

Appendix H Economics

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H1 INTRODUCTION

The aim of Task 3.4b from the SMP guidance is to confirm the economic viability of the proposed policies by assessing the costs of flood and coastal risk management interventions in relation to their economic benefits compared to a baseline of No Active Intervention. This involves a high level assessment based on the approach prescribed by the Flood and Coastal Defence Project Appraisal Guidance.

The SMP guidance states that “*policy decisions are initially taken upon the appraisal of achievement of objectives, not on an economic appraisal. Economic assessments are only undertaken to provide a check on the viability of the selected preferred policies,*” (p.13, Section 2.5). This reflects the overall aim of SMPs to develop shoreline management plans for balanced sustainability. The SMP only needs to do a check on the economic viability of the policies to assess whether a policy is clearly viable, clearly challenging or of marginal viability. This information can also serve to identify cases where local or third party funding may be needed in addition to national funding for the implementation of the policy.

The proposed policies have been developed through an iterative process with involvement from CSG and EMF and with input from the Key Stakeholders.

H2 METHODOLOGY

H2.1 Data Sources

In line with the SMP Guidance, this assessment uses the best available information about costs and benefits; if no information is available, a ‘high level assessment’ is applied, based on default defence cost data.

There is detailed information for the economic viability of various hold the line options within the estuary strategies, which were completed to varying degrees. The economic appraisal for Hamford water and the Colne and Blackwater Strategies have recently been updated. The Roach and Crouch Strategy gives a comprehensive economic appraisal of options within these estuaries. However the strategy for the Stour and Orwell was only progressed to a preliminary stage with a rough estimate of the Benefit cost ratio for holding the line. The relevant sources of information from these strategies are:

- The Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow Group Limited 2007)
- Hamford Water Estuary Strategy: Economic Appraisal (RPA, 2009)
- Draft Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA, 2009)
- Roach and Crouch Flood Management Strategy (EA, 2006)

Other sources of economic information are:

- Southern Felixstowe Coastal Strategy (EA 2007)
- Dengie to Burnham-on-Crouch Pre-Feasibility Study (Atkins 2009)
- Clacton-on-Sea Coast Protection Scheme Strategy Plan Summary Report (Posford Haskoning 2003)
- Southend-on-Sea Shoreline Strategy Plan (Mouchel, 1997)

Some of this information is relatively old. Generally property prices have risen more quickly than the costs of constructing and maintaining defences, which adds to the conservatism of the resulting benefit cost ratios. For the Colne and Blackwater, the finalisation of the strategy economic appraisal will be taken into account in the implementation of the policies through the Action Plan and in the next review of the SMP.

There is no information available for part of the Tendring Peninsula and the Southend-on-Sea frontage. For these PDZs default defence costs, as detailed in Appendix C of the SMP Guidance (Defra 2006), have been compared against approximate values of residential properties as provided by the National Properties Dataset (NPD). Where residential property values were not present, these properties were omitted from the analysis (which adds to the conservatism of the result).

In many situations the NPD only gives an annual rental value rather than a capital value for commercial properties. The capital value is usually calculated from the rental value by applying the relevant yield factor. A yield of 5.5% has been suggested as acceptable for miscellaneous unvalued properties (Halcrow 2005) and this has been applied to obtain estimates for capital value of properties which are only given a rental value by the NPD. This gives the best approximation of the value of commercial properties without going into detail that is not appropriate for SMP level assessments.

$$\% \text{ yield} = (\text{Annual Rental Value} / \text{Capital Value}) \times 100$$

The benefits as calculated by the value of defended properties are only realised once the defences have reached the end of their useful life under a scenario of No Active Intervention. Using the analysis completed as part of the defence assessment (Task 2.1b) an average residual life was obtained for each section of defence. The residual life for the defences of each PDZ has been taken as the lowest average residual life of all the defence elements within that PDZ.

In general, the result of the assessment is conservative because it only includes benefits from the protection of properties, and does not include other benefits (risk to people, infrastructure, business, environment, etc.). This assumption is used in the conclusion whether the policies are viable.

For all calculations it has been assumed that Epoch 1 will commence on 1st January 2009. Epoch 1 therefore is from 2009 to 2025, Epoch 2 is from 2026 to 2055 and Epoch 3 is from 2056 to 2105. All values have been discounted back to present day values using current guidance and an optimism bias of 60% has been applied to all costs to reflect uncertainty (Appendix C SMP Guidance).

For PDZs where the policy is No Active Intervention and this is also the current management policy no assessment has been made as there are no flood and coastal risk management costs associated with these options.

H2.2 Assumptions

Several assumptions have been made regarding maintenance and replacement of defences and exactly when new defences will be constructed where they are required as part of Managed Realignment policies. This is only relevant for the Managed Realignment frontages and the Tendring (partly) and Southend frontages, because for these we've not been able to use information from existing strategies.

The assumptions are as follows:

- As there are a wide range of ages of defences on the Tendring peninsula assumptions were made where necessary (PDZs C1) regarding when they would need to be replaced under a Hold the Line policy. The linear defences extend for the entire length of the PDZ and due to the variation in age the following assumption was made. As the guidance suggests linear defences should be replaced once in every 100 years it has been assumed that there will be only one full replacement of defences in the SMP period. Due to the lack of knowledge on defence age this is assumed to occur at the mid point of the SMP period (2055), to spread the cost evenly. The groynes vary in date of construction from 1900 to 1986 and therefore it has been assumed that they currently require replacement under the SMP guidance methodology, which would occur in the first year of the SMP (2010), and every 30 years after that (2040, 2070 and 2100).
- For the Southend-on-Sea frontage (PDZ J1) on average the linear defences were constructed in the 1970s, therefore it has been assumed that all were built in 1975. Following the SMP Guidance on defence replacement they therefore should need replacement in 2075. There are 8.17 km of groynes along this frontage which were constructed between 1960 and 1980, the majority being built in 1970 or 1975. It has therefore been assumed that on average the groynes were built in 1970. Therefore it has been assumed that they currently require replacement under the SMP guidance methodology, which would occur in the first year of the SMP. There have been several beach recharge schemes implemented along this frontage; at Southend, Eastern Esplanade (2.1633 km) in 2002

and at Leigh Creek (0.17km) in 1993. It is assumed that these beach schemes will be continued and therefore following the guidance replacement would occur in 2043 and 2093 at Leigh Creek, and 2052 and 2102 at Southend. It may also be necessary to consider renourishment on the Westcliff frontage.

- For epoch 1 Managed Realignment policies it is assumed that the defences are breached in 2015 to allow sufficient time for adaptation and development of the scheme. For realignments in the later two epochs it is assumed that the defences will be breached in the first year of that epoch. It has also been assumed that any new defences required by Managed Realignment policies will be built in the same year as the defences are breached.
- As previously mentioned, the benefits taken into account in the SMP broad-scale assessment are conservative because the assessment only includes benefits from the protection of properties, and does not include other benefits (risk to people, infrastructure, business, environment, historic environment, agricultural land, etc.). It should be noted therefore that there are various costs and benefits that are not included in the assessment, these concern the impacts of loss of habitats, compensation of landowners, the impacts of loss of public footpaths and the impacts of loss or mitigation of heritage assets and their potential contribution to tourism and the local economy. Businesses such as caravans, golf courses, oyster fisheries and tourist facilities are also not included (apart from the value of associated commercial buildings). Benefits and costs for these features may be significant and it is essential that more detailed economic analysis is undertaken beyond the SMP in project appraisal and scheme development.
- The socio-economic value of realignment itself has also not been accounted for. It is likely that the value would vary greatly depending on the function of the habitat and its location. Furthermore there is very little information regarding attributing monetary values to realignment.
- The economic assessment undertaken by the strategies and studies named in H2.1 broadly includes the value of agricultural land as a benefit. This is not the case for the SMP broad scale assessment.
- The values and calculations of commercial properties are limited to the data contained within the National Property Dataset (2008) and the data within the different strategies.

These assumptions will generally underestimate both the costs and the benefits of the policies, so it is difficult to make general statements about their impact on the viability. Where relevant, the analysis per PDZ in section H3 includes location specific comments.

H2.3 Conclusions about viability

For each PDZ with a calculated benefit cost ratio, the report draws a conclusion about the viability of the policy: clearly viable, at least marginally viable or challenging. Generally speaking, the SMP uses the following bands:

- BCR higher than 4: clearly viable
- BCR between 1 and 4: at least marginally viable
- BCR under 1: challenging

However, the conclusion is also influenced by the source of information:

- If the BCR is based on broad-scale analysis carried out within the SMP, then the resulting number is conservative and the actual viability is likely to be better. This is also the case for the broad-scale economic analysis carried out for the Stour and Orwell Estuaries (Halcrow, 2007). In those cases, depending on the situation, the conclusion can be more positive. For example, it is then possible to conclude that the policy is likely to be marginally viable, even if the calculated BCR is lower than 1.
- On the other hand, if the BCR is based on detailed economic appraisal, then the resulting number is likely to be realistic, and the bands introduced above are used.

Finally, there are cases where the policy is assessed to be challenging, but there are unquantifiable benefits which are the main policy driver (and which will have to generate sources of funding for the policy). This can be the creation of intertidal habitats for proposed MR policies, or overriding land use issues (i.e. Ministry of Defence use) for HtL policies.

H3 ANALYSIS

This section outlines the results of the broad-scale economic assessment and the information from the strategies. Table H 1 gives a summary of the economic assessments carried out for each PDZ where there are defences. Table H 2 shows the supporting information and Table H 3 details the calculation of the costs associated with maintenance and replacement of defences. Finally, Table H 4 summarises the input, outcomes and conclusions.

H3.1 PDZ A1

The current expansion of the port constitutes a policy of Advance the Line, and therefore this is the policy for the first epoch. For the second and third epochs the policy for this frontage is to Hold the Line. The Southern Felixstowe Coastal Strategy: Strategy Appraisal Report (Environment Agency 2007) states that an option to improve the standard of protection to 1 in 200 years has a BCR of 93. The policy of advance the line is being promoted by the port authority and it is assumed to be economically viable. Therefore it

can be assumed that the overall policy for this frontage is clearly economically viable.

H3.2 PDZ A2

The policy for this frontage is to Hold the Line for the first epoch and then implement a policy of Managed Realignment in epoch 2. This frontage is discussed as part of the Southern Felixstowe Coastal Strategy: Strategy Appraisal Report (Environment Agency 2007). The environmental bund that separates Trimley Marsh from the port of Felixstowe (PDZ A1) was considered as part of the costs associated with defending the port. The strategy states that 'the Port of Felixstowe is obliged to maintain and reinstate this bund as long as they continue to operate on the current site'. Therefore once realigned there should be no costs associated with this PDZ.

The Strategy also states that there are no assets within Trimley Marsh and as such no benefits that can be used to justify protecting it. Therefore maintenance of the defences in epoch 1 and then realignment in epoch 2 would be economically challenging as there is no justification for maintaining the defences in epoch 1 (especially as they have an estimated residual life under No Active Intervention of 0-10 years). An assessment of the cost of maintaining these defences for epoch 1 following the SMP guidance gave a cost of £0.6m.

In reality, the defence protects the freshwater habitat and the coastal footpath, which have significant wider benefits. The high-level quantitative analysis cannot take these benefits into account, but they are taken into account in the SMP's decision making.

Even though the calculations show that the policy option is economically challenging there is an overriding legal responsibility to compensate for loss of intertidal habitats in the SMP area; see the Text box in section 3.1 of the main document.

H3.3 PDZ A3a

The policy for this frontage is to Hold the Line for epoch 1 and then implement a policy of Managed Realignment in epoch 2. Following this there will be no need for new defences so the policy for epoch 3 will be no active intervention. According to the SMP broad-scale economic assessment a cost of £157,000 would be incurred for maintaining the existing defence through epoch 1.

H3.4 PDZ A3b

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007). The preliminary assessment

of the benefit cost ratio (BCR) gave a value of 2.6 and confirms that the policy of Hold the Line is at least marginally economically viable.

H3.5 PDZ A4a

The policy for this frontage is for a form of Managed Realignment for all epochs. The intention is to allow local intervention to limit the erosion risk to assets as long as the impact on the natural development of the estuary is minimised.

An economic assessment of this policy has not been undertaken because the potential interventions and their benefits are not defined, and anyone wanting to intervene would carry out their own assessment of viability.

H3.6 PDZ A4b

There are currently no defences at this frontage and there is no intention for new defences to be built in the future. Therefore the policy for this frontage is the continuation of no active intervention for all epochs and hence an economic assessment is not required.

H3.7 PDZ A5

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Ipswich Flood Defence Management Strategy: Project Appraisal Report (Environment Agency 2005). The preferred policy for the strategy was of Hold the Line in the form of a barrier and improvement to defences downstream with a BCR of 8.2. Therefore it can be concluded that the policy of Hold the Line for this PDZ is clearly economically viable.

H3.8 PDZ A6

The policy for this frontage is for a form of Managed Realignment for all epochs. This will be implemented through an integrated plan for adaptation to be determined through a partnership approach. The road and 2 properties have been identified as being at risk from tidal flooding over the period of the SMP and protecting these may include some local defences.

An economic assessment of this policy has not been undertaken because the potential interventions and their benefits are not defined, and anyone wanting to intervene would carry out their own assessment of viability.

H3.9 PDZ A7a

There are currently no defences at this frontage and there is no intention for new defences to be built in the future. Therefore the policy for this frontage is the continuation of no active intervention for all epochs and hence an economic assessment is not required.

H3.10 PDZ A7b

The policy for this frontage is for a form of Managed Realignment for all epochs. There are no defences along this frontage at present however it may be necessary for some local defences in the future. There are 17 properties that will be at risk of tidal flooding at Pin Mill during the SMP period and 30 properties will be affected by erosion. Local defences in the future will be implemented through an integrated plan for adaptation to be determined through a partnership approach.

An economic assessment of this policy has not been undertaken because the potential interventions and their benefits are not defined, and anyone wanting to intervene would carry out their own assessment of viability.

H3.11 PDZ A8a

The policy for this frontage is for Managed Realignment in epoch 1 for the majority of the frontage with the requirement for a short length of new defence to the north which will be held for the remaining epochs. A broad-scale economic appraisal following the SMP guidance has been carried out for this policy and gave a BCR of only 0.04. There is only one property that generates benefits for the calculation. Therefore, the assessment concludes that the policy is likely to be economically challenging.

In reality, the defence protects freshwater habitat and the coastal footpath during the early part of epoch 1, which have significant wider benefits. The high-level quantitative analysis cannot take these benefits into account, but they are taken into account in the SMP's decision making.

Even though the calculations show that the policy option is economically challenging there is an overriding legal responsibility to compensate for loss of intertidal habitats in the SMP area; see the Text box in section 3.1 of the main document.

H3.12 PDZ A8b

The policy for this frontage is to Hold the Line for the first epoch and then implement a policy of Managed Realignment in epoch 2. A broad-scale economic appraisal following the SMP guidance has been carried out for this policy and gave a BCR of only 0.16. Therefore, despite the conservatism of the assessment, it can be concluded that the policy is likely to be economically challenging.

In reality, the defence protects freshwater habitat and the coastal footpath during epoch 1, which have significant wider benefits. The realignment would also require a short length of new defence to protect the marina and the

museum; again, these have significant wider benefits which the high-level quantitative analysis cannot take into account, but that do need to be included in the SMP's decision making.

Even though the calculations show that the policy option is economically challenging there is an overriding legal responsibility to compensate for loss of intertidal habitats in the SMP area; see the Text box in section 3.1 of the main document.

H3.13 PDZ A8c

The policy for this frontage is for a form of Managed Realignment for all epochs. There are no defences along this frontage at present however it may be necessary for some local defences in the future. There are 8 properties that have been identified to be at risk from erosion during the SMP period primarily in epoch 3. Local defences in the future will be implemented through an integrated plan for adaptation to be determined through a partnership approach.

An economic assessment of this policy option has not been undertaken as it is not possible to know when new defences will be required and therefore how much they may cost relative to the value of the assets they may protect.

H3.14 PDZ A9a,d,f

The policy for these frontages is to Hold the Line for all epochs. These frontages are covered in the Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007). This indicates that the policy is challenging as the preliminary BCR is only 0.5. It should be noted however that this is based on a strongly simplified assessment of viability. Therefore, at this stage the policy is likely to be marginally viable.

The existing defences protect the coastal footpath and other features with significant wider benefits. The high-level quantitative analysis cannot take these into account, but they do need to be included in the SMP's decision making.

H3.15 PDZ A9b

There are currently no defences at this frontage and there is no intention for new defences to be built in the future. Therefore the policy for this frontage is the continuation of no active intervention for all epochs and hence an economic assessment is not required.

H3.16 PDZ A9c,e

The policy for these frontages is for a form of Managed Realignment for all epochs. The intention is to allow local intervention to limit the erosion risk to assets as long as the impact on the natural development of the estuary is minimised.

An economic assessment of this policy has not been undertaken because the potential interventions and their benefits are not defined, and anyone wanting to intervene would carry out their own assessment of viability.

H3.17 PDZ A10a,c,e

The policy for these frontages is to Hold the Line for all epochs. These frontages are covered in the Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007). The preliminary assessment of the benefit cost ratio gave a value of 16 and confirms that the policy is clearly economically viable.

H3.18 PDZ A10b,g

There are currently no defences at these frontages and there is no intention for new defences to be built in the future. Therefore the policy for these frontages is the continuation of no active intervention for all epochs and hence an economic assessment is not required.

H3.19 PDZ A10d,f

The policy for these frontages is for a form of Managed Realignment for all epochs. The intention is to allow local intervention to limit the erosion risk to assets as long as the impact on the natural development of the estuary is minimised.

An economic assessment of this policy has not been undertaken because the potential interventions and their benefits are not defined, and anyone wanting to intervene would carry out their own assessment of viability.

H3.20 PDZ A11a

The current expansion of the port constitutes a policy of Advance the Line, and therefore this is the policy for the first epoch. For the second and third epochs the policy for this frontage is to Hold the Line. The Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007) gave a BCR for Hold the Line of 81. The policy of advance the line is being promoted by the port authority and it is assumed to be economically viable. Therefore it can be assumed that the overall policy for this frontage is clearly economically viable.

H3.21 PDZ A11b

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007) in the same flood management unit as PDZ A11a. The preliminary assessment of the benefit cost ratio gave a value of 81 and confirms that the policy of Hold the Line is clearly economically viable.

H3.22 PDZ B1

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Hamford Water Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009) and this indicates that the policy for this PDZ is clearly economically viable. The BCR for an option of sustain standard of protection was 44.5.

H3.23 PDZ B2 and B3

The policy for the B2 frontage is to Hold the Line for the first epoch and then implement a policy of Managed Realignment in epoch 2. For PDZ B3 the policy is to Hold the Line throughout all epochs. These frontages are considered together in the economic appraisal as they share one continuous floodzone. Therefore the defences all protect the same collection of assets and produce one joint set of benefits. A broad-scale economic appraisal following the SMP guidance has been carried out for these policies and gave a BCR of 1.57. Given the conservative nature of this assessment, it can be concluded that the policy is clearly economically viable.

H3.24 PDZ B3a

The policy for this frontage is to Hold the Line for the first two epochs and then implement a policy of Managed Realignment in epoch 3. A broad-scale economic appraisal following the SMP guidance has been carried out for this policy and gave a BCR of almost 0. The main cost concerns maintaining the defences during Epoch 1; there is only one property that generates benefits

for the calculation. Therefore, the assessment concludes that the policy is likely to be economically challenging.

In reality, the defence continues to protect freshwater habitat during epochs 1 and 2, which has significant wider benefits. The high-level quantitative analysis cannot take these benefits into account, but they are taken into account in the SMP's decision making.

Even though the calculations show that the policy option is economically challenging there is an overriding legal responsibility to compensate for loss of intertidal habitats in the SMP area; see the Text box in section 3.1 of the main document.

H3.25 PDZ B4a

The policy for this frontage is to allow the Managed Realignment that is already planned for epoch 1 to go ahead and then to implement a policy of hold the line at the realigned position in epochs 2 and 3. This scheme has already been accepted and therefore it can be assumed that the policy for this frontage is viable and no assessment of the economic viability is required.

H3.26 PDZ B4b

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Hamford Water Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009) and this indicates that the policy for this PDZ is at least marginally economically viable. The benefit cost ratio for sustaining the standard of protection (1:500) for the flood management unit in which this PDZ lies is 1.1.

H3.27 PDZ B5

The policy for this frontage is to Hold the Line for the first two epochs and then implement a policy of Managed Realignment in epoch 3. A broad-scale economic appraisal following the SMP guidance has been carried out for this policy and gave a BCR of 5.29. Therefore from this analysis it can be concluded that the policy is clearly economically viable.

H3.28 PDZ B6a

There are currently no defences at this frontage and there is no intention for new defences to be built in the future. Therefore the policy for this frontage is the continuation of no active intervention for all epochs and hence an economic assessment is not required.

H3.29 PDZ B6b

The policy for this frontage is for Managed Realignment in the form of foreshore protection slowing the rate of erosion. This will be implemented through a scheme currently proposed by Tendring District Council under the Coast Protection Act (CPA) 1949. The preferred option set out by the Naze Coastal Protection Scheme-Crag Walk Project Appraisal Report (Royal Haskoning 2009) is for a rock revetment at the base of the cliffs including an access road for maintenance and providing access to the cliff face for geological interpretation. The cliffs will slump, vegetate and stabilise as the erosion of the toe is prevented, although small scale vegetation clearance will be required to maintain the geological exposure.

The BCR for the preferred option of the Project Appraisal Report is 0.26 over an appraisal period of 50 years, and the scheme would require third party or local funding contributions. However the defence will protect the Naze Tower which has significant heritage and tourism and economic value which are considered intangible benefits by the Project Appraisal Report and not included within the calculation of the BCR.

H3.30 PDZ C1

The policy for this frontage is to Hold the Line for all epochs, there is currently no relevant strategy information for this PDZ and therefore a broad-scale economic review was conducted following the approach outline by the SMP guidance.

The broad-scale economic review has given a benefit-cost ratio of 1.69 and therefore, given the conservatism of the assessment, it can be concluded that the policy is clearly economically viable.

H3.31 PDZ C2

The policy for this frontage is to Hold the Line for the first two epochs and then have a dual policy in epoch 3 of either Hold the line or Managed realignment. A broad-scale economic appraisal following the SMP guidance has been carried out for the two policy options. This gave a BCR of 9.96 for Hold the Line throughout all epochs, and 8.55 for Managed Realignment in epoch 3. Therefore from this analysis it can be concluded that the policy is clearly economically viable, independent of the policy selected for epoch 3.

It should be noted that this high level economic analysis does not take into account the benefits or costs related to non-property features. In this case, this mainly concerns the golf course and the country park: the BCR does not include the benefits of protecting these in epochs 1 and 2, but neither does it include the costs related to the impact of the potential realignment in epoch 3.

H3.32 PDZ C3

The policy for this frontage is to Hold the Line for all epochs. The frontage was assessed by the Clacton-on-Sea Coast Protection Scheme Strategy Plan Summary Report (Posford Haskoning 2003). Although this strategy was not adopted by Tendring District Council it gives the best source of information on the economic viability of Holding the Line along this frontage.

The draft policy of the strategy was to Hold the Line through a combination of detached breakwaters, beach nourishment, terminal structures and refurbishment of the existing seawalls. With an appraisal period of 50 years this option had a BCR of 2.04 and sensitivity analysis was carried out on this option which showed that it is economically robust. Although the appraisal period does not match that of the SMP this is the best source of information on this frontage and far more appropriate than the broad-scale approach suggested by the guidance. Therefore from this information it can be concluded that the policy is at least marginally economically viable.

H3.33 PDZ C4

The draft policy for this frontage is to Hold the Line for epoch 1 and 2 with uncertainty regarding the policy for epoch 3. It may be the case that realignment occurs at some point in these later epochs and this will be determined as part of Tendring District Council's ongoing Local Development Framework process.

This frontage is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009) and this indicates that the policy for this PDZ is clearly economically viable. The two flood management units within the strategy have BCRs of 5.1 and 19.2 for the option to hold the line with limited raising of the defence crest.

H3.34 PDZ D1a and D1b

The policy for this frontage is a combination of Hold the Line and Managed Realignment. These PDZs are considered together in the economic appraisal as they share one continuous floodzone. Therefore the defences all protect the same collection of assets. A broad-scale economic appraisal following the SMP guidance has been carried out for the entire area for the policy of Hold the Line for the first epoch and then implementing a policy of Managed Realignment in epoch 2 for PDZ D1b.

The broad-scale economic appraisal gave a BCR of 3.60. Therefore from this analysis it can be concluded that the policy is clearly economically viable.

It should be noted that this high level economic analysis does not take into account the benefits or costs related to non-property features. In this case,

this mainly concerns the golf course: the BCR does not include the benefits of protecting this in Epoch 1, or the costs related to the impact of the realignment in Epoch 2.

H3.35 PDZ D2

The policy for this frontage is to Hold the Line for the first two epochs and then implement a policy of Managed Realignment in epoch 3. A broad-scale economic appraisal following the SMP guidance has been carried out for this policy and gave a BCR of 0.08. Therefore the assessment concludes that the policy is likely to be economically challenging.

In reality, the defence protects the freshwater habitat and part of the historic park and gardens, which have significant tourism benefits. This area is particularly important due to its landscape character and heritage. The economic analysis does not take account of the potential costs of the mitigation and recording needed in case of a realignment. The high-level quantitative analysis cannot take these benefits and costs into account, but they are taken into account in the SMP's decision making and reflected in the wording of the policy statement (see section 4 of the main document).

Even though the calculations show that the policy option is economically challenging there is an overriding legal responsibility to compensate for loss of intertidal habitats in the SMP area; see the Text box in section 3.1 of the main document.

H3.36 PDZ D3, D4, D5

The policy for this frontage is a combination of Hold the Line and Managed Realignment. These PDZs are considered together in the economic appraisal as they share one continuous floodzone. Therefore the defences all protect the same collection of assets. A broad-scale economic appraisal following the SMP guidance has been carried out for the entire area for the policy of Hold the Line for the first epoch and then implement a policy of Managed Realignment in epoch 2 for the two separate realignment areas of D3 and D5.

The broad-scale economic appraisal gave a BCR of 1.24 and therefore, given the conservatism of the assessment, it can be concluded that the policy is at least marginally viable.

H3.37 PDZ D6a and D6b

The policy for these PDZs is a combination of Hold the Line, No Active Intervention and Managed Realignment. They are considered together in the economic appraisal as they share one continuous floodzone. This floodzone is covered in the Colne and Blackwater Flood Risk Management Strategy

(Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b).

Under the SMP the policy for D6a is to Hold the Line for all epochs where there are defences and for no active intervention where there are not. For D6b the policy for this frontage is to Hold the Line for the first epoch and then implement a policy of Managed Realignment in epoch 2. The new defences will be built to maintain protection of assets to the south (D6a) and reinforcement of the railway bank which would become more exposed. The BCR for the combination of this option is 0.13. This is based on the benefits calculated by the strategy economics (RPA, 2009b) and costs of realignment based on the SMP broad-scale assessment.

H3.38 PDZ D7

The policy for this frontage is to Hold the Line for all epochs.

This concerns the Colne Barrier. The Environment Agency's team that manages the barrier have provided verbal information about the costs and benefits. It was constructed in 1993 for a 50-year life, and at the time the BCR was just over 4. Since then the number of properties protected by the barrier has increased.

Based on the asset managers' judgement, it is expected that holding the line is at least marginally viable. Further study beyond the SMP is needed to determine the viability of maintaining or upgrading the existing standard of protection.

H3.39 PDZ D8a

The policy for this frontage is to Hold the Line for epoch 1, undertake Managed Realignment in epoch 2 by actively breaching the defences and then implementing a policy of no active intervention. This frontage is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and gave a BCR of 0.2 for a policy of maintaining the level of defence. A broad-scale economic appraisal following the SMP guidance has reached a benefit cost ratio of 0.4. In the course of the SMP's public consultation, new information has become available indicating that the quarry operations at the gravel pit are projected to continue in the short to medium term up to around 2045. The strategy economics indicate that maintenance of the defences is unlikely to be justified after that time.

The outcome of both economic assessments and the assessment of strategic options currently support a policy of Managed Realignment followed by no active intervention from epoch 2 onwards. It can be concluded that the policy to carry out Managed realignment instead of No active intervention from epoch 2 is challenging but there are unquantifiable benefits.

A more detailed appraisal of the long economic viability of PDZ D8a will need to be completed before or as part of the next SMP review. This review may result in policy changes for this frontage.

H3.40 PDZ D8b

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and this indicates that the policy for this PDZ is at least marginally economically viable for part of this frontage between Marsh Cottage and South Geedon Creek (Colne and Blackwater FMU 35) with a policy of maintain level of defence having a BCR of 1.4. However, it is challenging for the remainder: the northern part of the frontage at Fingringhoe Wick (Colne and Blackwater FMU 36) has a BCR of 0.1, while the southern part of the frontage at Langenhoe Marsh (Colne and Blackwater FMU 34) has a BCR of 0.2.

The overall conclusion is that the policy for PDZ D8b is challenging. However, this does not take account of the unquantifiable benefits, which are mainly related to the use of the land by the MoD.

H3.41 PDZ D8c

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and this indicates that the policy for this PDZ is at least marginally economically viable. The BCR for a strategy to hold the line (by maintaining the defences with the standard of protection reducing from 1:500 to 1:100) has a BCR of 1.0.

H3.42 PDZ E1

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and this indicates that the policy for this PDZ is at least marginally economically viable. The BCR for a strategy to hold the line with limited raising of the defence crest has a BCR of 1.0.

H3.43 PDZ E2

The policy for this frontage is to Hold the Line for the first epoch and then implement a policy of Managed Realignment in epoch 2. A broad-scale economic appraisal following the SMP guidance has been carried out for this

policy and gave a BCR of 0 because of the absence of permanent property. In reality the BCR for the frontage is greater than 0. The defence protects tourism facilities and enterprises around Rewsalls Lane including a vineyard, a micro-brewery and associated facilities and accommodation.

The high-level quantitative analysis cannot take these benefits into account, but they are taken into account in the SMP's decision making. In addition the detailed choice of the new defence alignment will impact significantly upon the cost of this policy.

Even though the calculations show that the policy option is economically challenging there is an overriding legal responsibility to compensate for loss of intertidal habitats in the SMP area; see the Text box in section 3.1 of the main document.

H3.44 PDZ E3

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and this indicates that the policy for this PDZ is clearly economically viable. This unit is covered by three flood management units in the strategy all with BCRs above 20 for the option to hold the line with limited raising of the defence crest.

H3.45 PDZ E4a

The policy for this frontage is to Hold the Line for the first epoch and then implement a policy of Managed Realignment in epoch 2. A broad-scale economic appraisal following the SMP guidance has been carried out for this policy and gave a BCR of 5.63. Therefore from this analysis it can be concluded that the policy is clearly economically viable.

The policies (both Hold the line and Managed realignment) could have a range of impacts on the oyster fisheries in the area, either positive or negative. Oyster fisheries are very important for Mersea and its economy and supports several businesses including the tourist industry. These benefits are significant, but they can't be taken into account in the broad-scale assessment and will have to be assessed beyond the SMP in project appraisal and scheme development. There is also an overriding legal responsibility to compensate for loss of intertidal habitats in the SMP area; see the Text box in section 3.1 of the main document.

H3.46 PDZ E4b

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy

(Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and this indicates that the policy for this PDZ is at least marginally economically viable. The BCR for the strategy is 1.2 for the option to hold the line with limited raising of the defence crest.

H3.47 PDZ F1

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and this frontage is covered by three flood management units within the strategy. This information indicates that a policy of hold the line is at least marginally viable for part of the frontage; however two of the units have preferred strategy polices of no active intervention suggesting that overall the policy for this PDZ is likely to be economically challenging.

However, this does not take account of the unquantifiable benefits, which are mainly related to the freshwater habitats that the defences protect.

H3.48 PDZ F2, F3, F4

The policy for this frontage is a combination of Hold the Line and Managed Realignment. These PDZs are considered together in the economic appraisal as they share one continuous floodzone. Therefore the defences all protect the same collection of assets. A broad-scale economic appraisal following the SMP guidance has been carried out for the entire area for the policy of Hold the Line for the first epoch and then implementing a policy of Managed Realignment in epoch 3 for PDZ F3.

This area is particularly important due to its landscape character and heritage, especially for PDZ F3. The economic analysis does not take account of the potential costs of the mitigation and recording needed in the case of a realignment. The high-level quantitative analysis cannot take these benefits and costs into account, but they are taken into account in the SMP's decision making and reflected in the wording of the policy statement (see section 4 of the main document).

The broad-scale economic appraisal gave a benefit cost ratio of 0.69 and therefore, given the conservatism of the assessment, it can be concluded that the policy is at least marginally economically viable.

H3.49 PDZ F5

The policy for this frontage is to Hold the Line for the first epoch and then implement a policy of Managed Realignment in epoch 3. A broad-scale economic appraisal following the SMP guidance has been carried out for this policy and gave a BCR of 0.02. The high-level quantitative assessment returns a low BCR as only two properties are defended within this PDZ, while

it does require maintenance of existing defences during epochs 1 and 2 and then construction of a (much shorter) length as part of the realignment. Therefore, the assessment concludes that the policy is likely to be economically challenging.

Note that the Colne and Blackwater Flood Risk Management Strategy update (RPA, 2009b) shows that Hold the Line is also economically challenging, which is why the strategy update identifies a preferred strategy option of No Active Intervention for most of this PDZ.

Even though the calculations show that the policy option is economically challenging, there are unquantifiable benefits of creating intertidal habitats, in addition to legal responsibilities to compensate for loss of intertidal habitats due to coastal squeeze; see section 3.1 of the main document. This area is also particularly important due to its landscape character and heritage. The economic analysis does not take account of the potential costs of the mitigation and recording needed in the case of a realignment. The high-level quantitative analysis cannot take these benefits and costs into account, but they are taken into account in the SMP's decision making and reflected in the wording of the policy statement (see section 4 of the main document).

H3.50 PDZ F6

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and this indicates that the policy for this PDZ is clearly economically viable. The policy has a BCR of 43.7 for the option to hold the line with limited raising of the defence crest.

H3.51 PDZ F7

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and this indicates that the policy for this PDZ is clearly economically viable. This unit is covered by three flood management units in the strategy all with BCRs above 7.

H3.52 PDZ F8

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b) and this indicates that the overall policy for this PDZ is clearly economically viable. This unit is covered by two flood management units in the strategy one of which has a BCR of 96 for the option to hold the line with

limited raising of the defence crest whilst the other is a no active intervention frontage.

H3.53 PDZ F9a

The policy for this frontage is Hold the Line. This PDZ is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b - Draft) and is covered by three flood management units in the strategy all with BCRs above 10 for policies equivalent to hold the line. It can be concluded that the overall policy for this frontage is clearly economically viable.

H3.54 PDZ F9b

The policy for this frontage is Hold the Line. The defences of Northey Island are owned and managed by the private landowner. It is assumed that they will continue holding the line of defence for all epochs in this PDZ. Therefore an economic analysis has not been undertaken by the SMP.

H3.55 PDZ F10

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b - Draft) and this indicates that the policy for this PDZ is clearly economically viable. The preferred policy from the strategy has a BCR of 10.1 for the option to hold the line with limited raising of the defence crest.

H3.56 PDZ F11 and F12

The policy for this frontage is a combination of Hold the Line, No Active Intervention and Managed Realignment. These PDZs are considered together in the economic appraisal as they share one continuous floodzone and as such are considered as occupying the same floodcell. Therefore the defences all protect the same collection of assets. A broad-scale economic appraisal following the SMP guidance has been carried out for the entire area for the policy of Hold the Line for the first epoch in all areas except for F11b. The policy for PDZ F11b is no active intervention for all epochs, while, a policy of Managed Realignment in epoch 3 is proposed within F12.

The broad-scale economic appraisal gave a benefit cost ratio 0.62 and therefore, given the conservatism of the assessment, it can be concluded that the policy is at least marginally economically viable

It should be noted that this high level economic analysis does not take into account the benefits or costs related to non-property features. In this case, these mainly concern the caravan park: the BCR does not include the

benefits of protecting these in epochs 1 and 2, or the costs related to the impact of the realignment in epoch 3.

H3.57 PDZ F13 and F14

The policy for this frontage is a combination of Hold the Line and Managed Realignment. These PDZs are considered together in the economic appraisal as they share one continuous floodzone. Therefore the defences all protect the same collection of assets. A broad-scale economic appraisal following the SMP guidance has been carried out for the entire area for the policy of Hold the Line in F13 and implementing a policy of Managed Realignment in epoch 2 for the area within F14. Once this realignment has occurred the new alignment of defences will be held for the remainder of the epochs.

The broad-scale economic appraisal gave a benefit cost ratio of 4.11 and therefore, given the conservatism of the assessment, it can be concluded that the policy is clearly economically viable.

PDZ F13 is also covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b - Draft) and this indicates that the policy for this PDZ is clearly economically viable. The preferred policy from the strategy of Maintain (1:500 reducing to 1:200) has a BCR of 11.

H3.58 PDZ F15

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b - Draft) and this indicates that the policy for this PDZ is clearly economically viable. The preferred policy from the strategy has a BCR of 3.8 for the option to hold the line with limited raising of the defence crest.

H3.59 PDZ G1

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007). The economics for this strategy was updated recently (RPA, 2009b - Draft) and this indicates that the policy for this PDZ is challenging. The preferred policy from the strategy is for no active intervention as the BCR for a policy of maintain the level of defence was only 0.7.

In reality, the defence protects St. Peter's chapel, the coastal footpath and other features which have significant wider benefits. The high-level quantitative analysis cannot take these benefits into account, but they are taken into account in the SMP's decision making.

H3.60 PDZ G2 and G3

The policy for these frontages is to Hold the Line for all epochs, they are classed as separate PDZs due to a counterwall that divides the flood zone at the Howe Outfall. They are covered in the Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) as one unit. The economics for this strategy was updated recently (RPA, 2009b - Draft) and this indicates that the policies for these PDZs are at least marginally economically viable. The preferred policy from the strategy for maintaining the defence has a benefit cost ratio of 1.6.

This unit is also covered by the Dengie to Burnham-on-Crouch Pre-Feasibility Study (Atkins 2009), which indicates that the policies for these PDZs are clearly economically viable.

H3.61 PDZ H1

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). The economic analysis from this strategy indicates that the policy for this PDZ is clearly economically viable. This unit is covered by two flood management units in the strategy, one of which has a BCR of 15 for sustaining the standard of protection, while the other has a BCR of 1.9 for improving it.

H3.62 PDZ H2a and H2b

The policy for this frontage is a combination of Hold the Line and Managed Realignment. These PDZs are considered together in the economic appraisal as they share one continuous floodzone. Therefore the defences all protect the same collection of assets. A broad-scale economic appraisal following the SMP guidance has been carried out for the entire area for the policy of Hold the Line for the first epoch and then implementing a policy of Managed Realignment in epoch 2 for the realignment area of H2a and in epoch 3 for the realignment area of H2b.

The broad-scale economic appraisal gave a benefit cost ratio of 0.69 and therefore the assessment concludes that the policy is at least marginally economically viable.

Note that the calculation is based on the (probably conservative) assumption that new embankments would be constructed in front of the existing railway embankments. As far as the benefits are concerned, the defence protects freshwater habitat and the coastal footpath during epoch 1, which have significant wider benefits. The high-level quantitative analysis cannot take these benefits into account, but they are taken into account in the SMP's decision making.

H3.63 PDZ H3

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). The economic analysis from this strategy indicates that the policy for this PDZ is challenging. The BCR from the strategy for sustaining the standard of protection (1:10) is 0.17.

In reality, the defence protects the freshwater habitat and the coastal footpath, which have tourism benefits. The high-level quantitative analysis can't take these benefits into account, but they are taken into account in the SMP's decision making. In addition, its location in the upper estuary means that realignment in this PDZ could have negative impacts further downstream.

H3.64 PDZ H4

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). The economic analysis from this strategy indicates that the policy for this PDZ is clearly economically viable. Note that this conclusion is based on adding up the costs and benefits of 6 strategy units, and some of these are likely to be challenging. The overall BCR for sustaining the standard of protection is 20.7.

H3.65 PDZ H5

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). The economic analysis from this strategy indicates that the policy for this PDZ is clearly economically viable. The BCR for the preferred policy of improve the standard of protection (1:100) was 34.1.

H3.66 PDZ H6, H7 and H8

The policy for this frontage is a combination of Hold the Line and Managed Realignment. These PDZs are considered together in the economic appraisal as they share one continuous floodzone. Therefore the defences all protect the same collection of assets. A broad-scale economic appraisal following the SMP guidance has been carried out for the entire area for the policy of Hold the line for all epochs for the frontage except for Managed Realignment in epoch 2 at H8b.

The broad-scale economic appraisal gave a benefit cost ratio of 0.41 and therefore the assessment concludes that the policy is likely to be economically challenging.

Note that the Roach and Crouch strategy calculates that holding the line would be viable within the strategy timeframe of the coming 50 years. The key driver for realignment of H8b is the pressure on the defences, which is expected to increase in the long term.

Even though the calculations show that the policy option is economically challenging there is an overriding legal responsibility to compensate for loss of intertidal habitats in the SMP area; see the Text box in section 3.1 of the main document.

H3.67 PDZ H9

There are currently no defences at this frontage and there is no intention for new defences to be built in the future. Therefore the policy for this frontage is the continuation of no active intervention for all epochs and hence an economic assessment is not required.

H3.68 PDZ H10

The policy for this frontage is to allow the Managed Realignment scheme that is currently being developed to go ahead in epoch 1 and then to hold the new defence alignment for the latter epochs. As this scheme already has approval it is assumed that it is viable and therefore no economic assessment is necessary.

H3.69 PDZ H11a, b

The policy for this frontage is a combination of Hold the Line and Managed Realignment. PDZs H11a and H11b are considered together in the economic appraisal as they share one continuous floodzone. Therefore the defences all protect the same collection of assets. A broad-scale economic appraisal following the SMP guidance has been carried out for the entire area for the policy of Managed Realignment in epoch 2 at H11a and H11b. The remainder of the frontages (outside the realignment areas) will have a policy of Hold the line throughout all 3 epochs.

The broad-scale economic appraisal gave a benefit cost ratio of 0.41; this is because of the need to construct new defences over a relatively long length, similar to the existing defence length. Therefore the assessment concludes that the policy is likely to be economically challenging.

Note that in reality the landward location of the new line is likely to lead to lower construction costs than assumed in the high level method, and also to significantly lower maintenance costs than with the current alignment.

Even though the calculations show that the policy option is economically challenging, there are unquantifiable benefits of creating intertidal habitats, in addition to legal responsibilities to compensate for loss of intertidal habitats

due to coastal squeeze; see the Text box in section 3.1 of the main document.

H3.70 PDZ H12

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). The economic analysis from this strategy indicates that the policy for this PDZ is at least marginally economically viable. The BCR for sustaining the standard of protection is 1.4.

H3.71 PDZ H13

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). The economic analysis from this strategy indicates that the policy for this PDZ is clearly economically viable. The BCR for sustaining the standard of protection is 65.2.

H3.72 PDZ H14

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). This unit is covered by two flood management units in the strategy, which both have BCRs greater than 8 for policies of sustain the current standard of protection. Therefore the policy for this frontage is clearly economically viable.

H3.73 PDZ H15

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). The BCR calculated by the strategy for a policy of sustain the current standard of protection was 20. Therefore the policy for this frontage is clearly economically viable.

H3.74 PDZ H16

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). This unit is covered by three flood management units in the strategy, the overall BCR for a policy of sustain the current standard of protection for this frontage using the information from the strategy is 18, therefore the policy for this frontage is clearly economically viable.

H3.75 PDZ I1a

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). The BCR for a policy of sustain standard of protection was 1.4. The strategic option was to maintain the flood defences in the short term while alternative more sustainable options are developed for the long term. Therefore it can be assumed that the policy for this frontage is at least marginally economically viable.

H3.76 PDZ I1b

The policy for this frontage is to Hold the Line for all epochs and this is covered in the Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006). The most economically robust option from the strategy for this unit was No Active Intervention, while the preferred strategic option was to maintain the existing flood defence in the short-term, while alternative long-term hydrodynamically sustainable solutions are developed. It can be concluded that the policy of Hold the Line is challenging, but there are unquantifiable benefits.

However, this does not take account of the unquantifiable benefits, which are mainly related to the use of the land by the MoD.

H3.77 PDZ I1c

The policy for this frontage is to Hold the Line for the first two epochs and then implementing Managed Realignment for epoch 3. The most economically robust option from the strategy for this unit was No Active Intervention, whilst the preferred strategic option was to maintain the existing flood defences in the short-term, while alternative long-term sustainable solutions are developed. The island has no residential properties hence there are no quantifiable benefits. According to the SMP broad-scale assessment there would be a cost of £1.7 million for maintaining the defences on epoch 1 and epoch 2. It can be concluded that the policy for this PDZ is challenging, but there are unquantifiable benefits of creating intertidal habitats, in addition to legal responsibilities to compensate for loss of intertidal habitats due to coastal squeeze; see the Text box in section 3.1 of the main document.

H3.78 PDZ J

The policy for this frontage is to Hold the Line for all epochs. This frontage is covered by the Southend-on-Sea Shoreline Strategy Plan (1997) which considers a 50 year appraisal period. Within the Strategy the PDZ is subdivided into 6 units with an average BCR of 6.9 for maintaining the defences. It can be concluded that the policy is clearly economically viable from this analysis.

H4 REFERENCES

Atkins (2009) Dengie to Burnham on Crouch Pre-Feasibility Study

Environment Agency (2005) Ipswich Flood Defence Management Strategy: Project Appraisal Report.

Environment Agency (2006) Roach and Crouch Flood Management Strategy: Project Appraisal Report

Environment Agency (2007) Southern Felixstowe Coastal Strategy: Strategy Appraisal Report.

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Halcrow (2007) Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review.

RPA (2009) Hamford Water Estuary Strategy: Economic Appraisal

RPA (2009) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (DRAFT)

Mouchel (1997) Southend-on-Sea Shoreline Strategy – Volume 1

Table H 1: Economic Assessment Summary per Policy Development Zone

This table provides the summary of the broad-scale assessment undertaken. It outlines the present value (PV) costs and the present value (PV) benefits to calculate the BCRs which are ultimately use to determine the viability of the policies. This table does not cover the PDZs for which the economic viability assessment has been based on available strategy information.

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ A2	Trimley Marsh	Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow 2007) Southern	<p><u>NAI Damages:</u> By 2025: none By 2055: none By 2105: none</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £0.6m	Current defences partially removed. No new defences required as environmental bund protects the Port of Felixstowe and the town. Cost: £0	The policy for this frontage effectively becomes No Active Intervention Cost: £0	The plan for this frontage is challenging as there are no assets to justify maintaining the defences in epoch 1.

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
		Felixstowe Coastal Strategy: Strategy Appraisal Report (Environment Agency 2007)		The plan for this Policy Development Zone is challenging .			
PDZ A3a	Loom Pit Lake		<p><u>NAI Damages:</u> By 2025: none By 2055: none By 2105: none</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	<p>Continuing maintenance of existing defences to sustain current standard of protection. Cost: £1.7m</p>	<p>Current defences partially removed. No new defences required. Cost: £0</p>	<p>The policy for this frontage effectively becomes No Active Intervention Cost: £0</p>	<p>The plan for this frontage is challenging as there are no assets to justify maintaining the defences in epoch 1.</p>
				The plan for this Policy Development Zone is challenging .			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ A8a	Shotley Marshes west	Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow 2007)	<p><u>NAI Damages:</u> By 2025: none By 2055: up to £0.25m By 2105: up to £0.25m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £2.0 m	New defences constructed to protect Clamp House as current defences partially removed. Cost: £0.9m	Continuing maintenance of new defences to sustain current standard of protection. Cost: £0.7m	This PP has a BCR of BCR of 0.04.
				The plan for this Policy Development Zone is challenging . The PVbenefits amount to £0.1m by 2105 whereas the PVcosts amount to £2.1m.			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ A8b	Shotley Marshes east	Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow 2007)	<p>NAI Damages: By 2025: none By 2055: up to £3.4m By 2105: up to £3.5m</p> <p>Managed Realignment Damages: By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £0.7m	New defences constructed to protect Old Hall Cott, Oldhall Road and Shotley Gate as current defences partially removed. Continuing maintenance of other existing defences. Cost: £9.7m	Continuing maintenance of defences to sustain current standard of protection. Cost: £2.2m	This PP has a BCR of 0.16.
				The plan for this Policy Development Zone is challenging The PVbenefits amount to £1.2m by 2105 whereas the PVcosts amount to £7.4m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ B2 and B3	Little Oakley and Little Oakley to Kirby-le-Soken	Hamford Water Flood Risk Management Strategy (Halcrow 2007) Hamford Water Estuary Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: up to £63.1m By 2055: up to £68.8m By 2105: up to £99.0m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £4.6m	New defences constructed to protect Harwich and the Great Oakley Works as current defences partially removed. Continuing maintenance of other existing defences. Cost: £88.2m	Continuing maintenance of defences to sustain current standard of protection. Cost: £21.2m	This PP has a BCR of 1.57
				The plan for this Policy Development Zone is clearly economically viable . The PVbenefits amount to £50.1m 2105 whereas the PVcosts amount to £31.9m.			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ B3a	Horse Island	Hamford Water Flood Risk Management Strategy (Halcrow 2007) Hamford Water Estuary Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: up to £1,500 By 2055: up to £1,500 By 2105: up to £1,500</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £1.7m	New defences constructed to protect the rest of Horse Island as current defences partially removed. Continuing maintenance of other existing defences. Cost: £30.9m	Continuing maintenance of defences to sustain current standard of protection. Cost: £11.0m	The broad-scale economic review gives a BCR of 0 for this PP.
				The plan for this Policy Development Zone is challenging . The PVbenefits amount to £0.001m by 2105 whereas the PVcosts amount to £11.8m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ B5	Walton Channel	Hamford Water Flood Risk Management Strategy (Halcrow 2007) Hamford Water Estuary Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: up to £77.9m By 2055: up to £86.8m By 2105: up to £123.8m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £1.6m	Continuing maintenance of defences to sustain current standard of protection. Cost: £17.2m	New defences constructed to protect Walton on the Naze and the sewage works at The Naze as current defences partially removed. Continuing maintenance of other existing defences. Cost: £18.5m	This PP has a BCR 5.29 based on the broad-scale assessment.
				The plan for this Policy Development Zone is clearly economically viable . The PVbenefits amount to £53.7m by 2105 whereas the PVcosts amount to £10.1m.			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ C1	Walton-on-the-Naze and Frinton-on-Sea	No data currently available	<p><u>NAI Damages:</u> By 2025: up to £64.6m By 2055: up to £72.1m By 2105: up to £126.6m</p> <p><u>Hold the Line Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Replacement of groynes in this epoch. Cost: £9.0m	Continuing maintenance of existing defences to sustain current standard of protection. Replacement of groynes and linear defence replaced in this epoch. Cost: £56.1m	Continuing maintenance of existing defences to sustain current standard of protection. Replacement of groynes in this epoch. Continuing maintenance of existing defences to sustain current standard of protection. Groynes in this epoch. Cost: £43.7m	This PP has a BCR of 1.69

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
				The plan for this Policy Development Zone is clearly economically viable . The PVbenefits amount to £52.1m by 2105 whereas the PVcosts amount to £30.9m			
PDZ C2 (MR2 epoch 3)	Holland-on-Sea	No data currently available	<p><u>NAI Damages:</u> By 2025: up to £71.3m By 2055: up to £79.0m By 2105: up to £100.5m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £0.6m	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £1.7m	New defences constructed to protect Frinton-on-Sea and Holland-on-Sea as current defences partially removed. Continuing maintenance of other existing defences Cost: £23.0m	This PP has a BCR of 8.55.

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
				The plan for this Policy Development Zone is clearly economically viable . The PVbenefits amount to £55.2m by 2105 whereas the PVcosts amount to £6.5m			
PDZ C2 (HTL all epochs)	Holland-on-Sea	No data currently available	<p><u>NAI Damages:</u> By 2025: up to £71.3m By 2055: up to £79.0m By 2105: up to £100.5m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £0.6m	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £16.6m	Continuing maintenance of defences to sustain current standard of protection. Cost: £4.0m	This PP has a BCR of 9.96.
				The plan for this Policy Development Zone is clearly economically viable . The PVbenefits amount to £55.2m by 2105 whereas the PVcosts amount to £5.5m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ D1a and D1b	Stone Point	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: up to £91.0m By 2055: up to £96.0m By 2105: up to £98.0m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £1.4m	New defences constructed to protect Point Clear as current defences partially removed. Continuing maintenance of other existing defences. Cost: £39.6m	Continuing maintenance of defences to sustain current standard of protection. Cost: £9.5m	This PP has a BCR of 3.60.
				The plan for this Policy Development Zone is clearly economically viable . The PVbenefits amount to £54.7m by 2105 whereas the PVcosts amount to £15.2m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ D2	Along the southern bank of Flag Creek	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: up to £1.1m By 2055: up to £1.3m By 2105: up to £1.5m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £1.2m	Continuing maintenance of defences to sustain current standard of protection. Cost: £18.8m	New defences constructed to protect St Osyth Park as current defences partially removed. Continuing maintenance of other existing defences. Cost: £13.5m	This PP has a BCR of 0.08
				The plan for this Policy Development Zone is challenging . The PVbenefits amount to £0.7m by 2105 whereas the PVcosts amount to £8.9m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ D3, D4 and D5	Brightlingsea	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: up to £56.2m By 2055: up to £56.2m By 2105: up to £91.7m</p> <p><u>Managed Realignment and Hold the Line Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £4.6m	New defences constructed to protect Brightlingsea and its only access road (B1029) as current defences partially removed. Continuing maintenance of other existing defences. Cost: £82.9m	Continuing maintenance of defences to sustain current standard of protection. Cost: £19.9m	This PP has a BCR of 1.24
				The plan for this Policy Development Zone is at least marginally economically viable . The PVbenefits amount to £38.0m by 2105 whereas the PVcosts amount to £30.8m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ D6a and D6b	South of Wivenhoe	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2105: up to £1.42 m (based on RPA 2009)</p> <p><u>Managed Realignment and Hold the Line Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £0.51m	New defences constructed to protect assets to the south and reinforce the railway bank. Continuing maintenance of other existing defences. Cost: £6.14m	Continuing maintenance of defences. Cost: £6.61m	This PP has a BCR of 0.13
				The plan for this Policy Development Zone not viable. The PVbenefits amount to £1.42m by 2105 whereas the PVcosts amount to £10.6m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
D8a	Inner Colne west bank	Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: none By 2055: none By 2105: none</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	<p>Continuing maintenance of existing defences to sustain current standard of protection. Cost: £0.5m</p> <p>The plan for this Policy Development Zone is challenging.</p>	Current defences partially removed. No new defences required. Cost: £0	The policy for this frontage effectively becomes No Active Intervention Cost: £0	This PP has a BCR of 0.4; this is conservative because it excludes the economic value of the quarry protected through epoch 1.

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ E2	Seaward frontage between North Barn and West Mersea	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: none By 2055: none By 2105: none</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £0.9m	New defences constructed to protect caravan park and youth camp as current defences partially removed. Continuing maintenance of other existing defences. Cost: £20.2m	Continuing maintenance of defences to sustain current standard of protection. Cost: £4.9m	This PP has a BCR of 0 both caravan park and youth camp not listed by national property database and therefore no benefits
				The plan for this Policy Development Zone is challenging . The PVbenefits amount to £0 by 2105 whereas the PVcosts amount to £3.4m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ E4a	North Mersea (Strood Channel)	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: none By 2055: up to £19.2m By 2105: up to £29.9m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £0.5m	New defences constructed to protect West Mersea as current defences partially removed. Continuing maintenance of other existing defences. Cost: £1.6m	Continuing maintenance of defences to sustain current standard of protection. Cost: £0.4m	This PP has a BCR of 5.63.
				The plan for this Policy Development Zone is clearly economically viable . The PVbenefits amount to £7.3m by 2105 whereas the PVcosts amount to £2.0m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ F2, F3 and F4	Salcott-cum-Virley to Tollesbury	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: up to £26.8m By 2055: up to £29.1m By 2105: up to £32.0m</p> <p><u>Managed Realignment and Hold the Line Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £4.4m	Continuing maintenance and replacement of defences to sustain current standard of protection. Cost: £53.7m	New defences constructed to protect Salcott cum Virley, Tollesbury, isolated properties and roads as current defences partially removed. Continuing maintenance of other existing defences. Cost: £20.9m	This PP has a BCR of 0.69
				The plan for this Policy Development Zone is at least marginally economically viable . The PVbenefits amount to £15.4 by 2105 whereas the PVcosts amount to £22.5m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ F5	Tollesbury Wick Marshes to Goldhanger	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p>NAI Damages: By 2025: up to £0.5m By 2055: up to £0.5m By 2105: up to £0.5m</p> <p>Managed Realignment Damages: By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £2.8m.	Continuing maintenance and replacement of defences to sustain current standard of protection. Cost: £37.2m	New defences constructed to protect Tollesbury Marina and isolated properties as current defences partially removed. Continuing maintenance of other existing defences. Cost: £16.8m	This PP has a BCR of 0.02
				The plan for this Policy Development Zone is challenging . The PVbenefits amount to £0.3m by 2105 whereas the PVcosts amount to £15.9m.			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ F11 and F12	Mayland Creek and Steeple	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: up to £2.7m By 2055: up to £4.9m By 2105: up to £41.8m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. cost of £2.2m	Continuing maintenance of defences to sustain current standard of protection. Cost: £35.1m	New defences constructed to protect Mayland and isolated properties as current defences partially removed. Continuing maintenance of other existing defences. Cost: £10.5m	This PP has a BCR of 0.62
				The plan for this Policy Development Zone is at least marginally economically viable . The PVbenefits amount to £8.3m by 2105 whereas the PVcosts amount to £13.2m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ F13 and F14	St. Lawrence to Bradwell-on-Sea	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2006) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	<p><u>NAI Damages:</u> By 2025: up to £80.8m By 2055: up to £88.9m By 2105: up to £117.5m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £2.3m.	New defences constructed to protect Ramsey Island and Beacon Hill Leisure Park as current defences partially removed. Continuing maintenance of other existing defences. Cost: £42.0m	Continuing maintenance of defences to sustain current standard of protection. Cost: £10.1m	This PP has a BCR of 4.11
				The plan for this Policy Development Zone is clearly economically viable . The PVbenefits amount to £62.3m by 2105 whereas the PVcosts amount to £15.2m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ H2a and H2b	From Burnham on Crouch to North Fambridge	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	<p><u>NAI Damages:</u> By 2025: up to £20.0m By 2055: up to £21.5m By 2105: up to £26.8m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £4.1m.	New defences constructed to protect Althorne Station, North Fambridge and the railway line as current defences partially removed. Continuing maintenance of other existing defences. Cost: £34.0m	Continuing maintenance of defences to sustain current standard of protection. Cost: £44.9m	This PP has a BCR of 0.69
				The plan for this Policy Development Zone is at least marginally economically viable . The PVbenefits amount to £15.1m by 2105 whereas the PVcosts amount to £22.0m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ H6, H7 and H8	Landward of Brandy Hole Reach to Canewdon	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	<p><u>NAI Damages:</u> By 2025: up to £18.4m By 2055: up to £20.9m By 2105: up to £26.0m</p> <p><u>Managed Realignment and Hold The Line Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £3.8m.	New defences constructed to protect Ashingdon and numerous isolated properties as current defences partially removed. Continuing maintenance of other existing defences. Cost: £76.8m	Continuing maintenance of defences to sustain current standard of protection. Cost: £18.5m	This PP has a BCR of 0.41
				The plan for this Policy Development Zone is challenging . The PVbenefits amount to £12.3m by 2105 whereas the PVcosts amount to £30.2m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ H11	Paglesham Creek	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	<p><u>NAI Damages:</u> By 2025: up to £21.0m By 2055: up to £21.0m By 2105: up to £21.6m</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	Continuing maintenance of existing defences to sustain current standard of protection. Cost: £2.7m.	New defences constructed to protect Paglesham Churchend and Paglesham Eastend as current defences partially removed. Continuing maintenance of other existing defences. Cost: £60.7m	Continuing maintenance of defences to sustain current standard of protection. Cost: £14.6m	This PP has a BCR of 0.41
				The plan for this Policy Development Zone is challenging . The PVbenefits amount to £11.6m by 2105 whereas the PVcosts amount to £28.7m			

Location		Calculation of Damages and Benefits		Assumed Defence Works & Costs			Comments
				Broad-Scale Economic Review			
		Previous Studies	Broad-scale Review (this SMP)	Epoch 1 (2009 to 2025)	Epoch 2 (2025 to 2055)	Epoch 3 (2055 to 2105)	
PDZ 11c	Rushley		<p><u>NAI Damages:</u> By 2025: none By 2055: none By 2105: none</p> <p><u>Managed Realignment Damages:</u> By 2025: none By 2055: none By 2105: none</p>	<p>Continuing maintenance of existing defences to sustain current standard of protection. Cost: £1.7m</p>	<p>Current defences partially removed. No new defences required. Cost: £0</p>	<p>The policy for this frontage effectively becomes No Active Intervention Cost: £0</p>	<p>The plan for this frontage is challenging as there are no assets to justify maintaining the defences in epoch 1.</p>
			<p>The plan for this Policy Development Zone is challenging.</p>				

Table H 2 Supporting Economic Data – Summary Table per Policy Development Zone

This table presents the calculated damages for each PDZ based on the information provided by the National Property Database. This table also presents the calculated defence costs per epoch with the 60% optimism bias. These costs and damages were used for the broad-scale economic assessment. This table does not cover the PDZs for which the economic viability assessment has been based on available strategy information.

Policy Unit	Epoch	Asset Value Loss Per Epoch (Damages) (£)		Cumulative Property Damage/Loss (PV) (£)		Management Cost Per Epoch (Draft Plan) ¹	Draft Plan	
		NAI	Draft Plan	NAI	Draft Plan		Property Damages Averted (PV)	Costs (PV) ² (£)
PDZ A3a	1	0	-	0	-	557,286	-	-
	2	0	-	0	-	0	-	-
	3	0	-	0	-	0	-	-
PDZ A8a	1	0	-	0	-	2,028,960	0	1,682,395
	2	250,028	-	84,361	-	907,200	84,361	273,637
	3	0	-	0	-	777,600	0	113,266
PDZ A8b	1	0	-	0	-	657,978	0	594,997
	2	3,350,028	-	1,130,322	-	9,673,232	1,130,322	6,291,920
	3	122,500	-	1,148,165	-	2,199,970	17,844	515,992
PDZ B2 and B3	1	63,093,120	-	43,471,529	-	4,568,240	43,471,529	3,518,651
	2	5,740,026	-	45,666,694	-	88,221,600	2,195,165	25,322,357
	3	30,148,632	-	50,058,193	-	21,173,184	4,391,499	3,084,122

¹ Including 60% Optimism Bias

² Including 60% Optimism Bias

Policy Unit	Epoch	Asset Value Loss Per Epoch (Damages) (£)		Cumulative Property Damage/Loss (PV) (£)		Management Cost Per Epoch (Draft Plan) ¹	Draft Plan	
		NAI	Draft Plan	NAI	Draft Plan		Property Damages Averted (PV)	Costs (PV) ² (£)
PDZ B3a	1	1,500	-	1,034	-	1,743,520	1,034	1,342,933
	2	0	-	0	-	30,859,200	0	8,502,790
	3	0	-	0	-	11,048,832	0	1,958,472
PDZ B5	1	77,928,139	-	44,941,618	-	1,572,976	44,941,618	1,211,573
	2	8,850,847	-	48,326,459	-	17,208,000	3,384,840	4,941,285
	3	37,070,696	-	53,726,237	-	18,513,792	5,399,778	3,944,614
PDZ C1	1	64,573,371	-	42,135,426	-	9,008,960	42,135,426	8,065,822
	2	7,527,122	-	45,014,032	-	56,066,400	2,878,606	16,714,107
	3	54,451,333	-	52,129,611	-	43,703,040	7,115,579	6,126,400
PDZ C2 (MR epoch 3)	1	71,296,042	-	49,123,391	-	626,960	49,123,391	482,911
	2	7,753,206	-	52,088,459	-	1,663,200	2,965,068	636,060
	3	21,455,698	-	55,213,731	-	23,018,688	3,125,272	5,340,016
PDZ C2 (HTL all epochs)	1	71,296,042	-	49,123,391	-	626,960	49,123,391	482,911
	2	7,753,206	-	52,088,459	-	16,632,000	2,965,068	4,479,097
	3	21,455,698	-	55,213,731	-	3,991,680	3,125,272	581,435
PDZ D1a and D1b	1	90,974,545	-	52,465,558	-	1,425,280	52,465,558	1,097,842
	2	5,017,747	-	54,384,501	-	39,204,000	1,918,943	12,728,810
	3	1,971,940	-	54,671,737	-	9,408,960	287,236	1,370,525
PDZ D2	1	1,144,419	-	659,993	-	1,156,000	659,993	890,400
	2	121,127	-	706,316	-	18,806,400	46,323	5,212,915
	3	193,725	-	734,534	-	13,526,784	28,128	2,775,906

Policy Unit	Epoch	Asset Value Loss Per Epoch (Damages) (£)		Cumulative Property Damage/Loss (PV) (£)		Management Cost Per Epoch (Draft Plan) ¹	Draft Plan	
		NAI	Draft Plan	NAI	Draft Plan		Property Damages Averted (PV)	Costs (PV) ² (£)
PDZ D3, D4 and D5	1	57,203,367	-	32,989,520	-	4,608,496	32,989,520	3,549,656
	2	0	-	32,989,520	-	82,944,000	0	24,303,814
	3	34,677,873	-	38,040,756	-	19,906,560	5,051,236	2,899,622
PDZ D8a	1	0	-	0	-	458,818	-	-
	2	0	-	0	-	0	-	-
	3	0	-	0	-	0	-	-
PDZ E2	1	0	-	0	-	884,000	0	680,894
	2	0	-	0	-	20,246,400	0	6,955,582
	3	0	-	0	-	4,859,136	0	707,790
PDZ E4a	1	0	-	0	-	484,160	0	372,920
	2	19,155,415	-	5,726,126	-	1,605,600	5,726,126	866,586
	3	10,733,544	-	7,289,592	-	385,344	1,563,466	56,130
PDZ F2, F3 and F4	1	25,129,253	-	14,492,189	-	4,357,712	14,492,189	3,356,493
	2	1,778,215	-	15,172,234	-	53,519,200	680,045	11,263,742
	3	1,779,354	-	15,431,418	-	20,888,064	259,184	14,045,625
PDZ F5	1	510,623	-	294,479	-	2,805,408	294,479	2,160,843
	2	0	-	294,479	-	37,166,400	0	10,475,029
	3	0	-	294,479	-	16,844,544	0	3,223,373

Policy Unit	Epoch	Asset Value Loss Per Epoch (Damages) (£)		Cumulative Property Damage/Loss (PV) (£)		Management Cost Per Epoch (Draft Plan) ¹	Draft Plan	
		NAI	Draft Plan	NAI	Draft Plan		Property Damages Averted (PV)	Costs (PV) ² (£)
PDZ F11 and F12	1	2,660,388	-	2,049,143	-	2,244,000	2,049,143	1,728,423
	2	2,208,876	-	2,893,886	-	35,100,000	844,743	9,758,080
	3	36,898,245	-	8,268,545	-	10,475,136	5,374,659	1,758,546
PDZ F13 and F14	1	80,755,030	-	55,640,689	-	2,282,080	55,640,689	1,757,754
	2	8,181,023	-	58,086,241	-	41,976,000	2,445,552	11,927,437
	3	28,605,728	-	62,252,998	-	10,074,240	4,166,757	1,467,431
PDZ H2a and H2b	1	20,017,501	-	13,792,175	-	2,891,360	13,792,175	2,227,048
	2	1,490,303	-	14,362,114	-	34,034,400	569,938	10,026,872
	3	5,332,880	-	16,138,910	-	44,865,792	776,796	9,784,362
PDZ H6, H7, H8	1	18,448,682	-	10,639,464	-	3,756,320	10,639,464	2,893,275
	2	2,433,191	-	11,569,992	-	76,824,000	930,528	24,661,099
	3	5,152,617	-	13,320,531	-	18,437,760	750,539	2,685,675
PDZ H11	1	21,048,713	-	12,138,917	-	2,660,160	12,138,917	2,048,968
	2	0	-	12,138,917	-	60,696,000	0	24,523,314
	3	524,078	-	12,215,255	-	14,567,040	76,338	2,121,858

Table H 3 Supporting Economic Data – Defence Cost Calculations per Policy Development Zone

This table presents the defence costs calculations for the broad-scale assessment based on the SMP guidance. This table does not cover the PDZs for which the economic viability assessment has been based on available strategy information.

Policy Unit	Epoch	Replacement				Maintenance				Total cost (£)			PV Costs (£)		
		Length (km)			Cost (£) ⁵	Length (km)			Cost (£) ⁵	Total Cost	With Optimism Bias (60%)	Cumulative Total	PV Total	With Optimism Bias (60%)	Cumulative PV Total
		B	L	G		B	L	G							
A3a	1	0.00	0.00	0.00	0.00	0.00	0.750	0.00	127,500	127,500	204,000	204,000	98,206	157,130	157,130
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	204,000	0	0	157,130
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	204,000	0	0	157,130
PDZ A8a	1	0.00	0.36	0.00	972,000	0.00	4.47	0.00	296,100	1,268,100	2,028,960	2,028,960	1,051,497	1,682,395	1,682,395
	2	0.00	0.09	0.00	364,500	0.00	0.45	0.00	202,500	567,000	907,200	2,936,160	171,023	273,637	1,956,032
	3	0.00	0.00	0.00	0	0.00	0.45	0.00	486,000	486,000	777,600	3,713,760	70,791	113,266	2,069,298
PDZ A8b	1	0.00	0.00	0.00	0	0.00	2.55	0.00	433,500	433,500	693,600	693,600	371,873	594,997	594,997
	2	0.00	1.76	0.00	7,128,000	0.00	1.76	0.00	792,000	7,920,000	12,672,000	13,365,600	3,932,450	6,291,920	6,886,917
	3	0.00	0.00	0.00	0	0.00	1.76	0.00	1,900,800	1,900,800	3,041,280	16,406,880	322,495	515,992	7,402,909
PDZ B2 and B3	1	0.00	0.00	0.00	0	0.00	16.80	0.00	2,855,150	2,855,150	4,568,240	4,568,240	2,199,157	3,518,651	3,518,651
	2	0.00	12.25	0.00	49,624,650	0.00	12.25	0.00	5,513,850	55,138,500	88,221,600	92,789,840	15,826,473	25,322,357	28,841,008
	3	0.00	0.00	0.00	0	0.00	12.25	0.00	13,233,240	13,233,240	21,173,184	113,963,024	1,927,576	3,084,122	31,925,130
PDZ B3b	1	0.00	0.00	0.00	0	0.00	6.41	0.00	1,089,700	1,089,700	1,743,520	1,743,520	839,333	1,342,933	1,342,933
	2	0.00	4.05	0.00	16,402,500	0.00	6.41	0.00	2,884,500	19,287,000	30,859,200	32,602,720	5,314,244	8,502,790	9,845,723
	3	0.00	0.39	0.00	2,106,000	0.00	4.44	0.00	4,799,520	6,905,520	11,048,832	43,651,552	1,224,045	1,958,472	11,804,195
PDZ B5	1	0.00	0.00	0.00	0	0.00	5.78	0.00	983,110	983,110	1,572,976	1,572,976	757,233	1,211,573	1,211,573
	2	0.00	2.01	0.00	8,152,650	0.00	5.78	0.00	2,602,350	10,755,000	17,208,000	18,780,976	3,088,303	4,941,285	6,152,858
	3	0.00	1.45	0.00	7,830,000	0.00	3.46	0.00	3,741,120	11,571,120	18,513,792	37,294,768	2,496,634	3,994,614	10,147,472
PDZ C1	1	0.00	0.00	5.99	3,594,000	0.00	5.99	5.99	2,036,600	5,630,600	9,008,960	9,008,960	5,041,139	8,065,822	8,065,822
	2	0.00	5.99	5.99	29,650,500	0.00	5.99	5.99	5,391,000	35,041,500	56,066,400	65,075,360	10,446,317	16,714,107	24,779,930
	3	0.00	0.00	11.98	14,376,000	0.00	5.99	5.99	12,938,400	27,314,400	43,703,040	108,778,400	3,829,000	6,126,400	30,906,330

Policy Unit	Epoch	Replacement				Maintenance				Total cost (£)			PV Costs (£)		
		Length (km)			Cost (£) ⁵	Length (km)			Cost (£) ⁵	Total Cost	With Optimism Bias (60%)	Cumulative Total	PV Total	With Optimism Bias (60%)	Cumulative PV Total
		B	L	G		B	L	G							
PDZ C2 (MR)	1	0.00	0.00	0.00	0	0.00	2.31	0.00	391,850	391,850	626,960	626,960	301,819	482,911	482,911
	2	0.00	2.22	0.00	0	0.00	2.31	0.00	1,039,500	1,039,500	1,663,200	2,290,160	397,537	636,060	1,118,971
	3	0.00	2.22	0.00	11,988,000	0.00	2.22	0.00	2,398,680	14,386,680	23,018,688	25,308,848	3,337,510	5,340,016	6,458,986
PDZ C2 (HTL)	1	0.00	0.00	0.00	0	0.00	2.31	0.00	391,850	391,850	626,960	626,960	301,819	482,911	482,911
	2	0.00	2.31	0.00	9,355,500	0.00	2.31	0.00	1,039,500	10,395,000	16,632,000	17,258,960	2,799,436	4,479,097	4,962,008
	3	0.00	0.00	0.00	0	0.00	2.31	0.00	2,494,800	2,494,800	3,991,680	21,250,640	363,397	581,435	5,543,443
PDZ D1a and b	1	0.00	0.00	0.00	0	0.00	5.24	0.00	890,800	890,800	1,425,280	1,425,280	686,151	1,097,842	1,097,842
	2	0.00	5.45	0.00	22,052,250	0.00	5.45	0.00	2,450,250	24,502,500	39,204,000	40,629,280	7,955,506	12,728,810	13,826,651
	3	0.00	0.00	0.00	0	0.00	5.45	0.00	5,880,600	5,880,600	9,408,960	50,038,240	856,578	1,370,525	15,197,176
PDZ D2	1	0.00	0.00	0.00	0	0.00	4.25	0.00	722,500	722,500	1,156,000	1,156,000	556,500	890,400	890,400
	2	0.00	2.43	0.00	9,841,500	0.00	4.25	0.00	1,912,500	1,754,000	18,806,400	19,962,400	3,258,072	5,212,915	6,103,315
	3	0.00	0.90	0.00	4,860,000	0.00	3.33	0.00	3,594,240	8,454,240	13,526,784	33,489,184	1,734,941	2,775,906	8,879,221
PDZ D3, D4 and D4	1	0.00	0.00	0.00	0	0.00	16.94	0.00	2,880,310	2,880,310	4,608,496	4,608,496	2,218,535	3,549,656	3,549,656
	2	0.00	11.52	0.00	46,656,000	0.00	11.52	0.00	5,184,000	51,840,000	82,944,000	87,552,496	15,189,884	24,303,814	27,853,470
	3	0.00	0.00	0.00	0	0.00	11.52	0.00	12,441,600	12,441,600	19,906,560	107,459,056	1,812,264	2,899,622	30,753,093
PDZ D6a and D6b	1	0.00	0.00	0.00	0.00	0.00	3.92	0.00	666,400	666,400	1,066,240	1,066,240	513,289	821,262	513,289
	2	0.00	2.98	0.00	12,069,000	0.00	2.98	0.00	1,341,000	13,410,000	21,456,000	2,252,224	5,626,812	9,002,899	6,140,101
	3	0.00	0.00	0.00	0.00	0.00	2.98	0.00	3,218,400	3,218,400	5,149,440	2,7671,680	468,798	750,077	6,608,899
D8a	1	0.00	0.00	0.00	0.00	0.00	2.19	0.00	372,300	372,300	595,680	595,680	286,761	458,818	458,818
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	595,680	0.00	0.00	458,818
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	595,680	0.00	0.00	458,818
PDZ E2	1	0.00	0.00	0.00	0	0.00	3.25	0.00	522,500	522,500	884,000	884,000	425,559	680,894	680,894
	2	0.00	2.81	0.00	11,388,600	0.00	2.81	0.00	1,265,400	12,654,000	20,246,400	21,130,400	4,347,239	6,955,582	7,636,477
	3	0.00	0.00	0.00	0	0.00	2.81	0.00	3,036,960	3,036,960	4,859,136	25,989,536	422,369	707,790	8,344,267
PDZ E4a	1	0.00	0.00	0.00	0	0.00	1.78	0.00	302,600	302,600	484,160	484,160	233,075	372,920	372,920
	2	0.00	0.22	0.00	903,150	0.00	0.22	0.00	100,350	1,003,500	1,605,600	2,089,760	541,616	866,586	1,239,506
	3	0.00	0.00	0.00	0	0.00	0.22	0.00	240,840	240,840	385,344	2,475,104	35,081	56,130	1,295,635

Policy Unit	Epoch	Replacement				Maintenance				Total cost (£)			PV Costs (£)		
		Length (km)			Cost (£) ⁵	Length (km)			Cost (£) ⁵	Total Cost	With Optimism Bias (60%)	Cumulative Total	PV Total	With Optimism Bias (60%)	Cumulative PV Total
		B	L	G		B	L	G							
PDZ F2, F3 and F4	1	0.00	0.00	0.00	0	0.00	16.02	0.00	2,723,570	2,723,570	4,357,712	4,357,712	2,097,808	3,356,493	3,356,493
	2	0.00	6.51	0.00	26,365,500	0.00	16.02	0.00	7,209,000	33,574,500	53,719,200	58,076,912	9,525,934	15,241,494	18,597,987
	3	0.00	0.93	0.00	5,022,000	0.00	7.44	0.00	8,033,040	13,055,040	20,888,064	78,964,976	2,421,883	3,875,012	22,472,999
PDZ F5	1	0.00	0.00	0.00	0	0.00	10.31	0.00	1,753,380	1,753,380	2,805,408	2,805,408	1,350,527	2,160,843	2,160,843
	2	0.00	4.59	0.00	18,589,500	0.00	10.31	0.00	4,639,500	23,229,000	37,166,400	39,971,808	6,546,893	10,475,029	7,897,420
	3	0.00	0.86	0.00	4,644,000	0.00	5.45	0.00	5,883,840	10,527,840	16,844,544	56,816,352	2,014,608	3,223,373	8,619,494
PDZ F11 and F12	1	0.00	0.00	0.00	0	0.00	8.25	0.00	1,402,500	1,402,500	2,244,000	2,244,000	1,080,265	1,728,423	1,728,423
	2	0.00	4.50	0.00	18,225,000	0.00	8.25	0.00	3,712,500	21,937,500	35,100,000	37,344,000	6,098,800	9,758,080	11,486,503
	3	0.00	0.26	0.00	1,404,000	0.00	4.76	0.00	5,142,960	6,546,960	10,475,136	47,819,136	1,099,091	1,758,546	13,245,049
PDZ F13 and F14	1	0.00	0.00	0.00	0	0.00	8.39	0.00	1,426,300	1,426,300	2,282,080	2,282,080	1,098,596	1,757,754	1,757,754
	2	0.00	5.83	0.00	23,611,500	0.00	5.83	0.00	2,623,500	6,235,000	41,976,000	44,258,080	7,454,648	1,927,437	13,685,192
	3	0.00	0.00	0.00	0	0.00	5.83	0.00	6,296,400	6,296,400	10,074,240	54,332,320	917,144	1,467,431	15,152,622
PDZ H2a and H2b	1	0.00	0.00	0.00	0	0.00	10.63	0.00	1,807,100	1,807,100	2,891,360	2,891,360	1,391,905	2,227,048	2,227,048
	2	0.00	4.19	0.00	16,953,300	0.00	9.60	0.00	4,318,200	21,271,500	34,034,400	36,925,760	6,266,795	10,026,872	12,253,920
	3	0.00	3.63	0.00	19,602,000	0.00	7.81	0.00	8,439,120	28,041,120	44,865,792	81,791,552	6,115,226	9,784,362	22,038,282
PDZ H6, H7, H8	1	0.00	0.00	0.00	0	0.00	13.81	0.00	2,347,700	2,347,700	3,756,320	3,756,320	1,808,297	2,893,275	2,893,275
	2	0.00	10.67	0.00	43,213,500	0.00	10.67	0.00	4,801,500	48,015,000	76,824,000	80,580,320	15,413,187	24,661,099	27,554,374
	3	0.00	0.00	0.00	0	0.00	10.67	0.00	11,523,600	11,523,600	18,437,760	99,018,080	1,678,547	2,685,675	30,240,049
PDZ H11	1	0.00	0.00	0.00	0	0.00	9.78	0.00	1,662,600	1,662,600	2,660,160	3,693,760	1,280,605	2,048,968	2,845,090
	2	0.00	8.43	0.00	34,141,500	0.00	8.43	0.00	3,793,500	37,935,000	60,696,000	64,389,760	15,327,071	24,523,314	27,368,403
	3	0.00	0.00	0.00	0	0.00	8.43	0.00	9,104,400	9,104,400	14,567,040	77,923,200	1,326,161	2,121,858	28,694,140
I1c	1	0.00	0.00	0.00	0.00	0.00	3.54	0.00	601,800	601,800	962,880	962,880	463,532	741,651	741,651
	2	0.00	0.00	0.00	0.00	0.00	3.54	0.00	1,593,000	1,593,000	2,548,800	3,511,680	609,213	974,741	1,716,392
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3,511,680	0	0	1,716,392

Table H 4 Summary of conclusions

This Table lists the benefit cost ratios, the policies and the viability conclusions for each Policy Development Zone (PDZ).

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
A1	AtL	HtL	HtL	Southern Felixstowe Coastal Strategy: Strategy Appraisal Report (Environment Agency 2007)	93.0	Clearly viable
A2	HtL	MR2	HtL	Southern Felixstowe Coastal Strategy: Strategy Appraisal Report (Environment Agency 2007) SMP guidance broad-scale assessment	0	Challenging (but there are unquantifiable benefits)
A3a	HtL	MR2	NAI	Southern Felixstowe Coastal Strategy: Strategy Appraisal Report (Environment Agency 2007) SMP guidance broad-scale assessment	0	Challenging (but there are unquantifiable benefits)
A3b	HtL	HtL	HtL	Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007)	2.6	At least marginally viable
A4a	MR1	MR1	MR1	No assessment needed		
A4b	NAI	NAI	NAI	N/A	N/A	N/A
A5	HtL	HtL	HtL	Ipswich Flood Defence Management Strategy: Project Appraisal Report (Environment Agency 2005).	8.2	Clearly viable
A6	MR1	MR1	MR1	No assessment needed		
A7a	NAI	NAI	NAI	N/A	N/A	N/A
A7b	MR1	MR1	MR1	No assessment needed		
A8a	MR2	HtL	HtL	SMP guidance broad-scale assessment	0.04	Challenging (but there are unquantifiable benefits)

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
A8b	HtL	MR2	HtL	SMP guidance broad-scale assessment	0.2	Challenging (but there are unquantifiable benefits)
A8c	MR1	MR1	MR1	No assessment needed		
A9a, d, f	HtL	HtL	HtL	Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007).	0.5	Marginally viable
A9b	NAI	NAI	NAI	N/A	N/A	N/A
A9c, e	MR1	MR1	MR1	No assessment needed		
A10a, c, e	HtL	HtL	HtL	Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007).	16.0	Clearly viable
A10b, g	NAI	NAI	NAI	N/A	N/A	N/A
A10d, f	MR1	MR1	MR1	No assessment needed		
A11a	AtL	HtL	HtL	Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007).	81.0	Clearly viable
A11b	HtL	HtL	HtL	Stour and Orwell Estuaries Flood Risk Management Study Preliminary Strategic Review (Halcrow, 2007).	81.0	Clearly viable
B1	HtL	HtL	HtL	Hamford Water Flood Risk Management Strategy (Halcrow 2007) Hamford Water Estuary Strategy: Economic Appraisal (RPA 2009)	44.5	Clearly viable
B2	HtL	MR2	HtL	SMP guidance broad-scale assessment	1.6	Clearly viable
B3	HtL	HtL	HtL	SMP guidance broad-scale assessment	1.6	Clearly viable
B3a	HtL	HtL	MR2	SMP guidance broad-	0	Challenging

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
				scale assessment		
B4a	MR2	HtL	HtL	This scheme has already been accepted and therefore it can be assumed that the policy for this frontage is viable and no assessment of the economic viability is required.	N/A	Assumed viable
B4b	HtL	HtL	HtL	Hamford Water Flood Risk Management Strategy (Halcrow 2007) Hamford Water Estuary Strategy: Economic Appraisal (RPA 2009)	1.1	At least marginally viable
B5	HtL	HtL	MR2	SMP guidance broad-scale assessment	5.3	Clearly viable
B6a	NAI	NAI	NAI	N/A	N/A	N/A
B6b	MR1	MR1	MR1	The Naze Coastal Protection Scheme-Crag Walk Project Appraisal Report (Royal Haskoning 2009)	0.3	Challenging (but there are unquantifiable benefits)
C1	HtL	HtL	HtL	SMP guidance broad-scale assessment	1.7	Clearly viable
C2	HtL	HtL	MR2/ HTL	SMP guidance broad-scale assessment	8.6 / 10.0	Clearly viable
C3	HtL	HtL	HtL	Clacton-on-Sea Coast Protection Scheme Strategy Plan Summary Report (Posford Haskoning 2003).	2.0	At least marginally viable
C4	HtL	HtL	MR2 / HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	5.1 and 19.2 (2 flood units)	Clearly viable
D1a	HtL	HtL	HtL	SMP guidance broad-scale assessment	3.6	Clearly viable
D1b	HtL	MR2	HtL	SMP guidance broad-scale assessment	3.6	Clearly viable

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
D2	HtL	HTL	MR2	SMP guidance broad-scale assessment	0.08	Challenging (but there are unquantifiable benefits)
D3	HtL	MR2	HtL	SMP guidance broad-scale assessment	1.2	At least marginally viable
D4	HtL	HtL	HtL	SMP guidance broad-scale assessment	1.2	At least marginally viable
D5	HtL	MR2	HtL	SMP guidance broad-scale assessment	1.2	At least marginally viable
D6a	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009) SMP guidance broad-scale assessment	0.1	Challenging (but there are unquantifiable benefits)
D6b	HtL	MR2	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009) SMP guidance broad-scale assessment	0.1	Challenging (but there are unquantifiable benefits)
D7	HtL	HtL	HtL	Environment Agency Asset Systems Management team information and judgement		At least marginally viable
D8a	HtL	MR2	NAI	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	0.4	Challenging (but there are unquantifiable benefits)

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
D8b	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	1.4, 0.1 and 0.2	Challenging (but there are unquantifiable benefits)
D8c	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	1.0	At least marginally viable
E1	HtL	HtL	HTL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	1.2	At least marginally viable
E2	HtL	MR2	HtL	SMP guidance broad-scale assessment	0	Challenging (but there are unquantifiable benefits)
E3	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	>20.0	Clearly viable
E4a	HtL	MR2	HtL	SMP guidance broad-scale assessment	5.6	Clearly viable
E4b	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	1.2	At least marginally viable
F1	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management	4.5, 0.8	Challenging (but there are

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
				Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	and 0.3	unquantifiable benefits)
F2	HtL	HtL	HtL	SMP guidance broad-scale assessment	0.7	At least marginally viable
F3	HtL	HtL	MR2	SMP guidance broad-scale assessment	0.7	At least marginally viable
F4	HtL	HtL	HtL	SMP guidance broad-scale assessment	0.7	At least marginally viable
F5	HtL	HtL	MR2	SMP guidance broad-scale assessment	0.02	Challenging (but there are unquantifiable benefits)
F6	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	43.7	Clearly viable
F7	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	>7	Clearly viable
F8	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	96.0	Clearly viable
F9	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater	>10	Clearly viable

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
				Flood Risk Management Strategy: Economic Appraisal (RPA 2009)		
F9a	HtL	HTL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	>10	Clearly viable
F9b	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	>10	Clearly viable
F10	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	10.1	Clearly viable
F11a	HtL	HtL	HtL	SMP guidance broad-scale assessment	0.6	At least marginally viable
F11b	NAI	NAI	NAI	N/A	N/A	N/A
F11c	HtL	HtL	HtL	SMP guidance broad-scale assessment	0.6	At least marginally viable
F12	HtL	HtL	MR2	SMP guidance broad-scale assessment	0.6	At least marginally viable
F13	HtL	HtL	HtL	SMP guidance broad-scale assessment	4.1	Clearly viable
F14	HtL	MR2	HtL	SMP guidance broad-scale assessment	4.1	Clearly viable
F15	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management	3.8	Clearly viable

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
				Strategy: Economic Appraisal (RPA 2009)		
G1	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009)	0.7	Challenging (but there are unquantifiable benefits)
G2	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009) the Dengie to Burnham-on-Crouch Pre-Feasibility Study (Atkins 2009)	1.6	At least marginally viable
G3	HtL	HtL	HtL	Colne and Blackwater Flood Risk Management Strategy (Halcrow 2007) Colne and Blackwater Flood Risk Management Strategy: Economic Appraisal (RPA 2009) the Dengie to Burnham-on-Crouch Pre-Feasibility Study (Atkins 2009)	1.6	At least marginally viable
H1	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	15 and 1.9	Clearly viable
H2a	HtL	MR2	HtL	SMP guidance broad-scale assessment	0.7	At least marginally viable
H2b	HtL	HtL	MR2	SMP guidance broad-scale assessment	0.7	At least marginally viable

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
H3	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	0.2	Challenging (but there are unquantifiable benefits)
H4	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	20.7	Clearly viable
H5	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	34.1	Clearly viable
H6	HtL	HtL	HtL	SMP guidance broad-scale assessment	0.4	Challenging
H7	HtL	HtL	HtL	SMP guidance broad-scale assessment	0.4	Challenging
H8a	HtL	HtL	HtL	SMP guidance broad-scale assessment	0.4	Challenging
H8b	HtL	MR2	HtL	SMP guidance broad-scale assessment	0.4	Challenging
H9	NAI	NAI	NAI	N/A	N/A	N/A
H10	MR2	HtL	HtL	As this scheme already has approval it is assumed that it is viable and therefore no economic assessment is necessary.	N/A	N/A
H11a	HtL	MR2	HtL	SMP guidance broad-scale assessment	0.4	Challenging
H11b	HtL	MR2	HTL	SMP guidance broad-scale assessment	0.4	Challenging
H12	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	1.4	At least marginally viable

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
H13	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	65.2	Clearly viable
H14	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	2 units >8	Clearly viable
H15	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	20.0	Clearly viable
H16	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	18.0	Clearly viable
I1a	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	1.4	At least marginally viable
I1b	HtL	HtL	HtL	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	0.08	Challenging (but there are unquantifiable benefits)
I1c	HtL	HtL	MR2	Roach and Crouch Flood Management Strategy: Project Appraisal Report (Environment Agency 2006)	N/A	Challenging (but there are unquantifiable benefits)

PDZ	Policy			Information Source	BCR	Conclusion
	Now - 2025	2025 - 2055	2055 - 2105			
J1	HtL	HtL	HtL	Southend-on-Sea Shoreline Strategy Plan (1997)	6.9 (50yr)	Clearly viable