North Norfolk Coastal Management Plan Evidence Gathering Study 01

Final Report

for

North Norfolk District Council

Collingwood Environmental Planning

EWP Edwin Watson Partnership

RPA

August 2008

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Final Report

prepared for

North Norfolk District Council

by

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EXECUTIVE SUMMARY

INTRODUCTION

The Kelling to Lowestoft Ness Shoreline Management Plan (SMP) (Halcrow *et al*, 2006) includes recommendations for no active intervention and retreat. Potential social and community issues have made it difficult for North Norfolk District Council (NNDC) to accept these recommendations. In considering its response, NNDC decided to prepare a Coastal Management Plan that aims to address many of the social and community issues that the SMP was unable to tackle. The aim of the Coastal Management Plan is to develop a positive vision and address the consequences of coastal change.

AIM OF THE STUDY

The overall aim of this study is to derive data and support a strategy for the long-term management of change along the North Norfolk coast. It is intended to develop knowledge and policy tools to fill the information gap relating to which adaptation options may be available and their feasibility in order to inform the development of the Coastal Management Plan. In this way, the study is to help identify how change, either as a result of coastal erosion or the risk of coastal erosion, can and should be managed. The study also supports some of the initiatives being progressed through the Defra Adaptation Toolkit and consequently has been part funded by Defra.

MANAGING FUTURE CHANGE

The focus of the study is on managing change, to minimise the negative consequences of coastal erosion. In many cases, this will require a process for moving assets (including property, infrastructure, utilities, etc.) from areas at risk and relocating them, here, defined as roll-back. This is likely to require some form of financial intervention or funding to enable property owners, businesses and organisations to roll-back. The combination of funding, enabling mechanisms and minimisation of negative consequences is defined as adaptation to coastal erosion. The impacts described in the study focus mainly on the individuals, businesses and communities at risk of erosion along NNDC's operational frontage (i.e. the eroding coastline); no consideration has been given to assessing the impacts on the areas to which roll-back occurs (e.g. as a result of increased development in those areas).

For this study, adaptation and roll-back are defined as follows:

- **adaptation**: a process of managing the impacts of coastal change on communities and individuals, in advance of erosion or realignment, with the aim of reducing the risk and mitigating the adverse effects; and
- **roll-back**: facilitating the relocation of properties from areas at risk of coastal erosion or realignment to areas not at risk.

This report also includes economic terms such as discounting and UK plc:

- **discounting**: discounting is defined in the HM Treasury Green Book[1] as 'a technique to compare costs and benefits that occur in different time periods…based on the principle that, generally, people prefer to receive goods and services now rather than later'. Thus, the discounted costs reflect the timing of the costs with those costs incurred further into the future reduced using the Treasury recommended discount rate of 3.5%[2];
- **UK plc**: defined as representing the UK economy and includes impacts on taxpayers; and
- **£2008**: this notation shows that costs are expressed in 2008 values to ensure that all monetary estimates are in the same year costs to take account of inflation, etc. All the costs can then be compared.

THE REAL COSTS OF NO ACTIVE INTERVENTION

The SMP identified stretches of the coast for which no active intervention was the preferred option where previously the policy had been to defend. This was based on a very narrow economic appraisal where the damages were based on number of properties affected compared with the costs of providing coast protection works (in line with the guidance). However, this does not consider impacts on individual property owners, businesses and organisations, community effects such as blight[3] or costs that have to be covered at the local (North Norfolk District Council) or regional level. To better understand the implications and costs of roll-back and adaptation, it was necessary to assess the real costs of no active intervention and who bears those costs.

Table 1 highlights the assets at risk as identified in the SMP across the 100 year time horizon. The table shows the number of assets at risk in each of the three Epochs considered, including 989 residential properties at risk, 29 commercial properties, 6 hotels and guest houses, and 3,690m of road including the coast road between Trimingham and Mundesley.

Table 1: Assets Lost per Epoch

Category	EPOCH 1 (to 2025)	EPOCH 2 (to 2055)	EPOCH 3 (to 2105)	TOTAL
Residential property	51	283	655	989
Commercial property/land use	4	6	19	29
Hotels and guest houses	0	1	5	6
Residential institutions (including care homes)	0	1	0	1
Assembly and leisure (including village halls)	1	0	2	3
Other properties (including utilities)	1	3	3	7
Historical	0	2	5	7
Agricultural land	0	0	175ha	175 ha

[1] HM Treasury (2003): **Appraisal and Evaluation in Central Government (The Green Book)**, Treasury Guidance, London: TSO.

[2] In fact, the discount rate proposed by HM Treasury declines over time such that it is 3.5% between years 0 and 30, 3% between years 31 and 75 and 2.5% from year 75. This project only estimates costs over the next 100 years (i.e. from year 0 to year 99), such that changes in the discount rate beyond year 99 are not relevant.

[3] Blight is defined as the negative social and economic consequences of third party decisions. The decisions may be made by the public or private sector and may be policy or regulatory decisions. (Taussik *et al*, 2006).

Table 1: Assets Lost per Epoch				
Category	**EPOCH 1 (to 2025)**	**EPOCH 2 (to 2055)**	**EPOCH 3 (to 2105)**	**TOTAL**
Caravan/chalet/holiday parks [1]	327	656	491	1,474
Recreation/open space	0	614m footpaths	0	614m
Golf course [2]	0	3	4	7
Roads	0	860m	2830m	3,690m
Lifesaving and emergency	2	0	2	4
Notes: [1] The caravan park assets are expressed in numbers of pitches for individual caravans [2] Expressed as number of holes affected				

Table 2 summarises the key impacts identified and, where possible, places a monetary cost against them. It also provides an overview of the key assumptions made when estimating the monetary costs. The table shows that many of the predicted impacts cannot be valued in monetary terms, but that the costs of the no active intervention option are likely to be significant at a minimum of £87 million[4] (excluding any non-monetised impacts and loss of direct spend from visitors to North Norfolk). This can be compared against the estimated benefits to UK plc from not having to pay to provide coast protection works along the affected frontages of £41 million.

Table 2: Summary of the Real Costs of No Active Intervention in North Norfolk (total costs across all three Epochs)			
Stakeholder	**Impact**	**Cost[1]**	**Assumptions**
Individual property owners	*Decrease in capital value of property (eventually total loss of property value) Negative equity ties property owners to existing location Exclusion from mortgage market, cannot raise money against home Cannot get insurance Loss of inheritance/pension value Lack of maintenance of property with impacts on quality of life/well-being Loss of self esteem Feeling of injustice Loss of control over own future, or right to make their own decisions about own future Loss of utility (e.g. loss of garden) †Loss of individual sense of identity Increased levels of stress and depression	£43m £4.9m	*Based on average price of £215,000 per property in North Norfolk and time property is eroded (pers. comm., 2008) †Based on £200 per household per year value for flooding (RPA/FHRC, 2004)

[4] All costs are given as discounted figures to reflect the timing of costs. Discounting is undertaken following the principles set out in the HM Treasury Green Book, using a discount rate of 3.5%.

Table 2: Summary of the Real Costs of No Active Intervention in North Norfolk (total costs across all three Epochs)

Stakeholder	Impact	Cost[1]	Assumptions
Businesses	*Loss of commercial premises Decrease in capital value of business (eventually total loss of business value) Potential financial liability of landlords with current leases when property erodes Lack of investment in business resulting in gradual deterioration, leading to business failure due to reduced demand for goods and services Lack of access to loan facilities, with implications for business viability No certainty for future business planning, businesses cannot plan ahead Business is tied to current location, likely to be wound down over time (cannot be sold as going concern)	£5.7m	*Based on rebuild costs for commercial properties (pers. comm.., 2008)
Visitors	*Loss of access to beaches Loss of access along coast as roads are eroded Loss of tourist assets (e.g. caravan parks, hotels) Loss of attractions (e.g. listed buildings, footpaths) Area becomes much less attractive due to derelict properties	£357m	*Estimated direct spend by visitors to North Norfolk per year (EETB, 2003)
Communities	Blight causing downward spiral of decline Strings of derelict properties further reducing property prices and attractiveness of area Decrease in value of properties outside the areas at risk (residential and commercial) New residents no longer attracted to the area changing the composition of the community Loss of public buildings and meeting places Loss of jobs as businesses are lost Threat to public services (schools, health, transport) *Long-term effects increasing poverty and deprivation of area	£3.2m	*Based on 150,000 people taken out of poverty for 1% spend of GDP across population in affected parishes of North Norfolk (based on Atkinson, 2000)
North Norfolk District Council	*Administration costs of dealing with 989 households whose properties have been eroded †Cost of providing temporary accommodation for 989 households whose properties have been eroded ¥Cost of having to rebuild lost stock (may be grant aided)	£0.02m £0.18m £33m	*Based on £94.50 per household affected and time property is eroded (pers. comm.., 2008) †Based on £300 per week for six weeks per household eroded (pers. comm.., 2008) ¥Based on costs of meeting Registered Social Landlord requirements eroded (pers. comm., 2008)
UK plc[2]	Grant may be needed to help fund rebuild costs Reduction in potential to meet poverty and deprivation targets – may mean that there is a need for regeneration in the area	-	Included in above estimate

Notes:
[1] All costs are discounted over 100 years (or as stated) using the Treasury Green Book discount rate
[2] Defined as the UK economy including taxpayers

THE NEED FOR SOCIAL JUSTICE

Adaptation to changing coastlines entails costs and how those costs are shared out raises issues of distributive justice. Many institutions have recognised that the current policy of putting the burden on the individual resident or business to manage the losses resulting from the change in approach to managing coastlines is unsustainable.

Growing concerns over the appropriateness of placing the impacts of policy changes for coastal erosion onto individuals and the likely increase in the number of 'no active intervention' policies should SMPs be carried out using the narrow focus of economic appraisal mean that approaches to adaptation need to be considered now. The costs associated with no active intervention need to be estimated in detail to ensure that there really is a benefit to the nation (i.e. taxpayers) and, if so, how those who are losing should be supported. This is one of the main principles of cost-benefit analysis. A project should only be undertaken where the benefits outweigh the costs (this is currently included within the economic analysis and appraisal, albeit rather superficially) and that those who win should compensate the losers such that society as a whole is better off. At present, those who are apparently 'winning' are taxpayers not having to pay for coast protection works. However, the 'losers' are not just those living in the at risk properties (who could be judged to have made a 'bad choice' in purchasing at risk property, but only where they could have reasonably known the risks), but the wider community, ratepayers in North Norfolk (who will have to pay for the additional costs incurred at the local level), ratepayers and taxpayers in Norfolk who may be impacted by lost economic opportunities (e.g. tourism) in North Norfolk and, potentially, taxpayers across the country who may have to pay to help North Norfolk recover from the widespread impacts. It is clear that the current approach does not enable society as a whole to benefit from no active intervention; in fact, society as a whole may face additional costs as a result of the change in policy.

THE COST OF ADAPTATION

There are three main approaches that can be used to undertake adaptation:

- rebuild key assets/infrastructure as they are eroded to maintain beach/coastal access and to minimise the economic impacts. This approach is used for those assets that need to be maintained to reduce/minimise impacts to the region, e.g. to help preserve the local economy;

- relocate/roll-back properties and assets as they are threatened by erosion to reduce community and economic impacts. This approach could be used for most assets and infrastructure, although the potential for roll-back and its costs varies across different land uses; and

- provide assistance with adaptation to reduce impacts on individual property owners, businesses and communities. Again, this approach could apply to all assets and infrastructure but the type and amount of help required and, hence, costs varies by land use.

Table 3 provides an overview of the indicative costs of rebuilding key assets and infrastructure, here for those assets that are affected in Epoch 1 (i.e. to 2025). Car parks

would be rebuilt in an area that is not at risk from erosion and the costs include replacing any existing facilities (e.g. toilets) that would be lost. Footpath costs are based on rolling path agreements such that the paths can be rolled back as erosion proceeds. Beach accesses would be repaired and replaced as necessary, with some requiring temporary beach accesses where vehicular accesses are affected.

The lack of roll-back to date means there must be significant constraints that have to be overcome, since the potential benefits of roll-back are illustrated by the costs associated with the no active intervention baseline. One such constraint is likely to have been the lack of a policy, but there are also economic, organisational and social constraints that are contributing to the lack of roll-back to date. A series of intervention measures have been identified based on removing or reducing each constraint. The costs of implementing these intervention measures have been identified and are used as the basis for estimating the cost of roll-back. It is important to note that <u>all</u> of the constraints preventing roll-back need to be reduced/removed (or, as a minimum, the key constraints) if roll-back as a policy is to be successful. Table 4 summarises the estimated (indicative) costs of roll-back for each Epoch, with the total cost estimated at £39 million, of which almost three-quarters is associated with land purchase and rebuild costs.

The cost of funding roll-back such that property owners and businesses can move out of areas at risk of coastal erosion is estimated by considering a wide range of different possible options. The options considered are provided in Table 5.

It is a lack of available capital that is often the most significant constraint preventing roll-back from occurring. Therefore, each option has been assessed to determine how it could be used to provide financial assistance to the property owners. Table 6 provides a summary of the discounted costs of each option, where these costs represent the total funding requirements.

Table 3: Summary of Cost Estimates for Rebuilding Key Assets/Infrastructure					
Policy Unit		**Solutions**			**Total Cost**
Kelling Hard to Sheringham	Car park	£58,000			£230,000
	Norfolk Coast Path	£180,000			
Sheringham to Cromer	Norfolk Coast Path and other footpaths	£180,000			£180,000
Cromer to Overstrand	Paston Way	£51,000			£51,000
Overstrand	Car park	£200,000			£420,000
	Beach access[1]	£58,000	£120,000	£200,000	
	Paston Way	£16,000			
Overstrand to Mundesley	Car park	£14,000			£260,000
	Beach access[1]	£100,000	£150,000	£250,000	
Bacton, Walcott and Ostend	Beach access[1]	£100,000	£400,000	£700,000	£700,000
Ostend to Eccles	Car park	£290,000			£740,000
	Beach access[1]	£180,000	£300,000	£380,000	
	Footpaths	£69,000			
Total Costs		**£1,500,000**	**£2,000,000**	**£2,600,000**	**£2,600,000**

Notes:
[1] Includes three different costs related to the type of beach access that is replaced (e.g. pedestrian or vehicular access, temporary solution similar to the access tower at Happisburgh or more 'permanent' solutions)

Table 4: Indicative Costs of Roll-back (all costs given to two significant figures and discounted)

Epoch	**No. properties and assets affected**	**Land purchase and rebuild costs[2]**	**Admin and legal costs[3]**	**Other[4]**	**Total Cost[5]**
1 (to 2025)	59 properties 327 pitches 0m main road 0 golf course holes	£7.7 million	£1.2 million	£1.6 million	£10 million
2 (to 2055)	292 properties 656 pitches 860m main road 3 golf course holes	£13 million	£2.5 million	£1.8 million	£17 million
3 (to 2105)	679 properties 491 pitches 2,830m main road 4 golf course holes	£8.2 million	£1.8 million	£1.1 million	£11 million
Total	1,030 properties 1,471 pitches 3,690m main road 7 golf course holes	**£29 million**	**£5.5 million**	**£4.4 million**	**£39 million**

Notes:
[1] Discount rates applied to mid year of range, i.e. year 10 in Epoch 1, year 35 in Epoch 2 and year 75 in Epoch 3 (assuming 2005 is year 0)
[2] Includes cost of purchasing land and rebuilding property
[3] Includes costs of identifying appropriate land, negotiation and legal costs associated with purchase, plus costs of demolishing existing property and making good (but excludes costs of environmental enhancements)
[4] Includes costs of engagement with stakeholders, policy development and setting up, publicising and running a funding scheme (excludes funding costs but includes funder's fee), dealing with complaints and providing on-going assistance
[5] Rounding within the table may mean that the total cost (to two significant figures) is not the exact sum of the preceding columns

Table 5: Overview of Options Considered	
Option(s)	**Description**
Outright purchase and demolish	Property is bought at market value (or some aspect of market value depending on time when the property was purchased, rebuild costs, change in market value over time (e.g. as garden was eroded), whether it was reasonable to assume that the short-term life of the property could have been known at the time of purchase, etc.)
Underwriting values	Liability is accepted for the property in the future. The owner receives a written guarantee that the property will be bought for a set amount when erosion is imminent
Buy and lease	Property is purchased from the owner and rented out for continued occupation until the property is in imminent danger of erosion
Use of property for time-restricted use	Appropriate (pre-defined) land uses would be permitted to take over the property and continue to use it until erosion of the property became imminent
Land purchase by Local Authority	NNDC purchases land (or uses existing land it owns) to provide a free location for those displaced by erosion to develop new properties
Re-locatable properties in at risk areas	Development would be allowed in the 'at risk' areas provided this only involved properties that can be easily relocated to a new site as the risk increases
Low interest loans to buy new property/land once property is eroded	The property is not bought, instead the opportunity is given for the property owner to take a low interest loan. This is offered to those whose house is to be eroded to help purchase another property or land on which to construct another property
Government payback scheme	An estimate is made of the savings by Government in terms of coastal defence costs for urban areas downcoast that are protected by the material coming from the areas that are eroded. This estimate is used as the basis for paying property owners for the loss of their land
Coastal Adaptation Fund	A fund is established to make payments to those who are suffering due to changes in coastal policy. Payments would help cover a range of needs including new mortgages and cost of removal of buildings at risk and could be extended to provide further financial assistance where funds are available
Subsidised maintenance	NNDC pays for/contributes to the cost of maintaining at risk properties to ensure they remain in keeping with the surrounding village/living standards
Streamlined planning permission	An opportunity is given to take advantage of planning permission where fewer steps are required to obtain permission to build a new property. This includes a presumption of planning permission being granted provided some pre-defined requirements are met
Physically move property	Where the property is jacked up and moved, or disassembled and reassembled elsewhere

Some of the options provide opportunities for recouping of funds (e.g. from renting properties to the same or a new owner under buy and lease). Table 7 summarises the potential of each option to recoup funds, thus reducing the overall funding cost. It is important to note though that all options require initial funding outlay, with the income received over a future time period (this has been taken into account through discounting).

Table 6: Summary of Funding Costs by Option			
Option(s)	**Funding Estimates**	**Costs (Property Bought Now)**	**Costs (Property Bought as it is Eroded)**
Outright purchase and demolish Underwriting values Buy and lease Use of property for time-restricted use (relates to residential properties only unless stated otherwise)	1: full market value	£210 million	£43 million
	1a: full market value: residential and commercial	£240 million	£49 million
	2: value based on residual life	£190 million	£33 million
	3: residual life when purchased	£200 million	£26 million
	4: difference between residual life and market value	£24 million	£11 million
	5: rebuild costs	£94 million	£19 million
Land purchase by Local Authority Re-locatable properties in at risk areas	6: land purchased at £12,300 per hectare (compulsory purchase)	£0.41 million	£0.08 million
	7: land purchased at £930,000 per hectare	£31 million	£6.6 million
	8: land purchased at £1.9 million per hectare	£65 million	£13 million
	9: land purchased from residential property owners only (£1.9 million per ha)	£63 million	£13 million
Low interest loans to buy new property/land once property is eroded	10: to cover full cost of rebuild	Options only applicable to owner of property just before it is eroded	£29 million
Government payback scheme (calculated assuming 50% savings on defence costs for Cromer/Bacton Gas terminal)	11: at £42,000 per asset		£8.9 million
	12: at £17,000 per asset		£3.6 million
Coastal Adaptation Fund	13: £2,500 for each applicant		£0.53 million
	14: £5,000 for each applicant		£1.1 million
	15: £10,000 for each applicant		£2.1 million
Subsidised maintenance	16: £2,150 per year (1% of property value)		£55 million
	17: £2,150 per year (maximum 20 years)		£18 million
	18: 50% grant		£27 million
Streamlined planning permission	19: to cover costs of developing guidelines		£0.02 million
Physically move property	20: to fund property moves for unique assets only		£0.6 million

A comparison of Tables 6 and 7 shows that the option to rent out properties or land has a potential (discounted) income of around £100 million against costs of up to £190 to £240 million (depending on approach used to estimate the market value of the property) or £94 million if the rebuild costs are used. This is because it is assumed that the property is bought in year 0 and that income is discounted over time. The undiscounted income from renting properties or land is £230 million; a value which suggests that a profit could be made. The discounted costs also take no account of any potential increase in rent over time, such that the income estimated is likely to be a worst-case estimate. If, for example, rental costs were to

increase at 3.5% per year (the same rate used for discounting), the overall income would equal the undiscounted estimate of potential income.

Table 7: Summary of Potential to Recoup Funds by Option		
Option(s)	**Approach to Recouping Funds**	**Potential Income**
Underwriting values Buy and lease Use of property for time-restricted use (relates to residential properties only unless stated otherwise)	1: Rent out properties at typical rent of £10,000 per year until property is eroded (-25% tax, 25% maintenance costs, 10% borrowing costs) 2: Sell property at residual (market) value	£97 million £33 million
Outright purchase and demolish Underwriting values Re-locatable properties in at risk areas	3: Sell land at £8,300 per property 4: Sell land at £63,200 per property 5: Rent land at £1,000 per caravan pitch	£1.7 million £13 million £100 million
Low interest loans to buy new property/land once property is eroded	6: Low interest rate charged	Cannot be estimated
Government payback scheme	7: Compared with costs of providing defences without erosion elsewhere (£42,000 per asset) 8: at £17,000 per asset	£8.9 million £3.6 million
Coastal Adaptation Fund	No significant potential to recoup funds	-
Subsidised maintenance		
Streamlined planning permission		
Physically move property		

SUMMARY

The no active intervention baseline has significant costs for individual property owners, businesses, communities and North Norfolk District Council. The combination of impacts and knock-on effects locally and regionally mean that UK plc (and specifically UK taxpayers) is also likely to be negatively affected without some mechanism for managing the change such that the impacts can be avoided or reduced. The total costs of no active intervention have been estimated at almost £100 million (discounted), although this excludes significant community impacts that cannot be valued in monetary terms.

On-going repair and replacement of key assets and infrastructure is estimated to cost around £2.6 million over the next 20 years, while roll-back is estimated to cost £39 million and funding for adaptation between £20,000 (for streamlined planning permission only) and £240 million (for purchasing properties from their existing owners at the not at risk market value) or £94 million if rebuild costs are used as the basis for buying at risk properties.

Overall, packages of options that include purchasing the at risk properties at the rebuild costs may offer the greatest benefits. This option has four key advantages:

(i) it provides property owners with the finance to replace their home;
(ii) it means that they are not financially worse off since, once re-built, the property will have a market value that 'belongs' to the property owners (this may require the option to be offered in combination with land provided by the local authority);
(iii) the existing (at risk) property can continue to be occupied while the new property is being built, avoiding/reducing the need for temporary accommodation (providing the

property is not at immediate risk reducing costs for NNDC but also reducing impacts on the local community). This may reduce the potential income from buy and lease for the period over which the new property is being built and could reduce the potential to return a profit where residual lives of the at risk properties are short; and

(iv) once the replacement property is available, the at risk property can be sold at a residual value for buy and lease (potentially recouping profits for the funding body (i.e. the option would be self-funding) and/or the future landlord) or demolished to make way for relocatable properties or provide recreational benefits.

Although the above option/combination of options would require some initial funding outlay, there is the potential for the option to become self-funding over time (since potential profits from buy and lease or renting land for relocatable properties) exceeds the cost of funding the rebuild costs and providing land.

It is unlikely, however, that any one funding option will be appropriate in all circumstances. Instead, it would be beneficial to offer packages of options that build upon the benefits of the individual options. For example, some residential property owners may want to continue to live in their home until it erodes. They may benefit more from subsidised maintenance to ensure they continue to live in a well-kept property and a coastal adaptation fund to help them move when their property is at imminent threat of erosion, potentially with the guarantee of selling the property at its rebuild value. This has the benefit of delaying the funding requirement (and thus reducing the discounted costs), reducing knock-on impacts on the community and providing the household with continued access to their home and, in part at least, their individual sense of identity. The property owner would not lose out financially if they invested in their property. Furthermore, there would be no 'reward' for speculative buyers purchasing properties at a reduced (blighted) price with the potential that they would receive full market value when the property eroded. It is by offering packages of options where residents and businesses can choose what is best for them that the greatest benefits can be secured.

REFERENCES

Atkinson AB (2000): **A European Social Agenda: Poverty Benchmarking and Social Transfers**, CAE2000.

Halcrow *et al* (2006): **Kelling to Lowestoft Ness Shoreline Management Plan**, First Review Final Report, November 2006.

RPA/FHRC (2004): **The Appraisal of the Human-Related Intangible Impacts of Flooding**, Defra/Environment Agency R&D Technical Report FD2005/TR, London.

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1. INTRODUCTION

1.1 Background to the Study

The coastline in North Norfolk is around 45 miles in length, a large proportion of which is designated as Area of Outstanding Natural Beauty (AONB) and Heritage Coast. The population is around 100,000 living in 200 distinct communities[1].

The final version of the Kelling to Lowestoft Ness Shoreline Management Plan (SMP[2]) was produced in 2006 and largely reflects the shift in Government policy to be more in keeping with natural processes. As a result, there are numerous recommendations of no active intervention and retreat. The potential for significant social and community issues has made it difficult for North Norfolk District Council (NNDC) to accept the results. In considering its response to the SMP, NNDC decided to prepare a Coastal Management Plan that aims to address many of the social and community issues that the SMP was unable to tackle. The aim of the Coastal Management Plan is to develop a positive vision and address the consequences of coastal change.

Within NNDC's Core Strategy (Submission) Development Plan Document, there are possibilities for the implementation of roll-back, most notably Policy EN12 on the relocation and replacement of development affected by coastal erosion. Other general planning policies on infrastructure and environment are also relevant. At a more individual level, there is also the opportunity for planning to facilitate the roll-back of individuals on their own land, particularly in the case of caravan parks.

Opportunities for implementation of a roll-back policy may also have been facilitated by the announcement in the October 2007 Comprehensive Spending review of the introduction of 'an adaptation toolkit of £30 million over three years to assist communities in adapting to change where constructing defences is not the most appropriate means of managing flood and coastal erosion risk'[3]. However, there is an information gap relating to which roll-back and adaptation options may be available and their feasibility.

1.2 Aim of the Study

The overall aim of this study is to derive data and support a strategy for the long-term management of the North Norfolk coast. It is intended to cover areas where knowledge is absent or limited, or to help develop other policy tools.

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1 NNDC (2003): **Economic Development Strategy to 2007**.

2 Halcrow *et al* (2006): **Kelling to Lowestoft Ness Shoreline Management Plan**, First Review Final Report, November 2006.

3 HM Treasury (2007): **Meeting the Aspirations of the British People**, 2007 Pre-Budget Report and Comprehensive Spending Review, October 2007, downloaded from: www.hm-treasury.gov.uk/budget2007.

This aim is to be achieved through four specific study areas that are required to provide the necessary evidence to support bids for resources and to indicate the most feasible options to assist in implementation of processes to adapt to climate change. These four specific study areas have been addressed through four tasks, each addressing one of the specific study areas:

- Task 1: effects on infrastructure;
- Task 2: implementing a roll-back policy;
- Task 3: investigating blight; and
- Task 4: opportunities for financial intervention.

The key issues assessed through each of these tasks are described in Section 1.3. Full details on the approaches used in each Task are available in the four Task reports, which form annexes to this report.

1.3 Definitions

Two key terms are used throughout this study: adaptation and roll-back. To ensure there is common understanding of what is meant by these terms in the context of this report, the definitions used are:

- **adaptation**: a process of managing the impacts of coastal change on communities and individuals, in advance of erosion or realignment, with the aim of reducing the risk and mitigating the adverse effects; and
- **roll-back**: facilitating the relocation of properties from areas at risk of coastal erosion or realignment to areas not at risk.

This report also includes economic terms such as discounting and UK plc:

- **discounting**: discounting is defined in the HM Treasury Green Book[4] as 'a technique to compare costs and benefits that occur in different time periods…based on the principle that, generally, people prefer to receive goods and services now rather than later'. Thus, the discounted costs reflect the timing of the costs with those costs incurred further into the future reduced using the Treasury recommended discount rate of 3.5%[5];
- **UK plc**: defined as representing the UK economy and includes impacts on taxpayers; and
- **£2008**: this notation shows that costs are expressed in 2008 values to ensure that all monetary estimates are in the same year costs to take account of inflation, etc. All of the costs can then be compared.

[4] HM Treasury (2003): **Appraisal and Evaluation in Central Government (The Green Book)**, Treasury Guidance, London: TSO.

[5] In fact, the discount rate proposed by HM Treasury declines over time such that it is 3.5% between years 0 and 30, 3% between years 31 and 75 and 2.5% from year 75. This project only estimates costs over the next 100 years (i.e. from year 0 to year 99), such that changes in the discount rate beyond year 99 are not relevant.

1.4 Audience of this Report

This report is aimed as those interested in the process and principles behind adaptation as well as the detailed approach to estimating the costs of various adaptation options. Although the study attempts to keep use of jargon to a minimum, it is intended as a study that assesses the economic case for adaptation (i.e. estimates the impacts (damages) caused by no active intervention and compares this with the costs of adaptation option). As a result, the report contains a lot of monetary information with this reported as both undiscounted and discounted costs.

Undiscounted costs reflect the 'actual' estimated costs that may be incurred by implementing an adaptation option and do not take into account the time when those costs are incurred. Although this report is not intended as a detailed economic analysis, some of the discussions required to support the estimation of the costs of the adaptation options do assume some knowledge of economic principles.

The report also focuses on economic impacts associated with the no active intervention option. As with the estimation of costs of adaptation and roll-back, the approach is based on the rules of economic appraisal as set out in the Treasury Green Book. However, discussion is given on some of the local and regional impacts that are expected to occur due to no active intervention. It is important to note though that local and regional impacts are not usually considered in a project appraisal due to the economic rules that have to be followed. It is not the aim of this study to reassess the economic case for defences to the affected stretch of coastline.

1.5 Overview of the Tasks Undertaken

The overall objective of Task 1 is to identify those infrastructure assets that need to respond to change such as beach accesses, roads, footpaths, promenades, car parking areas and toilets and provide indicative costs for managing the response. Task 1 involves an investigation of the impact of sea level rise and coastal retreat on infrastructure. These impacts have arisen (and continue to arise) because many of the assets associated with activities to make a living from the sea or visiting the sea have been squeezed into a narrowing coastal zone. Task 1 identifies those assets that are at risk in the short-term (i.e. to 2025), and the local and regional importance of those assets. The Task 1 report is provided as Annex 1 to this report.

The objective of Task 2 is to assess the indicative costs of implementing a roll-back policy for different types of land use. In particular, Task 2 is to investigate issues such as:

- optimum timing of roll-back;
- nature of external intervention necessary;
- nature of the properties for which roll-back is most likely to be effective;
- indicative costs for different types of land use;
- opportunities for adaptation and regeneration;
- community resilience;

- influence of historical and cultural heritage; and
- the relationship between affected communities and others.

The Task 2 report is appended as Annex 2 to this report.

The objective of Task 3 is to build upon the findings of research undertaken by the Tyndall Centre to investigate the blighting effects of coastal change for North Norfolk[6]. Task 3 focuses on the impact of the change in public policy regarding the defence of the North Norfolk coastline from the time it was set out in the SMP consultation document. Task 3 is to investigate the social, economic and wellbeing issues associated with blighting perceived by the affected coastal communities now and in the future such as:

- investment decisions relating to existing property and business;
- maintenance of infrastructure;
- inward investment;
- effect on land and property values;
- reduced maintenance, dereliction and abandonment of property;
- changing demographic profile;
- participation in community activity;
- viability of community facilities (including commercial enterprises serving community needs);
- changes in visitor numbers/patterns/behaviour;
- social exclusion;
- psychological and social aspects of identity;
- impact upon environmental assets or tourist attractions; and
- any knock-on (multiplier) effects.

The Task 3 report forms Annex 3 of this report.

Tasks 2 and 3 included two workshop with local residents and were held in Bacton (21 February 2008) and Overstrand (22 February 2008). The aim of these workshops was to gather evidence from local people on the impacts of the no active intervention option, to begin discussions on how roll-back might work and to identify some of the key constraints that exist that are preventing roll-back occurring now. The reports of these workshops are attached as annex 4 to this report. A workshop was also held with caravan park owners (13 March 2008) given the importance of this land use to the local economy and also the particular issues that is faced by caravan parks. The caravan park report is appended as Annex 5.

The objective of Task 4 is to investigate the feasibility of possible adaptation options, such as outright purchase, buy and lease, underwriting values and to assess the financial viability of each. Task 4 draws upon the findings of Task 2, in particular, but also engagement (during both Tasks 2 and 3). Task 4 involves:

[6] Nicholson-Cole S *et al* (2007): **Investigating the Scope for Community Adaptation to a Changing Shoreline in the Area Between Caister and Hemsby,** Great Yarmouth Borough Council, January 2007; O'Riordan T *et al* (2006): **Living with a Changing Coastline: Exploring New Forms of Governance for Sustainable Coastal Futures,** Tyndall Centre for Climate Change Research, Norwich.

- identification of options for financial intervention;
- assessment of costs of each option; and
- assessment of the implications of each option on individual property owners, local communities, NNDC and UK plc.

The Task 4 report forms Annex 6. As part of Task 4, a questionnaire was sent to estate agents in North Norfolk. The aim of the questionnaire was to identify how far the impacts of property blight extend (including whether there are impacts on properties in parishes not at risk of coastal erosion) and what the extent of property blight may be (in terms of reduction in property prices). A summary of responses to the questionnaire is provided as Annex 7 to this report.

1.6 Organisation of this Report

This report is organised as follows:

- Section 2 estimates the real costs of no active intervention;
- Section 3 discusses the need for social justice;
- Section 4 considers the options and costs for adaptation; and
- Section 5 provides a summary and conclusions.

Thus, this report brings together the findings of Task 1, 2, 3 and 4 to provide a complete picture of the need for and potential use of adaptation measures in North Norfolk. It uses data collected on the issues being faced by local communities and the District Council to assess why adaptation measures are required. Data on which measures may bring the greatest benefits to the local communities and District Council are used to identify which measures could be used, and data on the timing of actions and costs are used to indicate when adaptation measures should be implemented. In addition, this report focuses on key areas of uncertainty, highlighting where data are limited or missing such that efforts to improve the estimates set out in this report can be undertaken in a targeted and focused manner.

This report is supported by the evidence collected through the four tasks, with the Task reports, workshop reports and results of the questionnaire provided as annexes to the Final Report. This ensures that the approach is fully auditable and transparent and provides full details of all assumptions made during the study.

2. THE REAL COSTS OF NO ACTIVE INTERVENTION

2.1 Overview

This Section identifies issues that have arisen following publication of the SMP and the proposal of policies that would not provide continued coast protection to all of the villages and communities along the North Norfolk coast. The issues discussed here are based on data collected on the problems and challenges being faced by local communities and the District Council. Assessment of these problems and challenges provides the basis for determining why adaptation measures are required. The discussion begins by identifying the assets that are at risk from coastal erosion, identifies the impacts expected to occur because of those risks and then estimates the costs associated with those impacts.

2.2 Assets at Risk from Coastal Erosion

Properties and land uses were considered to be at risk and, hence potentially require adaptation, if they were identified in the SMP as lying within one of the three erosion Epochs (Epoch 1: from 2005 to 2025; Epoch 2: from 2026 to 2055; or Epoch 3: 2056 to 2105). Using the SMP to identify assets at risk, a comprehensive list of potentially affected land uses was developed and grouped. The generic classes identified as being at risk and the land uses considered within them are:

- residential property;
- commercial property/land use;
- hotels and guest houses;
- residential institutions (including care homes);
- non-residential institutions (including schools and libraries);
- assembly and leisure (including village halls);
- other properties (including sewage works, sewage pumping stations, MoD facility, places of worship, telephone exchanges and mobile phone masts);
- historical (including listed buildings, sites of heritage importance and Saxon cemetery);
- agricultural land;
- caravan parks (including chalet and holiday parks and their associated infrastructure);
- recreation/open space (including car parks, National Trails and other footpaths, beach accesses, allotments, slipways, parks, playing fields, playgrounds, promenades;
- golf courses;
- roads;
- environmental sites (including cliff top habitats and County Wildlife Sites); and
- lifesaving and emergency (including coastguard lookouts, lifeguard stations, and lighthouse).

These 15 different land uses comprise the example land uses for which the potential and need for adaptation was considered. Table 2.1 shows how many assets in each of the categories are threatened in each of the three Epochs considered.

Table 2.1: Assets lost by Epoch

Category	EPOCH 1 (to 2025)	EPOCH 2 (to 2055)	EPOCH 3 (to 2105)	TOTAL
Residential property	51	283	655	989
Commercial property/land use	4	6	19	29
Hotels and guest houses	0	1	5	6
Residential institutions (including care homes)	0	1	0	1
Non-residential institutions	0	0	0	0
Assembly and leisure (including village halls)	1	0	2	3
Other properties (including utilities)	1	3	3	7
Historical	0	2	5	7
Agricultural land	0	0	175ha	175 ha
Caravan/chalet/holiday parks [1]	327	656	491	1,474
Recreation/open space	7% of total car park capacity	614m footpaths	0	614m
Environmental sites	0	0	0	0
Golf course [2]	0	3	4	7
Roads	0	860m	2830m	3,690m
Lifesaving and emergency	2	0	2	4

Notes:
[1] The caravan park assets are expressed in numbers of pitches for individual caravans
[2] Expressed as number of holes affected

The information included in Table 2.1 highlights the significant impacts of coastal change that are already being seen or will be experienced in the immediate future. Over the next 20 years around 50 homes will be lost, along with more than 300 caravan park pitches in an area where tourism is the major economic activity. Nevertheless, the scale of the impacts is significantly greater in the following period, for example with a five-fold increase in the number of homes likely to be lost.

2.3 The Potential for Blight

Blight has been defined as "the negative social and economic consequences of third party decisions. The decisions may be made by the public or private sector and may be policy or regulatory decisions"[7]. The threat of coastal erosion may cause blight if economic and social interactions in the threatened area are relocated, reduced or ended. There is a risk that this could lead to a downward spiral of decline, as the

[7] Taussik, J *et al* (2006): **Adapting to Changing Coastlines and Rivers,** Preliminary Report to Defra, London.

reduction in economic activities or transfer of population may have knock-on effects on other businesses and services, in the public as well as the private sector, and the area is likely to cease to attract new residents or even visitors. Some of the expressions of the blighting effect documented by researchers are:

- drop in value of unprotected properties;
- negative equity ties owners to current properties as they are uncompetitive in the wider market;
- potential financial liability of landlords with current leases when properties are lost;
- business failure as a result of reduced demand for goods and services;
- loss of jobs;
- lack of maintenance of the built and natural environment; and
- threat to public services (schools, health services, transport links)[8].

There is no public responsibility to provide defences to reduce the risk of flooding or coastal erosion, nor to provide compensation to those suffering loss as a result. "There can be no general assumption of blanket compensation for any property owner facing loss of property due to coastal change or an alteration of coastal management policy"[9]. Some writers and politicians have argued that people living in coastal areas should have known that they were at risk and have made plans to manage that risk. This position is used both to justify the change in coastal policy and to deny public responsibility for the consequences of the change: "… there is no argument for public compensation of individuals for their bad luck. Instead they rely on their own planning (usually property insurance)"[10]. Yet it is hard to see how individuals can be expected to predict changes in public policy.

2.4 Impacts of No Active Intervention on Individuals

Impacts on individuals include threats to individual identity (self-esteem and control over the future), loss of capital value in property, reduction in quality of life such as through increased stress and loss of opportunities and flexibility. For business owners, there are additional impacts where the business gradually deteriorates before it is lost entirely. Table 2.2 summarises these impacts and, where possible, estimates the impacts in monetary terms.

8 Taussik J *et al* (2006): p18.

9 O'Riordan T *et al* (2006): **Living with a Changing Coastline: Exploring New Forms of Governance for Sustainable Coastal Futures**, p15.

10 Cooper JAG & McKenna J (2008) p298.

Table 2.2: Summary of Impacts of No Active Intervention on Individuals			
Impact Type	**Description**	**Monetary Impacts**	
		Undiscounted	**Discounted**
Loss of self-esteem	Lack of value (lack of self-worth) as property is eroded since this is perceived to reflect achievements over the lifetime Lack of confidence in terms of future investments Injustice over impacts on them while others are protected	Cannot be estimated in monetary terms	
Loss of self-efficacy	Lack of ability to make decisions about the future (unable to sell house, raise a mortgage or equity), feeling of powerlessness and lack of rights Lack of ability to safeguard the value of the property Loss of choice about the future, change in coastal management policy has taken away their right to make decisions about their own future, feeling that future is lost	Cannot be estimated in monetary terms	
Loss of distinctiveness	Loss of uniqueness of community	Cannot be estimated in monetary terms	
Loss of continuity	Loss of familiar places	Cannot be estimated in monetary terms	
Reduced property prices Loss of capital value	Reduction in market value (25-30% overnight in Happisburgh, 10-15% on Overstrand) Total loss of capital value up to 20 years before property is eroded, unable to sell property Unable to afford to buy an alternative property, effectively become homeless	£210 million[1]	£43 million[2]
Increased stress	Knowledge that property will erode, worry about the future, stress, anxiety, uncertainty	£11 million[3]	£4.9 million[4]
Loss of well-being	Loss of garden Loss of home and memories/family history associated with the home Loss of individual sense of identity (closely linked to place) Depression Lack of investment in property, reduced quality of life, potential health impacts	Cannot be estimated in monetary terms	
Ties to property/job	Unable to take up job elsewhere	Cannot be estimated in monetary terms	
Risk of becoming homeless	Unable to move to new property Council rehousing may be to smaller property, may have to reduce possessions	Cannot be estimated in monetary terms	
Loss of financial opportunities	Lack of access to mortgage market Lack of access to insurance Lack of access to equity release Loss of inheritance value	Cannot be estimated in monetary terms	
Reduced value of business Loss of business	Unable to move business to new location Unable to develop business beyond existing limitations, loss of land on which to expand Gradual deterioration of business, lack of investment due to knowledge that business will have to close Reduction in reputation, quality of business Hastens the time when the business is wound down	£26 million[5]	£5.9 million

Table 2.2: Summary of Impacts of No Active Intervention on Individuals			
Impact Type	**Description**	**Monetary Impacts**	
		Undiscounted	**Discounted**
Notes: [1] Based on 989 properties and average property value of £215,000 [2] Based on loss of 51 properties in year 9, 283 properties in year 34 and 655 properties in year 69 [3] Based on £200 per household per year (value from stress caused by flooding and likely to be under-estimate) [4] Assumes stress continues for one year after property is eroded (to capture stress of actual erosion/moving) [5] Based on cost of rebuilding commercial premises as indicator of cost of lost capital value of business, likely to be an under-estimate			

2.5 Impacts of No Active Intervention on the Community

The impacts on communities are more than just a sum of the impacts on individuals. The knock-on effects of the risk of coastal erosion are likely to affect investment and maintenance of the area such that the attractiveness of the area diminishes. Along with the winding down of businesses in properties at risk from erosion, this will reduce job opportunities affecting those living in the community and, potentially, providing further encouragement for those who can afford to move away to do so. Over time, the lack of capital value in properties will mean it is not worthwhile maintaining or improving properties such that there is increased dereliction, with this exacerbating the knock-on effects and leading to an increase in poverty and deprivation that could spread, in time, to the whole region. Table 2.3 summarises the impacts predicted to fall onto the communities affected both directly and indirectly by erosion.

Table 2.3: Summary of Impacts of No Active Intervention on Communities			
Impact Type	**Description**	**Monetary Impacts**	
		Undiscounted	**Discounted**
Reduction in number of visitors	Loss of access to coast (roads, footpaths and beach accesses) Increased levels of deprivation Loss of car park capacity Loss of caravan pitches Lack of action to stop erosion resulting in rubble and rubbish on beach, eyesore Lack of investment in visitor facilities and accommodation (due to risk of erosion) All factors reduce attractiveness of area for visitors	Cannot be estimated in national terms but likely to be significant local/regional impact (£357 million direct spending on tourism in NNDC per year)[1]	
Reduction in recreation	Loss of recreation opportunities for residents (access to beach, footpaths, etc.)	Cannot be estimated in money terms (no data on current usage)	
Loss of jobs	Winding down of business at risk of erosion Closure of businesses due to reduced demand	Cannot be estimated in money terms	
Loss of services	Reduced demand for services as people move out when properties erode, or when businesses/jobs are lost Eventual loss of services (e.g. schools, post office, shop, pub, bus routes) when demand falls below critical threshold	Cannot be estimated in money terms	

Table 2.3: Summary of Impacts of No Active Intervention on Communities			
Impact Type	**Description**	**Monetary Impacts**	
		Undiscounted	**Discounted**
Change in community structure	Young people move away as there are no jobs, services – not seen as family community Change in reputation of community due to loss of jobs, opportunities, changes to people making up community Loss of community buildings (through erosion or reduced demand) Loss of community spirit	Cannot be estimated in money terms	
Increased deprivation	Spiral into poverty of village and potentially region	£29 million[2]	£3.2 million[2]
Loss of transport links	Loss of coastal roads linking villages Loss of through route	Cannot be estimated in money terms	
Increasing dereliction	Lack of investment in maintenance results in blocks of increasingly derelict properties People moving out leaves blocks of unoccupied properties in varying states of decay	Cannot be estimated in money terms	
Reduction in property prices	Knock-on effects of threat of erosion to those properties not at immediate risk due to lack of confidence in area for investment Knock-on effects from increased deprivation (loss of jobs, services) and attractiveness of area as place to live Potential for new equilibrium to be reached over time, but at significantly reduced property prices (but on-going erosion may prevent this)	£48 million[3]	£9.8 million[3]
Increase in community action	Communities grouping together to fight the perceived inequalities and to stand up for those seen as being treated unfairly Increase in complaints, petitions, demonstrations at local, regional and national level Potential for short-term increase in community spirit and activities Loss of trust in public bodies Loss of confidence that public bodies will help reduce the impacts	Cannot be estimated in money terms	

Notes:
[1] EETB (2003): **Economic Impact of Tourism**, Summary Report for NNDC, East of England Tourist Board.
[2] Based on value of reducing poverty (1% of GDP to reduce poverty by 3.5%), assumed equal to increasing poverty over coastal parishes in North Norfolk (7,650 people). Assumes impacts build to point of increased deprivation after 50 years
[3] Based on 10% reduction in property price around erosion risk zones (from questionnaire sent to Estate Agents) and that properties in all coastal parishes in North Norfolk are affected (again based on questionnaire results)

2.6 Impacts of No Active Intervention on NNDC

NNDC is likely to be responsible to cover the costs of some of the effects of the no active intervention option. This includes the costs of rehousing those whose properties have been eroded, as well as dealing with community complaints and concerns. NNDC is also likely to bear many of the costs associated with increases in deprivation and dereliction, with income from visitors and Council tax both likely to reduce. Table 2.4 summarises the key impacts that NNDC is expected to face as a result of the no active intervention option.

Table 2.4: Summary of Impacts of No Active Intervention on NNDC			
Impact Type	**Description**	**Monetary Impacts**	
		Undiscounted	**Discounted**
Increase in rehousing costs	Increase in housing register administration Increase in costs for housing options service Costs associated with homelessness assessment Costs associated with provision and management of temporary accommodation (passed onto individual) Costs associated with provision of nominations	£93,000[1] £890,000[2]	£19,000[1] £180,000[2]
Increase in complaints and concerns	Increased costs of dealing with complaints and concerns including providing replies and undertaking research	Cannot be estimated in money terms	
Provision of land/ residential development	Cost of identifying and providing land and properties to replace those lost through erosion (costs of providing properties may not be incurred by NNDC)	£150 million[3] (off-the-shelf) £130 million[3] (new build)	£33 million[3] (off-the-shelf) £28 million[3] (new build)
Provision of land/ commercial development	Cost of providing opportunities for commercial development and community facilities to replace those lost through erosion	£26 million[4]	£5.7 million[4]

Notes:
[1] Based on £94.50 per applicant and 989 applicants
[2] Based on 50% of families requiring temporary accommodation for an average of 6 weeks at a cost of £300 per week (the large number of additional families requiring accommodation in Epochs 2 and 3 in particular are likely to mean that these costs are under-estimates)
[3] Based on costs of off-the-shelf purchase of three bedroom dwellings and bringing them up to Registered Social Landlord (RSL) standard of £160,000 per property or new build costs of £136,360 per property. Grant may be available to cover some of the costs such that a proportion of the costs may move from NNDC to UK plc
[4] Based on rebuild costs for 29 commercial premises, 6 hotels/guest houses and 3 community facilities

2.7 Impacts of No Active Intervention on UK plc

UK plc is a term used to reflect impacts on the UK economy and UK taxpayers. Many of the impacts on UK plc occur as a result of the combination of impacts and knock-on effects that occur. There are also opportunities for the UK government to provide grants and funding that would help cover some of the costs faced at the local and regional level. Table 2.5 summarises the impacts predicted for UK plc.

Table 2.5: Summary of Impacts of No Active Intervention on NNDC			
Impact Type	**Description**	**Monetary Impacts**	
		Undiscounted	**Discounted**
Funding and provision of grants	Potential that the UK government would provide grants to help NNDC (and others) cover the costs of providing accommodation and properties	£75 million[1] (off-the-shelf) £65 million[1] (new build)	£17 million[1] (off-the-shelf) £14 million[1] (new build)
Missed targets on poverty	Accumulation of impacts in NNDC results in significant additional deprivation that may reduce the chance that government targets on poverty can be met	Cannot be estimated in monetary terms, but may require significant regeneration funds to be provided	

Table 2.5: Summary of Impacts of No Active Intervention on NNDC			
Impact Type	**Description**	**Monetary Impacts**	
		Undiscounted	**Discounted**
Benefits from costs avoided where coast protection works are not being provided	Selection of no active intervention as preferred option means that no capital or maintenance works would be carried out, thus avoiding the need to spend taxpayers money on protecting all of the coast	£98 million[2]	£41 million[2]
Notes: [1] Based on 50% grant being available to NNDC [2] Based on costs avoided through implementation of SMP policies, where 30km of the coast would not be protected, 26% of this 30km would not incur costs associated with beach management (£20,000/km/year) and 76% would not incur costs associated with linear structures (£10,000/km/year maintenance, plus no capital replacement in year 20 at a cost of £2 million/km for revetment and £7 million/km for concrete walls)			

2.8 Total Costs and Benefits of No Active Intervention

The overall monetised costs and benefits associated with the no active intervention option are summarised in Table 2.6.

Table 2.6: Summary of Monetised Costs and Benefits of No Active Intervention		
Impact Type	**COSTS**	
	Undiscounted	**Discounted**
Residential property - capital value	£210,000,000	£43,000,000
Commercial properties - capital value	£26,000,000	£5,900,000
Stress	£11,000,000	£4,900,000
Deprivation	£29,000,000	£3,200,000
Knock-on loss of property value	£48,000,000	£9,800,000
Rehousing costs	£93,000	£19,000
Temporary accommodation	£890,000	£180,000
Sub-Total	**£330,000,000**	**£67,000,000**
New property - off the shelf	£160,000,000	£33,000,000
New property - new build	£130,000,000	£28,000,000
Sum (off the shelf)	**£490,000,000**	**£100,000,000**
Sum (new build)	**£460,000,000**	**£95,000,000**
Grant costs - off the shelf (if 50% grant)	£79,000,000	£17,000,000
Grant costs - new build (if 50% grant)	£67,000,000	£14,000,000
Impact Type	**BENEFITS**	
	Undiscounted	**Discounted**
Costs avoided - no cost protection works	**£98,000,000**	**£41,000,000**
Notes: Sum values include costs of either new property-off the shelf or new property-new build (grant costs are ignored from the sums, but could represent a transfer payment from UK plc to NNDC)		

Table 2.6 shows that the undiscounted damages are estimated at £460 million to £490 million (depending on the costs used for new build), with the discounted damages estimated at £95 million to £100 million. These cost estimates only include those impacts that could be valued in monetary terms. There are many other damages that could only be described and which could be significant and wide-ranging. Loss of beach accesses is likely to have significant impacts on tourism and number of visitors to the area. Loss of visitors would result in loss of businesses and, potentially, services such as pubs, shops, banks, etc. As properties are eroded and jobs and businesses are lost, people who could afford to move would move away from the area, further affecting services such as schools, libraries and community facilities. Those who cannot afford to move would be forced to remain with no (or reduced) access to insurance, mortgage lenders, and loss of inheritance, pension or a means of raising money. All of these factors would increase deprivation of the local area, with lost jobs meaning that even those outside the at risk zone are unlikely to be able to afford to move, such that the overall impacts may extend across the whole of North Norfolk.

2.9 Growing Recognition of the Need for Social Justice

Many institutions have recognised that the current policy of putting the burden on the individual resident or business to manage the losses resulting from the change in approach to managing coastlines is unsustainable. In some areas, particularly those areas subject to aggressive coastal erosion, the Environment Agency highlighted the need for long-term, possibly innovative, adaptation solutions. It told us 'what preys heavily on people is compensation for their property', and that 'there may be a case for recognising the current generation's special needs in grants and social support *where individuals are affected*'[11].

Adaptation to changing coastlines entails costs and how those costs are shared out raises issues of distributive justice. For many people, the emphasis on the cost benefit principle in decision making on flood and coastal erosion risk management rules out the possibility of ensuring equity, particularly in areas with small or scattered populations. However, the underlying principle of cost-benefit analysis is that a project is only undertaken where the benefits outweigh the costs such that society as a whole is better off. This should include *all* the benefits and *all* the costs; not just those that can be easily expressed in monetary terms. It is the way in which the methodology has been implemented where impacts that cannot be expressed in terms of money are often excluded that is, perhaps, a more pertinent concern.

A recent examination[12] of the 'fairness' of the current flood and coastal erosion risk management system using three social justice models concluded that that current FCERM decision making is based on benefit and not on equality or fairness. This means that decision-makers are unable to target those most vulnerable to flooding or areas where large capital investments are not justified. However, this conclusion suggests that the authors were considering 'fairness' from the local perspective only.

[11] House of Commons Communities and Local Government Committee (2006-07), op cit.

[12] Johnson C *et al* (2007): *Natural and Imposed Injustices: The Challenges in Implementing 'Fair' Flood Risk Management Policy in England*, The Geographical Journal, 173 (4).

Current FCERM decision making is intended to ensure that the projects implemented provide good value for taxpayers and provide benefits at the national scale. It could be argued that implementation of schemes on a local basis may be unfair at the national scale, for example, if a scheme that would protect more people, properties, businesses, etc. could not be funded because the money had been spent on a rural area. Steps are also being taken to address concerns over vulnerability of communities to flooding or erosion, while a move to outcome measures as the basis for prioritising projects may address some of the equity issues[13].

Taussik *et al* (2006) looks briefly at the blighting effects of shoreline or catchment management options which leave previously defended assets or communities undefended. The authors suggest that "… the no active intervention policy carries considerable social and economic costs, costs which need to be incorporated in wider cost benefit analysis … [14]". It can be seen from Section 2.8, above, that the costs of no active intervention are estimated to be significant, with wide-ranging implications for the region and not just local villages. The costs of no active intervention have been estimated at £460 million to £490 million (undiscounted) or £95 million to £100 million (discounted)[15], with costs avoided from not having to provide defences of £98 million (undiscounted) or £41 million (discounted). Only the property damages (which make up around 50% of the monetised damages under no active intervention in Section 2.8) would have been captured in the economic appraisal undertaken as part of the SMP decision-making process.

Growing concerns over the appropriateness of placing the impacts of policy changes for coastal erosion onto individuals and the likely increase in the number of 'no active intervention' policies should SMPs be carried out using the current, narrow focus of economic appraisal mean that approaches to adaptation need to be considered now.

The costs associated with no active intervention need to be estimated in detail to ensure that there really is a benefit to the nation (i.e. taxpayers) and, if so, how those who are losing should be supported. This is one of the main principles of cost-benefit analysis. A project should only be undertaken where the benefits outweigh the costs (this is currently included within the economic analysis and appraisal, albeit rather superficially) and that those who win should compensate the losers such that society as a whole is better off. At present, those who are apparently 'winning' are taxpayers not having to pay for coast protection works. However, the 'losers' are not just those living in the at risk properties (who could be judged to have made a 'bad choice' in purchasing at risk property, but only where they could have reasonably known the risks), but the wider community, ratepayers in North Norfolk (who will have to pay for the additional costs incurred at the local level), ratepayers and taxpayers in Norfolk who may be impacted by lost economic opportunities (e.g. tourism) in North Norfolk and, potentially, taxpayers across the country who may have to pay to help North Norfolk recover from the widespread impacts.

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13 Equally, it may introduce new issues.

14 Taussik J *et al* (2006): **Adapting to Changing Coastlines and Rivers**, Making Space for Water (Strand SD2), p21.

15 This estimate assumes that all property lost has to be rebuilt elsewhere. Any grant costs would have to be paid by UK plc (i.e. by taxpayers) or, in the absence of grant, by NNDC (i.e. ratepayers), hence, the total costs is included in the estimates.

It is clear from the assessment of the costs of the no active intervention option that the current approach does not enable society as a whole to benefit; in fact, society as a whole may face additional costs as a result of the change in policy.

3. THE COSTS OF ADAPTATION

3.1 Overview

This Section focuses on how adaptation could be undertaken and includes consideration of funding of measures to assist property owners faced by erosion with the costs associated with adapting and/or moving. There are three main approaches that can be used to undertake adaptation:

- rebuild key assets/infrastructure as they are eroded to maintain beach/coastal access and to minimise the economic impacts. This approach is only assumed relevant to those assets that need to be maintained to reduce/minimise impacts to the region, e.g. to help preserve the local economy;
- relocate/roll-back properties and assets as they are threatened by erosion to reduce community and economic impacts. This approach could be used for most assets and infrastructure, although the issues vary across different land uses; and
- provide assistance with adaptation to reduce impacts on individual property owners and communities. Again, this approach could apply to all assets and infrastructure but the type of help required and, hence, costs vary by land use.

3.2 Rebuild Assets as they are Eroded

3.2.1 Assets to be Rebuilt

The main assets for consideration here are those that need to be located close to communities or visitor attractions, such as the beach, cliff top or services provided, in order that they will provide the benefit of reducing the impacts of coastal erosion in communities and the local economy. This includes assets such as car parks, beach accesses and footpaths (including National Trails and local paths). This approach would provide little assistance to individual property owners, other than maintaining recreational opportunities and helping to secure jobs in the local community.

3.2.2 Car Parks

Where the car parks are affected, the main option that has been considered is to relocate the car park to an area which will not be affected by 2105. This is a long term option, depending on the location chosen, which can be implemented in the short term or when necessary.

The key issues associated with relocating car parks are:

- locating and purchasing a similar area of land that is accessible from the local road network;
- providing fencing;
- providing new signs; and
- determining whether it would be necessary to provide hard standing.

In Happisburgh, the toilet facilities will also be lost along with the car park; therefore an additional cost will be incurred to replace both the car park and toilets. At Overstrand, the toilet facilities may not be lost within the first Epoch. However, if the car park is relocated it may be desirable to relocate the toilets as well.

The location of the new car parks will be critical to ensuring that the maximum potential benefits are realised by all stakeholders. Care will be needed to locate the new car parks as close to existing facilities and beach access points as possible, whilst ensuring the long-term sustainability of the replacement car park. Consideration should also be given to facilitating access to the beach and existing facilities, for example, with clear signing and an easily accessible route to and from the car park.

3.2.3 Beach Access

Where beach access is affected, the main option that has been considered is to maintain the access, through rebuilding access routes in some form; this would be applicable over the short to long term. The accesses affected at Overstrand and Mundesley provide vehicular access (tarmaced or concrete roads), whilst at Ostend and Happisburgh there is pedestrian access only. At Happisburgh, access to the beach is currently provided via a metal walkway and tower. This is one option that might be appropriate elsewhere, but would provide pedestrian access only.

These access points can be rebuilt if damaged or eroded; however the key issue is how often/how many times this will be necessary. Where access roads run parallel to the cliff, they may be eroded or become unstable a number of times. Therefore it may not be possible for them to be rebuilt straight away. In other words, there may be periods where access is limited at Overstrand, Mundesley and Ostend. In this situation, it may be possible to provide temporary beach access structures, such as wooden ramps across debris. This would provide continued pedestrian access but would limit vehicular access.

Metal walkways and steps, such as those at Happisburgh, provide the opportunity for continued pedestrian access, which can be extended as necessary and moved back in its entirety when required. However, opinions expressed on the Coastal Concern Action Group website[20] suggest that this walkway and steps are seen as an interim measure rather than a long term option for access. Furthermore, the loss of the beach access at Happisburgh was identified as a key contributor to blight at the Bacton workshop. While the 'tower' has maintained beach access to some extent, it is not readily accessible by all (e.g. elderly, those with pushchairs, etc.), therefore, is not necessarily a like-for-like solution. However, it is acknowledged that other forms of access such as a ramp would be difficult to maintain without other coast protection works.

3.2.4 National Trails and Other Footpaths

To replace the sections of National Trail/long distance path and other footpaths that are lost, consideration has been given to new routes which will be accessible in the

[20] http://www.happisburgh.org.uk/forum/viewtopic.php?t=68.

short, medium and long terms. Creating statutory Rights of Way has been identified as an option where footpaths may be lost, whether existing paths are rights of way or not. This is because it provides the necessary mechanism for creating and maintaining the coastal path. Rolling path agreements are also a key option.

Public paths can be created under the Highways legislation by:

- Public Path Creation Orders made by the local authority; and
- Public Path Creation Agreement between the landowner and local authority.

The principal legislation used in the creation of public rights of way is the Highways Act 1990, sections 25 and 26, which deal with the creation of rights of way by Agreement and Order respectively. In addition, for paths located on land which is subject to erosion or submersion by dunes and changing tides, the local authority or other relevant body may be able to enter into a rolling path agreement with the landowner. The rolling path agreements secure the right for a path to be moved inland should erosion occur, allowing for a path to remain above the high water mark, following the line of the coast.

Separate arrangements must be made with each landowner along a stretch of path to be created or rolled back. As there is a cost per arrangement, the number of landowners involved has a significant influence on the overall costs. The number of landowners has been estimated from Ordnance Survey maps according to property and field boundaries. Of course, two fields next to each other may be owned by one or two land owners and this results in an element of uncertainty in the indicative costs. Low and high estimates have been made for the number of landowners where appropriate. In cases where the land is publicly owned the costs are generally minimised – however, for this study it has been assumed that all land involved is under private ownership.

Staff, administrative and legal costs are assumed to be lower where public path Creation Agreements are made, and higher where Orders are required. It is also assumed that all Public Path Orders are contested (otherwise an agreement would be made) and will therefore lead to a public inquiry.

3.2.5 Costs of Maintaining/Rebuilding Assets to Reduce Impacts on Communities

The costs associated with replacement of assets such as beach accesses and footpaths to try and minimise impacts on the local economy and, in particular, tourism are summarised in Table 3.1. The table shows that the estimated cost of replacing and maintaining all of the assets affected in Epoch 1 over the long-term is £2.6 million.

Table 3.1: Summary of Cost Estimates for Rebuilding Key Assets/Infrastructure					
Policy Unit		**Solutions**			**Total Cost**
Kelling Hard to Sheringham	Car park	£58,000			£230,000
	Norfolk Coast Path	£180,000			
Sheringham to Cromer	Norfolk Coast Path and other footpaths	£180,000			£180,000
Cromer to Overstrand	Paston Way	£51,000			£51,000
Overstrand	Car park	£200,000			£420,000
	Beach access[1]	£58,000	£120,000	£200,000	
	Paston Way	£16,000			
Overstrand to Mundesley	Car park	£14,000			£260,000
	Beach access[1]	£100,000	£150,000	£250,000	
Bacton, Walcott and Ostend	Beach access[1]	£100,000	£400,000	£700,000	£700,000
Ostend to Eccles	Car park	£290,000			£740,000
	Beach access[1]	£180,000	£300,000	£380,000	
	Footpaths	£69,000			
Total Costs		**£1,500,000**	**£2,000,000**	**£2,600,000**	**£2,600,000**

Notes:
[1] Includes three different costs related to the type of beach access that is replaced (e.g. pedestrian or vehicular access, temporary solution similar to the access tower at Happisburgh or more 'permanent' solutions)

3.3 Relocate/Roll-Back of Assets Threatened by Erosion

3.3.1 Identifying Constraints to Roll-Back

The first issue to consider is why roll-back has not occurred naturally, once the threat of coastal erosion became apparent. The lack of roll-back means there must be significant constraints that have to be overcome to facilitate roll-back, since the potential benefits of roll-back are illustrated by the costs associated with coastal erosion estimated in Section 2. Constraints were identified and grouped under one of three categories (physical, socio-economic and political) for each land use type (residential property, commercial property/land use, hotels/guest houses, residential institutions, assembly and leisure assets, historical assets, caravan parks, recreation/open space, golf courses, roads, and lifesaving and emergency assets). The approach is summarised in Figure 3.1.

Table 3.2 provides details of the physical, socio-economic and political constraints identified for the example land use of commercial property (full details for all land uses are available in the Task 2 report, which forms Annex 2 to this report). Commercial property is used to illustrate the whole process for assessing the indicative costs of roll-back.

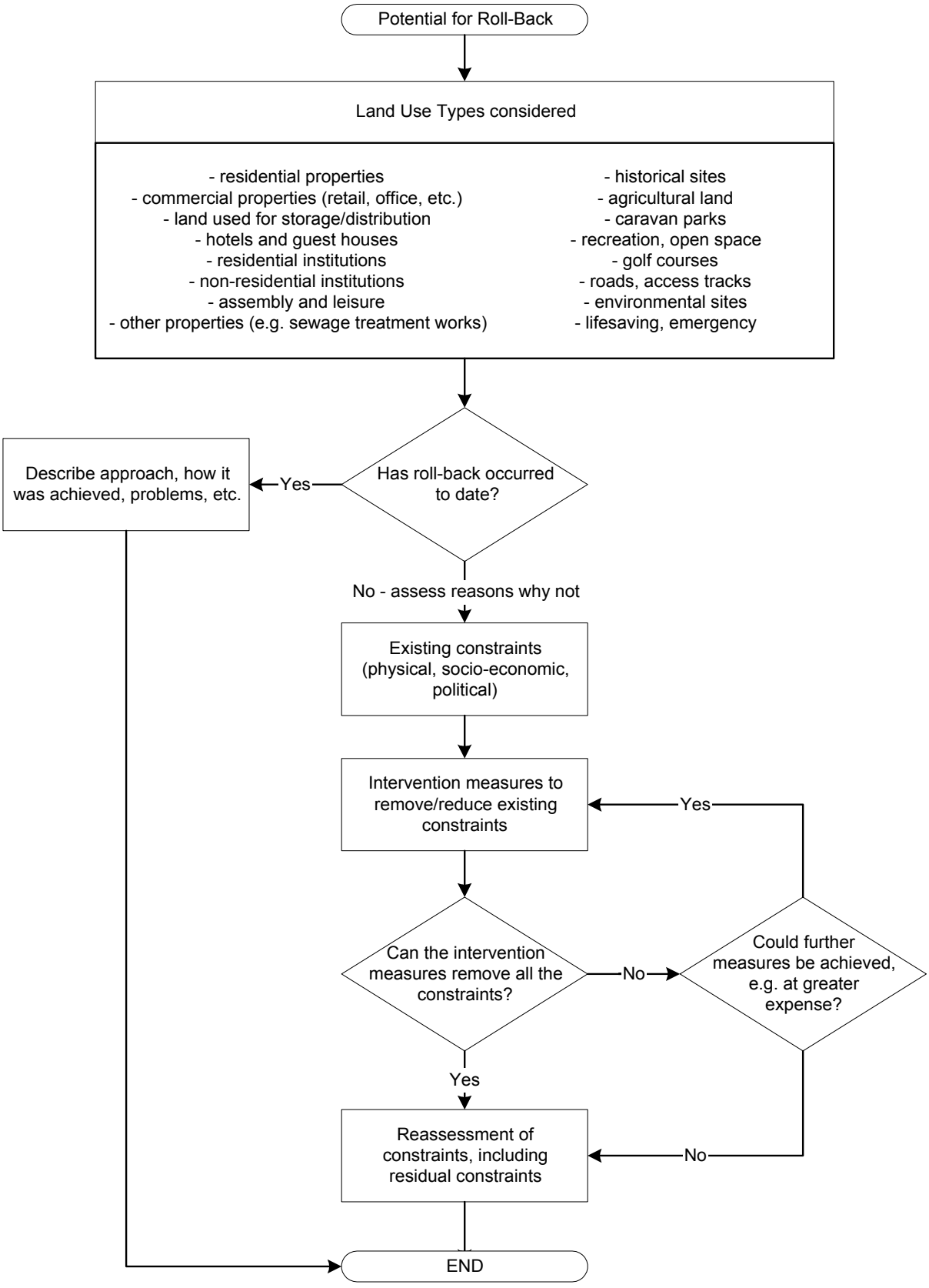

Figure 3.1: Overview of the Approach to Assessing the Constraints to Roll-Back and how they can be Overcome

Table 3.2: Constraints, Intervention Measures and Mechanisms for COMMERCIAL PROPERTIES			
Constraint Type	**Constraint**	**Intervention Measures**	**Cost of Implementation**
Physical	• Lack of appropriate property/land • Need to be near to markets/customers • Need to be near to suppliers • Need to be near to major roads, sea • Need to be in location with appropriate services (water, sewerage, electricity, gas, telephone)	Need for facilitation of purchase/obtaining land appropriate for commercial development that has access to all required services and infrastructure. The actual requirements may vary by commercial property/business type such that the mechanism may need to be flexible	• Cost of identifying appropriate land • Cost of negotiations to purchase • Cost of purchase of land
Socio-Economic	• Lack of value in business/existing property/assets (where value is tied to existing location)	Need for measures to include opportunity for business owners to be able to finance move	• Need for funding (national, regional, local) that will provide the capital required to provide owners/operators with the money needed to undertake mechanisms • Cost of setting up approach for application for funding • Cost of application • Cost of assessing applications • Cost of distributing funds
	• Commitment to local markets, suppliers	Need for land to be in an appropriate location to allow on-going commitments to be honoured	• Cost of lost business/ recreation value if roll-back cannot be completed or company moves to another location and uses new suppliers
	• Uncertainty over future business planning	Need for process to be implemented that provides some degree of certainty such that business owners can plan for future investment, etc.	• Cost of publicising availability of funding/help for roll-back • Cost of providing advice and assistance to those wanting to undertake roll-back • Cost of mediation between conflicting bodies (particularly at outset)
Political	• No policy at present • Proposed Core Strategy policy may not be as restrictive for commercial	Introduction of proposed Core Strategy policy could help facilitate roll-back for commercial premises	• Cost of publicising policy and what it means • Cost of dealing with those who consider policy means they are being 'abandoned' • Cost of dealing with complaints and problems associated with roll-back policy as it is implemented

3.3.2 Identifying Potential Intervention Measures

The intervention measures were identified based on removing or reducing each constraint. These measures could then be costed while any opportunities for additional benefits could be identified (in particular through consideration of the potential to reduce or remove blight). In some cases, one intervention measure addresses more than one constraint and/or more than one land use. Table 3.2 sets out possible intervention measures for the example land use of commercial property to address the constraints highlighted above (intervention measures for all other land uses are provided in the Task 2 report, Annex 2 to this report).

3.3.3 Identifying the Costs of Implementing the Intervention Measures

Each intervention measure would involve a number of different costs as it is being implemented, where the costs reflect the need to address each constraint. It is these costs that provide the basis for costing the roll-back policy as a whole. It is important to note that all of the constraints need to be reduced/removed (or, as a minimum, the key constraints) if roll-back as a policy is to be successful. This will require packages of intervention measures to be implemented (in this section it is assumed that all the implementation costs are to be incurred). Each of these costs needs to be estimated in monetary terms such that indicative costs for roll-back overall can be estimated.

A wide range of different implementation costs has been identified, some of which apply per property and some of which are not linked to the number or type of properties affected. Others are only relevant to certain land use types (e.g. commercial properties or caravan parks). Table 3.2 provides a summary of the implementation costs identified for the example land use of commercial property.

3.3.4 Identifying the Costs Associated with Implementing the Intervention Measures

The costs of implementing the intervention measures can be divided into three broad categories:

- those costs that are likely to apply to all properties affected by erosion;
- those costs that are relevant to specific land uses (sub-divided into: commercial properties, caravan parks, utilities, agriculture and environmental sites); and
- those costs that are not linked to the properties but to other intervention measures that need to be put in place to ensure that roll-back can occur.

The indicative cost of the intervention measures has been calculated, assuming all the constraints need to be overcome before roll-back can happen. Some costs apply to all land uses. These costs include those required when:

- identifying appropriate land (£5,320 per property);
- negotiating to purchase land (£9,860 per property);
- purchasing land (variable dependent on asset but estimated at around £375,000 for residential/commercial property development to £12,300 for purchasing agricultural land);

- rebuilding (variable dependent on asset but estimated at around £850/m^2 for property, £15,000 per static caravan pitch and £120 per metre run for replacing main roads);
- setting up and publicising a funding scheme for roll-back (assumed to form a new role for 1 full-time equivalent (FTE) employee at a cost of £50,000 per year, where this includes salary, superannuation and on-costs);
- applying for funding for roll-back (£1,600 per application);
- assessing applications (part of additional 1 FTE's job); and
- distributing funds (part of additional 1 FTE's job).

Other intervention measures and their associated fees will only be relevant to specific operations. For example, commercial property owners will have to prepare and distribute publicity about their move in order that their existing (and future) customers can find them.

Not all of the costs would be incurred immediately or even in the short-term; instead they will be dependent on the pattern and timing of coastal erosion. Table 3.3 provides a summary of the indicative cost estimates of roll-back for the three different Epochs. In all three Epochs, the majority of the costs result from land purchase and rebuilding. Within Epoch 1 this stands at nearly £11 million but by Epoch 3 it has risen to around £87 million. Epoch 3 incurs the biggest indicative cost in terms of the money required to finance the mechanisms to enable roll-back and administration and legal costs. However since this period is also the furthest away, it brings the greatest opportunity in terms of financial planning.

Table 3.3: Indicative Costs of Roll-back (all costs given to two significant figures)

Epoch	No. properties and assets affected	Land purchase and rebuild costs	Admin and legal costs	One-off costs	Total Cost
1 (to 2025)	59 properties 327 pitches 0m main road 0 golf course holes	Undiscounted £11 million	Undiscounted £1.7 million	Undiscounted £2.2 million	Undiscounted £15 million
		Discounted £7.7 million	Discounted £1.2 million	Discounted £1.6 million	Discounted £10 million
2 (to 2055)	292 properties 656 pitches 860m main road 3 golf course holes	Undiscounted £42 million	Undiscounted £8.5 million	Undiscounted £5.7 million	Undiscounted £56 million
		Discounted £13 million	Discounted £2.6 million	Discounted £1.8 million	Discounted £17 million
3 (to 2105)	679 properties 491 pitches 2,830m main road 4 golf course holes	Undiscounted £87 million	Undiscounted £20 million	Undiscounted £11 million	Undiscounted £120 million
		Discounted £8.2 million	Discounted £1.8 million	Discounted £1.1 million	Discounted £11 million
Total	1,030 properties 1,471 pitches 3,690m main road 7 golf course holes	Undiscounted **£140 million**	Undiscounted **£30 million**	Undiscounted **£19 million**	Undiscounted **£190 million**
		Discounted **£29 million**	Discounted **£5.7 million**	Discounted **£4.4 million**	Discounted **£39 million**

Table 3.3 shows that the total indicative costs for roll-back across all three Epochs are **£190 million** (undiscounted; to two significant figures) and **£39 million** (discounted). Of this, costs for residential properties make up 56% of the total costs, with costs for caravan parks at 12%. The third most significant cost is the non-property specific cost at 10% (which is mainly comprised of the funder's fee associated with obtaining

and retaining the appropriate level of funding to allow roll-back to be undertaken; if this role were undertaken by a public body, the costs could be reduced). Following this, hotels/guest houses make up 8%, with other commercial properties at 4%. Some of these costs could be recouped through car park charges at the new site. Some of the adaptation options considered in Section 3.4, below, also offer opportunity for recouping some of these costs such that the overall funding requirement could be less than the £190 million estimate.

3.4 Assistance to Help Individuals and Businesses Adapt to the Threat of Erosion

3.4.1 Identifying Options for Providing Assistance

Adaptation requires tools for managing the coast such that any adverse impacts can be minimised. The tools for providing assistance with adaptation can be grouped into three main types (henceforth referred to as options):

- options involving removing the property;
- options involving continued use of the property or land; and
- options involving moving the property.

Table 3.4 summarises the options considered in this study.

Table 3.4: Overview of Options Considered

Option(s)	Description
Options Involving Removing the Property	
Outright purchase and demolish	Property is bought at market value (or some aspect of market value depending on time when the property was purchased, rebuild costs, change in market value over time (e.g. as garden was eroded), whether it was reasonable to assume that the short-term life of the property could have been known at the time of purchase, etc.)
Underwriting values	Liability is accepted for the property in the future. The owner receives a written guarantee that the property will be bought for a set amount when erosion is imminent
Buy and lease	Property is purchased from the owner and rented out for continued occupation until the property is in imminent danger of erosion
Options Involving Continued Use of the Property or Land	
Use of property for time-restricted use	Appropriate (pre-defined) land uses would be permitted to take over the property and continue to use it until erosion of the property became imminent
Streamlined planning permission	An opportunity is given to take advantage of planning permission where fewer steps are required to obtain permission to build a new property. This includes a presumption of planning permission being granted provided some pre-defined requirements are met
Land purchase by Local Authority	NNDC purchases land (or uses existing land it owns) to provide a free location for those displaced by erosion to develop new properties
Low interest loans to buy new property/land once property is eroded	The property is not bought, instead the opportunity is given for the property owner to take a low interest loan. This is offered to those whose house is to be eroded to help purchase another property or land on which to construct another property

Table 3.4: Overview of Options Considered	
Option(s)	**Description**
Government payback scheme	An estimate is made of the savings by Government in terms of coastal defence costs for urban areas downcoast that are protected by the material coming from the areas that are eroded. This estimate is used as the basis for paying property owners for the loss of their land
Coastal Adaptation Fund	A fund is established to make payments to those who are suffering due to changes in coastal policy. Payments would help cover a range of needs including new mortgages and cost of removal of buildings at risk and could be extended to provide further financial assistance where funds are available
Subsidised maintenance	NNDC pays for/contributes to the cost of maintaining at risk properties to ensure they remain in keeping with the surrounding village/living standards
Options Involving Moving the Property	
Physically move property	Where the property is jacked up and moved, or disassembled and reassembled elsewhere
Re-locatable properties in at risk areas	Development would be allowed in the 'at risk' areas provided this only involved properties that can be easily relocated to a new site as the risk increases

3.4.2 Costs of Funding the Options

Table 3.5, overleaf, sets out the funding costs associated with each option. The table also provides an overview of the assumptions used when estimating the costs. It is important to note that the cost estimates are indicative only, in many cases being based on a significant number of assumptions. Detailed calculations can be found in the Task 4 report, which forms Annex 6 of this report.

3.4.3 Potential Opportunities to Recoup some of the Funding Outlay

A number of the adaptation options offer the potential to sell or rent the property or land once it is purchased from the property owner. When assessing the funding implications of each option, it is important that these offsetting opportunities are considered since they will affect the overall funding requirement. There may also be opportunities to involve the private sector in some of the options, such that funding from the public sector is significantly reduced.

Table 3.6 sets out the estimated income when the property or land is sold or rented. The table includes some of the key assumptions used when estimating the potential income that could be generated by the options. The table shows that the largest income possible comes from renting properties over their residual life or renting the land on which those properties stood before they were demolished. Both provide significant potential incomes of £230 million (undiscounted) and around £100 million (discounted).

3.4.4 Potential for Options to Return a Profit

Table 3.7 compares the results of Table 3.5 (costs) and Table 3.6 (income) and shows that that there is potential to return a (gross) profit for some of the options, in

Table 3.5: Summary of Funding Estimates by Option				
Option(s)	**Funding Estimates**	**Summary of Key Assumptions**	**Undiscounted Costs[1]**	**Discounted Costs[1]**
Outright purchase and demolish Underwriting values Buy and lease Use of property for time-restricted use (relates to residential properties only unless stated otherwise)	1: full market value	Average not-at-risk value of £215,000; 51 properties lost in year 9 (Epoch 1), 283 in year 34 (Epoch 2) and 655 in year 69 (Epoch 3)	£210 million	£43 million
	1a: full market value: residential and commercial	Based on average market value of £900/m^2, average floor area of 750m^2 (giving average market value of £675,000); 5 properties lost in year 9, 7 properties lost in year 34 and 26 properties lost in year 69	£240 million	£49 million
	2: value based on residual life	Value based on sliding scale reflecting potential income from renting where property with 10 years residual life is valued at£73,100; residual life of 35 years: £156,950; residual life of 60 years: £202,100; and residual life of 70 years: £215,000	£190 million	£33 million
	3: residual life when purchased	Assumes a percentage of properties would be paid a higher value than residual life 'now' since it was not known that the property was at risk when it was bought. Residual life increased to 35 years (from 10 years) for 20% of properties in Epoch 1 and to 70 years (from 10 years) for 50% of properties in Epoch 1. Residual life increased to 60 years (from 35 years) for 50% properties in Epoch 2. All properties in Epoch 4 have residual lives of 70 years	£200 million	£26 million
	4: difference between residual life and market value	Provides funding to cover difference between value based on residual life and full market value (benefit for Epoch 1 mainly)	£24 million	£11 million
	5: rebuild costs	Property is purchased at the rebuild cost either now or at some point into the future	£94 million	£19 million
Land purchase by Local Authority Re-locatable properties in at risk areas	6: land purchased at £12,300 per hectare (compulsory purchase)	Based on value of agricultural land (assuming exceptions policy means that land without planning consent would be used to replace eroded properties). Land provided in lieu of a cash payment to property owners. Replacement at 333m^2 for residential properties and 750m^2 for commercial properties	£0.41 million	£0.08 million
	7: land purchased at £930,000 per hectare	Based on average value of commercial and residential land (assuming land desirable for replacement properties may attract a higher value)	£31 million	£6.6 million
	8: land purchased at £1.9 million per hectare	Worst case cost estimate based on value of residential development land	£65 million	£13 million
	9: land purchased from residential property owners only (£1.9 million per ha)	Assumes that land is not provided for roll-back of commercial properties	£63 million	£13 million

Table 3.5: Summary of Funding Estimates by Option				
Option(s)	**Funding Estimates**	**Summary of Key Assumptions**	**Undiscounted Costs[1]**	**Discounted Costs[1]**
Low interest loans to buy new property/land once property is eroded	10: to cover full cost of rebuild	Based on rebuild costs estimated for roll-back (see Table 3.2)	£140 million	£29 million
Government payback scheme (calculated assuming 50% savings on defence costs for Cromer/Bacton Gas terminal)	11: at £42,000 per asset	Based on 50% of the *undiscounted* costs of providing defences to Cromer and Bacton Gas Terminal being saved as a result of the provision of sediment from the undefended lengths of coast. The combined funding costs for this option and defence costs for Cromer/Bacton Gas terminal are less than the costs of providing defences to the whole coastline so is cost-beneficial to UK plc	£42 million	£8.9 million
	12: at £17,000 per asset	Based on 50% of the *discounted* costs of providing defences to Cromer and Bacton Gas Terminal being saved as a result of the provision of sediment from the undefended lengths of coast. As above this option is cost-beneficial to UK plc	£17 million	£3.6 million
Coastal Adaptation Fund	13: £2,500 for each applicant	Based on a payment to cover the costs of demolishing the property (and making good), mortgage arrangement fees, moving costs, etc.	£2.5 million	£0.53 million
	14: £5,000 for each applicant		£4.9 million	£1.1 million
	15: £10,000 for each applicant		£9.9 million	£2.1 million
Subsidised maintenance	16: £2,150 per year (1% of property value)	Based on £2,150 maintenance costs per property per year until the property is eroded. This assumes subsidised maintenance for 10 years (properties affected in Epoch 1), 34 years (Epoch 2) and 69 years (Epoch 3). If 20 years subsidised maintenance only is provided (as time after which property is unlikely to have significant capital value, the funding costs reduce to £43 million (undiscounted) and £18 million (discounted)	£130 million	£55 million
	17: 50% grant	Assumes maintenance would be subsidised at a rate of 50%	£63 million	£27 million
Streamlined planning permission	18: to cover costs of developing guidelines	Cost of developing guidelines that set out the pre-requisites that, if complied with, would give a presumption of planning consent, based on 200 hours input from a council officer at £100 per hour	£0.02 million	£0.02 million
Physically move property	19: to fund property moves for unique assets only	Funding to assist with the costs of physically moving the property, 7 properties to be moved (2 in Epoch 2 and 5 in Epoch 3)	£3.5 million	£0.6 million

Notes: Full details of all the calculations and assumptions are provided in the Task 4 report (Annex 6 to this report)
[1] The undiscounted costs assume the options is implemented in year 0 (i.e. 2008); the discounted costs assume the costs are incurred when the property is eroded. If all properties are purchased in year 0 (e.g. to allow the property or land on which they sit to be rented) then the discounted costs will be the same as the undiscounted costs

Table 3.6: Summary of Potential to Recoup Funds				
Option(s)	**Approach to Recouping Funds**	**Summary of Key Assumptions**	**Undiscounted Income**	**Discounted Income**
Underwriting values Buy and lease Use of property for time-restricted use	1: Rent out properties at typical rent of £10,000 per year until property is eroded	Assumes typical rent of £10,000 per year over 51 properties to year 10, 283 properties to year 34 and 655 properties to year 69. Income estimates exclude 25% tax, 25% maintenance costs and 10% borrowing costs	£230 million	£97 million
	2: Sell property at residual (market) value	Assumed to be equal to cost of funding when value paid is based on residual life of the property	£190 million	£33 million
Outright purchase and demolish Underwriting values Re-locatable properties in at risk areas	3: Sell land at £8,300 per property	Assumed that land on which the at risk property stood before it was demolished can be sold for alternative uses (caravan park, recreational use, re-locatable properties). Based on average property footprint of 333m^2 with land valued at £250,000 per ha (similar to commercial development land values)	£8.2 million	£1.7 million
	4: Sell land at £63,200 per property	Based on average property footprint of 333m^2 with land valued at £1.9 million per ha (similar to residential development land values, likely to be an over-estimate of potential income)	£63 million	£13 million
	5: Rent land at £1,000 per caravan pitch	Based on land being rented at £1,000 per caravan pitch, where a caravan pitch covers 80 m^2 and land value of £125,000 per ha (1,250 pitches per ha). Assumes that all the land is rented providing 4,100 caravan pitches	£230 million	£100 million
Low interest loans to buy new property/land once property is eroded	6: Low interest rate charged	-	Cannot be estimated	
Government payback scheme	7: Compared with costs of providing defences without erosion elsewhere (£42,000 per asset)	Assumed that the payment to property owners is based on saving achieved such that the option is effectively self-funding	£42 million	£8.9 million
	8: at £17,000 per asset	Assumed that the payment to property owners is based on saving achieved such that the option is effectively self-funding	£17 million	£3.6 million
Coastal Adaptation Fund Subsidised maintenance Streamlined planning permission Physically move property	No significant potential to recoup funds	-	-	
Notes: Full details of all the calculations and assumptions are provided in the Task 4 report (Annex 6 to this report)				

particular when renting properties or land. Even when the cost of tax, maintenance costs and borrowing costs are taken into account the figures show a small profit. This suggests that there may be overall benefit from some of the adaptation options. The potential to return a profit may also make the options of interest to private investors, possibly reducing the need for funding from public bodies. However, this will need to be investigated further with more detailed costing and income streams calculated before any strong conclusions can be drawn.

The discounted figures generally show a much larger profit than the undiscounted figures, suggesting that the overall balance between funding costs and income from rent is driven by properties with a long residual life (and consequently a significant time over which rental incomes are received), i.e. those properties that are not affected until Epoch 3.

The potential income from those properties affected in Epoch 1 is much smaller since they (or the land they are standing on) are assumed in this study to have an average residual life of 10 years. Table 3.8 provides a comparison of the funding costs and potential income from renting properties for the three Epochs (both undiscounted and discounted costs). The table shows that it is much more difficult to return any profit from the properties affected in Epoch 1. However, there are significantly fewer properties affected in Epoch 1 (51) than in Epochs 2 and 3 (283 and 655, respectively).

Table 3.8 shows that there may be potential for buy and lease to return more than the initial funding outlay even over the first Epoch, but only where the value paid for the property is based on residual life or the rebuild cost. However, taking into account expenses such as tax, maintenance of the property and the cost of borrowing means that the overall return is expected to be a loss. The undiscounted figures for Epochs 2 and 3 show much greater returns. The discounted figures, which involve discounting the future income from rent, return losses when tax, maintenance costs and cost of borrowing is included for all Epochs. The discounted figures do not take account of increases in rent over time, such that they are a worst case estimate of income.

Since a profit can be made in Epoch 3, but not Epoch 2 (unless rebuild costs is used as the basis for the funding option), there must be an optimal time when the costs of purchasing property at the residual value are outweighed by the income. This optimal time (using the assumptions set out here) is at 33 years. If all properties are bought at a residual (market) value of £172,000 (total cost of £85 million for the properties at risk in Epoch 3), the income from rent (excluding tax, maintenance and cost of borrowing) would be £86 million. Based on rebuild costs, the optimal time in terms of residual life of the property is much shorter due to the lower costs associated with buying a property at its rebuild cost (£95,000 rebuild costs compared with residual value of £172,000). As a result, the residual life of a property to break even is estimated at 24 years (total cost of £62 million with rental income (excluding tax, maintenance and cost of borrowing) of £63 million). It is important to note that additional costs may be incurred if the land is to be provided by the local authority (£0.41 million undiscounted or £0.08 million discounted). These additional costs would be higher if the property owner had to find land themselves since they may have to pay residential development land values.

Table 3.7: Summary of Potential to Return a Profit by Option/Funding Mechanism (all profit/loss estimates calculated using spreadsheet, hence, rounding errors may occur)								
Option(s)	**Funding Estimates**	**Funding Costs**		**Approach to Recouping Funds**	**Potential Income**		**Profit/Loss**	
		Undiscounted	**Discounted**		**Undiscounted**	**Discounted**	**Undiscounted**	**Discounted**
Underwriting values Buy and lease Use of property for time-restricted use	1: full market value (residential properties only)	£210 million	£210 million	1: Rent out properties at £10,000 per year until property is eroded	£230 million	£97 million	**PROFIT £12 million**	LOSS £100 million
				2: Sell property at residual (market) value	£190 million	£33 million	LOSS £24 million	LOSS £24 million
Outright purchase and demolish Underwriting values Re-locatable properties in at risk areas	1: full market value (residential properties only)	£210 million	£210 million	3: Sell land at £8,300 per property	£8.2 million	£1.7 million	LOSS £200 million	LOSS £210 million
				4: Sell land at £63,200 per property	£63 million	£13 million	LOSS £150 million	LOSS £200 million
				5: Rent land at £1,000 per caravan pitch	£230 million	£100 million	**PROFIT £22 million**	LOSS £110 million
Underwriting values Buy and lease Use of property for time-restricted use	1a: full market value (residential and commercial properties)	£240 million	£240 million	1: Rent out properties at £10,000 per year until property is eroded	£230 million	£97 million	LOSS £13 million	LOSS £140 million
				2: Sell property at residual (market) value	£190 million	£33 million	LOSS £49 million	LOSS £49 million
Outright purchase and demolish Underwriting values Re-locatable properties in at risk areas	1a: full market value (residential and commercial properties)	£240 million	£240 million	3: Sell land at £8,300 per property	£8.2 million	£1.7 million	LOSS £230 million	LOSS £240 million
				4: Sell land at £63,200 per property	£63 million	£13 million	LOSS £180 million	LOSS £230 million
				5: Rent land at £1,000 per caravan pitch	£230 million	£100 million	LOSS £4 million	LOSS £140 million
Underwriting values Buy and lease Use of property for time-restricted use	2: value based on residual life (residential properties only)	£190 million	£190 million	1: Rent out properties at £10,000 per year until property is eroded	£230 million	£97 million	**PROFIT £36 million**	LOSS £92 million
				2: Sell property at residual (market) value	£190 million	£33 million	£0	LOSS £160 million
Outright purchase and demolish Underwriting values Re-locatable properties in at risk areas	2: value based on residual life (residential properties only)	£190 million	£190 million	3: Sell land at £8,300 per property	£8.2 million	£1.7 million	LOSS £180 million	LOSS £190 million
				4: Sell land at £63,200 per property	£63 million	£13 million	LOSS £130 million	LOSS £180 million
				5: Rent land at £1,000 per caravan pitch	£230 million	£100 million	**PROFIT £45 million**	LOSS £88 million

Table 3.7: Summary of Potential to Return a Profit by Option/Funding Mechanism (all profit/loss estimates calculated using spreadsheet, hence, rounding errors may occur)								
Option(s)	**Funding Estimates**	**Funding Costs**		**Approach to Recouping Funds**	**Potential Income**		**Profit/Loss**	
		Undiscounted	**Discounted**		**Undiscounted**	**Discounted**	**Undiscounted**	**Discounted**
Underwriting values Buy and lease Use of property for time-restricted use	3: residual life when purchased (residential properties only)	£200 million	£200 million	1: Rent out properties at £10,000 per year until property is eroded	£230 million	£97 million	**PROFIT £22 million**	LOSS £110 million
				2: Sell property at residual (market) value	£190 million	£33 million	LOSS £14 million	LOSS £14 million
Outright purchase and demolish Underwriting values Re-locatable properties in at risk areas	3: residual life when purchased (residential properties only)	£200 million	£200 million	3: Sell land at £8,300 per property	£8.2 million	£1.7 million	LOSS £190 million	LOSS £200 million
				4: Sell land at £63,200 per property	£63 million	£13 million	LOSS £140 million	LOSS £190 million
				5: Rent land at £1,000 per caravan pitch	£230 million	£100 million	**PROFIT £31 million**	LOSS £100 million
Outright purchase and demolish Underwriting values Buy and lease Use of property for time-restricted use Re-locatable properties in at risk areas	4: difference between residual life and market value (residential properties only)	£24 million	£24 million	Would require another funding mechanism/private investor to pay market value and assumes private investor would receive income (only likely to be viable for			-	-
Underwriting values Buy and lease Use of property for time-restricted use	5: residual life when purchased	£94 million	£94 million	1: Rent out properties at £10,000 per year until property is eroded	£230 million	£97 million	**PROFIT £140 million**	**PROFIT £3 million**
				2: Sell property at residual (market) value	£190 million	£33 million	**PROFIT £100 million**	LOSS £61 million
Buy and lease Use of property for time-restricted use Relocatable properties in at risk areas	5: residual life when purchased	£94 million	£94 million	3: Sell land at £8,300 per property	£8.2 million	£1.7 million	LOSS £86 million	LOSS £92 million
				4: Sell land at £63,200 per property	£63 million	£13 million	LOSS £31 million	LOSS £81 million
				5: Rent land at £1,000 per caravan pitch	£230 million	£100 million	**PROFIT £140 million**	**PROFIT £6 million**

Table 3.7: Summary of Potential to Return a Profit by Option/Funding Mechanism (all profit/loss estimates calculated using spreadsheet, hence, rounding errors may occur)								
Option(s)	**Funding Estimates**	**Funding Costs**		**Approach to Recouping Funds**	**Potential Income**		**Profit/Loss**	
		Undiscounted	**Discounted**		**Undiscounted**	**Discounted**	**Undiscounted**	**Discounted**
Land purchase by Local Authority Re-locatable properties in at risk areas	6: land purchased at £12,300 per hectare (compulsory purchase)	£0.4 million	£0.08 million	Unlikely to be appropriate for LA to profit from option, therefore, compulsory purchase to make land available for replacement properties may need to be combined with another option			-	-
	7: land purchased at £930,000 per hectare	£31 million	£31 million	3: Sell land at £8,300 per property	£8.2 million	£1.7 million	LOSS £24 million	LOSS £30 million
	8: land purchased at £1.9 million per hectare (residential development land value)	£65 million	£65 million	3: Sell land at £8,300 per property	£8.2 million	£1.7 million	LOSS £57 million	LOSS £64 million
	9: land purchased at £1.9 million per hectare (to replace residential properties only)	£63 million	£63 million	3: Sell land at £8,300 per property	£8.2 million	£1.7 million	LOSS £54 million	LOSS £61 million
Land purchase by Local Authority Re-locatable properties in at risk areas	7: land purchased at £930,000 per hectare	£31 million	£31 million	4: Sell land at £63,200 per property	£63 million	£13 million	LOSS £31 million	LOSS £19 million
	8: land purchased at £1.9 million per hectare (residential development land value)	£65 million	£65 million	4: Sell land at £63,200 per property	£63 million	£13 million	LOSS £2.9 million	LOSS £53 million
	9: land purchased at £1.9 million per hectare (to replace residential properties only)	£63 million	£63 million	4: Sell land at £63,200 per property	£63 million	£13 million	£0	£0
Land purchase by Local Authority Re-locatable properties in at risk areas	7: land purchased at £930,000 per hectare	£31 million	£31 million	5: Rent land at £1,000 per caravan pitch	£230 million	£100 million	**PROFIT £200 million**	**PROFIT £69 million**
	8: land purchased at £1.9 million per hectare (residential development land value)	£65 million	£65 million	5: Rent land at £1,000 per caravan pitch	£230 million	£100 million	**PROFIT £170 million**	**PROFIT £36 million**
	9: land purchased at £1.9 million per hectare (to replace residential properties only)	£63 million	£63 million	5: Rent land at £1,000 per caravan pitch	£230 million	£100 million	**PROFIT £170 million**	**PROFIT £36 million**
Low interest loans to buy new property/land once property is eroded	9: to cover full cost of rebuild	£140 million	£37 million	4: Low interest rate charged	Cannot be estimated		-	-

Table 3.7: Summary of Potential to Return a Profit by Option/Funding Mechanism (all profit/loss estimates calculated using spreadsheet, hence, rounding errors may occur)								
Option(s)	**Funding Estimates**	**Funding Costs**		**Approach to Recouping Funds**	**Potential Income**		**Profit/Loss**	
		Undiscounted	**Discounted**		**Undiscounted**	**Discounted**	**Undiscounted**	**Discounted**
Government payback scheme	10: at £42,000 per asset	£42 million	£8.9 million	5: Compared with costs of providing defences without erosion elsewhere (£42,000 per asset)	£42 million	£8.9 million	£0	£0
	11: at £17,000 per asset	£17 million	£3.6 million	6: at £17,000 per asset	£17 million	£3.6 million	£0	£0
Coastal Adaptation Fund	12: £2,500 for each applicant	£2.5 million	£0.5 million	No significant potential to recoup funds	-	-	No significant potential to recoup funds, therefore, full funding costs have to be found	
	13: £5,000 for each applicant	£4.9 million	£1.1 million					
	14: £10,000 for each applicant	£9.9 million	£2.1 million					
Subsidised maintenance	15: £2,150 per year (1% of property value)	£130 million	£55 million					
	16: 50% grant	£63 million	£27 million					
Streamlined planning permission	17: to cover costs of developing guidelines	£20,000	£20,000					
Physically move property	18: to fund property moves for unique assets only	£3.5 million	£0.6 million					

Table 3.8: Potential Income from Renting Properties				
UNDISCOUNTED FIGURES				
Purchase Type (residential properties only)	**Total costs**	**Total Potential Income (excluded tax, maintenance costs and cost of borrowing)**		
		Epoch 1	**Epoch 2**	**Epoch 3**
		£2 million	£40 million	£180 million
Full market value	1: £11 million 2: £61 million 3: £140 million	LOSS £9 million	LOSS £20 million	**PROFIT** **£43 million**
Sliding scale based on residual life	1: £3.7 million 2: £44 million 3: £140 million	LOSS £2 million	LOSS £5 million	**PROFIT** **£43 million**
Sliding scale based on residual life 'when bought'	1: £6.5 million 2: £56 million 3: £140 million	LOSS £4 million	LOSS £20 million	**PROFIT** **£43 million**
Rebuild costs	1: £4.8 million 2: £27 million 3: £62 million	LOSS £-3 million	**PROFIT** **£13 million**	**PROFIT** **£120 million**
DISCOUNTED FIGURES				
Purchase Type (residential properties only)	**Total costs**	**Total Potential Income (excluded tax, maintenance costs and cost of borrowing)**		
		Epoch 1	**Epoch 2**	**Epoch 3**
		£1.8 million	£23 million	£72 million
Full market value	1: £11 million 2: £61 million 3: £140 million	LOSS £6 million	LOSS -£40 million	LOSS -£70 million
Sliding scale based on residual life	1: £3.7 million 2: £44 million 3: £140 million	LOSS £1 million	LOSS -£20 million	LOSS -£70 million
Sliding scale based on residual life 'when bought'	1: £6.5 million 2: £56 million 3: £140 million	LOSS £3 million	LOSS -£30 million	LOSS -£70 million
Rebuild costs	1: £4.8 million 2: £27 million 3: £62 million	LOSS -£3 million	LOSS -£4 million	**PROFIT** **£10 million**

The option to pay the difference between the value based on residual life and the not-at-risk market value could operate where the property is sold to a third party (e.g. private landlord) either directly, with the difference funded publicly, or indirectly where the public body purchases the property at the full market value and then sells it on. This approach could help raise interest from private investors (since there is potential for a profit to be returned when the residual value of the property is the price paid), although the sale of the property would need to be based on the knowledge that it has a finite life. The private investor would then bear the risk that the estimated residual life may be much shorter (reducing the time for a profit to be made based on rental income).

3.5 Identification of Packages of Options

Many of the suggested options for those who own properties at risk need to be seen as part of a package of potential ways forward, rather than individual solutions. There is unlikely to be one solution which is satisfactory to all. This point was highlighted by discussions on roll-back at the workshops, where it was acknowledged that a flexible approach to the problem was required so different needs were recognised.

Packages of options are developed such that they can provide one overall option that (i) offers an opportunity for adaptation to coastal erosion and (ii) removes as many of the residual negative impacts associated with each single option as possible. In all cases, the packages are determined by whether the owner of the property at risk moves some time before the property is eroded or just before it is eroded, and whether any help is provided to the property owner once they have made the decision (or been forced by erosion) to move. Table 3.9 provides a matrix showing which options are included in each package. The result is eight main packages, with 19 packages in total (the options included in each package, together with the package references (A1 to H2) are shown in Table 3.9).

An assessment of the performance of the packages in terms of the baseline impacts avoided shows that those packages that retain some value in properties at risk, combined with keeping residents in the local community perform best. The final choice of package may depend on the funds available. Packages D1 and D2 (based on low interest loans) are the worst and is unlikely to be appropriate since it does not adequately address impacts on property owners or the local community.

Packages that address the financial constraints faced by property owners (at least to some extent) and which help to retain residents in local communities perform the best. This includes packages that could provide the potential to return a profit and, hence, which could involve the private sector, e.g. buy and lease, renting of land for time-limited uses (packages A, C and F). The option to purchase the property at rebuild costs could be combined with land to help reduce financial implications for those living in property at risk, but also for funders.

It is the amount of funding that will be available that is likely to determine which packages of options are preferred. If the funding is extremely limited (say in the order of a few million pounds), any options that involve purchase of properties at full market value (or even rebuild costs) will not be possible. Thus, the best packages of options are identified in terms of the likely level of funding that may be available, with this assumed to be limited (at least in terms of initial outlay). In this case, the preferred packages are likely to be:

Table 3.9: Developing Packages of Options

Option	Package																	
	A				B			C	D			E			F	G		H
	A1	A2	A3	A4	B1	B2	B3	C1	D1	D2	D3	E1	E2	E3	F1	G1	G2	H1	H2
Outright purchase and demolish	■	■	■	■															
Underwriting values					■	■	■												
Buy and lease		■					■	■			■								
Use of property for time-restricted use						■									■				
Land purchase by Local Authority	■	■	■							■		■			■	■	■		
Low interest loan									■	■	■			■					■
Government payback scheme																	■		
Streamlined planning permission				■	■			■	■				■			■		■	
Coastal Adaptation Fund																		■	■
Subsidised maintenance	■															■	■	■	■
Physically move property												■	■	■					
Re-locatable properties in at risk areas			■	■															

Notes: Shaded cells indicate which options are included in each package

- A2: outright purchase and demolish (at rebuild costs), land provided by local authority, buy and lease:
  - **implementation cost**: £94 million (all funding costs have to be incurred in year 0 if the full (discounted) income is to be realised, this discounted and undiscounted implementation costs are the same);
  - **potential income**: £230 million (discounted) and £100 million (discounted) (if property is leased); giving
  - *potential for package to be self-funding and/or attractive to private investors (at least for properties at risk in Epoch 3).*

- A3: outright purchase and demolish (at rebuild costs), land provided by local authority, relocatable properties:
  - **implementation cost**: £94 million (all funding costs have to be incurred in year 0 if the full (discounted) income is to be realised, this discounted and undiscounted implementation costs are the same);
  - **potential income**: £230 million (discounted) and £100 million (discounted) (if land is rented for re-locatable properties); giving
  - *potential for package to be self-funding and/or attractive to private investors (at least for properties at risk in Epoch 3).*

- A4: outright purchase and demolish, streamlined planning permission, re-locatable properties:
  - **implementation cost**: £190 million (using the price paid to property owners being based on the residual life) or £94 million if rebuild costs are used (all funding costs have to be incurred in year 0 if the full (discounted) income is to be realised, this discounted and undiscounted implementation costs are the same);
  - **potential income**: £230 million (discounted) and £100 million (discounted) (if land is rented for re-locatable properties); giving
  - *potential for package to be self-funding and/or attractive to private investors (at least for properties at risk in Epoch 3).*

- C1: buy and lease, streamlined planning permission:
  - **implementation cost**: £190 million (using the price paid to property owners being based on the residual life) (all funding costs have to be incurred in year 0 if the full (discounted) income is to be realised, this discounted and undiscounted implementation costs are the same); and
  - **potential income**: £230 million (discounted) and £100 million (discounted) (if property is leased); giving
  - *potential for package to be self-funding and/or attractive to private investors (at least for properties at risk in Epoch 3).*

- F1: use of property for time restricted sale, streamlined planning permission:
  - **implementation cost**: £190 million (using the price paid to property owners being based on the residual life) (all funding costs have to be incurred in year 0 if the full (discounted) income is to be realised, this discounted and undiscounted implementation costs are the same); and

- **potential income**: £190 million (if property is sold at residual value) or £230 million (discounted) and £100 million (discounted) (if land is rented for re-locatable properties); giving
- *potential for package to be self-funding and/or attractive to private investors (at least for properties at risk in Epoch 3).*

- G1: Government payback scheme, subsidised maintenance, streamlined planning permission:
  - **implementation cost**: £150 million to £170 million (undiscounted) and £59 million to £64 million (discounted) depending on saving estimate per asset, assumes subsidised maintenance is available until property is eroded[21];
  - **potential income**: £0 assumes property is used by the owner until it is eroded; giving
  - *potential for Government payback element to be self-funding (£17 million to £42 million (undiscounted) and £3.6 million to £8.9 million (discounted)) as the payment given to property owners is based on costs avoided from not having to provide defences.*

- G2: Government payback scheme, subsidised maintenance, land purchase by LA:
  - **implementation cost**: £150 million to £240 million (undiscounted) and £59 million to £77 million (discounted) depending on saving estimate per asset, assumes subsidised maintenance is available until property is eroded[22], total varies according to value paid for land[23];
  - **potential income**: £0 assumes property is used by the owner until it is eroded; giving
  - *potential for Government payback element to be self-funding (£17 million to £42 million (undiscounted) and £3.6 million to £8.9 million (discounted)) as the payment given to property owners is based on costs avoided from not having to provide defences. Land purchase by LA assumes land is given in lieu of additional cash.*

- H1: Coastal Adaptation Fund, subsidised maintenance, streamlined planning permission:
  - **implementation cost**: £130 million to £140 million (undiscounted) and £56 million to £57 million (discounted) depending on payments from Coastal Adaptation Fund and assumes subsidised maintenance is available until property is eroded[22]; and
  - **potential income**: no potential income; giving
  - ***no potential for this package of options to be self-funding.***

[21] The costs would reduce by £90 million (undiscounted) and £40 million (discounted) if subsidised maintenance is only available for the last 20 years of a property's residual life.

[22] The costs would reduce by £90 million (undiscounted) and £40 million (discounted) if subsidised maintenance is only available for the last 20 years of a property's residual life.

[23] Varies from £0.4 million (undiscounted) and £0.08 million (discounted) for compulsory purchase at agricultural land values (£12,300 per ha) (in line with exceptions policy) to £65 million (undiscounted) and £13 million (discounted) for land purchased as residential development value (£1.9 million per ha).

- H2: Coastal Adaptation Fund, subsidised maintenance, land purchase by LA:
  - **implementation cost**: £130 million to £140 million (undiscounted) and £56 million to £57 million (discounted) depending on payments from Coastal Adaptation Fund and assumes subsidised maintenance is available until property is eroded[22], total varies according to value paid for land[23]; and
  - **potential income**: no potential income; giving
  - ***no potential for this package of options to be self-funding.***

These packages have been selected since they offer the greatest opportunities for involving the private sector, which will reduce funding implications and/or offer the greatest potential benefits to both individuals and the local communities. Subsidised maintenance is identified as an integral part of these packages, although it is estimated to be a high cost option. The costs can be reduced if subsidised maintenance is provided for a limited period towards the end of the property's residual life. The cost estimates are also based on an assumption of maintenance costs of 1% of market value per year, which is likely to be an over-estimate of actual spend. An alternative to paying all of the estimated costs would be to provide grants, which would again reduce the on-going funding requirement.

All of the short-listed packages except those based on funding property owners to rebuild their property are likely to involve significant loss of capital investment for property owners. This may disproportionately affect those who are most vulnerable or living in properties with residual lives of less than 10 years. In these cases, it is likely to be packages G1, G2, H1 and H2 that offer the greatest benefits as property owners receive some payment but can carry on living in their property until it is at imminent risk of erosion, after which they are helped with obtaining planning consent for a replacement property or provided land by the LA. With residual lives of 10 years, the costs of subsidised maintenance for properties at risk in Epoch 1 would be significantly reduced (estimated at £11 million (undiscounted) and £1.1 million (discounted)), with total funding costs of:

- G1: Government payback scheme, subsidised maintenance, streamlined planning permission:
  - undiscounted: £2.2 million to £3.6 million; and
  - discounted: £1.8 million to £2.8 million.

- G2: Government payback scheme, subsidised maintenance, land purchase by LA;
  - undiscounted: £2.2 million to £7.2 million; and
  - discounted: £1.8 million to £5.5 million.

- H1: Coastal Adaptation Fund, subsidised maintenance, streamlined planning permission:
  - undiscounted: £1.4 million to £1.8 million; and
  - discounted: £1.2 million to £1.5 million.

- H2: Coastal Adaptation Fund, subsidised maintenance, land purchase by LA:
  - undiscounted: £1.4 million to £5.4 million; and
  - discounted: £1.2 million to £4.1 million.

Package A1 may also be attractive for properties with very short residual lives as the funding costs are greatly reduced, although there is limited potential for recouping funding costs on such properties. However, the costs of purchasing properties at the rebuild costs reduce the overall funding costs from an (undiscounted) total across all three Epochs of £94 million to £4.8 million for Epoch 1 only (undiscounted). The discounted costs reduce from a total across all three Epochs of £19 million to £3.5 million for Epoch 1 only.

4. SUMMARY AND EXTRAPOLATION OF FINDINGS

4.1 Summary of Results

While funding for adaptation may be limited, it is important to consider the real costs of the no active intervention option. The baseline assessment undertaken in Section 2 highlights that there are significant costs to property owners, to local communities, to visitors to the area and to local government that appear to outweigh the costs avoided that arise from not providing defences to the whole coastline. This does not mean that there is a justifiable case for protecting all of the communities where no active intervention is currently proposed. However, it does identify that that the appraisal process in the Shoreline Management Plan is unable to include all of the impacts such that the most economically efficient option to UK plc as a whole (not just central Government) may not always be that identified as preferred.

The overall costs of the baseline are estimated at £460 to £490 million (undiscounted)[24] or £95 million to £100 million (discounted)[25]. The baseline also offers costs avoided of around £98 million (undiscounted) or £41 million (undiscounted), based on coastal erosion protection costs that are not incurred under no active intervention. This can be compared against the estimated funding costs for the various options, where the most expensive is £230 million to purchase properties at risk at their not at risk market value or the £94 million estimated as being required to cover the rebuild costs of property at risk. Even if the administration, funding and implementation costs were equal to the property purchase costs, the adaptation options may still only cost the same as the no active intervention baseline.

The costs of adaptation have been estimated and give an indication of the magnitude of the likely funding requirements based on a range of different options and packages. The actual costs will depend on the payments given to those living in or using properties at risk of erosion, but in most cases, exceed the £30 million adaptation fund proposed by Defra. However, careful planning and early introduction could provide the basis for some options to become self-funding over time. While this may not occur in the short-term (i.e. Epoch 1, to 2025) because of the short residual lives of properties and land, there may be significant cost reductions in the medium to long-term (Epochs 2 and 3) (because private firms could be interested in offering the (profitable) services.

[24] Based on £210 million in lost market value of existing residential properties, £26 million for rebuild of commercial properties, £130 million to £160 million for rebuild of properties, £11 million for stress values, £29 million for increased poverty and deprivation, £48 million knock-on property price decreases, £93,000 for housing register administration costs and £890,000 temporary accommodation costs (undiscounted).

[25] The discounted values are: £43 million (lost market value); £5.9 million (rebuild commercial properties); £28 million to £33 million (NNDC rebuild costs); £4.9 million (stress); £3.2 million (poverty and deprivation); £9.8 million knock-on property price decreases; £19,000 (housing register administration) and £180,000 (temporary accommodation).

4.2 Conclusions

This study has identified that there are numerous options available to help those at risk of coastal erosion adapt to those risks in order that the adverse effects are reduced. There is potential for some of these options to provide a profitable return provided they are implemented at an early date. For example, buy and lease can provide a 6% return on an investment that would enable a replacement property to be purchased when the at risk property is eroded. However, the time needed to generate this return is significant, estimated at a minimum of 33 years if the property is purchased at a market value that reflects its residual life. The time needed to generate a return decreases to 24 years if the rebuild cost is used as the property value. Therefore, approaches that facilitate roll-back and adaptation need to begin now. There are significant numbers of properties at risk whose residual lives are longer than the payback periods of 33 or 24 years (283 in Epoch 2 and 655 in Epoch 3) that could benefit from this option and could help reduce the impacts on individuals, local communities and rate and taxpayers more generally. Further delays in implementing adaptation options would mean that there are fewer opportunities for involving private investors. This would result in the costs being picked up by the public purse, either because adaptation options have to be funded publicly, or worse, because the impacts of no active intervention are realised.

4.3 Need for Further Research

There has been little research in the UK on the blighting effect of coastal erosion on communities. The change in flood and coastal erosion risk management policy from an approach based on defending the coastline to one of adaptation to natural processes is relatively recent and there is little data on the effect on people. A review of the literature on communities facing dramatic changes in their physical environment found difficulties in extrapolating from these experiences to the situation of coastal communities in North Norfolk.

A longitudinal survey of the impact of change on coastal communities would provide valuable information to inform the development of policy and programmes to address the problems associated with coastal erosion. It is recommended that this kind of survey should be established, considering the following topic areas:

- demographics: including distribution of the population by age, household income, nature of housing tenure, health etc;
- attitudes: covering perception of the local environment, perception of home, perceptions of the changes that are happening in the community; and
- efficacy and identity: what actions have they taken and with what outcome?

A systematic process to monitor residents' experience of coastal change, with particular reference to the two identity dimensions of self-esteem and self-efficacy, could provide valuable evidence on the impacts of this process and the responses of local people. This might provide a barometer of the resilience of the community as a whole, as well as enabling support services or local organisations to see which parts of

the community may be particularly affected, to understand these responses and to develop and implement effective support strategies.

Information on the timing of intervention will also impact upon the estimated funding costs and the potential to recoup some of the initial funding outlay (particularly the discounted estimates) and may be influenced by a number of factors, such as:

- the ability to forecast when impacts are likely to begin: with this affecting whether properties can be occupied for a longer (or shorter) time than predicted in the SMP and how soon action has to be taken to ensure that any impacts associated with coastal erosion can be minimised;
- the availability of funding for adaptation measures: with this affecting not just the adaptation options available, but also how soon options can be implemented, particularly where this involves a payment to a property owner;
- the preferences of individuals, households and businesses in terms of how risk averse they are: where this affects whether the people would want to move sooner or later (or at all) and how the threat of coastal erosion will affect them personally and professionally;
- the financial situation of the individual, household or business: where this affects what options are available to them (including where there is no public funding available for adaptation options);
- connections of the individual, household or business to the local community, identity with sense of place, etc.: again this may affect whether they wish to move out of the area altogether or continue to live/work nearby and the timing of the move; and
- the need to repair/replace assets such as beach accesses and car parks to reduce the impacts associated with erosion for the local economy.

Additional information on the timing issues will help identify whether the assumptions made in this study are over or under-optimistic and, therefore, would provide a stronger case for (or against) the adaptation options and packages.

To make a fuller assessment of the extent to which the short-listed packages could be implemented, more information is needed on:

- the potential uptake of buy and lease, or time-limited uses in the at-risk areas and, from this, the property prices that may be offered to property owners;
- the extent to which property owners need funding to help them move to new properties/sites and, from this, whether people want to stay in the local area or move away; and
- whether caravan park owners or developers of re-locatable properties would be interested in previously developed land (where the properties had been demolished) and whether these users would be supportive of combining their frontage with recreational land.

This information may need to be collected through a detailed consultation exercise with local stakeholders focusing on real options. This will require more detail on the potential for funding of options to be made available if the property owners' expectations are not to be raised to a point where they cannot be met. It may also be

necessary to consider specific locations to identify how the different options would work in practice through desk-based pilot trials. Only once such information has been collected and verified can the preferred packages of options be identified with confidence.

Further information is also needed on the 'real' costs of implementing the packages of options. The costs estimated in this report are based mainly on indicative and average (mean) data (e.g. property prices and rebuild costs). The 'real' costs of the options may differ significantly from these indicative cost estimates if the actual property prices, actual rebuild costs or residual lives are different from the assumptions made. These issues could be addressed by undertaking valuations of the properties at risk, with a simple and quick approach involving drive-by valuations (alternatively Internet sites such as www.zoopla.co.uk provide estimates of property values by road, postcode, etc.). Rebuild costs may be easier to estimate as they can be found on mortgage statements and insurance policies or can be estimated using internet-based calculators such as that provided by the ABI/BCIS. Such an approach should give valuations within ±15% of the total property values and/or rebuild costs for each Epoch by identifying the main properties with much higher/lower values than the mean.

Following identification of the preferred packages, it will be necessary to work up specific details of how the packages could be applied on the ground. This may require on-the-ground pilot trials in small areas initially to iron out key difficulties and address concerns of local residents. This approach will also provide invaluable information on the specific costs involved when considering issues such as the price to be paid for land and the rental value that properties may attract, as well as whether all aspects of the packages are attractive to people when they are made available. However, care would be needed when identifying pilot trail areas as this may provide one community (or local area) with opportunities that are denied to others.

4.4 Potential for Extrapolation of Findings to Other Areas

4.4.1 Coverage of Land Use Examples

Many different land uses have been considered for this report. However, due to the small spatial scale of the study when compared with the country as a whole, there are likely to be different uses in other areas which have not been covered, such as ports, harbours and jetties, railway lines, major (trunk) roads, theme parks/fairgrounds, and amusement arcades. It would be possible to deal with these uses following the same method of identifying constraints, suggesting intervention measures and looking at the costs involved. There would probably be some overlap of constraints and intervention measures for new land uses with those already considered. For example a coastal fairground, like a golf course, would be constrained by the lack of appropriate or available land.

However, there are likely to be some constraints and associated intervention measures which are very specific to each particular land use. This study included a special workshop for caravan sites, because they are a prominent land use in the area

investigated. Caravan site owners and operators may be at risk of losing their home and business, yet they need to retain a coastal location because that is partly what attracts their visitors. This situation may be relevant to other commercial coastal enterprises such as guesthouses, hotels and shops reliant on the tourist trade. Yet there are other points which are only relevant to caravan sites. From discussions it appears that some caravan park owners are trying to invest in the future and gradually roll-back, but they have to balance this with the present demands on their businesses. One stakeholder pointed out that if a park was to roll-back, it would need several years to become established and blend in with the local environment, thus minimising the visual impact and making the park attractive to visitors. This need for landscaping would be unlikely to be so important to other tourism-based businesses such as seafront hotels, or it may be possible to manage the change in different ways. It is a very specific requirement and shows the importance of considering different land uses in detail and not merely combining all land uses in broad groups such as commercial premises. Therefore when considering the coverage of different land use types and potential extrapolation to other areas, there may be some overlap of constraints and intervention measures, but each type of land use does need to be taken account of individually.

4.4.2 Implications for Comprehensiveness of Constraints

In terms of dealing with the practicalities of roll-back, the physical and socio-economic constraints are probably quite comprehensive for each land use considered. However, if the process is put into practice in other areas of the country, there are likely to be different politics and opinions involved, even with underlying similarities in regional planning legislation. Hence the political constraints may be significantly different. Attitudes towards roll-back and how acceptable it is as a way of dealing with coastal change have varied throughout the workshops undertaken as part of this study. When implementing roll-back and allocating land which is in limited supply, there would probably also be conflicting opinions on the importance of different land uses. It may therefore not be possible to generalise when considering political constraints, because by their very nature they will be subject to local variation, and hence require local identification. Universal application of many of the physical and socio-economic constraints to similar land uses may be feasible, because problems such as the need to maintain access to the seashore are likely to be valid in all cases of adaptation to coastal change. In contrast, political constraints will probably show local and/or regional variation, so will need to be identified in each area and not simply inferred from the land uses covered in this study.

4.4.3 Implications for Coverage of Intervention Measures

As shown by the tables given above, several constraints may be dealt with by one intervention measure. In consequence, any new constraints identified in other areas of the country may not necessarily require additional measures. The importance of different constraints will probably vary between land uses and individual cases as well so not all of the intervention measures given will be appropriate or necessary in each instance of roll-back. It may therefore be possible to use the measures already identified to deal with any new constraints which are discovered when extrapolating this roll-back framework to other areas.

4.4.4 Implications for Indicative Costs of Intervention Measures

When considering the extrapolation of the indicative costs of intervention measures to other areas, it is necessary to remember that there will be considerable variation between regions. For example, the price of land or rebuild costs will not be consistent throughout the country. It may therefore not be possible to generalise with respect to specific costs. In addition the extent to which the indicative costs are seen as reasonable in any location will be affected by the likely benefits to be achieved from roll-back. These will be different for each land use and will be affected by various factors, for example, the number of expected visitors to the new site if the enterprise relies on tourism. Whether the costs of intervention measures can be met will be affected by the amount of money individuals have and are prepared to invest in roll-back, and if there is likely to be any funding available from other sources for example local authority or government. These factors may also vary considerably when looking at different areas.