20 years. After 20 years, there will be complete failure of the seawall. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Transport | Y | Loss of some local roads, plus part of A149. | 0.75km of A149 and 2km of local roads | 0 | |
| Business development | Y | Loss of tourist facilities is likely to have knock-on impacts on economy on town (which relies largely on tourism) such that business development is also likely to be reduced. | Loss of 30 commercial properties, many of which rely on the tourist trade (fish & chip shops, souvenir shops, etc.). | 0 | |
| Environmental impacts | | | | | |
| Physical habitats | Y | Natural environmental features are reliant on presently defended line remaining stable such that erosion of cliffs would result in loss of vegetated cliff face, which is a County Wildlife Site. | Loss of one county wildlife site. | 0 | |
| Water quality | N | | | | |
| Water quantity | N | | | | |
| Natural processes | N | | | | |
| Historical environment | Y | After 20 years, there will be (gradual) loss of Grade II listed buildings, the church and other important monuments. | Loss of five Grade II listed buildings from year 20 onwards. Assumed that 'heritage' value of properties is equivalent to 'twice' the value of standard commercial properties, i.e. £200,000 per property | | £1m |

Table B1.2.1 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|---|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | 'Do-nothing' | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes are expected to fail towards the end of 20 years. After 20 years, there will be complete failure of the seawall. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Landscape and visual amenity | Y | Loss of historic buildings, loss of promenade will alter the visual amenity of the town. The beach is also likely to retreat changing the coastal landscape. | | 0 | |
| Social impacts | | | | | |
| Recreation | Y | Loss of promenade (between 20 and 50 years), loss of pier after 50 years, loss of access to beach as promenade is lost. | Loss of access to beach from town of Cromer along 1km. Assuming 100,000 visits to the town per year with willingness to pay of £3.59 per visit (based on deterioration in beach and promenade in Multi-Coloured Manual, from study in Yellow Manual) gives lost annual value to recreation of: 100,000 x £3.59 = £359,000 per year | | |
| Health and safety | Y | Gradual loss of promenade is likely to make beach access more dangerous. Loss of the lifeboat station may affect lifesaving actions to sea, while loss of pier may affect nearshore craft. | | 0 | |
| Availability and accessibility of services | Y | Loss of many commercial properties and infrastructure is likely to affect services within the town. | | 0 | |

Table B1.2.1 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | 'Do-nothing' | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes are expected to fail towards the end of 20 years. After 20 years, there will be complete failure of the seawall. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Equity | Y | Loss of tourism will reduce number of jobs available locally and is likely to increase deprivation. | | 0 | |
| Sense of community | Y | Loss of tourism based jobs and properties are likely to result in people having to move out of the local area. The cost of housing nearby is very high such that the existing community is likely to be widely dispersed. | | 0 | |
| Cross-cutting impacts | | | | | |
| Policy Integration | Y | Potential for a move to a more naturally functioning coastline but at the expense of local planning. | | 0 | |

Table B1.2.2 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | Managed re-alignment | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes would be allowed to fail (by year 20), after which the seawall would fail. Works would be undertaken to reduce issues of safety, with access to the beach likely to be restricted much sooner than under 'do-nothing'. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Economic impacts | | | | | |
| Assets | Y | <p>Loss of residential and commercial properties from 20 years onwards.</p> <p>Loss of infrastructure associated with properties.</p> <p>Loss of tourist facilities along the sea front.</p> <p>Loss of Victorian seawall.</p> <p>Loss of lifeboat station after 20 years and pier after 50 years.</p> | <p>80m will be eroded in 80 years (from year 20 to 100) at an erosion rate of 1m/yr.</p> <p>Loss of:</p> <ul style="list-style-type: none"> - 40 residential properties; - 30 commercial/tourist properties; - 1km of promenade; - 1 lifeboat station; and - 1 pier. <p>Average house price in 'NR32 9' is £128,000 (Oct-Dec 2003, from Land Registry Internet Site). Total value of lost properties: £5.1million.</p> <p>Average rating (from Valuation Agency Office) for 2000 of £20,000 per year; assumed total value is 10x rating = £200,000 per property. Total value of lost properties: £6.0 million.</p> <p>Lifeboat station assumed to have same value as commercial properties: £200,000.</p> <p>Loss of promenade valued in terms of recreation trips.</p> | | £11.3m |
| Land use | Y | Change from residential and commercial land use to abandoned areas with derelict/damaged properties. | | 0 | |

Table B1.2.2 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | Managed re-alignment | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes would be allowed to fail (by year 20), after which the seawall would fail. Works would be undertaken to reduce issues of safety, with access to the beach likely to be restricted much sooner than under 'do-nothing'. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Transport | Y | Loss of some local roads, plus part of A149. | 0.75km of A149 and 2km of local roads | 0 | |
| Business development | Y | Loss of tourist facilities is likely to have knock-on impacts on economy of town (which relies largely on tourism) such that business development is also likely to be reduced. | Loss of 30 commercial properties, many of which rely on the tourist trade (fish & chip shops, souvenir shops, etc.). | 0 | |
| Environmental impacts | | | | | |
| Physical habitats | Y | Natural environmental features are reliant on presently defended line remaining stable such that erosion of cliffs would result in loss of vegetated cliff face, which is a County Wildlife Site. | Loss of one county wildlife site. | 0 | |
| Water quality | N | | | | |
| Water quantity | N | | | | |
| Natural processes | N | | | | |
| Historical Environment | Y | After 20 years, there will be (gradual) loss of Grade II listed buildings, the church and other important monuments. | Loss of five Grade II listed buildings from year 20 onwards. Assumed that 'heritage' value of properties is equivalent to 'twice' the value of standard commercial properties, i.e. £200,000 per property | | £1m |

Table B1.2.2 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | Managed re-alignment | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes would be allowed to fail (by year 20), after which the seawall would fail. Works would be undertaken to reduce issues of safety, with access to the beach likely to be restricted much sooner than under 'do-nothing'. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Landscape and visual amenity | Y | Loss of historic buildings, loss of promenade will alter the visual amenity of the town. The beach is also likely to retreat changing the coastal landscape. | | 0 | |
| Social impacts | | | | | |
| Recreation | Y | Loss of promenade (between 20 and 50 years), loss of pier after 50 years, loss of access to beach may occur earlier than year 20 due to failure of groynes that could pose a safety hazard. | Loss of access to beach from town of Cromer along 1km. Assuming 100,000 visits to the town with willingness to pay of £3.59 per visit (based on deterioration in beach and promenade in Multi-Coloured Manual, from study in Yellow Manual) gives lost annual value to recreation of: 100,000 x £3.59 = £359,000 per year | | |
| Health and safety | Y | Loss of lifeboat station may affect lifesaving actions to sea, while loss of pier may affect nearshore craft. Safety associated with beach access will be controlled as far as possible. | | 50 | |
| Availability and accessibility of services | Y | Loss of many commercial properties and infrastructure is likely to affect services within the town. | | 0 | |

Table B1.2.2 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | Managed re-alignment | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes would be allowed to fail (by year 20), after which the seawall would fail. Works would be undertaken to reduce issues of safety, with access to the beach likely to be restricted much sooner than under 'do-nothing'. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Equity | Y | Loss of tourism will reduce number of jobs available locally and is likely to increase deprivation. | | 0 | |
| Sense of community | Y | Loss of tourism based jobs and properties are likely to result in people having to move out of the local area. The cost of housing nearby is very high such that the existing community is likely to be widely dispersed. | | 0 | |
| Cross-cutting impacts | | | | | |
| Policy integration | Y | Potential for a move to a more naturally functioning coastline but at the expense of local planning. | | 0 | |

Table B1.2.3: Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | 'hold the line' | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes and seawall would be maintained such that the promenade would be retained and there would be no loss of properties. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| <i>Economic impacts</i> | | | | | |
| Assets | Y | Properties protected until year 100 by scheme, such that erosion damages would not begin until year 120. | | | |
| Land use | Y | Maintenance of current land use. | | 100 | |
| Transport | Y | All roads and infrastructure would be protected. | | 100 | |
| Business development | Y | Protection of tourist facilities may encourage on-going business development. | | 100 | |
| <i>Environmental impacts</i> | | | | | |
| Physical habitats | Y | Protection of natural environmental features, including a County Wildlife Site. | | 100 | |
| Water quality | N | | | | |
| Water quantity | N | | | | |
| Natural processes | N | | | | |
| Historical environment | Y | Protection of historic buildings | | | |

Table B1.2.3: Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | 'hold the line' | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes and seawall would be maintained such that the promenade would be retained and there would be no loss of properties. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Landscape and visual amenity | Y | Visual amenity will be unchanged. | | 100 | |
| Social impacts | | | | | |
| Recreation | Y | Recreation can continue unhindered (damages avoided). | | | |
| Health and safety | Y | Protection of lifeboat station ensures that reduction in safety does not occur (onshore or offshore). | | 100 | |
| Availability and accessibility of services | Y | Protection of services and economy. | | 100 | |
| Equity | Y | Protection of tourist facilities, commercial and residential properties should prevent undue impacts on any groups as a result of flood defence policy. | | 100 | |
| Sense of community | Y | Protection of town should maintain sense of community. | | 100 | |

Table B1.2.3: Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|--|--------------|-----------------------|
| Project name | | Cromer (Run 3 of Management Area 'RUN') from Cromer, Bernard Road to Cromer Coastguard Lookout | | | |
| Description of option | | 'hold the line' | | | |
| Description of area affected by option | | Residential, commercial and recreational areas of Cromer currently protected by groynes, a Victorian seawall and promenade. The groynes and seawall would be maintained such that the promenade would be retained and there would be no loss of properties. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Cross-cutting impacts | | | | | |
| Policy Integration | Y | Prevents move to a more natural coastline, but is more in line with local authority, planning, etc. policies. | | 100 | |

Appendix B1.3:

Appraisal summary table for main assessment – MA-AST for Kelling Hard to Lowestoft Ness SMP – Trimingham Frontage

Table B1.3.1 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|--------------|-----------------------|
| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
| Description of option | | "DO-NOTHING" | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Economic impacts | | | | | |
| Assets | Y | Potential loss of caravan parks and isolated properties in Vale Road, Mundesley. Agricultural land would also be lost. | 2 caravan parks plus 7 properties due to erosion of 2 m/yr. Also loss of agricultural reservoir and 7ha of agricultural land. Average price of detached property: £220,000 (from Land Registry Internet site for Oct-Dec 2003). Average rateable value of caravan parks: £60,000 x 10 = £600,000 Average value of land (assumed to be Grade 3): £7,203 per ha (multiplied by 0.45). | | Damages of £0.5m |
| Land use | Y | Change in land use from recreational/residential /agricultural to coastline. | | 0 | |
| Transport | Y | Small lengths of local roads lost, plus erosion of coastline may threaten B1159 after 100 years. | 0.3km of local roads lost. | 0 | |
| Business development | Y | Loss of caravan parks is likely to affect tourism in the area, although there are many other sites further back from the defences. | | 0 | |
| Environmental impacts | | | | | |

Table B1.3.1 Appraisal summary table for flood management and coastal defence – main assessment

| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
|---|-----------------------------|--|--|--------------|-----------------------|
| Description of option | | "DO-NOTHING" | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Physical habitats | Y | Sidestrand and Trimingham Cliffs SSSI continues through this area and part of Mundesley Cliffs CWS. 'Do-nothing' would allow for continuance of erosion which is important for the maintenance of the environmental interests. | | 100 | |
| Water quality | N | | | | |
| Water quantity | N | | | | |
| Natural processes | Y | Continued erosion will provide sediment that will be moved off-site due to the high on-offshore energy component. This will provide sediment supply to adjacent areas (although there is also the possibility of outflanking of defences). | | 100 | |
| Historical environment | N | | | | |
| Landscape and visual amenity | Y | Change in landscape as cliffs erode back replacing caravan parks, agricultural land and some residential properties. | | 100 | |

Table B1.3.1 Appraisal summary table for flood management and coastal defence – main assessment

| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
|---|-----------------------------|---|---|--------------|-----------------------|
| Description of option | | "DO-NOTHING" | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Social Impacts | | | | | |
| Recreation | Y | Vale Road is the main access point to the beach, and the only access for 6km south of Overstrand. Loss of this access point would result in a loss of beach-based recreation in this area. | 'Cliff erosion, deterioration in beach and seawall, much reduced access to and along beach and seawall' has £ loss per adult visit of £1.89 per visit (from Multicoloured Manual for Corton, staying visitors). Assuming 30,000 visits per year gives annual losses once the access is lost of: 30,000 x £1.89 = £56,700 per year Access is assumed to be lost after 20 years. | | Damages of £0.8m |
| Health and safety | Y | Potential health and safety issues if access to the beach is lost and no warnings/barriers are put in place. The current defences are also in poor condition and may represent a safety hazard. | | 0 | |
| Availability and accessibility of services | Y | Loss of tourist facilities may have knock-on impacts on local shops, businesses, etc. that may result in loss of services for local people (and for visitors to the area). | | 0 | |

Table B1.3.1 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|--|--------------|-----------------------|
| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
| Description of option | | "DO-NOTHING" | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Equity | Y | Loss of facilities, both for tourists and locals, is likely to result in local job losses and may increase deprivation in an area that relies on income from tourism. Loss of beach access would also affect recreation in the area (again for visitors and locals) and would reduce the quality of life. | | 0 | |
| Sense of community | Y | Loss of businesses, employment and some properties is likely to reduce the sense of community. | | 0 | |
| Cross-cutting impacts | | | | | |
| Policy integration | Y | The coastline would move to a more natural state and would provide sediment for adjacent units. Tourism (and the economy) would be impacted. | | 0 | |

Table B1.3.2: Appraisal summary table for flood management and coastal defence – main assessment

| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
|---|-----------------------------|---|--|--------------|-----------------------|
| Description of option | | MANAGED REALIGNMENT | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Economic impacts | | | | | |
| Assets | Y | Potential loss of isolated properties in Vale Road, Mundesley. Agricultural land would also be lost. Under managed realignment, the caravan parks would be re-sited, such that they are no longer at risk from erosion. | 2 caravan parks plus 7 properties due to erosion of 2 m/yr. Also loss of agricultural reservoir and 7ha of agricultural land. Average price of detached property: £220,000 (from Land Registry Internet site for Oct-Dec 2003). Average rateable value of caravan parks: £60,000 x 10 = £600,000 Average value of land (assumed to be Grade 3): £7,203 per ha (multiplied by 0.45). | | Damages of £0.2m |
| Land use | Y | Change in land use from tourism/residential/agricultural to coastline, with agricultural land likely to be the new sites for the caravan parks that will have to move. | Score based on number of land use 'types' affected (here, agricultural and residential are affected while tourism is not). | 33 | |
| Transport | Y | Small lengths of local roads lost, plus erosion of coastline may threaten B1159 after 100 years. | 0.3km of local roads lost. | 0 | |
| Business development | Y | Movement of caravan parks should offset most of the business development issues. However, loss of beach access may reduce the attraction of the local area to tourists. | Study for North Norfolk District Council shows that 20% of trips (and spend) are made to the coast; assumed that these trips are lost. | 80 | |

Table B1.3.2: Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|--------------|-----------------------|
| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
| Description of option | | MANAGED REALIGNMENT | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Environmental impacts | | | | | |
| Physical habitats | Y | Sidestrand and Trimingham Cliffs SSSI continues through this area and part of Mundesley Cliffs CWS. Managed realignment would allow for continuance of erosion which is important for the maintenance of the environmental interests. | | 100 | |
| Water quality | N | | | | |
| Water quantity | N | | | | |
| Natural processes | Y | Continued erosion will provide sediment that will be moved off-site due to the high on-offshore energy component. This will provide sediment supply to adjacent areas (although there is also the possibility of outflanking of defences). | | 100 | |
| Historical environment | N | | | | |
| Landscape and visual amenity | Y | Change is landscape as cliffs erode back replacing agricultural land and some residential properties. Caravan parks would move to what is currently agricultural land, changing the landscape inland. | | 0 | |

Table B1.3.2: Appraisal summary table for flood management and coastal defence – main assessment

| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
|---|-----------------------------|---|---|--------------|-----------------------|
| Description of option | | MANAGED REALIGNMENT | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Social impacts | | | | | |
| Recreation | Y | Vale Road is the main access point to the beach, and the only access for 6km south of Overstrand. Loss of this access point would result in a loss of beach-based recreation in this area (and may affect the attraction of the area to visitors unless new beach access points can be provided). | 'Cliff erosion, deterioration in beach and seawall, much reduced access to and along beach and seawall' has £ loss per adult visit of £1.89 per visit (from Multicoloured Manual for Corton, staying visitors). Assuming 30,000 visits per year gives annual losses once the access is lost of: 30,000 x £1.89 = £56,700 per year Access is assumed to be lost after 20 years. | | Damages of £0.8m |
| Health and safety | Y | Warning/barriers would be put in place preventing use of Vale Road as a beach access point. The current defences would be monitored with any safety issues dealt with as required. | Warnings, barriers and removing of defences as required will reduce safety issues such that this option is not considered to result in any additional risk to that of 'hold the line'. | 100 | |
| Availability and accessibility of services | Y | Tourist facilities would be moved, but loss of beach access may reduce attraction of the area to visitors. | With 20% of trips (and spend) lost from reduced number of tourist trips, there will be knock-on impacts on local services. The study by North Norfolk District Council allows a multiplier of 1.5 to be calculated (in terms of jobs supported) such that 30% of services may be affected. | 70 | |

Table B1.3.2: Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|---|--------------|-----------------------|
| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
| Description of option | | MANAGED REALIGNMENT | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Equity | Y | Any reduction in the number of tourists visiting the area is likely to result in local job losses and may increase deprivation in an area that relies on income from tourism. Loss of beach access would also affect recreation in the area (again for visitors and locals) and would reduce the quality of life. | Based on loss of access for trips made to coast and knock-on impacts for local services. | 70 | |
| Sense of community | Y | Any loss of businesses, employment and some properties are likely to reduce the sense of community. | Again based on number of trips as the impacts of this are what will drive the loss of sense of community. Impact from lost residential properties is insignificant (7 out of 971 properties). | 70 | |
| Cross-cutting impacts | | | | | |
| Policy integration | Y | The coastline would move to a more natural state and would provide sediment for adjacent units. Tourism (and the economy) would be protected to some degree, but loss of beach access is likely to affect recreation policies. | | 100 | |

Table B1.3.3 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|--|--------------|-----------------------|
| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
| Description of option | | HOLD THE LINE | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| <i>Economic impacts</i> | | | | | |
| Assets | Y | Protection of properties in Vale Road, Mundesley, agricultural land and caravan parks. | Protection against erosion for 100 years. | | Damages of £0.02m |
| Land use | Y | No change in current land use. | | 100 | |
| Transport | Y | All local roads would be protected. | | 100 | |
| Business development | Y | There would be no impacts on business development from the policy of hold the line. | | 100 | |
| <i>Environmental impacts</i> | | | | | |
| Physical habitats | Y | Sidestrand and Trimingham Cliffs SSSI continue through this area and part of Mundesley Cliffs CWS. Hold the line would prevent erosion of the cliffs, which is important for the maintenance of the environmental interests. Hence, the environmental interests are likely to reduce over time. | | 0 | |
| Water quality | N | | | | |
| Water quantity | N | | | | |

Table B1.3.3 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|---|--------------|-----------------------|
| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
| Description of option | | HOLD THE LINE | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Natural processes | Y | Erosion will be minimised such that there will be a reduction in sediment that can be moved off-site due to the high on-offshore energy component. This will reduce sediment supply to adjacent areas (although there is no longer the possibility of outflanking of defences). | | 0 | |
| Historical Environment | N | | | | |
| Landscape and visual amenity | Y | Protection of current land use will mean that landscape will remain unchanged. | Based on the NERA Landscape Intrusion Index and slight intrusion, which indicates a reduction of 40%. | 60 | |
| Social impacts | | | | | |
| Recreation | Y | Vale Road is the main access point to the beach, and the only access for 6km south of Overstrand. Under hold the line, the access point would be protected such that recreation would be able to continue. | No loss of access for beach-based erosion for 100 years. | | Damages of £0.03m |
| Health and safety | Y | The current defences will need to be upgraded such that health and safety concerns would no longer be an issue. | | 100 | |
| Availability and accessibility of services | Y | Protection of facilities will ensure that services are maintained. | | 100 | |

Table B1.3.3 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|--|--------------|-----------------------|
| Project name | | Trimingham (TRI5) from Trimingham, Beacon Hill to Mundesley, Seaview Road. | | | |
| Description of option | | HOLD THE LINE | | | |
| Description of area affected by option | | The area contains a sandy beach with a little shingle fronting cliffs which decrease in height towards Mundesley. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Equity | Y | Maintenance of the beach access should ensure that there is no impact upon equity. | | 100 | |
| Sense of community | Y | The community will be protected from erosion and may feel more secure. | | 100 | |
| Cross-cutting impacts | | | | | |
| Policy Integration | Y | Hold the line would minimise the potential for a move to a more sustainable, natural coastline and may affect adjacent areas due to a reduction in sediment supply. Economic policies are supported by this option. | | 0 | |

Appendix B1.4:

Appraisal summary table for main assessment – MA-AST for Kelling Hard to Lowestoft Ness SMP – Winterton Frontage

Table B1.4.1 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|--|------------------|-----------------------|
| Project name | | Winterton (Management Unit WIN 2) from Winterton, Beach Road to Hemsby, Long Beach Estate | | | |
| Description of option | | 'do-nothing' | | | |
| Description of area affected by option | | Beach with dune system up to 500m inland. Important conservation area with SPA, SSSI, NNR and CWS designations and area also falls into the Norfolk Coast AONB. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Economic impacts | | | | | |
| Assets | Y | No assets on site but possible damage to cables following erosion of dunes. | | 0 | |
| Land use | N | | | | |
| Transport | N | | | | |
| Business development | N | | | | |
| Environmental impacts | | | | | |
| Physical habitats | Y | Maintenance of natural coastal conditions will help to maintain habitats and conservation interests of SPA, SSSI and NNR. Potential loss of County Wildlife Site. | | 100 | |
| Water quality | N | | | | |
| Water quantity | N | | | | |
| Natural processes | N | | | | |
| Historical Environment | N | | | | |
| Landscape and visual amenity | Y | May be localised changes in landscape due to areas of erosion/advance of dunes. | | All options same | |

Table B1.4.1 Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|------------------|-----------------------|
| Project name | | Winterton (Management Unit WIN 2) from Winterton, Beach Road to Hemsby, Long Beach Estate | | | |
| Description of option | | 'do-nothing' | | | |
| Description of area affected by option | | Beach with dune system up to 500m inland. Important conservation area with SPA, SSSI, NNR and CWS designations and area also falls into the Norfolk Coast AONB. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| <i>Social impacts</i> | | | | | |
| Recreation | Y | May be some loss of access to beach if dunes are eroded, but there is likely to be a balance between retreat and advance such that alternative access points are likely to become available. | | All options same | |
| Health and safety | N | | | | |
| Availability and accessibility of services | N | | | | |
| Equity | N | | | | |
| Sense of community | N | | | | |
| <i>Cross-cutting impacts</i> | | | | | |
| Policy integration | Y | Is in line with policy to make coastal processes more natural and sustainable. | | 100 | |

Table B1.4.2: Appraisal summary table for flood management and coastal defence – main assessment

| Project name | | Winterton (Management Unit WIN 2) from Winterton, Beach Road to Hemsby, Long Beach Estate | | | |
|---|-----------------------------|---|--|------------------|-----------------------|
| Description of option | | Managed re-alignment (this option is equivalent to 'do-nothing' as there are no defences on site at present) | | | |
| Description of area affected by option | | Beach with dune system up to 500m inland. Important conservation area with SPA, SSSI, NNR and CWS designations and area also falls into the Norfolk Coast AONB. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| <i>Economic impacts</i> | | | | | |
| Assets | Y | No assets on site but possible damage to cables following erosion of dunes. | | 0 | |
| Land use | N | | | | |
| Transport | N | | | | |
| Business development | N | | | | |
| <i>Environmental impacts</i> | | | | | |
| Physical habitats | Y | Maintenance of natural coastal conditions will help to maintain habitats and conservation interests of SPA, SSSI and NNR. Potential loss of County Wildlife Site. | | 100 | |
| Water quality | N | | | | |
| Water quantity | N | | | | |
| Natural processes | N | | | | |
| Historical Environment | N | | | | |
| Landscape and visual amenity | Y | May be localised changes in landscape due to areas of erosion/advance of dunes. | | All options same | |

Table B1.4.2: Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|------------------|-----------------------|
| Project name | | Winterton (Management Unit WIN 2) from Winterton, Beach Road to Hemsby, Long Beach Estate | | | |
| Description of option | | Managed re-alignment (this option is equivalent to 'do-nothing' as there are no defences on site at present) | | | |
| Description of area affected by option | | Beach with dune system up to 500m inland. Important conservation area with SPA, SSSI, NNR and CWS designations and area also falls into the Norfolk Coast AONB. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Social impacts | | | | | |
| Recreation | Y | May be some loss of access to beach if dunes are eroded, but there is likely to be a balance between retreat and advance such that alternative access points are likely to become available. | | All options same | |
| Health and safety | N | | | | |
| Availability and accessibility of services | N | | | | |
| Equity | N | | | | |
| Sense of community | N | | | | |
| Cross-cutting impacts | | | | | |
| Policy Integration | Y | Is in line with policy to make coastal processes more natural and sustainable. | | 100 | |

Table B1.4.3: Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|---|--|------------------|-----------------------|
| Project name | | Winterton (Management Unit WIN 2) from Winterton, Beach Road to Hemsby, Long Beach Estate | | | |
| Description of option | | 'hold the line' | | | |
| Description of area affected by option | | Beach with dune system up to 500m inland. Important conservation area with SPA, SSSI, NNR and CWS designations and area also falls into the Norfolk Coast AONB. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| Economic impacts | | | | | |
| Assets | Y | Work would be undertaken to protect cables if there is a risk that impacts would occur. | | 100 | |
| Land use | N | | | | |
| Transport | N | | | | |
| Business development | N | | | | |
| Environmental impacts | | | | | |
| Physical habitats | Y | Minimal intervention will ensure that the natural coastal conditions are maintained and will help to maintain habitats and conservation interests of SPA, SSSI and NNR. Potential loss of County Wildlife Site. | | 0 | |
| Water quality | N | | | | |
| Water quantity | N | | | | |
| Natural processes | N | | | | |
| Historical environment | N | | | | |
| Landscape and visual amenity | Y | May be localised changes in landscape due to areas of erosion/advance of dunes. | | All options same | |

Table B1.4.3: Appraisal summary table for flood management and coastal defence – main assessment

| | | | | | |
|---|-----------------------------|--|--|------------------|-----------------------|
| Project name | | Winterton (Management Unit WIN 2) from Winterton, Beach Road to Hemsby, Long Beach Estate | | | |
| Description of option | | 'hold the line' | | | |
| Description of area affected by option | | Beach with dune system up to 500m inland. Important conservation area with SPA, SSSI, NNR and CWS designations and area also falls into the Norfolk Coast AONB. | | | |
| Impact category | Impact likely? (Y/N) | Qualitative description of impacts | Quantitative assessment of impacts (no. units/monetary) | Score | Monetary value |
| <i>Social impacts</i> | | | | | |
| Recreation | Y | May be some loss of access to beach if dunes are eroded, but there is likely to be a balance between retreat and advance such that alternative access points are likely to become available. | | All options same | |
| Health and safety | N | | | | |
| Availability and accessibility of services | N | | | | |
| Equity | N | | | | |
| Sense of community | N | | | | |
| <i>Cross-cutting impacts</i> | | | | | |
| Policy Integration | Y | Is in line with policy to make coastal processes more natural and sustainable, with intervention only occurring where necessary. | | 0 | |